Kitchener Utilities
City of Kitchener Drinking Water Distribution System

Drinking Water Quality Management Standard
Management Review – 2022

City of Kitchener Water Distribution

DWQMS Management Review

TABLE OF CONTENTS

City of Kitchener Water Distribution

DWQMS Management Review

PART A - INTRODUCTION

Purpose

The purpose of this report is to inform the decision-making authority about the status of the drinking water system. The Drinking Water Quality Management Standard (DWQMS) under the Ministry of Environment, Conservation and Parks (MECP) requires management to review and evaluate the continuing suitability, adequacy, and effectiveness of the Quality Management System at least once a calendar year and that the results of the management review, identified deficiencies, decisions and action items are provided to Council as the 'Owner' of the drinking water system.

Executive Summary

Highlights of the report are:

- The Summary Water Report-2022 (INS-2023-010) confirmed that the drinking water system was in compliance with regulatory water sampling requirements during 2022. The DWQMS Management Review confirms the continuing adequacy and effectiveness of the quality management system which includes compliance, customer feedback, operational performance, audit information etc. as outlined in this report.
- COVID restrictions were minimal and largely did not impact 2022 operations; however, construction and operating costs increased.
- Year Five Water Infrastructure Program (WIP) maintenance end of year achievements (specific areas of improvement identified by WIP):
    - Cleaned approximately 168km of watermain. 2022 was the final year of the 6 year program to complete all main cleaning over 6 years. In 2023 the program will restart with the area previously cleaned in 2017.
    - Water quality complaints continue to decrease. There were 105 complaints total with 28 discoloured water complaints for 2022; which has greatly decreased from pre-watermain cleaning/pre-treatment plant upgrade levels in 2016 (395 complaints total with 147 discoloured water).
    - 21 broken valves and/or failing valves were either replaced or removed which allows for quicker isolation for water emergencies. Broken valves are tracked in real time and the majority are addressed within weeks (except for winter).
    - Approximately 1,873 valves were proactively operated (23%); the majority were within the watermain cleaning area and the 2022 reconstruction areas. Operating valves ensures that they will work when they are needed in an emergency or for construction activities.
    - Completed spring and fall maintenance of fire hydrants.
    - Underground utility locates – continued to meet regulatory requirements with a combination of in-house and contract staff (17,885 locates completed; representing the largest number of locates completed over the past 10 years).
    - Approximately 3,300 services are protected by Backflow Prevention (BFP) – the focus is on high risk use.

  - Regulatory reliefs were provided by the Ministry to decrease the number of monthly samples and to limit the fall lead testing programs (customer premises) to hydrants only due to COVID restrictions. A relief has also been granted for the spring 2023 lead testing program (hydrants only).
- An inspection of approximately 130 air relief valves in chambers was completed. No air reliefs were replaced in 2022. A study was commenced to determine which air reliefs require replacement and which may be removed.
- There were 93 watermain breaks in 2022, which is above than the 5-year average of 84.
- Approximately 6,065 aging/problem water meters were replaced.
- Hydrant painting program for corrosion protection was re-started with 450 hydrants painted, painting will continue in 2023. Hydrants are also stencilled with the watermain diameter for the Fire Department.
- Unaccounted for water was 10% (At the 10% industry target). The unaccounted for water generally fluctuates around 10% (9-12%, with 10% being the approx. 10 year average).
- Pressure reducing valve maintenance was completed.
- The Water Utility Asset Management Plan was completed in 2022. The water assets have a value of more than $1 Billion and are generally in very good condition. Overall, watermains are more than halfway through their useful life. This is being addressed through the WIP.
- Staff training programs included: Ethics for Drinking Water Operators, Water Quality for Distribution System Operators and New Watermain Commissioning Course. DWQMS Awareness training occurred for new staff.
- Replaced watermains as outlined in the 2022 City of Kitchener Engineering & Water Utility Capital Forecast.
- External audit determined that the management system is effectively implemented and maintained and recommended continued certification of accreditation for the municipal drinking water system.
- Increased erosion and sediment control procedures during watermain breaks to minimize sediment from entering storm sewer and to provide rehabilitation steps if sediment does enter storm sewer or watercourses. Sediment control/rehabilitation costs associated with watermain breaks can be significant.
- Locate related costs are expected to increase significantly in 2023 due to new regulatory requirements. Locating costs are split between gas and water. A Locate Review is currently being led by the City's Internal Auditor to evaluate the service level, risk and resourcing needs associated with new legislative requirements.

Continuing Areas of Focus are:

- Continue with tasks associated with the next WIP review.
- Re-endorsement of the DWQMS Operational Plan by Council.

- Approval of the Water Distribution System Financial Plan as part of Application for Renewal of Licence due later this year.
- Proceed with improvements to the As-built process in conjunction with Engineering, specifically hiring the additional resource approved through the budget process. There has been difficulty filling this position. Hiring staff is the last outstanding item related to the 2020 MECP inspection which flagged that The owner did not have up-to-date documents describing the distribution components as required. As-builts and GIS mapping is required within 12-months from when a new watermain is commissioned. A number of process changes have been completed over the last 2 years to improve turn-around time.
- Development and roll out AMANDA solution for better tracking of Backflow Prevention/Cross Connection program.
- Development of a water disruption communication tool. The existing Watermain Break App provides for updates to the website and email for emergency watermain breaks but there is no notification for planned water outages or emergency outages associated with other infrastructure (valves, services).
- Check valves along the LRT. The valves are largely new but are deemed to be critical due to potential impacts to the LRT.
- Hydrant mobile field inspections are anticipated to be rolled out in spring 2023. It is anticipated that the solution will provide efficiencies by minimizing data entry and provide faster deficiency follow-up.
- Proceed with OnPoint roll-out to replace ArcReader infrastructure mapping.
- Proceed with filling technical water position approved as part of the 2023 budget process.
- Participation in locates review with Internal Auditor.

Background

One of recommendations from Justice O'Connor's Part Two Report of the Walkerton Inquiry was "The Ministry of the Environment should require the owners of municipal water systems to obtain an owner's licence for the operation of their waterworks". Justice O'Connor also recommended that the Owners and Operating Authorities of these systems implement a quality management approach to operations and management. As a result of these recommendations a Drinking Water Quality Management Standard (DWQMS) under the *Safe Drinking Water Act, 2002* was released in October 2006.

The *Safe Drinking Water Act, 2002* and *Regulation 188/07*, requires the City of Kitchener to be licensed to operate and maintain Kitchener's Water Distribution System. Some of the licensing requirements include the development and management of a Quality Management System (QMS) and Operational Plan as well as communication to the Owner. The City of Kitchener became licensed in August 2009 with a Financial Plan originally submitted in July 2010. Renewals of the Licence and Financial Plan were complete and brought forward to Council in 2014 and 2018, and every 4-5 years thereafter prior to each Drinking Water System License

renewal. The Financial Plan will be brought forward to Council in 2023 and an application for licence renewal will be made in late 2023.

Section 19 of the *Safe Drinking Water Act, 2002* imposes a statutory standard of care on persons who oversee the municipal drinking water system: "…every person who, on behalf of the municipality, oversees the accredited operating authority of the system or exercises decision-making authority over the system." This standard of care includes Council since they have decision-making authority as the 'Owner" of the system. Part of the standard of care includes requiring system owners to undertake financial planning and implement a QMS.

The following link is a guide for municipal councillors to help understand their responsibilities under the *Safe Drinking Water Act, 2002* and provides information on how Ontario's drinking water is safeguarded: Taking Care of Your Drinking Water: A Guide for Members of Municipal Councils | ontario.ca

Three things to remember as a municipal councillor (as outlined in the above Guide):

- It's your duty. There are legal consequences for not acting as required by the standard of care, including possible fines or imprisonment.
- Be informed. Your decisions can have an impact on public health. You don't have to be an expert in drinking water operations, but you do need to be informed about them.
- Be vigilant. It is critical you never take the drinking water safety for granted or assume all is well with the drinking water systems under your care and direction.

Other Related Water Quality Reports

The City of Kitchener Summary Water Report for 2022 is a regulatory report provided to Council, which provides a summary of drinking water including adverse water quality incidences and water volume.

The Kitchener Distribution System prepares an annual summary of the number of tests taken within the distribution system as well as the range of the results. A copy of this report is available on the Kitchener Utilities website.

The Kitchener Distribution System is part of an Integrated Urban System, meaning the Regional Municipality of Waterloo is responsible for water treatment and the development and operation of a trunk water network to distribute treated water to Kitchener, Cambridge, Waterloo, Woolwich, and Wilmot. There is a variety of groundwater supply wells (80%), treatment facilities as well as a Grand River (20%) source. The Region of Waterloo's water infrastructure system is complex, consisting of numerous supply sources, pressure zones, reservoirs, and pumping stations. Ensuring sufficient pressure and quantities to meet current and planned growth requires a long-term, co-ordinated strategy. The Region provides annual summaries for each supply and the information is available on their website with a link available at the Kitchener Utilities website.

A portion of Kitchener (River Ridge area) is supplied by the City of Waterloo. Kitchener supplies water to a small section of Waterloo (Ira Needles area) and water travels through the Kitchener distribution system to Breslau (Woolwich). The City of Waterloo's water quality report is available on their website.

Quality Management System Policy

Kitchener Utilities owns, maintains, and operates the City of Kitchener's Drinking Water Distribution System. At Kitchener Utilities, we are committed to supplying the City with safe drinking water. We work together as the City of Kitchener and the Region of Waterloo to keep water matters top of mind. We are committed to these principles:

1. Quality

Kitchener water is safely treated and regularly tested according to government legislation and regulations for the consistent delivery of safe, quality drinking water. We are committed to maintaining and continually improving the Quality Management System and complying with applicable legislation.

2. Trust

Trust us to look after your water needs by delivering quality water and reliable service.

3. Value

Tap water is the most economical choice.

4. Communication

We will communicate openly with the public concerning matters of drinking water quality.

PART B – MANAGEMENT REVIEW

System Description

The scope of the waterworks begins at the point where treated water enters the watermain from the treatment facilities and ends at the property lines of the consumers. There is no storage, chlorine boosting, secondary disinfection or pressure boosting within the control of the waterworks.

