MW-2022-15

Report

Report to:	Mayor and Council
Date:	March 22, 2022
Title:	**Drinking Water System Summary Report and Overview**

Recommendation(s)

That Council receive and file Report MW-2022-15 regarding the Annual Drinking Water System Summary Report and Overview.

Executive Summary

In accordance with the Safe Drinking Water Act, each Municipal Council having jurisdiction over its water distribution system is required to receive and publish an Annual Summary Report prior to March 31 in each calendar year. This report provides technical data regarding the system's performance.

Additionally, attached is the Drinking Water Quality Management Standard (DWQMS) Management Review which is to be provided to the system Owner annually. The Management Review evaluates the suitability, adequacy and effectiveness of the quality management system.

The purpose of this report is to provide the Owners of the drinking water system documentation confirming that the City is operating in accordance with all current legislation and is taking appropriate measures to guarantee the safety of the drinking water quality to all of its consumers.

Background

Each year the Annual Summary report is presented to Council to illustrate the effectiveness and performance of the drinking water system. The Annual Summary report provides detailed quantitative and qualitative information regarding the performance of the drinking water system.

Analysis

Highlights of the report include:

- In 2021 Environmental Services responded to 50 watermain breaks, in 2020 there were 56 watermain breaks.

- In Q2 of 2021 NSF-International performed a conformance audit on the City's Drinking Water Quality Management System. Zero non-conformances were found during the audit. This document has been attached to this report for reference.

DWQMS Management Review

Annually the DWQMS Management Review takes place; it provides an overall picture as to the effectiveness and adequacy of the Drinking Water Quality Management System.

Items of note from the Management Review Include:

- Compliance rating of 100% during 2021 Ministry of the Environment Conservation and Parks inspection.
- The City will continue involvement with Niagara Region on the new raw water intake location.
- The City will continue the implementation of the backflow prevention program as resources become available, as recommended in the MECP inspection.

During the internal audit of the Drinking Water Quality Management System a few administrative changes were suggested. None of these changes impact how the quality management system functions or how the water system operates.

In May of 2021, drinking water systems were provided Directors Direction on the minimum requirements for Operational Plan. These directions were followed, and implemented, resulting in revision 6 of the City's Operation Plan. Changes based on the Directors Direction and other updates were mostly administrative in nature and are outlined in attached document "Summary of Revision 6 Operational Plan Changes".

This document has been attached to this report for reference.

Standard of Care

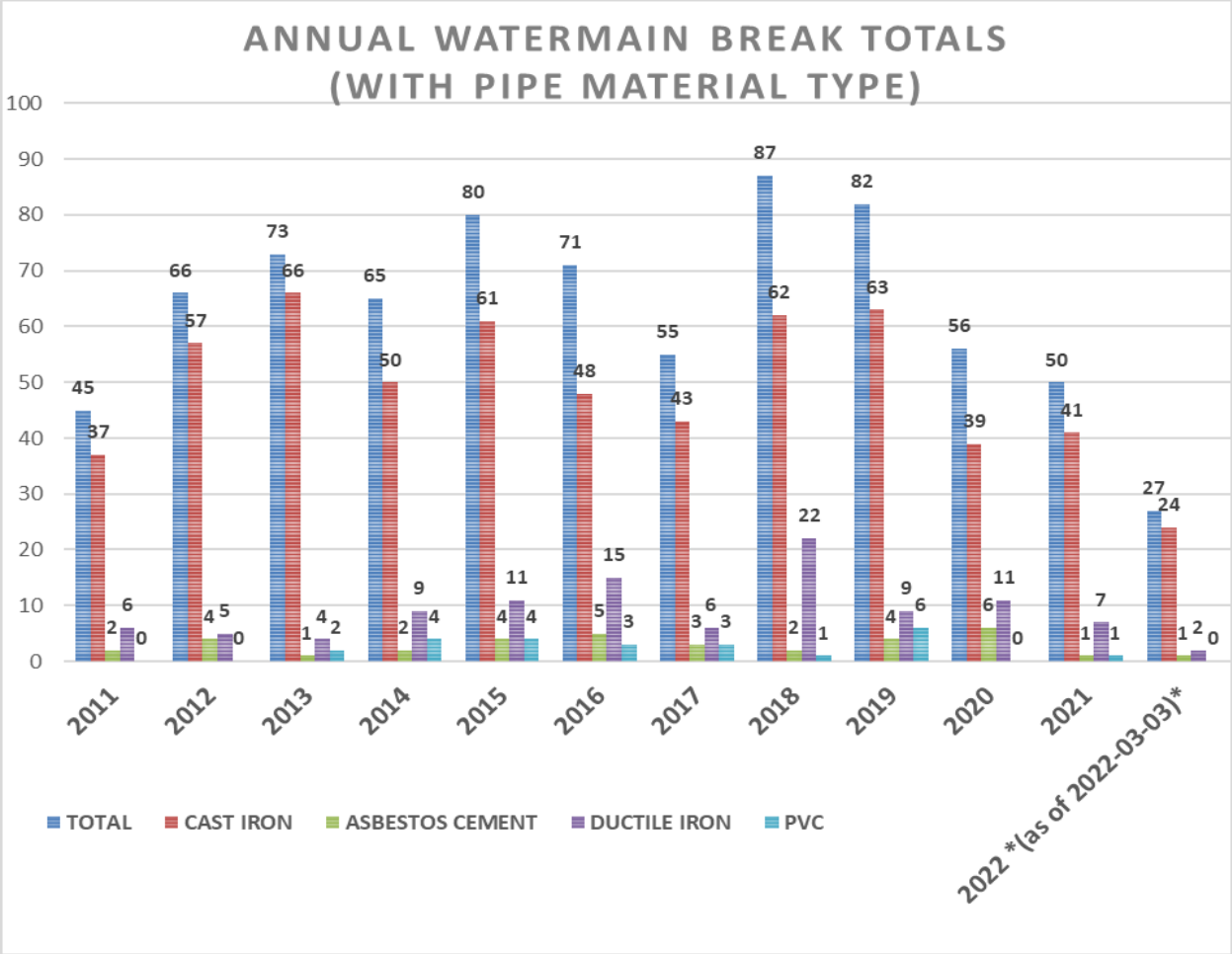
It is important to mention Section 19 of the *Safe Drinking Water Act*, entitled *Standard of Care*, this section states –

The Owner and/or each person on behalf of the Municipality that oversees the operating authority or exercises decision making authority over the system must exercise the level of care, diligence and skill in respect of a municipal drinking water system that a reasonable prudent person would be expected to exercise in a similar situation.

