



To: COUNCIL

Meeting Date: 10/05/21

Subject: Wastewater Summary Report for 2020

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Prepared By: Jason Alexander – Manager of Wastewater, Water Meters & Storm Water

Report No.: 21-147(IFS)

File No.: C1101

Recommendation(s)

THAT the 2020 City of Cambridge Wastewater Summary Report for 2020 be received for information.

Executive Summary

Purpose

The purpose of this report is to provide an update to Council, as the decision-making authority, on the operational and maintenance activities of the City of Cambridge Wastewater Collection System for 2020.

The Cambridge Wastewater collection system meets the requirements defined by Ontario Regulation 129/04 and within the Certificates of Approvals (C of As) for each of the Sanitary Pump stations.

Key Findings for 2020

- Inflow and Infiltration (I&I) rate decreased from 32% in 2016 to 23.3% in 2020. I&I flow rate is also subject to fluctuate due to weather conditions.
- Flow Monitoring program identified 8 catchment areas that should be targeted for future I&I investigation and potential repairs.
- Condition Assessments on 2 forcemains were completed using non-interruptive [Smart Ball Technology](#)
- 3 Sanitary pump station were upgraded in 2020, at a total cost of \$328,082
- Annual pump inspections were performed on 17 wastewater pumps

- 1 critical pump failure occurred without any adverse affects (environmental spill or a sanitary main back up) due to existing system redundancies and staff response procedures.
- 5604 (71%) sanitary structures were inspected in 2020
 - The annual inspection target is 20% of Sanitary structures per year, Due to Covid more time was spent on inspections.
- There were 3 sanitary main blockages in 2020 compared to 4 in 2019
- There were 147 sanitary service blockages compared to 234 in 2019, a 37% reduction.
- Risk reviews were performed to help ensure service continuity during the pandemic, and various COVID-19 SOP's were created to meet Public Health requirements.

Financial Implications

The 2020 annual budget for the operation of the Cambridge Wastewater system was \$34,865,000.

Background

The City's of Cambridge Sanitary Master Plan outlines the preventative maintenance programs and capital upgrades, including recommended budget allocations, that are to be completed annually to ensure continuous operation and reliability of the wastewater collection system. Staffing resources including operational procedures, and recommendations are also defined to help guide staff that are responsible for the Operation and Maintenance of the Wastewater Collection System.

These processes, procedures and recommendations are designed to create accountability and define frequencies for performing work, risk assessments, and various system upgrades.

Analysis

Strategic Alignment

PROSPERITY: To support and encourage the growth of a highly competitive local economy where there is opportunity for everyone to contribute and succeed.

Goal #7 - Transportation and Infrastructure

Objective 7.3 Provide innovative leadership in the management of city assets to help plan, fund and maintain city assets in a sustainable way.

The Wastewater Summary Report is to be provided to Council on an annual basis as an update on the status and suitability of the City's Wastewater collection system and is to

aid in the decision-making processes involving system financing and long-term strategic planning.

Comments

The Wastewater report is presented in two parts. Part One provides an overview of work completed on the linear infrastructure.

Part Two provides an overview of the City's 17 Pump Stations, their condition and highlights any upgrades that they received over the past year.

1. PART ONE

a) Linear Infrastructure

i. Inflow and Infiltration (I&I)

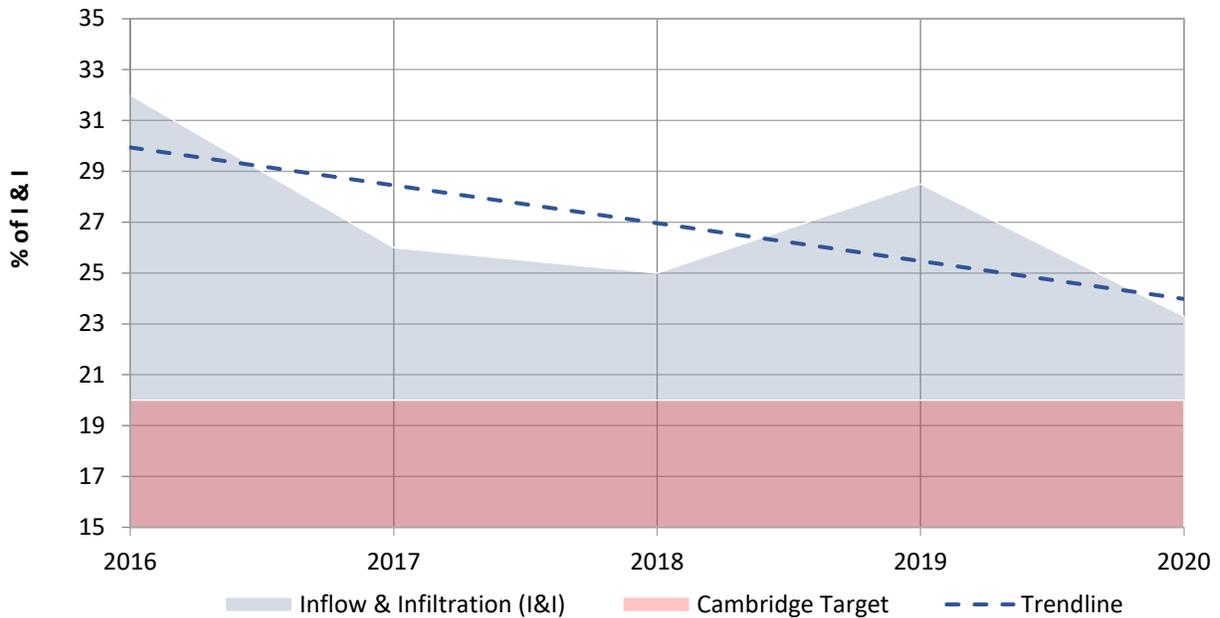
Inflow and infiltration refers to sources of storm water and groundwater that are entering the City's wastewater collection system through cracks in the system or via cross-connections to storm runoff infrastructure (i.e. Roof leaders.)

