

COMMITTEE OF THE WHOLE (2) – MARCH 9, 2020

STAFF COMMUNICATIONS

Distributed February 28, 2020

SC1 Memorandum from the Director of Environmental Services dated February 28, 2020.

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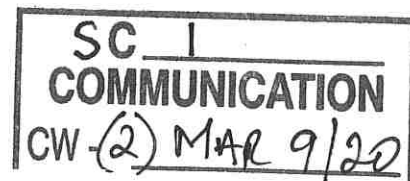
Please note there may be further Communications.

DATE: February 28, 2020

TO: Honourable Mayor and Members of Council

FROM: James Steele, Director of Environmental Services

RE: **STAFF COMMUNICATION**
Committee of the Whole (2), March 9, 2020
2019 Update on Drinking Water System Performance



1. Purpose

To provide the Mayor and Members of Council information on the performance of the City's Water Distribution System and its Drinking Water Quality Management System (DWQMS), for the year 2019.

2. Summary

This memo and its attachments support Council, as the system owner, in meeting its statutory standard of care under the *Safe Drinking Water Act, 2002* (SWA) by providing information on the quality of water supplied and the operation and performance of the drinking water system. This contents of this memorandum to Council satisfies the annual reporting requirements of Ontario Regulation 170/03 - Drinking Water System.

Key Points:

- In 2019, 99.80% of the 4,448 drinking water samples tested at a Ministry of Environment, Conservation and Parks (MECP) accredited laboratory and on-site tests by the City's MECP certified drinking water operators met the regulatory standards, thus confirming the City's continued delivery of safe drinking water;
- In 2019 the [MECP Chief Drinking Water Inspector's Report](#) for the 2018-2019 fiscal year, noted that the City's drinking water system achieved a 100% inspection rating;
- An internal DWQMS audit was conducted on July 29 and 30, 2019, which identified two minor non-conformances and 16 opportunities for improvement - both non-conformances have been addressed and closed;
- An external DWQMS audit was conducted on August 26 and 27, 2019 by MECP approved auditors, which did not identify any non-conformances; and,

- A Management Review, to evaluate the continuing suitability, adequacy and effectiveness of the Quality Management System, as required under Element 20 of the DWQMS, was completed on July 20, 2019.

3. Background

Annual reports on drinking water systems are required to satisfy statutory requirements.

Drinking water and drinking water systems are regulated by the Province through the MECP.

The Safe Drinking Water Act, 2002 (the Act), mandates owners and operating authorities of the municipal drinking water systems to annually produce a Summary Report, containing information on the system's operation and management, sampling, testing, certification of staff, and water quality and quantity. The Summary Report must be completed and made available to the public by March 31st of each year. A copy of this report is appended as Attachment 1 to this memorandum.

In addition to the Summary Report, Ontario Regulation 170/03 requires owners to produce an Annual Report, in a form prescribed by the Province, consisting of the following major components: a brief description of the water subsystem, summary of adverse water quality incidents, corrective actions, summary of all required testing results, and a description of major expenses to install, repair or replace required equipment. The Annual Report has been made available to the public through posting on the City's [website](#). As well, hard copies are available at the Joint Operations Centre upon request. For convenience, a copy of this report is provided as Attachment 2 to this memorandum.

Regular updates and annual reporting assists Council in exercising its due diligence in meeting its statutory standard of care.

The Act imposes a standard of care upon individuals with decision-making authority over municipal drinking water systems. Council, through its decision-making power, protects the City's citizens and businesses by demonstrating due diligence over the supply and delivery of drinking water.

Council's commitment to the provision of safe drinking water ensures financial sustainability, asset management, and continual improvement of the City's drinking water system to proactively manage risks and increase efficiency.

Mitigating and monitoring potential public health risks related to drinking water ensures the safety of drinking water users.

York Region's Medical Officer of Health (MOH) has a key role in protecting public health by assessing potential health impacts from adverse water quality test results. The MOH may direct the owner of a drinking water system to take corrective actions over and beyond the regulatory mandated corrective actions or the City's Standard Operating Procedures (SOPs). For the 2019 reporting period, there were no additional corrective

actions or water restrictions (e.g. boil water advisories or drinking water advisories) imposed on the City by the MOH.

Where an adverse water quality event or a water emergency occurs, procedures are in place to ensure close co-operation between the MOH, York Region, and MECP.

Communication between these parties ensures that the protection of public health is of utmost importance.

Multi-barrier approach mitigates risks, protects the drinking water system and public health.

The multi-barrier approach to protect drinking water in Ontario was a key recommendation in Justice O'Connor's report as a result of the Walkerton tragedy in 2000.

Elements of this approach include source water protection, certification and training of operators, an operational plan and Quality Management System based on Drinking Water Quality Management Standards, along with a Provincial inspection and enforcement program.

Multiple levels of protection protect the public and ensure that preventative and corrective actions are taken to address potential risks.

Regulatory mandated training for certified drinking water operators provides required knowledge to operate complex drinking water systems

The City continues to participate in high quality operator training through MECP approved training providers and training courses. There are two components to drinking water operator training: in-class training and on-the-job practical training. Both components are required to be completed by an operator to maintain certification. All the City's operators and contractors are required to hold current MECP issued drinking water certificates before operating any component of the City's drinking water system.

Provincial inspections and enforcement assess compliance.

The MECP's Provincial Officers conduct an on-site inspection to assess compliance with regulatory requirements including those laid out in the City's Municipal Drinking Water License and Drinking Water Works Permit. One detailed, unannounced, inspection is conducted by the MECP every three years.

The City's most recent MECP inspection was conducted on February 7, 2020.

System owners and operators are informed of significant findings that may affect public health, immediately during the inspection.

Complete findings are published annually in the Chief Drinking Water Inspector's Report, in April of each year, for the previous year's inspections.