At the end of 2022, the waterworks consists of approximately:

- 924.6 km of distribution watermain – 792 km Kitchener owned, 23 km Dual owned (joint ownership between Kitchener and Region) and 109 km Regional owned .
- 70,572 water meters in service.
- 4,717 hydrants (not including private hydrants).
- 8,005 valves (not including service valves or hydrant valves) – 7,445 Kitchener owned, 130 Dual and 430 Regional.

(See **Appendix** for a map at end of this document)

The waterworks system has the following permits and licences:

- Municipal Drinking Water Licence
- Drinking Water Works Permit
- Financial Plan
- Operational Plan

Water Infrastructure Program

The Water Infrastructure Program (WIP) was initiated in spring 2017. Targets for Year 5 of maintenance-related work were achieved, included:

- Watermain cleaning program - cleaned 168km of the City.
- Valve maintenance and replacement programs – operated approximately 1,873 valves and replaced 21 broken or failing valves.
- Hydrant operation and maintenance – completed as required.
- Underground utility locates – continued to meet regulatory requirements with a combination of in-house and contract staff (17,885 locates completed).
- Approximately 3,300 services are protected by Backflow Prevention (BFP), approximately 2,400 still require protection. The exact number of devices will not be reportable until the new system is fully operational, anticipated in 2023.

COVID Impacts

- COVID impacts were lessened in 2022, however there were ongoing difficulties with parts/supplies on back order and cost increases. There are indications that the cost increases and supply chain issues will continue into 2023 and may impact reconstruction project costs. Staff are monitoring trends closely to determine appropriate mitigation actions.
- A regulatory relief was provided for the spring and fall lead sampling program – hydrants were only sampled, no internal sampling. A request for relief from the spring 2023 program has been granted.

Incidents of Regulatory Non Compliance

A Ministry of Environment, Conservation and Parks (MECP) completed an announced inspection on June 23, 2023, and covered June 23, 2021, to June 23, 2022. There were no notices of non-compliance.

A notice of violation was created by the MECP on September 16, 2022, relating to three watermain breaks which occurred on September 14, 2022. Due to a lack of erosion and sediment control measures, significant sediment was discharged to Sandrock Creek. Corrective action included hiring a third party to assess the creek, completion of recommended remediation activities, creation of new procedures to prevent future issues and training staff on the procedures.

Incidences of Adverse Drinking Water

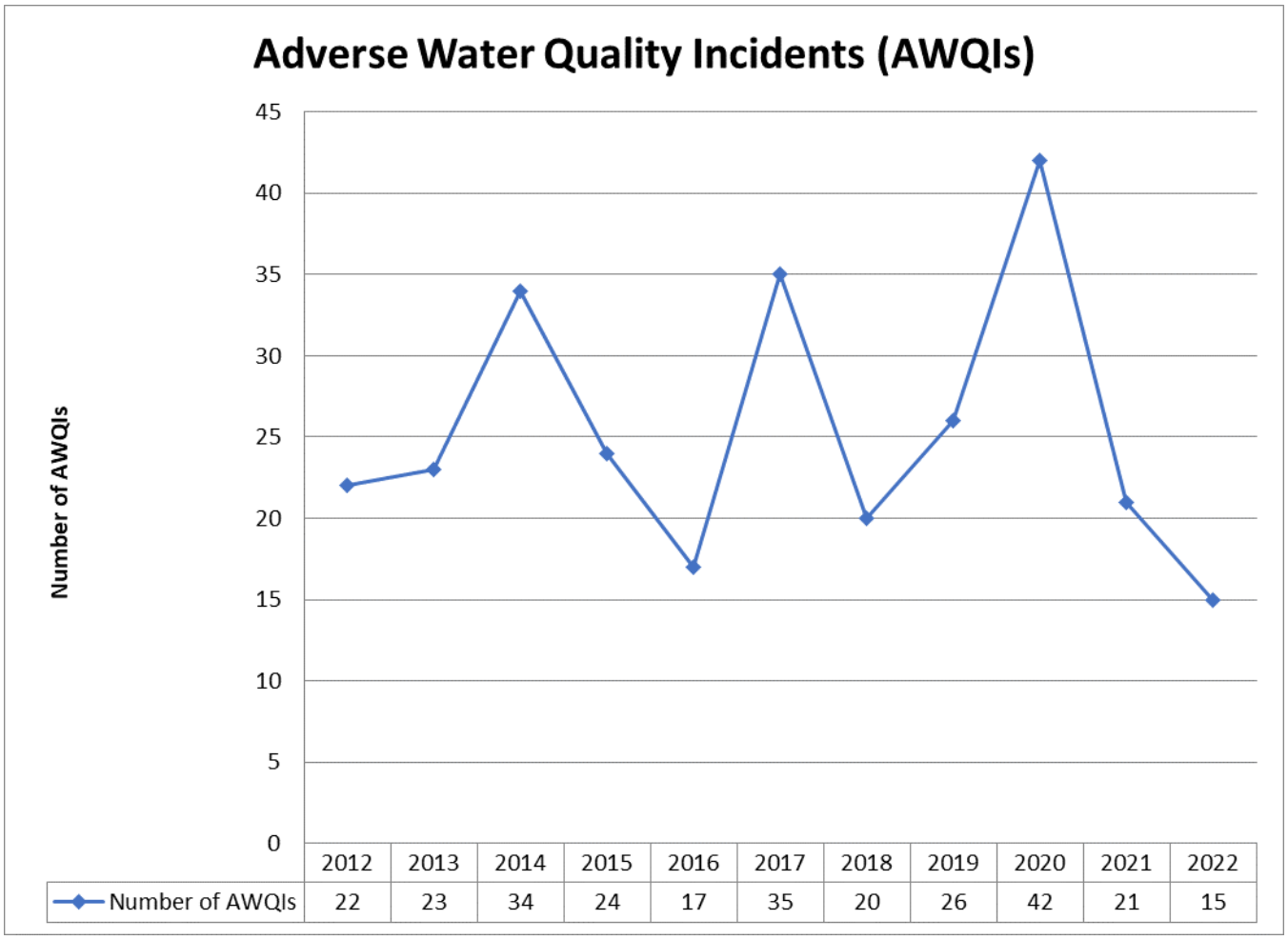
There were 15 Adverse Water Quality Incidences (AWQI) during the year. One self-imposed Boil Water Advisories (BWA) was initiated in 2022 and one Drinking Water Advisory (DWA) was initiated. The volume of AWQIs decreased from 2021, the majority of the decrease was related to temporary watermains used during construction. Temporary watermains are particularly sensitive as they are above ground systems influenced by the water heating up in warmer temperatures. This may increase the potential for bacteriological growth. Warmer weather seems to increase the incidences of Total Coliform. The additional challenge with temporary watermains is the sample port is located outside and subject to unsanitary conditions. Many contractors remove the sampling ports when not in use because they are subject to vandalism/theft. These ports need to be maintained in a sanitary condition between uses. The general nature of reconstruction projects often leads to “false positives”, where the results received are more reflective of what is on the sampling tap, rather than what is in the water. Every positive result is reportable, and resampling must occur in accordance with regulations. When the resamples are clear, it is an indication that the issue was with the sampling port, not in the water. Additional communications efforts to contractors regarding the importance of maintain the sampling ports in a sanitary manner was made over the 2022 construction season. These communication efforts will continue for 2023 and beyond.

- Low chlorine AWQIs (8 total)

  - Six were in areas of new subdivisions with no houses yet built. Along with dead ends, KU proactively flushes new areas until there are homes built and water is being used.
- Total coliform AWQIs (5 total)
  - 4 were at temporary main sampling locations.
  - 1 was at a distribution sampling location.
- Boil Water Advisory (BWA – 1 total)
  - E-Coli present in distribution sample for KID 129 Victoria Hills Community Centre.
- Drinking Water Advisory (DWA – 1 total)
  - Non-Potable Grease found on Fitting at 2 services
- Lead:
  - No lead adverses were reported in 2022. Due to COVID, the spring and fall lead program was reduced to sampling for lead at hydrants (relief was granted by MECP). No exceedances were reported.

