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**Date** May 4, 2021 **Report No.** 2021-113

**To** Chair and Members  
Committee of the Whole – Operations and Administration

**From** Inderjit Hans, P. Eng., PMP  
General Manager, Public Works Commission

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## 1.0 Type of Report

Consent Item ☒ [X]  
Item For Consideration ☐ [ ]

## 2.0 Topic **Wastewater Operations 2020 Annual Summary Report** **[Financial Impact – None]**

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## 3.0 Recommendation

THAT Report 2021-113 titled “Wastewater Operations 2020 Annual Summary Report”, BE RECEIVED.

## 4.0 Executive Summary

Wastewater Operations completes a summary report for Council on an annual basis to highlight activities of the past year. The report provides an overview and analysis of the Treatment, Maintenance and Compliance sections of the division as well as key performance indicators, the status of capital projects and planned activities for the upcoming year.

In 2020, Wastewater Operations was able to maintain current operations with only slight modifications throughout the COVID-19 pandemic period. Performance at the Brantford Wastewater Treatment Plant (WWTP) continued to be in compliance with all regulatory requirements and was also able to achieve more stringent voluntary targets for the Grand River watershed.

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Wastewater Maintenance ensured the continued operation and performance of equipment and infrastructure within the wastewater facilities. Wastewater Compliance was able to modify the existing approach to monitoring major dischargers within the sanitary sewer system. Current relationships with industry were leveraged to allow for on-going monitoring for compliance with the Sewer Use By-law.

## **5.0 Purpose and Overview**

The purpose of this report is to update Council about the activities of the Wastewater Operations division which includes the Treatment, Maintenance and Compliance sections for the period of January 1st to December 31st, 2020.

## **6.0 Background**

All wastewater produced by the City of Brantford's approximate 98,000 residents and industrial, commercial and institutional (ICI) properties is conveyed to the Brantford Wastewater Treatment Plant (WWTP) via nine (9) Wastewater Pumping Stations (WWPS) and gravity trunk sewers within the City's wastewater collection system.

The WWTP (originally commissioned in 1960) is a conventional activated sludge plant (primary and secondary treatment). Treated effluent is discharged to the Grand River. Biosolids generated at the WWTP is land applied as a soil conditioner. The nine (9) wastewater pumping stations (WWPS) were built in the 60 years since the WWTP was commissioned and are located throughout the City.

Owners of municipal wastewater treatment plants in Ontario are required to complete annual reports for the Ministry of the Environment, Conservation and Parks (MECP). Wastewater Operations staff submitted the annual report to the MECP before the March 31<sup>st</sup> deadline. Although not required by the MECP, Wastewater Operations also completes a summary report to Council on an annual basis.

## **7.0 Corporate Policy Context**

The Wastewater Operations 2020 Annual Summary Report documents how the division's activities are in line with Council's desired outcome of "The City is mitigating its environmental footprint and adapting to climate change" by:

- Using the tools within the Sewer-use Bylaw to work with local industries to reduce their impact on the WWTP;
- Maintaining all equipment, as needed to ensure the WWPS and WWTP can operate to their full capabilities;
- Achieving stringent voluntary targets from the WWTP to reduce the impact on the Grand River and ultimately Lake Erie; even under high flow events.

## **8.0 Input From Other Sources**

Staff from the Environmental Services and Financial Analysis Departments were consulted in the development of the Wastewater Operations 2020 Annual Summary Report.

## **9.0 Analysis**

The City of Brantford's Wastewater Operations Annual Summary Report provides Council with a divisional update on an annual basis. This report summarizes activities of the division as well as other key areas. Following a key retirement, a restructuring of the division occurred and three (3) separate sections (Treatment, Maintenance and Compliance) were created. The report is broken down into the following sections:

- Wastewater Treatment
- Wastewater Maintenance
- Wastewater Compliance
- Key Performance Indicators
- Capital Projects
- Planned 2021 Activities

### **9.1 Wastewater Treatment**

Wastewater Treatment is responsible for the day-to-day operations of the WWTP and assumes all regulatory responsibility of the wastewater facilities (WWTP and WWPS).

