

City of Vaughan
2800 Rutherford Road
Vaughan, ON L4K 2N9
www.vaughan.ca



CITY OF VAUGHAN

2022 ANNUAL SUMMARY REPORT

February 28, 2023

A description of the City of Vaughan's Water Distribution System to fulfill the requirements under Schedule 22 of *Ontario Regulation 170/03 – Drinking Water Systems*

This report is available to the public at no charge on the City of Vaughan's website and upon request.

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1.0 REPORT OVERVIEW

1.1 BACKGROUND

The 2022 Annual Summary Report is intended to provide the Mayor and Members of Council, as Owners of the Drinking Water System, an understanding of the status of the City of Vaughan's Drinking Water System for the reporting period of January 1, 2022 to December 31, 2022.

Under the *Safe Drinking Water Act, 2002 (the Act)*, municipalities are required 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.

This Report has also been prepared to satisfy the requirements of Schedule 22 of *Ontario Regulation 170/03 – Drinking Water Systems* (Summary Reports for Municipalities).

For the 2022 reporting period, a separate Annual Report, which contains data related to annual testing and sampling parameters, was prepared to fulfill Section 11 of *Ontario Regulation 170/03 – Drinking Water Systems*. This report will be posted on the City's website by March 31, 2023.

1.2 QUALITY MANAGEMENT SYSTEM (QMS) POLICY

The Owners and Operators of the City's Water Distribution System are committed to:

- Providing safe and clean drinking water to residents and businesses;
- Complying with all applicable legislation and regulations as related to the provision of safe drinking water; and
- Implementing and continually improving the effectiveness of the City's Quality Management System (QMS).

The City's QMS Policy has been developed 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's Environmental Services Department is responsible for the distribution of safe drinking water throughout the City. In 2022, 43,542,318 m³ of water was supplied to residential, 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 to ensure the water remains safe to drink from the time of treatment until it reaches the consumer.

The City's Water Distribution System includes 1,150.9 kilometres of active water mains, 1 booster station and 1 pressure elevating station. Table 1 below displays the City's Water Distribution System profile information, including the system number, class of subsystem, Municipal Drinking Water Licence (MDWL) number, Drinking Water Works Permit (DWWP) number, and the system classification.

Table 1 City of Vaughan Water 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 operates the Water Distribution System are:

- (a) *Ontario Regulation 170/03 of the Act;*
 - Overall legislative framework to operate a Drinking Water System
- (b) *Ontario Regulation 128/04 of the Act;*
 - Certification of the Drinking Water System Operators
- (c) *Ontario Regulation 169/03 of the Act;* and
 - Water sampling parameters according to the Ontario Drinking Water Quality Standards
- (d) *Ontario Regulation 188/07 of the Act.*
 - Licensing requirements for Drinking Water Systems

3.1.1 ONTARIO REGULATION 170/03 – DRINKING WATER SYSTEMS

Ontario Regulation 170/03 – Drinking Water Systems establishes eight categories of Drinking Water Systems, four of which are municipal, and the other four are non-municipal. The City’s Drinking Water System is a Large Municipal Residential System 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”.

Ontario Regulation 170/03 – Drinking Water Systems contains Schedules that address several requirements for a Drinking Water System. The following Schedules are applicable to the City’s Water 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 Municipality

3.0 LEGISLATIVE REQUIREMENTS

SCHEDULE 6 – OPERATIONAL CHECKS, SAMPLING AND TESTING – GENERAL

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

SCHEDULE 7 – OPERATIONAL CHECKS

This Schedule identifies the responsibility for chlorine, turbidity, and fluoride testing and defines tests that can be performed by a Certified Water Operator.

As required under this Schedule, the City ensures that drinking water samples from the City's Water Distribution System are taken and tested for a combined chlorine residual. In 2022, 2,118 samples were taken to measure chlorine residuals.

The City's Water Distribution System is a stand-alone system which means that the received water stays within the City borders. Primary disinfection, testing for turbidity, and fluoride addition is undertaken at wastewater treatment plants that are owned and operated by the City of Toronto and the Region of Peel.

