# COUNCIL INFORMATION PACKAGE

**June 29, 2020**

## Table of Contents

<table>
<thead>
<tr>
<th>Item</th>
<th>From</th>
<th>Subject</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>City of Cambridge – Community Development</td>
<td>Report 20-126(CD) Micromobility Update</td>
<td>2-14</td>
</tr>
<tr>
<td>2</td>
<td>City of Cambridge</td>
<td>Provincial Funding for Rehabilitation Funding</td>
<td>15-16</td>
</tr>
<tr>
<td>3</td>
<td>Township of Emo</td>
<td>Resolution re: Provincial Funding for Rehabilitation Funding</td>
<td>17</td>
</tr>
<tr>
<td>4</td>
<td>City of Cambridge – Community Development</td>
<td>DWQMS Report Internal Memo #: IM20-013(CD)</td>
<td>18-87</td>
</tr>
</tbody>
</table>
Executive Summary

Purpose

- To provide an update to Council on the status of micromobility (bike share, e-scooters) in the Region of Waterloo;

- To summarize and share Regional Report TES-TRS-20-14: Micromobility Update (attached as Appendix 1).

Key Findings

- Through funding provided by the Federation of Canadian Municipalities’ (FCM) Municipalities for Climate Innovation Program, staff from the cities of Cambridge, Kitchener, Waterloo and the Region of Waterloo retained the services of a consultant, Alta Planning + Design, in December 2018 to conduct a Shared Micromobility Feasibility Study. The final report was received in April 2020.

- The recommendations from the Shared Micromobility Feasibility Study will be further evaluated by regional and municipal staff to determine how to effectively implement the best practices in Waterloo Region.

- Next steps for the project team include developing a coordinated Micromobility Implementation Plan to prepare for shared mobility systems as early as 2021. Based on the implementation timeline, the cities and region do not plan on entering into a bike share agreement with any provider in 2020.

Financial Implications

- There are no financial implications to providing this update.
Background

In 2018, area municipalities and regional staff were successful in a joint application for funding for a bike share study from the Federation of Canadian Municipalities’ (FCM) Municipalities for Climate Innovation Program. The purpose of the study was to determine the minimum requirements for an expanded bike share system that adequately serves residents of Waterloo Region.

As the study was beginning, Dropbike Inc. approached the area municipalities and the Region with a proposal to operate a bikeshare pilot in the cities of Kitchener, Waterloo and Cambridge. The Dropbike pilot provided an opportunity to test a dockless bikeshare system at zero cost to the region and area municipalities. The pilot also provided an opportunity to collect data on ridership and user experience specific to Waterloo Region for the bikeshare study.

Other advancements in bike sharing technology and models emerged throughout the course of the study, which allowed for further expansion of the project scope. In the summer of 2018, the City of Waterloo implemented an e-scooter pilot and the bikesharing industry also began introducing e-bikes and e-scooters into their fleets. In addition, the Ministry of Transportation announced a 5-year e-scooter pilot to begin January 1, 2020 in the Province of Ontario, allowing for municipalities to permit e-scooters on roads.

With the ever evolving nature of shared transportation systems, the study scope was further expanded from a bikeshare study to a shared micromobility feasibility study, to include additional discussions on e-scooters and e-bikes.

Through funding from the FCM, the services of Alta Planning + Design were retained to outline best practices in shared micromobility systems. A final report was received by Alta Planning in April 2020 with recommended actions for implementing shared micromobility solutions throughout the Waterloo Region.

Analysis

Strategic Alignment

PROSPERITY: To support and encourage the growth of a highly competitive local economy where there is opportunity for everyone to contribute and succeed.

Goal #7 - Transportation and Infrastructure

Objective 7.1 Find new ways to help people move within and beyond the city without using a car (walking, cycling and transit).
A shared micromobility service helps the City achieve its strategic objective by providing people with additional transportation options to move within and beyond the city and providing options that are healthier for residents, the community, and the environment.

Comments

Shared Micromobility Feasibility Study

The scope of the shared micromobility feasibility study ("the study") was developed by a project team consisting of regional and municipal staff. The study provided recommendations for structuring and managing shared micromobility services in a way that is integrated with transit, adequately serves residents of the Waterloo Region and maximizes potential greenhouse gas reductions. Staff continue to work through the recommendations to determine how to effectively implement the best practices highlighted in the study and to create an implementation plan that involves various regional and municipal departments.

Key components of the study include:

- Market Analysis
- Dropbike Pilot Data Review
- Minimum Service Standards
- Implementation
- Business Plan
- Marketing Plan

Further details of the deliverables of the study are listed in the Appendix of the attached Regional Report: TES-TRS-20-14 (Appendix 1).

2021 Micromobility Implementation Plan

Given the multifaceted nature of shared micromobility programs, the project team maintains that these services would be more successful with a coordinated 2021 Micromobility Implementation Plan ("Implementation Plan") between the region and three cities. The Implementation Plan would outline service and performance standards as well as a regulating framework to enforce these standards. The Implementation Plan would also address any requirements related to service area and minimum number of micromobility vehicles as recommended in the Shared Micromobility Feasibility Study. Staff will report back to Council at a later date to provide an update on the 2021 Micromobility Implementation Plan.

Dropbike Pilot Update
Dropbike operated a pilot in the cities of Cambridge, Kitchener and Waterloo from May to November 2019. The pilot was a zero cost opportunity to test a dockless bike share service in Waterloo Region. This was the first time a bike share system had operated in the City of Cambridge.

Alta Planning evaluated the data from the Dropbike pilot and found that compared to other bikeshare systems, the pilot was considered to have limited success in terms of usage (over 4,500 rides over the pilot, or an average of 23 rides per day region wide). There were a number of constraints identified that could have hindered the service uptake of the pilot including: the duration of the pilot, the number of vehicles and the size of the service areas. Although the ridership was low, the pilot was considered conditionally successful in terms of achieving the majority of the pilot licence agreement terms.

Dropbike has expressed interest in operating in Waterloo Region in 2020. However, their proposal had a monthly service fee to continue operation, they were not including Cambridge without an additional investment and they did not include Cambridge in the launch with Kitchener and Waterloo.

Staff from the cities of Cambridge, Kitchener, and Waterloo and Region of Waterloo are not requesting an extension/renewal of the partnership with Dropbike at this time due to the staff time required to enter into a new agreement, unanticipated program costs and the proposed reduction in service.

Dropbike (along with other micromobility providers) will be encouraged to provide an updated proposal once the 2021 Micromobility Implementation Plan is complete and an intake process is developed.

**E-Scooter Pilot Opportunity**

The Ministry of Transportation (MTO) announced a 5-year e-scooter pilot beginning on January 1, 2020. Municipalities can now choose to permit e-scooters on roads (previously prohibited under the Highway Traffic Act) and will be responsible for considerations such as whether to allow them on sidewalks and trails.

Regional and municipal staff are interested in pursuing an e-scooter pilot as providing new transportation options aligns with many of the City’s and Region’s Strategic and Master Plans in terms of creating opportunities to reduce traffic congestion, provide first and last mile connections to transit, and offering residents a new way to get around their communities.

The framework for e-scooters including bylaws and regulations will be further explored in the 2021 Micromobility Implementation Plan.

A further analysis of these items can be found in the Regional Report: TES-TRS-20-14 (Appendix 1).
Existing Policy/By-Law

As of January 1, 2020 municipalities have the authority to create by-laws to prohibit or allow e-scooters on the road and to determine where they can operate most safely in each unique environment.

The e-scooters identified in this report are considered a motor-assisted vehicle under the City's Traffic & Parking By-Law 187-06. Under the by-law "No person shall drive a motor vehicle or a motor-assisted vehicle on any boulevard, sidewalk or multi-use trail except on a driveway".

An update to the Traffic By-law will be required in the future and coordinated with the completion of the 2021 Micromobility Implementation Plan.

Financial Impact

There is no financial impact at this time.

Public Input

Public input was gathered for all the studies and pilots discussed within this report.

**Shared Micromobility Feasibility Study:** Alta Planning hosted two stakeholder engagement sessions in December 2019 to present their findings at the time and to gather feedback from the community.

**Dropbike Pilot:** Public input was gathered in the form of a survey before the launch of the pilot, to determine where the public would like to see bikes. A second survey was completed at the end of the pilot to gather user satisfaction and feedback. In addition, the municipalities and the Region received feedback throughout the pilot from resident calls and emails.

**E-Scooter Pilot Opportunity:** Although the public has not been engaged on a municipal or regional level related to e-scooters, the Province of Ontario requested public feedback before the decision was made to permit a 5-year pilot. As of writing this report no decisions have been made regarding an e-scooter pilot in the City of Cambridge and as such public input is not necessary at this time. Public input on e-scooters will be gathered during the development of the 2021 Micromobility Implementation Plan.

Internal/External Consultation

Given the area municipalities’ and Region’s vision for a joint, seamless and coordinated approach to shared micromobility systems, staff from the cities of Kitchener, Cambridge, Waterloo and the Region of Waterloo have been working together to ensure that a future system is Region-wide, involving all three municipalities.
Conclusion

Supporting new and evolving forms of micromobility aligns with the City’s Transportation Master Plan, Cycling Master Plan, and the City’s Strategic Plan. Staff will continue to work with the project team to develop a shared Micromobility Implementation Plan for 2021, based on the Shared Micromobility Feasibility Study recommendations.

Staff will report back to Council at a later date to provide an update on the 2021 Micromobility Implementation Plan.

Signature

Division Approval

Reviewed by the CFO
Reviewed by Legal Services

Name: Sarah Austin
Title: Acting City Engineer

Departmental Approval

Name: Hardy Bromberg
Title: Deputy City Manager, Community Development

City Manager Approval

Name: David Calder
Title: City Manager

Attachments

- Appendix 1: Region of Waterloo Report: TES-TRS-20-14 Micromobility Update
Region of Waterloo
Transportation and Environmental Services
Transit Services

To: Chair Elizabeth Clarke and Members of Regional Council

Date: May 5, 2020  File Code: D10-70

Subject: Micromobility Update

Recommendation: For information.

Summary:

Through funding from the Federation of Canadian Municipalities' Municipalities for Climate Innovation Program, Transportation Demand Management staff along with Area Municipal partners retained the services of consultants, Alta Planning + Design, in December 2018 to conduct a micromobility (bike share and e-scooters) study on industry best practices and how they could be applied in Waterloo Region.

Staff received the final report from Alta Planning in April with recommended actions for implementing shared micromobility solutions throughout the Region. These recommendations must be further evaluated in order to determine how to most effectively implement the best practices in Waterloo Region.

TDM staff will be reviewing the study findings and recommendations in detail with the municipal partners on the project team, to then develop a shared micromobility implementation plan for 2021. This plan will include recommendations for both shared bike and e-scooter providers. In regards to e-scooters, the implementation plan will also be used to respond to the Minister of Transportation’s 5-year e-scooter pilot opportunity.

The 2021 implementation plan for shared micromobility providers will be prepared based on the study recommendations before entering into a partnership with any shared micromobility provider. As a result, staff would not enter into a new bike share agreement with Dropbike (provider of the 2019 bike share pilot in the Region) or any other provider in 2020.
Staff will report back to Committee at a later date to provide an update on the 2021 micromobility implementation plan.

Report:

What is Micromobility?

Micromobility is an umbrella term for light personal transportation devices that include human and motorized vehicles. The most common micromobility vehicles are bicycles, electric assist bikes (e-bikes), and e-scooters. Shared systems provide people access to vehicles through a membership, pay-per-use, or time-based fares.

For the purposes of this report, micromobility will refer to shared bicycles (including both traditional bicycles and e-bikes) and e-scooters.

Bike sharing programs have existed for over 50 years, and have evolved alongside advancements in information technologies. Today there are three main approaches to bike share programs:

- **Dock-based systems** are modular and consist of docking stations and kiosks that use solar power and wireless communication to house the bikes. This technology was the first to achieve widespread implementation among public systems. E.g. Bixi system in Montreal.

- **Dockless systems** allow the shared bicycles to be locked anywhere within a designated service area, either locked to a fixed object or locked to itself. This is a newer technology, which evolved to reduce equipment costs. E.g. LimeBike and Spin in Seattle.

- **Hybrid systems (“lock-to”)** feature bikes equipped with smart locks and require locking the bike to a fixed object or designated station. This is a newer technology, which evolved to reduce equipment costs. E.g. SoBi Bikes in Hamilton.

The evolution of shared micromobility technologies have also brought about the addition of new modes, such as e-scooters. An e-scooter is a power-assisted scooter with a step-through frame where a single rider can stand while driving the vehicle, with no seat. It can be parked in an upright position with use of a kickstand.

Study Background

Through funding from the Federation of Canadian Municipalities' Municipalities for Climate Innovation Program, Transportation Demand Management staff along with municipal partners retained the services of consultants, Alta Planning + Design in December 2018 to conduct a bike share study on best practices and how they could be applied in Waterloo Region. The study purpose is grounded in the potential of shared micromobility programs to reduce greenhouse gas emissions.
In June 2018, Region and Area Municipal staff received confirmation that a joint application for a bike share study to the Federation of Canadian Municipalities’ (FCM) Municipalities for Climate Innovation Program was successful. The study had been scoped in 2017 while the Working Centre’s Community Access Bikeshare (CAB) program was in operation, and before other cities started adding e-bikes and the e-scooter to their shared micromobility fleets. Staff had initially applied to the Municipalities for Climate Innovation Program in order to retain the services of a consultant to identify ways to increase the usage of the CAB system which provided over 2,100 trips in 2017.

Once CAB announced in January 2018 that they would no longer be in operation, staff reframed the purpose of the study as “to determine the minimum requirements for an expanded system to ensure that bike sharing is integrated with transit and adequately serves residents of the Waterloo Region.”

Region staff presented Report TES-TRS-18-11 dated April 10, 2018 to the Planning and Works Committee to provide an update on the discontinuation of the Working Centre’s CAB program and to outline the potential of partnering with a new company named Dropbike Inc. While separate from the Alta study, the Dropbike pilot was considered an opportunity to collect data on ridership and user experience for consultant analysis. The City of Waterloo also implemented a Lime e-scooter pilot in the summer of 2018, and the study scope was further expanded to include discussion of shared e-scooters as well.

**Study Scope and Key Deliverables**

The scope of the study was developed by the Regional and municipal members of the project team in order to get recommendations for structuring and managing shared micromobility services in a way that is integrated with transit and adequately serves residents of the Waterloo Region (and maximizes potential greenhouse gas reductions). Key components of the study and their primary deliverables are listed in Appendix 1.

Staff received the final report from Alta Planning in April with recommended actions for implementing shared micromobility solutions throughout the Region. Given the multifaceted nature of shared micromobility programs, an implementation plan based on the study recommendations requires input from various Regional and municipal departments, including but not limited to, the Waterloo Regional Police Service, Transportation, Public Health, and Legal Services. Consequently, the consultant recommendations must be further evaluated in order to determine how to most effectively implement the best practices for future bike share (including e-bikes) and/or e-scooter share programs in Waterloo Region.

**Dropbike Pilot Update and a Micromobility Implementation Plan**

The Dropbike pilot was considered a low-stakes opportunity to test a dockless bike share service in Waterloo Region. The pilot was operated by Dropbike at zero cost to the Region and municipalities. The pilot was operational in the Cities of Cambridge, Kitchener, and
Waterloo from May to November 2019. The Region’s licence agreement with Dropbike ended in December 2019.

The pilot was evaluated by Alta Planning, and was considered conditionally successful, since it achieved the majority of the pilot licence agreement terms. There are some aspects of the licence terms where the pilot was not successful and where improvements should be made to future systems. Compared to other bike share systems, the pilot was considered to have limited success in terms of usage (over 4,500 rides over the pilot, or approximately 23 rides per day). Alta Planning identified the duration of the pilot, number of vehicles, and service area as constraints to system uptake.

Dropbike have expressed interest in operating in Waterloo Region in 2020. However, Dropbike proposed a reduced service area, fewer bikes, and a monthly service fee to continue operation ($5,000/month for a partial system in Kitchener and Waterloo). To include Cambridge, Dropbike requested an additional Region investment in their vehicle fleet, and would not launch until August 2020 or the spring of 2021. Region staff and project team members from the Cities of Cambridge, Kitchener, and Waterloo are not requesting an extension/renewal of the partnership with Dropbike due to the staff time required to enter into a new agreement, unanticipated program costs, and proposed reduction in service.