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### **9.1.1 Performance**

Municipal wastewater treatment facilities in Ontario are required to be in compliance with effluent limits issued by the MECP. The City has also committed to meeting more stringent effluent voluntary targets for nitrogen and phosphorous through the Grand River Watershed-wide Wastewater Optimization Program (GRWWOP). Reduction in nitrogen and phosphorous levels in the effluent is beneficial in improving the Grand River and the Lake Erie ecosystem. Municipalities in the GRWWOP utilize optimization principles to make best use of their resources with a goal of achieving improved performance. The program also provides technical assistance to municipalities requiring additional support.

In 2020, the City was in compliance with all MECP Environmental Compliance Approval (ECA) effluent limits and achieved the GRWWOP voluntary targets in all 12 months. The City will continue to strive to achieve the voluntary targets and maintain compliance in the future. In November 2020, the City was recognized by the WWOP for their efforts in 2019 by meeting the criteria for Silver as part of the WWOP Recognition Program.

### **9.1.2 Wastewater Flows**

Wastewater flows vary seasonally and are typically higher in the spring. High flows increase pressure on pumping capacities at the WWPS and treatment processes at the WWTP.

The average and maximum daily flows to the plant for each month in 2020 are compared to the plant's rated capacity and trended in Figure 1.

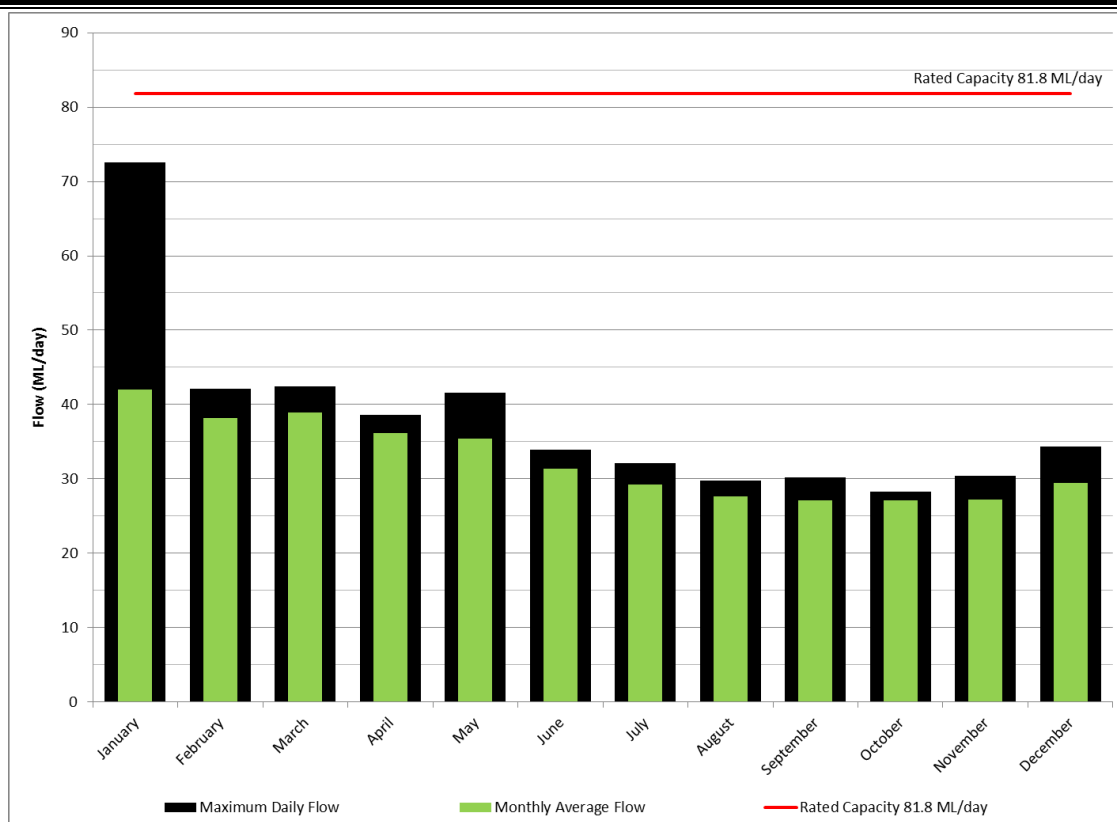


Figure 1 - 2020 Monthly Average and Maximum Daily Flows Compared to the Rated Capacity

