Attachment 'A'

Annual Water Quality Report (January – December 2022)

The Corporation of the City of Markham
2022 Annual Water Quality Report

Covering the period from
January 1, 2022 to December 31, 2022

In compliance with
The Ministry of the Environment, Conservation and Parks (MECP)
Ontario Drinking Water Systems Regulation 170/03

CITY OF MARKHAM – WATER SAMPLING PROGRAM

January 1 to December 31, 2022

To comply with the Ontario Drinking Water System Regulation, Markham collects and tests water samples throughout its distribution system at a total of 107 locations. The 107 sample locations are strategically selected and evenly distributed to ensure Markham gets the best representation of the water distribution system. The need for additional locations is reviewed annually & in 2021 one additional location was added to the list of sampling locations. Sampling is rotated through the 107 locations and the drinking water is tested for Chlorine residual, Bacteria, Trihalomethanes (THM), Haloacetic Acids (HAA), Nitrites & Nitrates, Lead, Organics & Inorganics in compliance with Ontario Regulation 170/03. The samples are collected by licensed Waterworks operators and analyzed by an accredited and provincially licensed Laboratory.

Waterworks follows rigorous testing and compliance procedures. The City reports any adverse sampling results that occur to the York Region Medical Officer of Health and to the Ministry of Environment, Conservation and Parks (MECP) and immediately undertakes the necessary corrective action. Re-samples are taken following the corrective action(s) and tested until two consecutive samples are within acceptable parameters.

Summary of the sampling for 2022 follows:

Sampling Program:

Total Number of Samples collected and tested in 2022= 7,126

Adverse Test Results:

Total Number of Adverse Water Quality Incidents (AWQI) = 13

Breakdown of Adverse Results:

Total adverse due to Microbiology Exceedances = 12

Total adverse due to low Chlorine Residual = 1

The drinking water distributed to the City of Markham residents in 2022 was safe to drink and met all drinking water requirements. During 2022 the operation of the water distribution system, there were very few adverse sample incidents (0.18%) of all system samples undertaken) and when these occurred, they were immediately resolved. The drinking water system is maintained by Waterworks with continual improvements and programs in place to ensure water of the highest quality.

ANNUAL REPORT

Drinking-Water System Number:	**220004162**
Drinking-Water System Name:	Markham Distribution System
Drinking-Water System Owner:	The Corporation of the City of Markham
Drinking-Water System Category:	Large Municipal Residential System
Period being reported:	January 1, 2022 to December 31, 2022

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 [ ]

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.

- www.markham.ca
- 8100 Warden Ave. – Environmental Services Department, Waterworks Division

Complete for all other Categories.

Number of Designated Facilities served:

Not applicable

Did you provide a copy of your annual report to all Designated Facilities you serve?
Yes [ ] No [ ]

Number of Interested Authorities you report to: Not applicable

Did you provide a copy of your annual report to all Interested Authorities you report to for each Designated Facility?
Yes [ ] No [ ]

Note: For the following tables below, additional rows or columns may be added or an appendix may be attached to the report

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

Drinking Water System Name	Drinking Water System Number
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 of its drinking water?
Yes [ ] No [ ] 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**
- **[x] Public access/notice via Government Office**
- **[ ] Public access/notice via a newspaper**
- **[x] Public access/notice via Public Request**
- **[ ] Public access/notice via a Public Library**
- **[ ] Public access/notice via other method _____**

Describe your Drinking-Water System

The City of Markham's distribution system is an extension of the Toronto and York Region distribution systems. Raw surface water from Lake Ontario is disinfected, treated and tested rigorously by the City of Toronto and Peel Region for microbiological, organic and inorganic parameters prior to reaching the York Region distribution system. Markham is supplied with treated water via feeder mains from Toronto and Peel Region. York Region distribution system acts as a wholesale supplier of water and provides further testing, storage and pressure boosting for the Markham system.

Markham's Distribution System provides treated water to approximately 356,060 residents and is comprised of approximately 1,098 kilometers of various size watermains, 11,242 watermain valves and 8,873 municipal fire hydrants. Markham is a distribution only system, without pumping and storage facilities. Markham's drinking water within the distribution system is tested for standard parameters, in compliance with Ontario Regulation 170/03. The samples are collected by licensed Waterworks operators and analyzed by an accredited and provincially licensed Laboratory.

List all water treatment chemicals used over this reporting period

Not applicable; treatment chemicals are introduced at various sources by the City of Toronto, Peel Region and York Region only.

Were any significant expenses incurred to?