Staff maintain that shared micromobility services (including bike share services) would be better managed, and likely more successful with the implementation of a coordinated 2021 micromobility plan among the Region and Cities. A micromobility plan would outline service and performance standards (e.g. fleet rebalancing and response time for customer inquiries) as well as a regulating framework to enforce these standards, which is expected to result in improved compliance amongst operator(s). The plan would also include any requirements related to service area and minimum number of micromobility vehicles as recommended in the Alta Planning report. It is expected that these improvements would result in greater bike share usage.

Dropbike will be encouraged to provide an updated expression of interest and/or proposal along with any other micromobility providers once the 2021 micromobility implementation plan is complete and an intake process is developed.

E-Scooter Pilot Opportunity Update

In recognition of e-scooters’ potential to help commuters get to transit connections and reduce congestion, the Ministry of Transportation (MTO) announced a 5-year e-scooter pilot beginning on January 1, 2020 (previously prohibited under the Highway Traffic Act). Under the pilot, the province has set out vehicle and safety requirements. Municipalities can choose to permit e-scooters, and will be responsible for considerations such as whether to allow or prohibit them on municipal roads and how shared e-scooter programs will be managed in their municipality.
Early conversations amongst Regional staff and municipal partners have indicated that there is interest in pursuing the opportunity presented by the MTO pilot. Allowing e-scooters to operate in the Waterloo Region would help position the network for New Mobility, which is one of the strategies of Moving Forward: 2018 Transportation Master Plan. There is also the acknowledgement that personal e-scooters are already available for purchase and in use in the community, and therefore the Region and municipalities should have the bylaws and regulations, as appropriate, in place to promote the safe use of e-scooters.

The micromobility implementation plan will be used in part to respond to the Minister of Transportation’s 5-year e-scooter pilot opportunity, e.g. recommendations for bylaws and regulations. Furthermore, the implementation plan will consider Alta Planning’s recommendations for how to successfully manage both bike share and e-scooter operators in a given service area.

Next Steps for Project Team

TDM staff will continue to work with Area Municipal partners to develop a shared micromobility implementation plan for the Region based on the study’s recommendations for bike share and e-scooter providers. The project team will prepare a draft plan in consultation with other departments, City and Region Active Transportation Advisory Committees, and members of the public.

Region and Area Municipal staff participating on the project team are not planning to enter into any new agreement with Dropbike or any other micromobility provider before the 2021 implementation plan is complete.

Staff will report back to Committee at a later date to provide an update on the 2021 micromobility implementation plan.

Corporate Strategic Plan:

Supporting micromobility programs aligns with the Region of Waterloo’s 2019-2023 Strategic Plan objectives (2.2 Increase Participation in Active Forms of Transportation; 3.1 Reduce Greenhouse Gas Emissions), as well as the broader strategic imperative of Climate Action.

Financial Implications: Nil.

Other Department Consultations/Concurrence:

Transit Services, Transportation Planning, and Legal Services were consulted in the development of the Dropbike bike share pilot and the micromobility study.

Staff from the Cities of Cambridge, Kitchener, and Waterloo comprised the project team that coordinated the implementation of the Dropbike bike share pilot and the development
of the micromobility study.

**Attachments**

Appendix 1 – Micromobility Study Scope of Work

**Prepared By:** Julie Bélanger, Principal Planner, Transportation Demand Management

**Approved By:** Thomas Schmidt, Commissioner, Transportation and Environmental Services
Appendix 1. Micromobility Study Scope of Work

The key components of the study and their primary deliverables include:

- **Market Analysis**
  - Discussion of barriers to use
  - Identification of high demand clusters and a composite demand map

- **Dropbike Pilot Review**
  - Evaluation of Dropbike's adherence to Licence Agreement
  - Summary of EngageWR survey results (developed to assess pilot satisfaction amongst users and non-users of Dropbike)
  - Performance evaluation based on Institute of Transportation and Development Policy's Bike Share Planning Guide evaluation metrics

- **Minimum Service Standards**
  - Recommended bike share and e-scooter share system type (docked, hybrid, or dockless) and recommended approach to ownership (procurement or permitted)
  - Recommended service area and phasing strategy
  - Bike and e-scooter parking recommendations within service area

- **Implementation**
  - Implementation recommendations by form of shared micromobility service
  - Regulating and organizational framework

- **Business Plan**
  - Cost/revenue assessment
  - Future funding mechanisms
  - Integration with transit
  - Subsidized rates or incentives for people facing barriers to transportation

- **Marketing Plan**
  - Target audiences
  - Marketing methods
May 13, 2020

Hon. Doug Ford
Premier’s Office, Room 281
Legislative Building, Queen’s Park
Toronto, ON M7A 1A1

To Premier Ford,

RE: Provincial Funding for Rehabilitation Facilities

Please be advised that Cambridge City Council, at its meeting held on the 15th day of April, 2020, approved motion 20-060 regarding Provincial Funding for Rehabilitation Facilities:

Moved by: Councillor Liggett
Seconded by: Councillor Mann

WHEREAS there is a failure of our overall drug and addictions policies and strategies to provide for adequate, timely and sustainable detox and addiction rehabilitation programs in a safe, supportive environment; and,

WHEREAS methods of harm reduction are a stopgap until those struggling with addiction are able to have immediate access to adequate detox and rehabilitation programs; and

WHEREAS the community of Cambridge has shown their concern and compassion for the lack of access and availability for their fellow residents who are asking for such assistance; and

WHEREAS there is an inadequate quantity of rehabilitation facilities throughout the province providing the required number of beds and programs for those struggling with substance abuse requesting assistance; and

WHEREAS publically funded services for detox and rehabilitation programs would ensure that all persons receive such help equitably and in a sustainable way; and

WHEREAS some persons struggling with substance abuse may need such programs more than once;
THEREFORE BE IT RESOLVED that the City of Cambridge asks the Province of Ontario for the much needed funding to provide for such relief for the City of Cambridge as well as throughout the province.

If you require any additional information, please do not hesitate to contact me.

Sincerely,

[Signature]

Danielle Manton
City Clerk

DM/jh

cc. Office of the Mayor – City of Cambridge
Belinda Karahalios, MPP – Cambridge
Amy Fee, MPP – Kitchener South-Hespeler
Region of Waterloo
City of Kitchener
City of Waterloo
Township of Wilmot
Township of Wellesley
Township of Woolwich
Township of North Dumfries
Association of Municipalities of Ontario
June 17, 2020

Via email: mantond@cambridge.ca

City of Cambridge,
50 Dickson Street, P.O. Box 669,
Cambridge, ON,
N1R 5W8

Dear Council,

RE: **Provincial Funding for Rehabilitation Facilities**.

Please be advised at the regular meeting of the Council of the Township of Emo held on May 26, 2020, the following resolution was passed:

> **BE IT RESOLVED that the Township of Emo hereby received correspondence from the City of Cambridge regarding Provincial funding for rehabilitation facilities; AND THAT Council endorses and supports the City of Cambridge in their efforts to request the Province of Ontario to provide detox and addiction rehabilitation facility funding for relief throughout the province.**

Council fully recognizes the importance of this matter and felt strongly about supporting this matter.

Yours truly,

Bridget Foster,
CAO/Clerk-Treasurer

BF/ss

cc. Hon. Doug Ford, Premier of Ontario, premier@ontario.ca.
Executive Summary

Purpose

The purpose of this report is to inform Council as the decision-making authority about the status of the drinking water system on an annual basis. The Cambridge water distribution system meets the requirements under the Safe Drinking Water Act. There are specific areas that must be reported per regulatory requirements, which include; but are not limited to consumer feedback, results of infrastructure review, results of audits and summary of maintenance.

Key Findings for 2019

- 6% (33.9 km) of the watermain system cleaned by swabbing and unidirectional flushing
- 19% (1011) of system valves were exercised
- 39 watermain breaks in 2019, with 11 found using enhanced leak detection
- 6.45% (2,600) of water meters were replaced under the AMI project
- Unaccounted for water loss was 18.5%, an improvement of 3% from 2018
- 21.5% (758) of fire hydrants were painted in 2019
- 2 samples of 2772 were deemed adverse and required follow up (6 in 2018)
- 17% of all service leaks and 28% of all main breaks were identified before they surfaced
- Internal & External Audits, Risk Assessment and Emergency Testing were all completed in 2019.
Financial Implications

- The City of Cambridge’s 2019 approved Water Utility Budget was $35,884,400
- The actual net expenditures in 2019 were $35,254,768, thus resulting in a year-end surplus of $629,632 or 1.7% of the overall approved budget.

Background

The Drinking Water Quality Management Standard (DWQMS) under the Ministry of Environment Parks and Conservation (MECP) requires management to review and evaluate the continuing suitability, adequacy and effectiveness of the Quality Management System at least once a year and that the results of the management review, identified deficiencies, decisions and action items are provided to Council.

The City’s DWQMS outlines administrative procedures to be followed by staff who interact, one way or another, with the drinking water system in the course of their work. These processes and procedures are designed to create personal accountability and define frequencies for performing audits, risk assessments, emergency testing and training. They also specify methods and timing for corrective actions to be taken as well as how this information is to be communicated to the water system decision makers.

In March Council was provided the Summary Water Report (Report 20-034) which provides a high level summary of drinking water usage volumes and specifics on water testing for the past year. This DWQMS Report is supplemental to the Summary Report in that it provides Council with additional details pertaining to water loss rates, consumer feedback, watermain and service leak frequencies, as well as details relating to the City’s operational conformance with its Quality Management System.

The 2019 DWQMS report is attached as Appendix A.

Analysis

Strategic Alignment

PROSPERITY: To support and encourage the growth of a highly competitive local economy where there is opportunity for everyone to contribute and succeed.

Goal #7 - Transportation and Infrastructure

Objective 7.3 Provide innovative leadership in the management of city assets to help plan, fund and maintain city assets in a sustainable way.
The Drinking Water Quality Management Report is provided to Council on an annual basis as an update on the status of the City’s municipal drinking water system to aid in the decision-making processes involving system financing and long term strategic planning.

Comments

The DWQMS report in Appendix A is laid out in two parts. Part A deals with the overall reasoning behind the report complete with executive highlights of system performance. Part B, of the report goes into more details by category and gives some in depth review.

Noted highlights are:

Water loss is down from 21.7% in 2018 to 18.5% in 2019.

The above chart demonstrates the declining amount of water being lost in our system. This loss is predominantly through unidentified underground leaks. Since 2015 we have seen a reduction of 3%. At approximately $160,000 per % this equates to a reduction of roughly $480,000 in water purchases for which would not otherwise recover through sales.
Water quality events are down to 2 occurrences in 2019.

The above chart shows that in 2019 there were two (2) events in which regulatory water sample analysis returned results that required follow up. Given that staff collect approximately 3,000 water samples in a year this is an extremely low occurrence of adverse results and indicates a high quality of water and testing.
Watermain breaks were up marginally in 2019.

The above chart indicates a slight increase in the number of watermain breaks experienced over the past 2 years, with a 5-year low in 2017.

While this may raise some questions regarding trending it should be recognized that the increases in 2018 and 2019 were primarily due to efforts made by staff to identify underground leaks proactively and prior to any water surfacing. In 2019 staff found 11 of the 39 main breaks through enhanced leak detection methods, allowing leaks to be stopped before they surface. In some cases these leaks could have otherwise persisted for months, even years, before observable on the surface.
The above pie charts provide some insight into the source of our watermain breaks. The chart on right indicates that 66% of our breaks in 2019 involved our cast iron pipe network (green & yellow) which makes up only 20% of our distribution network (orange and red). This information provides strong support for continuing with the capital replacement of our older drinking water pipes in order to help reduce main break frequency for the future.

These analyses, and many others, are presented in the attached DWQMS Management Review (Appendix A). Metrics such as these assist staff in their decision making related to resource allocation and targets for improvements to the water system year-over-year.
Existing Policy/By-Law

The following policy has been endorsed by Council and follows the language dictated by the Standard issued by the Ministry of Environment, Conservation and Parks (MECP):

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

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

Financial Impact

The 2019 approved budget for the operation of the Cambridge Drinking Water system was $35,884,700. The City’s actual expenditures were lower due to a combination of factors such as lower than forecasted waterloss, lower overall expenditures in materials and supplies, and salary gapping savings.

Overall, the Water Utility division reported a net annual surplus of $629,632 or 1.7% of the 2019 approved budget. Comparison of Budget to Actuals is summarized in the table below.

### 2019 Water Utility Budget Vs Actuals

<table>
<thead>
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<th>2019 Budget</th>
<th>2019 Actual</th>
<th>Under (Over)</th>
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</tr>
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<tr>
<td>Total Expenditures</td>
<td>35,884,700</td>
<td>34,260,282</td>
<td>1,624,418</td>
<td>4.53%</td>
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<tr>
<td>Total Revenue</td>
<td>(35,884,700)</td>
<td>(34,889,914)</td>
<td>(994,786)</td>
<td>-2.77%</td>
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<tr>
<td>Net Water Utility Budget - Surplus</td>
<td>-</td>
<td>(629,632)</td>
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</tbody>
</table>

As a result of fewer service main breaks in 2019, the actual expenditures for equipment, supplies and other program cost were lower than anticipated. Salary gapping savings (i.e. minimum 90 day period before filling vacant positions) also contributed to the overall surplus. Lastly, actual waterloss was better than previously forecasted, thus resulting in less purchase of water from the region, which is one of the biggest cost drivers for the City’s Water budget.

Public Input

This report has been posted to the City’s website with the agenda in advance of its submission into the Council Information Package.
Internal/External Consultation

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

There was no external consultation.

Conclusion

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

Attachment

DWQMS Management Report for 2019

Approvals:
☒ Manager/Supervisor ☒ Deputy City Manager ☒ City Manager
# TABLE OF CONTENTS

**Part A - Introduction** ............................................................................................................................ 3
  - Purpose............................................................................................................................................. 3
  - Executive Summary ......................................................................................................................... 3
  - Background .................................................................................................................................... 4

**Other Related Water Quality Reports** ................................................................................................. 4

**Quality Management System Policy** ................................................................................................... 5

**Part B – Management Review** ........................................................................................................ 5
  - System Description ......................................................................................................................... 5
  - Water Infrastructure Program ........................................................................................................ 7
  - Incidents of Regulatory Non Compliance ..................................................................................... 7
  - Incidences of Adverse Drinking Water ......................................................................................... 7
  - Deviations from Critical Control Points Limits and Response ..................................................... 7
  - Effectiveness of the Risk Assessment Process .............................................................................. 8
  - Results of Internal and External Audits ....................................................................................... 8
  - Results of the Emergency Response Training/Testing ................................................................. 8
  - Operational Performance .............................................................................................................. 8
  - Raw Water Supply and Drinking Water Quality Trends ................................................................. 11
  - Follow-up on Action Items from Previous Management Reviews ............................................. 14
  - Status of Management Action Items Identified Between Reviews ............................................. 16
  - Changes that could Affect the Quality Management System ....................................................... 21
  - Consumer Feedback ..................................................................................................................... 22
  - Resources Needed to Maintain the Quality Management System ............................................. 23
  - Results of the Infrastructure Review ............................................................................................. 23
  - Summary of Maintenance ............................................................................................................... 25
  - Effectiveness of Maintenance ........................................................................................................ 30
  - Operational Plan Currency, Content and Updates ........................................................................ 30
  - Staff Suggestions .......................................................................................................................... 30

**Appendix** (AM Report/ Internal Audit / External Audit) ..................................................................... 31
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 Parks and Conservation (MECP) requires management to review and evaluate the continuing suitability, adequacy and effectiveness of the Quality Management System at least once a year and that the results of the management review, identified deficiencies, decisions and action items are provided to the Owner. This 2019 summary report is being submitted to satisfy the Management Review requirement outlined in Element 20 of the City’s Water Operational Plan.

Executive Summary

Highlights of the report are:

- 33.9 km of water mains cleaned, which is approximately 5.8% of all watermain
- Approximately 1011 valves were proactively operated (19%)
- There were 39 watermain breaks in 2019
- Replaced approximately 2,600 aging water meters under the AMI project in 2019, or 6.45% of all City of Cambridge meters
- Unaccounted for water was 18.5% compared to 21.7% in 2018
- 758 of 3527 hydrants were painted in 2019, equal to 21.5% of all hydrants in the City of Cambridge
- There was a 66% drop in AWQI’s in 2019 compared to 2018
- 17% of all service leaks and 28% of all main breaks found by leak detection equipment
- External Surveillance Audit conducted in August of 2019 and recertification was achieved.
- Risk Assessment Redone in December 2019.
- Internal Audit performed in December of 2019.
- Testing of the Emergency Response Protocol and the Emergency Operations Center activation
City of Cambridge Water Distribution

DWQMS Management Review

<table>
<thead>
<tr>
<th>Action</th>
<th>Non-conformances</th>
<th>Opportunities For Improvement</th>
<th>Date Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017 External Audit</td>
<td>0</td>
<td>2</td>
<td>(Jun. 2017)</td>
</tr>
<tr>
<td>2017 Internal Audit</td>
<td>1</td>
<td>6</td>
<td>(Nov. 2017)</td>
</tr>
<tr>
<td>2018 External Audit</td>
<td>0</td>
<td>3</td>
<td>(Dec. 2018)</td>
</tr>
<tr>
<td>2018 Internal Audit</td>
<td>1</td>
<td>6</td>
<td>(Sep. 2018)</td>
</tr>
<tr>
<td>2019 External Audit</td>
<td>0</td>
<td>5</td>
<td>(Aug. 2019)</td>
</tr>
<tr>
<td>2019 Internal Audit</td>
<td>0</td>
<td>12</td>
<td>(Dec. 2019)</td>
</tr>
</tbody>
</table>

Background

One of recommendations from Justice O’Connor’s Part Two Report of the Walkerton Inquiry was that “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 Cambridge to be licensed to operate and maintain Cambridge’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.