Internal and external audits of the DWQMS promote continuous improvement.

In July 2019, staff completed an internal DWQMS audit with the assistance of an external consultant. The audit reviewed the elements of the DWQMS and their implementation.

The audit identified two minor non-conformances and 16 opportunities for improvement. The minor non-conformances and three opportunities for improvement were addressed immediately and closed, 13 opportunities for improvement remain open and are being incorporated into the system, as appropriate.

Subsequent to the internal audit, the Annual Management Review was conducted to update senior management on the status of the drinking water system, actions taken and planned for the next calendar year. A summary of the Management Review is provided as Attachment 3 to this memorandum.

In August 2019, an audit of the DWQMS was conducted by an external MECP approved auditor. The audit found that the City was fully in conformity with the elements reviewed during the audit.

4. Analysis

99.80% of laboratory samples were within Regulatory limits in 2019, re-confirming that the City's drinking water is, and continues to be safe.

In 2019, the York-Durham Environmental Laboratory, a MECP accredited drinking water testing laboratory, and the City's Certified Drinking Water Operators performed 4,448 water quality tests. Of these tests, only eight fell outside of the regulatory limits. These incidents are called Adverse Water Quality Incidents (AWQI).

Staff responded to each AWQI in accordance with the City's Standard Operating Procedures, performing corrective action required under relevant regulations of the SDWA and direction of the Region's MOH. Promptly and appropriately addressing AWQI and its cause maintained continuous delivery of drinking water and ensured public safety.

MECP inspections provide opportunities for improvement of the Drinking Water System.

December 2018's MECP inspection report made two recommendations for improvement, including, updating the City's adverse water quality SOP to include two sets of samples, the first set of samples to be taken immediately after completion of corrective actions and the second set of samples within 24 to 48 hours of the first sample. The second recommendation was for operators to keep detailed notes of any deviations or challenges during sampling.

Both MECP recommendations were implemented in 2019 through updates to the City's SOPs, operator training and management oversight processes.

Vaughan received 100% inspection score on the Chief Drinking Water Inspector's 2018-2019 Annual Report.

Ontario's Chief Drinking Water Inspector releases an annual report, scoring drinking water systems. Reporting timelines are based on the MECP's previous fiscal year April 1, 2018 to March 31, 2019.

The 2018-2019 Chief Drinking Water Inspector's Report, gave the City the highest possible score of 100%.

For comparison purposes, only four of the nine local area municipalities in York Region received a score of 100%, with the remaining five receiving scores ranging from 90.95% to 98.42%. Of the 659 municipal residential drinking water systems in Ontario, only 72% received the score of 100%, illustrating that the City's drinking water system operations and management are amongst the best in the Province.

5. Financial Impacts

Demonstrating long-term financial sustainability of the drinking water system is a requirement to maintain the City's Municipal Drinking Water License.

In May 2019, Council approved the proposed Long Term Water Financial Plan for 2020 to 2031, committing to long-term financial sustainability of the City's water distribution system, ensuring the continuous delivery of safe drinking water. The plan identifies financial support required to operate, maintain and perform asset management on the drinking water system and was a component in the City's Municipal Drinking Water License renewal submission to the MECP.

Section 11 of Ontario Regulation 170/03: Drinking Water Systems, requires that the owners describe "any major expenses incurred during the period covered by the report to install, repair or replace required equipment."

In 2019, the City invested \$9.32 million to install, repair or replace equipment required to deliver safe drinking water. Costs were funded through the City's water rates, associated reserves and the approved capital budget.

6. Conclusion

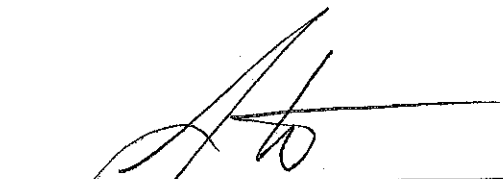
This memorandum and its attachments are provided to support Council's statutory duty of care under Provincial drinking water regulations, allowing Council to demonstrate its due diligence in performing informed decision making under its statutory standard of care.

The City's drinking water system is subject to strict regulations implemented by the Province to keep drinking water safe. The results from both internal and external parties for the reporting year 2019 confirm that the City's drinking water system is performing well.

These outcomes are a result of Council's commitment to the City's citizens and businesses by providing safe, clean drinking water.

As part of the regulatory reporting requirements, links to this memorandum and its attachments will be posted on the City's external website.

For additional information, please contact James Steele, Director of Environmental Services, ext. 6116


James Steele
Director of Environmental Services

cc. Zoran Postic, Deputy City Manager, Public Works

Attachments:

- 1: Annual Report
- 2: Annual Summary Report
- 3: Drinking Water Quality Management System – Summary of Management Review



CITY OF VAUGHAN 2019 ANNUAL SUMMARY REPORT

MARCH 03, 2020

Description of the Vaughan Water Distribution System to fulfill the requirements under Schedule 22 of Ontario Regulation 170/03

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1.0 REPORT OVERVIEW

1.1 BACKGROUND

This report is intended to provide the Mayor and Members of Council, as “Owners” of the drinking water systems, an understanding of the status of the City of Vaughan’s drinking water system for the reporting period of January 1, 2019 to December 31, 2019.

Second, the Safe Drinking Water Act (2002) mandates that it is the responsibility of the municipality to:

- Recognize that the people of Ontario are entitled to expect their drinking water to be safe; and,
- Provide for the protection of human health and the prevention of drinking water health hazards through the control and regulation of drinking water systems and drinking water testing.

Finally, this report has also been prepared to satisfy the requirements of Schedule 22, O. Reg. 170/03 (Summary Reports for Municipalities).

