Kitchener Utilities
City of Kitchener Drinking Water Distribution System

Drinking Water Quality Management Standard
Management Review – 2021

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-2021 (INS-2022-039) confirmed that the drinking water system was in compliance with regulatory water sampling requirements during 2021. 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 resulted in some slightly changed processes for example, start times and vehicle occupancy as well as delayed/modified training, however construction and maintenance activities were completed. Hands-on training was difficult to schedule but was completed throughout 2021 and will continue in early 2022.
- Year Four Water Infrastructure Program (WIP) maintenance end of year achievements (specific areas of improvement identified by WIP):
    - Cleaned approximately 184km of watermain.
    - Discoloured water complaints decreased significantly below 2019 numbers prior to pumping station upgrades (39 complaints for 2021, which is comparable to 2020 values). The Region of Waterloo's Strange Street Water Pumping station was off-line for the majority of 2021. The station was upgraded with iron and manganese filters and was returned to service in late 2021.
    - 37 broken valves and/or failing valves were either replaced (32) or removed (5) 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 2021 there were 8 broken valves remaining, 6 of which will be replaced as part of reconstruction work.
    - Approximately 1,800 valves were proactively operated (23%); the majority were within the watermain cleaning area and the 2021 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 (14,917 locates completed). Two additional Locators started on March 8, 2021.
  - Approximately 2,350 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 2022 lead testing program (hydrants only).
- An inspection of approximately 130 air relief valves in chambers was completed. One air relief valve was replaced in 2021; another four replacements have been identified for 2022.
- There were 78 watermain breaks in 2021, which is less than the 5-year average of 81. The 5-year average is starting to smooth out after no longer including a very cold 2015 in the 5 year average.
- Approximately 5,550 aging/problem water meters were replaced. It is anticipated that another 5,000 will be replaced in 2022.
- Hydrant painting program for corrosion protection was re-started with 400 hydrants painted, painting will continue in 2022. Hydrants are also stencilled with the watermain diameter for the Fire Department.
- Unaccounted for water was 9.7% (below the 10% industry target). The unaccounted for water generally fluctuates around 10% (9-12%, with 10% being the 10 year average).
- Pressure reducing valve maintenance was completed.
- DWQMS Awareness, Disinfection and Construction and Response training occurred in 2021.
- Efforts to address the non-compliance received in early 2020 for new watermains not being mapped within 12 months of replacement continues – see additional information under Incidence of Regulatory Non-Compliance. An additional resource was secured as part of the budget process by the Engineering division, anticipated to be filled in early-mid 2022.
- Revised the Site Plan mapping process to map new infrastructure closer to when it becomes live/removed.
- Implemented the MECP Revised Disinfection procedure on February 1, 2021.
- Replaced watermains as outlined in the 2021 City of Kitchener Engineering & Water Utility Capital Forecast.
- Hired five additional operational staff to address operations and maintenance growth needs.

Continuing Areas of Focus are:

- Proceed with improvements to the As-built process in conjunction with Engineering, specifically hiring the additional resource approved through the budget process.

- 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.
- Commence background tasks associated with the next WIP review.
- COVID has further highlighted opportunities for mobile maintenance inspections. Modelling on the success of the mobile valve inspection, a mobile solution for water hydrant field inspection is anticipated to be rolled out in spring 2022. It is anticipated that the solution will provide efficiencies by minimizing data entry and provide faster deficiency follow-up.
- The 2021 Water Utility Asset Management Plan is underway and will capture 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. As per the regulation, the Water AMP will present information on asset condition, valuation, current levels of service, lifecycle management activities (operations, maintenance, etc.), and financing.
- An additional technical position is required to support activities related to new development and replacement works, water meter replacement program, regulatory changes, and maintenance/operational work. Information will be brought forward as part of the 2023 budget process.

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.

Section 19 of the *Safe Drinking Water Act* 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.

Other Related Water Quality Reports

The City of Kitchener Summary Water Report for 2021 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 2021, the waterworks consists of approximately:

- 918.5 km of distribution watermain – 783 km Kitchener owned, 23 km Dual owned (joint ownership between Kitchener and Region) and 112 km Regional owned
- 69,714 water meters in service.
- 4,629 hydrants (not including private hydrants).
- 7,820 valves (not including service valves or hydrant valves) – 7,240 Kitchener owned, 129 Dual and 451 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 4 of maintenance-related work were achieved, included:

- Watermain cleaning program - cleaned 184km of the City.
- Valve maintenance and replacement programs – operated approximately 1,788 valves and replaced 36 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 (14,917 locates completed).
- Approximately 2,350 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 2022.

COVID Impacts

- COVID created some compounding factors that resulted in the next WIP Report being delayed by 1-year. Work on the report has commenced and it is anticipated that a Council Presentation for the new WIP program (2024-2028) will be available in mid-2023.
- In-person training was affected and pivoted to virtual training at various periods throughout the year accompanied with hands on one-on-one training.
- Water meter service order work was deemed non-essential and as a result of needing to enter private residences was not completed during the spring. This resulted in a backlog of open service orders for meter issues and fewer meter replacement. The backlog was largely cleared by the end of 2021. There are some remaining customers who will not allow access at this time due to COVID.
- There were some difficulties with parts/supplies on back order and cost increases due to COVID. There are indications that the cost increases will continue into 2022 and may impact reconstruction project costs. Staff are monitoring trends closely to determine appropriate mitigation actions.
- Water consumption was almost the same as 2020.
- Internal investigations for poor pressure and water quality were largely completed from outside the home. If samples were required, they were taken from the hose bib. Dispatch troubleshooted potential internal issues with customers to minimize staff visits. Staff started to enter private residences for investigations in the fall of 2021.
- Regulatory requirements for sampling – temporary hose bib samples were used to meet regulatory requirements during warmer months as community centres and other businesses closed. A relief was provided from the Ministry to decrease the number of samples per month from February 22 to April 30. A second relief request was provided from May 19 to October 16 to decrease the number of samples.
- 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 2022 program has been granted.

Incidents of Regulatory Non Compliance

A Ministry of Environment, Conservation and Parks (MECP) completed an announced inspection on June 22, 2021, and covered June 30, 2021 to June 22, 2021. There were no notices of non-compliance.

A previously identified Non-Compliance noted: *The owner did not have up-to-date documents describing the distribution components as required. 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.

The work plan was submitted in 2020 and work continues to map the infrastructure within 12 months. A number of meetings with internal staff, Regional staff and consultants were undertaken to stress the importance of the timeliness of as-builts as well as to improve the process as follows:

2021 Improvements

- Storyboard – to be posted on the Development website. The Storyboard is a self-guided lesson/reference for consultants on how to fill out the as-built information, where the most recent standards are located and how to minimize and correct errors prior to submission to the city. This tool will guide users through the checking/correction process, which is anticipated to result in fewer submissions and faster infrastructure mapping.
- Attribute template – 2021 version will include removals – for example anodes, hydrant bends, storm and sanitary manhole cover, storm pipe depth, bedding info will be removed to streamline data collection. Individual utilities have reviewed their data requests and removed some non-essential items.
- Topology fixer – GIS will complete the topology changes and not send these errors back to the consultants.
- Attribute checker – there will be an app where consultants can check their data first without providing it to GIS to run the checker.
- Red-lined reconstruction drawings are entered into GIS as drawings (not mapped) as a resource for locators and construction and maintenance staff.
- Interim as-recorded drawings are mapped at end of construction season for multi-year reconstruction projects.
- Engineering Graphics Technologist vacancy was filled in 2021 (reconstruction as-builts)

2022 Proposed Improvements

- An additional resource was approved in the Engineering division as part of the 2021 budget process and is anticipated to be fill in early to mid-2022. A dedicated AutoCAD resource will be able to complete as-recorded drawings/submissions for internal projects as well as process those completed by consultants on City reconstruction projects to meet the Ministry's 12-month mapping requirement.