SCHEDULE 10 – MICROBIOLOGICAL SAMPLING AND TESTING

This Schedule identifies the frequency of microbiological sampling for the presence of bacteria and associated testing. The number of required samples is based upon population size. The City was mandated to take a minimum of 135 microbiological samples per month in 2022 for an annual total of 1,620 samples.

The City collected a total of 1,758 microbiological samples for testing in 2022. Over 25% of the 1,758 microbiological samples were tested 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 the requirements for sampling of inorganics, organics, trihalomethanes (THMs), haloacetic acids (HAAs), nitrate and nitrite, sodium, and fluoride.

Though the City is not required to test for inorganics/organics, the City tested for inorganics in 2022 to maintain diligence.

The City also tested for THMs and HAAs (chlorine disinfection byproducts) on a quarterly basis as required under Schedule 13 of *Ontario Regulation 170/03 – Drinking Water Systems*. All test results were within legislative limits.

3.0 LEGISLATIVE REQUIREMENTS

SCHEDULE 15.1 – LEAD SAMPLING

This Schedule applies to sampling for lead and stipulates that there are two annual sampling periods to consider – one between December 15 and April 15 and the other between June 15 and October 15. 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 not serve private residences, and 20 samples from sampling points in the Water Distribution System. The City has since received approval from the MECP for relief from the regulatory requirements for standard lead sampling. In exchange for the relief granted, the City is required to comply with Schedule 15.1-5 (9) of *Ontario Regulation 170/03 – Drinking Water Systems* which allowed the City exemption from plumbing sampling. Relief was granted because the City demonstrated that not more than 10 per cent of all the samples from plumbing that were tested for lead in two consecutive sampling periods exceeded the standard prescribed for lead.

The City’s current lead sampling plan includes 10 distribution samples taken between December 15 and April 15 and 10 distribution samples taken between June 15 and October 15 annually which are measured for pH, alkalinity, and lead. There were no sample exceedances for lead in 2022.

SCHEDULE 16 – REPORTING ADVERSE TEST RESULTS AND OTHER PROBLEMS

This Schedule defines the City’s responsibility to report any drinking water test result which exceeds any of the standards outlined in the *Ontario Regulation 169/03 – Ontario Drinking Water Quality Standards*.

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 2022. The corrective action for each incident is also included in the Table. There were 36 adverse water quality incidents, none of which resulted in a risk to public health.

Table 2 2022 Adverse water quality incidents and corrective actions.

Incident Description	Incident Date	Adverse Test Result	Regulatory Limits	Corrective Action
Combined Chlorine Residual	04/06/22	4.11mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed water main at site and retested.
	04/11/22	3.06mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed water main at site and retested.
	06/06/22	3.54mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed water main at site and retested.

3.0 LEGISLATIVE REQUIREMENTS

Incident Description	Incident Date	Adverse Test Result	Regulatory Limits	Corrective Action
Combined Chlorine Residual	09/13/22	0.02mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed water main at site and retested.
	09/27/22	0.00mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed water main at site and retested.
	10/19/22	0.07mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed water main at site and retested.
	11/21/22	3.61mg/L	0.25 mg/L (Minimum) 3.0 mg/L (Maximum)	Water Operations flushed water main at site and retested.
Total Coliform (TC) Present	01/08/22	TC - Present	0	Water Operations flushed water main at site and resampled.
	03/23/22	TC - Present	0	Water Operations flushed water main at site and resampled.
	03/25/22	TC - Present	0	Water Operations flushed water main at site and resampled.
	03/26/22	TC - Present	0	Water Operations flushed water main at site and resampled.
	03/27/22	TC - Present	0	Water Operations flushed water main at site and resampled.
	03/27/22	TC - 1	0	Water Operations flushed water main at site and resampled.
	03/29/22	TC- Present	0	Water Operations flushed water main at site and resampled.
	04/09/22	TC- Present	0	Water Operations flushed water main at site and resampled.
	04/09/22	TC- Present	0	Water Operations flushed water main at site and resampled.
	04/24/22	TC- Present	0	Water Operations flushed water main at site and resampled.
	06/01/22	TC- Present	0	Water Operations flushed water main at site and resampled.
	08/03/22	TC- Present	0	Water Operations flushed water main at site and resampled.
	08/17/22	TC- Present	0	Water Operations flushed water main at site and resampled.
10/19/22	TC-Present	0	Water Operations flushed water main at site and resampled.	