For the 2019 reporting period, a separate Annual Report, which contains data related to annual testing and sampling parameters, was prepared to fulfill Section 11 of O. Reg. 170/03. This report will be posted on the City’s website by March 31, 2020.

1.2 QUALITY MANAGEMENT SYSTEM POLICY

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

- providing safe and clean drinking water to our citizens and businesses
- complying with all applicable legislation and regulations as related to the provision of safe drinking water
- implementing and continually improving the effectiveness of our Quality Management System

This quality management policy has been developed in accordance with the objectives of the 2018-2022 Term of Council Service Excellence Strategic Plan specifically to enhance and ensure community safety, health and wellness and to maintain assets and infrastructure integrity.

2.0 DRINKING WATER SYSTEM DESCRIPTION

2.1 DRINKING WATER SYSTEM PROFILE

The City of Vaughan, Environmental Services Department is responsible for the distribution of safe drinking water throughout the City. In 2019, 40,765,591m³ of water was supplied to residences, industrial, commercial and institutional locations throughout the City.

The City purchases its drinking water from York Region prior to distribution. York Region obtains this water from the City of Toronto and the Region of Peel. The water originates from Lake Ontario and is treated using a process called chloramination, a disinfection method which uses chlorine combined with ammonia, which ensures that the water continues to be safe to drink from the time of treatment until it reaches the consumer.

The Vaughan water distribution system includes 1,117 kilometres of active watermains, 1 booster station and 1 pressure elevating station. Table 1 below displays the Vaughan Distribution System profile information, which includes the system number, class of subsystem, Municipal Drinking Water Licence (MDWL) number, Drinking Water Works Permit (DWWP) number, and the system classification.

System Number: 260003097	Class 2 Water Distribution Subsystem
Municipal Drinking Water Licence: 011-101	Drinking Water Works Permit: 011-201
Classification: Large Municipal Residential System	

Table 1 Vaughan Distribution System Profile Information.

3.0 LEGISLATIVE REQUIREMENTS

3.1 SUMMARY OF LEGISLATIVE REQUIREMENTS

The Act and associated Regulations under which the City of Vaughan operates the water distribution system are:

The Safe Drinking Water Act, 2002 (SDWA),

- (a) **Ontario Regulation 170/03 of the SDWA**
 - The overall legislative framework for operating a drinking water system
- (b) **Ontario Regulation 128/04 of the SDWA**
 - The certification of the City's drinking water system operators
- (c) **Ontario Regulation 169/03 of the SDWA**
 - The water sampling parameters according to Ontario Drinking Water Quality Standards
- (d) **Ontario Regulation 188/07 of the SDWA**
 - The licensing requirements of our drinking water system

3.1.1 ONTARIO REGULATION 170/03

The Drinking Water Systems Regulation (O. Reg. 170/03) establishes eight categories of drinking water systems, four of which are municipal, and the other four being non-municipal. The City of Vaughan's water system is a **Large Municipal Residential System**. It meets this requirement because it matches the legislative definition of a *"municipal drinking water system that serves a major residential development and serves more than 100 private residences"*.

The Regulation contains schedules that address several requirements for a drinking water system. The following schedules are applicable to the City of Vaughan's distribution system:

- | | |
|-----------------|--|
| • Schedule 6 | Operational Checks, Sampling and Testing - General |
| • Schedule 7 | Operational Checks |
| • Schedule 10 | Microbiological Sampling and Testing |
| • Schedule 13 | Chemical Sampling and Testing |
| • Schedule 15.1 | Lead |
| • Schedule 16 | Reporting Adverse Test Results and Other Problems |
| • Schedule 17 | Corrective Action |
| • Schedule 22 | Summary Reports for Municipalities |

3.0 LEGISLATIVE REQUIREMENTS

SCHEDULE 6 – OPERATIONAL CHECKS, SAMPLING AND TESTING – GENERAL

This section of the Regulation provides direction on sample frequency, form, handling, monitoring equipment and record keeping. Wording in this schedule provides the framework for performing drinking water samples as discussed in detail in Schedule 7.

SCHEDULE 7 – OPERATIONAL CHECKS

This schedule identifies responsibility for chlorine, turbidity, and fluoride testing, as well as defines tests that can be done by a certified water operator.

As required under this schedule, the City ensures that drinking water samples from the Vaughan Water Distribution System are taken and tested for a combined chlorine residual. In 2019, 2,286 samples were taken to measure chlorine residuals.

The Vaughan Water Distribution System is a stand-alone system which means that the water which is received stays only within the City borders. Primary disinfection, testing for turbidity and fluoride addition is provided by the City of Toronto and the Region of Peel at their water treatment plants.

SCHEDULE 10 – MICROBIOLOGICAL SAMPLING AND TESTING

The frequency of microbiological sampling for the presence of bacteria and testing for the City is covered within this schedule. The number of required samples is based upon population size, and therefore in 2019 Vaughan was mandated to take a minimum of 134 microbiological samples per month for an annual total of 1,608 samples.

The City collected a total of 1,943 microbiological samples for testing. Of these, more than 25% of them were additionally sampled for Heterotrophic Plate Count (HPC) to satisfy regulatory requirements. HPC measures the overall bacteriological quality of drinking water.

SCHEDULE 13 – CHEMICAL SAMPLING AND TESTING

This schedule outlines requirements for sampling of inorganics, organics, trihalomethanes (THMs), haloacetic acids (HAAs), nitrate and nitrite, sodium, and fluoride.

Though the City itself was not required to test for inorganics, to maintain diligence, testing was performed for these in 2019.

The City also tested for THMs and HAAs – chlorine disinfection byproducts - on a quarterly basis. All levels were below legislative limits.

