



Hamilton

INFORMATION REPORT

TO:	Chair and Members Public Works Committee
COMMITTEE DATE:	April 29, 2024
SUBJECT/REPORT NO:	Annual Watermain Break Report (City Wide) (PW24013)
WARD(S) AFFECTED:	City Wide
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SIGNATURE:	

COUNCIL DIRECTION

On January 23, 2019, Council directed staff to provide the Public Works Committee with an annual report on watermain breaks, the total number, cause, and cost of each break, as well as the distance of watermains relined with total cost and overall report on sustainability.

INFORMATION

Total Number, Cause and Cost of Watermain Breaks:

In 2023, Hamilton Water experienced a total of 188 watermain breaks resulting in a total repair cost of approximately \$1.45M. The total repair cost is the sum of repair costs valued at \$0.80M (including excavation, repair, and temporary restoration), and permanent restoration costs valued at approximately \$0.65M.

Approximately 30% of the watermain breaks were caused by corrosion, 64% were caused by ground movement, 4% were the result of displaced pipe joints, and 2% were caused and repaired by a contractor. A summary of watermain breaks by cost and mode of failure is provided in Appendix "A" to Report PW24013. A detailed report of the cost and mode of failure of each watermain break is provided in Appendix "B" to Report PW24013.

On average, from 2013 to 2023, the City of Hamilton (City) experienced

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approximately 296 watermain breaks per year. However, this average is affected by significantly higher numbers of watermain breaks in 2014 (440) and 2015 (433). The increased number of watermain breaks in 2014 and 2015 were the result of abnormally low winter temperatures caused by polar vortex events. A summary of total watermain breaks by year for the previous 10 years is provided in Appendix “C” to Report PW24013.

Distance and Cost of the Watermain Relining and Replacement Program:

The Engineering Services Division monitors and tracks the length and cost of watermains that are replaced and relined.

Since 2014, Engineering Services has relined 51.9 km of watermain at a cost of \$51.9M. In 2023 the length of watermains relined was 2.8 km at a cost of \$3.1M.

Since 2014, Engineering Services has replaced 54.5 km of watermain at cost of \$77.8M. In 2023 the length of watermains replaced was 4.5 km at a cost of \$7.6M.

A 10-year historical summary of watermain replacements and relining is provided in Appendix “D” to Report PW24013.

From 2024 through 2033, the City plans to spend \$285.2M on watermain replacement and relining projects. A summary of the projects that have been approved in principle as part of the 10-year Water, Wastewater and Storm Rate Budget is provided in Appendix “E” to Report PW24013.

The Hamilton Water Division, Water Distribution & Wastewater Collection Section is responsible for maintenance and repairs of the City’s watermains throughout the asset lifecycle. This work adheres to the strict legislative requirements for potable water for municipal drinking water systems.

The primary objective of the City’s asset management, maintenance, and repair programs for watermains is to ensure the safe and reliable supply of potable water to the City’s residents and industrial, commercial, and institutional customers that meets or exceeds regulatory requirements. The City’s water distribution systems are designed with a significant amount of redundancy, allowing sections of watermain to be isolated for maintenance and repairs to be completed with minimal disruption to the supply of potable water to the City’s customers.

Transmission watermains are large watermains (typically 450mm and larger in diameter) designed to transport significant volumes of water throughout the City. They serve essential functions such as filling potable water storage facilities like reservoirs and towers, supplying water pumping stations, and distributing water to local watermains. Transmission watermains carry the largest risk for the City in

terms of ensuring that the supply of potable water remains uninterrupted. Due to the criticality of transmission watermains the Infrastructure Renewal Section within the Engineering Services Division completes periodic condition assessments. Local watermains or distribution watermains, are smaller (typically 400mm or smaller in diameter), and they supply potable water to the serviced properties within the City.

The City has 199 km of transmission watermains and 1,975 km of distribution watermains for a total of 2,174 km of watermains. These watermains range in age with 19% of distribution and 34% of transmission watermains being over 75 years old. A summary of the City's transmission and distribution watermain inventory is provided in Appendix "F" to Report PW24013.

Non-Revenue Water and Leak Detection

Drinking water that has been produced by the City that is lost before it reaches the customer is considered non-revenue water. Non-revenue water can occur through physical losses such as watermain breaks and from unbilled but authorized consumption such as watermain flushing and firefighting. Non-revenue water can also come from water meter inaccuracies, data handling errors, illegal connections, and water theft. A significant contributor to the City's non-revenue water is leaking and broken watermains. Ideally the total volume of water produced by each Municipality would be equal to the volume of water that reaches and is accurately billed to the consumers. However, this is never the case. The financial consequences of non-revenue water include lost revenue from unbilled consumption, theft, and increased operational costs to produce and distribute drinking water.

Due to Hamilton's unique geography and often rocky, porous ground there are many watermain leaks that do not surface and have the potential to remain undetected for years. These hidden leaks account for a large amount of non-revenue water and can be far more damaging to the pipe network, with erosion of pipe bedding leading to major pipe failures.

Currently, non-revenue water in the City represents about 23.9% of the water produced or imported by the City. While this is significantly higher than the industry standard of 15% the City has made significant improvements since 2018 when the non-revenue water peaked at 30.5%. The overall reduction of non-revenue water is a result of the City's proactive maintenance and inspection programs. These programs include the proactive leak detection, watermain relining and the specialty valve inspection and maintenance programs. The proactive leak detection program which was launched in 2019 has contributed significantly to the reduction in non-revenue water and has been recognized throughout the industry as best in class. Since the program began, 478 leaks have been identified and repaired. Most leaks were tied to public infrastructure like watermains, valves, services, and hydrants. On average, approximately 25% of the leaks were on private water services.

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Year over year non-revenue water percentages are provided in Appendix “G” to Report PW24013. A summary of both private and public leaks identified through the proactive leak detection program since 2019 is provided as Appendix “H” to Report PW24013.

APPENDICES AND SCHEDULES ATTACHED

Appendix “A” to Report PW24013 – Summary of Watermain Breaks by Cost and Mode of Failure

Appendix “B” to Report PW24013 – Detailed Watermain Break Mode of Failure and Cost Data

Appendix “C” to Report PW24013 – Summary of Total Watermain Breaks by Year

Appendix “D” to Report PW24013 – 10-Year Summary of Watermain Replacements and Relining

Appendix “E” to Report PW24013 – Summary of Approved in Principle, Watermain Replacement and Relining Projects in 10-Year Water, Wastewater and Storm Rate Budget

Appendix “F” to Report PW24013 – Summary of the City’s Transmission and Distribution Watermain Inventory by Age

Appendix “G” to Report PW24013 – Summary of Non-Revenue Water

Appendix “H” to Report PW24013 – Summary of Private and Public Leaks Identified