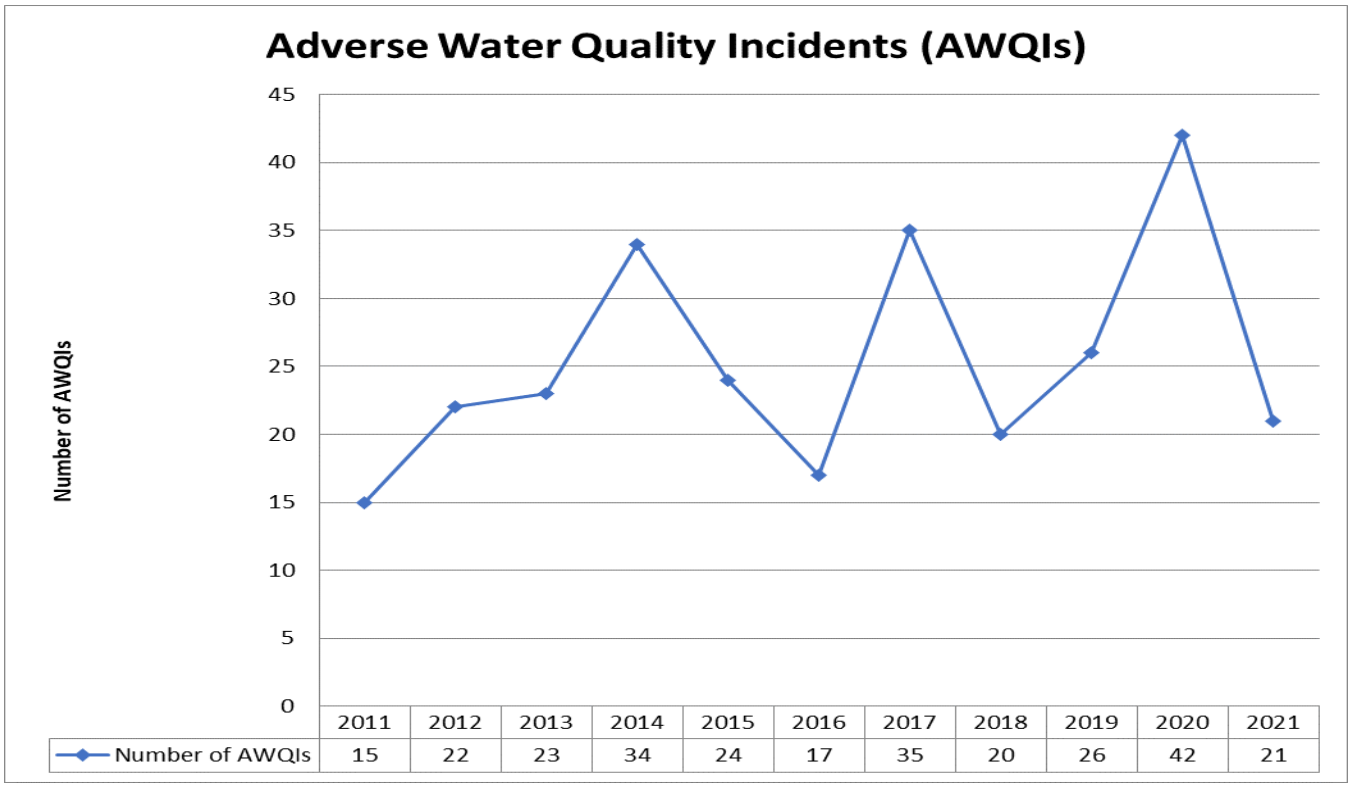
Incidences of Adverse Drinking Water

There were 21 Adverse Water Quality Incidences (AWQI) during the year. No self-imposed Boil Water Advisories (BWA) were initiated in 2021. The volume of AWQIs decreased from 2020, the majority of which were 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 2021 construction season. These communication efforts will continue for 2022 and beyond.

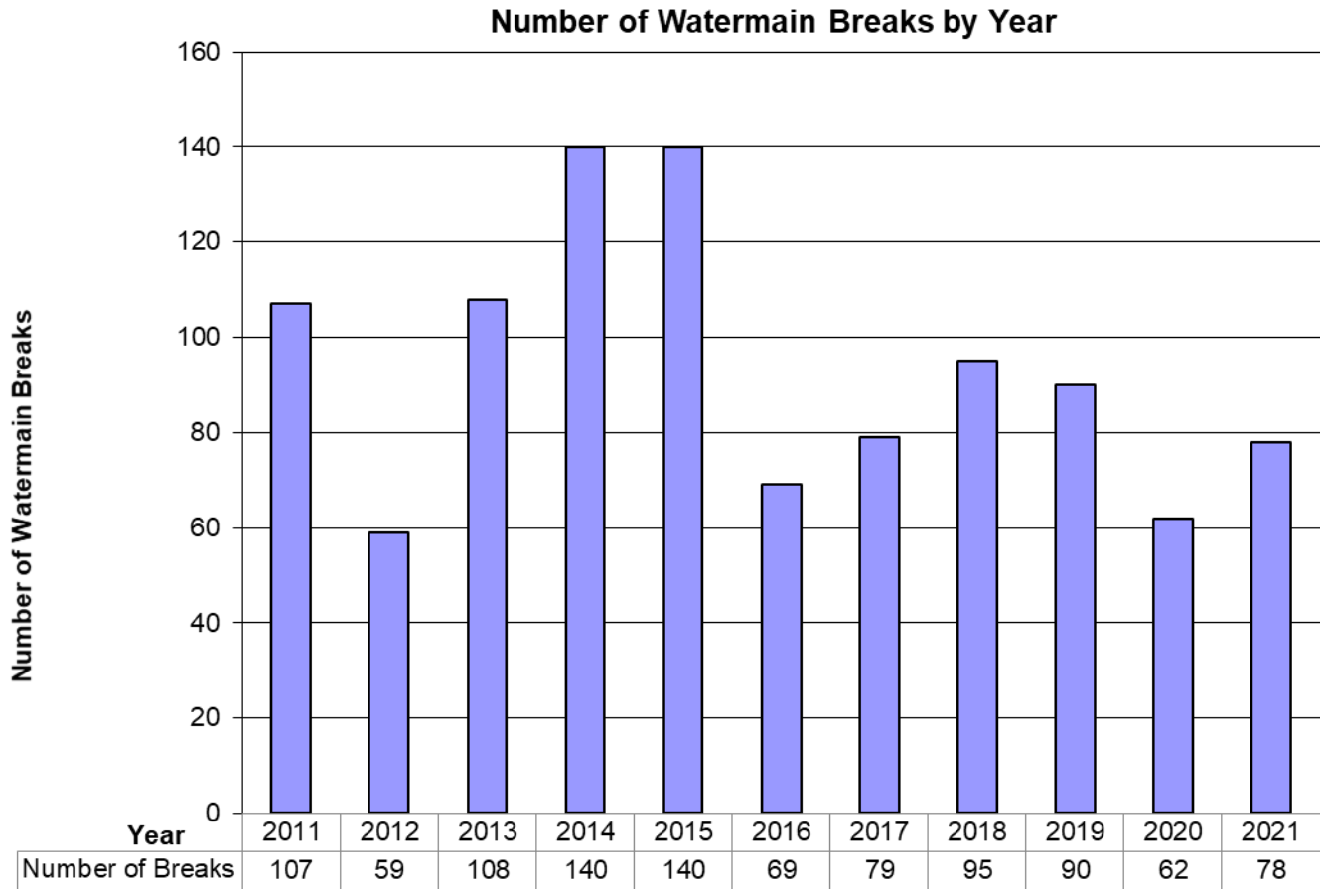
- Low chlorine AWQIs (4 total)
  - One was in areas of new subdivisions with no houses yet built. Along with dead ends, KU proactively flushes new areas until there are homes built and water is being used.
- Total coliform AWQIs (17 total)
  - 8 were at temporary main sampling locations.
  - 8 were at commissioning of new hydrants
  - 1 was at a distribution sampling location
- Lead:
  - No lead adverses were reported in 2021. Due to COVID, the spring and fall lead program was reduced to sampling for lead at hydrants (relief was granted by the Ministry). No exceedances were reported.
- The Summary Water Report for 2021 discusses water quality compliance further.