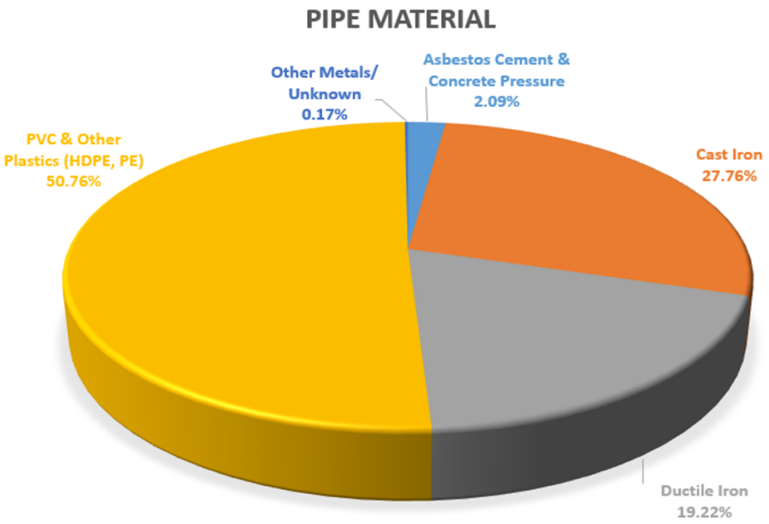
Section 19, in its entirety has been attached for reference.

Water System Indicators

As stated above, the City had a reduced number of watermain breaks in 2021. The number of watermain breaks fluctuate annually based on a variety of factors including weather, ground water table and capital infrastructure projects. The Graph below illustrates watermain break history since 2011. It should be noted that the remaining Cast Iron watermains in the system are the major cause of watermain breaks and should continue to be the focus of capital replacement projects.

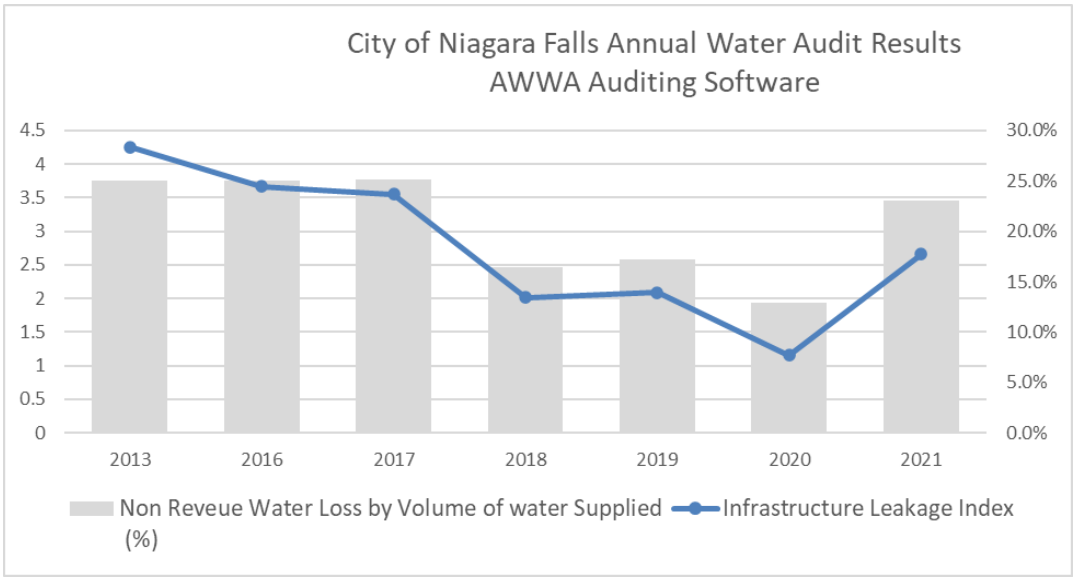


Since 2010, the City has increased its overall length of watermain by approximately 64 km to a total of 485 km. PVC is currently the highest percentage material type of watermain from a system perspective. However, this value is skewed by the increase in new development since 2010. The City still has a significant portion of its watermains being of made of Cast Iron and Ductile Iron representing approximately 47% of the overall system. It should be noted that some portions of cast iron watermain are over 100 years old, still in active service and are being relied on to providing residents with drinking water and support fire suppression in the event of an emergency.



Other Performance Indicators

The City uses an American Waterworks Association template to assess our annual water distribution system leakage index. As evidenced in the below graphic the City's estimated leakage index value for 2021 is 2.66 which is slightly higher than in 2020. Natural variability, and the lower wholesale/retail volumes due to reductions in water consumption due to the COVID-19 pandemic is likely skewing the leakage results; however, given these results Staff will closely monitor ongoing water-loss trends to proactively mitigate losses.



Operational Implications and Risk Analysis

In accordance with the *Safe Drinking Water Act,* the Annual Summary Report must be received by the drinking water system owner by a date of no later than March 31 of the following year. Failure to submit this would contravene the *Safe Drinking Water Act.*

The drinking water quality management standard requires that the results of the Management Review be provided to the Owner on an annual basis. Failure to provide the results would initiate a non-conformance with the Standard.

Strategic/Departmental Alignment
This report is to ensure adherence to Provincial Legislation and is consistent with the Council's strategic commitment to continually monitor the efficiency and effectiveness of the City's operations.

Contributor(s)
Jessica Blanchard, Environmental Services Coordinator

List of Attachments
Attachment # 1 - 2021 City of Niagara Falls Distribution System Summary Report
Attachment # 2 - DWQMS Management Review 2021
Attachment #3- Standard of Care
Attachment #4- Ops Plan Rev 6 Summary

Written by:
Erik Nickel, Director of Municipal Works

Submitted by:
Jason Burgess, CAO

Status:
Approved - 16 Mar 2022

City of Niagara Falls
Water Distribution System
Annual Summary Report
Period: January 1, 2021 to December 31, 2021

Waterworks Number: 260002304

Created February 2022

Table of Contents

City of Niagara Falls Water Distribution Annual Summary Report

Introduction

In accordance with the *Safe Drinking Water Act* this report provides members of Niagara Falls Municipal Council, the legal Owners of the water distribution system with an annual summary report of actions that took place from January 1, 2021 to December 31, 2021.

In accordance with the *Act,* this report must list any time the City failed to meet the conditions and requirements of the Acts, Regulations, Approvals, Drinking Water Works Permits, Municipal Drinking Water Licences and Orders issued by the Ministry of the Environment, Conservation and Parks. For each requirement not met, the report must specify the duration of the failure and the measures taken to correct the failure.
Additionally, the report must list the summary of the quantities and flows of the water supplied.

Waterworks Description

The City of Niagara Falls is a Class 2 water distribution system, which receives all treated water from the Regional Municipality of Niagara via the Niagara Falls Water Treatment Plant. The raw water source is surface water supplied from the Niagara River, via the Welland River.

