

To: SPECIAL COUNCIL (STATUTORY PUBLIC MEETING)
Meeting Date: 5/31/2022
Subject: 2021 Drinking Water Quality Report
Submitted By: Chris Whetstone, Manager of Water
Prepared By: Chris Whetstone, Manager of Water, Jessie Koczynasz Water Tech
Report No.: 22-003-IFS
File No.: C1101
Wards Affected: All Wards

RECOMMENDATION(S):

THAT Report 22-003-IFS 2021 Drinking Water Quality Report be received for information.

EXECUTIVE SUMMARY:

Purpose

The purpose of this report is to provide Council with an update on the status of the City's drinking water system for 2021, in accordance with the requirements of the Provinces Drinking Water Quality Management Standard, and the Safe Drinking Water Act.

Specific topics reported include status of action items from the 2020 Management Review, new action items list from the 2021 Management Review, consumer feedback summary of system audits, as well as overviews on maintenance activities, water loss and notable future projects.

Key Findings

- The City of Cambridge operates 594km of Drinking Water network with a total replacement value of \$681.7M.
 - 505km network is City owned (\$603.9M); 58km is Region owned (\$61.8M); 32km is shared ownership (\$16.9M);
- The 2021 Cambridge Drinking Water System inspection was conducted by the MECP in February 2022, resulting in a **perfect compliance score of 100% for the 7th consecutive year;**
- 21 emergency watermain breaks occurred in 2021, compared to 26 in 2020;

- 135 service line leaks were repaired in 2021, compared to 117 in 2020;
- 1601 leak detection loggers were deployed in 2021, from 1463 in 2020, resulting in 6 watermain breaks and 12 service leaks being pro-actively discovered;
- After being postponed in 2020, the fire hydrant painting project was reinstated in 2021 resulting in a total of 962 hydrants being stripped, sanded and painted. The City owns have inspected over 3550 hydrants for fire protection services.
- Approximately 873 (16%) valves were proactively exercised, slightly under the annual target of 20%;
- Non-revenue water loss decreased to 19.9% in 2021 compared to 21.3% in 2020. This includes water used for fire protection, water system and hydrant flushing and other infrastructure maintenance;
- 1 new District Metering Area was established using smart meter technology, helping identify areas of water loss within the area;
- 94% of all meters in the City of Cambridge have been swapped/converted to AMI since the start of 2018, with just over 2200 metered connections remaining as end of May 2022.
- External Surveillance Audit was conducted in October of 2021 resulting in re-accreditation of the drinking water system by the Ministry of Environment, Conservation and Parks (MECP);
- The annual Internal Audit was completed in November 2021, resulting in zero (0) non-conformances and six (6) opportunities for improvement identified;
- 4 Adverse Water Quality Incidents were recorded and resolved without impact to public in 2021;
- Rate of compliance with the City's cross-connection compliance program is currently 77%, with improving trending due to the lifting of COVID restrictions.

FINANCIAL IMPLICATIONS

The 2021 annual budget for the operation of the Cambridge Drinking Water system was \$37,852,732. The resulting rate increase between 2020-2021 was held at 0% in alignment with Region of Waterloo. The budget allocation for 2022 is \$39,544,900, which is a rate increase of 2.39%

STRATEGIC ALIGNMENT:

- Strategic Action; or
 Core Service

Objective(s): Not Applicable

Strategic Action: Not Applicable

Program: Water

Core Service: Water Services

The maintenance and operation of the City's drinking water system is a core service delivery, and supports the continued growth and health of the community. The Water Section of the Environmental Services Division oversees all annual maintenance activities related to the water system and is considered to its "Operating Authority".

BACKGROUND:

The Drinking Water Quality Management System (DWQMS) requires annual reporting to Council to encourage transparency and support informed decision making in relation to all things relating to the drinking water system. Council is considered "Owner Representatives", and ultimate decision makers, for the City's drinking water system. "The Owner" of the water system is the Corporation of the City of Cambridge.

Top Management is defined in the DWQMS as "a person, persons or group of people at the highest management level within an Operating Authority that makes decisions respecting the QMS and provides recommendations to the Owner respecting the subject system or systems".

