ATTACHMENT No. 1

City of Vaughan
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CITY OF VAUGHAN
2020 ANNUAL SUMMARY REPORT

March 8, 2021

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, 2020 to December 31, 2020.

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 2020 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, 2021.

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 2020, 42,331,721m³ 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 1,135 kilometers 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.

Table 1 Vaughan Distribution System Profile Information.

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	

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 2020, 2,197 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 2020 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 1,755 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 2020.

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 2020, 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 2020. The corrective action for each incident is also included. There were 27 adverse water quality incidents, none of which resulted in a risk to public health.

Table 2 2020 Adverse Water Quality Incidents and Corrective Actions.

Incident Description	Incident Date	Adverse Test Result	Regulatory Limits	Corrective Action
Combined Chlorine Residual	06/02/20	0.00mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed watermain at site and resampled.
	08/05/20	0.10mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed watermain at site and resampled.
	08/20/20	0.06mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed watermain at site and resampled.
	08/30/20	0.12mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed watermain at site and resampled.

3.0 LEGISLATIVE REQUIREMENTS

Incident Description	Incident Date	Adverse Test Result	Regulatory Limits	Corrective Action
Combined Chlorine Residual	10/01/20	0.12mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed watermain at site and resampled.
	10/06/20	0.04mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed watermain at site and resampled.
	10/22/20	3.09mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed watermain at site and resampled.
	10/23/20	0.00mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed watermain at site and resampled.
	11/04/20	0.05mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed watermain at site and resampled.
	11/19/20	0.08mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed watermain at site and resampled.
	12/08/20	0.04mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed watermain at site and resampled.
	12/14/20	0.10mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed watermain at site and resampled.
Total Coliform (TC) Present	01/17/20	TC -Present	0	Water Operations flushed watermain at site and resampled.
	03/18/20	TC- Present	0	Water Operations flushed watermain at site and resampled.
	07/19/20	TC- Present	0	Water Operations flushed watermain at site and resampled.
	08/26/20	TC- Present	0	Water Operations flushed watermain at site and resampled.
	09/02/20	TC- Present	0	Water Operations flushed watermain at site and resampled.
	10/21/20	TC- Present	0	Water Operations flushed watermain at site and resampled.
	10/28/20	TC- Present	0	Water Operations flushed watermain at site and resampled.
	11/04/20	TC- Present	0	Water Operations flushed watermain at site and resampled.
	11/04/20	TC- Present	0	Water Operations flushed watermain at site and resampled.

3.0 LEGISLATIVE REQUIREMENTS

Incident Description	Incident Date	Adverse Test Result	Regulatory Limits	Corrective Action
Total Coliform (TC) Present	11/04/20	TC-Present	0	Water Operations flushed watermain at site and resampled.
	11/06/20	TC -Present	0	Water Operations flushed watermain at site and resampled.
	11/11/20	TC- Present	0	Water Operations flushed watermain at site and resampled.
	11/18/20	TC- Present	0	Water Operations flushed watermain at site and resampled.
	11/20/20	TC- Present	0	Water Operations flushed watermain at site and resampled.
	12/18/20	TC- Present	0	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 2020. 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, 2020, to December 31, 2020, 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 surveillance audit completed August 4 & 5, 2020. 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 2020. Types of inquiries include taste, odour, discolouration, lead inquiries, and general inquiries which include questions pertaining to pH, hardness, alkalinity, etc. There was a total of 124 water quality inquires in 2020. Most inquiries were classified as water inquiries (i.e. questions pertaining to fluoride, internal plumbing, etc.). 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

Table 3 2020 Water Quality Inquiries for the Vaughan Distribution System.

Type of Inquiry	Number of Inquiries	Action Taken
Odour	23	• 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 or flush and sample at the nearest fire hydrant.
Discolouration	21	• 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	7	• 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	4	• Samples collected for analysis at the request of the citizens • Copies of laboratory report provided to citizens
General Inquiries (i.e. pH, hardness, alkalinity, fluoride internal plumbing)	69	• Information provided by phone conversation and/or email correspondence • Provide most recent sample results upon request • Operator inspect nearest hydrant for water quality if appropriate
TOTAL	**124**	

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, 2020 to December 31, 2020 was 42,331,721m³.

A comparison of 2019 and 2020 monthly flows for the Vaughan Water Distribution System are indicated in 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 2020, July had the greatest flow and February had the lowest flow.

Table 4 2019 vs 2020 Monthly Flows for the Vaughan Distribution System.

Month	2019 Volume (m3)	2020 Volume (m^3)
January	2,980,004	3,077,774
February	2,829,251	2,878,450
March	3,047,182	3,095,795
April	3,054,086	2,962,290
May	3,452,107	3,457,889
June	3,525,204	4,142,098
July	4,451,385	4,908,594
August	4,335,309	4,482,517
September	3,640,636	3,852,898
October	3,309,436	3,199,023
November	3,065,445	3,186,863
December	3,075,547	3,087,530
TOTAL	40,765,591	42,331,721
MONTHLY AVERAGE FLOW	3,397,133	3,527,643

6.0 WATER USAGE

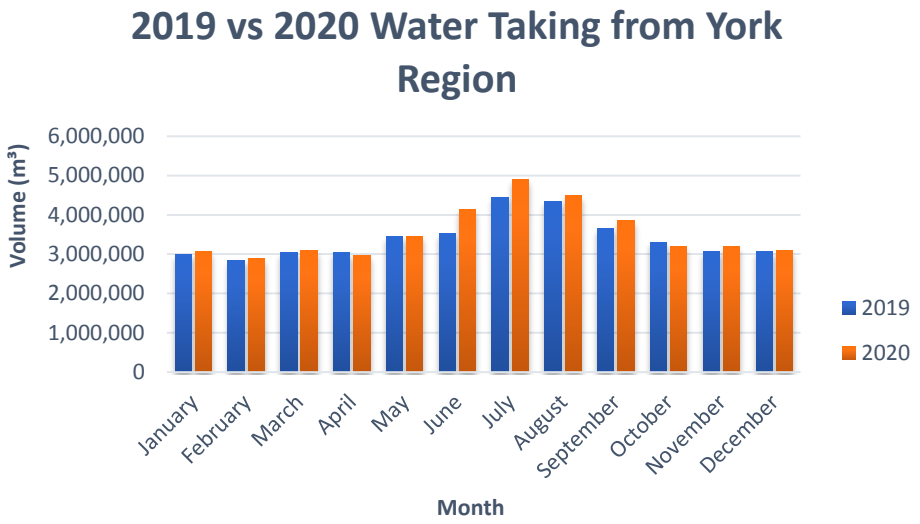

Figure 1 2019 vs 2020 Monthly Flows for the Vaughan Distribution System.

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

7.1 LINKS TO 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

8.1 REPORT CONTACT INFORMATION

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