Action: No further action required – for information only



Deviations from Critical Control Points Limits and Response

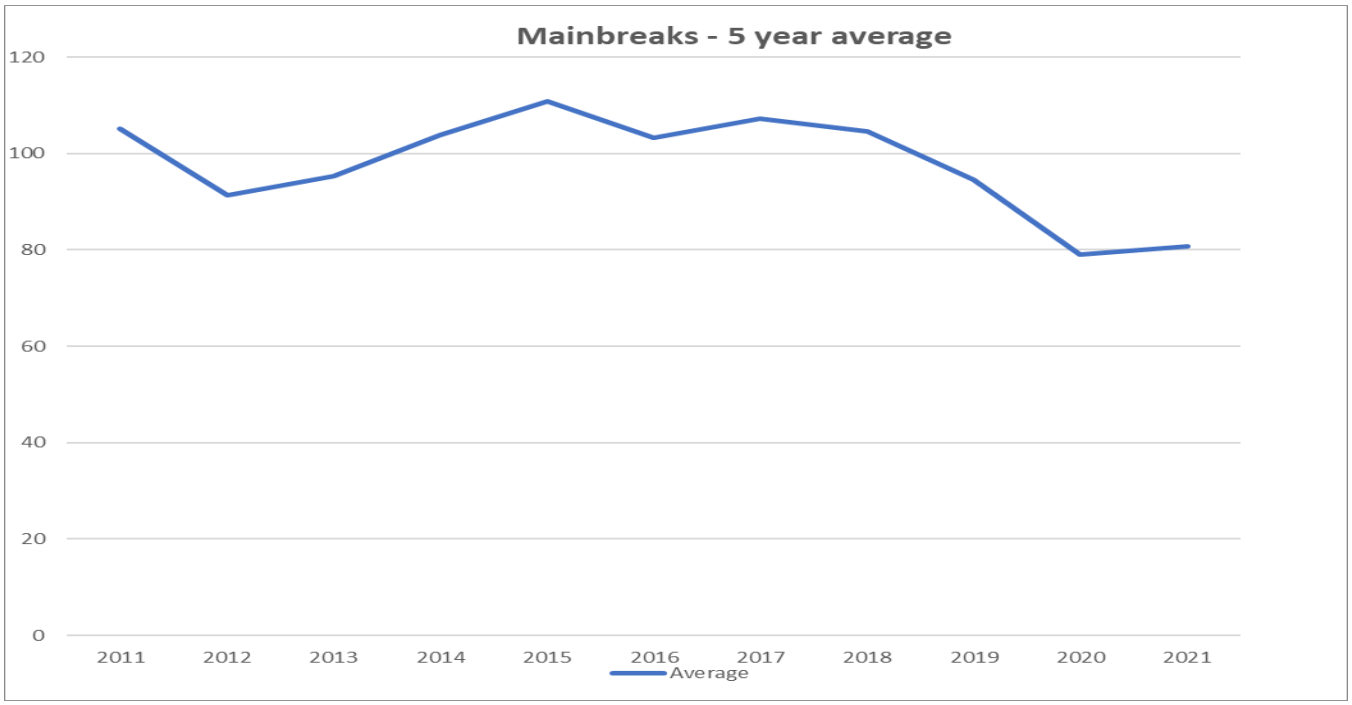
- There were 78 watermain breaks in 2021, which is slightly below than the 5-year average of 81. Of the 78, 7 were deemed to be Category 2. Category 2 watermain breaks require bacteriological sampling upon completion. The 5-year average increased slightly due to an increase in watermain breaks in 2021 over 2020. We have been investing in watermain replacements which have reduced the number of watermain breaks. Watermain breaks are also heavily weather dependent due to the frost movement with colder winters resulting in more breaks (2021 was a bit colder than 2020). Incident debriefs are completed for watermain breaks. This information helps to determine priorities for replacement due to condition.

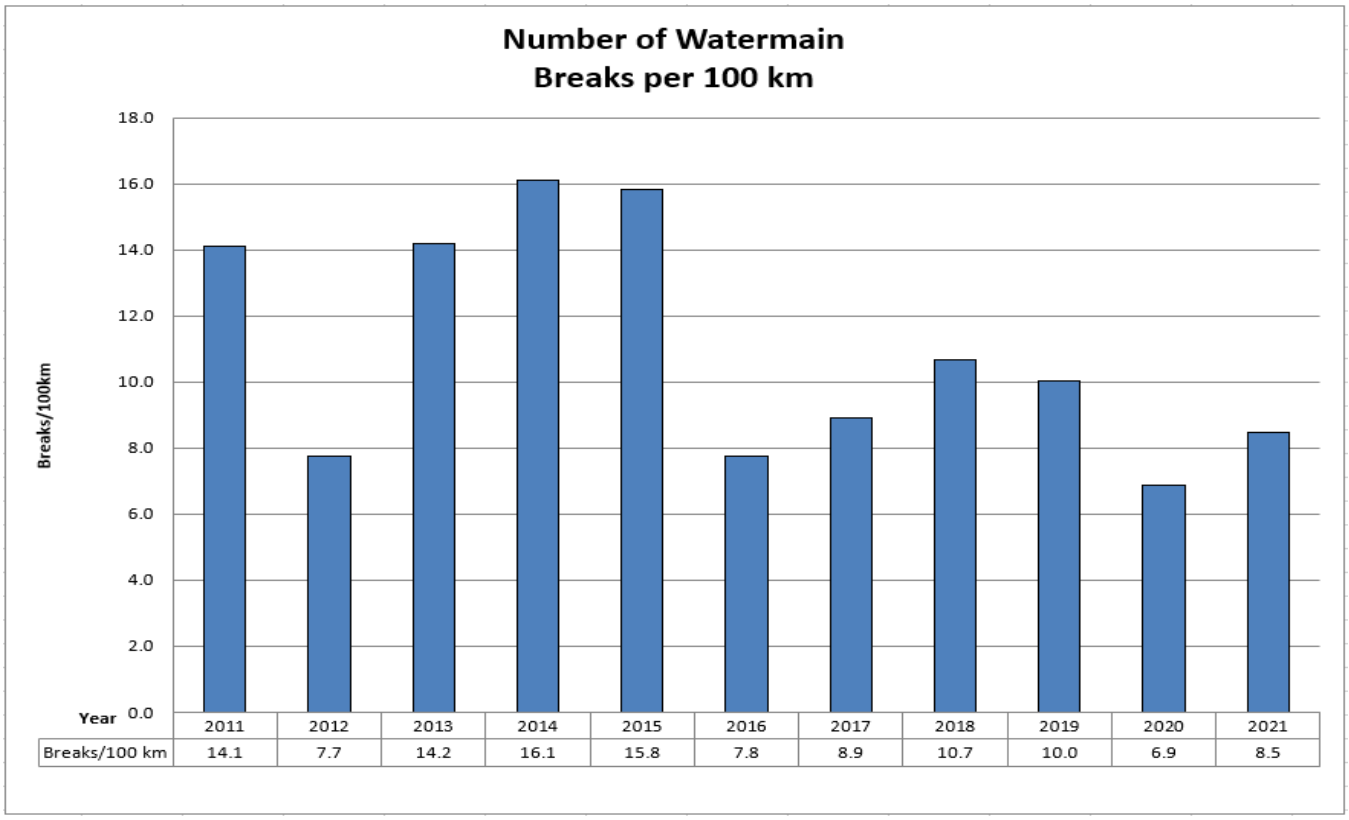


Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Number of Breaks	107	59	108	140	140	69	79	95	90	62	78