3.0 LEGISLATIVE REQUIREMENTS

Incident Description	Incident Date	Adverse Test Result	Regulatory Limits	Corrective Action
Total Coliform (TC) Present	11/20/22	TC- Present	0	Water Operations flushed water main at site and resampled.
	11/22/22	TC -1	0	Water Operations flushed water main at site and resampled.
	11/24/22	TC- 11	0	Water Operations flushed water main at site and resampled.
	11/24/22	TC- 1	0	Water Operations flushed water main at site and resampled.
	11/26/22	TC- 3	0	Water Operations flushed water main at site and resampled.
	11/26/22	TC- 12	0	Water Operations flushed water main at site and resampled.
	11/26/22	TC- 3	0	Water Operations flushed water main at site and resampled.
	11/26/22	TC- 3	0	Water Operations flushed water main at site and resampled.
	11/28/22	TC- 2	0	Water Operations flushed water main at site and resampled.
	11/28/22	TC- 6	0	Water Operations flushed water main at site and resampled.
	11/28/22	TC- 1	0	Water Operations flushed water main at site and resampled.
	11/29/22	TC- 5	0	Water Operations flushed water main at site and resampled.
	11/29/22	TC- 4	0	Water Operations flushed water main at site and resampled.
	11/30/22	TC- 4	0	Water Operations flushed water main at site and resampled.
	12/01/22	TC- 3	0	Water Operations flushed water main at site and resampled.

3.0 LEGISLATIVE REQUIREMENTS

SCHEDULE 17 – CORRECTIVE ACTION

In conjunction with the requirements of Schedule 16, corrective actions are immediately undertaken to address adverse water quality incidents. Responses include water main flushing and resampling of the identified area as well as any additional direction provided by the Medical Officer of Health at the York Region Public Health Unit and MECP Spills Action Centre. The samples are tested for chlorine residuals onsite and sent to the laboratory for further tests that may include microbiological and/or chemical 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 ONTARIO REGULATION 170/03 – DRINKING WATER SYSTEMS

Summary Report requirements for Municipalities with Large Municipal Residential Systems are identified within Schedule 22. Annual Report 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 31st of the following year. The City also posts the Report on the City's external 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, as defined under Section 11 of the Regulation, for the previous calendar year are prepared for submission to the City's Mayor and Members of Council, as Owners of the system, no later than February 28th of the following year. Annual Report requirements are defined in the legislation. The City ensures that effective steps are taken to advise users that copies of the Report are available, without charge, including the location where copies of the Report may be obtained. This Report is also made available on the City's external website.

3.0 LEGISLATIVE REQUIREMENTS

3.1.2 *ONTARIO REGULATION 128/04 – CERTIFICATION OF DRINKING WATER SYSTEM OPERATORS AND WATER QUALITY ANALYSTS*

This Regulation establishes the training and certification requirements that must be satisfied by Certified Water Operators.

The City's Water Operations staff operated the City's Water Distribution System in 2022. 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 accredited classroom training and 69 hours of on-the-job practical training.

During the reporting period of January 1, 2022 to December 31, 2022, every Drinking Water Operator at the City held a valid Operator certificate in compliance with *Ontario Regulation 128/04 – Certification of Drinking Water System Operators and Water Quality Analysts* and met provincial training requirements.

3.1.3 *ONTARIO REGULATION 169/03 – ONTARIO DRINKING WATER QUALITY STANDARDS*

Ontario Regulation 169/03 - Ontario Drinking Water Quality Standards identifies the minimum level of drinking water quality acceptable for human consumption.

The City's water sampling and testing program complied with the Standards under the Regulation and ensured appropriate corrective actions were taken when necessary. As this Regulation indicates the minimum standard, exceedance of these values represent the point of which adverse reporting and corrective action is triggered.