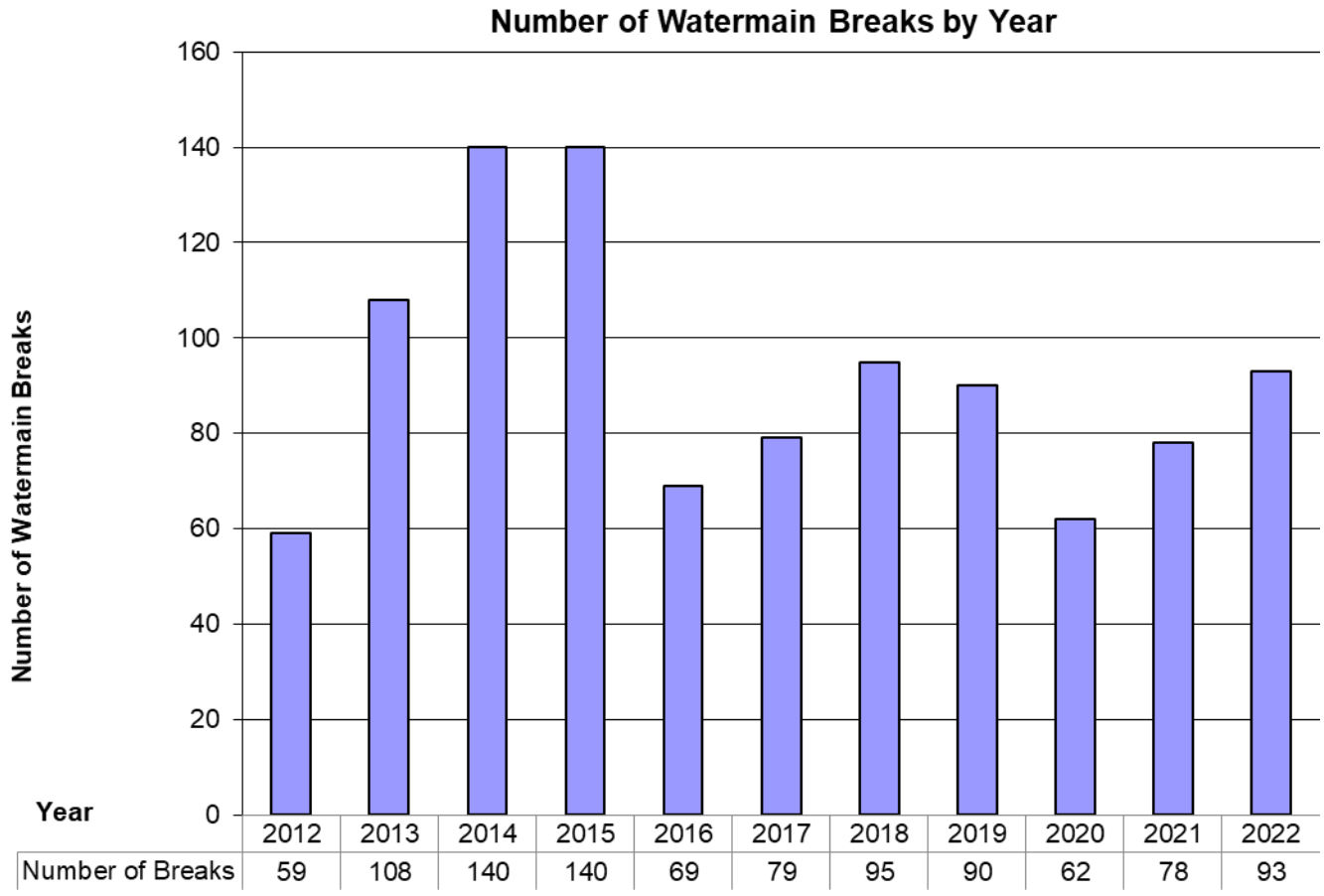
In general, corrective actions include reporting, flushing and resampling. The above AWQIs were all resolved. The Summary Water Report for 2022 discusses water quality compliance and corrective actions further.

Action: No further action required – for information only



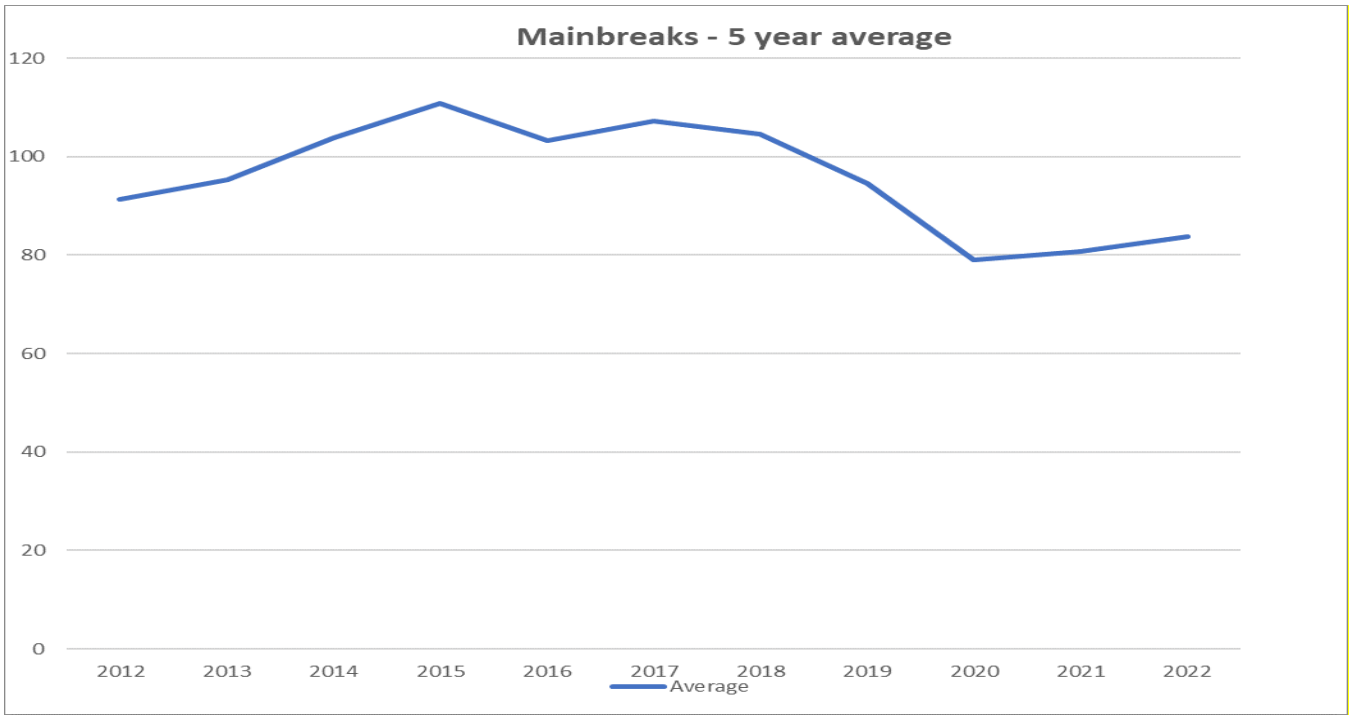
Deviations from Critical Control Points Limits and Response

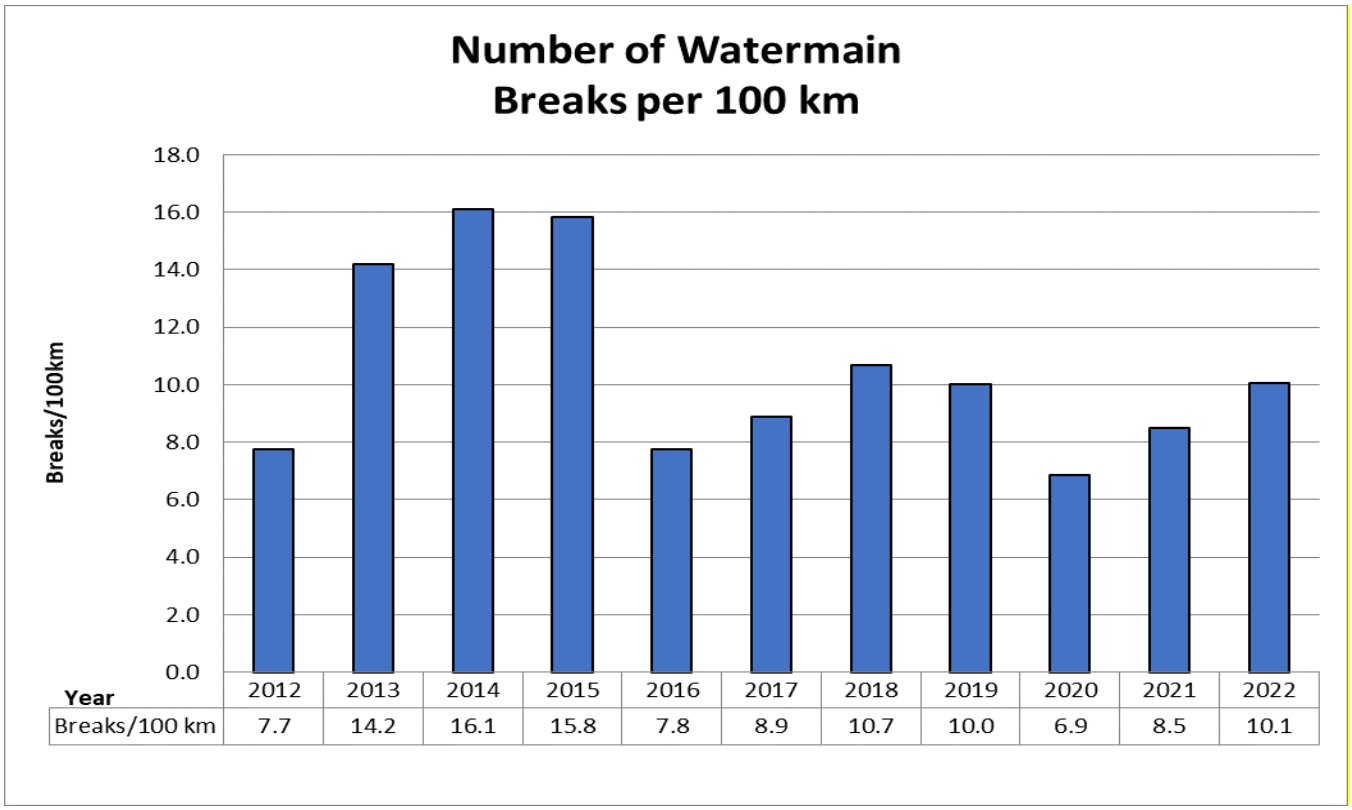
- There were 93 watermain breaks in 2022, which is slightly higher than the 5-year average of 84. Of the 93, 17 were deemed to be Category 2. Category 2 watermain breaks require bacteriological sampling upon completion. The 5-year average increased slightly due to an increase in watermain breaks in 2022 over 2021 as well as the removal of a low break year (2017 was 79 breaks). Watermain breaks are influenced by the watermain age/condition, material type, and is also heavily weather dependent due to the frost movement with colder winters resulting in more breaks. Incident debriefs are completed for watermain breaks and break history is included as part of asset condition. This information helps to determine priorities for replacement due to condition.