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. 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 Cambridge Summary Water Report – January 1st to December 31st 2019 is a regulatory report provided to Council, which provides a summary of drinking water including adverse water quality incidences and water volume.
The Cambridge 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 provided on the City of Cambridge website and provided to Council separately.

The Cambridge Distribution System is part of an Integrated Urban System, meaning the Regional Municipality of Waterloo is responsible for water treatment and the development, operation of a trunk water network to distribute treated water to Cambridge, Kitchener, Waterloo, Woolwich and Wilmot. There are a variety of 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.

Quality Management System Policy

As Owners and Operators of the City of Cambridge Water Distribution System we are committed to:

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

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.

The City of Cambridge does not own or operate any of the wells, pumping stations, storage tanks, reservoirs, or treatment plants within the water distribution system; these are all owned and operated by the Region of Waterloo. All water treatment is carried out by the Region of Waterloo.

The majority of all water in the distribution is from groundwater sources. A small constituent of this water is surface water that enters through the Briardene and Dundee Rd. motorized control valves which are controlled by the Region of Waterloo. The water is typically hard (> 20 grains/gallon) and secondary disinfection is through free chlorine with a small constituent of combined chlorine. Temperature and quality fluctuations are minimal throughout the year due to the nature of the groundwater sources.
The City of Cambridge maintains and operates 563 kilometers of watermains within the City’s boundaries. Within the network, there are approximately 40,887 metered service connections supplying water to residents and various business and industrial locations. There are 5257 valves and 3527 fire hydrants.

The distribution system is divided into five individual pressure zones based on the water supply components and the varying elevations throughout the City. Pressures in the City’s distribution system vary from 40 psi to 110 psi.

**Downstream processes:**

Water from Cambridge is provided to Lloyd Brown Subdivision in North Dumfries Township via a 150mm watermain that leaves the City from the south east along Blenheim Rd.

Water passes through a booster station (operated by the Region of Waterloo) before leaving the City limits, on its way to Lloyd Brown subdivision. There are no other downstream processes or users.

**The waterworks system has the following permits and licences:**

- Municipal Drinking Water Licence (renewed in 2019)
- Drinking Water Works Permit
- Financial Plan (renewed in 2019)
- Operational Plan

**Water Infrastructure Program**

2018 vs. 2019 Infrastructure Growth:

<table>
<thead>
<tr>
<th>Infrastructure</th>
<th>2018</th>
<th>2019</th>
<th>Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watermain</td>
<td>586 km</td>
<td>586 km</td>
<td>0</td>
</tr>
<tr>
<td>Hydrants</td>
<td>3464</td>
<td>3524</td>
<td>1.7</td>
</tr>
<tr>
<td>Valves</td>
<td>5126</td>
<td>5270</td>
<td>2.8</td>
</tr>
<tr>
<td>Metered Connections</td>
<td>40,241</td>
<td>40,271</td>
<td>0.07</td>
</tr>
</tbody>
</table>

See Appendix for more information (Asset Management Report)

**Action:** No further action required – for information only
Incidents of Regulatory Non Compliance

In 2019 there were no identified regulatory non-compliances.

**Action:** No further action required – for information only

Incidences of Adverse Drinking Water

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit of Measure</th>
<th># of Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Coliform</td>
<td>Present/ Absent</td>
<td>1</td>
</tr>
<tr>
<td>Sodium Exceedance</td>
<td>mg/L</td>
<td>1</td>
</tr>
</tbody>
</table>

The sodium exceedance reported as an adverse is normally reported under the water system that provides the treatment of water. In this case, it was accidently reported under the City of Cambridge Distribution System Identification Number. Though it is considered an adverse result, Regulation 170/03 states that sodium exceedances of 20mg/L or greater only need to be reported every 57 months. As sodium was already reported as an exceedance by the Region of Waterloo prior to that 57 month period, it would normally not require reporting again.

In summary, adverse drinking water incidents have significantly decreased over the last few years. 2018 saw a total of 6 water quality incidents, vs. 2 in 2019. This is a reduction of 66% year over year.


**Action:** No further action required – for information only

Deviations from Critical Control Points Limits and Response

<table>
<thead>
<tr>
<th>CCP Type</th>
<th># of Events</th>
<th>Threshold</th>
<th># of Exceedances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Watermain Breaks (2a &amp; 2b)</td>
<td>0</td>
<td>Adverse Sample (TC/E.coli)</td>
<td>0</td>
</tr>
<tr>
<td>Minor Watermain Breaks</td>
<td>39</td>
<td>Adverse Sample (TC/E.coli)</td>
<td>0</td>
</tr>
<tr>
<td>Temp Watermains/Services</td>
<td>10</td>
<td>Adverse Sample (TC/E.coli)</td>
<td>0</td>
</tr>
</tbody>
</table>
### Table

<table>
<thead>
<tr>
<th>CCP Type</th>
<th># of Events</th>
<th>Threshold</th>
<th># of Exceedances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Stagnation</td>
<td>0</td>
<td>Adverse Sample (Chlorine)</td>
<td>0</td>
</tr>
<tr>
<td>Cross-Connection &amp; Backflow</td>
<td>0</td>
<td>Adverse Sample (Any)</td>
<td>0</td>
</tr>
<tr>
<td>Frozen Main/Services (Sustained cold weather)</td>
<td>0</td>
<td>Frozen Mains/Services</td>
<td>0</td>
</tr>
</tbody>
</table>

**Action:** No further action required – for information only

### Effectiveness of the Risk Assessment Process

The Risk Assessment Outcomes were redone and included in the Risk Assessment in 2019 were:

1. Long Term Impacts of Climate Change
2. Extreme Weather Events (tornadoes, ice storm, etc.)
3. Chemical Spills Impacting Source Water

**Action:** No further action required – for information only

### Results of Internal and External Audits

- An External Audit – Reaccreditation Verification Audit was performed on August 14, 2019. The City of Cambridge was recertified due to the successful completion of the Full Scope Audit, under DWQMS Version 2. Certification Expiry is on July 28, 2022. 0 Non-conformances were assigned by SAI Global during this audit.

- An Internal Audit was completed by a contractor (SAI Global) on December 17th, 2019.

- Refer to section “Status of Management Action Items Identified between Reviews” for non-conformances and OFI’s associated with both the internal and external audits.

**Action:** Follow-up is required on various minor opportunities for improvement

### Results of the Emergency Response Training/Testing

- A Region-wide emergency took place called “Operation Hazy Day” which involved 300 people. The emergency was a mock truck crash and chemical spill near Conestoga College and involved smoke plumes, casualties, spill response, etc.
In addition, debriefs are also completed for selected events in order to determine if there were any deficiencies or chances for improvement.

**Action:** No further action required – for information only

**Operational Performance**

See AM Operational Report (2019) attached in appendix. Additionally, operational performance can be described by the number and qualification of customer complaints. For this see section “Consumer Feedback”.

**Leak Detection** – In 2019 there were 39 water main breaks (see graph above) and 115 service breaks. Not all of these breaks were customer call in related (low pressure, water surfacing, dirty water, etc.). A large percentage of breaks were found using leak detection equipment by the Preventative Maintenance Staff.

See below:

![Leak Detection Program Summary](image)

In 2018, 20% of all main breaks and 6.7% of all service breaks were found using leak detection equipment. In 2019, that number has increased to 28% for main breaks and 17% for service leaks. These are massive jumps which have resulted in significant water savings for the 2019 year.

Service leaks also continue to drop throughout the City of Cambridge due to the City’s proactive workforce. Service leaks have decreased from 134 to 115 (2018 vs. 2019) resulting in a decrease of
16.5% service repairs, despite the fact 17% of service leaks were also found by our own staff using leak detection equipment.

This proactive approach along with an aggressive capital replacement program has resulted in a decrease in water loss.

See below for water loss details:

**Summary of IWA Software Analysis Results**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>2017 Audit</th>
<th>2018 Audit</th>
<th>2019 Audit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Annual Real Losses (CARL)</td>
<td>2,380 ML</td>
<td>2,723.30 ML</td>
<td>2,093.70 ML</td>
</tr>
<tr>
<td>Unavoidable Annual Real Losses (UARL)</td>
<td>849 ML</td>
<td>850 ML</td>
<td>876 ML</td>
</tr>
<tr>
<td>Infrastructure Leakage Index (ILI)</td>
<td>2.80</td>
<td>3.20</td>
<td>2.39</td>
</tr>
<tr>
<td>Apparent Losses</td>
<td>438 ML/Yr.</td>
<td>505 ML/Yr.</td>
<td>486 ML/Yr.</td>
</tr>
<tr>
<td>Water Purchase From Region of Waterloo</td>
<td>14,887 ML</td>
<td>15,355 ML</td>
<td>14,714 ML</td>
</tr>
<tr>
<td>Revenue Water</td>
<td>11,971 ML</td>
<td>12,127 ML</td>
<td>11,991 ML</td>
</tr>
<tr>
<td>Non-Revenue Water</td>
<td>2,916 ML</td>
<td>2,723 ML</td>
<td>2,722 ML</td>
</tr>
<tr>
<td>Volume of Non-Revenue Water - % of Water Purchased</td>
<td>19.6%</td>
<td>21.7%</td>
<td>18.5%</td>
</tr>
</tbody>
</table>

2019 Water loss results show a decrease from 21.7% to an 18.5% loss annually, and should continue to drop as the AMI project continues with residential, industrial and commercial water meter replacements.

**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

Well P6 off Dunbar St was abandoned and the piping was removed from GRCA land. No other wells were abandoned or put on-line during the 2019 year by the Region of Waterloo.

In January 2019, a truck carrying jet fuel crashed which led to contamination of the Mill Creek River system off the 401, Hespeler. The Region immediately shut off any wells in the surrounding area that may have been impacted by the spill. Berms and tests were put in place immediately thereafter and
there was found to be minor contamination. Hydrocarbons (the contaminant) are lighter than water and thus the majority of the fuel would evaporate within a short period of time. Berms remained in place to trap any heavier hydrocarbons but they were to eventually be eaten by aquatic species and turned into carbon dioxide. In May 2019, it appeared that there were no long term ill-effects from the jet fuel.

Regional Water Quality Trends
City of Cambridge Water Distribution

DWQMS Management Review

Pinebush WTP Manganese

<table>
<thead>
<tr>
<th>Date</th>
<th>Manganese (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>01-May-15</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Jul-15</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Sep-15</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Nov-15</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Jan-16</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Mar-16</td>
<td>0.003</td>
</tr>
<tr>
<td>01-May-16</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Jul-16</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Sep-16</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Nov-16</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Jan-17</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Mar-17</td>
<td>0.003</td>
</tr>
<tr>
<td>01-May-17</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Jul-17</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Sep-17</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Nov-17</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Jan-18</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Mar-18</td>
<td>0.003</td>
</tr>
<tr>
<td>01-May-18</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Jul-18</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Sep-18</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Nov-18</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Jan-19</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Mar-19</td>
<td>0.003</td>
</tr>
</tbody>
</table>

Shades Mills WTP Iron Total

<table>
<thead>
<tr>
<th>Date</th>
<th>Iron (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>01-Sep-18</td>
<td>0.04</td>
</tr>
<tr>
<td>01-May-18</td>
<td>0.03</td>
</tr>
<tr>
<td>01-Mar-18</td>
<td>0.02</td>
</tr>
<tr>
<td>01-Jan-18</td>
<td>0.02</td>
</tr>
<tr>
<td>01-Nov-18</td>
<td>0.02</td>
</tr>
<tr>
<td>01-Jan-19</td>
<td>0.02</td>
</tr>
<tr>
<td>01-Mar-19</td>
<td>0.02</td>
</tr>
<tr>
<td>01-May-19</td>
<td>0.02</td>
</tr>
<tr>
<td>01-Jul-19</td>
<td>0.02</td>
</tr>
<tr>
<td>01-Sep-19</td>
<td>0.02</td>
</tr>
<tr>
<td>01-Nov-19</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Shades Mills WTP Manganese Total

<table>
<thead>
<tr>
<th>Date</th>
<th>Manganese (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>01-Sep-18</td>
<td>0.003</td>
</tr>
<tr>
<td>01-May-18</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Mar-18</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Jan-18</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Nov-18</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Jan-19</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Mar-19</td>
<td>0.003</td>
</tr>
<tr>
<td>01-May-19</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Jul-19</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Sep-19</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Nov-19</td>
<td>0.003</td>
</tr>
<tr>
<td>01-Jan-20</td>
<td>0.003</td>
</tr>
</tbody>
</table>
Summary:

All wells and major treatment facilities that serve the City of Cambridge are trending lower in hardness over the last 5 years. Iron and manganese totals are also similar to 2015 levels or trending lower. There is no sign from any water source that these trends are heading in a negative direction. There are slight fluctuations in hardness (50mg/L) but there have historically been minor fluctuations over time (e.g. Middleton).

Action: No further action required – for information only

Follow-up on Action Items from Previous Management Reviews

<table>
<thead>
<tr>
<th>SR#</th>
<th>Action Item Description</th>
<th>Assigned To</th>
<th>Proposed Timeline</th>
<th>Priority Ranking</th>
<th>Status as of 19-May-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>106622</td>
<td>Revise Water Supply Bylaw</td>
<td>Mike Parsons</td>
<td>December 2021 (Revised)</td>
<td>Medium</td>
<td>In Progress (On hold due to COVID-19)</td>
</tr>
<tr>
<td>009-15</td>
<td>Incorporate new lockout procedures for new service valves</td>
<td>Ron Rooke</td>
<td>For next management meeting</td>
<td>Medium</td>
<td>In Progress</td>
</tr>
</tbody>
</table>

Action: Continue to close out OFI’s and Non-conformances as their requirements are met
### Status of Management Action Items Identified Between Reviews

<table>
<thead>
<tr>
<th>SR#</th>
<th>Action Item Description</th>
<th>Type</th>
<th>Source</th>
<th>Assigned To</th>
<th>Priority</th>
<th>Status as of April 24, 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>1839</td>
<td>Recommendation made to provide input to Planning to include requirements for chlorine management (flushing) and district meters in all new development agreements.</td>
<td>CI2</td>
<td>Risk Assessment</td>
<td>Mike Parsons</td>
<td>Med</td>
<td>IN PROGRESS Planning has initialized review of current agreement template and developer communication plan.</td>
</tr>
<tr>
<td>1840</td>
<td>After-hours handling of online requests needs to be set up for call service to manage. Language of website needs updating for interim.</td>
<td>CI2</td>
<td>Staff Suggestion</td>
<td>Mike Parsons</td>
<td>Med</td>
<td>IN PROGRESS (All techs have been assigned to assist with website requests related to water quality in the meantime)</td>
</tr>
<tr>
<td>1824</td>
<td>Operational Plan has not been endorsed by Council since November 17, 2008.</td>
<td>CI2</td>
<td>Internal Audit</td>
<td>Mike Parsons</td>
<td>Med</td>
<td>COMPLETE</td>
</tr>
<tr>
<td>2044</td>
<td>The City’s Operations &amp; Maintenance Manual does not include all current versions of documents, as outlined in MDWL s. 16.0; and the records of watermain repairs (as viewed in Maximo) do not always record the specified information of s. 4.0 of the Watermain Disinfection Procedure.</td>
<td>NC</td>
<td>Internal Audit</td>
<td>Aaron O’Keefe</td>
<td>Med</td>
<td>COMPLETE</td>
</tr>
<tr>
<td>2044</td>
<td>Verify that communications with essential suppliers (e.g. parts suppliers and contractors for construction projects) so that they are aware.</td>
<td>CI2</td>
<td>Internal Audit</td>
<td>Aaron O’Keefe</td>
<td>Med</td>
<td>In Progress</td>
</tr>
</tbody>
</table>
# DWQMS Management Review