3.1.4 *ONTARIO REGULATION 188/07 – LICENSING OF MUNICIPAL DRINKING WATER SYSTEMS*

The Act requires Owners and Operating Authorities of municipal residential Drinking Water Systems to have an accredited Operating Authority. 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 – Licensing of Municipal Drinking Water Systems* was 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 and risk management of critical control points. The City's 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 the Canadian General Standards Board to the Corporation of the City of Vaughan on July 7, 2009. The City's Drinking Water Works Permits and Municipal Drinking Water Licenses were received on July 27, 2009 after obtaining DWQMS accreditation and submitting a Council approved Financial Plan to the Ministry of Municipal Affairs and Housing, as required under the *Sustainable Sewage and Water System Act*. The City's DWQMS was re-accredited on June 22, 2021 followed by a surveillance audit completed on May 19, 2022.

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

4.0 DRINKING WATER SYSTEM MAINTENANCE PROGRAMS

4.1 WATER MAIN FLUSHING PROGRAM

The main objective of the water main flushing program is to maintain chlorine residual in the water distribution system to meet regulatory requirements and ensure the chlorine residual reflects the water quality in a given area. Flushing also helps clean the water main by removing mineral deposits from the pipe walls while improving the aesthetics of the water. Flushing 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 water main repairs to remove any debris in the water main 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 water main flushing. A total of 21 anti-stagnation valves were maintained by the City in 2022.

4.2 HYDRANT INSPECTION PROGRAM

An annual inspection of all hydrants in the City is a requirement under *Ontario regulation 213/07 – Fire Code*. The inspection determines the operational functionality of hydrants and valves to ensure smooth operation for firefighting. The hydrant inspection program is completed by external contractors. Repairs for deficiencies identified through the hydrant inspection program are completed by the City's Drinking Water Operators with the assistance of external Contractors, if required.

4.3 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 and are required to be operated during maintenance activities such as water main swabbing and water main flushing. During a water main break, valves isolate a section of water main for the repair which confined the water disruption to a smaller area. Valves are exercised by an external contractor 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. In 2022, preventative maintenance programming targeted valves in unassumed new development areas that were in long maintenance programs as well as the assumed City valves.

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 that was taken must be documented. Table 3 below provides a summary of the water quality inquiries the City addressed in 2022. Inquiries included questions pertaining to pH, hardness, lead, alkalinity, taste, odour, and colour. The City received a total of 119 water quality inquiries in 2022, most of which were classified as water inquiries (i.e. questions pertaining taste, odour, colour, etc.). The City can address citizens' concerns and continually improve the Drinking Water System by documenting inquiries, tracking inquiries of a similar nature and location, and identifying trends.

Table 3 2022 Water quality inquiries related to the City's Drinking Water System.

Type of Inquiry	Number of Inquiries	Action Taken
Taste and Odour	33	<ul style="list-style-type: none"> Information provided by phone or email to identify the source of the smell (plumbing vs. drinking water) and to flush taps. Forwarded to Water Operations group for site investigation which may include testing for chlorine residuals and sampling for microbiological lab test.
Discoloured Water	24	<ul style="list-style-type: none"> Information provided by phone or email to flush taps. Forwarded to Water Operations group for site investigation which may include testing for chlorine residuals and sampling for microbiological lab test.
General Inquiries	62	<ul style="list-style-type: none"> Information provided by phone conversation and/or email correspondence. Provide most recent sample results upon request. Forwarded to Water Operations group for site investigation which may include testing for chlorine residuals and sampling for microbiological lab test.
Total	119	

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 for distribution. The total volume of water supplied from York Region to the City's Water Distribution System during the reporting period of January 1, 2022 to December 31, 2022 was 43,542,318 m³.

A comparison of 2020, 2021, and 2022 monthly flows for the City's Water Distribution System and the monthly average flow are included in Table 4 below. Figure 1 below shows a graphical representation of the data from Table 4. In 2022, July had the greatest flow and February had the lowest flow.

Table 5 shows the City's Water Distribution System's maximum, minimum, and average daily flows during each month of 2022. The highest daily flow (10,514m³) was recorded on September 7, 2022 and the lowest daily flow (-3,146m³) was recorded on February 6, 2022.

Table 4 The City's Water Distribution System's monthly flows during 2019, 2020, and 2021.