Number of Watermain Breaks by Year
Number of Watermain Breaks
160
140
120
100
80
60
40
20
0
Year
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Number of Breaks
59
108
140
140
69
79
95
90
62
78
93

City of Kitchener Water Distribution

DWQMS Management Review



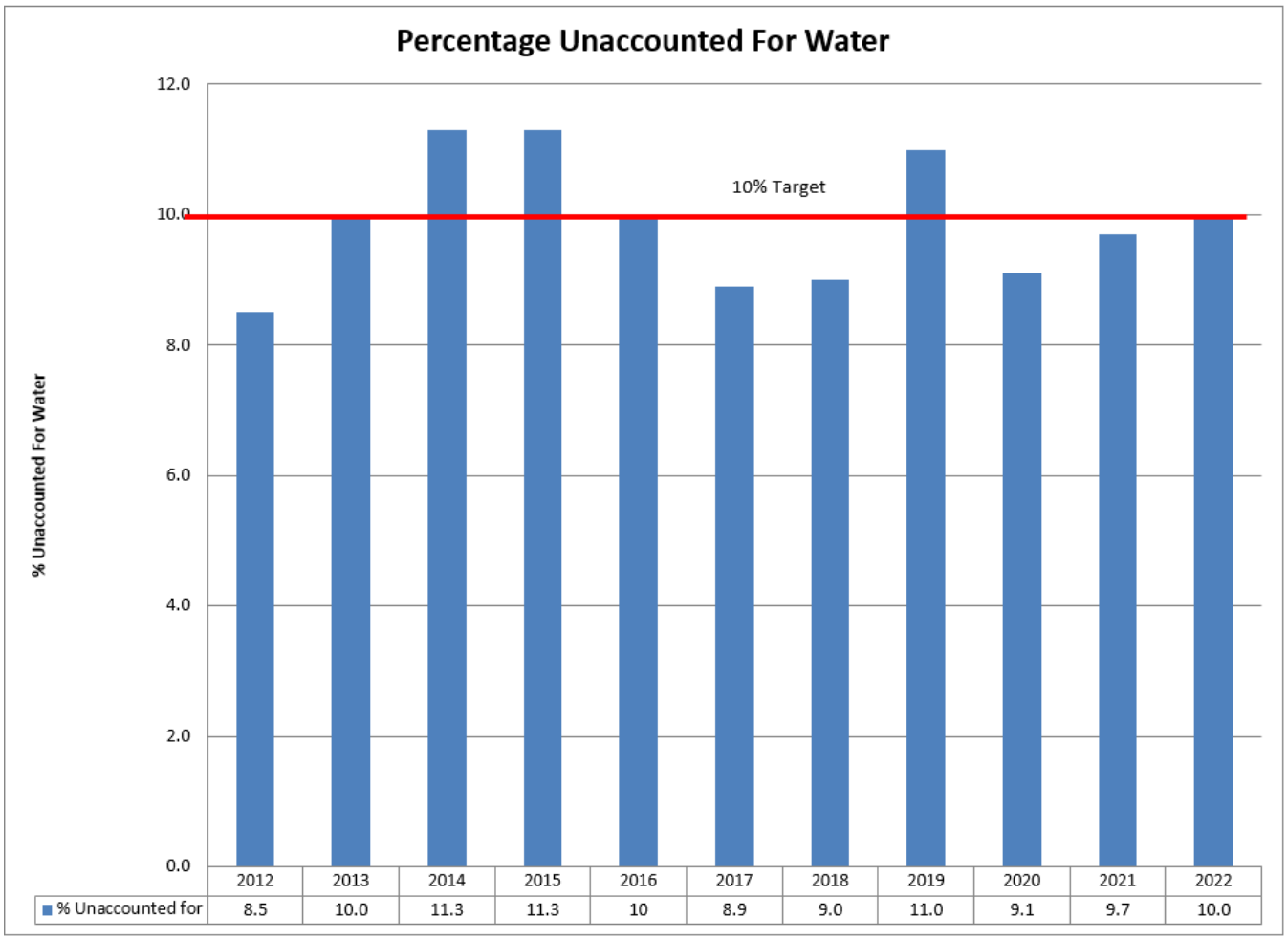


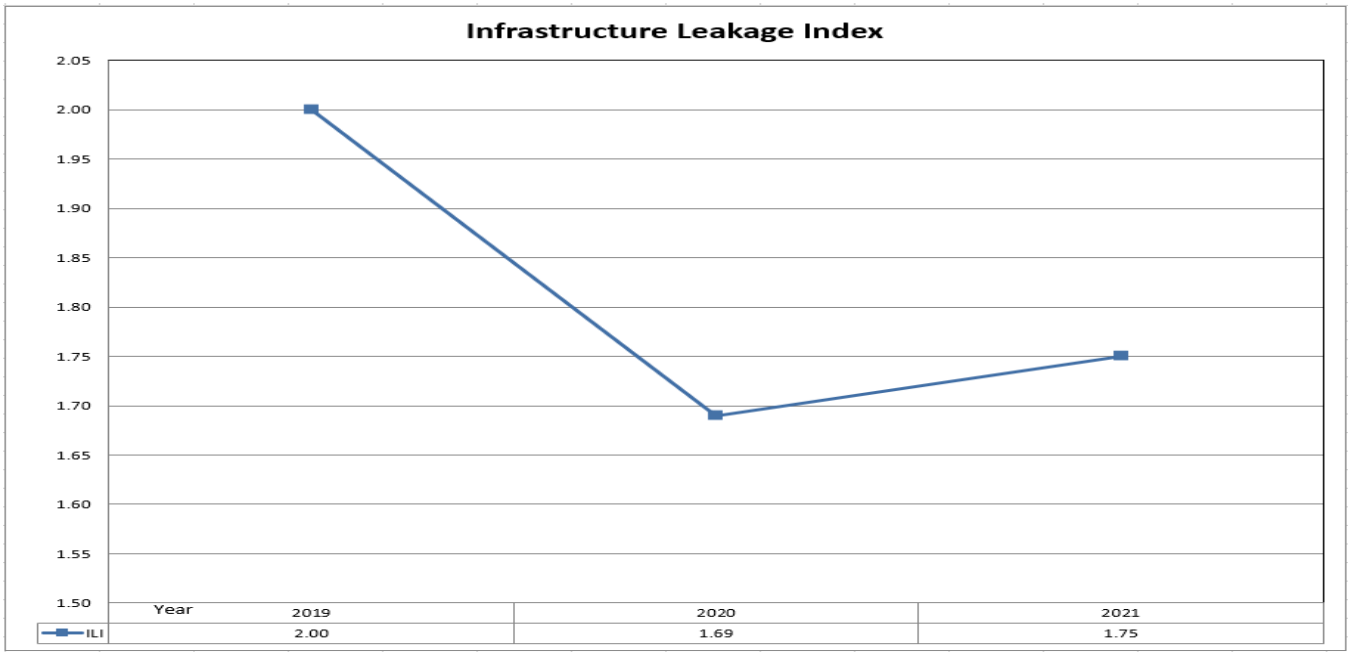
Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Breaks/100 km	7.7	14.2	16.1	15.8	7.8	8.9	10.7	10.0	6.9	8.5	10.1

- Unaccounted for water for was 10%; the MECP target is 10%. Water loss includes water used for construction watermain commissioning (e.g., new mains and replacement mains), water for temporary main supply during reconstruction, and water use for reactive flushing). The 10-year average for Kitchener is 9.9%, although the percentage fluctuates.
- Infrastructure Leak Index (ILI) is a performance indicator which is the ratio of the level of Current Annual Real Losses (CARL) to the Unavoidable Annual Real Losses (UARL). The UARL considers the total length of watermain in the distribution system, number of hydrants, average pressures, number of service connections, length of service and hydrant connections. The UARL is the theoretical low limit of leakage that could be achieved if all the current best leakage management could be implemented. The URAL is specific to each water system. For example, the UARL for a large system with high pressure will be higher than a small system with low pressure. Leakage in any water system can never be totally eliminated. One caveat is that the calculation is made based on an average pressure. Kitchener has several pressure zones with a great deal of variation across the city. As part of the National Water and Wastewater Benchmarking Initiative (Benchmarking), Kitchener recently began reporting ILI and trending will be established as more data is generating. Benchmarking is completed on the previous year's data. The 2021 ILI value was 1.75 meaning the current level of real losses is 1.75 times greater than the theoretical low level losses. The ILI graph is a comparison to other Cities participating in 2021 benchmarking.

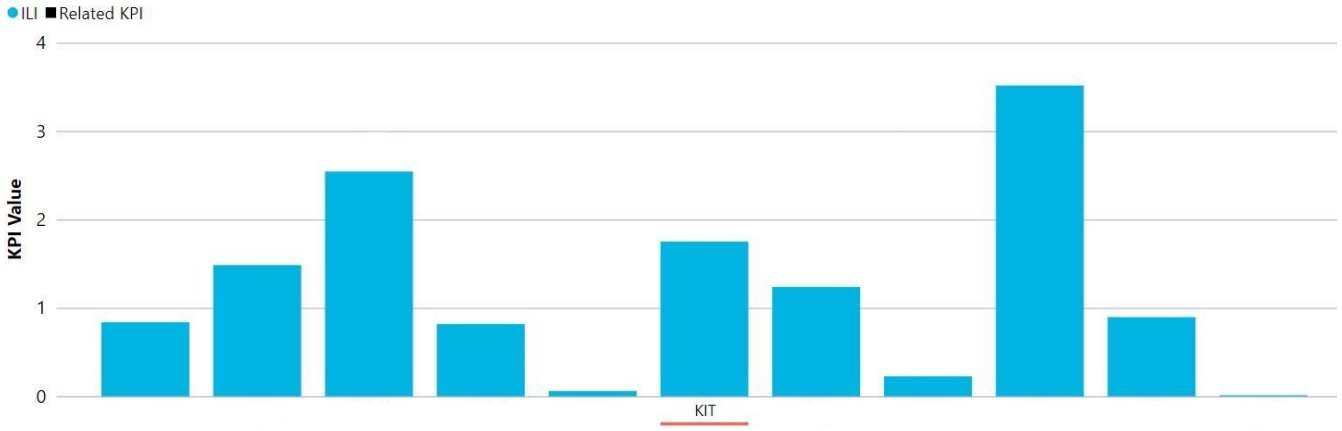
City of Kitchener Water Distribution

DWQMS Management Review





Displaying: Infrastructure Leakage Index - Non Outliers



Action: No further action required – for information only

Effectiveness of the Risk Assessment Process

- A risk assessment was completed on September 22, 2022. For 2022, attendees included staff from the Region of Waterloo and City of Kitchener. The purpose of the risk assessment was to brainstorm potential risks and identify counter measures, where appropriate. The following is a summary:

- Reviewed all risks to ensure all information and assumptions are current and valid. Also discussed and added the following new potential risks:
  - Cyber Security.
  - Telecommunications provider outage.
  - OnPoint GIS mapping system to replace existing ArcReader system (not scored – additional info required).
  - Equipment and Supplies shortages.
  - Cost of chemicals, construction costs, etc. due to inflation.
- Preventive / Control measures and risk score updated for several existing risks and added for the new risks above.