City of Kitchener Water Distribution

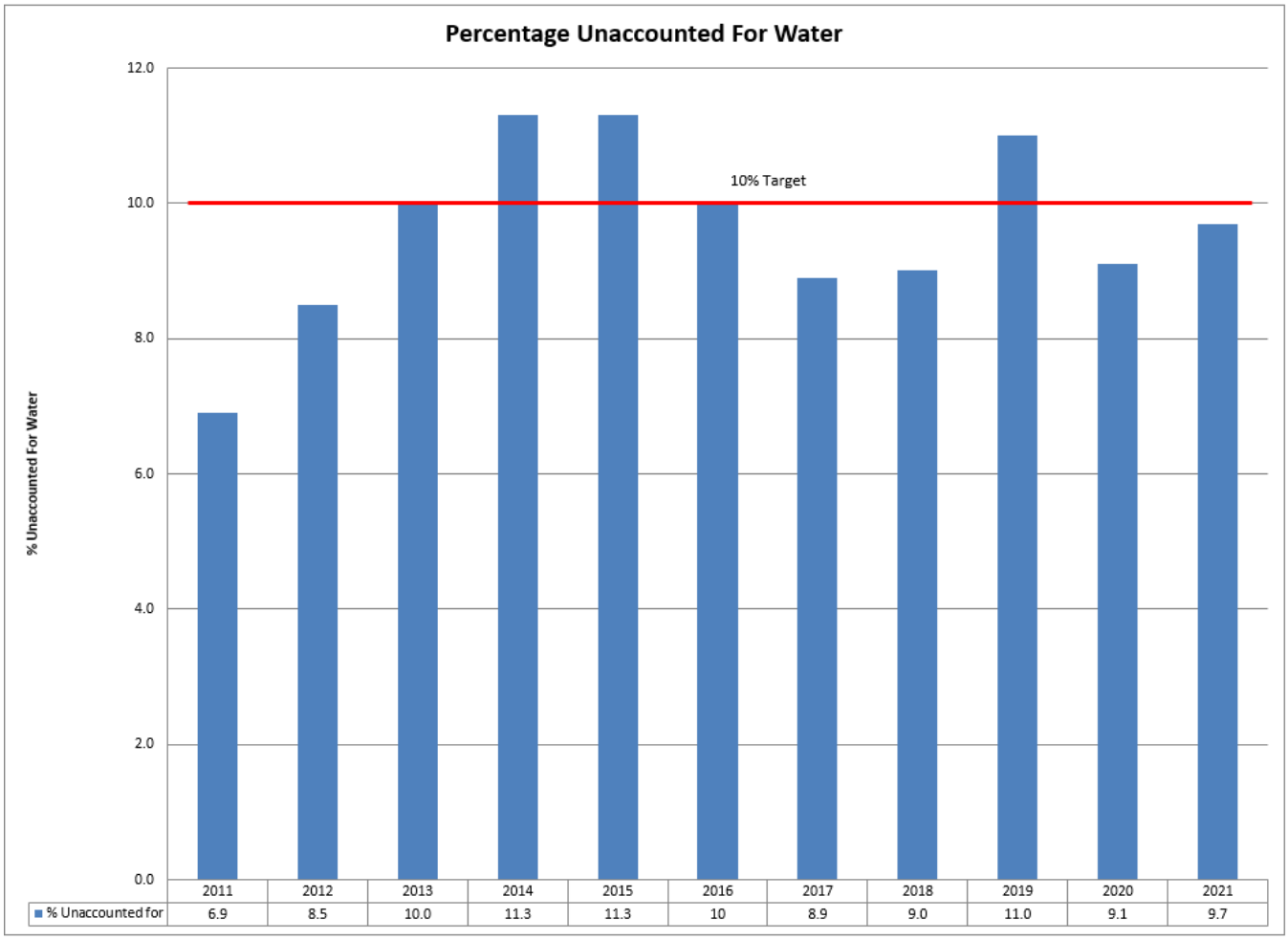
DWQMS Management Review





Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Breaks/100 km	14.1	7.7	14.2	16.1	15.8	7.8	8.9	10.7	10.0	6.9	8.5

- Unaccounted for water for was 9.7%; 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 (e.g., discoloured water). The 10-year average for Kitchener is 10%, although the percentage fluctuates.



Action: No further action required – for information only

Effectiveness of the Risk Assessment Process

- A risk assessment was completed on November 17, 2021. 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 the following new potential risks:

- Risk of water services removed/added in ArcReader(GIS) prior to work being completed.
- Risk of working around the LRT/ION (C&M – planned and unplanned).
- Risk of challenged resources and maintenance resources and impacts on service delivery during the pandemic.

- Preventive or Control measures updated for several existing risks and added for the three new risks above.
- There were three risks that were addressed and removed.

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 staff.

External:

- An external audit (12 month surveillance audit) was completed by a certified external auditor (SAI Global) on September 30, 2021. No non-conformances were found. One opportunity for improvement was identified:
  - Consider reviewing all deficiencies identified during the management review to determine if action items, timelines and responsibility should be assigned (i.e., communication with contractors about maintaining sampling ports on temporary watermains). This item will be included as part of annual top management review in 2021.

Internal:

- 5 Field audits were conducted in 2021:
  - Water Valve Operating Checks
  - Hydrant Operating Checks
  - Hydrant Operation Checks - Contractor
  - Cut and Cap – 3rd Party Responsibilities
  - Watermain Cleaning
- 4 Element audits were conducted in 2021There were 31 opportunities for improvement were identified from internal audits in 2021. As of December 2, 2021,
  - 15 (48%) of these opportunities have been acted upon and implemented;
  - 3 (10%) of these opportunities could not be implemented; and
  - 13 (42%) of these opportunities are still being investigated.
- Zero nonconformances and zero non-compliances were found during the internal audits.
- Two nonconformances were found outside of the internal audits.

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 2021, excluding the results from internal audits, there were:

- 99 opportunities for improvement, of which:
  - 35 (35%) were acted upon and implemented;
  - 6 (6%) could not be implemented; and
  - 58 (59%) 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 will be reviewed annually with Top Management as part of the Management Review.

Results of the Emergency Response Training/Testing

- On-Call Management Staff took the IMS-100 Introduction to the Incident Management System (IMS) for Ontario training and participated in scenario training in late 2021
- Water Emergency – Management training was provided to supervisors and management over fall 2021/January 2022.
- Remaining staff received emergency training in early 2021 (training is every 3 years).

- 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. One major section still requires connection (Bleams/Fischer- Hallman areas). Valves and temporary bypasses are installed to keep water circulation in sections of the Regional main.
- 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. Work commenced in 2017 and is ongoing. A section of the newly installed watermain between the Mannheim Water Treatment Plant and Bleams Road is temporarily being used as a Zone 5 watermain while the Ottawa St watermains are out of service for construction.