Month	2020 Volume (m ³)	2021 Volume (m ³)	2022 Volume (m ³)
January	3,077,774	3,286,583	3,261,305
February	2,878,450	2,799,114	2,927,218
March	3,095,795	3,207,629	3,273,864
April	2,962,290	3,132,150	3,252,791
May	3,457,889	3,729,063	3,713,184
June	4,142,098	4,393,697	4,348,879
July	4,908,594	4,346,091	4,799,278
August	4,482,517	4,645,725	4,525,906
September	3,852,898	3,868,170	3,983,104
October	3,199,023	3,488,178	3,462,097
November	3,186,863	3,132,888	2,985,305
December	3,087,530	3,256,141	3,009,388
Total	42,331,721	43,285,428	43,542,318
Monthly Average Flow	3,527,643	3,607,119	3,628,526

6.0 WATER USAGE

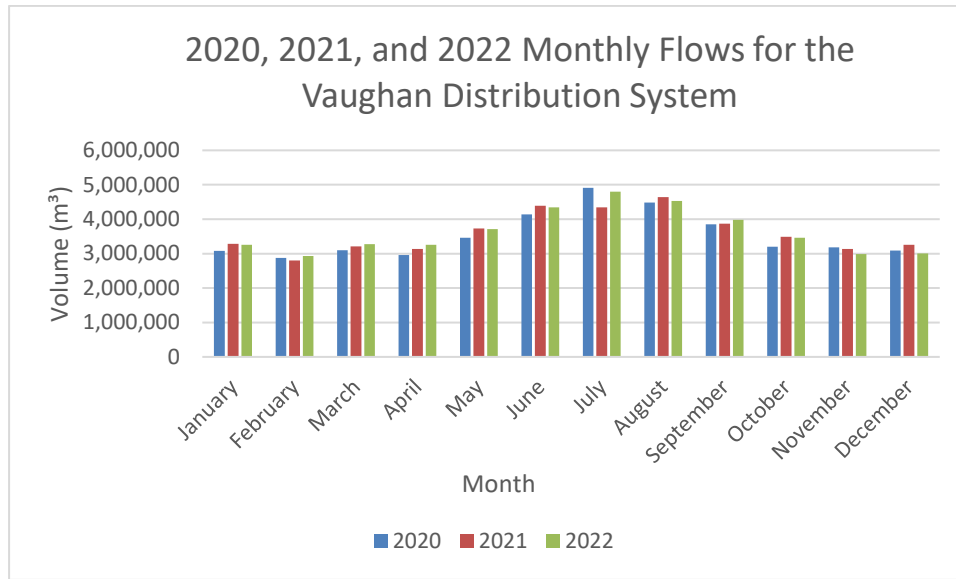


Figure 1 The City’s Water Distribution System’s monthly flows during 2020, 2021, and 2022.

Table 5 Maximum, minimum, and average daily flows during 2022.

Month	Maximum Daily Flow (m³)	Date of Maximum Flow	Minimum Daily Flow (m³)	Date of Minimum Flow	Average Daily Flow (m³)
January	5,206	24-Jan-22	3,988	01-Jan-22	4,541
February	4,993	02-Feb-22	-3,146	06-Feb-22	127
March	4,692	27-Mar-22	-875	01-Mar-22	1,683
April	4,587	30-Apr-22	-870	25-Apr-22	-11
May	7,461	19-May-22	3,587	02-May-22	5,357
June	9,098	22-Jun-22	4,943	07-Jun-22	7,099
July	8,975	23-Jul-22	5,755	25-Jul-22	7,859
August	9,042	10-Aug-22	5,291	25-Aug-22	7,194
September	10,514	07-Sep-22	988	29-Sep-22	6,174
October	1,553	14-Oct-22	502	20-Oct-22	987
November	293	01-Nov-22	-1,798	23-Nov-22	-128
December	4,186	21-Dec-22	-1,582	02-Dec-22	2,618

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 must be provided in accordance with Schedule 22. 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 *Municipal Act, 2001* 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

Emily Fahlgren, Acting Supervisor, Compliance and Training
Environmental Services Department
City of Vaughan
(905) 832-8585 ext. 6175
emily.fahlgren@vaughan.ca