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: Drinking-Water System Name: Drinking-Water System Owner: Drinking-Water System Category:

Period being reported:

| 220004162 |
|--|
| Markham Distribution System |
| The Corporation of the City of Markham |
| Large Municipal Residential System |
| January 1, 2022 to December 31, 2022 |

<u>Complete if your Category is Large Municipal</u> 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.

- <u>www.markham.ca</u>
- 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 []

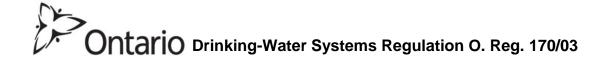
Note: For the following tables below, additional rows or columns may be added or an appendix may be attached to the report

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.

| ~ 5 · · | |
|--|--|
| [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 |



<u>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</u>

| Spins Action Co | | D 14 | TT 14 P | O 43 | C 4: 4 4: |
|----------------------------|-----------------------|-----------|------------------------------|--------------|-------------------|
| Incident Date and | Parameter | Result | Unit of | Corrective | Corrective Action |
| AWQI# | | | Measure | Action | Date |
| January 31, 2022 | Combined | 0.22 | milligrams | Flush Mains | January 31, 2022 |
| (AWQI # 157748) | Chlorine | | per litre | and Resample | |
| June 14, 2022 | Total Coliform | No Data, | colony | Flush Mains | June 14, 2022 |
| (AWQI # 158688) | E. coli | Overgrown | forming | and Resample | |
| | | | units per 100 | _ | |
| | | | millilitres | | |
| July 12, 2022 | Total Coliform | 1 | colony | Flush Mains | July 12, 2022 |
| (AWQI # 159112) | | | forming | and Resample | , |
| (= , , (= , , == , | | | units per 100 | r | |
| | | | millilitres | | |
| August 16, 2022 | Total Coliform | No Data, | colony | Flush Mains | August 16, 2022 |
| (AWQI # 159578) | E. coli | Overgrown | forming | and Resample | 114gust 10, 2022 |
| (1111 Q1 // 155510) | | | units per 100 | and Resumpte | |
| | | | millilitres | | |
| September 13, 2022 | Total Coliform | No Data, | colony | Flush Mains | September 13, |
| (AWQI # 159965) | E. coli | Overgrown | forming | | 2022 |
| (AWQ1#159905) | L. con | | O | and Resample | 2022 |
| | | | units per 100 millilitres | | |
| C 4 1 12 2022 | T | | | TH. 1.34. | 0 1 12 |
| September 13, 2022 | Total Coliform | 2 | colony | Flush Mains | September 13, |
| (AWQI # 159966) | | | forming | and Resample | 2022 |
| | | | units per 100 | | |
| | | | millilitres | | |
| September 13, 2022 | Total Coliform | 6 | colony | Flush Mains | September 13, |
| (AWQI # 159967) | | | forming | and Resample | 2022 |
| | | | units per 100 | | |
| | | | millilitres | | |
| November 11, 2022 | Total Coliform | 84 | colony | Flush Mains | November 11, |
| (AWQI # 160635) | | | forming | and Resample | 2022 |
| | | | units per 100 | | |
| | | | millilitres | | |
| November 14, 2022 | Total Coliform | 2 | colony | Flush Mains | November 14, |
| (AWQI # 160645) | | | forming | and Resample | 2022 |
| , | | | units per 100 | _ | |
| | | | millilitres | | |
| November 15, 2022 | Total Coliform | 2 | colony | Flush Mains | November 15, |
| (AWQI # 160672) | | | forming | and Resample | 2022 |
| | | | units per 100 | | |
| | | | millilitres | | |
| November 15, 2022 | Total Coliform | No Data, | colony | Flush Mains | November 15, |
| (AWQI # 160673) | E. coli | Overgrown | forming | and Resample | 2022 |
| (1111 (111 100013) | | | Torining | and Resample | |

| | | | 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.

| periou covered by | 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 | |

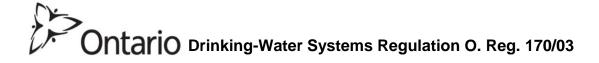
| NOTE: For | |
|-------------------|--|
| continuous | |
| monitors use 8760 | |

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 | Parameter | Date Sampled | Result | Unit of Measure |
|--------------------------|-----------|--------------|--------|-----------------|
| issued | | | | |
| N/A | | | | |



<u>Summary of Inorganic parameters tested during this reporting period or the most</u> recent sample results

| <u>Parameter</u> | Sample Date | Result Value | Exceedance |
|------------------|-------------------|------------------------------------|------------|
| | | (measured in micrograms per litre) | |
| 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)

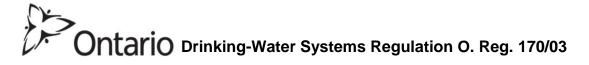
| Location Tyme | Number of | Range of Lead Results | Number of |
|----------------------|-----------|--|----------------|
| Location Type | Samples | (minimum to maximum) | Exceedances |
| Plumbing | 0 | Not applicable | Not applicable |
| Distribution | 20 | Minimum was less than 0.0005 milligrams 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.



<u>Summary of Organic parameters sampled during this reporting period or the most recent sample results</u>

| Parameter | Sample Date | Result Value | Exceedance |
|---|-------------------------|-----------------------|-------------|
| | | (measured in | |
| | | micrograms per litre) | |
| 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 |
| Parameter | Sample Date | Result Value | Exceedance |
| | <u></u> | (measured in | |
| | | micrograms per litre) | |
| Haleoacetic Acids (HAA) | Running | less than 5.08 | No |
| | Annual | | |
| | Average of Quarterly | | |
| | Results | | |
| 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 | Running | 0.0012 | No |
| (NDMA) | Annual | | |
| | Average of | | |
| | Quarterly Results | | |
| | | | |



| 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 |

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

| Parameter | Result Value | Unit of Measure | Date of Sample |
|-----------|--------------|-----------------|----------------|
| None | | | |