

To: COUNCIL

Meeting Date: 4/15/2025

Subject: 2024 Drinking Water System Performance Report

Submitted By: Mike Parsons, Director of Environmental Services

Prepared By: Chris Whetstone, Manager of Water; and Jessie Koczynasz, Water Systems Technologist; and David Cattrysse, Utility Compliance Technologist

Report No.: 25-002-IFS

File No.: C11

Wards Affected: All Wards

RECOMMENDATION(S):

THAT Report 25-002-IFS 2024 Drinking Water System Performance Report be received for information.

EXECUTIVE SUMMARY:

Purpose

To provide Council with an update on the status of the City's Water Distribution System during 2024, in conformance with the requirements of the Province's Drinking Water Quality Management Standard, and the Safe Drinking Water Act.

Specific topics reported include the status of action items from the 2023 Management Review, new action items from the 2024 Management Review, consumer feedback, system audit summaries, as well as overviews on maintenance activities, water loss and notable projects.

Key Findings

- The City of Cambridge operates roughly 614 km of watermains in the Drinking Water network with a total replacement value of \$931.1M.
 - 525 km is City owned (\$829.0M); 60 km is Region owned (\$83.6M); 29 km is shared ownership (\$18.5M).

- 30 emergency watermain breaks occurred in 2024, compared to 31 in 2023.
- 100 service line leaks were repaired in 2024, compared to 100 in 2023.
- 1873 leak detection loggers were deployed in 2024, resulting in 2 watermain breaks and 5 service leaks being discovered pro-actively, compared to 1501 in 2023 discovering 5 main breaks and 3 service leaks.
- The City inspected 3762 (100%) hydrants for fire protection services. 1174 hydrants received additional sanding, cleaning, or paint touch ups in 2024, compared to 838 in 2023.
- Approximately 836 (13%) valves were recorded as proactively exercised in 2024, down from 14% in 2023, and slightly under the annual target of 15%. This value trends closer to the target when accounting for valves that were exercised but registered through alternative reporting methods.
- 9 Adverse Water Quality Incidents were recorded and resolved without impact to the public in 2024.
- The annual Internal Audit was completed in June 2024, resulting in zero (0) non-conformances (NC), 1 opportunity for improvement (OFI), and 4 staff suggestion OFIs being identified.
- The annual External Surveillance Audit was completed in September 2023, resulting in 0 NC and 1 OFI being identified.
- The 2024 Cambridge Water Distribution System inspection was conducted by the MECP from January to March of 2025. The inspection resulted in one (1) non-compliance due to a delay in providing notification and performing corrective actions following an adverse water quality incident.
- Non-revenue water-use increased to 17.7% in 2024, up from 16.6% in 2023. This includes water used for fire protection, water main/hydrant flushing, other infrastructure maintenance and system losses.
- 99.8% of all meters in the City of Cambridge have been swapped/converted to AMI since the start of 2018, with 68 metered connections remaining as end of December 2024. The remaining connections consist primarily of meters that are not compatible with the system, are inaccessible to staff, or have been abandoned.

- Rate of folders within 3 months of compliance with the City’s cross-connection compliance program is averaging 92% in 2024, down from 94% in 2023. The City’s target threshold is 90%.

Financial Implications

The 2024 operational budget for Water was \$42,830,000. The budget increased in 2025 by \$1.468M for a total of \$44,297,600.

STRATEGIC ALIGNMENT:

Strategic Action

Objective(s): Choose an Objective

Strategic Action: Choose a Strategic Action

OR

Core Service

Program: Water

Core Service: Water Services

The maintenance and operation of the City’s Water Distribution System is a core service 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 designated as the system’s “Operating Authority”.

BACKGROUND:

The Drinking Water Quality Management System (DWQMS) requires annual reporting to “The Owner” to encourage transparency and support informed decision making in relation to all things relating to the Water Distribution System. Council is considered “Owner Representatives”, and ultimate decision makers, for the City’s Water Distribution 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 Quality Management System (QMS) and provides recommendations to the Owner respecting the subject system or systems. Top Management for the Water

Department is comprised of the Director of Environmental Services, Mike Parsons, and the Manager of Water, Chris Whetstone.