<table>
<thead>
<tr>
<th>SR#</th>
<th>Action Item Description</th>
<th>Type</th>
<th>Source</th>
<th>Assigned To</th>
<th>Priority</th>
<th>Status as of April 24, 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>2044</td>
<td>of the quality specifications for parts: NSF 61 and NSF 372 certified as per s. 14.0 MDWL.</td>
<td>C12</td>
<td>Internal Audit</td>
<td>Aaron O</td>
<td>Low</td>
<td>In Progress</td>
</tr>
<tr>
<td>2313</td>
<td>Consider developing a process to periodically document staff suggestions presented through: ✧ the corporate C12 system and ✧ at tailgate meetings; to compile a more fulsome list of ideas provided by Water staff. Also consider a standard agenda item at quarterly staff meetings to discuss these suggestions. Also consider developing a communication process about the status and follow-up on staff suggestions (e.g. what can/can’t be pursued, why, thank you, etc.)</td>
<td>C12</td>
<td>Internal Audit</td>
<td>Aaron O</td>
<td>Low</td>
<td>COMPLETE</td>
</tr>
<tr>
<td>2313</td>
<td>Update the drinking water system description to denote Well P6 as being disconnected from the distribution system.</td>
<td>C12</td>
<td>External Audit</td>
<td>Aaron O</td>
<td>Low</td>
<td>COMPLETE</td>
</tr>
<tr>
<td>2313</td>
<td>Ensure current versions of the DWQMS Policy are posted at Public Works and at City Hall (could not be verified during the audit).</td>
<td>C12</td>
<td>External Audit</td>
<td>Aaron O</td>
<td>Med</td>
<td>COMPLETE</td>
</tr>
<tr>
<td>2313</td>
<td>Consider improving oversight/communication</td>
<td>C12</td>
<td>External Audit</td>
<td>Aaron O</td>
<td>Med</td>
<td>COMPLETE</td>
</tr>
<tr>
<td>SR#</td>
<td>Action Item Description</td>
<td>Type</td>
<td>Source</td>
<td>Assigned To</td>
<td>Priority Ranking</td>
<td>Status as of April 24, 2020</td>
</tr>
<tr>
<td>------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------</td>
<td>-----------------</td>
<td>--------------</td>
<td>-----------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>2313</td>
<td>Rev. 4 Continual Improvement: Non-Conformances are given high priority and should be completed as soon as reasonably possible. The minor non-conformance from the most recent internal audit is listed as IN PROGRESS in the management review report tracking table after 11 months of being issued, with no resulting action recorded.</td>
<td>CI2</td>
<td>External Audit</td>
<td>Aaron O</td>
<td>Med</td>
<td>COMPLETE</td>
</tr>
<tr>
<td>2313</td>
<td>Pre-vetted list of qualified plumbers to give to homeowners when they have a larger home issue.</td>
<td>CI2</td>
<td>Internal Audit</td>
<td>Aaron O</td>
<td>Low</td>
<td>COMPLETE</td>
</tr>
<tr>
<td>2313</td>
<td>Consider re-wording “residents and businesses” to “consumers” as this is the wording of the standard.</td>
<td>CI2</td>
<td>Internal Audit</td>
<td>Aaron O</td>
<td>Low</td>
<td>COMPLETE</td>
</tr>
<tr>
<td>2313</td>
<td>Top Management commitment includes the required commitments, signed in November / December 2018 by the Director of Public Works, the Manager of Corporate Compliance and the</td>
<td>CI2</td>
<td>Internal Audit</td>
<td>Aaron O</td>
<td>Med</td>
<td>IN PROGRESS</td>
</tr>
<tr>
<td>SR#</td>
<td>Action Item Description</td>
<td>Type</td>
<td>Source</td>
<td>Assigned To</td>
<td>Priority Ranking</td>
<td>Status as of April 24, 2020</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------</td>
<td>--------------</td>
<td>-------------</td>
<td>-----------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>2313</td>
<td>Manager of Water Operations. New Top Management (new Director, no Corporate Compliance Mgr). (OFI for Element 9 re: organizational information update)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2313</td>
<td>Consider listing Cambridge’s Licence-related documents (MDWL, DWWP, Accreditation Certificates, Financial Plan) and their expiries. Consider adding internal and external audit reports to the list of records as well. Note: Already been updating this document. It is just not finished yet due to SharePoint (all locations of documents are changing).</td>
<td>CI2</td>
<td>Internal Audit</td>
<td>Aaron O</td>
<td>Med</td>
<td>IN PROGRESS</td>
</tr>
<tr>
<td>2313</td>
<td>Consider (when using the numbered-date format) to standardize numbered dates using the international standard, YYYY-MM-DD so that it is always clear to the reader the date of the document or record.</td>
<td>CI2</td>
<td>Internal Audit</td>
<td>Aaron O</td>
<td>Low</td>
<td>COMPLETE</td>
</tr>
<tr>
<td>2313</td>
<td>Consider updating the references to “once per year” and “once every three years” to “once per calendar year” and “once every thirty-six months”, as this is the</td>
<td>CI2</td>
<td>Internal Audit</td>
<td>Aaron O</td>
<td>Med</td>
<td>IN PROGRESS (some documents already updated)</td>
</tr>
<tr>
<td>SR#</td>
<td>Action Item Description</td>
<td>Type</td>
<td>Source</td>
<td>Assigned To</td>
<td>Priority Ranking</td>
<td>Status as of April 24, 2020</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------</td>
<td>-----------------</td>
<td>-------------</td>
<td>-----------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>2313</td>
<td>Consider creating a Maximo service request so that Risk Assessment updates can be tracked and logged into.</td>
<td>C12</td>
<td>Internal Audit</td>
<td>Aaron O</td>
<td>Low</td>
<td>COMPLETE</td>
</tr>
<tr>
<td>2313</td>
<td>Consider updating the organizational chart and the QMS Roles, Responsibilities and Authorities (SYS-WD-09-T2) to reflect that it is the Utilities Compliance Technologist who is the QMS Representative; and the “Manager of Corporate Compliance” is now a position within Public Works.</td>
<td>C12</td>
<td>Internal Audit</td>
<td>Aaron O</td>
<td>Low</td>
<td>COMPLETE</td>
</tr>
<tr>
<td>2313</td>
<td>MDWL s.14.0 – include in next tender package the NSF 372 requirement by the Ministry.</td>
<td>C12</td>
<td>Internal Audit</td>
<td>Aaron O</td>
<td>Low</td>
<td>COMPLETE DUPLICATE</td>
</tr>
<tr>
<td>2313</td>
<td>Viewed Appendix 13A (SYS-WD-13) Information Sheet for Tender and Contract Packages. OFI: Consider including MDWL s.14.0 Chemical and Parts reference to requirements at a minimum in Appendix 13A</td>
<td>C12</td>
<td>Internal Audit</td>
<td>Aaron O</td>
<td>Low</td>
<td>COMPLETE DUPLICATE</td>
</tr>
<tr>
<td>2313</td>
<td>Consider including a reference to the outcomes of the risk assessment documented under Element 8 as part of this</td>
<td>C12</td>
<td>Internal Audit</td>
<td>Aaron O</td>
<td>Low</td>
<td>COMPLETE</td>
</tr>
</tbody>
</table>
Action: Continue to close out OFI’s and Non-conformances as their requirements are met.

Changes that could Affect the Quality Management System

- A revised DWQMS document was released in February 2017 (version 2.0). This version includes mandatory review of potential climate change impacts as part of system’s risk assessment and additional guidance surrounding continual improvement.

- Ministry of Environment and Climate Change Excess Soil Reuse Regulation

- Impacts how soil from excavations (e.g. watermain breaks) is sampled and disposed of. This may have an impact on the overall cost of watermain breaks

- SharePoint software has been chosen as the product to be used at the City of Cambridge. It is being installed across the corporation to enhance the electronic filing process of all internal electronic files. This is a major software deployment being rolled out at the very same time as cityONE, and will require significant staff time to clean up their network folders and migrate their documents into a new filing system. Depending on the department and the existing file content this could require significant time commitments by operational management.

Action: No further action required – for information only
Consumer Feedback

Watermain Breaks – There were 39 water main breaks in 2019 vs. 36 watermain breaks in 2018. The majority of watermain breaks historically occur in the winter months as we can see in the blue and red overlaps below. There were 5 reported watermain breaks on February 4th, 2019.

Dirty Water – There was 375 dirty water calls in 2019 vs. 205 in 2018. This is an increase of 55%. This is majorly because on October 10th 2019, the Region opened a valve at Middleton that should have never touched, causing dirty water throughout the City. This alone resulted in 64 dirty water calls.

Low Pressure – Pressure complaints in the City were slightly higher this year at 262, vs. 242 in 2018. This appears to be related to a colder winter which resulted in a significantly larger amount of frozen services.
Action: No further action required

Resources Needed to Maintain the Quality Management System

Utilizing Sharepoint will assist in making document control more accurate and accessible.

Action: No further action required – waiting on the implementation of Sharepoint

Results of the Infrastructure Review

See Appendix for Asset Management System Summary report.

Engineering 5 Year Construction Update is below. Please be aware that the COVID-19 Pandemic could have a significant impact on the services and contracts shown below and is subject to change. Regional projects are also not included below.

Due to constant issues on a 100mm watermain on Millvue St, the watermain is now being scheduled for design and construction by 2022 because of customer feedback and review.

In 2019, Wright and Goldie St were also under construction (both streets back onto the Grand River) and one of the key elements of this reconstruction was the addition of watermain on the street fronting the homes, rather than continue to utilize the infrastructure behind the homes backing onto the river. An investigation of these homes took place and action plan was put together for moving the water services to the front of the homes and ensuring all homes were in compliance with existing bylaws. This initiative continued onto the Main St reconstruction where services were reviewed in detail and changes were made, if possible, to existing services. These actions have resulted in the elimination of multi-serviced single parcel properties when possible, reducing chances of infrastructure failure in the future.
See the 5 year construction forecast below:

### Cambridge 2020 - 2024 Capital Projects

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Limits</th>
<th>Length (m)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>20C011</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Budget Available in 20C011</td>
<td></td>
<td>$10,500,000</td>
<td></td>
</tr>
<tr>
<td>Forest Road</td>
<td>Churchill to Victoria</td>
<td>490</td>
<td>$1,871,000</td>
</tr>
<tr>
<td>Clarence Street</td>
<td>Franklin to Strathcona</td>
<td>300</td>
<td>$1,190,000</td>
</tr>
<tr>
<td>Tannery Street W</td>
<td>Adam to Dead End</td>
<td>250</td>
<td>$1,079,000</td>
</tr>
<tr>
<td>Selkirk Street</td>
<td>Glenmorris to Tait</td>
<td>294</td>
<td>$1,190,000</td>
</tr>
<tr>
<td>Talt Street</td>
<td>Dumfries to First</td>
<td>370</td>
<td>$1,860,000</td>
</tr>
<tr>
<td>Park Hill Road East</td>
<td>Ainslie St N to Wellington St</td>
<td>250</td>
<td>$1,040,000</td>
</tr>
<tr>
<td>Cambridge Street</td>
<td>Park Hill to Dundas</td>
<td>540</td>
<td>$2,470,000</td>
</tr>
<tr>
<td>Lutz Street/Mill Street Lot</td>
<td>Mill St to Wellington</td>
<td>130</td>
<td>$1,755,000</td>
</tr>
<tr>
<td>Shaw Ave W</td>
<td>Tribal to Fearwood</td>
<td>135</td>
<td>$610,000</td>
</tr>
<tr>
<td>Fearnwood St</td>
<td>Fisher Mills to Milton Ave W</td>
<td>352</td>
<td>$1,595,000</td>
</tr>
<tr>
<td>Trillium Ave</td>
<td>Fisher Mills to Shaw Ave W</td>
<td>196</td>
<td>$890,000</td>
</tr>
<tr>
<td>Lansdownes Road N Watermain</td>
<td>Salisbury to Wentworth</td>
<td>192</td>
<td>$529,000</td>
</tr>
<tr>
<td>Francis Watermain</td>
<td>John to Middleton</td>
<td>140</td>
<td>$605,000</td>
</tr>
<tr>
<td>John St Watermain</td>
<td>Selkirk to Francis</td>
<td>91</td>
<td>$200,000</td>
</tr>
<tr>
<td><strong>20C011</strong></td>
<td></td>
<td></td>
<td><strong>ESTIMATED TOTAL</strong> 16,353,000</td>
</tr>
</tbody>
</table>

| **21C011**                       |                         | $9,000,000  |                               |
| Center Street                    | Concession to South     | 405        | $1,620,000                    |
| Short Street                     | Centre to Dead End      | 91         | $279,407                      |
| South Street                     | Centre to Vimy          | 291        | $1,219,416                    |
| Dickson Street Streetscaping     | Ainslie to Water (and Dickson Lot) | 3,000,000 | **Separate Budget** - Placeholder Project - Design 30% |
| Elgin St N Utility Relocations   | Mill Creek to Garris    | 1250       | $200,000                      |
| Kris Street                      | Forbes to Rife          | 150        | $615,000                      |
| Henderson Street                 | Kris to Bella           | 138        | $565,800                      |
| Bella Street                     | Cooper to Rife          | 197        | $807,700                      |
| Bechtel Street                   | Shepherd to End         | 520        | $2,080,000                    |
| Utility Corridor 195             | Bechtel to Holiday Inn Drive | 220   | $550,000                      |
| Groh Avenue                      | Holiday Inn Drive to Bechtel | 500     | $2,000,000                    |
| Salisbury Avenue                 | Grand Avenue to Dead End| 885        | $3,540,000                    |
| Sheldon Drive                    | Conestoga to Franklin   | 460        | $1,840,000                    |
| **21C011**                       |                         | $15,188,500| **ESTIMATED TOTAL** 15,188,500|

| **22C011**                       |                         | $11,509,400|                               |
| Elgin Street North Phase 1       | CP Rail Bridge to Galt  | 650        | $6,900,000                    |
| Laneway 164                      | Salisbury to Wentworth  | 205        | $840,500                      |
| Wentworth Avenue                 | Landsdowne to Crescent  | 111        | $455,100                      |
| Credit Place                     | Wentworth to George St N | 167     | $684,700                      |
| Gladstone Avenue                 | Berkeley to Parkwood    | 203        | $812,000                      |
| Grand Avenue South               | Cedar to Crombe         | 270        | $1,080,000                    |
| First Avenue                     | Toner Dr to Glenmorris  | 438        | $1,752,000                    |
| Glendale Place                   | Sherwood to End         | 72         | $288,000                      |
| Ash Street                       | Sherwood to End         | 82         | $328,000                      |
| Argyle Street N                  | King to Duke            | 120        | $480,000                      |
| Argyle Street S                  | Queenston to King       | 120        | $480,000                      |
| **22C011**                       |                         | $13,800,300| **ESTIMATED TOTAL** 13,800,300|

| **23C011**                       |                         | $13,000,000|                               |
| Elgin Street North Phase 2       | Galt to Glarus          | 650        | $5,500,000                    |
| Westminster Drive N              | King St E to Margaret   | 355        | $1,420,000                    |
| Wellington Street                | Beverly St to Dundas St N | 810     | $3,240,000                    |
| Ketter Street                    | Tannery St W to Sharrock | 117    | $458,000                      |
| Clemens Ave                      | Sheffield to Fisher Mills | 519   | $2,076,000                    |
| **23C011**                       |                         | $12,704,000| **ESTIMATED TOTAL** 12,704,000|

| **24C011**                       |                         | $14,500,000|                               |
| Church St N                      | King to Duke            | 119        | $476,000                      |
| Church St S                      | King to Queenston       | 119        | $476,000                      |
| Church St                        | Hamilton to Sherring    | 343        | $1,372,000                    |
| Westminster Drive S              | King to Queenston       | 120        | $480,000                      |
| Hamilton Street                  | Eagle to Dover          | 141        | $578,100                      |
| Dover Street                     | King to Moore           | 359        | $1,471,900                    |
| Oxford Street                    | Roseview Av to Laneway 180 | 340   | $1,360,000                    |
| Roseview Avenue                  | Cambridge St to Oxford St | 155   | $620,000                      |
| Brook Street                     | Wellington St to Cambridge St | 155    | $620,000                      |
|                                |                         |            | **ESTIMATED TOTAL** 1851 $7,454,000 |

Combined Tender - Design at 60%
City of Cambridge Water Distribution

DWQMS Management Review

Action: Discussions to take place to move Millvue up on reconstruction/design list for 2022 reconstruction.