The 2021 Management Review was presented by the Utility Compliance Technologist, Aaron O'Keefe, to Mike Parsons, Director of Environmental Services, and Chris Whetstone, Manager of Water, (Top Management).

Included in the meeting were Jason Alexander, Manager of Wastewater, Meters and Storm; and Harpreet Sumra, Supervisor of Compliance and Meters

Action items from the 2020 and 2021 Management reviews, along with their current statuses, can be found as Appendix A and B.

ANALYSIS:

System Description:

The City of Cambridge Drinking Water System contains roughly 594kms of watermain, including approximately 58kms of Regional transmission mains, 505kms of City owned watermains and 32 kms of shared ownership mains. The City maintains and operates all mains. The total asset replacement value of drinking water network is approximately \$681M.

In 2021 the system grew by approximately 1.5%, the equivalent of 8kms of additional watermain, 750 new valves to support residential and industrial growth.

The following charts identify the overall age and material types currently found in our water system. Chart 1 indicates a bulk of the watermain in the system was installed after 1970. Chart 2 indicates that a majority (47%) of the watermain in the system is plastic, with another 32% being ductile iron. Cast iron main constitutes approximately 19%.

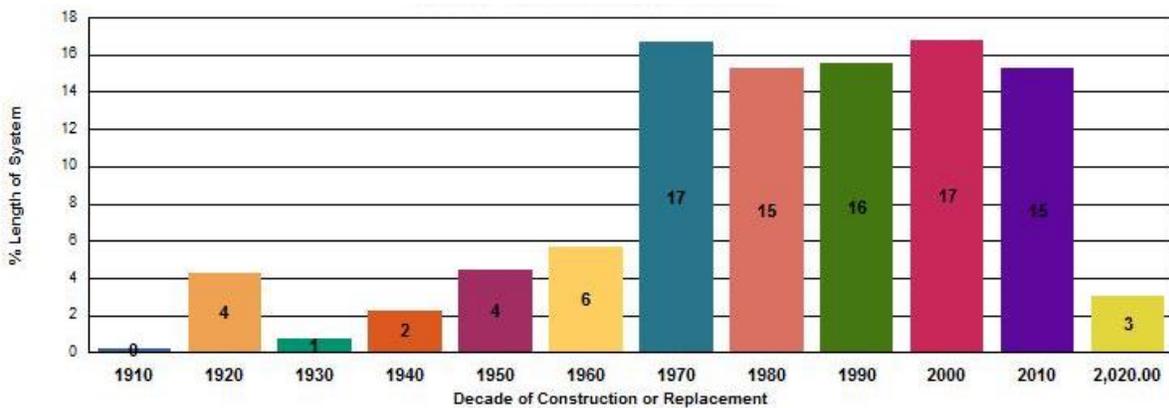


Chart 1: Water System Age Profile

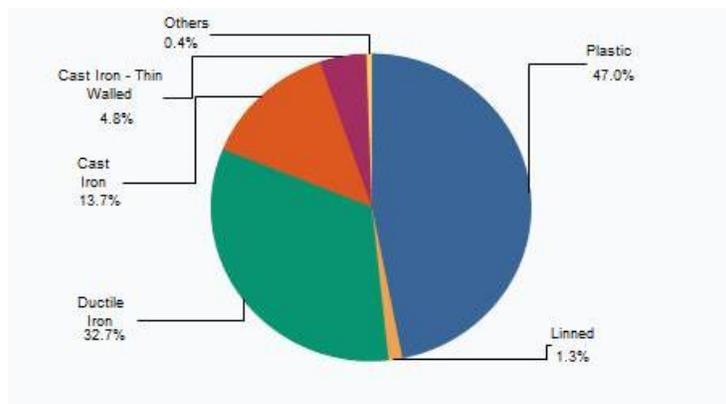


Chart 2: Water Pipe Material

Within the water system there are 6007 valves and 3,589 fire hydrants.

Additionally, there are approximately 40,500 service connections in the City with roughly 380km of water service pipe to maintain.

Auditing and Assessment:

The annual DWQMS external surveillance audit was conducted in October of 2021.