The 2024 Management Review was presented by the Utility Compliance Technologist, David Cattrysse, as well as the Supervisor of Metering and Compliance, Harpreet Sumra to Top Management. Action items from the 2023 and 2024 Management Reviews, along with their current statuses, can be found as Appendix A and B.

ANALYSIS:

System Description

System Summary

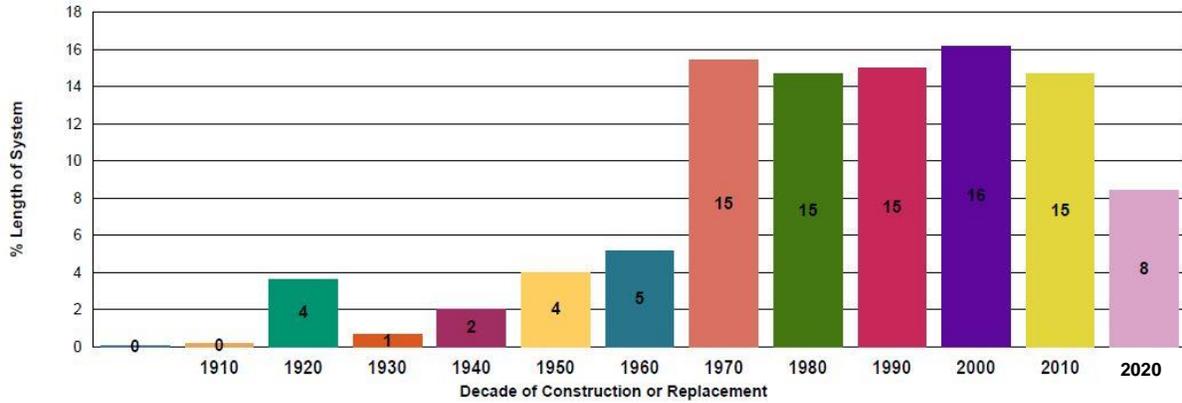
The City of Cambridge Water Distribution System contains roughly 614 kms of watermain, including approximately 60 kms of Regional transmission mains, 525 kms of City owned watermains and 29 kms of shared ownership mains. The City maintains and operates all mains. The total asset replacement value of the drinking water network is approximately \$931.1M.

In 2024 the system grew by approximately 0.3%, the equivalent of 1.8 kms of new watermain, with an additional 5.3 kms of watermain rehabilitated or replaced. 501 new service valves and 50 new main valves were also added to support residential and industrial growth.

Within the water system there are 6863 valves and 3,693 fire hydrants. Additionally, there are approximately 41,000 service connections in the City with roughly 391 km of water service pipe to maintain.

System Profile

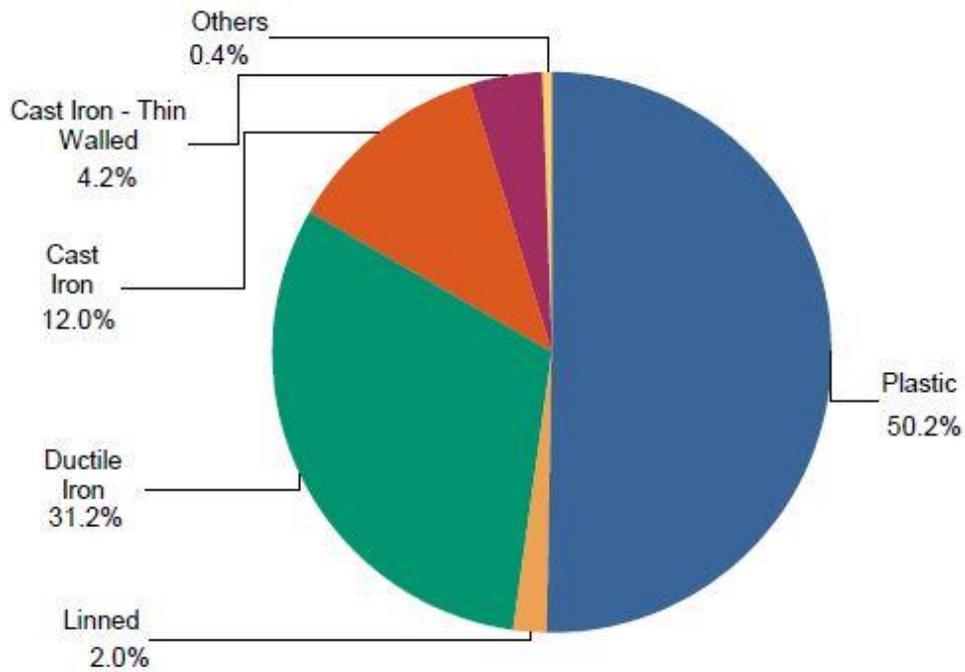
The following charts provide a comprehensive overview of the current age and material composition of the City's Water Distribution System.