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

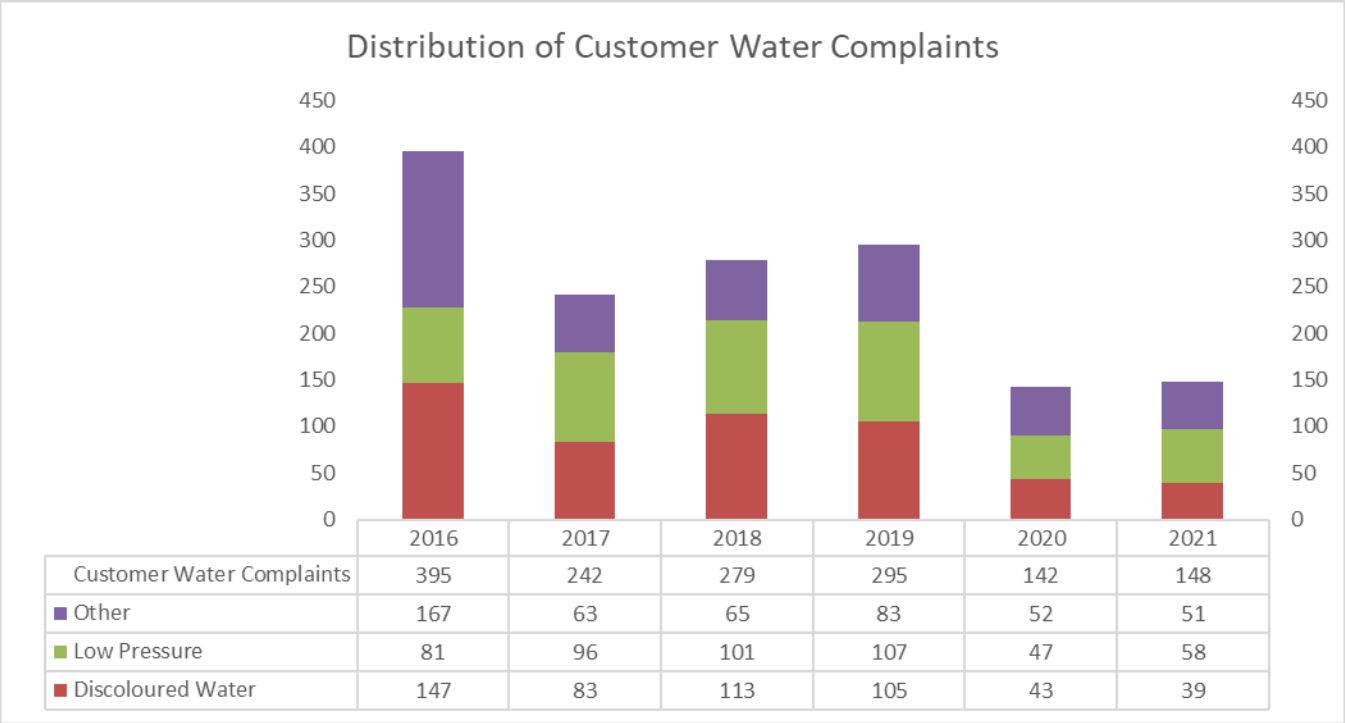
- The Federal government has a manganese limit, however the current provincial regulations, which Kitchener is required to follow only has an aesthetic limit. It is anticipated that the Province will follow the federal guidelines and implement a maximum allowable concentration. The Strange Street upgrades 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.
- In compliance with O.Reg. 406/19 On-Site Excess Soils Management the city has implemented sampling and soil management procedures. This includes hiring a Qualified Professional to develop an Excess Soil and Material Management Plan for the City's maintenance programs. All excess soils are temporarily stored at the City's Waste Transfer Facility and characterized as per the standards set in the regulation. The based on the results an average of 8,200 tonnes of excess soils from Utilities work within the right of way is sent for reuse as fill. An additional annual average of 850 tonnes is trucked to an MECP licensed facility.

Action: No further action required – for information only

Consumer Feedback

- The number of customer water complaints has decreased from 2019. Due to COVID, staff were not entering homes until late 2021 however, water samples were taken at hydrants or outside hose bibs, when appropriate. Dispatch staff guide customers through a number of questions to determine whether the problem is suspected to be internal or external. The majority of pressure issues are related to water softeners or other internal issues.
- KU tracks the problem, cause and remedy for each complaint. The percentage of discoloured water complaints has been decreasing since the watermain cleaning program began in 2016.
- 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. The number of discoloured water complaints decreased significantly once Strange St pumping station was taken offline
- 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
Customer Water Complaints	395	242	279	295	142	148
Other	167	63	65	83	52	51
Low Pressure	81	96	101	107	47	58
Discoloured Water	147	83	113	105	43	39

Action: Continue with proposed watermain cleaning area in 2022.

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 delivered 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 2022.
- In addition to other duties, the Manager – Quality Management and Water Programs (previously Utilities Water Engineer) provides support for new and replacement capital, water meter replacement program and maintenance work for several groups including Development Services – Engineering Design and Approvals, Engineering Construction, Development Engineering, Planning, Building and internal Operations. The volume of work has increased significantly over the years in several areas - new construction of

water infrastructure to support development activity, capital (reconstruction), operating, maintenance and regulatory requirements. 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. There is a need to provide an additional position to support the existing work, and to provide back-up support for this role. An Issue Paper will be submitted for the 2023 budget, requesting a technical position to address the growing demand on the water utility.

Action: An Issue Paper will be brought forward as part of the 2023 budget process.

Results of the Infrastructure Review

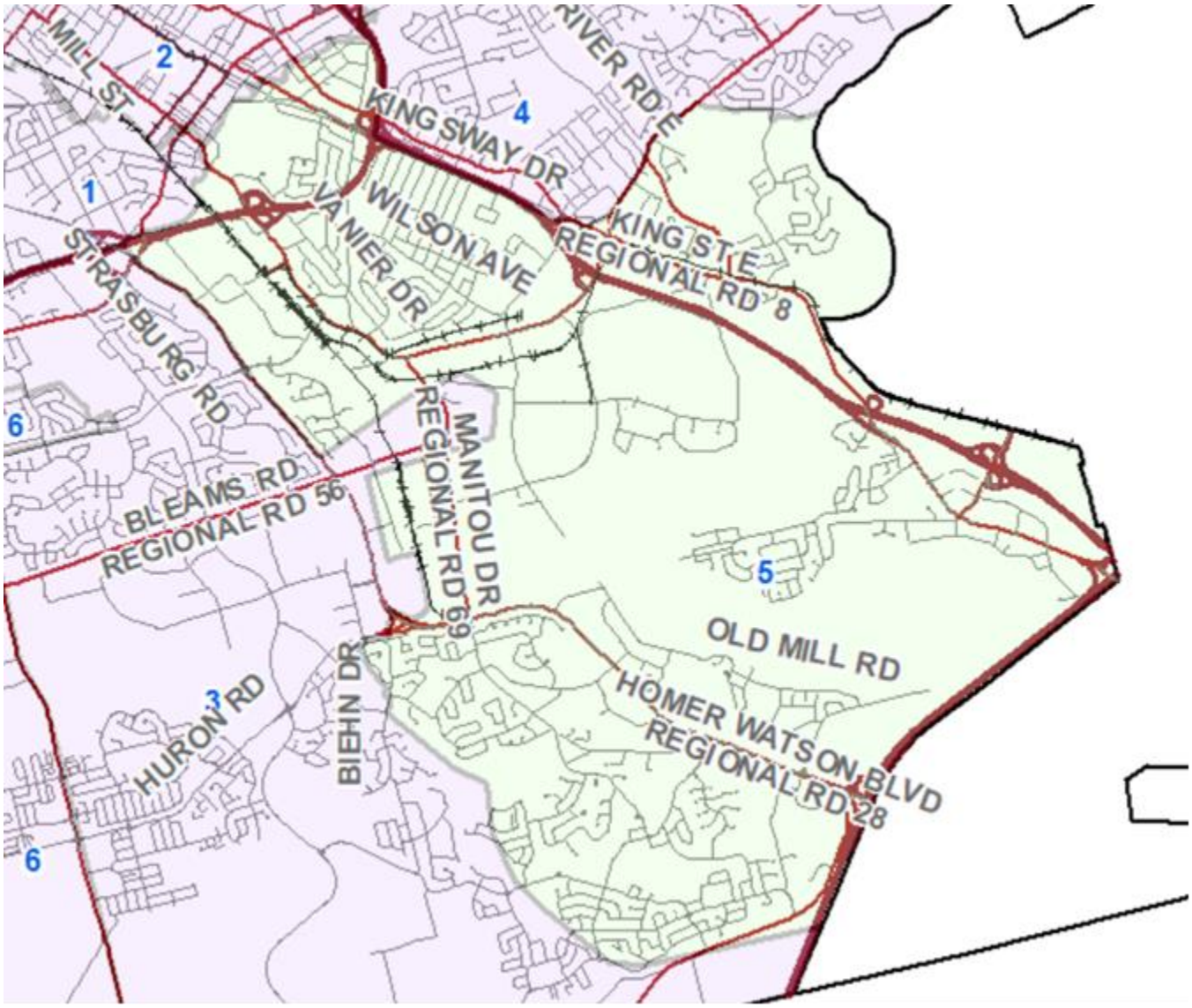
- Individual project selection is based on a number of factors including condition (watermain break history), material, criticality, watermain size, presence of lead services, shallow mains, and other infrastructure needs (storm, sanitary, road).
- 2021 reconstruction projects were largely completed as per the 2021 Engineering/Storm/Sanitary/Water Capital Forecast
- The Region replaces some Kitchener infrastructure as part of their projects (Kitchener funded).
- 2022 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