The distribution system consists of approximately 485 km of watermain, 3,080 fire hydrants and 5,005 valves owned and operated by the City of Niagara Falls. Additionally, there is 40 km of watermain owned and operated by Niagara Region.

The size of watermains owned by the City of Niagara Falls range from 25mm to 450 mm in size.

Additional information regarding the Niagara Falls Water Treatment Plant can be found on the Regional Municipality of Niagara website: http://www.niagararegion.ca/home.aspx

Compliance

Municipal Drinking Water Licensing Program

As part of a recommendation made by Justice O'Connor during the Walkerton Inquiry, the Ministry of the Environment introduced the Municipal Drinking Water Licensing Program. This program requires the Drinking Water System Owner (City of Niagara Falls) to obtain a licence to operate their drinking water system.

There are four components to each licence; the Drinking Water Works Permit, Implementation of a Drinking Water Quality Management System, Accreditation of the Quality Management System and preparation of a Financial Plan.

- Drinking Water Work Permit allows the Municipality to alter, add, replace, modify and extend the drinking water based on a series of predefined conditions.

- Drinking Water Quality Management System (DWQMS) is a series of 21 elements that address all aspects of a water system. The overall goal of the DWQMS is continuous improvement with respect to planning, operating and reviewing the drinking water system. Through the creation of an operational plan the drinking water system Owner demonstrates the ability to operate a safe and effective drinking water system, while continuously monitoring performance and compliance via internal and external audits.

- Accreditation of the Quality Management System is achieved through internal and external audits, the goal of these audits are to ensure that the Owner is following the processes and procedures laid out in the operational plan. The City of Niagara Falls has enlisted NSF International to act as the Quality Management System accreditation body.

- *Ontario Regulation 453/07*, *Safe Drinking Water Act* requires that each Owner prepare a Financial Plan for the drinking water system. The City has retained a consultant to aid in the preparation of the Financial Plan.

In 2021, the City's Drinking Water Quality Management System was audited by NSF-ISR. Zero non-conformances were found during this audit, allowing the City to continue their accreditation, meeting the requirements of the *Safe Drinking Water Act, 2002.*

Safe Drinking Water Act

To remain compliant with the *Safe Drinking Water Act*, the City performs a minimum of 96 microbiological samples a month. Each of these samples is taken from a different location, providing a diverse profile of the water distribution system. Disinfection levels showing free chlorine residuals are also taken at the time of each sample; ensuring proper disinfection levels are maintained. The City takes additional free chlorine residuals throughout the week, again to ensure proper disinfection levels are maintained. In 2021, the City was again granted temporary relief from microbiological sampling, due to the continuing Covid-19 pandemic. A minimum of 68 microbiological samples were performed monthly from January 2021 to December 2021, as approved by the Ministry.

The City also takes water samples testing for elevated levels of trihalomethanes (THM), a chlorine disinfection by-product. The City takes these water samples from areas where the formation of THM would most likely occur.
In 2018, a clarification to the Ministry guidance document for HAA sampling occurred, which will required the City to test for Haloacetic Acids (HAA) at two separate locations (previously one location) beginning in 2019, which was and continues to be satisfied. HAA similar to THM is a chlorine disinfection by-product. The City and Niagara Region keep in close communications regarding these test results.

The Ministry of the Environment, Conservation and Parks has also provincially mandated a Community Lead Testing Program. The City has been granted permission, by the Ministry of the Environment, Conservation and Parks to reduce the number of lead samples taken per sampling window due to the ratio of results that meet the Provincial Water Quality Objectives, compare to the samples that do not. The sample numbers have been reduced to 20 resident samples, 4 distribution system samples and 2 non-residential samples as per Table 2 of Schedule D of the City of Niagara Falls Distribution System Municipal Drinking Water Licence. This must be done once between December 15 and April 15 and again June 15 to October 15, on an ongoing cycle. In 2021, the City was granted further temporary relief from lead sampling, due to the continuing Covid-19 pandemic of 6 residential samples and 2 distribution samples per sampling period. This was achieved in 2021.

All the aforementioned samples, in accordance with the *Act* must be taken by an individual with a Water Operators licence or a Water Quality Analyst licence. These licences are distributed by the Ontario Water Wastewater Certification Office, in accordance with *Ontario Regulation 128/04, Safe Drinking Water Act*.

Samples are then taken to a Ministry of the Environment, Conservation and Parks approved laboratory. Laboratories must meet quality standards determined by the Ministry of the Environment Parks and Conservation and are audited by the Canadian Association for Laboratories Accreditation. In the event an incident occurs where water samples do not meet Provincial water quality standards, this is deemed an Adverse Water Quality Incident (AWQI). This is detailed further in the chart following entitled *Adverse Water Quality Incidents and Actions*.

An Annual Drinking Water Report has been completed and is available free of charge to the public through the City website and at the Municipal Service Centre. Members of the public may also view water sample results at the Municipal Service Centre.

On December 31, 2012 section 19 of the *Safe Drinking Water Act, 2002*. Section 19 entitled, **Standard of Care** came into force. This section requires the Owner of the Drinking Water System and each person with decision making authority to exercise the level of care, diligence and skill in respect of a municipal drinking water system that a reasonably prudent person would be expected to exercise in a similar situation and to act honestly, competently and with integrity with a view ensuring the protection and safety of the users of the drinking water system. Section 19 has been listed as an attachment to the accompanying Council Report.

Niagara Falls Water Quality Test Results

Parameter		MAC	Number of Samples	Range	Comments
Microbiological Analysis					
Escherichia Coli (E. Coli) CFU/ 100mL		0	1032	0	Indicates presence of fecal matter
Total Coliforms CFU/ 100 mL		0	1032	0	Indicates the possible presence of fecal contamination
Heterotrophic Plate Count (HPC) CFU/mL		N/A	1032	0 – >300	Indication of overall water quality
Chemical Analysis					
Trihalomethanes mg/L		0.10 mg/L	4	0.0160 - 0.0390	Average of Samples taken quarterly
Haloacetic Acids mg/L		0.08 mg/L	8	0.0053 - 0.0077	Average of Samples taken quarterly
Lead mg/L	Residential and Non- Residential Plumbing	0.010 mg/L	13	<0.00003 - 0.00124	Lead services were used in construction prior to 1955.
	Distribution	0.010 mg/L	10	<0.00002 - 0.00045	City does not have lead watermains
Disinfection					
Free Chlorine Residual mg/L		0.05 to 4.0 mg/L	1257	0.21 - 1.40	Level of disinfectant

Adverse Water Quality Incidents and Actions

Date	Location	Parameter	Result	Actions	Date of Resolution

In the event of an adverse water quality incident (AWQI), the City receives immediate notification from the laboratory. The City is then required as per Ministry of the Environment, Conservation and Parks regulations to verbal notify the Regional Public Health Unit and the Ministry of the Environment Spills Action Centre.