Source: Asset Inventory Registry -am.age_profile_wat

Chart 1: Water System Age Profile

Chart 1 illustrates that the majority (84%) of the water distribution system was installed after 1970, with 40% of all watermains being less than 25 years old.



Source: Asset Inventory Registry - am.wat_pipe_stats_by_material

Chart 2: Water Pipe Material

Chart 2 highlights the material breakdown of the watermains, indicating that approximately half (50.2%) of the system is comprised of plastic pipes. The remainder of the system primarily consists of ductile iron, which accounts for 31.2%, and cast iron, accounting for 12.0%.

Auditing and Inspection

The City completed its annual Drinking Water Quality Management Standard (DWQMS) internal audit in June 2024. The audit, conducted by Acclaims Environmental, an independent third-party auditor, and was supported by the City's Environmental Services staff. The objective of the audit was to determine whether the City's Drinking Water Quality Management System (QMS) conforms to the DWQMS requirements set forth by the Ontario Ministry of Conservation and Parks (MECP). Through this exercise zero (0) non-conformances, one (1) opportunity for improvement, and four (4) staff suggested opportunities for improvement were identified.

The City completed its annual DWQMS external audit was in September 2024 through a remote documentation review. As required, the surveillance audit was performed by a third-party auditor, SAI Global. The external audit follows the same objectives as the internal audit. Through this exercise zero (0) non-conformances, and one (1) opportunity for improvement were identified.

All opportunities for improvement identified in the internal and external audits have been promptly followed up on and are documented in the City's work management system.

To finalize the year's review, the MECP performed its annual inspection between January and March of 2025 for the entirety of 2024. This unannounced, focused inspection was conducted to confirm compliance with applicable legislation and conformance with ministry drinking water policies and guidelines. Through this exercise, one (1) non-compliance was identified, zero (0) opportunities for improvement, and zero (0) non-conformances were found for a final score of 92.52%

The single non-compliance resulted from a delay in reporting, and performing corrective actions, following the receipt of a chlorine test result that was below the required concentration for combined chlorine (0.25 mg/L). The water test was performed as part of the City's dead-end flushing program at 10:50pm on September 4, 2024. Upon staff realizing the oversight the next morning notification, flushing and resampling was immediately completed to the satisfaction of Public Health and the MECP.

For improved awareness, business intelligence functions were implemented to alert supervisors autonomously when adverse chlorine results are entered into work orders.

Please see the full inspection report attached for additional details.

The annual inspections and audits are fundamental checks on the system, helping to underscore the City's ongoing commitment to maintaining high standards of water quality management and ensuring the safety of its drinking water for all residents.

System Maintenance Activities

In 2024, the City efficiently responded to and repaired 30 watermain breaks. This marks a slight reduction from 2023, which saw 31 watermain breaks, as illustrated in **Chart 3**.