The objective of the audit was to determine whether the drinking water Quality Management System (QMS) conforms to the requirements of the Ontario Ministry of Conservation and Parks (MECP) Drinking Water Quality Management Standard (DWQMS V2) through a remote documentation only review.

Through this audit zero (0) non-conformances were identified with only two (2) opportunities for improvement provided, resulting in re-accreditation of the drinking water system by the Ministry of Environment, Conservation and Parks (MECP);

Following this re-accreditation, and in accordance with the City's Operating Plan, Water staff with the assistance of a third party, performed an internal audit in November 2021 as a more thorough, process driven review. Through this exercise zero (0) non-conformances and six (6) opportunities for improvement.

All opportunities for improvement were followed up and recorded in the City's work management system.

As a final evaluation on the City's Water Distribution System, the Ministry of Environment, Conservation and Parks performed its annual inspection in February 2022 for the entirety of 2021. Through this 3-week inspection all documents required by Ontario Regulation 170/03 were inspected and tested for compliance with the regulation. A perfect score of 100% was achieved, indicating full compliance, for the 7th consecutive year.

System Maintenance Activities:

In 2021 Water Operations responded to and repaired 21 emergency watermain breaks. This is reduction to the number responded to in 2020, which saw 26 breaks and continues the reduced trending year-to-year as indicated by the following chart.

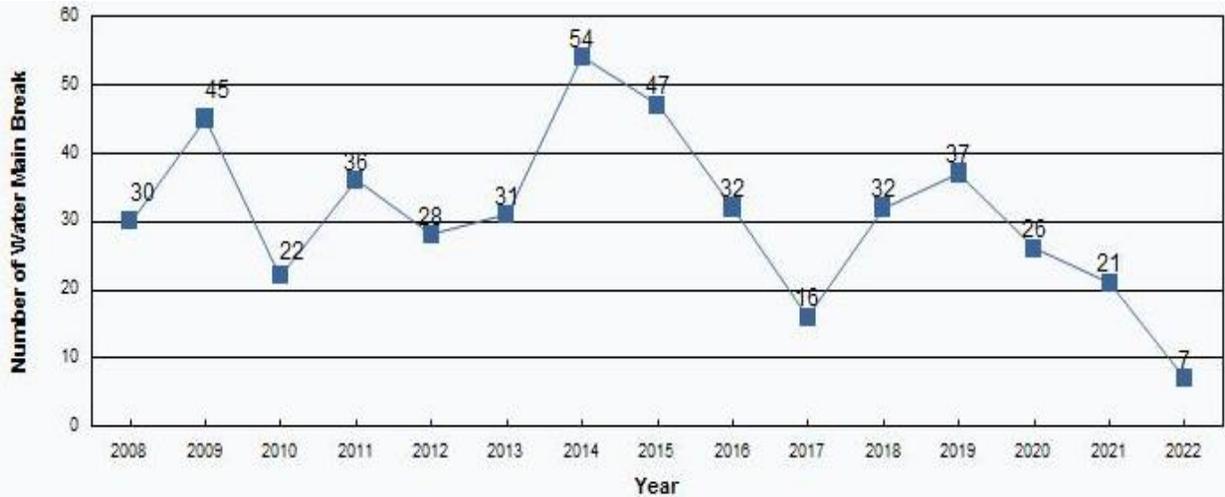


Chart 3: Watermain Breaks 2008-2022 (YTD)

There was an increase in water service responses in 2021, with 135 service leaks identified and repaired compared to 117 in 2020. While higher year over year the overall trend for water service leaks continues to show a positive direction, with some significant reductions in leaks since 2012, when we recorded a record high 307 service leaks repaired. The following chart provides a summary of our service leaks since 2008.



Chart 4: Service Leak Responses 2008 – 2022 (YTD)

To aid in our preventative maintenance staff exercised approximately 873 valves, or roughly 16% were proactively exercised, slightly under the annual target of 20%.

The fire hydrant maintenance activities saw inspections on all 3,500+ hydrants, with related maintenance activities being completed or scheduled for follow up. The hydrant painting project restarted after being postponed in 2020 as a pandemic cost saving measure, resulting in 962 hydrants being stripped and painted, improving the appearance to a significant portion of our hydrants and improving customer confidence.