Additionally, the City has chosen to contact our local Ministry of the Environment, Conservation and Parks Inspector to share this information. These individuals are then faxed the same information that was shared verbally.

To ensure water safety with a microbiological or chemical exceedance, the City immediately sends a member of staff to flush the nearest fire hydrant, and take additional water samples at the source of the AWQI. In addition, in the instance of a microbiological exceedance, City immediately initiates sampling upstream and downstream of the AWQI. This upstream/downstream sampling occurs for two consecutive days at minimum until the City receives verbal notification from the laboratory that the water samples are all clear.

In the above table, the column “Date of Resolution” indicates the date in which the City has received copies of the laboratory results and submits the “Notice of Resolution” to the Ministry of the Environment, Conservation and Parks and Public Health Unit.

It should be noted that an Adverse Water Quality Incident does not indicate that the drinking water is unsafe; rather it indicates that with respect to that specific sample, the Provincial water quality objective was exceeded.

In the event a lead result exceeds the Provincial standard, this result does not indicate system wide lead level, but rather at the specific sample site. Possible sources of lead include; lead solder, leaded brass fixtures and lead service lines. Prior to 1955 it was common to use lead water service lines as opposed to copper due to the malleability of lead. Properties that have lead results that exceed the Provincial standard are given an information package on ways to best reduce lead in their drinking water.

The City of Niagara Falls experienced zero (0) AWQI’s in 2021.

Operational Activities

In 2021, the City of Niagara Falls experienced 50 water main breaks, compared to 56 in the previous year.

With all water main breaks, the City follows a standard operating procedure, detailing the steps taken to repair the water main, while ensure water quality. Following Category 2 water main breaks, microbiological samples are taken upstream and downstream of the break; ensuring the break was repaired in such a way that water quality levels were not affected.

Flow Rates

2021 Monthly Water Flow Rates (Mega Litres)

Month	Quantity (ML)
January	1072.557
February	969.115
March	1099.411
April	1020.415
May	1265.264
June	1386.422
July	1336.091
August	1663.522
September	1298.075
October	1196.934
November	1105.778
December	1140.602
Total	14,554.186
Monthly Average	1,212.849
Daily Average	40.082

1 Mega Litre = 1,000,000 Litres

Definitions

MAC - Maximum Acceptable Concentration

This is a health-related standard established for parameters which when present above a certain concentration, have known or suspected adverse health effects. The length of time the MAC can be exceeded without injury to health will depend on the nature and concentration of the parameter. (Ontario Drinking Water Standards. Ministry of the Environment and Climate Change. Revised January 2001. PIBS #4065e. Page 2.)

mg/L - milligrams per litre (parts per million)

cfu/100 mL - Colony Forming Units per 100 millilitres of sample

µg/L - micrograms per litre (parts per billion)

< - Less than

> - Greater than

Microbiological parameters (i.e. bacteria) - the source of bacteria may come from wastewater treatment plants, livestock operations, septic systems and wildlife. Microbiological analysis is the most important aspect of drinking water quality due to its association with dangerous waterborne diseases. (Paraphrased from Ontario Drinking Water Standards. Ministry of the Environment and Climate Change.)

Total Coliform - the group of bacteria most commonly used as an indicator of water quality. The presence of these bacteria in a water sample indicates inadequate filtration and / or disinfection. (Ontario Drinking Water Standards. Ministry of the Environment and Climate Change.)

Escherichia coli (E. coli) - a sub-group of coliform bacteria. It is most frequently associated with recent fecal pollution. The presence of E. coli or fecal coliforms in drinking water is an indication of sewage contamination. (Ontario Drinking Water Standards. Ministry of the Environment and Climate Change)

Heterotrophic Plate Count (HPC) - an estimate of the number of background bacteria present in the distribution system. It is not an indicator of fecal contamination, but more a general indicator of disinfection effectiveness and distribution system status with respect to biofilm presence and the influence of bacterial re-growth in the distribution system.

Trihalomethanes (THM's) - The maximum acceptable concentration (MAC) for Trihalomethanes (THMs) in drinking water is 0.10 mg/L based on a four quarter moving annual average of test results. Trihalomethanes are the most widely occurring synthetic organics found in chlorinated drinking water.
The four most commonly detected Trihalomethanes in drinking water are chloroform, bromodichloromethane, chlorodibromomethane and bromoform. The principal source of Trihalomethanes in drinking water is the action of chlorine with naturally occurring organics (precursors) left in the water after filtration.

Haloacetic Acid (HAA) - The Guidelines for Canadian Drinking Water Quality (GCDWQ) recommend a maximum acceptable concentration (MAC) of 0.08 mg/L for HAAs in drinking water, based on a locational running annual average of a minimum of quarterly samples taken in the distribution system. The reported HAAs value refer to the sum of the concentration of six haloacetic acid compounds which include mono-, di-, and trichloroacetic acids, and mono- and dibromoacetic acids, and bromochloroacetic acid. HAAs are a type of chlorination disinfection by-product that are formed when the chlorine used to disinfect drinking water reacts with naturally occurring organic matter, usually in raw water. HAA's are a relatively new disinfection by-product.

Lead - Metals, for the most part, are naturally present in source water, or are the result of industrial activity. Some, such as Lead, may enter the drinking water from plumbing in the distribution system. Lead can occur in the source water as a result of erosion of natural deposits. The most common source of lead is corrosion of the household plumbing. The MAC for lead levels is 0.010 mg/L.

DWQMS Management Review

2021

Table of Contents

List of Acronyms and Definitions

DWQMS – Drinking Water Quality Management System

DWS – Drinking Water System

MECP – Ministry of the Environment, Conservation and Parks

QMS – Quality Management System

THM –Trihalomethanes are a group of compounds that can form when the chlorine used to disinfect drinking water reacts with naturally occurring organic matter (e.g., decaying leaves and vegetation).

HAA - Haloacetic Acid. HAA values refer to the sum of the concentration of six haloacetic acid compounds which include mono-, di-, and trichloroacetic acids, and mono- and dibromoacetic acids, and bromochloroacetic acid. HAAs are a type of chlorination disinfection by-product that are formed when the chlorine used to disinfect drinking water reacts with naturally occurring organic matter, usually in raw water.

OFI – Opportunity for Improvement

Ontario Regulation 170/03 – Regulation under the Safe Drinking Water Act governing Drinking Water Systems

Ontario Regulation 169/03 – Ontario Drinking Water Quality Standards which Outline maximum allowable concentrations (standards) for Microbiological, Chemical and Radiological elements and compounds in drinking water systems.