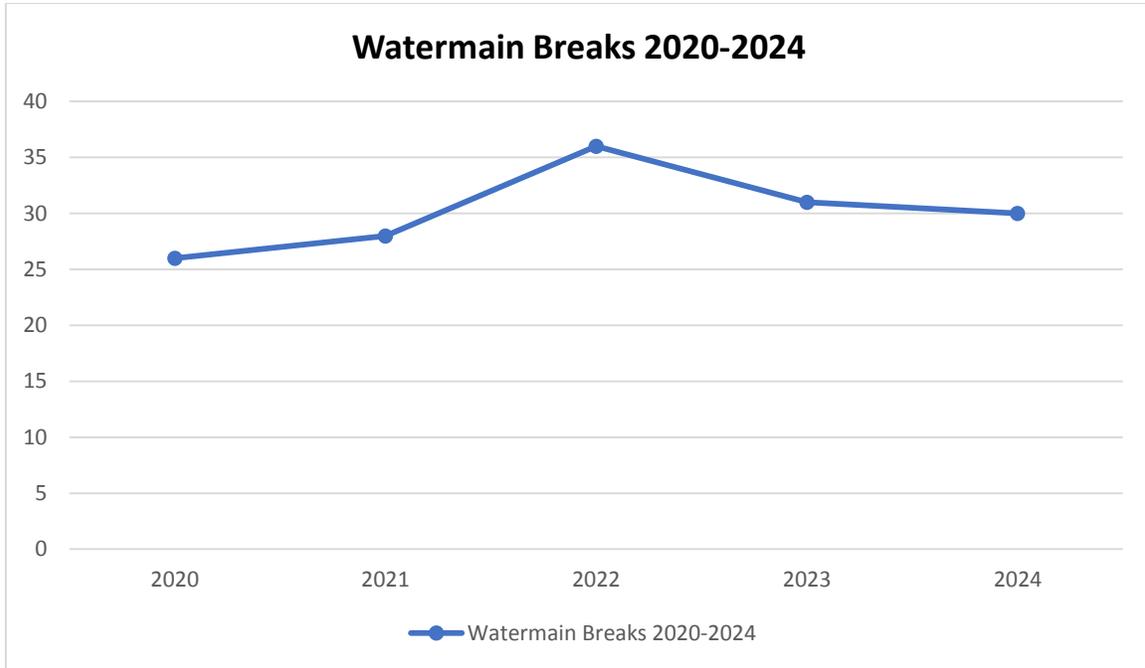
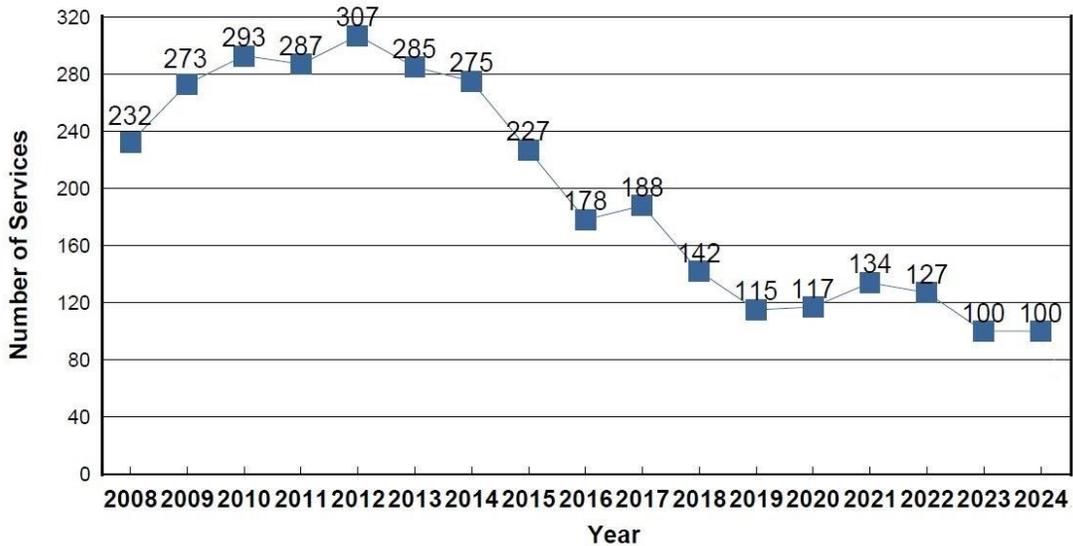


Chart 3: Watermain Breaks 2020-2024

The City identified and repaired 100 service leaks in 2024, matching the 100 repaired in 2023. This consistent performance reflects an ongoing positive trend in the reduction of water service leaks. Since 2012, the City has seen a significant decrease in leaks, with a notable drop from the record high of 307 service leaks repaired in 2012.