These sources of water increase the volumes of water the City transfers to the Region of Waterloo's Wastewater Treatment Plants, resulting in higher treatment costs to the City. Minimizing these volumes by repairing pipes and identifying cross-connections reduces treatment costs and allows for additional system maintenance and provides for a more robust system with fewer insurance claims.

The chart below demonstrates the downward trend of Inflow and Infiltration volumes entering our system since 2016, and an overall reduction of 8.7% as a percentage of our total wastewater flows. Inflow and infiltration volumes are also subject to fluctuations due to weather conditions such as extreme temperatures and change to annual precipitation pattern.

At approximately \$187,500 for every % reduction this equates to approximately \$1,631,250 in reduced wastewater treatment charges, and savings we would not otherwise recover through water sales.

Cambridge Inflow and Infiltration



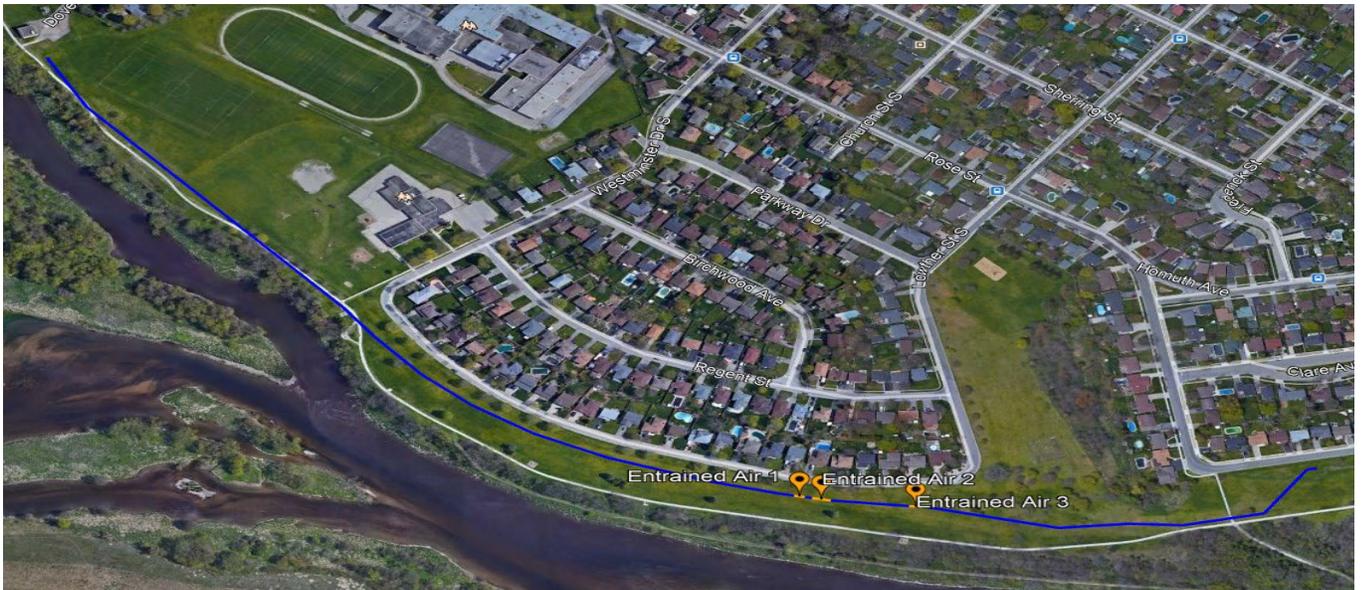
The reduction of I&I has been achieved through multiple methods of repairs, from traditional open cut repair to our crews using new relining methods. The wastewater sub-division also has an annual relining contract with a vendor who completes up to 20 lateral relining repairs and multiple mainline spot repairs and Maintenance hole repairs.