Ontario Regulation 319/08 – Regulation under the Health Protection and Promotion Act governing Small Drinking Water Systems. This Reg. lies outside the scope of the Safe Drinking Water Act as it relates to systems separate from the distribution system.

Watermain Disinfection Procedure
Section 4 – Documentation requirements for operators who are performing maintenance and repair activities associated with disinfecting water mains as part of an addition, modification, replacement, extension, planned maintenance, or emergency repair in a municipal residential drinking water system

SDWS – Small Drinking Water Systems. The City of Niagara Falls owns 2 cistern fed SDWS properties, which are the: Willoughby Town Hall at 11211 Sodom Rd. and; Fire Station #6 at 8137 Schisler Rd.

Niagara Region Emergency Drinking Water Provision
Plan – A Niagara Region document created in 2018 (in collaboration the key officials, agencies, departments and stakeholders), to establish framework for responding to an emergency involving the drinking water supply in Niagara Region. It is intended to service as a guideline that outlines the responsibilities and activities in managing a drinking water emergency.

Introduction

Element 20 of the Drinking Water Quality Management Standard states that a Management Review must be completed at least once every calendar year. This review is to be completed with the person(s) deemed Top Management in the Drinking Water System.

The purpose of the Management Review is to document the actions and effectiveness of the Quality Management System. The outcome of the Management Review must be reported to the Owner of the Drinking Water System.

The information reported to the Owner can be relayed at the same time as the Annual Drinking Water System Report, scheduled to be provided to Council in March.

1. Incidents of regulatory non-compliance

On February 7, 2022, the Ministry of the Environment, Conservation and Parks completed an inspection of the City of Niagara Falls DWS for the October 16, 2020 to December 31, 2021 time frame. This inspection report indicated that there were zero (0) incidents of regulatory non-compliance. The Inspection Rating Report (IRR), which indicates the percentage compliance for the inspection will not be officially available until March 2022, due to the remote way inspections have been taking place during the continued Covid-19 pandemic and their monthly report running for scoring, as per the MECP Inspector. It was noted verbally to the Environmental Services Coordinator that the score would be 100%, as there were no non-conformances noted during the inspection.

The Ministry noted in the inspection that all areas examined comply, and had one recommendation in the body of the document, which was as follows:

- The City is encouraged to continue the implementation of its backflow prevention program as resources become available.

The MECP 2021 Inspection Report is attached as Appendix A, for review.

2. Incidents of adverse drinking-water tests

The City experienced zero (0) adverse sample result within its distribution system in 2021.

The City experienced one (1) adverse sample result within one of its small drinking water systems. This summary is for information only, as SDWS's are outside of the Reg. 170 scope.

i) June 16, 2021:

A sample collected at Fire Station #6 (cistern - 8137 Schisler Road) resulted in an adverse reading of 1 Total Coliform (cfu/100 mL) The MAC for Total Coliform in a small drinking water system is 0. It was determined that this reading was likely caused by a faulty UV disinfection system at this location, which was immediately corrected. Following the service to the UV system, the sample was re-taken on June 18, 2021, with a result of 0 Total Coliform.

Upon receiving the adverse notification from the Licenced Lab in the above instance, staff followed SOP "MW-ES-DWS-SOP-012-007– Adverse Water Quality Incident Reporting – O. Reg. 319/", as this was outside the scope of the City of Niagara Falls Drinking Water System.

A copy of MW-ES-DWS-SOP-012-007 can be found in previous Management Reviews.

3. Deviations from critical control point limits and response actions

There were no deviations from critical control points during this report period.

4. Efficacy of the risk assessment process

It should be noted that currently there are items listed as critical control points in the risk assessment matrix that the City cannot control, regardless of their importance, such as backflow prevention devices not owned by the City, and Niagara Region processes (such as water treatment).

As per the updated DWQMS standard (Version 2.0), MECP required items were also addressed in the Risk Assessment. These included climate change issues such as drought, forest fires, tornados or extended extreme temperatures. These were captured initially in the 2018 Risk Assessment, again in the 2019, 2020, and 2021 Risk Assessments and will continue to be included in all future Risk Assessments.

During the 2018 internal audit, it was suggested that outcomes of the most recent risk management assessment are highlighted and considered during the infrastructure review meeting. The most recent risk management assessments have been discussed and considered since this time – including 2021.This will continue for all future Infrastructure Reviews.

A new Element (14: Niagara Region: System Pressure Maintenance and Pressure Surge Protection) was added to the matrix during the Risk Assessment process in 2020, based on Niagara Regions consideration of decommissioning the Lundy's Lane tank and installing one in a different area due to increased demands in the growing south end of the City. The current elevated tank on Lundy's is requiring substantial upgrades/repairs to maintain current legislative requirements. It has been discussed internally that the City of Niagara Falls must be a strong presence in the decision making of this tentative project (which is assumed to involve several flow studies to confirm feasibility and seamless service transition and continuance), as it will be stressed that if this is to occur, the residents should continue to receive the same, if not better service levels of water delivery (specifically related to pressure). This project will also require the City to install/upgrade/take over the current Niagara Region watermain along Lundy's lane. The greatest risk to the system if this tank is decommissioned is likely frequent pressure surges (currently absorbed by the Lundy's Lane tank), that would work through the system and likely cause several watermain breaks, which always increases the likelihood of microbiological contamination before and during their repair. Also, without the tank providing consistent pressure in the system, the north end residents may experience a pressure drop in their water. If this was to become severe enough, the risk is a backflow event. Further discussion to this during the 2021 Infrastructure Review outlined that currently, this project (based on budget estimates) is likely to begin in 2023 and move into 2025. The City will likely install municipal main along Lundy's Lane (as the current main in this area is a Regional main, and will be decommissioned along with the tank. The City, however, will likely not inherit the QEW critical crossing of this watermain, and the new municipal system will be looped at this location. The entire decommissioning process (tank and main) lays in a preliminary design model. Impacts are being studies/considered (with focus on pressure surge protection, service levels and water quality standards), and the City will remain in communication with Niagara Region as these plans further develop, to ensure a seamless transition throughout and following this decommissioning project. Element 14 remains rated under the risk threshold, as the tank is still in service.

5. Third-party and Internal Audit Reports

Third Party Audit

On May 18th, 2021, NSF Internal performed a virtual surveillance audit of the City's DWQMS.There were not any non-conformances found during the third party audit.