Action: For Information Only

Results of External and Internal Audits

The DWQMS Standard is divided into Plan, Do, Check, and Improve sections. Audits are completed to analyze processes to confirm that what is stated in the procedures and work instructions is what is being done. External Audits are completed by a third party while Internal Audits are completed by accredited City saff.

External:

- In 2022, two audits were conducted and completed by a certified external auditor (SAI Global) – Certificate of Accreditation achieved.
  - Systems Audit – October 5 – October 6, 2022. No non-conformances were found. One opportunity for improvement was identified.
  - Reaccreditation Audit – November 1 – November 2. 2022. No non-conformances were found. Three opportunities for improvement were identified.

Internal**:**

- 5 Field audits were conducted in 2022:
  - New Development Flushing
  - Tool Room
  - Water Tapping
  - Water Service Cut-offs
  - Curb Stop Repair
- 4 Element audits were conducted in 2022.
- 17 opportunities for improvement were identified from internal audits in 2022. As of December 31, 2022,
  - 5 (29%) of these opportunities have been acted upon and implemented;
  - 2 (11%) of these opportunities could not be implemented; and
  - 10 (60%) of these opportunities are still being investigated.
- Zero nonconformances and zero non-compliances were found during the internal audits.

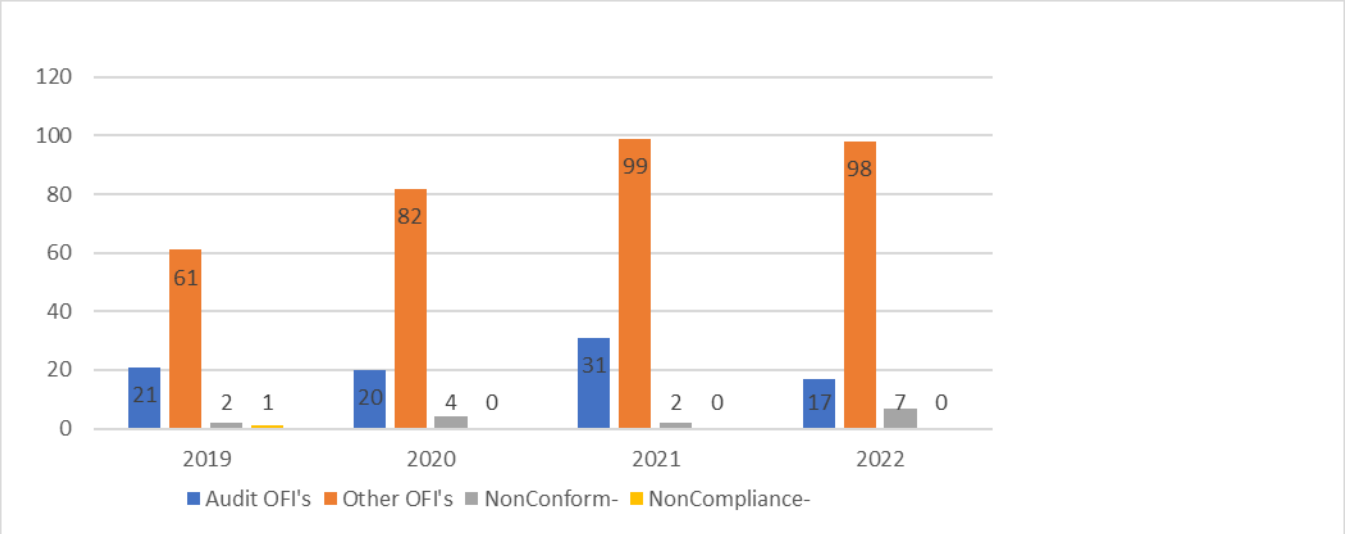
- Seven nonconformances were found outside of the internal audits. All have been resolved with follow-up completed:
    - Plug style main stop with non-NSF grease
    - Chlorine residuals above 2.0mg/L need to be reported since equipment does not accurately read above this level
    - Notice of violation relating to sediment release
    - Digital sign-off was delayed on weekly chlorine residuals
    - Categorization of watermain break was incorrect
    - Water sample was not taken immediately after a main break
    - Low chlorine residual adverse was not called in by staff member immediately
- A previous 2020 non-conformance is still outstanding (CAR 42). The Owner did not have up-to-date documents describing the distribution components as required. At the time of the inspection, the City was in the process of updating the distribution map which is referenced in Table 1 of the DWWP. Condition 3.5 in Schedule B of the DWWP requires the City to update the map within 12 months of any additions, modifications, replacements or extensions to the distribution system. For further clarification, the 12 month clock starts when a watermain is commissioned and the public is able to consume the water from the respective watermain. A number of process improvements were made. The remaining item is to fill a dedicated AutoCAD resource position to complete as-recorded drawings/submissions for internal projects as well as process those completed by consultants on City reconstruction projects. Process improvements have been made over 2020/21 include:
    - A First Submission Asset Drawing Checklist was developed for consultants
    - Kitchener Utilities will not conduct final water inspections until as-builts have been received and mapped in GIS
    - Letter of Credit is not reduced until the As-Recorded information has been accepted
    - GIS boundaries to flag projects under construction, until as-builts have been received.
    - New Water As-Built Drawing Work Instruction Procedure with monthly email alerts
    - Regional mapping of projects where City infrastructure is replaced
    - Development Storyboard as a reference for consultants to fill out as-built information
    - Revised attribute template to streamline data connection
    - Topology fixer to minimize errors back to consultant
    - Attribute checker to allow consultants to check their own data
    - Entering red-line construction documents

Continuous Improvement

Continual Improvement is a key element of all quality management systems and we are regulated to have a process to identify and implement preventative actions to eliminate the occurrences of potential non-conformities. Opportunities for improvement can come from many sources, such as external audits, staff suggestions, public concerns, management reviews, debriefs, or the risk assessment meeting. In total for 2022, excluding the results from internal audits, there were:

- 98 opportunities for improvement, of which:
  - 51 (52%) were acted upon and implemented;
  - 6 (6%) could not be implemented; and
  - 41 (42%) are still being investigated.

OFI's, Non-Conformances, Non-Compliances by Year



Action: The Continual Improvement Log is updated monthly to discuss new items, track process and circle back to determine the effectiveness of implementation. The log is be reviewed annually with Top Management as part of the Management Review.

Results of the Emergency Response Training/Testing

- New On-Call Management Staff took the IMS-100 Introduction to the Incident Management System (IMS) for Ontario training
- Water Emergency – Management training was provided to supervisors and management in January 2022.
- Debriefs are also completed for selected events. For example, debriefs after Boil Water and Drinking Water Advisories are completed to improve our processes.

Action: No further action required – for information only

Operational Performance

- Ongoing work with the Region for the Zone 2 and 4 Optimization – this will improve water pressures and supply in the southeastern end of the city. The majority of the work is Regional; however, there is coordination work with the City. This work is dependent on timing of development in the areas and as development proceeds, additional sections of the main are installed. The section between Strasburg Road and Robert Ferrie Drive is awaiting the completion of the Environmental Assessment for the Road extension.
- The Region's Zone 4 Trunk Watermain project includes the installation of 750mm concrete pressure pipe watermain from the Mannheim Water Treatment plant across the southern portion of the City to Strasburg Rd. The watermain was brought into service on January 23, 2023.

Action: No further action required – for information only

Raw Water Supply and Drinking Water Quality Trends

There are known seasonal issues with the water supply:

- Fall - Grand River temperature changes may cause odour challenges in the source water, which may increase flushing requirements.
- Winter – temperature extremes may cause more watermain breaks in the system.

Action: No further action required – for information only

Follow-up on Action Items from Previous Management Reviews

Action items were completed as part of the revised report and associated council report.

Action: No further action required – for information only

Status of Management Action Items Identified Between Reviews

There were no items identified between the management reviews.

Action: No further action required – for information only

Changes That Could Affect the Quality Management System

- The Federal government has a manganese limit, however the current provincial regulations, which Kitchener is required to follow only has an aesthetic limit. It is anticipated that the Province will follow the federal guidelines and implement a maximum allowable concentration. The Strange Street upgrades were complete in anticipation of this regulatory change.