Watermain flushing and swabbing activities were also reinstated in 2021 with 78 km of the system being unidirectionally flushed throughout the City to effectively scrub the inside of the pipes, removing accumulated sediment and scale, ultimately improving water quality and reducing friction loss in the system for improved flow characteristics.

Water Loss:

In Cambridge Water Operations staff deploy sensitive listening equipment strategically throughout the system on an on-going basis in an attempt to catch leaks proactively, when they are small, and before they surface resulting in expensive restorations, claims and outages to customers.

In 2021 City staff deployed 1601 leak detection loggers, an increase from 1463 in 2020. Through these efforts 6 watermain breaks and 12 service leaks were pro-actively discovered and repaired, doubling the number of leaks found in this manner from 2020, when only 9 leaks combined were pro-actively found.

This number is significant, since these leaks have potential to run for very long periods of time without surfacing, especially in Cambridge where there are large areas of fractured bedrock to provide leaking water a perfect pathway to escape undetected.

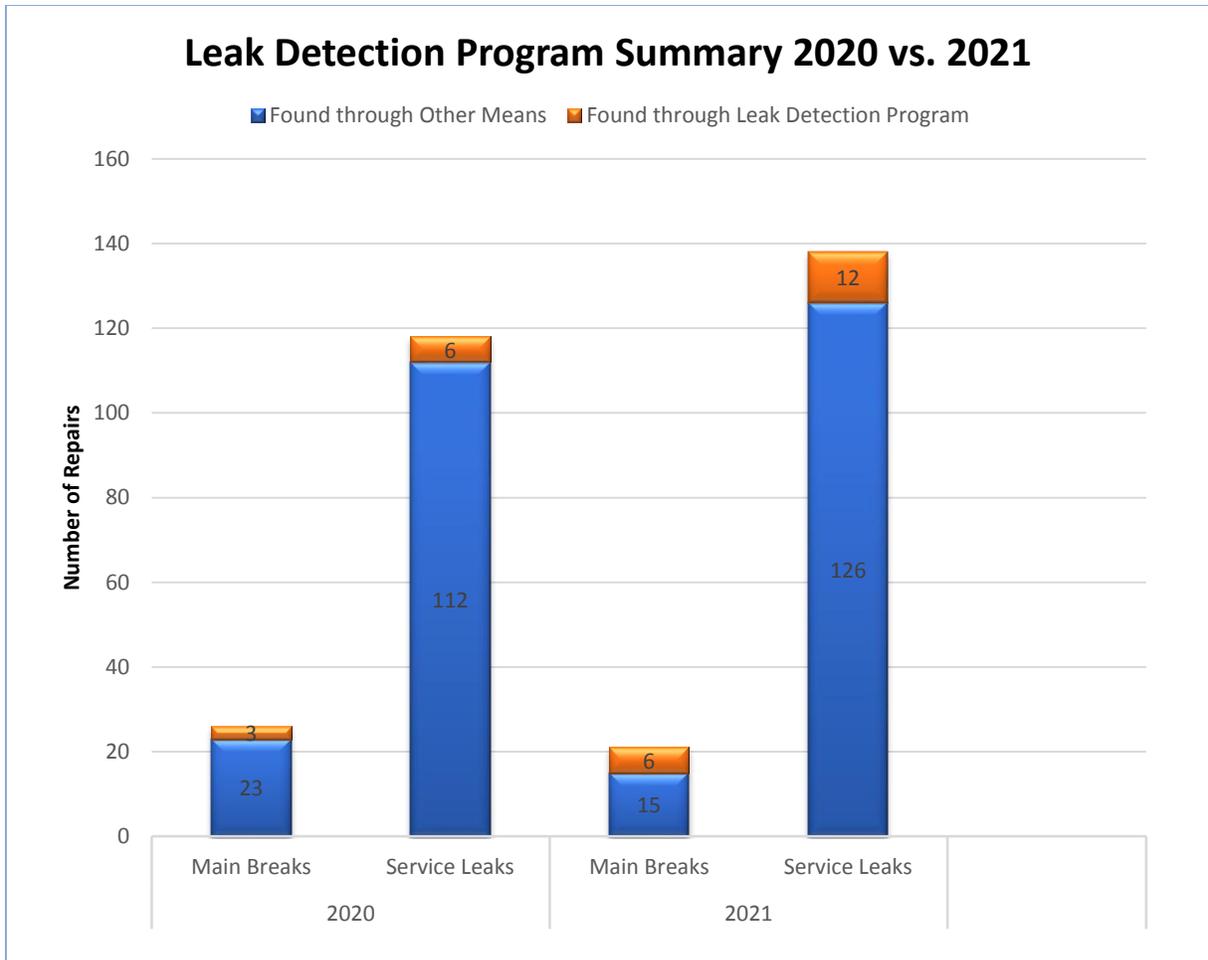


Chart 5: Leak Detection Results 2020-2021

Unfortunately leaks on plastic pipe are not as easy to detect with audible noise. For this advanced metering is highly effective. As a result, Water staff have been establishing district metering areas, or DMAs. These areas, combined with a new advanced metering network that is nearing completion, will allow staff to perform mass balance calculations on neighbourhoods that are suspected of having high to moderate water loss. In 2021 staff established one (1) new DMA, combining for a total of three (3) in the City. As the metering project nears completion staff will begin to analyze these areas in greater detail with the intent of finding additional areas of loss.

Additional DMAs are planned for 2022, along with the development of a longer-ranged strategy to deploy DMAs throughout for the City.

In early 2022 a Water Loss Audit was performed using the 2021 water consumption data from water billing, Regional purchase volumes and known operational uses. This audit identified a water loss rate of 19.9% for 2021 (as non-revenue water), a decrease from the 2020 rate of 21.3%. This reduction in water loss, while a move in the right

direction, is slightly above the City’s target of 18.5% for 2021. This non-revenue water includes water used for fire protection and infrastructure maintenance such as hydrant flushing and watermain swabbing/flushing. It is suspected that the increase in leak detection loggers and improved metering aided in the year to year reduction. The following chart provides a summary of water loss since 2016.