3.0 LEGISLATIVE REQUIREMENTS

SCHEDULE 15.1 – LEAD SAMPLING

This Schedule applies to sampling for lead and stipulates that there are two sample periods to consider – one during the winter and the other during the summer. Prior to 2011, the City was mandated to collect 100 samples from points in plumbing that serve private residences, 10 samples from points in plumbing that do serve private residences and 20 samples from sampling points in the distribution system. These samples showed that lead is not a matter of significant health concern in the City, and therefore regulatory relief from testing in private residences was granted by the MECP.

A reduced lead sampling schedule is followed in Vaughan with 10 distribution samples, obtained from fire hydrants throughout the City, taken twice per year and measured for pH, alkalinity and lead. In 2019, there were no sample exceedances for lead.

SCHEDULE 16 – REPORTING ADVERSE TEST RESULTS AND OTHER PROBLEMS

The schedule defines the City's duty to report any drinking water test result which exceed any of the standards prescribed by the Ontario Drinking Water Quality Standards (O.Reg. 169/03).

The reporting requirement involves immediate oral and written notification to the Ministry of the Environment, Conservation, and Parks (MECP) Spills Action Centre (SAC), and the Medical Officer of Health at the York Region Public Health Unit.

Table 2 below provides a summary of all adverse water quality incidents that occurred in 2019. The corrective action for each incident is also included. There were eight (8) adverse water quality incidents, none of which resulted in a risk to public health.

Table 2 2019 Adverse Water Quality Incidents and Corrective Actions.

Incident Description	Incident Date	Adverse Test Result	Regulatory Limits	Corrective Action
Combined Chlorine Residual	01/24/19	0.02mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed watermain at site and resampled.
	02/22/19	0.01mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed watermain at site and resampled.
	05/08/19	0.04mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed watermain at site and resampled.

3.0 LEGISLATIVE REQUIREMENTS

NDOGN Detected	01/26/19	NDOGN	0	Water Operations flushed watermain at site and resampled.
Total Coliform (TC) Present	06/12/19	TC - Present	0	Water Operations flushed watermain at site and resampled.
	09/13/19	TC- Present	0	Water Operations flushed watermain at site and resampled.
	10/04/19	TC- Present	0	Water Operations flushed watermain at site and resampled.
NDMA	10/10/19	0.000023mg/L	> 0.000009mg/L	Water Operations flushed watermain at site and resampled.

SCHEDULE 17 – CORRECTIVE ACTION

In conjunction with the requirements of Schedule 16 listed above, corrective actions are immediately undertaken to address adverse water quality incidents. Responses include watermain flushing and resampling of the identified area. The samples are tested for chlorine residuals and sent to the laboratory for further microbiological tests. Once complete results have been received from the laboratory, and are within the set regulatory limits, a notice of issue resolution is reported back to both the MECP Spills Action Centre and the Medical Officer of Health at the York Region Public Health Unit.

SCHEDULE 22 - SUMMARY REPORTS FOR MUNICIPALITIES, AND SECTION 11 OF O. REG. 170/03

Summary Reports for Municipalities for Large Municipal Residential systems are identified within Schedule 22. The requirements of the report are listed within it, and annual submissions for the previous calendar year, must be submitted to the City's Mayor and Members of Council, as "Owners" of the system, by March 31 of the following year. The City also posts the report on the City's website and hard copies of the report are available free of charge to the public at the City's Joint Operations Centre located at 2800 Rutherford Road.

Similarly, Annual Reports defined under Section 11 of the Regulation are prepared for submission no later than February 28th of the following year. The requirements of the content set within this report are also defined in the legislation. The City ensures that effective steps are taken to advise users that copies of the report are available, without charge, and locations where copies of the report may be obtained. This report is also made available on the City of Vaughan's website.

3.0 LEGISLATIVE REQUIREMENTS

3.1.2 ONTARIO REGULATION 128/04

This Regulation establishes the training and certification requirements that must be satisfied by certified water operators.

The City of Vaughan's water operations staff operated the Vaughan Water Distribution System in 2019. Every operator is required to complete a total of 105 training hours within the three-year operator certificate renewal period. Operator training consists of 36 hours of MECP's classroom training, plus 69 hours of On-the-Job practical training.

During the reporting period January 1, 2019, to December 31, 2019, all City of Vaughan's drinking water operators held a valid operator certificate in compliance with O. Reg. 128/04 and met provincial training requirements.

3.1.3 ONTARIO REGULATION 169/03

The Ontario Drinking Water Quality Standard (ODWQS) under Ontario Regulation 169/03 identifies the minimum level of drinking water quality acceptable for human consumption.

The City of Vaughan water sampling and testing program complied with the following standards:

- Schedule 1. Microbiological Standards
- Schedule 2. Chemical Standards
- Schedule 3. Radiological Standards

As this Regulation indicates the minimum standard, exceedance of these values represents the point of which adverse reporting and corrective action is triggered.

3.1.4 ONTARIO REGULATION 188/07

The Safe Drinking Water Act, 2002 (SDWA) requires Owners and Operating Authorities of municipal residential drinking water systems to have an accredited Operating Authority. In order to become accredited, an Operating Authority must establish and maintain a Quality Management System (QMS). Minimum requirements for the QMS are specified within the Drinking Water Quality Management Standard (DWQMS). Ontario Regulation 188/07 of the SDWA has been established to aid in the licensing of the municipal drinking water systems.

3.0 LEGISLATIVE REQUIREMENTS

3.2 DRINKING WATER QUALITY MANAGEMENT STANDARD (DWQMS)

The Drinking Water Quality Management Standard has 21 elements which relate to quality management and the risk assessment/risk management of critical control points. The Operational Plan documents the processes and procedures that the Owner and Operating Authority have in place to meet the requirements of the DWQMS.