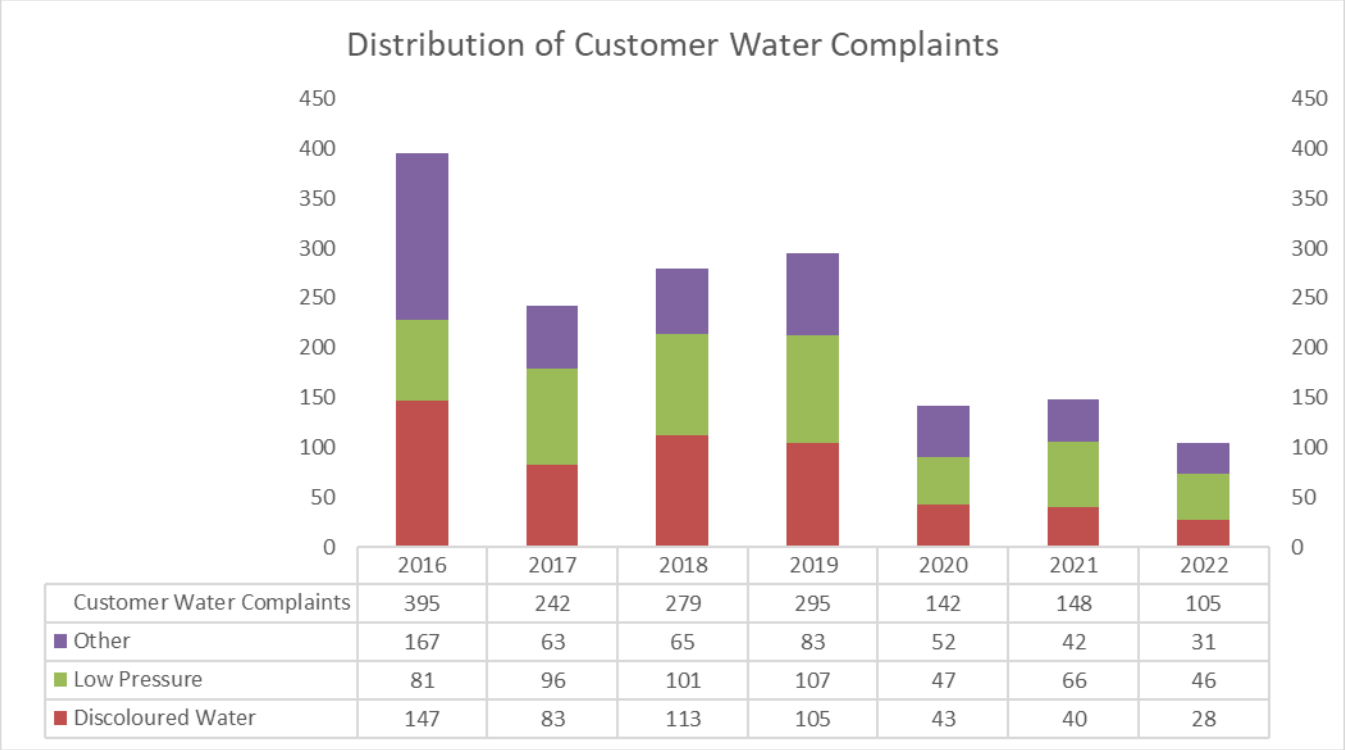
- There are indications that the lead maximum allowable concentration will be reduced, which will likely increase the number of lead tests that exceed the regulatory limits. Customers are not required to complete any corrective actions when elevated lead exists. The City is required to flush and resample if there is a lead adverse in the distribution system. The City tracks streets with lead or suspected lead and includes them as part of the considerations for replacement. It is most cost effective to replace a number of lead services as part of a road reconstruction project, rather than individual services.
- Bill 23, *More Homes Built Faster Act,* 2022 and Bill 109, *More Homes for Everyone Act, 2022.* It is anticipated that changes in the Development Charge (DC) Framework and decreased DC revenue could hamper the City's ability to supply infrastructure in a timely and coordinated manner to support grown (e.g., Strasburg Road South & Watermain project).
    - Kitchener does not have surplus funds in the DC reserve fund that are not allocated to a future project.
    - It is anticipated that the Province's investment to help unlock and build housing supply will increase the volume of subdivision and site plan review and processing for Drinking Water Works Permits.
    - Bill 23 may impact the Region's Official Plan update and the existing urban boundary.
    - Bill 93 – "An Act to amend the Building Broadband Faster Act, 2021 and the Ontario Underground Infrastructure Notification System Act, 2012" which is related to locating infrastructure, has set out several new requirements that the City of Kitchener (the infrastructure owner) must meet. The first being a strict adherence to a 5 day locate completion timeframe. Locates not completed within this timeframe are now subject to an Ontario One Call fine and it is now possible for excavators to seek compensation from a loss or expense incurred due to the locate being late. It is expected that locating costs will increase significantly in 2023. A Locate Review is currently being led by the City's Internal Auditor to evaluate the service level, risk and resourcing needs associated with new legislative requirements.

Action: No further action required – for information only

Consumer Feedback

- The number of customer water complaints continues to decrease. Dispatch staff guide customers through a number of questions to determine whether the problem is suspected to be internal (plumbing) or external (distribution system).
- The problem, cause, and remedy are tracked for each complaint.
- Discoloured water complaints are often the result of changes in flow in the system. This can be due to reconstruction, watermain cleaning, watermain breaks, valve replacement and other construction.

- Low pressure complaints are largely internal issues (softeners, internal plumbing).
- Other complaints include water hardness, no water, odour/taste, air in lines (white water), customer sample requests. We are seeing more residents moving into Kitchener who may not be familiar with water hardness and education is a component of resolving the concerns.
- In general, a number of customer complaints can be resolved by educating the customer (water hardness), flushing/sampling (discoloured water) or confirming private side issue (water softener, pressure reducing valve, drain issues)



	2016	2017	2018	2019	2020	2021	2022
Customer Water Complaints	395	242	279	295	142	148	105
Other	167	63	65	83	52	42	31
Low Pressure	81	96	101	107	47	66	46
Discoloured Water	147	83	113	105	43	40	28

Action: Continue with proposed watermain cleaning area in 2023.

Resources Needed to Maintain the Quality Management System

- A mobile solution for inspection data entry would decrease administrative burden. A mobile water valve program was implemented in 2020 and there are a number of programs that could be mobile. Anticipated that a mobile application for hydrant inspections will be rolled-out in 2023.
- An Issue Paper requesting a technical position to address the growing demand on the water utility was submitted for the 2023 budget.

Action: Proceed with posting for the position following approval of 2023 budget process.

Results of the Infrastructure Review

- The Water Utility Asset Management Plan was completed and captured watermains, valves, hydrants, and meters. Asset Management Plans are required for all core and non-core asset classes (roads, storm, parks, facilities etc.), prepared in accordance with Ontario Regulation 588/17 – Asset Management Planning for Municipal Infrastructure. The water assets have a value of more than $1 Billion and are generally in very good condition. Overall, watermains are more than halfway through their useful life. This can be attributed to an increase in infrastructure investments made between the 1950s and 1970s. These assets may be beginning to deteriorate and could require replacement or rehabilitation. This is being addressed through the WIP.
- Individual project selection is based on a number of factors including condition (watermain break history), material, criticality, watermain size, presence of lead services, shallow mains, and other infrastructure needs (storm, sanitary, road).
- 2022 reconstruction projects were largely completed as per the 2022 Engineering/Storm/Sanitary/Water Capital Forecast
- The Region replaces some Kitchener infrastructure as part of their projects (Kitchener funded).
- 2023 projects were finalized; however, it should be noted that there were a number of Regional projects moved out to future years in the Regional capital program.
- Meetings were held with Asset Management and Engineering staff at both the City and the Region to determine future project needs.
- Issue papers are brought forward as part of the budget process, additional funding requests related to maintenance and water-only capital projects. The majority of water-only projects are included as part of Regional roadwork to minimize disruptions to citizens and be cost effective.

Action: No further action required – for information only

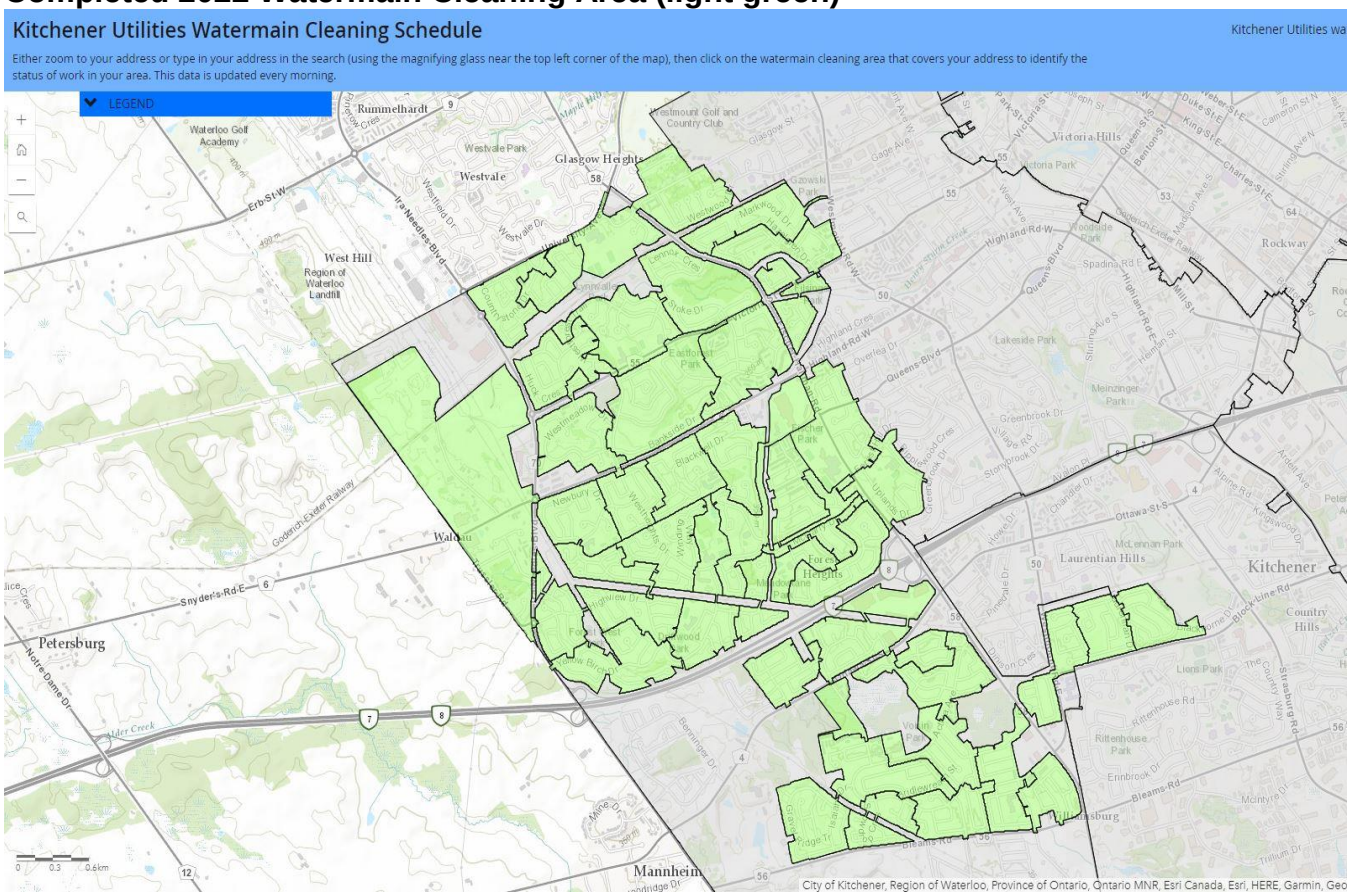
Summary of Maintenance

- Watermain cleaning – Approximately 168kms of watermain was cleaned in 2022. The 2022 watermain cleaning area map is shown below. The next map shows the proposed 2023 area in pink/red. The 2023 area was previously cleaned in 2017 thus re-starting the 6-year cleaning cycle. The purpose of watermain cleaning is to remove iron and manganese build up in the watermains. The iron and manganese cause discolouration in the water. Although iron and manganese are naturally occurring and not health related, discoloured water causes a public perception of issues with the drinking water. Provincial health related regulations are anticipated for iron and manganese.