The maximum flow day in 2020 occurred on January 13, when the Grand River water levels increased significantly due to snow melt and rain fall. By the time on-call Operations staff arrived, considerable amount of water from the Grand River entered the WWTP through the bypass line. Since then, a redundant early warning system for river levels to alert Operators has been installed. Also, a 2021 capital project was approved to install automated flow control on the bypass line preventing river water from entering into the plant without requiring manual intervention.

## 9.2 Maintenance

Wastewater Maintenance is responsible for repairs and maintenance of all equipment at the wastewater facilities. The majority of the activities performed are preventative maintenance which ensures equipment remains operational. When failures occur, staff also complete reactive maintenance to return equipment back to service as soon as possible.

### 9.2.1 Wastewater Treatment Plant

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Some of the major maintenance activities that were completed at the WWTP in 2020 included the following:

- Refurbishment of the mixers to anaerobic digester P3;
- Replacement of the effluent pipe from secondary clarifiers #1 to #4;
- Rehabilitation of raw sewage pump #4;
- Full electrical upgrade of secondary clarifiers #1 to #4;
- Upgrade of all outdoor lights to LED.

### **9.2.2 Wastewater Pumping Stations**

Some of the major maintenance activities that were completed at the wastewater pumping stations in 2020 included the following:

- To address odour complaints, a portable air scrubber was installed at the Alexander WWPS. The industrial waste which caused the odours was diverted away from the Alexander WWPS, which resolved the odour issue from the WWPS. Staff are working with the local industry to resolve the odour issue permanently;
- Bypassed and cleaned out the Greenwich WWPS wet well;
- Upgraded the Empey WWPS automatic transfer switch;
- Constructed a new PLC panel and rewired the St. Andrew's WWPS in order to add SCADA programming.

## **9.3 Compliance**

Wastewater Compliance is responsible for monitoring discharges to the sanitary system throughout Brantford, ensuring that all Industrial, Commercial and Institutional (ICI) locations are provided a solid understanding of the Sewer-use Bylaw and ensure compliance with all of its provisions.

Due to COVID, Compliance had to adopt new ways of maintaining oversight of the sanitary system and its major dischargers. The

implementation of a broad-scope monitoring program aimed at capturing on-going data from carefully selected locations along industrial sections of the East and Northwest trunk lines, coupled with data from self-monitoring programs already in place at the City's major industries, allowed Compliance to retain a functional understanding of the discharges being received from ICI locations and ensure on-going compliance throughout the system.

## 9.4 Key Performance Indicators

The City has developed Key Performance Indicators (KPI's) for select parameters to track each division's success year to year. Table 3 is a summary of the annual KPI's for Wastewater Operations in 2019 and 2020.

| Key Performance Indicators                              | 2019             | 2020             |
|---------------------------------------------------------|------------------|------------------|
| Chemical Costs per ML Treated                           | \$42.38          | \$47.74          |
| Biosolids Disposal Costs per ML Treated                 | \$34.81          | \$45.93          |
| Electricity Consumption (kWh) per ML Treated            | 639.43           | 622.96           |
| # of WWTP Non-Compliance Events                         | 0                | 0                |
| Maintenance Costs per Maintenance Related Hours         | \$78.33 per hour | \$71.34 per hour |
| Breakdown Maintenance as % of Total Maintenance Hours   | 9.8%             | 6.5%             |
| # of Complaints Received                                | 10               | 5                |
| % of Time Raw Sewage Quality Has Exceeded By-law Limits | 2.7%             | 8.1%             |
| # of Spill Response Incidents                           | 27               | 31               |

Table 1 - Annual Summary of Wastewater Operations KPI's for 2019 and 2020

Based on the KPI's in Table 3, some key observations over the last two (2) years include the following:

- The increase in chemical costs per ML treated were related to an increase in the unit price for all process chemicals.