However, the Auditor suggested, in the "Opportunities for Improvement" section of the report to:

- Consider ensuring that all relevant processes within the City's Risk Assessment are documented separately from the Regional processes

- Consider modifying/improving the recording of quality checks of all essential supplies as they are received in stock. The quality checks should be performed by a staff of the Operating Authority
- Consider incorporating a more detailed breakdown of the water infrastructure component of the long-range financial plan. If not in the body of the document, but perhaps as an appendix.
- Consider adding a “debrief” session of the annual Emergency Preparedness exercise for those who were not present, for their review.
- Consider adding timelines and specific deadlines/due dates for action items in the Management Review.

The NSF Third Party Audit is attached as Appendix B, for review.

Internal Audit

An internal audit was completed by Acclaims Environmental on December 21st and 22nd, 2021.

During the 2021 internal 2.0 audit, zero non-conformances were noted by the auditor.
However, there were some opportunities for improvement noted which included:

- Consider updating the municipal drinking water system name to reflect the City’s DWS name in MDWL #068-11 and including a completed copy of the updated Subject System Description Form in Schedule “C” of Directors Direction (or a reference to it)
- Consider editing the Record Control Matrix (MW-ES-DWS-LM-003-001) to include DWWP Forms 1 and 2 with “10 years” as retention time.
- Consider confirming that the actual training requirements (as per O. Reg 128/04 s. 29 Annual Training Operators table) for the highest class of system operated by the team (i.e., Class II).
- Consider adding references to new provisions available through O. Reg. 128/04 s. 29 (proposed through ERO notice no. 019-3513 and ERO Notice 019-3515 regarding staff coverage in out of ordinary conditions (such as in pandemics and labour disruptions).
- Consider cross-referencing watermain break-related procedures and forms (with 2019 revision dates) with latest version of MECP’s Watermain Disinfection Procedure (2020) to ensure conformity with latest requirements
- Ensure the 2021 DWQMS Management Review Report is provided to Council in their 2022 March session.
- Consider tracking the usual timeframes for various QMS activities in a schedule.
- Consider training all Operations staff on what Asset Management (and the associated new requirement for planning) is, why it is important, some of the principles of planning and how their role in incorporated into this.

The internal audit report is attached as Appendix C, for review.

6. Results of emergency response testing

On November 25, 2021, Environmental Services Staff participated in an Emergency Response desktop training exercise.

The scenario included prolonged frozen water services, handling main breaks at critical crossings, suspected special contamination and water disruptions to critical users of the distribution system.

The group was asked to work together on a plan of action, remediation and communication to City staff as well as Niagara Falls residents and pertinent external agencies. Team discussion touched on items such as emergency water provisions, flushing techniques, service tie overs, thawing mechanisms, optimum communication (inter departmental and identified new contact numbers for external agencies), water advisory procedures, watermain isolation, valve closures, sample protocols, operational reporting requirements and health and safety procedures. The City of Niagara Falls Emergency Drinking Water Provision Consideration/Guideline (MW-ES-DWS-PRO-014-002) was again reviewed at this training session and applied in the mock scenarios. As recommended in the 2020 re-accreditation audit, two alternate lead hand staff from the Environmental Services Division took part in this Emergency Management Training (as they did in 2020 session), as well as the regular Supervisor and Management staff.

7. Operational performance

In 2021 Environmental Services responded to 50 watermain breaks. This total number is a decrease from the previous year (2020), during which 56 watermain breaks occurred. The winters of 2020 and 2021 were similar in weather patterns during the winter months.

8. Raw water supply and drinking-water quality trends

Niagara Region is responsible for all sampling and testing of raw water. Through a previous year's hydrant maintenance program, City staff members have found areas of the municipal drinking water system where weekly or bi-weekly flushing's can improve water quality. These areas are tracked by way of a flushing report form and this practice has continued throughout 2021.

Source water temperature changes in late spring and fall have historically resulted in resident inquiries about chlorine levels. The majority of these calls

originate from the south end of the City which is the geographic area closest to the water treatment plant. The City receives weekly chlorine residual results from Niagara Region, which have indicated no significant fluctuation in chlorine levels leaving the treatment plant. This remained unchanged in 2021.

The raw water intake for Niagara Falls Water Treatment plant is planned to be physically shifted to the south, with a tentative completion date of 2027. The City remains in communication with Niagara Region on the development of this project.

Niagara Region is continuing to monitor THM (trihalomethane) levels in conjunction with all local area municipalities. Various methods of preventing THM levels from increasing have been discussed. The City's Environmental Services Division will continue to flush dead end watermains, which is a currently a suitable manner for which a distribution system can mitigate potential high THM levels. The Niagara Region replaced their granular activated carbon (GAC) filter in February of 2021.This filter media removes organic debris from the treated water and reduces THM formation. THM monitoring will carry on indefinitely, as we collaboratively strive for the continual improvement of water quality in the distribution system.

9. Follow-up on action items from previous management reviews

Action Items	Assigned To	Due Dates	Status/Follow-up
Consider reviewing/re-training Operators in sampling procedures (including MW inspectors, as it relates to Capital Works Projects) to ensure consistency.	Jessica Blanchard	Q4 2021	Complete. HACH training for proper use of chlorine meters and sampling techniques took place in December 2021. MW Inspectors provided summary and teaching example of Commissioning Checklist/Sampling updated procedures and requirements (as per the 2020 Disinfection Procedure) in spring of 2021.
Compare City of Niagara Falls Fire Departments & DWQMS Risk Assessments to ensure consistency in phrasing, fire flow concerns and format	Erik Nickel	Q4 2021	Complete. Upon review, it was identified that NFFD Risk Assessment does not speak to fire flow demands, but rather demographics and environmental conditions as they relate to where and when fires occur within the City (i.e. areas of fire concentrations, reason for fire, types of buildings, times of day, weather/seasonal influences etc.). Their matrix is established, updated and reviewed for the purpose of fire prevention, specifically to continually improve their public education outreach. The only reference to fire flow on their matrix is where they indicate whether a property

			is within municipal drinking water boundaries, or rural. When it is indicated that a property is within municipal drinking water boundaries, it is assumed that fire flows are present, and were established/proven at the time of the building/subdivisions development.
Ensure the City has a liaison present at all discussions with Niagara Region involving the tentative decommissioning of the Lundy's Lane Tank	Erik Nickel/ James Sticca	2021 onward	Ongoing. The City has been a presence at discussions involving this decommissioning process.
Share Risk Assessment results with the Niagara Region: Niagara Falls Water Treatment Plants Operations Manager; and DWQMS Lead	Jessica Blanchard	Q4 2021	Complete. 2021 Risk Assessment Results and Minutes (which took place in November of 2021) were shared with Niagara Falls Water Treatment Plant Operator and DWQMS lead in February of 2022 for their information, comment and review.
Collaborate with Infrastructure to develop a scoring matrix based on age, material type, tuberculation, so the dial (score) is standardized and not left up to the discretion of the Operator	Jessica Blanchard/ ES Supervisor Staff/ Infra. Team	Q4 2021	Ongoing. ES began providing photos to Infrastructure of pipes extracted during main breaks in 2021 to initiate the scoring matrix and give context to this process. Infrastructure still to provide/share current condition rating table for review and adjustment, as necessary
To follow up with Niagara Region Public Health to confirm that a former SDWS (Willoughby Volunteer Fire Station) is under new ownership and adhering to Reg 319/08 appropriately	ES Staff	Q1 2021	In progress. Awaiting follow up from Niagara Region Public Health Inspections Division for this confirmation. Most recent communication from the City to the Region to inquire on this was February 2022. Communication commenced in March of 2021.