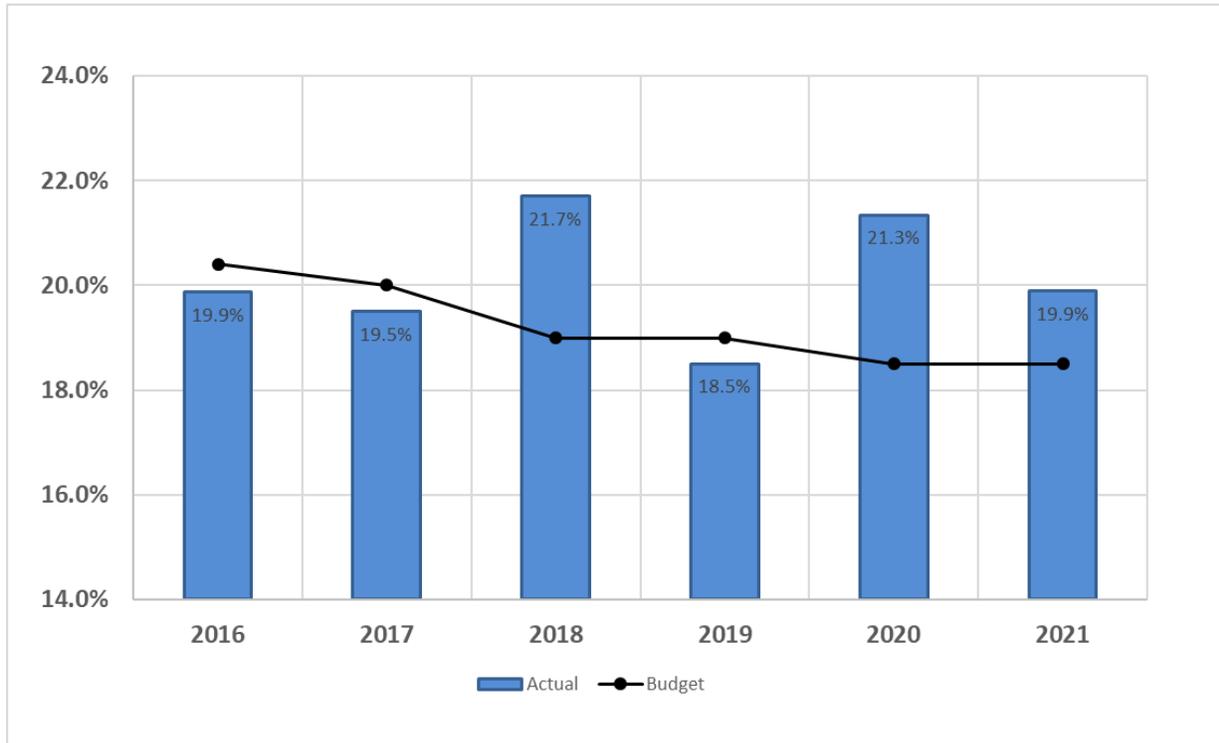


Chart 6: Annual Water Loss Results

Advanced Water Metering Infrastructure:

2021 was a very positive year for the AMI project. As a result of the many lockdowns and restrictions imposed by the province due to the global pandemic the project suffered a number of setbacks in 2020. At the beginning of 2021 the total number of meters upgraded was slightly greater than 50% of our customers.

At the time of this report the project is boasting a completion rate of approximately 94%. At the end of 2021 there were 34,199 meters installed and/or retrofitted with smart metering technology. We are currently at 36,236 with just over 2,200 metered connections remaining.

Water Sampling:

The City of Cambridge, with support from the Region of Waterloo Environmental Services staff collected and analyzed 2488 water samples in 2021. Of these 1635

assessed the water for microbacteria, 824 for chlorine residual and 8 for trihalomethane and haloacetic acid.

Of these samples take only four (4) results were identified as Adverse Water Quality Incidents (AWQI) as per O.Reg 170/03. Each AWQI resulted in corrective actions such as flushing and resampling, and each were resolved without any need for further mitigation measures. Water sampling information has been taken from the 2021 Annual Summary Water Report.

Cross-connection Controls:

As with the Advanced Metering Infrastructure project, the cross-connection control program was heavily impacted by the global pandemic, as access to homes and businesses was difficult.

At this time 77% of customers involved in our municipal cross-connection control program have complied with testing and reporting requirements. Early signs in 2022 indicate much improved response rates, and greater compliance is expected.

EXISTING POLICY / BY-LAW(S):

City of Cambridge Drinking Water Quality Management System Policy

As the owners and operators of the City of Cambridge's water distribution system we are committed to:

- Providing safe sustainable drinking water to our consumers;
- Complying with applicable legislation and regulations as related to the provision of safe drinking water; and
- Maintaining and continually improving our Quality Management System

FINANCIAL IMPACT:

The 2021 annual budget for the operation of the Cambridge Drinking Water system was \$37,852,732. The resulting rate increase between 2020-2021 was held at 0% in alignment with Region of Waterloo. The budget allocation for 2022 is \$39,544,900, which is a rate increase of 2.39%

PUBLIC VALUE:

This report provides public information relating to the status of the 2021 Drinking Water distribution system.

ADVISORY COMMITTEE INPUT:

N/A

PUBLIC INPUT:

This report has been posted to the City's website with the agenda in advance of its submission into the Council Information Package. The City's Drinking Water Quality Management Policy is available on the City of Cambridge website.

INTERNAL / EXTERNAL CONSULTATION:

Internal consultation was completed with Finance, Asset Management, Engineering and Building Divisions.

This report references the City of Cambridge Annual Drinking Water Distribution System Inspection report for 2021 as provided by Ministry of Environment, Conservation and Parks.

CONCLUSION:

As referenced in the Drinking Water Quality Management report, Cambridge has met and continues to meet all legislative requirements and continues to improve and sustain its drinking water system.

REPORT IMPACTS:

Agreement: **No**

By-law: **No**

Budget Amendment: **No**

Policy: **No**

APPROVALS:

This report has been reviewed by the Chief Financial Officer and City Solicitor.

It has been reviewed and approved by the Director, Deputy City Manager and City Manager.

ATTACHMENTS:

When naming attachments please use the following format:

1. Appendix A – 2020-2021 QMS Action Items Status Table
2. Appendix B – 2021-2022 New QMS Action Items