The original full scope DWQMS accreditation certificate was formally issued by Canadian General Standards Board to the Corporation of the City of Vaughan on July 7, 2009. The City of Vaughan DWQMS was re-accredited on August 11, 2018 and had a full-scope audit completed August 26, 2019. Based on obtaining DWQMS accreditation and submitting a Council approved Financial Plan, as required under the Sustainable Sewage and Water System Act, to the Ministry of Municipal Affairs and Housing, the City of Vaughan received its Drinking Water Works Permits and Municipal Drinking Water Licenses on July 27, 2009.

As participants of the full scope accreditation process for the DWQMS, the City of Vaughan is required to submit system information for an on-site verification audit to maintain accreditation status. The Vaughan Distribution System remains fully accredited.

4.0 DRINKING WATER SYSTEM MAINTENANCE PROGRAMS

4.1 WATERMAIN FLUSHING PROGRAM

The main objective of the watermain flushing program is to maintain chlorine residual in the water distribution system in order to meet the regulatory requirements and ensure the chlorine residual reflects the water quality in a given area. Flushing also helps clean the pipe by removal of mineral deposits from the pipe walls while improving the aesthetics of the water. It is performed at locations that have the potential for stagnant water, such as dead ends, areas of low water consumption (i.e. new subdivisions), and during watermain repairs to remove any debris in the watermain and restore chlorine residuals. Flushing is performed by the City's certified and trained drinking water operators. Chlorine residuals are recorded at each location on completion of watermain flushing.

4.2 WATERMAIN SWABBING

The primary reason for watermain swabbing is to clean any mineral build-up from pipe walls and remove rust due to corrosion of metallic pipes. Swabbing typically utilize a polyurethane swab slightly bigger than the diameter of the watermain. The swab is inserted from a hydrant which exits from another hydrant; any mineral deposits removed from the pipe walls will also exit from this hydrant. Mineral and rust build-up in pipes provides a potential safe place for harmful pathogens to hide by avoiding contact with chlorine. Swabbing assists in removal of these pathogens and helps in delivery of safe drinking water. Flushing and swabbing improve the hydraulics in the water distribution systems which reduce energy costs and improve water flow.

4.3 HYDRANT INSPECTION PROGRAM

An annual inspection of all hydrants in the City is a requirement under the Provincial Fire Code (Ontario Regulation 213/07). The inspection determines the operational functionality of hydrants and valves to ensure their smooth operation for firefighting. The hydrant inspection program is outsourced by the City. Repairs for deficiencies identified through the hydrant inspection program are completed by City drinking water operators along with the contractor, if required.

4.4 VALVE EXERCISING PROGRAM

Valves, along with hydrants, and water booster stations are key components of the City's water distribution infrastructure. Valves control and change the direction of flow of water within the water distribution system, they are required to be operated during other maintenance activities including watermain swabbing and watermain flushing. During a watermain break, valves isolate a section of watermain for the repairs, confining the water disruption to a smaller area. Valves are exercised as part of the City's preventative maintenance program. Valve exercising involves turning the valve on and off to prevent the valve from becoming stiff and not functioning properly- this is completed by a contractor.

5.0 WATER QUALITY

5.1 WATER QUALITY INQUIRIES

Under the current issue of the City's MDWL, the City is required to address water quality inquiries related to the drinking water system. The nature of the inquiry and the appropriate corrective action taken in respect of the inquiry must be documented. Table 3 below provides a summary of the water quality inquiries addressed in 2019. Types of inquiries include taste, odour, discolouration, lead inquiries, and general inquiries which include questions pertaining to pH, hardness, alkalinity, etc. There were a total of 157 water quality inquiries in 2019. Most inquiries were classified as discoloured water (i.e. cloudy water). By documenting the water quality inquiries, the City can address citizens' concerns and continually improve the drinking water system by tracking inquiries of a similar nature within a given area(s) of the City.

5.0 WATER QUALITY

Type of Inquiry	Number of Inquiries	Action Taken
Odour	32	<ul style="list-style-type: none"> Information provided by phone or email to identify the source of the smell (plumbing vs. drinking water), and flush taps. Appointment scheduled for chlorine residual sample to be collected in home and/or flush and sample at the nearest fire hydrant.
Discolouration	50	<ul style="list-style-type: none"> Information provided by phone or email to flush taps. Appointment scheduled for chlorine residual sample to be collected in home and/or flush and sample at the nearest fire hydrant.
Taste	4	<ul style="list-style-type: none"> Information provided by phone or email. Appointment scheduled for chlorine residual sample to be collected in home and/or flush and sample at the nearest fire hydrant.
Lead Inquiries	47	<ul style="list-style-type: none"> Samples collected for analysis at the request of the citizens Copies of laboratory report provided to citizens
General Inquiries (i.e. pH, hardness, alkalinity)	24	<ul style="list-style-type: none"> Information provided by phone conversation and/or email correspondence Provide most recent sample results upon request
TOTAL	157	

Table 3 2019 Water Quality Inquiries for the Vaughan Distribution System.

6.0 WATER USAGE

6.1 ANNUAL WATER TAKING FROM YORK REGION

York Region receives treated water from the City of Toronto and the Region of Peel and supplies it to the City of Vaughan for distribution. The total volume of water supplied from York Region to the Vaughan Distribution System for the reporting period of January 1, 2019 to December 31, 2019 was 40,765,591m³.

Monthly flows for the Vaughan Water Distribution System are indicated in the Table 4 below. The monthly average flow and maximum daily flow are also included. Figure 1 below shows a bar graph of the data from Table 4. In 2019, July had the greatest flow and February had the lowest flow.

Table 4 2019 Monthly Flows for the Vaughan Distribution System.