Chart 4 provides a comprehensive summary of the number of service leaks repaired since 2008, highlighting the City's continued efforts in improving water infrastructure and reducing water loss.

Water Service Repaired / Replaced



Source : Maximo : am.maximo wat ser repair repl

Chart 4: Service Leak Responses 2008 – 2024

Through preventative maintenance programs City staff proactively exercised approximately 836 recorded valves in 2024, which accounted for roughly 13% of all water distribution valves, slightly up from 813 recorded valves in 2023. While landing under the annual target of 15%, the total valves turned trends closer to the target when accounting for valves that were exercised but registered through alternative reporting methods.

Fire hydrant preventative maintenance programs saw inspections completed on 3,762 hydrants, reaching a 100% completion rate for the third (3) consecutive year. The hydrant painting project continued in 2024, resulting in 1,174 hydrants being sanded, cleaned, and painted, improving the appearance to a significant portion of our hydrants, and improving customer confidence.

Watermain flushing and swabbing activities continued in 2024, with roughly 119 km of the system being unidirectionally flushed throughout the City to effectively scrub the inside of the pipes, remove accumulated sediment and scale, improve water quality and reduce friction loss in the system for improved flow characteristics.

Non-Revenue Water use and Water Loss

City staff continued to deploy sensitive listening equipment strategically throughout the system in 2024 in an on-going effort to catch leaks proactively, and before they surface, resulting in expensive restorations, claims and outages to customers.

In 2024, City staff deployed 1873 leak detection loggers, increased from 1501 in 2023. Through these efforts 2 watermain breaks, and 5 service leaks were proactively discovered and repaired, compared to 5 main breaks and 3 service leaks in 2023, noted in **Chart 5**.

The proactive detection of leaks before they surface is a critically helpful tool, as certain leaks have the potential to go unnoticed for extended periods due to large areas of fractured bedrock beneath the City, which provide a pathway for water to escape undetected.