Summary of Maintenance

Hydrants - Below we can see that a total of 758 Hydrants were stripped and repainted in 2019. There are a total of 3,524 hydrants. This means that 21.5% of all hydrants in the City of Cambridge were primed and painted in 2019.

![Image of hydrants]

2019 Hydrant Painting Program Summary

<table>
<thead>
<tr>
<th>Month</th>
<th>Public</th>
<th>Private</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>May</td>
<td>196</td>
<td>13</td>
<td>209</td>
</tr>
<tr>
<td>June</td>
<td>126</td>
<td></td>
<td>126</td>
</tr>
<tr>
<td>July</td>
<td>125</td>
<td></td>
<td>125</td>
</tr>
<tr>
<td>August</td>
<td>80</td>
<td></td>
<td>80</td>
</tr>
<tr>
<td>September</td>
<td>114</td>
<td>34</td>
<td>148</td>
</tr>
<tr>
<td>October</td>
<td>70</td>
<td></td>
<td>70</td>
</tr>
<tr>
<td>Total</td>
<td>711</td>
<td>47</td>
<td>758</td>
</tr>
</tbody>
</table>

Past Work

Painted in 2018

- 300 Public
- 0 Private
- 300 Total

Future Work

Approx. # of Hydrants to Be Painted

- 2503 Public
- 165 (known) Private
- 2668 Total

Work Plan - Public Hydrants

<table>
<thead>
<tr>
<th>Year</th>
<th># of Hydrants</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>725</td>
</tr>
<tr>
<td>2021</td>
<td>725</td>
</tr>
<tr>
<td>Early 2022</td>
<td>Re-tender</td>
</tr>
<tr>
<td>2022</td>
<td>725</td>
</tr>
<tr>
<td>2023</td>
<td>725</td>
</tr>
</tbody>
</table>

*Every public hydrant painted once by mid-2023

Work Plan - Private Hydrants

<table>
<thead>
<tr>
<th>Year</th>
<th># of Hydrants</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>30-40 per year (as-needed basis; 30-40 per year)</td>
</tr>
<tr>
<td>2021</td>
<td></td>
</tr>
<tr>
<td>2022</td>
<td>Re-tender</td>
</tr>
<tr>
<td>2023</td>
<td></td>
</tr>
<tr>
<td>2024</td>
<td></td>
</tr>
</tbody>
</table>

Attachments

- 2019 Hydrant Painting Program Summary
- 2019 Painting Summary Map

Social Media Post

City of Cambridge (cityofcambridge - Sep 18)

Wondering about the white fire hydrants you see around Cambridge? We’re working to restore the surface of all hydrants over the next few years. The white hydrants have had their new primer coat applied & are waiting for it to cure before bright yellow paint can be applied. #safety
Water Meters:

As part of the AMI (Advanced Metering Technology) meter swap-out, approximately 2600 water meters (residential) of various sizes was swapped out in 2019. All meters were from 2006 and older. A Project Manager was hired in order to look after the $13,000,000 project in conjunction with the Wastewater Department.

In total there are 40,271 service connections and with 2600 meter replacements, it equates to 6.45% of the entire City.

Valve Turning:

Approximately 1,011 of 5,270 valves were turned in 2019. Overall that is equal to 19% of all valves in 2019.

Watermain Cleaning:

Approximately 33,905m’s of watermain, or 33 kilometres were cleaned in 2019 out of a total of 586 kilometres. This works out to a total of 5.8% flushed/swabbed in 2019.
City of Cambridge Water Distribution

DWQMS Management Review

2019 Water Main Cleaning Program Summary

<table>
<thead>
<tr>
<th>Size (mm)</th>
<th>City (m)</th>
<th>Regional (m)</th>
<th>Total (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>180</td>
<td></td>
<td>180</td>
</tr>
<tr>
<td>100</td>
<td>4,390</td>
<td></td>
<td>4,390</td>
</tr>
<tr>
<td>150</td>
<td>14,050</td>
<td></td>
<td>14,050</td>
</tr>
<tr>
<td>200</td>
<td>9,950</td>
<td></td>
<td>9,950</td>
</tr>
<tr>
<td>250</td>
<td>2,280</td>
<td></td>
<td>2,280</td>
</tr>
<tr>
<td>300</td>
<td>2,785</td>
<td>270</td>
<td>3,055</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>33,635</strong></td>
<td><strong>270</strong></td>
<td><strong>33,905</strong></td>
</tr>
</tbody>
</table>

2019 Volume of Water Used

5,803.1 m³

2020 Plan

Preston (see attached map)

Start Date: 13-Oct-20

Water Main Length (m):

- 69,747 City
- 9,844 Shared
- 3,389 Regional
- **82,991 Total**

Area Remaining for Spring 2020

Due to unexpected snowfall the week of November 11, 2019, there were concerns with proper drainage and risk of freezing flush water. It was decided that the remaining area is postponed until Spring 2020. The presence of leaves over catchbasins under the snow contributed to our drainage concerns.

Area to finish in Spring 2020 (when weather permits): [Map Image]

Summary

- No swabbing this year, unidirectional flushing only;
- Updated door hanger notice to include website to find flushing instructions;
- Attachments: 1. 2019 Water Main Cleaning Area, 2. Proposed 2020 Water Main Cleaning Area
Locates

In 2019, a Locate Coordinator was hired to look after all locates for Public Works and assist with other initiatives. Below are 2018 – 2019 comparisons in regards to locates received, marked and cleared:

**2019 Water Locate Completions By Month**

<table>
<thead>
<tr>
<th>Month</th>
<th>Cleared</th>
<th>Marked</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>81</td>
<td>53</td>
</tr>
<tr>
<td>Feb</td>
<td>74</td>
<td>65</td>
</tr>
<tr>
<td>Mar</td>
<td>80</td>
<td>81</td>
</tr>
<tr>
<td>Apr</td>
<td>151</td>
<td>402</td>
</tr>
<tr>
<td>May</td>
<td>179</td>
<td>199</td>
</tr>
<tr>
<td>June</td>
<td>181</td>
<td>175</td>
</tr>
<tr>
<td>July</td>
<td>247</td>
<td>153</td>
</tr>
<tr>
<td>Aug</td>
<td>213</td>
<td>116</td>
</tr>
<tr>
<td>Sept</td>
<td>256</td>
<td>165</td>
</tr>
<tr>
<td>Oct</td>
<td>227</td>
<td>146</td>
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<tr>
<td>Nov</td>
<td>181</td>
<td>162</td>
</tr>
<tr>
<td>Dec</td>
<td>59</td>
<td>59</td>
</tr>
</tbody>
</table>

**Locate Requests Received by Quarter, 2018-2019**

<table>
<thead>
<tr>
<th>Quarter</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>669</td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>1951</td>
<td>2668</td>
</tr>
<tr>
<td>Q3</td>
<td>1918</td>
<td>2321</td>
</tr>
<tr>
<td>Q4</td>
<td>1685</td>
<td>1347</td>
</tr>
</tbody>
</table>

**Action:** No further action required – for information only
Effectiveness of Maintenance

The effectiveness of the maintenance program is determined by the following factors:

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

**Action:** No further action required – for information only

Operational Plan Currency, Content and Updates

The OP is constantly being updated to reflect changes in operational methodology and organization. The following are some of the most important changes:

1. The Sampling Plan was updated to show new sampling locations and long services that lacked usage at certain times of the year were removed. This will help mitigate adverse water samples that might occur due to a lack of water use from the end-user.

2. We procured the assistance of Brigitte Roth for the second year in a row (a former employee of the City of Guelph). She conducted the Internal Audit in 2019 and her results are thorough and well thought out. We will continue to procure her services in the 2020 year for the subsequent Internal Audit.

**Action:** No further action required – for information only

Staff Suggestions

Getting staff suggestions onto Sharepoint is a high priority as we move forward. Currently, staff suggestions are brought up in tailgate talks or quarterly meetings.

**Action:** No further action required – for information only
Appendix: AM 2019 System Detailed Report

Asset Management System Summary
Water Distribution System

<table>
<thead>
<tr>
<th>Water Distribution System Summary</th>
<th>Cambridge and Sharad</th>
<th>Length (km)</th>
<th>Average Age</th>
<th>Average Remaining Life</th>
<th>Oldest Pipe</th>
<th>Newest Pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td>WATER MAIN</td>
<td>528</td>
<td>34</td>
<td>44</td>
<td>1915</td>
<td>2020</td>
<td></td>
</tr>
</tbody>
</table>

Source: Asset Inventory Registry - am avg_age_underground

Water Distribution System Inventory Summary

<table>
<thead>
<tr>
<th>Asset Code</th>
<th>Quantity</th>
<th>Units</th>
<th>Current Replacement Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>WP</td>
<td>496,453</td>
<td>m</td>
<td>$293,246,705</td>
</tr>
<tr>
<td>WV</td>
<td>0,269</td>
<td>EACH</td>
<td>$20,107,671</td>
</tr>
<tr>
<td>WC</td>
<td>746</td>
<td>EACH</td>
<td>$11,721,525</td>
</tr>
<tr>
<td>WJ</td>
<td>2,732</td>
<td>EACH</td>
<td>$2,264,011</td>
</tr>
<tr>
<td>WS</td>
<td>376,670</td>
<td>m</td>
<td>$159,097,712</td>
</tr>
<tr>
<td>WH</td>
<td>3,519</td>
<td>EACH</td>
<td>$34,082,110</td>
</tr>
</tbody>
</table>

$520,677,555

<table>
<thead>
<tr>
<th>Asset Code</th>
<th>Quantity</th>
<th>Units</th>
<th>Current Replacement Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>WP</td>
<td>31,730</td>
<td>m</td>
<td>$11,571,674</td>
</tr>
<tr>
<td>WV</td>
<td>185</td>
<td>EACH</td>
<td>$594,934</td>
</tr>
<tr>
<td>WC</td>
<td>157</td>
<td>EACH</td>
<td>$1,233,431</td>
</tr>
<tr>
<td>WJ</td>
<td>207</td>
<td>EACH</td>
<td>$138,776</td>
</tr>
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</table>

$13,836,810

<table>
<thead>
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<th>Asset Code</th>
<th>Quantity</th>
<th>Units</th>
<th>Current Replacement Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>WP</td>
<td>56,401</td>
<td>m</td>
<td>$44,911,705</td>
</tr>
<tr>
<td>WV</td>
<td>284</td>
<td>EACH</td>
<td>$1,812,411</td>
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<tr>
<td>WC</td>
<td>205</td>
<td>EACH</td>
<td>$3,283,913</td>
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<tr>
<td>WJ</td>
<td>303</td>
<td>EACH</td>
<td>$354,619</td>
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<tr>
<td>WS</td>
<td>225</td>
<td>m</td>
<td>$99,078</td>
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<tr>
<td>WH</td>
<td>10</td>
<td>EACH</td>
<td>$95,900</td>
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</table>

$13,659,405

Total: $854,963,837

Source: Asset Inventory Registry - am asset_summary_water

Water System Age Profile

Source: Asset Inventory Registry - am asset_profile_water
Water Main Breaks

Source: maximo - am.maximo_wat_main_break Until May 12, 2020

Water Main Breaks by Month

Compared to 5 year average

Source: maximo : am.maximo_wat_main_break_avg 12-May-20
City of Cambridge Water Distribution

DWQMS Management Review

![Water Service Repaired/Replaced](chart1)

Source: Maximo: am.maximo_wat_ser_repair_repl Until May 12, 2020

![Water Service Repair/Replaced by Month](chart2)

Source: Maximo: am.maximo_wat_ser_rep REPL AVG 12-May-20
### Water Pipe Material

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>Length (m)</th>
<th>%</th>
<th>Average Remaining Age</th>
<th>Oldest Pipe</th>
<th>Newest Pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC</td>
<td>23,321,4</td>
<td>44%</td>
<td>17</td>
<td>63</td>
<td>2020</td>
</tr>
<tr>
<td>DUCTILE IRON</td>
<td>17,950</td>
<td>34%</td>
<td>38</td>
<td>42</td>
<td>1920</td>
</tr>
<tr>
<td>CAST IRON</td>
<td>17,955</td>
<td>34%</td>
<td>17</td>
<td>42</td>
<td>1920</td>
</tr>
<tr>
<td>CAST IRON THIN WALL</td>
<td>17,951</td>
<td>34%</td>
<td>17</td>
<td>42</td>
<td>1920</td>
</tr>
<tr>
<td>COPPER</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>SPYLL LINO</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CONCRETE</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ASBESTOS CEMENT</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>STEEL</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Asset Inventory Registry - water.pipe_stats_by_material

### Main Breaks by Material

<table>
<thead>
<tr>
<th>Pipe Material</th>
<th>No of Break</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASBESTOS CEMENT</td>
<td>1</td>
</tr>
<tr>
<td>CAST IRON</td>
<td>178</td>
</tr>
<tr>
<td>DUCTILE IRON</td>
<td>121</td>
</tr>
<tr>
<td>POLYETHYLENE</td>
<td>2</td>
</tr>
<tr>
<td>PVC</td>
<td>38</td>
</tr>
<tr>
<td>STEEL</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: asset_main_break_sum_by_mat (since 2008)

### Water Pipe Condition

- **Very Good**: 21%
- **Good**: 32%
- **Fair**: 23%
- **Poor**: 12%
- **Very Poor**: 12%
- **Others**: 0%

Source: asset.pipe_condition_summary. The pipe condition is calculated based on remaining service life of the pipe. The pipe condition is Very Poor if the remaining service life is less than 20% and Very Good if the remaining service life is greater than 80%.
City of Cambridge Water Distribution

DWQMS Management Review

Water Pipe by Size

<table>
<thead>
<tr>
<th>Size (mm)</th>
<th>Length (%)</th>
<th>% Age</th>
<th>Remaining Life (%)</th>
<th>Oldest Pipe (Decade)</th>
<th>Newest Pipe (Decade)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>9</td>
<td>3%</td>
<td>15</td>
<td>42</td>
<td>2002</td>
</tr>
<tr>
<td>25</td>
<td>29</td>
<td>0%</td>
<td>100</td>
<td>0</td>
<td>1920</td>
</tr>
<tr>
<td>50</td>
<td>1,317</td>
<td>0%</td>
<td>38</td>
<td>37</td>
<td>1904</td>
</tr>
<tr>
<td>100</td>
<td>18,475</td>
<td>3%</td>
<td>70</td>
<td>18</td>
<td>1920</td>
</tr>
<tr>
<td>150</td>
<td>222,567</td>
<td>42%</td>
<td>38</td>
<td>42</td>
<td>1920</td>
</tr>
<tr>
<td>200</td>
<td>129,164</td>
<td>24%</td>
<td>27</td>
<td>53</td>
<td>1920</td>
</tr>
<tr>
<td>250</td>
<td>35,199</td>
<td>7%</td>
<td>40</td>
<td>40</td>
<td>1918</td>
</tr>
<tr>
<td>300</td>
<td>38,642</td>
<td>17%</td>
<td>38</td>
<td>53</td>
<td>1920</td>
</tr>
<tr>
<td>350</td>
<td>394</td>
<td>0%</td>
<td>52</td>
<td>18</td>
<td>1962</td>
</tr>
<tr>
<td>400</td>
<td>12,479</td>
<td>2%</td>
<td>42</td>
<td>51</td>
<td>1915</td>
</tr>
<tr>
<td>450</td>
<td>21,080</td>
<td>4%</td>
<td>28</td>
<td>52</td>
<td>1915</td>
</tr>
<tr>
<td>500</td>
<td>488</td>
<td>0%</td>
<td>57</td>
<td>0</td>
<td>1962</td>
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</tbody>
</table>