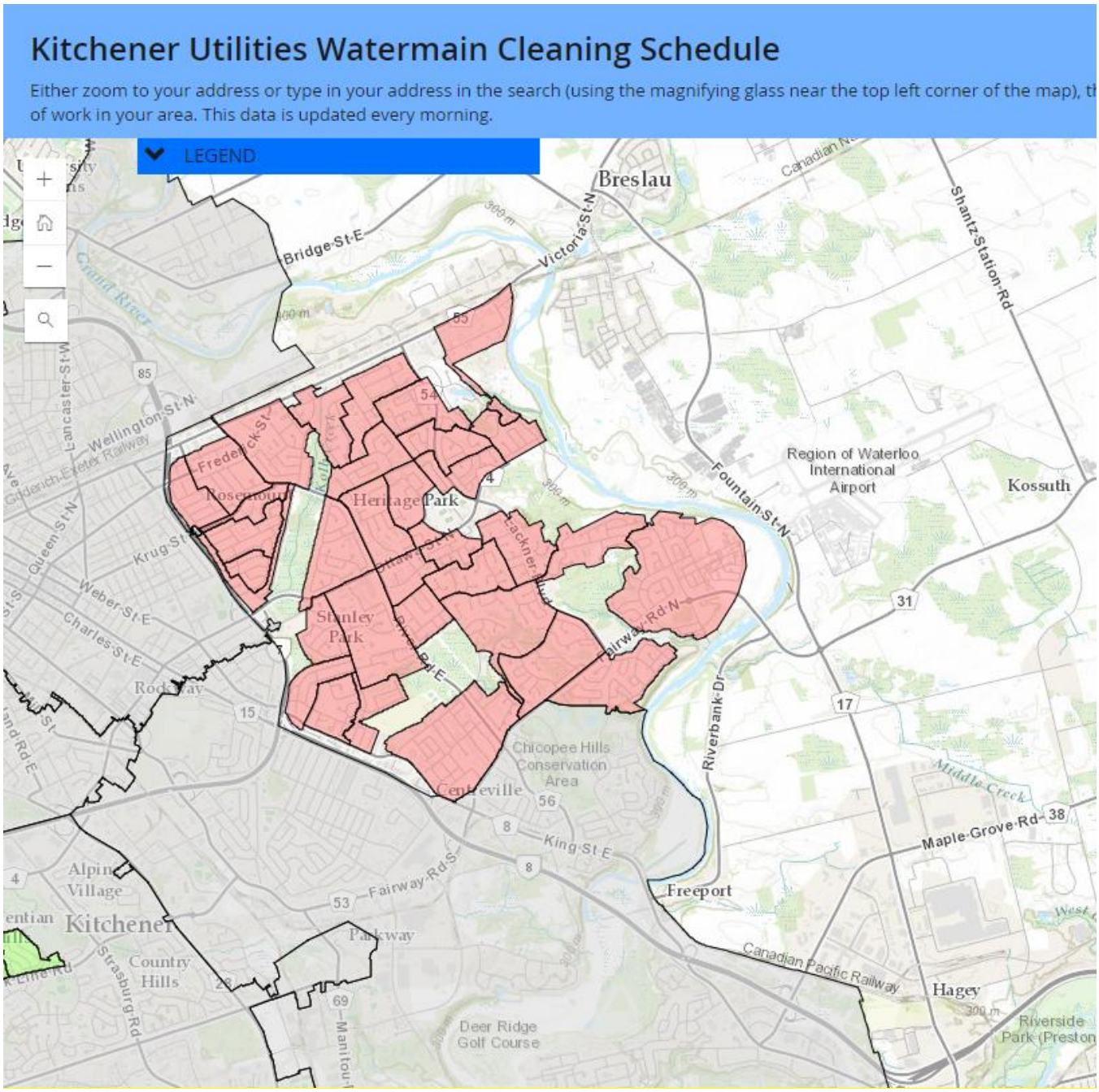
City of Kitchener Water Distribution

DWQMS Management Review

Completed 2022 Watermain Cleaning Area (light green)



Proposed 2023 Watermain Cleaning Area



- Hydrant maintenance – spring maintenance was completed on all hydrants and all hydrants were dipped in the fall.
- Hydrants are flushed to maintain chlorine residuals was completed in spring and fall.
- New development areas are flushed monthly until the subdivision is built-up.
- A valve turning/exercising program was completed for 1,863 valves – the majority of valves were operated in the watermain cleaning area with additional valve operation in

areas of reconstruction. Operating valves ensures that they will work when they are needed in an emergency or for construction activities.

- There were 21 broken valves and/or failing valves were either replaced or removed which allows for quicker isolation for water emergencies. Broken valves are tracked in real time and the majority are addressed within weeks (except for winter). At the end of 2022 there were 11 broken valves remaining, 7 of which will be replaced as part of future reconstruction work.
- 450 hydrants were painted.
- Leak detection survey – 1/3 of city completed each year. Follow-up is completed on potential leaks. Approximately 330km of mains were surveyed resulting in 4 possible hydrant leaks – the majority of which were repaired by tightening the nuts of the hydrants. No leaks were found.
- Staff continue to inspect new connections and cut and caps for reconstruction and new development. Staff complete all new service tappings for development as well as witness old service abandonment. This work requires 48 hours to schedule and is driven by new development and watermain replacement work.
- Erosion and sediment control procedures were developed and rolled-out to staff.
- Anodes are installed on existing watermains whenever they are exposed (e.g., watermain breaks, valve repairs, hydrant repairs).
- Pressure Reducing Valves (PRVs) were inspected.
- Chamber inspections/pump outs for chambers containing air relief valves – approximately 130. Air reliefs are a potential risk to the system if they become submerged and there is a watermain break or incident in the distribution system. A study was commenced in 2022 to determine which air reliefs could possibly be removed.
- Staff continue to use the watermain break app for reporting breaks, which improves customer communication for breaks

Action: No further action required – for information only

Effectiveness of Maintenance

Completion of numerous maintenance programs associated with the water and the infrastructure are essential for the delivery of safe drinking water, although not all maintenance programs have been identified. The effectiveness of the maintenance program is determined by the following key factors:

- Number of Adverse Water Quality Incidents
- Water loss/unaccounted for water
- Water quality complaints
- Number of watermain breaks

The system performance has demonstrated effectiveness by achieving:

- There were 15 AWQIs (downward trend and an indication of water quality).
- Water loss/unaccounted for water was 10% (at the target of 10%).
- The number of quality complaints was at 105, 26% of which were related to discoloured water and 44% pressure (largely internal issues). The remainders included complaints relating to hard water (new residents are not always familiar with hard water), and general safety concerns. The watermain cleaning program has decreased the number of complaints.
- There were 93 watermain breaks in 2022, which is a bit higher than the 5-year average of 84 breaks/year.

Action: No further action required – for information only

Operational Plan Currency, Content and Updates

- The Operational Plan is updated annually.

Action: No further action required – for information only

Staff Suggestions

Staff suggestions are included under the new Continual Improvement section of the report.