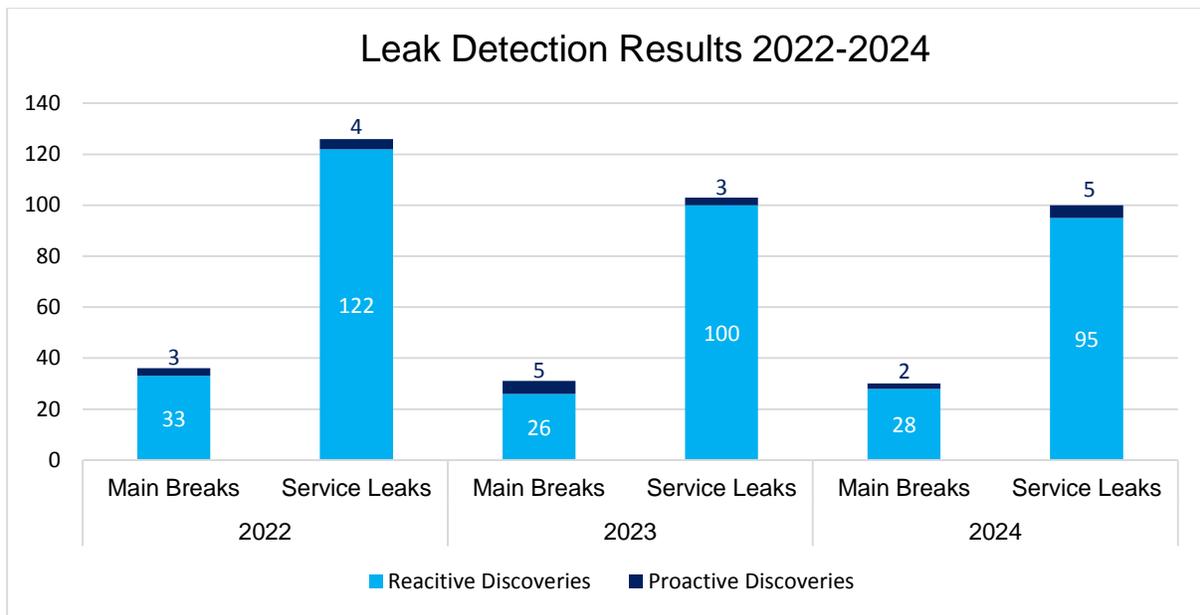


Chart 5: Leak Detection Results 2022-2024

Detecting leaks in plastic piping systems presents unique challenges, as they are not easily identified through audible noise alone. As a result, Water staff have been establishing District Metering Areas (DMAs). These areas allow staff to perform mass balance calculations on neighbourhoods that are suspected of having high to moderate water loss. In 2024, staff utilized 4 DMAs located in various areas of the City in an effort to detect unseen leaks.

The City's Engineering Standards and Development Manual requires new developments to be equipped with DMA meters (provided by developers) in an effort to provide the City with more DMAs to help prevent future water loss. The continuous benefits of these projects are being assessed, with the development of a long-range DMA strategy potentially being implemented.

The 2024 Water Loss Audit identified a non-revenue water use (including water loss) rate of 17.7% for 2024, a slight increase from the 2023 rate of 16.6%. Non-revenue

water use is calculated using water billing revenue, purchased volumes from the Region of Waterloo, and known operational uses including fire protection, hydrant flushing, watermain swabbing/flushing, and other preventative maintenance measures.

Advanced Metering Infrastructure (AMI) Project

99.8% of all meters in the City of Cambridge have been swapped/converted to AMI since the start of 2018, with 68 metered connections remaining as end of December 2024. The remaining connections consist primarily of meters that are not compatible with the system, are inaccessible to staff, or have been abandoned.

Water Sampling

The City, with support from the Region of Waterloo Environmental Enforcement and Laboratory Services (EELS) staff, collected and analyzed 2457 regularly scheduled water samples in 2024. Amongst these samples, 1628 microbiological samples were taken, for an average of 136 a month, ensuring the City was over MECP required 114. There were 821 chlorine residual samples taken, an average of 15.8 per week, ensuring the City was over the MECP required 7. Trihalomethanes (THMs) and haloacetic acids (HAAs) were sampled quarterly, in line with MECP requirements.

The 2457 samples yielded 9 Adverse Water Quality Incidents (AWQI) as per O. Reg 170/03. Each individual AWQI underwent corrective actions, such as flushing and resampling, resulting in all AWQIs being resolved without disruption to the public. Detailed water sampling information can be located in the 2024 Annual Water Summary Report 25-001-IFS.

Cross-Connection Controls

The City has observed an average of 92% of cross-connection folders being in, or within 3 months of, compliance in 2024, down from 94% in 2023, but above the targeted threshold of 90%.

EXISTING POLICY / BY-LAW(S):

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.
- Maintaining and continually improving our Quality Management System.

FINANCIAL IMPACT:

The 2024 operational budget for Water was \$42,830,000. The budget increased for 2025 by \$1.468M for a total of \$44,297,600.

PUBLIC VALUE:

This report provides public information relating to the status of the 2024 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 Financial Services, Asset Management, Engineering and Building Divisions.

This report references the 2024 DWQMS Audit Report provided by SAI Global, as well as the Cambridge Distribution System Inspection Report for 2024 provided by Ministry of Environment, Conservation and Parks.

CONCLUSION:

As referenced in the Drinking Water System Performance Report, The City has met, and continues to meet, all legislative requirements and continues to improve and sustain its Drinking Water Distribution System.

REPORT IMPACTS:

Agreement: **No**

By-law: **No**

Budget Amendment: **No**

Policy: **No**

APPROVALS:

This report has gone through the appropriate workflow and has been reviewed and or approved by the following as required:

Director

Deputy City Manager

Chief Financial Officer

City Solicitor

City Manager

ATTACHMENTS:

1. 25-002-IFS Appendix A – 2023 Top Management Review Action Items
2. 25-002-IFS Appendix B – 2024 Top Management Review Action Items
3. 25-002-IFS Appendix C – Final 2024-25 Cambridge Distribution System Inspection Report