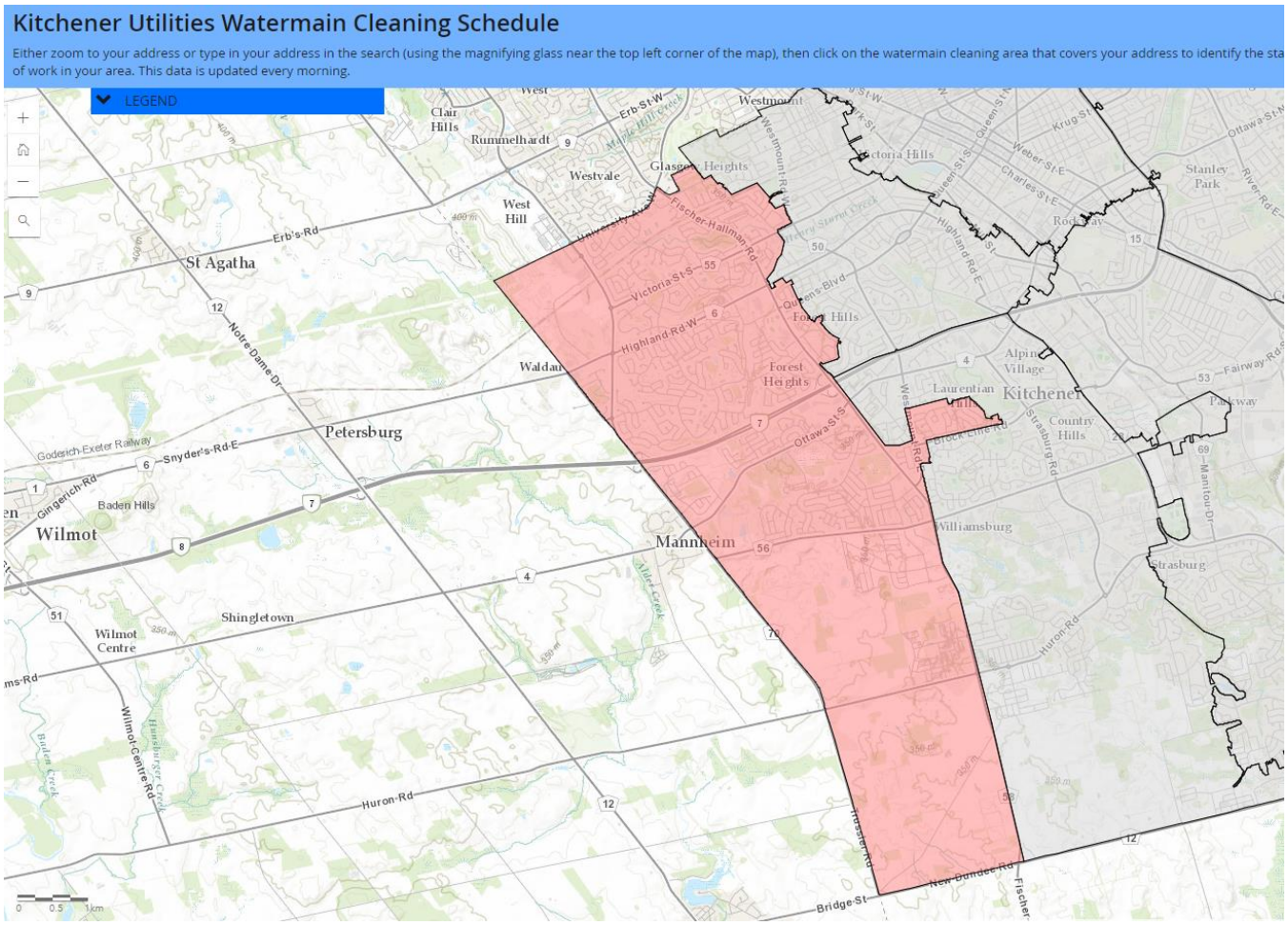
Summary of Maintenance

- Watermain cleaning – Approximately 184kms of watermain was cleaned in 2021. The 2021 watermain cleaning area map is shown below. The next map shows the proposed 2022 area in light green. 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.

Completed 2021 Watermain Cleaning Area (light green)



Proposed 2022 Watermain Cleaning Area



- Hydrant maintenance – spring maintenance was completed on all hydrants and hydrants were dipped in the fall, as required.
- Hydrants are flushed to maintain chlorine residuals was completed in spring and fall.
- New development areas are flushed until the subdivision is built-up.
- A valve turning/exercising program was completed for 1,800 valves – the majority of valves were operated in the watermain cleaning area with additional valve operation in areas of reconstruction.
- There were 37 broken or failing water valves – 32 were replaced and 5 were spooled. At the end of the year there were 8 broken valves remaining in the system. Of the 8, 3 will be replaced as part of Regional reconstruction projects (Lancaster St) and another 3 will be replaced in coordination with Regional road work (Westmount/Ottawa St). The Water Incidents dashboard provides a real time indication of valves that are closed in the system – for example they may be closed for emergencies (shown as a Water Valve