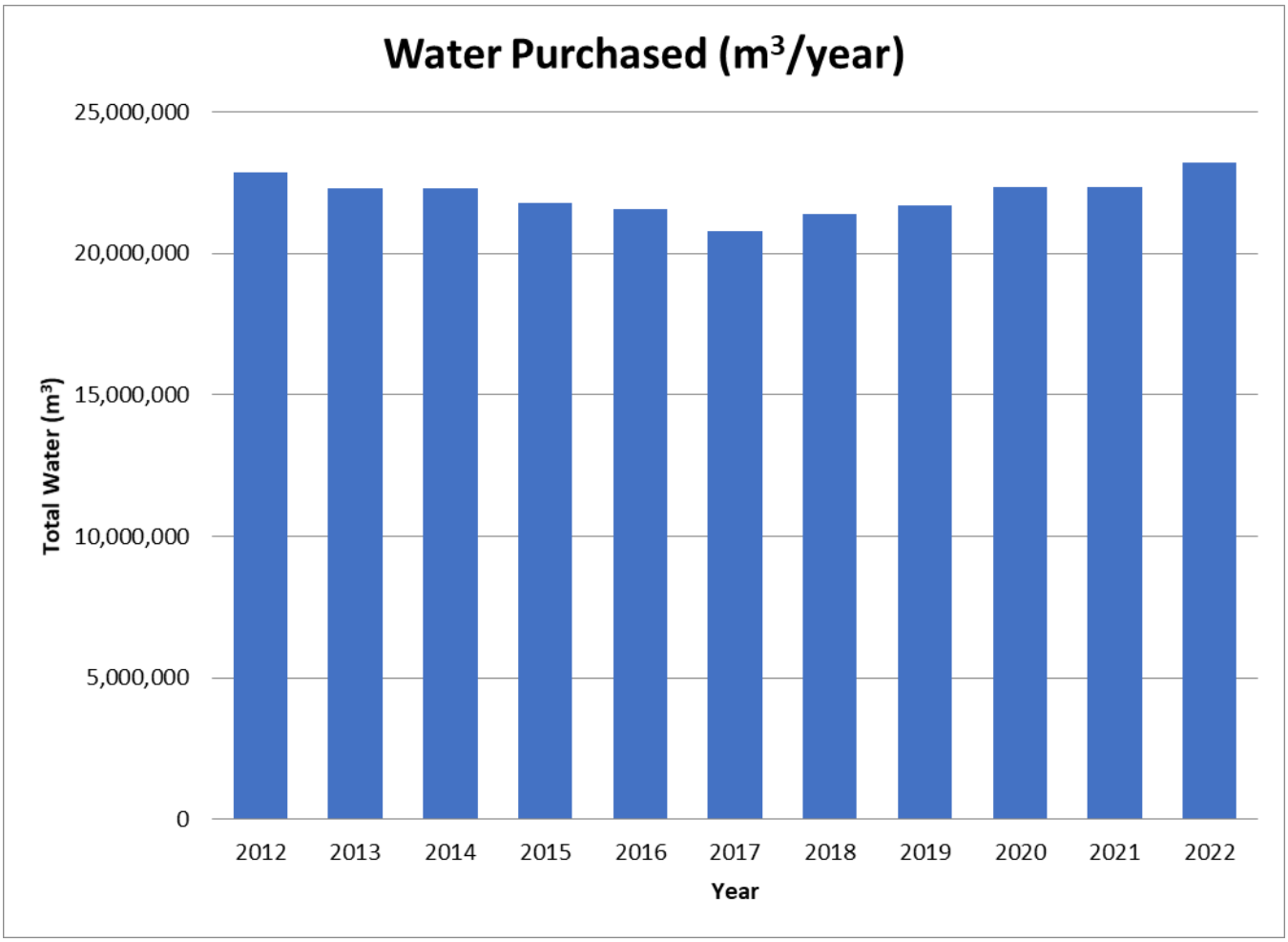
Other

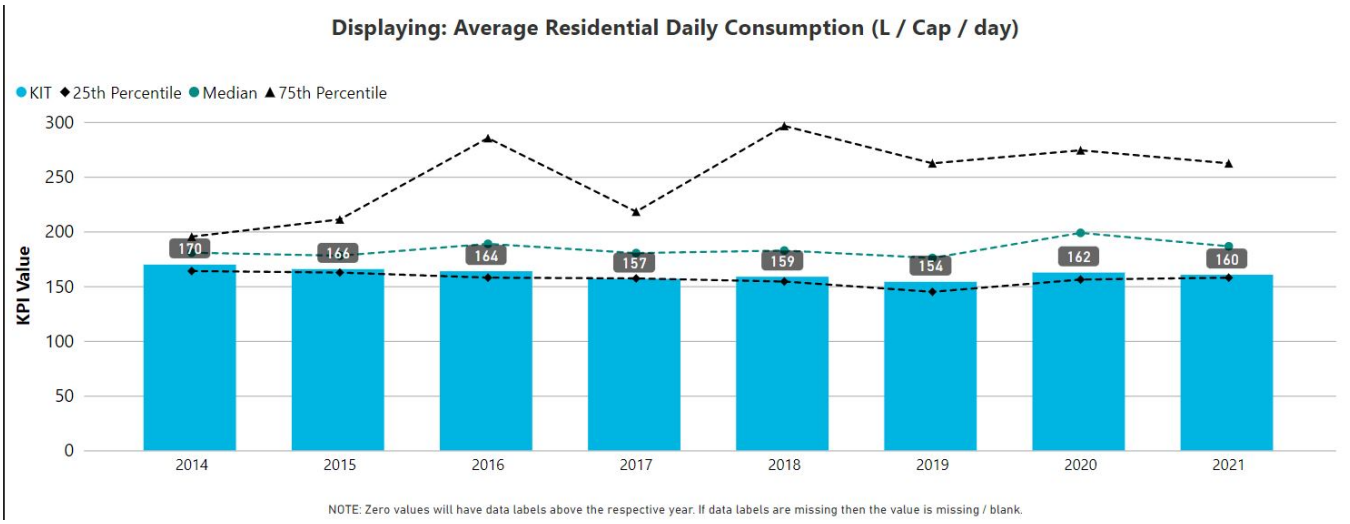
- Water Meter Replacement – 6,065 aging water meters were replaced. There are 70,572 meters in the system. There are currently water meter supply issues. An Advanced Metering Infrastructure (AMI) option will be brought forward as part of the WIP report. Given the meter shortages and potential of meter change outs as part of AMI, there are no large-scale meter replacement plans for 2023.
- Development growth is anticipated to continue with both new subdivision, site plans and redevelopment, which creates technical demands for Drinking Water Works Permit approvals, commissioning plan approvals and on-demand inspection requirements for final connections, tappings and cut and caps.
- Water Consumption Trends – water consumption has increased since 2018 as population growth demands increase. Average residential daily consumption values were decreasing prior to the pandemic but increased in 2020. The 2021 values decreased slightly; however 2022 benchmarking values are not yet available. Kitchener average residential daily consumption levels are lower than many comparison municipalities (around the 25th percentile).

The Region of Waterloo is initiating an update to their Water Supply Strategy, to look at current water supply sources, assessing future water demands and investigating possible new water

sources. The previous Water Supply Master Plan was completed in 2015. The Strategy will develop and evaluate recommendations to meet future water supply needs in Waterloo Region to 2051. The Water Supply Strategy will build on previous master plans, and will look at:

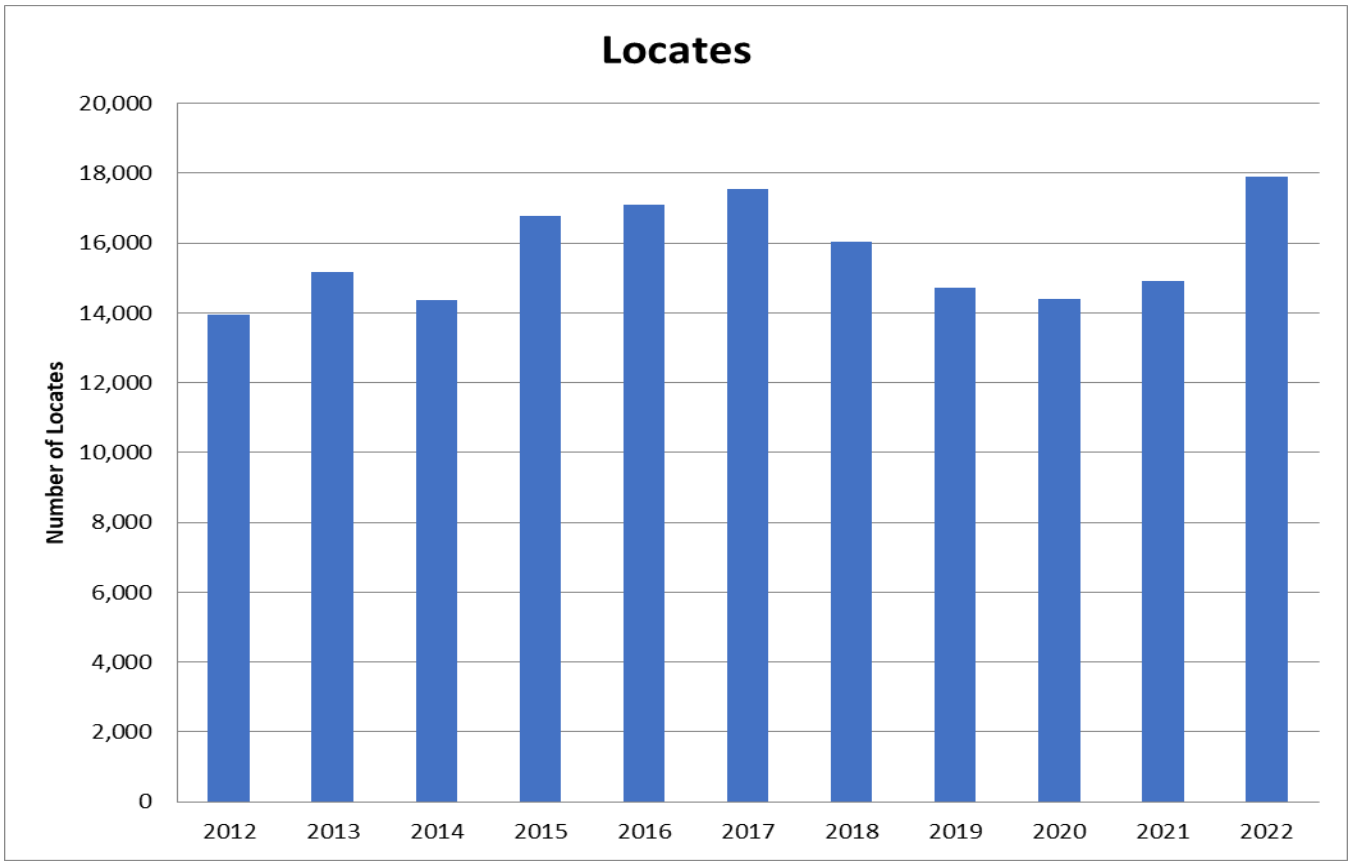
- Current sustainable water supply sources and water demands.
- Population growth and how it impacts future water demands.
- The gap between today’s water supply and tomorrow's needs and resourcing that gap in a sustainable, efficient way.
- The effect of climate change on our water supply resources.


Water Purchased (m³/year)
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
Total Water (m³)
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Year


Displaying: Average Residential Daily Consumption (L / Cap / day)
KIT
25th Percentile
Median
75th Percentile
KPI Value
300
250
200
150
100
50
0
170
166
164
157
159
154
162
160
2014
2015
2016
2017
2018
2019
2020
2021
NOTE: Zero values will have data labels above the respective year. If data labels are missing then the value is missing / blank.

- Locates - Kitchener Utilities and their Locate Service Provider physically locate gas and water infrastructure for contractors prior to construction and excavation work. Approximately 17,885 locates were completed in 2022, which is up from 2021 levels and the highest levels ever experienced. Locate volumes are driven by customer requests and construction. *Bill 93* will likely create additional financial impacts (see Changes That Could Affect the Quality Management System section).

Action: No further action required – for information only



Appendix

Water Distribution System Map