528,184

Source: Asset Inventory Registry - Asset_main_water_pipes_by_size

Main Break Analysis

<table>
<thead>
<tr>
<th>Breaks Material</th>
<th>Construction Decade</th>
</tr>
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<tbody>
<tr>
<td>CAST IRON</td>
<td>1910</td>
</tr>
<tr>
<td>24 CAST IRON</td>
<td>1920</td>
</tr>
<tr>
<td>2 DUCTILE IRON</td>
<td>1920</td>
</tr>
<tr>
<td>8 CAST IRON</td>
<td>1930</td>
</tr>
<tr>
<td>1 DUCTILE IRON</td>
<td>1930</td>
</tr>
<tr>
<td>18 CAST IRON</td>
<td>1940</td>
</tr>
<tr>
<td>1 DUCTILE IRON</td>
<td>1940</td>
</tr>
<tr>
<td>1 ASBESTOS CEMENT</td>
<td>1950</td>
</tr>
<tr>
<td>80 CAST IRON</td>
<td>1950</td>
</tr>
<tr>
<td>20 CAST IRON</td>
<td>1960</td>
</tr>
<tr>
<td>75 CAST IRON THIN WALL</td>
<td>1980</td>
</tr>
<tr>
<td>21 DUCTILE IRON</td>
<td>1960</td>
</tr>
<tr>
<td>4 STEEL</td>
<td>1960</td>
</tr>
<tr>
<td>15 CAST IRON</td>
<td>1970</td>
</tr>
<tr>
<td>43 CAST IRON THIN WALL</td>
<td>1970</td>
</tr>
<tr>
<td>35 DUCTILE IRON</td>
<td>1970</td>
</tr>
<tr>
<td>5 CAST IRON</td>
<td>1980</td>
</tr>
<tr>
<td>3 CAST IRON THIN WALL</td>
<td>1980</td>
</tr>
<tr>
<td>26 DUCTILE IRON</td>
<td>1980</td>
</tr>
<tr>
<td>1 PVC</td>
<td>1980</td>
</tr>
<tr>
<td>6 CAST IRON</td>
<td>1980</td>
</tr>
<tr>
<td>12 DUCTILE IRON</td>
<td>1980</td>
</tr>
<tr>
<td>5 PVC</td>
<td>1990</td>
</tr>
<tr>
<td>10 DUCTILE IRON</td>
<td>2000</td>
</tr>
<tr>
<td>1 POLYETHYLENE</td>
<td>2000</td>
</tr>
<tr>
<td>19 PVC</td>
<td>2000</td>
</tr>
<tr>
<td>1 POLYETHYLENE</td>
<td>2010</td>
</tr>
<tr>
<td>11 PVC</td>
<td>2010</td>
</tr>
<tr>
<td>1 CAST IRON</td>
<td></td>
</tr>
<tr>
<td>2 PVC</td>
<td></td>
</tr>
</tbody>
</table>

Source: GIS. Asset_main_break_analysis (since 2000)

Water Main Valve Replaced

Source: maximo: am_maximo_wat_valve_repl As of: 12-May-2020

Water Main - Dead End Flushing

Source: Maximo: am_maximo_wat_flushing as of 12-May-2020
**Water System Renewal Need Profile**

<table>
<thead>
<tr>
<th>Decade</th>
<th>%Length of System</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>12</td>
</tr>
<tr>
<td>2025</td>
<td>4</td>
</tr>
<tr>
<td>2030</td>
<td>2</td>
</tr>
<tr>
<td>2035</td>
<td>13</td>
</tr>
<tr>
<td>2040</td>
<td>14</td>
</tr>
<tr>
<td>2045</td>
<td>17</td>
</tr>
<tr>
<td>2050</td>
<td>17</td>
</tr>
<tr>
<td>2055</td>
<td>13</td>
</tr>
</tbody>
</table>

**Notes:**
- Needs shown in the decade prior to the current decade is considered to be backlogged having reached end of serviceable life.
- Renewal priority of specific backlogged infrastructure is determined based on risk analysis and actual current condition.

*Source: Asset Inventory Registry - am forecast_water_system_cap*
City of Cambridge Water Distribution

DWQMS Management Review

Water System Replacement

<table>
<thead>
<tr>
<th>Year</th>
<th>Pipe Length (m)</th>
<th>Replacement Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>5,130</td>
<td>$3,802,147</td>
</tr>
<tr>
<td>2011</td>
<td>2,610</td>
<td>$2,865,026</td>
</tr>
<tr>
<td>2012</td>
<td>4,369</td>
<td>$3,804,736</td>
</tr>
<tr>
<td>2013</td>
<td>5,816</td>
<td>$5,800,412</td>
</tr>
<tr>
<td>2014</td>
<td>6,130</td>
<td>$5,828,003</td>
</tr>
<tr>
<td>2015</td>
<td>9,079</td>
<td>$9,223,190</td>
</tr>
<tr>
<td>2016</td>
<td>9,459</td>
<td>$7,335,194</td>
</tr>
<tr>
<td>2017</td>
<td>5,269</td>
<td>$5,155,776</td>
</tr>
<tr>
<td>2018</td>
<td>1,732</td>
<td>$1,527,274</td>
</tr>
<tr>
<td>2019</td>
<td>4,318</td>
<td>$4,360,984</td>
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</table>

Grand Total: 51,387 $48,404,048

Source: Asset Registry - am.asset_changes_by_year (includes Cambridge and Shared assets)

Water System Growth

<table>
<thead>
<tr>
<th>Year</th>
<th>Length(m)</th>
<th>Replacement Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>3,716</td>
<td>$4,883,196</td>
</tr>
<tr>
<td>2011</td>
<td>1,944</td>
<td>$2,972,233</td>
</tr>
<tr>
<td>2012</td>
<td>6,622</td>
<td>$9,172,333</td>
</tr>
<tr>
<td>2013</td>
<td>1,773</td>
<td>$2,447,030</td>
</tr>
<tr>
<td>2014</td>
<td>754</td>
<td>$1,270,136</td>
</tr>
<tr>
<td>2015</td>
<td>3,804</td>
<td>$4,763,455</td>
</tr>
<tr>
<td>2016</td>
<td>104</td>
<td>$464,575</td>
</tr>
<tr>
<td>2017</td>
<td>4,415</td>
<td>$5,649,222</td>
</tr>
<tr>
<td>2018</td>
<td>3,336</td>
<td>$5,109,524</td>
</tr>
<tr>
<td>2019</td>
<td>1,579</td>
<td>$2,742,322</td>
</tr>
</tbody>
</table>

Grand Total: 30,024 $40,049,325

Source: Asset Registry - am.asset_changes_by_year (includes IT SERVICE assets owned by Cambridge and Shared)
<table>
<thead>
<tr>
<th>Year</th>
<th>GROWTH</th>
<th>Replacement</th>
<th>Total G &amp; R Value 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>WATER HYDRANT RECONSTRUCTION</td>
<td>WATER HYDRANT RECONSTRUCTION CAMBRIDGE 1 EACH</td>
<td>$15,713</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER HYDRANT SUBDIVISION</td>
<td>WATER HYDRANT SUBDIVISION CAMBRIDGE 2 EACH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER JUNCTION RECONSTRUCTION</td>
<td>WATER JUNCTION RECONSTRUCTION CAMBRIDGE 3 EACH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER JUNCTION SUBDIVISION</td>
<td>WATER JUNCTION SUBDIVISION CAMBRIDGE 3 EACH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER PIPE RECONSTRUCTION</td>
<td>WATER PIPE RECONSTRUCTION CAMBRIDGE 1,333 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER SERVICE RECONSTRUCTION</td>
<td>WATER SERVICE RECONSTRUCTION CAMBRIDGE 90 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER SERVICE VALVE RECONSTRUCTION</td>
<td>WATER SERVICE VALVE RECONSTRUCTION CAMBRIDGE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER VALVE RECONSTRUCTION</td>
<td>WATER VALVE RECONSTRUCTION CAMBRIDGE 8 EACH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER VALVE SUBDIVISION</td>
<td>WATER VALVE SUBDIVISION CAMBRIDGE 10 EACH</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total Value - REPLACEMENT</td>
</tr>
<tr>
<td>2019</td>
<td>WATER HYDRANT RECONSTRUCTION</td>
<td>WATER HYDRANT RECONSTRUCTION CAMBRIDGE 1 EACH</td>
<td>$15,713</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER HYDRANT SUBDIVISION</td>
<td>WATER HYDRANT SUBDIVISION CAMBRIDGE 2 EACH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER JUNCTION RECONSTRUCTION</td>
<td>WATER JUNCTION RECONSTRUCTION CAMBRIDGE 3 EACH</td>
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<tr>
<td></td>
<td></td>
<td>WATER JUNCTION SUBDIVISION</td>
<td>WATER JUNCTION SUBDIVISION CAMBRIDGE 3 EACH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER PIPE RECONSTRUCTION</td>
<td>WATER PIPE RECONSTRUCTION CAMBRIDGE 1,333 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER SERVICE RECONSTRUCTION</td>
<td>WATER SERVICE RECONSTRUCTION CAMBRIDGE 90 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER SERVICE VALVE RECONSTRUCTION</td>
<td>WATER SERVICE VALVE RECONSTRUCTION CAMBRIDGE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER VALVE RECONSTRUCTION</td>
<td>WATER VALVE RECONSTRUCTION CAMBRIDGE 8 EACH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER VALVE SUBDIVISION</td>
<td>WATER VALVE SUBDIVISION CAMBRIDGE 10 EACH</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total Value - REPLACEMENT</td>
</tr>
<tr>
<td>2020</td>
<td>WATER HYDRANT RECONSTRUCTION</td>
<td>WATER HYDRANT RECONSTRUCTION CAMBRIDGE 6 EACH</td>
<td>$77,520</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER HYDRANT SUBDIVISION</td>
<td>WATER HYDRANT SUBDIVISION CAMBRIDGE 2 EACH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER JUNCTION RECONSTRUCTION</td>
<td>WATER JUNCTION RECONSTRUCTION CAMBRIDGE 3 EACH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER JUNCTION SUBDIVISION</td>
<td>WATER JUNCTION SUBDIVISION CAMBRIDGE 3 EACH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER PIPE RECONSTRUCTION</td>
<td>WATER PIPE RECONSTRUCTION CAMBRIDGE 1,333 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER SERVICE RECONSTRUCTION</td>
<td>WATER SERVICE RECONSTRUCTION CAMBRIDGE 90 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER SERVICE VALVE RECONSTRUCTION</td>
<td>WATER SERVICE VALVE RECONSTRUCTION CAMBRIDGE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER VALVE RECONSTRUCTION</td>
<td>WATER VALVE RECONSTRUCTION CAMBRIDGE 8 EACH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER VALVE SUBDIVISION</td>
<td>WATER VALVE SUBDIVISION CAMBRIDGE 10 EACH</td>
</tr>
</tbody>
</table>
## DWQMS Management Review

### Water Distribution System Report

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WATER PIPE RECONSTRUCTION</td>
<td>CAMBRIDGE</td>
<td>23</td>
<td>m</td>
<td>$11,537</td>
</tr>
<tr>
<td>WATER SERVICE RECONSTRUCTION</td>
<td>CAMBRIDGE</td>
<td>157</td>
<td>m</td>
<td>$70,867</td>
</tr>
<tr>
<td>WATER VALVE RECONSTRUCTION</td>
<td>CAMBRIDGE</td>
<td>23 EACH</td>
<td></td>
<td>$8,044</td>
</tr>
<tr>
<td>Total Value - GROWTH</td>
<td></td>
<td></td>
<td></td>
<td>$171,968</td>
</tr>
<tr>
<td>2020 REPLACEMENT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WATER JUNCTION RECONSTRUCTION</td>
<td>CAMBRIDGE</td>
<td>4 EACH</td>
<td></td>
<td>$3,658</td>
</tr>
<tr>
<td>Total Value - REPLACEMENT</td>
<td></td>
<td></td>
<td></td>
<td>$3,658</td>
</tr>
<tr>
<td>Total Growth and Replacement Value - 2020</td>
<td></td>
<td></td>
<td></td>
<td>$175,626</td>
</tr>
<tr>
<td>Grand Total</td>
<td></td>
<td></td>
<td></td>
<td>$15,228,877</td>
</tr>
</tbody>
</table>

Source: Asset Inventory Registry - am_asset_changes_by_year (includes Cambridge, Shared and Regional assets)
# City of Cambridge Water Distribution

## DWQMS Management Review

**Metered Water Consumption Profile (cubic metres) 2019**

<table>
<thead>
<tr>
<th>ACCOUNTS</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Avg Daily Use (m³)</th>
<th>Estimated Monthly Base Flow Per Acct</th>
<th>Estimated Annual Outdoor Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>NON-RESIDENTIAL</td>
<td>1,754</td>
<td>419,569</td>
<td>353,328</td>
<td>495,224</td>
<td>355,650</td>
<td>411,275</td>
<td>497,167</td>
<td>515,496</td>
<td>533,919</td>
<td>445,367</td>
<td>456,552</td>
<td>415,529</td>
<td>353,866</td>
<td>21.27</td>
<td>738.1</td>
</tr>
<tr>
<td>RESIDENTIAL-MF</td>
<td>4,447,636</td>
<td>1,220,707</td>
<td>1,189,148</td>
<td>146,870</td>
<td>184,020</td>
<td>199,804</td>
<td>170,525</td>
<td>184,148</td>
<td>175,868</td>
<td>175,594</td>
<td>162,317</td>
<td>161,722</td>
<td>167,918</td>
<td>2.17</td>
<td>79.5</td>
</tr>
<tr>
<td>RESIDENTIAL-SF</td>
<td>5,459,071</td>
<td>2,529,046</td>
<td>453,167</td>
<td>433,503</td>
<td>444,732</td>
<td>439,659</td>
<td>472,896</td>
<td>481,169</td>
<td>503,746</td>
<td>486,835</td>
<td>451,701</td>
<td>453,631</td>
<td>434,735</td>
<td>452,370</td>
<td>0.53</td>
</tr>
<tr>
<td>Total</td>
<td>712,273</td>
<td>24,589,726</td>
<td>12,174</td>
<td>12,774</td>
<td>12,249</td>
<td>15,034</td>
<td>16,284</td>
<td>15,443</td>
<td>16,780</td>
<td>17,580</td>
<td>21,542</td>
<td>25,751</td>
<td>30,969</td>
<td>37,274</td>
<td>8.14</td>
</tr>
</tbody>
</table>

Total # of Accounts: 39,778

Year Total Consumption All Groups: 11,899,887 (includes Outdoor Usage)

Source: Water Account Monthly Pre-Rated Consumption History, Water Billing System, Consumption Classification, MPBC Building Coded annual_consumption_summary

**Daily Water Supply from Region**

![Daily Water Supply from Region](image)

Source: Region of Waterloo water supply data sheet_daily_supply_stats
City of Cambridge Water Distribution

DWQMS Management Review

Internal Audit Report:

DWQMS 2.0

Internal Audit Report

For the period of:
September 27, 2018 to December 17, 2019

For:
City of Cambridge
Public Works Division
Cambridge Water Distribution System

Conducted by:
acclaims.ca

Audit date: December 17, 2019
<table>
<thead>
<tr>
<th>Reference</th>
<th>Opportunity for Improvement – Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational Plan – general</td>
<td>Consider updating references throughout the Operational Plan from “annual”, “once per year”, or “annually” to “once per calendar year” for the DWQMS Elements that contain this specific wording (e.g. Elements 7, 14, 15, 19, 20). Also, consider updating references from “once every three years” to “once every thirty-six months” for the DWQMS Elements that contain this specific wording (e.g. Elements 7 and 21).</td>
</tr>
<tr>
<td>Organizational updates re: top management in Operational Plan</td>
<td>Consider updating all existing top management references related to “Manager of Compliance” or “Manager of Corporate Compliance” to the new management title (once decided, as it has moved from “Corporate” to within Public Works). Also, verify that the QMS Representative is consistently linked to the “Utilities Compliance Technologist” position (at times, linked to “Corporate Compliance”)</td>
</tr>
<tr>
<td>QMS Policy</td>
<td>In the next version of the QMS Policy, consider re-wording “residents and businesses” to “consumers” as this is the wording in DWQMS Element 2.</td>
</tr>
<tr>
<td>Document &amp; Records</td>
<td>Consider listing Cambridge’s Licence-related documents (MDWL, DWWP, Accreditation Certificate, Financial Plan) in the list of official documents, along with their document expiries. Internal and external audit reports should also be added to the list of official records.</td>
</tr>
<tr>
<td>Use of numbered dates</td>
<td>Consider (when using the numbered-date format) standardizing numbered dates using the international standard for dates, YYYY-MM-DD so that it is always clear to the reader the date of the document or record.</td>
</tr>
<tr>
<td>Risk Assessments – “Calendar Year” and “36-month” updates</td>
<td>Consider creating a Maximo service request ensuring that Risk Assessment “Calendar Year” and “36-month” updates take place and log notes retained noting a summary of any changes / decisions regarding system risks.</td>
</tr>
<tr>
<td>Essential Supplier Tender / Communications</td>
<td>Consider including in the next version of essential supplier tenders a reference to NSF 372 (as per the City’s MDWL, Schedule B section 14.0). Also, consider including a reference to MDWL, Schedule B section 14.0 in Appendix 13A (SYS-WD-13) related to communicating relevant information.</td>
</tr>
<tr>
<td>Review and Provision of Infrastructure</td>
<td>Consider including a reference that the outcomes of the risk assessment under Element 8 are considered as part of the Review and Provision of Infrastructure (SYS-WD-14) document (as required by DWQMS Element 14).</td>
</tr>
<tr>
<td>Continual Improvement (BMPs)</td>
<td>Consider describing how best management practices are tracked, considered and from what sources (e.g. BMP group, MWWRC, workshops, conferences, training, magazine articles, etc.), as required by DWQMS Element 21.</td>
</tr>
<tr>
<td>List of qualified plumbers [Staff Suggestion]</td>
<td>Consider developing a pre-vetted list of qualified plumbers for Operators to hand-out to customers when an issue has been confirmed as a private-side issue. This would help address a commonly asked question.</td>
</tr>
</tbody>
</table>
# Appendix “A” – Audit Plan