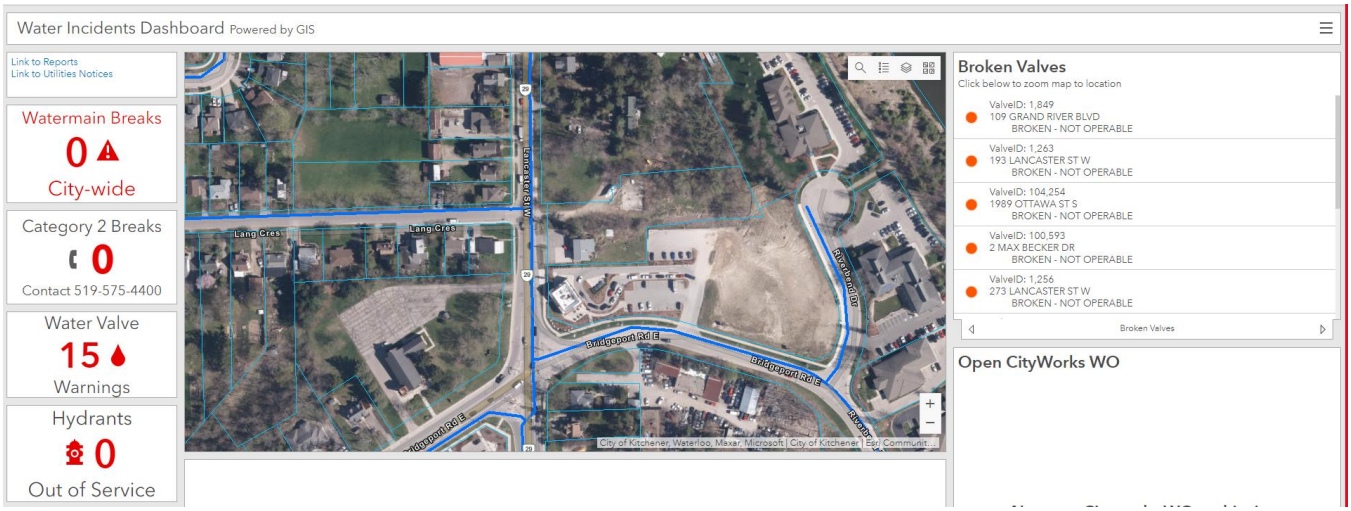
Warning) and broken valves (see below Water Incidents Dashboard). The dashboard is also used to show current and historic watermain breaks.

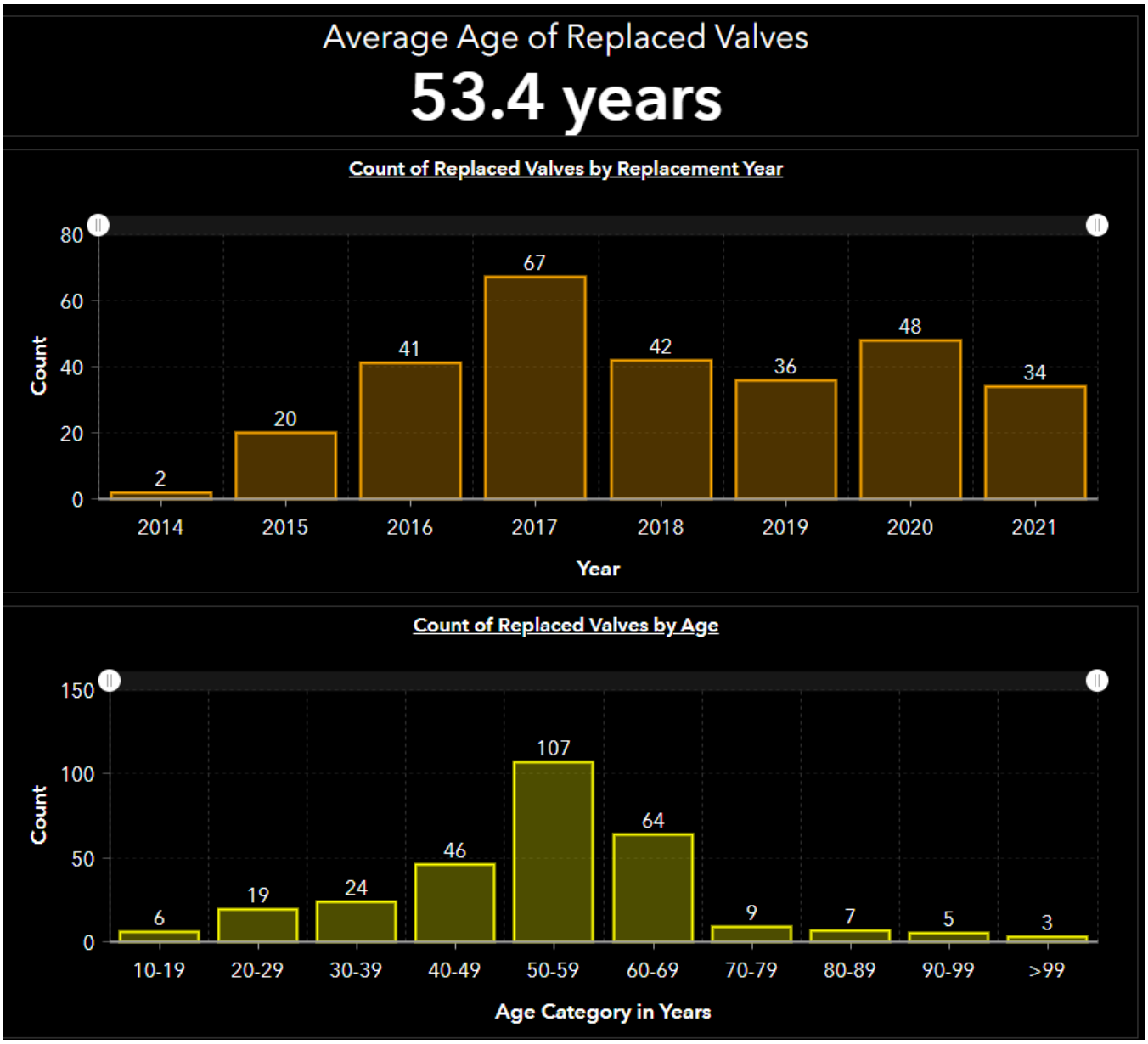
- A new dashboard was developed to track the age at which valves break as well as the number of valves replaced and breakdown of valve age. Previous assumptions had been that valves last approximately 40 years, but the data is trending at 53 years.
- 400 hydrants were painted
- Leak detection survey – 1/3 of city completed each year. Follow-up is completed on potential leaks. Approximately 300km of mains were surveyed resulting in 15 possible hydrant leaks – the majority of which were repaired by tightening the nuts of the hydrants
- 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.
- Dechlorination procedures for hydrant flushing 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.
- An auto flusher was installed on Morrison Road to maintain water quality until future pressure zone changes can be made.
- 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. One chamber was replaced with a boulevard configuration in 2021 with another four scheduled for 2022, eliminating the chambers.
- 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

City of Kitchener Water Distribution

DWQMS Management Review





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 21 AWQIs (downward trend and an indication of water quality).
- Water loss/unaccounted for water was 9.7% (below the target of 10%).
- The number of quality complaints was at 148, 26% of which were related to discoloured water and 40% 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 78 watermain breaks in 2021, which is lower than the 5-year average of 81 breaks/year.

Action: No further action required – for information only

Operational Plan Currency, Content and Updates

- The Operational Plan is updated annually.