- **[x]** Install required equipment
- **[x]** Repair required equipment
- **[x]** Replace required equipment

Please provide a brief description and a breakdown of monetary expenses incurred

Cathodic Protection of Iron Watermains	**= $477,040**
Watermain CIPP Lining (Watermain Rehabilitation)	**= $3,687,095**
Water Meter Replacement/Upgrades	**= $842,651**
Watermain Replacement	**= $ 7,087,127**
Watermain Replacement Design for 2022	**= $266,996**
Curb Box Inspection and Replacement	**= $394,208**

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 and AWQI #	Parameter	Result	Unit of Measure	Corrective Action	Corrective Action Date
January 31, 2022 (AWQI # 157748)	Combined Chlorine	0.22	milligrams per litre	Flush Mains and Resample	January 31, 2022
June 14, 2022 (AWQI # 158688)	Total Coliform E. coli	No Data, Overgrown	colony forming units per 100 millilitres	Flush Mains and Resample	June 14, 2022
July 12, 2022 (AWQI # 159112)	Total Coliform	1	colony forming units per 100 millilitres	Flush Mains and Resample	July 12, 2022
August 16, 2022 (AWQI # 159578)	Total Coliform E. coli	No Data, Overgrown	colony forming units per 100 millilitres	Flush Mains and Resample	August 16, 2022
September 13, 2022 (AWQI # 159965)	Total Coliform E. coli	No Data, Overgrown	colony forming units per 100 millilitres	Flush Mains and Resample	September 13, 2022
September 13, 2022 (AWQI # 159966)	Total Coliform	2	colony forming units per 100 millilitres	Flush Mains and Resample	September 13, 2022
September 13, 2022 (AWQI # 159967)	Total Coliform	6	colony forming units per 100 millilitres	Flush Mains and Resample	September 13, 2022
November 11, 2022 (AWQI # 160635)	Total Coliform	84	colony forming units per 100 millilitres	Flush Mains and Resample	November 11, 2022
November 14, 2022 (AWQI # 160645)	Total Coliform	2	colony forming units per 100 millilitres	Flush Mains and Resample	November 14, 2022
November 15, 2022 (AWQI # 160672)	Total Coliform	2	colony forming units per 100 millilitres	Flush Mains and Resample	November 15, 2022
November 15, 2022 (AWQI # 160673)	Total Coliform E. coli	No Data, Overgrown	colony forming	Flush Mains and Resample	November 15, 2022

			units per 100 millilitres		
November 17, 2022 (AWQI # 160685)	**Total Coliform**	**3**	**colony forming units per 100 millilitres**	**Flush Mains and Resample**	**November 17, 2022**
November 20, 2022 (AWQI # 160723)	**Total Coliform**	**6**	**colony forming units per 100 millilitres**	**Flush Mains and Resample**	**November 20, 2022**

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 (minimum #) - (maximum #)	Range of Total Coliform Results (minimum #) - (maximum #)	Number of HPC Samples	Range of HPC Results (minimum #) - (maximum #)
Raw	**N/A**				
Treated	**N/A**				
Distribution	**1,854**	**0**	**0 – 84**	**613**	**0 - 1,820**

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

	Number of Grab Samples	Range of Results (minimum #)-(maximum #) (in milligrams per litre)
Turbidity	**Not applicable**	
Chlorine	**8,760 (Chlorine Analyzer)** **4,367 (Grab)**	**Combined: 0.22.mg/L – 1.97**
Fluoride (If the DWS provides fluoridation)	**Not applicable**	

NOTE: For continuous monitors use 8760

*NOTE: Record the unit of measure if it is **not** milligrams per litre.*

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 Sampled	Result	Unit of Measure
N/A				

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

Parameter	Sample Date	Result Value (measured in micrograms per litre)	Exceedance
Antimony	April 28, 2022	less than 0.05	No
Arsenic	April 28, 2022	less than 1.0	No
Barium	April 28, 2022	less than 2.0	No
Boron	April 28, 2022	less than 10.0	No
Cadmium	April 28, 2022	less than 0.090	No
Chromium	April 28, 2022	less than 5.0	No
*Lead	See Summary Below		
Mercury	April 28, 2022	less than 0.01	No
Selenium	April 28, 2022	less than 2.0	No
Sodium	Not applicable		
Uranium	April 28, 2022	less than 0.10	No
Fluoride	Not applicable		
Nitrite	November 29, 2022	less than 10.0	No
Nitrate	November 29, 2022	470	No