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Auditor</th>
<th>Auditee</th>
<th>Process / Program</th>
<th>DWQMS Element – Standard and version: DWQMS 2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1  2  3  4  5  6  7  8  9  10 11 12 13 14 15 16 17 18 19 20 21</td>
</tr>
<tr>
<td>12-17</td>
<td>7:30</td>
<td>BR</td>
<td>ALL</td>
<td>Opening Meeting</td>
<td>x</td>
</tr>
<tr>
<td>12-17</td>
<td>8:00</td>
<td>BR</td>
<td>MP</td>
<td>Top Mgmt. Responsibilities</td>
<td>x x x x x x x x x x x x x x x x x x x x x x x x</td>
</tr>
<tr>
<td>12-17</td>
<td>9:30</td>
<td>BR</td>
<td>AO/K</td>
<td>QMS Rep’s Responsibilities</td>
<td>x x x x x x x x x x x x x x x x x x x x x x x x</td>
</tr>
<tr>
<td>12-17</td>
<td>10:00</td>
<td>BR</td>
<td>BD</td>
<td>Distribution Ops Planning</td>
<td>x x x x x x x x x x x x x x x x x x x x x x x x</td>
</tr>
<tr>
<td>12-17</td>
<td>1:20</td>
<td>BR</td>
<td>BD</td>
<td>Training &amp; Certification</td>
<td>x x x x x x x x x x x x x x x x x x x x x x x x</td>
</tr>
<tr>
<td>12-17</td>
<td>1:30</td>
<td>BR</td>
<td>AH</td>
<td>Distribution Maint. Programs</td>
<td>x x x x x x x x x x x x x x x x x x x x x x x x</td>
</tr>
<tr>
<td>12-17</td>
<td>1:45</td>
<td>BR</td>
<td>JK / JS</td>
<td>Dist Sampling, Testing, Monitoring</td>
<td>x x x x x x x x x x x x x x x x x x x x x x x x</td>
</tr>
<tr>
<td>12-17</td>
<td>2:15</td>
<td>BR</td>
<td>JK / JS</td>
<td>Communications (staff, Owner, suppliers, public)</td>
<td>x x x x x x x x x x x x x x x x x x x x x x x x</td>
</tr>
<tr>
<td>12-17</td>
<td>2:30</td>
<td>BR</td>
<td>ALL</td>
<td>Closing Meeting</td>
<td>x x x x x x x x x x x x x x x x x x x x x x x x</td>
</tr>
</tbody>
</table>

Legend for DWQMS Elements:

1. Quality Management System
2. Quality Management System Policy
3. Commitment and Endorsement
4. QMS Representative
5. Document and Records Control
6. Drinking Water System
7. Risk Assessment
8. Risk Assessment Outcomes
9. Organizational Structure, Roles, Responsibilities and Authorities
10. Competencies
11. Internal Coverage
12. Communications
13. Essential Supplies and Services
14. Review and Provision of Infrastructure
15. Infrastructure Maintenance, Rehabilitation and Renewal
16. Sampling, Testing and Monitoring
17. Measurement and Recording Equipment Calibration and Maintenance
18. Emergency Management
19. Internal Audits
20. Management Review
21. Continual Improvement

Acclains Environmental Inc. 6 of 23
Appendix "B" – Documents and Records
The list of documents and records were reviewed and observations made during the audit include:

- City of Cambridge staff interviews December 17, 2019
  - Brandon Demeester, Supervisor of Water
  - Al Hyde, Distribution Lead Hand (PM)
  - Jessie Koczynas, Water Technologist
  - Aaron O’Keefe, QMS Representative
  - Joanne Simpson, Water Technologist
  - Mike Parsons, Director of Public Works
  - Chris Whetstone, Manager of Water
- 2018 Internal Audit Report, by Acclaims Environmental Inc., dated September 25-26, 2018
- City of Cambridge Operational Plan for the Cambridge Water Distribution System
  - QMS Policy, dated October 13, 2017
  - Commitment and Endorsement (SYS-WD-03), dated November 20, 2018
  - Internal correspondence dated June 19, 2019 re: General Committee June 4, 2019
  - June 4, 2019 General Committee Agenda (as accessed online on December 17, 2019)
  - Appendix 4-A Notice of Appointment of QMS Representative, dated November 20, 2019
  - Document and Records Control (SYS-WD-05), dated February 24, 2016
  - List of Official Documents (SYS-WD-05-F1) and List of Official Records (SYS-WD-05-F2)
  - Water Distribution System Description (SYS-WD-06), dated January 29, 2018
  - Risk Assessment (SYS-WD-07), dated July 18, 2018
  - Risk Assessment Tables (SYS-WD-08-T1), dated February 25, 2016
  - Risk Assessment CCP Decision Tree (SYS-WD-08-F2), dated February 26, 2016
  - Risk Assessment Outcomes, dated December 11, 2019
  - Organizational Structure, Roles, Responsibilities and Authorities (SYS-WD-09), dated February 25, 2016
  - Appendix 9A City of Cambridge – DWQMS Organizational Chart
  - QMS Roles, Responsibilities and Authorities (SYS-WD-09-T2), dated January 18, 2018
  - Competencies document (SYS-WD-10), dated February 25, 2016
  - Personnel Coverage (SYS-WD-11), dated February 25, 2016
  - Staff Shortage Contingency Plan – Water System Compliance, dated February 25, 2016
  - Communications document (SYS-WD-12), dated February 26, 2016
  - Quarterly staff meeting PowerPoint presentation from August 15, 2019
  - Essential Supplies and Services document (SYS-WD-13), dated February 26, 2016
  - Essential Supplies & Services List (SYS-WD-13 – Form F1)
  - Appendix 13A (SYS-WD-13) Information Sheet for Tender and Contract Packages
  - List of Approved Suppliers, Service Contracts (SYS-WD-13–Form F1), dated May 4, 2017
  - Region of Waterloo and Area’s Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS)
  - Municipal Drinking Water Licence (#015-101), dated September 27, 2019
  - Drinking Water Works Permit (#015-201), dated September 27, 2019
  - MECP letter re: Acceptance of the Operational Plan (#015-401) for the Cambridge Distribution System, dated September 27, 2019
  - Infrastructure Maintenance, Rehabilitation and Renewal (SYS-WD-15), dated February 26, 2016
  - Maximo system work orders and Collector applications

Acclaims Environmental Inc.
City of Cambridge Water Distribution

DWQMS Management Review

INTERNAL PROCESS AUDIT CHECKSHEET

Process: Distribution Maintenance Program

Audit(ies): All Hady, Distribution Lead Plant (EM)

Audit Date: December 13, 2023

1. Adequate Resources? (Is it 9, 11, 13, 14, 15)


5. What If Out of Control? (Is it 7, 9, 12, 18)

6. What? (Is it 2, 5, 4, 16)

1. What are the different roles and responsibilities?

2. What are the resources required to carry out this process? Such as:

   a. Staff and adequate staff coverage
   b. Materials
   c. Equipment
   d. Flowsheets/Unsafe

3. Are there enough resources?

4. Are the special requirements for the resources:

   a. How do we ensure the quality of supplies?

5. Process Input:

   a. Large-volume requirements
   b. Work orders or maintenance requests
   c. Internal or external customers

6. Is there a "previous process step" that feeds into this one?

7. Do you keep up with the supply / data?

8. How regularly do you keep up with the process step?

9. Process Output:

   a. What is the output of this process?

10. What records do you produce?

   a. Production reports
   b. Production reports organized / identifiable / retrievable / protected / conforming

11. Are they complete?

12. Are records disposed of (why) / when?

13. What level of satisfaction with this output?

14. Are relevant stakeholders satisfied with this output?

15. Internal / external customers

16. Government agencies

17. Public

18. Owner

19. Top management

20. How are you judged?

21. What are some improvements related to this process that you have made / implemented in the past year? If it is none, anything you'd like to change about this process?

22. Evidence of Continued Improvement?

23. What are some improvements related to this process that you have made / implemented in the past year? If it is none, anything you'd like to change about this process?

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## INTERNAL PROCESS AUDIT CHECKSHEET

<table>
<thead>
<tr>
<th>Documentation Reasonableness</th>
<th>Known or Other Evidence (based on evidence observed and evidence provided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0 Compliance</td>
<td>Responded correctly (considering pressure zones, methodically).</td>
</tr>
<tr>
<td>S.0 Evidence of Continued Improvement? (x. 21)</td>
<td>Dead-end flushing – investigating new potential areas. flushing is required, ensuring customer satisfaction and water quality.</td>
</tr>
<tr>
<td>Off-site</td>
<td>Pre-waived list of qualified plumbers to go to for homeowners when they have a larger home issue.</td>
</tr>
</tbody>
</table>

### DOCUMENT REVIEW – DMSO 3.1 (Condition Expected)

| PLAN | THE CP shall document the activities and procedures for the DMSO to ensure compliance with the requirements of this Standard and the objectives and procedures documented in the SDP. |
| PLAN | The CP shall document and maintain the DMSO in accordance with the requirements of this Standard and the objectives and procedures documented in the SDP. |

### DOCUMENT REVIEW – Auditor Comments (Condition Found)

| PLAN | The CP shall document the activities and procedures for the DMSO to ensure compliance with the requirements of this Standard and the objectives and procedures documented in the SDP. |
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### DOCUMENT REVIEW – DWQMS Management Review

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**City of Cambridge Water Distribution**

**DWQMS Management Review**

---

**DOCUMENT REVIEW – DMSO 3.1 (Condition Expected)**

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**DOCUMENT REVIEW – DWQMS Management Review**

The CP shall document the activities and procedures for the DMSO to ensure compliance with the requirements of this Standard and the objectives and procedures documented in the SDP.

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**DOCUMENT REVIEW – Auditor Comments (Condition Found)**

The CP shall document the activities and procedures for the DMSO to ensure compliance with the requirements of this Standard and the objectives and procedures documented in the SDP.

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**DOCUMENT REVIEW – DMSO 3.1 (Condition Expected)**

The CP shall document and maintain the DMSO in accordance with the requirements of this Standard and the objectives and procedures documented in the SDP.

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**DOCUMENT REVIEW – Auditor Comments (Condition Found)**

The CP shall document the activities and procedures for the DMSO to ensure compliance with the requirements of this Standard and the objectives and procedures documented in the SDP.

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**DOCUMENT REVIEW – DWQMS Management Review**

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**DOCUMENT REVIEW – Auditor Comments (Condition Found)**

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**DOCUMENT REVIEW – DMSO 3.1 (Condition Expected)**

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**DOCUMENT REVIEW – Auditor Comments (Condition Found)**

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**DOCUMENT REVIEW – DWQMS Management Review**

The CP shall document the activities and procedures for the DMSO to ensure compliance with the requirements of this Standard and the objectives and procedures documented in the SDP.

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**DOCUMENT REVIEW – Auditor Comments (Condition Found)**

The CP shall document the activities and procedures for the DMSO to ensure compliance with the requirements of this Standard and the objectives and procedures documented in the SDP.
City of Cambridge Water Distribution

DWQMS Management Review

DOCUMENT REVIEW - DWQMS 22 (Condition Expected)

1. Risk Assessment

AIM: The City shall perform a risk assessment process that:

a. Identifies potential hazardous events and associated hazards;

b. Identifies potential failures, including associated resistance, to the occurrence of hazardous events;

c. Calculates risk associated with the occurrence of hazardous events, the associated hazards, and the associated failures;

d. Identifies potential control measures to reduce the probability and/or consequence of hazardous events, the associated hazards, and the associated failures;

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The City shall perform a risk assessment process.

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The City shall perform a risk assessment process.
City of Cambridge Water Distribution

DWQMS Management Review

DOCUMENT REVIEW - DWQMS 3.0 (Condition Expected)

- The QA shall implement and confirm in the procedure.

- All personnel, workers, vendors, consultants, contractors, suppliers, and subcontractors shall be trained on the procedures.

- The QA shall implement and confirm the procedures.

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City of Cambridge Water Distribution

DWQMS Management Review

DOCUMENT REVIEW - DWQMS v1.0 (Condition Specific)

16. Sampling, Testing and Monitoring

PLAN - The DP shall implement a program to ensure regular and reliable water quality monitoring at all water supply sites and water distribution systems.

DO - The DP shall implement and enforce the procedures.

17. Water Quality Management

PLAN - The DP shall implement a program for the collection and maintenance of water quality data, including monitoring of water distribution systems.

DO - The DP shall implement and enforce the procedures.

18. Water Distribution System

PLAN - The DP shall implement a program for the collection and maintenance of water distribution system data, including regular flushing of water distribution systems.

DO - The DP shall implement and enforce the procedures.

19. Internal Audit

PLAN - The DP shall implement an internal audit program to ensure compliance with all water distribution system requirements, including regular auditing of water distribution system data.

DO - The DP shall implement and enforce the procedures.

20. Management Review

PLAN - The DP shall implement an internal audit program to ensure compliance with all water distribution system requirements, including regular auditing of water distribution system data.

DO - The DP shall implement and enforce the procedures.

21. Environmental Management

PLAN - The DP shall implement a program for the collection and maintenance of environmental data, including monitoring of water distribution systems.

DO - The DP shall implement and enforce the procedures.

DOCUMENT REVIEW - Audit Criteria (Condition Specific)

PAGE 49

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<table>
<thead>
<tr>
<th>DOCUMENT REVIEW – DWQMS 2.0 (Condition Expected)</th>
<th>DOCUMENT REVIEW – Auditor Comments (Condition Found)</th>
</tr>
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<tbody>
<tr>
<td>a) reviewing the action(s) taken to correct the non-conformity, verifying that they are implemented and are effective in correcting and preventing the recurrence of the non-conformity.</td>
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<td>b) documenting a process for identifying and implementing Preventive Actions to eliminate the occurrence of potential non-conformities that are identified during an audit.</td>
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<tr>
<td>i) identifying potential non-conformities that are identified during an audit to determine if preventative actions may be necessary.</td>
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<tr>
<td>ii) documenting the outcomes of the review, including the action(s), if any, that will be taken to prevent a non-conformity from occurring.</td>
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<tr>
<td>iii) reviewing the action(s) taken to prevent a non-conformity, verifying that they are implemented and are effective in preventing the recurrence of the non-conformity.</td>
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</tbody>
</table>

90 – The CoW shall strive to continually improve the effectiveness of its GMS by implementing and conforming to the procedure.

Viewed Masters, the City’s work management system; method to track GMS’s from previous audit.

Viewed Service Request relating to staff suggestions still open from last audit – awaiting for the iPad implementation – when staff will have field access to provide suggestions more directly.

Evidence of implementation – plans to implement technology for online access to OAM, SOP’s, MCMW work management system, etc.
External Audit Results:

Audit Report

Re Accreditation Audit for

The Corporation of the City of Cambridge

1631840-02

Audited Address: 1310 Bishop St., Cambridge, Ontario, CAN, N1R 6V5

Start Date: Aug 13, 2019   End Date: Aug 14, 2019

Type of audit – Reaccreditation Verification Audit

Issue Date: August 19, 2019
Revision Level: Final
Audit Report

BACKGROUND INFORMATION

SAI Global conducted an audit of The Corporation of the City of Cambridge beginning on Aug 13, 2019 and ending on Aug 14, 2019 to DRINKING WATER QUALITY MANAGEMENT STANDARD VERSION 2 - 2017. The purpose of this audit report is to summarise the degree of compliance with relevant criteria, as defined on the cover page of this report, based on the evidence obtained during the audit of your organization. This audit report considers your organization’s policies, objectives, and continual improvement processes. Comments may include how suitable the objectives selected by your organization appear to be in regard to maintaining customer satisfaction levels and providing other benefits with respect to policy and other external and internal needs. We may also comment regarding the measurable progress you have made in reaching these targets for improvement.

SAI Global audits are carried out within the requirements of SAI Global procedures that also reflect the requirements and guidance provided in the international standards relating to audit practice such as ISO/IEC 17021-1, ISO 19011 and other normative criteria. SAI Global Auditors are assigned to audits according to industry, standard or technical competencies appropriate to the organization being audited. Details of such experience and competency are maintained in our records.