To ensure document which will summarize all new documentation requirements for new developments watermains has been approved by James and shared with Engineering Department to be circulated to all pertinent staff and provided in all new RFP's	Jessica Blanchard	Q2 2021	Complete. Summary pdf document "DOCUMENTATION REQUIRED FOR NEW WATERMAINS as per Aug 2020 version" created in Q2 of 2021 and circulated to staff. This was re-circulated in February of 2022 to include any new hires, remind staff and to ensure inclusion of the Manager of Engineering.
To follow up with Niagara Region Process Specialist to determine if the DMA agreement/proposal involving WaterTrax with the Region was fulfilled (i.e. technological subsidies applied for the City's use of the application). Also, to discuss with WaterTrax representative further application capabilities/components that may be of benefit to the City.	Jessica Blanchard	Q4 2021	Complete. As per Niagara Region Process Specialist, 7 out of the 11 local area municipalities with Drinking Water Systems were currently using WaterTrax to house their sampling data (including the City of Niagara Falls). The tentative agreements never did come to fruition, as it remained in the tentative phase. The City is not bound to utilize this application in any manner. Discussions with WaterTrax indicated that their trending and data storge capabilities could also be accomplished by housing the sample data in a database such as excel. Based on this, the City ended its contract with WaterTrax as of January 31, 2021. All City of Niagara Falls Water Distribution Watertrax data was exported and saved in ES s drive prior to the contracts end.
Follow up with Building and Enforcement Division regarding the ETA for the re-opening of Willoughby Town Hall – to ensure that prior to this, the water lines for this SDWS are re-chlorinated	Jessica Blanchard	Q4 2021	Complete. As per the Technologist in this Division, this location remains closed to the public – with no rentals, as it has been since the onset of Covid in early 2020. It is currently being used as a storage facility. When it does re-open (date still to be determined), the plan is to turn this location into the Willoughby History Museum. ES and the Building Division will remain in contact on this timeline to ensure the cistern and water lines are re-chlorinated and SDWS sampling is re-initiated prior to its opening.

To further discuss the possibility of ensuring asset data (with focus on watermains) is entered into the digital mapping application as soon as possible – perhaps without awaiting the as build drawings	Jessica Blanchard	Q4 2021	Complete. Discussions with Infrastructure stated that this would be possible, with the aid of the Inspectors providing red line mark up drawings to them or ES staff providing detailed location maps of hydrant/valve installs (to clear with CAD division), to input into Falls Viewer prior to receiving the as built drawings. This could occur on a case per case basis, or approaching legislative due date, as to be accurate and avoid duplicate/adjusted entries for one asset, obtaining the as built drawings is key.
Order/direct staff to order more reflective pressure indicating stickers to have on hand for fire hydrants	James Sticca	Q2 2021	Complete. Ordered and several (approx.1000) installed during the 2021 flushing season. All hydrants in the city (which have been assumed by the City) have stickers present on them. There are also stickers in stock for those few hydrants which may have been overseen during the 2nd install process and for those hydrants of new developments.
The following ACTION items from the 2020 Management Review remain in the DELAYED stage due to Covid Restrictions			
To ensure Environmental Services Supervisor staff have been trained in IMS 200 for improved emergency management preparedness.	ES Staff	Q4 2021	Delayed. To continue consideration once training is more readily offered in Emergency Management following Covid-19 related training access limitations.
Research Service Line Warranties of Canada to potentially offer residents (City would endorse this insurance company). Consider benefits & potential support from Council of this protection of private water and sewer lines.	ES Staff	Q4 2021	Delayed. To re-address once services have resumed fully, following Covid-19 related delays. **ACTION: to speak to N-o-t-L representative regarding the benefits of this program, as it is in use at this municipality. This will be complete as we approach returning to normal operations. Contact information of this insurance company is as follows: 866-922-9004; www.slwofc.ca**

10. Status of management action items identified between management reviews

No action items identified during this time period.

11. Changes that could affect the Quality Management System

In May of 2021, the Ministry of Environment, Conservation and Parks released "Director's Directions (Safe Drinking Water Act, 2002): Minimum Requirements for Operational Plans". The full document can be viewed at https://prod-environmental-registry.s3.amazonaws.com/2021-05/Directors%20Directions%20for%20Operational%20Plans_1.pdf

The City's current Operational Plan was already in compliance with most of the requirements outlined in this document, with the following exceptions (which must be updated by April 1 of 2022):

- The Operational Plan must contain a title that generally describes the municipal drinking water system(s) to which the operational plans apply;
    - The title of the current Ops Plan will be adjusted to mirror the DWS name on the Licence upon its next revision (March 2022)
- The Operational Plan must contain a completed copy of the Subject System Description Form in Schedule "C" that includes the name of the municipal residential drinking water system(s), municipal drinking water licence number(s), and if applicable the operational subsystem, to which the plans apply.
    - This has been completed, and will be provided in the body of the Ops Plan upon its next revision (March 2022)
    -

To review, since July 1, 2017, schools and child care centres in Ontario have been required to test all fountains and drinking water taps in their facilities by Ministry prescribed timelines. If a sample result exceeds the standard, immediate action needs to be taken until the issue is resolved. The increased lead testing requirement was developed to ensure all water taps serving drinking water to children in schools and child care centres are sampled for lead. This program currently remains the responsibility of the Public Health System. There has been discussion that the MAC for lead in a water distribution system may be lowered to mimic the new Health Canada Guideline (currently the MAC is 0.01 mg/L in water distribution systems in Ontario, where the Health Canada MAC has been lowered to 0.005 mg/L). The City of Niagara Falls has experienced lead distribution samples ranging from 0.0003 to 0.00140 over the past two years – all well below the potential new proposed MAC.

Another topic worth repeating as it relates to the Quality Management System is the Niagara Regions tentative plans to decommission the Lundy's Lane elevated

tank and watermain on the same road (as mentioned in the Efficacy of the risk assessment process section – page 7). The City should be included in this project as the potential absence of this structure will likely crate pressure relief issues in the distribution system, which are currently absorbed by the elevated tank.