- Due to the digester clean out capital project and related operational challenges, there was a significant increase in the volume of biosolids to be hauled off site in 2020.
- Over the last several years, there has been a steady decline in electricity usage at the WWTP as a result of replacement of old blowers and aeration piping. Due to falling under the usage threshold (1 MWh) category, the electricity billing structure was changed (from Class A to Class B) which resulted in an increase in electricity costs. However overall 2020 electricity costs per million litres treated is lower than 2019.
- There has been a decline in the number of breakdowns as Wastewater Maintenance have been proactive with their maintenance activities.
- The number of complaints received in 2019 and 2020 were related to odours at the Alexander WWPS from an industrial discharger. The issue was corrected in mid-2020.
- The number of spill events that staff have responded to impact the sanitary and storm systems.

## **9.5 Capital Projects**

Annually, the City develops and updates a 10-year capital forecast which includes upgrades to wastewater facilities. Capital projects are delivered by Environmental Services and Engineering Services Departments on behalf of Wastewater Operations. The COVID-19 pandemic also slowed down the progress of capital projects, which mainly impacted the delivery of equipment.

### **9.5.1 Completed Capital Projects**

In 2020, the following capital projects were completed at the wastewater facilities:

- Replacement of the insulation on the digester gas piping and installation of heat tracing
- Replacement of the PM #1 Aeration System Piping and Diffusers,



- Effluent Pumping Station Feasibility Study,
- Primary Effluent Cross-Connection Feasibility Study

### **9.5.2 On-Going Capital Projects**

The following capital projects were initiated previously and are currently on-going, including:

- Replacement of the biosolids storage tank decant systems.
- Upgrades to the original primary clarifiers.
- Upgrades to the Fifth Avenue WWPS.
- Rehabilitation of the anaerobic digesters.
- Replacement of WWTP influent flow metering.
- Preliminary treatment building bypass and automation.
- Replacement of the Empey WWPS Gates and Valves.
- Comprehensive WWTP Upgrade Assessment.

## **9.6 Planned 2021 Activities**

The following list represents a summary of some of Wastewater Operations' planned activities for 2021:

- Continue to maintain current performance from the WWTP, while striving to consistently achieve the voluntary targets in the Grand River WMP on a monthly basis.
- Support the continued progress of on-going capital projects.
- Support the initiation of the following key 2021 capital projects:
  - Replacement of the WWTP process boilers,
  - Installation of check valve in the bypass line to the outfall,
  - Design for the rehabilitation of the secondary clarifiers,
  - Assessment of the Wastewater Operations maintenance program,

- Design of flow monitoring at the WWPS,
  - Effluent Pumping Station EA preparation and geotechnical study,
  - Empey Street WWPS EA and design,
  - Johnson Road WWPS Rehabilitation,
  - St. Andrew's WWPS Rehabilitation.
- Continue development and improvement to the Wastewater Quality Management System (WWQMS) including a risk assessment.
- Continue to support major dischargers with maintaining compliance with the Sewer-Use By-law.
- Ensure on-going progress is being realized in long-term Compliance Agreement with industries.
- Work with the development community and assume operation and maintenance of new WWPS such as Nature's Grand.

## **10.0 Financial Implications**

There are no financial implications resulting from this report.

The Wastewater Operations division is 100% funded from the wastewater rate. Wastewater capital projects are funded from Development Charges as well as the wastewater rate. Revenue is also generated through programs under the Sewer-use Bylaw and from the septage receiving station.

## **11.0 Conclusion**

Wastewater Operations was able to successfully navigate the events of 2020 and the COVID-19 pandemic through a combination of modified work processes and effective adaptation to a new health and safety environment. Despite challenges posed by a reduction in staff and management restructuring, the WWTP has been able to maintain the standards of excellence it has been recognized for by the Grand River Watershed-wide Wastewater Optimization Program in 2019.



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In adopting this report, is a by-law or agreement required? If so, it should be referenced in the recommendation section.

By-law required ☐ yes ☒ no

Agreement(s) or other documents to be signed by Mayor and/or City Clerk ☐ yes ☒ no

Is the necessary by-law or agreement being sent concurrently to Council? ☐ yes ☒ no