*Summary of Lead testing under Schedule 15.1 during this reporting period

(applicable to the following drinking water systems; large municipal residential systems**,** small municipal residential systems, and non-municipal year-round residential systems)

Location Type	Number of Samples	Range of Lead Results (minimum to maximum)	Number of Exceedances
Plumbing	0	Not applicable	Not applicable
Distribution	20	Minimum was less than 0.0005 milligrams per litre Maximum was less than 0.0005 milligrams per litre	0

The City of Markham was granted relief from regulatory requirements contained in Schedule 15.1 of O. Reg. 170/03. This includes no lead testing from plumbing servicing of private residences, no lead testing from plumbing servicing non-residential buildings and reduced lead testing from distribution locations (10 per period). This reduced sampling was granted for the two periods of sampling in 2022, December 15, 2021 to April 15, 2022 and June 15, 2022 to October 15, 2022.

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

Parameter	Sample Date	Result Value (measured in micrograms per litre)	Exceedance
Alachlor	April 29, 2022	less than 0.50	No
Atrazine + Metobolites	April 29, 2022	less than 1.0	No
Azinphos-methyl (Guthion)	April 29, 2022	less than 2.0	No
Benzene	April 29, 2022	less than 0.10	No
Benzo(a)pyrene	April 29, 2022	less than 0.0050	No
Bromoxynil	April 29, 2022	less than 0.50	No
Carbaryl	April 29, 2022	less than 5.0	No
Carbofuran	April 29, 2022	less than 5.0	No
Carbon Tetrachloride	April 29, 2022	less than 0.10	No
Chlorpyrifos	April 29, 2022	less than 1.0	No
Diazinon	April 29, 2022	less than 1.0	No
Dicamba	April 29, 2022	less than 1.0	No
1,2-Dichlorobenzene	April 29, 2022	less than 0.20	No
1,4-Dichlorobenzene	April 29, 2022	less than 0.20	No
1,2-Dichloroethane	April 29, 2022	less than 0.20	No
1,1-Dichloroethylene	April 29, 2022	less than 0.10	No
Dichloromethane	April 29, 2022	less than 0.50	No
2-4 Dichlorophenol	April 29, 2022	less than 0.25	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	April 29, 2022	less than 1.0	No
Diclofop-methyl	April 29, 2022	less than 0.90	No
Dimethoate	April 29, 2022	less than 2.5	No
Diquat	April 29, 2022	less than 7.0	No
Diuron	April 29, 2022	less than 10.0	No
Glyphosate	April 29, 2022	less than 10.0	No
Haleoacetic Acids (HAA)	Running Annual Average of Quarterly Results	less than 5.08	No
Malathion	April 29, 2022	less than 5.0	No
Metolachlor	April 29, 2022	less than 0.5	No
Metribuzin	April 29, 2022	less than 5.0	No
Monochlorobenzene	April 29, 2022	less than 0.10	No

Nitrosodimethylamine (NDMA)	**Running Annual Average of Quarterly Results**	**0.0012**	**No**
Paraquat	**April 29, 2022**	**less than 1.0**	**No**
Pentachlorophenol	**April 29, 2022**	**less than 0.50**	**No**
Phorate	**April 29, 2022**	**less than 0.50**	**No**
Picloram	**April 29, 2022**	**less than 5.0**	**No**
Polychlorinated Biphenyls(PCB)	**April 29, 2022**	**less than 0.05**	**No**
Prometryne	**April 29, 2022**	**less than 0.25**	**No**
Simazine	**April 29, 2022**	**less than 1.0**	**No**
THM (NOTE**:** show latest annual average**)**	**Running Annual Average of Quarterly Results**	**9.79**	**No**
Terbufos	**April 29, 2022**	**less than 0.50**	**No**
Tetrachloroethylene	**April 29, 2022**	**less than 0.10**	**No**
2,3,4,6-Tetrachlorophenol	**April 29, 2022**	**less than 0.50**	**No**
Triallate	**April 29, 2022**	**less than 1.0**	**No**
Trichloroethylene	**April 29, 2022**	**less than 0.10**	**No**
2,4,6-Trichlorophenol	**April 29, 2022**	**less than 0.05**	**No**
Trifluralin	**April 29, 2022**	**less than 1.0**	**No**
Vinyl Chloride	**April 29, 2022**	**less than 0.20**	**No**
MCPA	**April 29, 2022**	**less than 10.0**	**No**

List any Inorganic or Organic parameter(s) that exceeded half the standard prescribed in Schedule 2 of Ontario Drinking Water Quality Standards.

Parameter	Result Value	Unit of Measure	Date of Sample
None			