12. Consumer feedback (i.e., internal & external communications)

Environmental Services continues to flush areas known to have low chlorine residuals weekly.

Discoloured or dirty water calls have continued to decrease; this is due to the extensive capital work taking place in areas known for water quality issues.

13. Resources needed to maintain the Quality Management System

The DWQMS Representative (Environmental Services Coordinator) continues to use an external consultant for the internal audit. This provides the DWQMS Representative with detailed reports and multi-industry expertise during the on-site audit. The city chose to utilize the same internal auditor in 2021 as in 2020, for a fulsome and continued comparative gauge of improvement. This external auditor was also the successful candidate of the City's Purchase Requisition process.

14. Results of DWQMS Infrastructure Review

The DWQMS Infrastructure Review is one of many documents which aid in the decision making process for determining Capital Works projects and schedules. The DWQMS Representative and the Manager of Environmental Services, along with the Asset and Infrastructure teams have worked collectively to prioritize the proposal of capital work for design. Suggestions are also provided by Environmental Services staff based on previous experience and were taken into consideration along with other factors, such as sewer separation.

The process still remains as stated above. Additionally, as operational challenges arise, the Environmental Services Coordinator (DWQMS Rep), and Environmental Services Supervisors ensure these are communicated to the Manager of Environmental Services who flags these to the Asset and Infrastructure teams for future capital replacement programs.

This consistent line of communication between Operations and Engineering was missing prior to the initiation of the DWQMS.

As previously mentioned, the outcomes of the most recent Risk Management Assessment were presented and considered in during the 2021 Infrastructure Review, and this process will continue for all future Infrastructure Reviews, as suggested by the City's Internal Auditor.

15. Operational Plan currency, content & updates

The Operational Plan was updated in March of 2020 which created current version/revision 5 (which was outlined and provided to council via MW-2020-07 in April of 2020). There have been no changes/revision to this current version (5) since that time.
The Operational Plan will be updated in February/March of 2022 to satisfy the most recent Directors Direction and to update any other phrasing, processes or administrative changes required at that time.

16. Staff suggestions

Throughout 2020, Environmental Services staff offered several process improvement suggestions for the DWQMS. They included:

- Providing continued on line/virtual training which would benefit during times of altered shifts, recognizing social distancing (during state of emergency). This will ensure staff are keeping up on position requirements and industry best practices and also allow staff to work at their own pace;
- Creating guidance documents for Environmental Services field staff to aid in: Utilizing newly initiated iPad work/document/data recording devices and; Learning/ understanding functionality of updated maintenance management system (Cartegraph OMS);
- Actively seeking dedicated volunteer locations from which to sample in 2021, in anticipation of the increased population requiring to perform more microbiological samples per month (once 2021 Census data is released in February of 2022).

Section 19 of the Safe Drinking Water Act (SDWA)

Standard of care, municipal drinking water system

19 (1) Each of the persons listed in subsection (2) shall,

(a) exercise the level of care, diligence and skill in respect of a municipal drinking water system that a reasonably prudent person would be expected to exercise in a similar situation; and

(b) act honestly, competently and with integrity, with a view to ensuring the protection and safety of the users of the municipal drinking water system. 2002, c. 32, s. 19 (1).

Same

(2) The following are the persons listed for the purposes of subsection (1):

1. The owner of the municipal drinking water system.
2. If the municipal drinking water system is owned by a corporation other than a municipality, every officer and director of the corporation.
3. If the system is owned by a municipality, every person who, on behalf of the municipality, oversees the accredited operating authority of the system or exercises decision-making authority over the system. 2002, c. 32, s. 19 (2).

Offence

(3) Every person under a duty described in subsection (1) who fails to carry out that duty is guilty of an offence. 2002, c. 32, s. 19 (3).

Same

(4) A person may be convicted of an offence under this section in respect of a municipal drinking water system whether or not the owner of the system is prosecuted or convicted. 2002, c. 32, s. 19 (4).

Reliance on experts

(5) A person shall not be considered to have failed to carry out a duty described in subsection (1) in any circumstance in which the person relies in good faith on a report of an engineer, lawyer, accountant or other person whose professional qualifications lend credibility to the report. 2002, c. 32, s. 19 (5).

CITY OF NIAGARA FALLS DISTRIUBITON SYSTEM OPERATIONAL PLAN REVISION 6: SUMMARY OF CHANGES, MARCH 2022

- Title of Operational Plan: “City of Niagara Falls Water Distribution System” changed to “City of Niagara Falls Distribution System”, in keeping consistent with the City’s Municipal Drinking Water Licence official system name, as per Directors Direction. This systems name was also changed throughout the body of the document, where required.

- Definition of DWQMS and references throughout the document was changed from Drinking “Water Quality Management System” to “Drinking Water Quality Management Standard”, which is the proper acronym of the Standard.

- “DWQMS” changed to “QMS” at fitting locations throughout the body of the document, to specify the difference between the Standard and the City’s Quality Management System.

- Page 11 of the Operations Plan (the Plan): Updated the City’s drinking water system (DWS) service population, and number of households, as per the 2021 Census data.

- Page 12 of the Plan: Updated Niagara Falls water treatment plant source water characteristics data (from Niagara Region Process Specialist 2021 data).

- Page 13 of the Plan: Updated the total kilometer of watermain present in the City’s DWS (from 2021 annual summary data).

- Page 13 of the Plan: Updated number of City owned water meters (from 2022 maintenance/asset management program data).

- Page 13 of the Plan: Updated number of City owned fire hydrants and system valves (from 2021 annual summary data).

- Page 15 of the Plan: Updated date and spoke to most recent Risk Assessment outcomes (which occur on an annual basis – once every calendar year, as per the Standard).

- Page 19 of the Plan: Updated Environmental Services shift times, as afternoon shifts no longer exist.

- Page 19 of the Plan: Addition of amendments made to Ontario Regulations 128/04 and 129/04 which allow alternate and special provisions to ensure staff coverage for out-of-ordinary conditions (such as in pandemics and labour disruptions).

- Page 30 of the Plan: Addition of Emergency Drinking Water Provision Guideline (MW-ES-DWS-PRO-014-002) to the document list of The Niagara Falls Emergency Response Procedures Manual for Drinking Water. This document was created in late 2019 and revised in early 2020.

- Page 34 of the Plan: Addition of Schedule C (which is an MECP Subject System Description Form which contains City’s DWS name and contact information for questions regarding the Operations Plan), as per the Director’s Direction May 2021: Minimum Requirements for Operational Plans Municipal Drinking Water Systems.