Month	Volume (m ³)
January	2,980,004
February	2,829,251
March	3,047,182
April	3,054,086
May	3,452,107
June	3,525,204
July	4,451,385
August	4,335,309
September	3,640,636
October	3,309,436
November	3,065,445
December	3,075,547
TOTAL	40,765,591
MONTHLY AVERAGE FLOW	3,397,133
MAX DAILY FLOW	143,593

6.0 WATER USAGE

2019 Monthly Flows for the Vaughan Distribution System

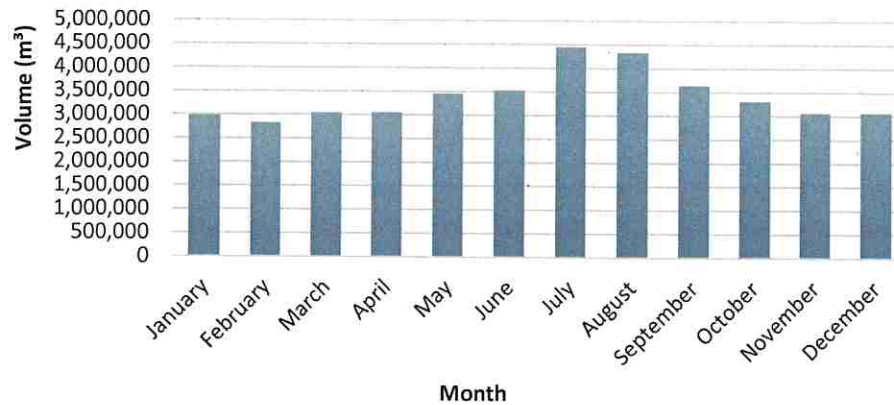


Figure 1 2019 Monthly Flows for the Vaughan Distribution System.

Schedule 22 requires that if a system is receiving all of its water from another system under an agreement, a comparison of actual flow rates to the flow rates specified in the written agreement, needs to be provided. The City does not currently have a written agreement under subsection 5 (4) with the Regional Municipality of York. The City, along with the other area municipalities, rely on Sections 11 and 89 (b), of the Ontario Municipal Act with respect to the supply of water.

7.0 ASSOCIATED WATER SUMMARY REPORTS

City of Toronto, [Annual Report and Annual Summary Report](#)

Region of Peel, [Annual Report and Annual Summary Report](#)

York Region, [Annual Report and Annual Summary Report](#)

8.0 CONTACT INFORMATION

Report Contact Information

Kewal Kharbanda - Supervisor, Compliance and Training

Environmental Services Department

City of Vaughan

(905) 832-8585 x. 6105

kewal.kharbanda@vaughan.ca

**Ontario Drinking-Water Systems Regulation O. Reg. 170/03****ANNUAL REPORT – City of Vaughan**

Drinking-Water System Number:	260003097
Drinking-Water System Name:	Vaughan Distribution System
Drinking-Water System Owner:	The Corporation of the City of Vaughan
Drinking-Water System Category:	Large Municipal Residential
Period being reported:	January 1, 2019 – December 31, 2019

Complete if your Category is Large Municipal Residential or Small Municipal Residential

Does your Drinking-Water System serve more than 10,000 people? Yes [X] No []

Location where Summary Report required under O. Reg. 170/03 Schedule 22 will be available for inspection.

City of Vaughan, Joint Operation Centre, 2800 Rutherford Road, Vaughan, ON L4K 2N9

Is your annual report available to the public at no charge on a web site on the Internet?

Yes [X] No []

Location where Summary Report required under O. Reg. 170/03 Schedule 22 will be available for inspection.

http://www.vaughan.ca/services/residential/water/water_quality/Pages/default.aspx

List all Drinking-Water Systems (if any), which receive all their drinking water from your system:

Not Applicable

Did you provide a copy of your annual report to all Drinking-Water System owners that are connected to you and to whom you provide all its drinking water?

Not Applicable

Indicate how you notified system users that your annual report is available and is free of charge.

[X] Public access/notice via the web



Ontario Drinking-Water Systems Regulation O. Reg. 170/03

Description of Drinking-Water System

The Vaughan Distribution System consists of one (1) booster pumping station (Maplewood Booster Station/North Maple Booster Station), one (1) pressure elevating system (Woodland Acres Pressure Elevating System) and trunk and distribution watermains in the City of Vaughan.

Drinking water for the City of Vaughan is supplied from York Region, who procure water from the City of Toronto and Peel Region. The City of Toronto operates four (4) water treatment plants using Lake Ontario as a raw water source.

List all water treatment chemicals used over this reporting period

Water is treated by City of Toronto and the Regional Municipality of Peel. List of chemicals used for water supplied to City of Vaughan is available on their web site www.toronto.ca and <https://www.peelregion.ca/pw/water/quality/reports/>, respectively.

Brief description and a breakdown of expenses incurred to repair, replace and install equipment

- Removal of easement at Islington Ave by extending the Tayok Dr watermain- \$77,700
- Maplewood Water Booster Station controller switch replaced- \$15,000
- Hydrant repairs- \$89,200
- Concrete pressure pipe repairs on Langstaff Rd at Hwy 27- \$33,000
- Water service connection repair on Park St - \$10,000
- Watermain Replacement on Hanlan Rd and Clark Avenue, Bass Pro Mills Dr and Friuli Ct - \$9.1 million (approximately)

Provide details on the notices submitted in accordance with subsection 18(1) of the Safe Drinking-Water Act or section 16-4 of Schedule 16 of O.Reg.170/03 and reported to Spills Action Centre.

Incident Date	Parameter	Result	Unit of Measure	Corrective Action	Corrective Action Date
01/24/19	Combined Chlorine	0.02	mg/L	Flush and resample	01/24/19
01/26/19	NDOGN	NDOGN	Count/100mL	Flush and resample	01/28/19
02/22/19	Combined Chlorine	0.01	mg/L	Flush and resample	02/22/19
05/08/19	Combined Chlorine	0.04	mg/L	Flush and resample	05/10/19
06/12/19	Total Coliform	TC – P	P-A/100mL	Flush and resample	06/14/19



09/13/19	Total Coliform	TC – P	P-A/100mL	Flush and resample	09/13/19
10/04/19	Total Coliform	TC – P	P-A/100mL	Flush and resample	10/05/19
10/10/19	NDMA	0.000023	mg/L	Flush and resample	10/25/19

Microbiological testing done under the Schedule 10, 11 or 12 of Regulation 170/03, during this reporting period.