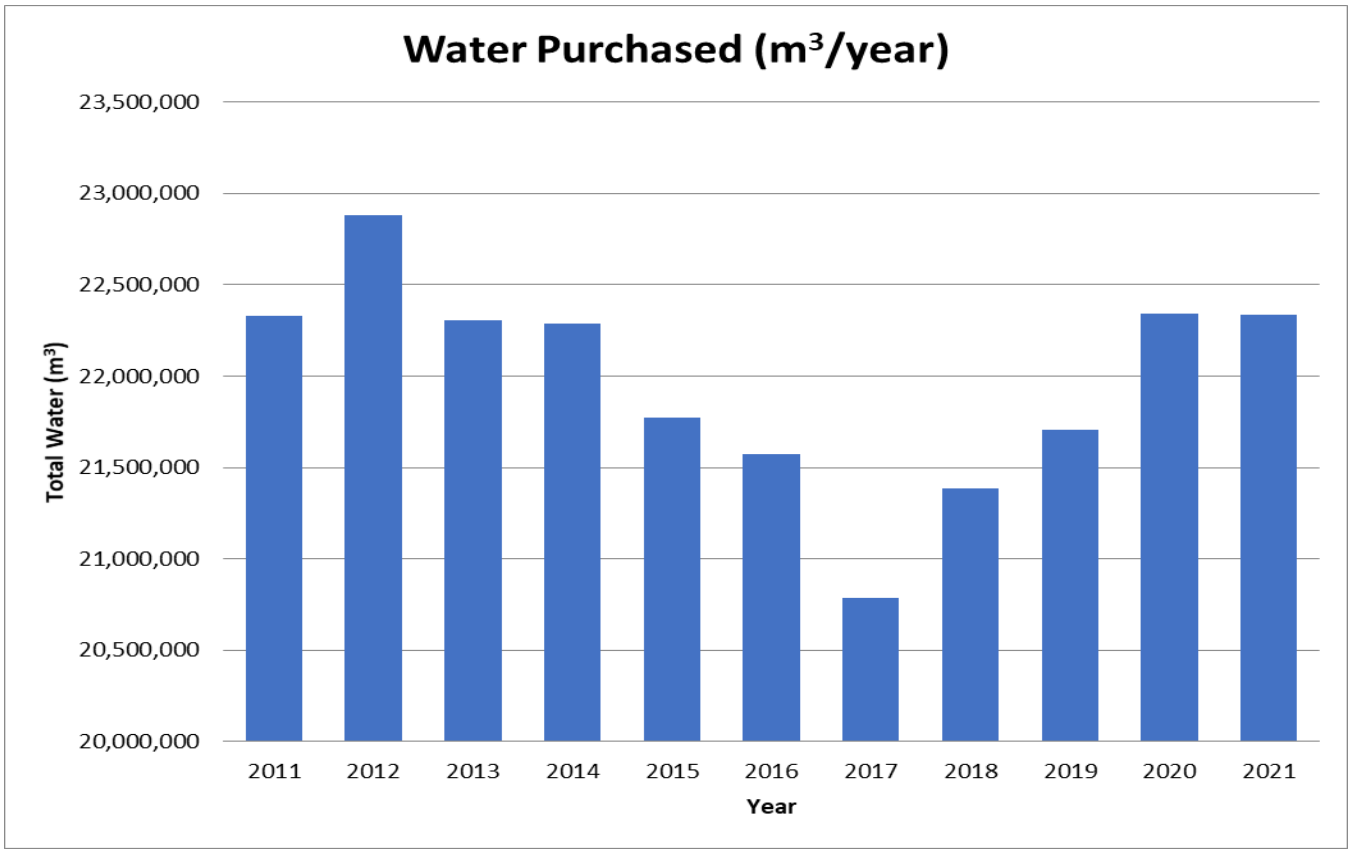
Action: No further action required – for information only

Staff Suggestions

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

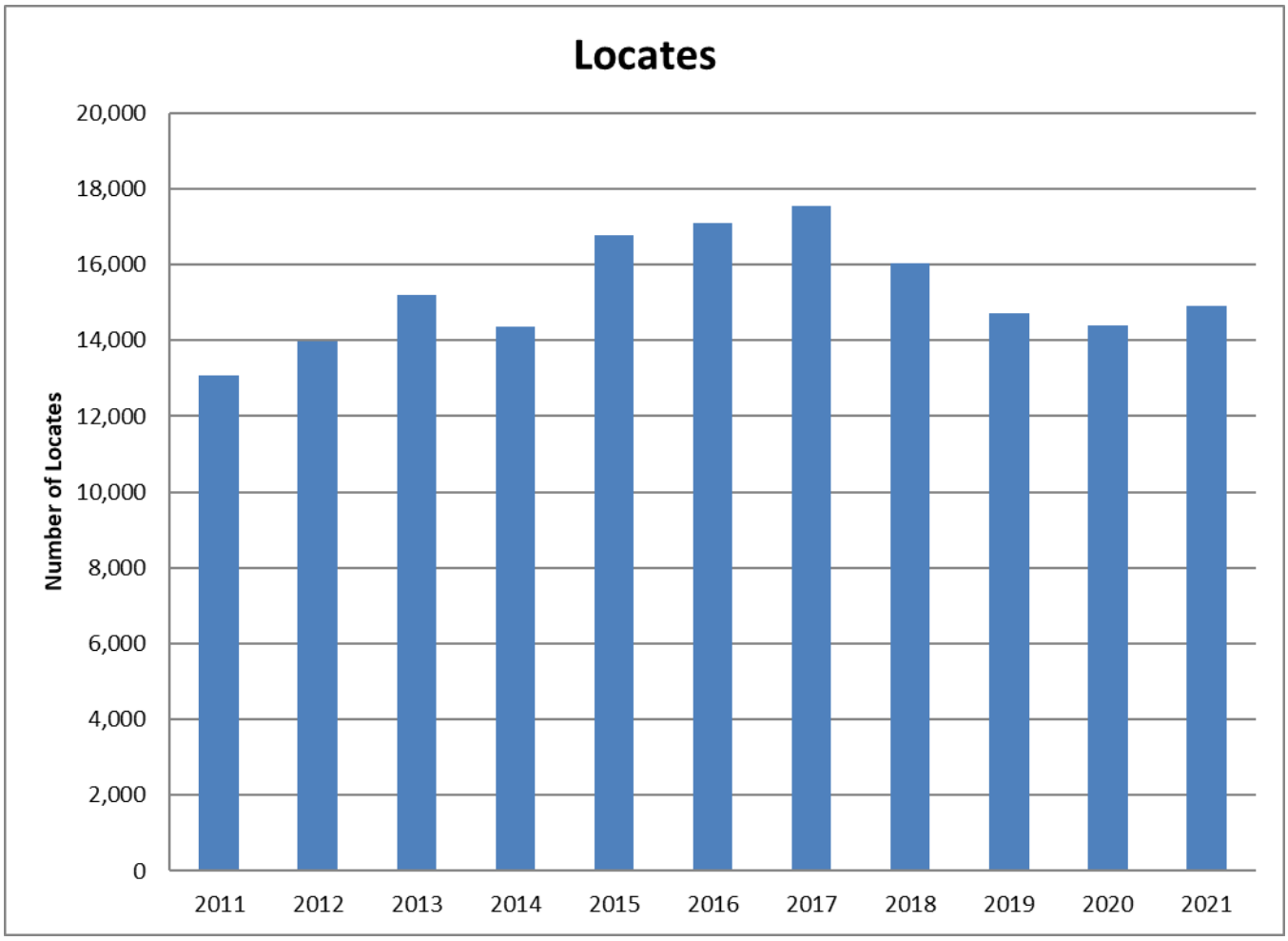
Other

- Water Meter Replacement – 5,537 aging water meters were replaced. There are 69,714 meters in the system with a backlog of approximately 8,368 meters to be replaced (replacement is targeted at 15 years for residential meters).
- Water Meter Shop digitized the new meter request process and in October moved appointment setting in-house for water meter issues (approximately 1200 service orders/year).
- 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 in 2019 as it was projected to do in Regional modelling (population demand outpaces water conservation measures). The trend may fluctuate a bit due to COVID impacts and weather, continuing until population growth demands outpace water conservation measures.



- Locates - Kitchener Utilities and their Locate Service Provider physically locate gas and water infrastructure for contractors prior to construction and excavation work. Approximately 14,917 locates were completed in 2021, which is comparable to 2020 levels. Locate volumes are driven by customer requests and construction. Two additional locating FTEs were hired in March 2021 to decrease risk to water and gas infrastructure.

Action: No further action required – for information only


Locates
Number of Locates
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021

City of Kitchener Water Distribution

DWQMS Management Review

Appendix

Water Distribution System Map