ii. Flow Monitoring Program

Wastewater staff established a flow monitoring program to help gain a better understanding of where Inflow and Infiltration is occurring in our system. Year one of the program had 20 flow monitors deployed in the sanitary system to set up smaller catchment areas in order to create smaller Catchment areas to identify I&I. The chart below shows 8 high priority areas to focus our I&I investigations efforts on for 2021.

WWTP	Site	Catchment Area (ha)	Land Use	Recommendations
Galt WWTP	FM-P04	227	Residential, some ICI	Investigate direct connection sources
	FM-P07	404	Residential & ICI	Isolate I/I area, flushing
	FM-P11	1015	ICI	Isolate I/I area
	FM-T02	103	Residential & ICI	Investigate direct connection sources
Preston WWTP	FM-P01	720	ICI	Isolate I/I area
	FM-P10	358	Residential	Isolate I/I area
	FM-P14	139	Residential, some ICI	Investigate direct connection sources
Hespeler WWTP	FM-P02	224	Residential, some ICI	Investigate direct connection sources

iii. Force Main Inspection



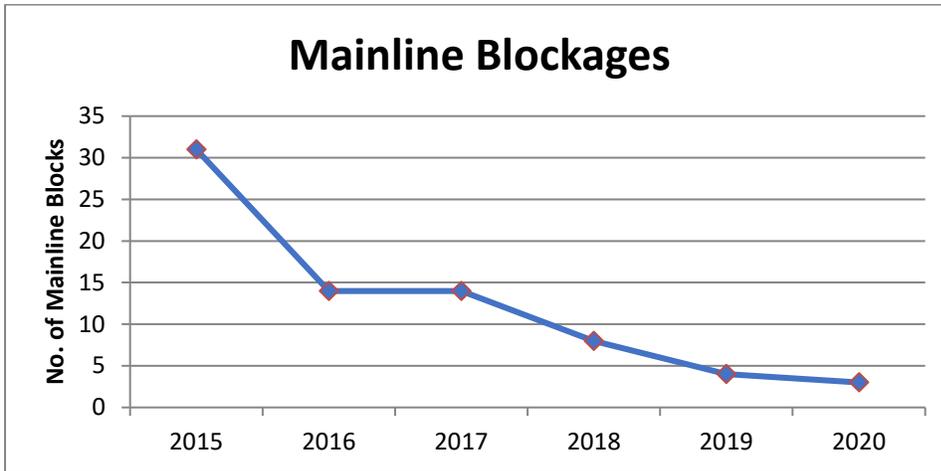
Asset Management and the Wastewater Division contracted Pure Technologies to perform a force main condition assessment on the Dover St. Pumping Station force mains. This was done using a new sophisticated “Smart Ball” technology, where foam balls equipped with special sensors are inserted into the main and are allowed to flow the length of the pipe collecting pipe data.

The results of the two inspections showed that overall the mains are in generally good condition with no active leaks detected, however the 400mm pipe is 53 years old and its useful life is scheduled to be done within the next 7-12 years. Further investigation has been recommended and a plan for remediation or replacement will be determined.

The data collected identified some locations where trapped air exists, which could cause a build up of corrosive gas and result in premature deterioration of the pipe. Existing air relief valves are to be inspected and repaired as needed to insure gas pockets are properly vented. Pure Technologies also recommended adjusting the operation of the station’s pumps to help reduce gas formation in the force main due to water hammer, or pressure transients.

All of the identified deficiencies should be resolved as part of the Dover St. Pump Station capital upgrade project scheduled for summer 2021.