	Number of Samples	Range of E.Coli Or Fecal Results Present (P)/ Absent (A)	Range of Total Coliform Results Present (P)/ Absent (A)	Number of HPC Samples	Range of HPC Results (min #)-(max #)
Distribution	1,943	A MPN/100mL	A – P MPN/100mL	991	<1 CFU/mL – 3,000 CFU/mL

Operational testing done under Schedule 7, 8 or 9 of Regulation 170/03 during the period covered by this Annual Report.

Parameter	Number of Grab Samples	Range of Results (min #) - (max #)
Turbidity	1	0.10 NTU
Combined Chlorine – Range (Maximum/ Minimum)	2,286	Combined- 0.01mg/L – 2.65mg/L

Summary of additional testing and sampling carried out in accordance with the requirement of an approval, order or other legal instrument.

Date of legal instrument issued	Parameter	Date Last Sampled	Range of Results	Unit of Measure
05/23/19	Nitrosodimethylamine (NDMA)	12/10/19	<0.000009- 0.000023	mg/L
05/23/19	Chlorite	06/27/19	0.01	mg/L
05/23/19	Chlorate	06/27/19	0.01-0.06	mg/L

Summary of Inorganic parameters tested during this reporting period or the most recent sample results

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony	10/30/2019	<0.0005	mg/L	No
Arsenic	10/30/2019	0.0008	mg/L	No
Cadmium	10/30/2019	<0.0005	mg/L	No
Chromium	10/30/2019	<0.0005	mg/L	No
Selenium	10/30/2019	<0.0005	mg/L	No
Sodium	10/30/2019	16.8	mg/L	No
Fluoride	10/30/2019	0.61	mg/L	No



Ontario Drinking-Water Systems Regulation O. Reg. 170/03

Nitrite	12/10/2019	<0.05	mg/L	No
Nitrate	12/10/2019	0.76	mg/L	No

Summary of Lead testing under Schedule 15.1 during this reporting period

Location Type	Number of Samples	Range of Lead Results (min#) – (max #)	Number of Exceedances
Plumbing	74	<0.0005 – 0.0017	0
Distribution	49	<0.0005 – 0.0046	0

Summary of Organic parameters sampled during this reporting period or the most recent sample results

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Haloacetic Acids (HAA's) (NOTE: show latest annual average)	4/year	8.8	µg/L	No
Trihalomethane (THM) (NOTE: show latest annual average)	4/year	18.9	µg/L	No

None of inorganic or organic parameters exceeded half the standard as prescribed in Schedule 2 of Ontario Drinking Water Quality Standards

Drinking Water Quality Management System – Management Review Summary

The purpose of this summary is to update Council on the City of Vaughan's drinking water system performance as mandated through Element 20 of the [Drinking Water Quality Management Standard \(DWQMS\)](#).

	Requirement of Element 20 - Management Review	Achieved?	Conforms to
1	<p>Ensure that a Management Review is conducted at least once every calendar year</p> <p>Completed on July 18, 2019 with the top management and the Owner representative for the 2019 operational year</p>	<p>Yes</p> <p>✓</p>	<p>Yes</p> <p>✓</p>
2	<p>Consider the results of the Management Review and identify deficiencies and action items to address the deficiencies</p> <p>Completed. See the Management Review Summary below</p>	<p>Yes</p> <p>✓</p>	<p>Yes</p> <p>✓</p>
3	<p>Provide a record of any decisions and action items related to the management review including the personnel responsible for delivering the action items related and the proposed timelines for their implementation</p> <p>All decisions and action items discussed during the review have been captured through record of minutes. Follow up on actions is tracked.</p>	<p>Yes</p> <p>✓</p>	<p>Yes</p> <p>✓</p>
4	<p>Report the results of the Management Review, the identified deficiencies, decisions and action items to the Owner (Council)</p> <p>Completed through this communication, March 3, 2020.</p>	<p>Yes</p> <p>✓</p>	<p>Yes</p> <p>✓</p>

Management Review Summary

a) Annual Review of QMS 02- Quality Management System (QMS) Policy

The QMS Policy was reviewed with all attendees. No changes were identified.

Action Items: No action items pending from 2019 report.

b) Incidents of regulatory non-compliance

There were no non-compliances identified in 2018 Ministry of Environment, Conservation and Parks inspection (MECP) and the 2019 MECP inspection was completed on February 7, 2020.

The 2019 MECP Inspection Report will be issued to the City by March 31, 2020.

Action Item: No action items pending.

c) Incidents of adverse drinking water tests

Indicators of adverse water quality are immediately reported to York Region's Medical Officer of Health (MOH) and the Ministry of the Environment, Conservation and Parks (MECP) Spills Action Centre and appropriate corrective action is taken.

In 2019, there were a total of eight water quality reportable events, all of which were immediately addressed as required by the regulation and the City's Standard Operating Procedures.

None of these events compromised the safety or integrity of the drinking water system.

Action Item: Completed.

d) Deviations from Critical Control Points (CCP)

Critical control limits have been established, based on known critical control points, identified through Risk Assessment outcomes.

There was no deviation from the two identified CCP's and both the CCPs are related to potential contamination during a watermain break.

Action Item: No action items pending from 2019 report.

e) The efficacy of the risk assessment process

Verification of risks to public health and the drinking water system is conducted at least once every calendar year and assessed at least once every thirty-six (36) months.