In addition to the information contained in this audit report, SAI Global maintains files for each client. These files contain details of organization size and personnel as well as evidence collected during preliminary and subsequent audit activities (Documentation Review and Scope) relevant to the application for initial and continuing certification of your organization.

Please take care to advise us of any change that may affect the application/certification or may assist us to keep your contact information up to date, as required by SAI Global Terms and Conditions. This report has been prepared by SAI Global Limited (SAI Global) in respect of a Client’s application for assessment by SAI Global. The purpose of the report is to comment upon evidence of the Client’s compliance with the standards or other criteria specified. The content of this report applies only to matters, which are evident to SAI Global at the time of the audit, based on sampling of evidence provided and within the audit scope. SAI Global does not warrant or otherwise comment upon the suitability of the contents of the report or the certificate for any particular purpose or use. SAI Global accepts no liability whatsoever for consequences to, or actions taken by, third parties as a result of or in reliance upon information contained in this report or certificate.

Please note that this report is subject to independent review and approval. Should changes to the outcomes of this report be necessary as a result of the review, a revised report will be issued and will supersede this report.

Standard: DRINKING WATER QUALITY MANAGEMENT STANDARD VERSION 2 - 2017
Scope of Certification: Drinking Water
Drinking Water System Owner: The Corporation of the City of Cambridge
Operating Authority: City of Cambridge Public Works Division
Owner: The Corporation of the City of Cambridge
Population Services: 130000
Activities: Distribution
Drinking Water Systems: DWS #: 280002460

Total audit duration: Person(s): 1 Day(s): 2.00
Audit Team Member(s): Team Leader: Janet McKenzie

Other Participants: n/a
Audit Report

Definitions and action required with respect to audit findings:

Major Non-conformance:

Based on objective evidence, the absence of, or a significant failure to implement and/or maintain conformance to requirements of the applicable standard. Each issue may raise significant doubt as to the capability of the management system to achieve its intended outputs (i.e., the absence of or failure to implement a complete Management System clause of the standard), or

A situation which would be the basis of available objective evidence, raise significant doubt as to the capability of the Management System to achieve the stated policy and objectives of the customer.

NOTE: The "applicable Standard" is the Standard which SAI Global are issuing certification against, and may be a Product Standard, a management system Standard, a food safety Standard or another set of documented criteria.

Action required: This category of findings requires SAI Global to issue a formal NCR; to receive and approve client's proposed correction and corrective action plans; and formally verify the effective implementation of planned activities. Correction and corrective action plan should be submitted to SAI Global prior to commencement of follow-up activities as required. Follow-up action by SAI Global must close out the NCR or reduce it to a lesser category within 50 days for initial certification and within 60 days for surveillance or re-certification audits from the last day of the audit.

If significant risk issues (e.g. safety, environmental, food safety, product legality/quality, etc.) are detected during an audit these shall be reported immediately to the Client and more immediate or instant correction shall be requested. If this is not agreed and cannot be resolved to the satisfaction of SAI Global, immediate suspension shall be recommended.

In the case of initial certification, failure to close out NCR within the time limits means that the Certification Audit may be repeated.

If significant risk issues (e.g. safety, environmental, food safety, product legality/quality, etc.) are detected during an audit these shall be reported immediately to the Client and more immediate or instant correction shall be requested. If this is not agreed and cannot be resolved to the satisfaction of SAI Global, immediate suspension shall be recommended.

In the case of an already certified client, failure to close out NCR within the time limits means that suspension proceedings may be instituted by SAI Global.

Follow-up activities incur additional charges.

Minor Non-conformance:

Represents either a management system weakness or minor issue that could lead to a major nonconformance if not addressed. Each minor NCR should be considered for potential improvement and to further investigate any system weaknesses for possible inclusion in the corrective action program

Action required: This category of findings requires SAI Global to issue a formal NCR; to receive and approve client's proposed correction and corrective action plans; and formally verify the effective implementation of planned activities at the next scheduled audit.

Opportunity for Improvement:

A documented statement, which may identify areas for improvement however shall not make specific recommendation(s).

Action required: Client may develop and implement solutions in order to add value to operations and management systems. SAI Global is not required to follow-up on this category of audit finding.
Audit Report

Audit Type and Purpose

On-site Verification Audit:
An on-site audit to assess whether a QMS has been implemented for the subject system that meets the "DO" requirements of the DWQMS V2.

Audit Objectives
The objective of the audit was to determine whether the drinking water Quality Management System (QMS) of the subject system conforms to the requirements of the Ontario Ministry of the Environment & Climate Change (MOECC) Drinking Water Quality Management Standard (DWQMS V2).
The audit was also intended to gather the information necessary for SAI Global to assess whether accreditation can continue or be offered or to the operating authority.
Audit Report

Audit Scope
The facilities and processes associated with the operating authority's QMS were objectively evaluated to obtain audit evidence and to determine a) whether the quality management activities and related results conform with DWQMS V2 requirements, and b) if they have been effectively implemented and/or maintained.

Audit Criteria:
- The Drinking Water Quality Management Standard Version 2
- Current QMS manuals, procedures and records implemented by the Operating Authority
- SAI Global Accreditation Program Handbook

Confidentiality and Documentation Requirements
The SAI Global stores their records and reports to ensure their preservation and confidentiality. Unless required by law, the SAI Global will not disclose audit records to a third party without prior written consent of the applicant. The only exception will be that the SAI Global will provide audit and corrective action reports to the Ontario Ministry of the Environment. For more information, please refer to the SAI Global Accreditation Program Handbook.

As part of the SAI Global Terms, it is necessary for you to notify SAI Global of any changes to your Quality Management System that you believe are significant enough to risk non-conformity with DWQMS V2: For more information, please refer to the SAI Global Accreditation Program Handbook.

Review of any changes
Changes to the Operating Authority since last audit include:

n/a
EXECUTIVE OVERVIEW

Based on the results of this onsite verification audit (Stage 2) and the results of the System audit (Stage 1) it has been determined that the management system is effectively implemented and meets the requirements of the standard relative to the scope of certification identified in this report; therefore, a recommendation for certification will be submitted to SAI Global review team.

Recommendation

Based on the results of this audit it has been determined that the management system is effectively implemented and maintained and meets the requirements of the standard relative to the scope of certification identified in this report; therefore, a recommendation for (continued) certification will be submitted to SAI Global review team.

Opportunities for Improvement:

See the specific elements identified below for details of the 5 opportunities for improvement.

It is suggested that the opportunities for improvement be considered by management to further enhance the Operating Authority’s Quality Management System and performance.
Audit Report

Management System Documentation

The management systems operational plan(s) was reviewed and found to be in conformance with the requirements of the standard.

Management Review

Records of the most recent management review meetings were verified and found to meet the requirements of the standard. All inputs were reflected in the records, and appear suitably managed as reflected by resulting actions and decisions.

Internal Audits

Internal audits are being conducted at planned intervals to ensure conformance to planned arrangements, the requirements of the standard and the established management system.

Corrective, Preventive Action & Continual Improvement Processes

The Operating Authority is implementing an effective process for the continual improvement of the management system through the use of the quality policy, quality objectives, audit results, data analysis, the appropriate management of corrective and preventive actions and management review.
Summary of Findings

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<tbody>
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<td>1.</td>
<td>Quality Management System</td>
<td>Conforms</td>
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<td>2.</td>
<td>Quality Management System Policy</td>
<td>Conforms</td>
</tr>
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<td>3.</td>
<td>Commitment and Endorsement</td>
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</tr>
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<td>4.</td>
<td>Quality Management System Representative</td>
<td>Conforms</td>
</tr>
<tr>
<td>5.</td>
<td>Document and Records Control</td>
<td>Conforms</td>
</tr>
<tr>
<td>6.</td>
<td>Drinking-Water System</td>
<td>OFI</td>
</tr>
<tr>
<td>7.</td>
<td>Risk Assessment</td>
<td>OFI</td>
</tr>
<tr>
<td>8.</td>
<td>Risk Assessment Outcomes</td>
<td>Conforms</td>
</tr>
<tr>
<td>9.</td>
<td>Organizational Structure, Roles, Responsibilities and Authorities</td>
<td>Conforms</td>
</tr>
<tr>
<td>10.</td>
<td>Competencies</td>
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</tr>
<tr>
<td>11.</td>
<td>Personnel Coverage</td>
<td>Conforms</td>
</tr>
<tr>
<td>12.</td>
<td>Communications</td>
<td>2 OFIs</td>
</tr>
<tr>
<td>13.</td>
<td>Essential Supplies and Services</td>
<td>Conforms</td>
</tr>
<tr>
<td>14.</td>
<td>Review and Provision of Infrastructure</td>
<td>Conforms</td>
</tr>
<tr>
<td>15.</td>
<td>Infrastructure Maintenance, Rehabilitation &amp; Renewal</td>
<td>Conforms</td>
</tr>
<tr>
<td>16.</td>
<td>Sampling, Testing and Monitoring</td>
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</tr>
<tr>
<td>17.</td>
<td>Measurement &amp; Recording Equipment Calibration and Maintenance</td>
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<tr>
<td>18.</td>
<td>Emergency Management</td>
<td>Conforms</td>
</tr>
<tr>
<td>19.</td>
<td>Internal Audits</td>
<td>Conforms</td>
</tr>
<tr>
<td>20.</td>
<td>Management Review</td>
<td>Conforms</td>
</tr>
<tr>
<td>21.</td>
<td>Continual Improvement</td>
<td>OFI</td>
</tr>
</tbody>
</table>

**Major NCR #**

Major non-conformity. The auditor has determined one of the following:
(a) a required element of the DWQMS has not been incorporated into a QMS;
(b) a systemic problem with a QMS is evidenced by two or more minor non-conformities; or
(c) a minor non-conformity identified with a corrective action request has not been remedied.

**Minor NCR #**

Minor non-conformity. In the opinion of the auditor, part of a required element of the DWQMS has not been incorporated satisfactorily into a QMS.

**OFI**

Opportunity for improvement. Conforms to requirement, but there is an opportunity for improvement.

**Conforms**

Conforms to requirement.

**NANC**

Not applicable/Not Covered during this audit.

****

Additional comment added by auditor in the body of the report.
### Audit Report

#### PART D. Audit Observations, Findings and Comments

<table>
<thead>
<tr>
<th>DWQMS Reference</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Quality Management System</td>
<td>Conforms</td>
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<tr>
<td>City of Cambridge Water Distribution System Procedure manual</td>
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<thead>
<tr>
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<td>2 Quality Management System Policy</td>
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<td>SYS-WD-02 : Quality Management System Policy Revision Date: 10/13/17 Revision #: 5</td>
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<tr>
<td>3 Commitment and Endorsement</td>
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<td>SYS-WD-03 (Rev. 6, Nov 2018)</td>
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<tr>
<td>4 Quality Management System Representative</td>
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<td>SYS-WD-04: QMS Representative Revision Date: 5-Aug Revision #: 2</td>
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<tr>
<td>5 Document and Record Control</td>
<td>Conforms</td>
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<td>SYS-WD-05: Document and Records Control Revision Date: 24-Feb-16 Revision #: 5</td>
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<table>
<thead>
<tr>
<th>DWQMS Reference</th>
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<tbody>
<tr>
<td>8 Drinking Water System</td>
<td></td>
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</tbody>
</table>
| SYS-WD-06: Drinking Water System Description Revision Date: 1/29/18 Revision #: 9 | OK – Update the drinking water system description to denote Well P9 as being disconnected from the City’s distribution system.

<table>
<thead>
<tr>
<th>DWQMS Reference</th>
<th>Details</th>
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<tbody>
<tr>
<td>7 Risk Assessment</td>
<td></td>
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<tr>
<td>SYS-WD-07: Risk Assessment Revision Date: 07/18/18 Revision #: 5</td>
<td>OK - There was no evidence to suggest that applicable/relevant MECP-recommended considerations are part of the risk assessment process. Long-term weather conditions were considered but not other climate change-related considerations (i.e. flooding, etc.)</td>
</tr>
</tbody>
</table>
## City of Cambridge Water Distribution
### DWQMS Management Review

## Audit Report

<table>
<thead>
<tr>
<th>DWQMS Reference:</th>
<th>8 Risk Assessment Outcomes</th>
</tr>
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<tbody>
<tr>
<td>Client Reference:</td>
<td>Table 1: Determination of Significant Hazards and/or CCP's</td>
</tr>
<tr>
<td></td>
<td>August 25, 2017</td>
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<tr>
<td></td>
<td>2018 Risk Assessment</td>
</tr>
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<td></td>
<td>Summary of Critical Control Points</td>
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<tr>
<td></td>
<td>SYS-WD-08-T2 Page 3 of 4 Revision Date: 10/10/17 Revision #: 11</td>
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<thead>
<tr>
<th>DWQMS Reference:</th>
<th>9 Organizational Structure, Roles, Responsibility and Authorities</th>
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<tbody>
<tr>
<td>Client Reference:</td>
<td>SYS-WD-09: Organizational Structure, Roles, Responsibilities and Authorities Revision Date: 02/25/16 Revision #: 3</td>
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<td></td>
<td>SYS-WD-09-T2 City of Cambridge QMS Roles, Responsibilities and Authorities, Rev. 6, June 19, 2017</td>
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<tr>
<th>DWQMS Reference:</th>
<th>10 Competencies</th>
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<tbody>
<tr>
<td>Client Reference:</td>
<td>SYS-WD-10: Competencies Revision Date: 02/25/16 Revision #: 4</td>
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<th>11 Personnel Coverage</th>
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<tbody>
<tr>
<td>Client Reference:</td>
<td>SYS-WD-11: Personnel Coverage Revision Date: 01/22/18 Revision #: 3</td>
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<th>12 Communications</th>
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<tr>
<td>Client Reference:</td>
<td>SYS-WD-12: Communications Revision Date: 02/28/16 Revision #: 4</td>
</tr>
<tr>
<td>Details:</td>
<td>Conforms</td>
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</tbody>
</table>

Remarks:

- CPI – Ensure current versions of the DWQMS Policy are posted at Public Works and at City Hall (could not be verified during the audit).
- CPI – Consider improving oversight/communications of watermain commissioning processes to ensure DWQMS and regulatory requirements are met.

<table>
<thead>
<tr>
<th>DWQMS Reference:</th>
<th>13 Essential Supplies and Services</th>
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<tbody>
<tr>
<td>Client Reference:</td>
<td>SYS-WD-13: Essential Supplies and Services</td>
</tr>
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<th>14 Review and Provision of Infrastructure</th>
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<tbody>
<tr>
<td>Client Reference:</td>
<td>SYS-WD-14: Review and Provision of Infrastructure</td>
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<td>Revision Date:</td>
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</table>
# DWQMS Management Review

## Audit Report

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<td>02/26/16</td>
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### DWQMS Reference: 15 Infrastructure Maintenance, Rehabilitation and Renewal

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<td>SYS-WD-15: Infrastructure Maintenance, Rehabilitation and Renewal</td>
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### DWQMS Reference: 16 Sampling, Testing and Monitoring

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### DWQMS Reference: 17 Measurement and Recording Equipment Calibration and Maintenance

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<td>SYS-WD-17: Measurement and Recording Equipment Calibration and Maintenance</td>
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### DWQMS Reference: 18 Emergency Management

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<td>SYS-WD-18: Emergency Management</td>
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### DWQMS Reference: 19 Internal Audits

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<td>SYS-WD-19: Internal Audits</td>
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### DWQMS Reference: 20 Management Review

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<td>SYS-WD-20: Management Review</td>
<td>Conforms</td>
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Audit Report

Details: Conforms

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<thead>
<tr>
<th>DWQMS Reference:</th>
<th>21 Continual improvement</th>
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<tbody>
<tr>
<td>Client Reference:</td>
<td>SYS-WD-21: Continual Improvement Revision Date: 02/29/16 Rev #: 3</td>
</tr>
<tr>
<td></td>
<td>2018 Water Audit and Balance/Leak Detection program</td>
</tr>
</tbody>
</table>

Details: OFI – As noted in SYS-WD-21 rev. 4 Continual Improvement. Non-Conformances are given high priority and should be completed as soon as reasonably possible. The minor non-conformance from the most recent internal audit is listed as IN PROGRESS in the management review report tracking table after 11 months of being issued, with no resulting action recorded.

Details regarding the personnel interviewed and objective evidence reviewed are maintained on file at SAI Global.

This report was prepared by:

Janet McKenzie
SAI Global Management Systems Auditor

The audit report is distributed as follows:

- SAI Global
- Operating Authority
- Owner
- MOECC

Notes

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