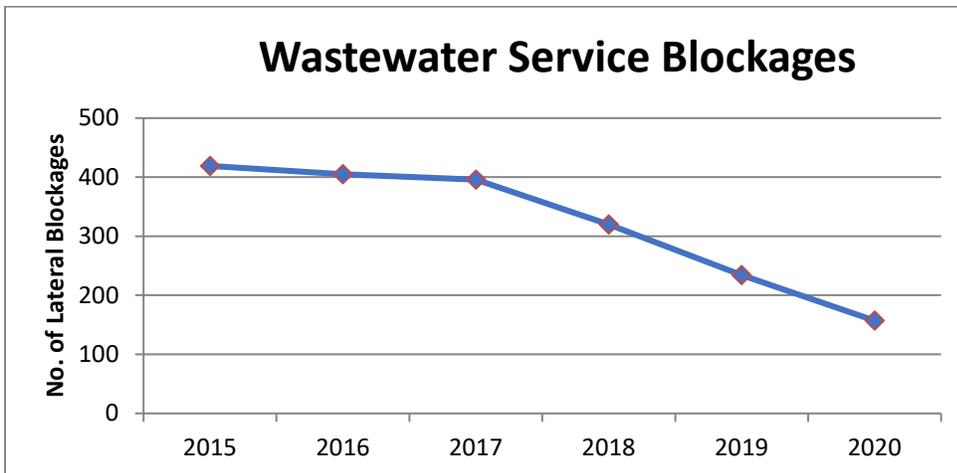
iv. Sanitary Main Blockages



The above chart shows that the City has seen a drastic decline in mainline blockages over the past 5 years.

The City's capital replacement program has been a major contributor to this trend, as has the Mainline Flushing and Inspection Program, along with assistance from the Region of Waterloo Environmental Enforcement team, who assists the City by providing inspection services and education for business owners on the impacts of fats, oils and greases on our system.

v. Wastewater Service Blockages



The above chart indicates a significant decrease in the number of service blockages experienced over the past 3 years, with a 5-year low in 2020. The Sanitary Lateral Relining Program has been in place for over 10 years and has led to a significant reduction in blockages at residential properties. The replacement of the sanitary infrastructure through capital replacement projects is also significant contributor to the reduction of Lateral Blockages

PART 2

a) Pump Stations

i. Pump Station Operations

The Wastewater sub-division takes a preventative maintenance approach when it comes to operating pump stations, this includes weekly, monthly, bi-annual and annual maintenance, including:

- Monthly high-water float alarm testing;
- Monthly emergency generator test, with an annual load bank test;
- Annual pump inspection:
 - 1 critical pump failure occurred in 2020, but did **NOT** result in any spillage to the environment or bypass;
- Bi-annual wet well cleaning;
- Valve turning of process valves in pump stations
- Weekly wet well inspection and cleaning (Frequency reduced for the first 3 months of the pandemic due to emergency staffing reduction) (Reinstated to full capacity when all safety protocols for Covid-19 were in place)

ii. Capital projects

Since 2016 the Wastewater sub-division has completed the upgrade of 5 pump station in accordance with the City of Cambridge Sanitary Master Plan. The most recent upgrades took place in 2020 with the renewal of the Eagle Street and Burnett Avenue sanitary pumping stations.

Rather than procuring a consultant and general contractor to oversee the projects, as with past Pump Station projects, the Eagle St. and Burnett Ave projects were managed entirely by internal Wastewater Operations staff. Staff undertook the detailed management and direction of the project, using City resources wherever possible, ranging from:

- Using a City Vactor truck to stop flows to the wet well, allowing set up of bypass system;
- Use of the City cranes to lift pumps and panels into confined spaces;
- Valve and By-Pass Chambers replaced by City staff to prepare site for construction;

As a result of these project experiences City staff gained a much more intimate understanding of the inner workings of each station, and significant savings were realized.

To help upcoming budget impacts, the Wastewater sub-division plans on continuing to leverage this internal project management experience to complete similar projects in the future, where detailed design from an engineering consultant is not required and where resourcing permits.

Existing Policy/By-Law

The Cambridge Wastewater Collection System meets the requirements under Ontario Regulation 129/04 and as per the registered Certificates of Approvals on the sewer works. The City of Cambridge Sewer Policy TPW-070 and the Region of Waterloo Sewer Use By-law, set roles, responsibilities, and limits within the Sanitary system.

Financial Impact

The 2020 annual budget for the operation of the Cambridge Wastewater system was \$34,865,000

Public Input

N/A

Internal/External Consultation

N/A

Conclusion

The Cambridge Wastewater Collection System meets the requirements defined by Ontario Regulation 129/04 and within the Certificates of Approvals (C of As) for each of the Sanitary Pump stations.

Trending continues to show promising results in regards to the reduction of I & I through continued inspection, maintenance and repair activities and supports similar continuing efforts.

Similar summary reports are to be provided on an annual basis to inform Council in its awareness for decision making.

Signature

Division Approval

Reviewed by the CFO



Reviewed by Legal Services

Name: Mike Parsons

Title: Director of Environmental Services

Departmental Approval



Name: Yogesh Shah

Title: Deputy City Manager – Infrastructure Services

City Manager Approval



Name: Cheryl Zahnleiter

Title: Acting City Manager

Attachments

N/A