The 2019 Risk Assessment was held on May 10 and 23, 2019. The following hazards, identified by the MECP, were considered and assessed for the Vaughan Distribution System: long-term impacts of climate change, source water supply shortfall, extreme weather events, sustained extreme temperatures, chemical spill impacting source water, sustained pressure loss, backflow, and terrorist threat/vandalism.

Action Item: No action items pending from 2019 report.

f) Internal and third-party Audit results

Internal and third-party audits assess compliance to the Drinking Water Quality Management Standard (DWQMS).

An Internal Audit held March 21, 2018 noted two corrective actions and nine Opportunities for Improvement (OFIs) which were all addressed.

An External audit held July 18-20, 2018 noted zero non-conformances and four OFIs which were all addressed.

An Internal audit held July 29 and 30, 2019 noted two minor non-conformances and 16 OFIs. Both non-conformances and three OFIs were addressed.

The 2019 external audit was held August 26 and 27- zero non-conformances were issued.

Action Item: There are 13 OFIs under review.

g) Results of emergency response testing

Testing of emergency response ensures that staff are prepared for emergency situations and allows the City to identify what could happen in the drinking water system to cause an emergency. The Emergency Tabletop Exercise with Water Operations occurred August 7, 2019. The Corporate Emergency Exercise (GridX) occurred November 13, 2019 and incorporated a water emergency scenario.

Action Item: No action items pending from 2019 report.

h) Operational performance

Annual MECP inspections ensure that the City meets the requirements identified in applicable legislation and regulations.

The MECP Inspection was held on December 20, 2018. Two recommendations were made: update to the adverse procedure to include corrective actions for NDOGN adverse sampling and operators should keep notes of sampling issues that occur.

Action Item: Completed.

i) Raw water supply and drinking water quality trends

The Annual Report and Annual Summary Report provide data on drinking water quality trends within the City's drinking water. The 2018 Annual Summary Report and Annual Report were posted on the City's website prior to February 28 and March 31, 2019, respectively.

The City has an exemption under the Municipal Drinking Water Licence (MDWL) for lead sampling from plumbing systems. It was also discussed to extend an invitation to Council for a tour of the drinking water system and facilities, to provide additional insight into the system and its complexities.

Action Item: Completed lead sampling information request.

Invitation to Council for tour of drinking water system is pending.

j) Follow-up on action items from previous management reviews

The previous Management Review (prior to 2019) was held September 25, 2018. There was a total of 26 action items.

Action Item: Water Operations Procedures Manual update is in ongoing and will be completed in Q1 2020.

k) The status of management action items identified between reviews

The City's Internal Audit Department investigation and findings identified key areas of improvement for Environmental Services.

Action Items: Management actions from the City's Internal Audit in 2019 are being tracked within the Environmental Services Department and progress is regularly reviewed.

l) Changes that could affect the Quality Management System

A new Municipal Drinking Water Licence (MDWL) was issued May 23, 2019. Additional sampling for Chlorite, Chlorate, and NDMA were identified under Schedule C.

As of July 23, 2019, the MECP identified that sampling for Chlorite and Chlorate is no longer required. A revised licence was sent to the City.

The City's current licence is Issue 8, incorporating regulatory relief for reduced lead sampling.

Action Items: No action items pending from 2019 report.

m) Consumer feedback

Consumer feedback allows the City to identify if the water system is operating effectively.

In the 2019 Management Review report, a total of 62 calls that were received and classified as odour, taste, discoloured, and general inquiries (water testing, sample results, etc.).

All the concerns/inquiries were addressed appropriately and in a timely manner. Some resolutions included sharing information and laboratory results.

Action Items: No action items pending from the 2019 report.

n) Resources needed to maintain the QMS

At the time of the 2019 Management Review the Supervisor of Compliance and Business Services position was vacant. The Quality Management System Representative was appointed and is responsible for the Drinking Water Quality Management System and channels important information to top management. Kewal Kharbanda is currently Acting as the Supervisor of Compliance and Training and has been appointed as the QMS Representative by top management.

Action Items: No action items pending from 2019 report.

o) The results of the infrastructure review

Physical condition of water infrastructure is regularly evaluated to maintain a state of good repair.

Capital projects are identified by Environmental Services and Infrastructure Delivery via the City's capital budget process.

In the 2019 Management Review reporting period, there were 11 watermain breaks and were mainly attributed to contractor error.

More than 32 kilometers (32.1 km) of watermain was added/replaced during the 2019 reporting period.

Preventative maintenance on the drinking water system included: approximately 17 kilometers of swabbing, 1957 valves exercised, and 8713 hydrants inspected. More than 1000 deficiencies were identified during the inspection, with the majority being rectified and only 126 remaining.

Action Items: Completed.

p) Operational Plan currency, contact and updates

The Operational Plan has been revised to reflect changes to the Drinking Water Quality Management Standard 2.0. The Operational Plan was endorsed by Council on June 4, 2019.

Action Items: No action items pending from 2019 report.

q) Staff suggestions

Staff suggested updates to the Water Sampling SOP. The SOP was updated based on the staff suggestions.

Staff also provided suggestions for risks to the drinking water system associated with long-term impacts of climate change and extreme weather events prior to the 2019 Risk Assessment.

Action Items: Completed.

r) New Business

Staffing plans to compliment the DWQMS and requirements for Acting positions were discussed.

Action Items: No action items pending from 2019 report.

s) Date of Next Meeting

The DWQMS dictates that the Management Review meeting be held at least once every calendar year, next meeting is scheduled for June 26, 2020.

Action Items: No action items pending from 2019 report.

Conclusion

The Management Review is recognized as a best practice for continual improvement for the City of Vaughan's Drinking Water Quality Management System, drinking water system, and associated monitoring and maintenance programs.

