



MEMO / NOTE DE SERVICE

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TO: Mayor and Members of Council

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SUBJECT: **MUNICIPAL DRINKING WATER SYSTEMS – 2020 SUMMARY REPORTS**

OBJET : **RÉSEAUX MUNICIPAUX D'ALIMENTATION EN EAU POTABLE –
RAPPORTS SOMMAIRES DE 2020**

EXECUTIVE SUMMARY

The purpose of this memorandum is to provide Members of Council with the City of Ottawa's 2020 Drinking Water Summary Reports in fulfillment of Schedule 22 of O.Reg.170/03, which requires a Summary Report be prepared annually and circulated to

all Members of the Municipal Council by March 31st of the following calendar year. The report also satisfies the requirement that Owners of municipal drinking water systems “be informed,” as part of their responsibilities under the Standard of Care (Section 19) of the *Safe Drinking Water Act (2002)*.

The report is based on the operational period from January 1st, 2020 to December 31st, 2020, and reviews the eight municipal water systems owned and/or operated by the City of Ottawa:

- Britannia Water Purification Plant
- Lemieux Island Water Purification Plant
- Carp Drinking Water System
- Kings Park (Richmond) Drinking Water System
- Richmond West (Richmond) Drinking Water System
- Munster Hamlet Drinking Water System
- Shadow Ridge (Greely) Drinking Water System
- Vars Drinking Water System

This report details all aspects of Ottawa’s municipal drinking water systems including operational performance, water quality, flowrates, capital projects, inspections, regulatory requirements, and any items of non-compliance noted during the year. A thorough review of Licenses, Permits, Regulations, and Ministry Inspection Reports indicates that Ottawa residents were provided with safe drinking water during 2020.

In preparation of this report, technical staff intensively reviewed 35 sets of regulatory requirements for each of Ottawa’s eight municipal water systems. Some notable highlights and challenges experienced during 2020 are summarized below.

- **COVID-19 response measures** – primarily related to the protection of our essential workers that operate and maintain our drinking water systems. During 2020, there were no positive cases of COVID19 for the 282 staff that work in drinking water. A number of operational measures were implemented including: rotating maintenance crews, PPE, physical distancing, air/ventilation improvements, shift-change procedures, self-screening, disinfection of work surfaces, and staff isolation while awaiting test results. Through these efforts, an uninterrupted supply of safe drinking water was delivered to Ottawa residents throughout 2020.

- **Customer sampling/testing during COVID restrictions** – water sampling and testing activities were modified during 2020 in order to better protect staff and Ottawa residents. Routine sampling sites were shifted to water facility locations without public access or person-to-person contact. All in-home water quality testing activities were suspended on March 16th, 2020. Modified procedures were adopted to test water quality without entering the resident’s home. In this way, a total of 682 customer inquiries and complaints were handled during the year. Regulatory relief was granted to the City of Ottawa for testing that required in-home sampling, such as Community Lead Testing.
- **Water quality monitoring** – during 2020, more than 100,000 laboratory and operational tests were conducted to ensure the safety of Ottawa’s drinking water supply. The monitoring program includes 75 continuous analyzers and 8 laboratories analyzing more than 315 test parameters. The results confirm that Ottawa residents continue to be supplied with high quality drinking water.
- **Annual Inspection Ratings** – Ottawa’s municipal water systems were inspected during 2020 and all eight systems achieved an excellent rating of 100% by Ontario’s Chief Drinking Water Inspector.
- **Radioactivity in the Ottawa River** – the City’s extensive radioactivity monitoring program at both treatment plants did not detect any radiological impacts from upstream activities such as Chalk River. Ottawa’s drinking water met all safe drinking water standards for radiological parameters. As a means of protecting our source water, technical staff are actively engaged in reviewing and providing comments on the proposed Near Surface Disposal Facility at Chalk River.
- **Regulatory compliance** – Ottawa’s municipal water systems complied with all drinking water regulatory requirements with the exception of (2) items of minor non-compliance. These non-compliance items were technical and/or administrative in nature and did not affect the quality of drinking water supplied to the public.
- **Water production rates** – each day, an average of 288 million litres of drinking water was treated and distributed to Ottawa residents and businesses, which represents a small fraction of the Ottawa River flow (0.27 %).
- **Drinking Water Advisories** – during 2020, four Boil Water Advisories were issued by the Medical Officer of Health for localized areas of the water distribution system, in total affecting 75 households and 2 commercial buildings. All four advisories were issued on a precautionary basis and were lifted once confirmation that water quality was not impacted.

- **Emerging issues in drinking water** – a number of substances were highlighted in the media such as: microplastics, PFAS compounds, pharmaceuticals, and radioactivity. In all cases, test results from Ottawa’s monitoring program demonstrated the safety of Ottawa’s drinking water supply. Ottawa continues to be an industry leader in monitoring, evaluating, and responding to emerging issues in water quality.

The City remains committed to continually improving our water supply through research, process optimization, quality management, public reporting, and diligence in complying with provincial regulations and Health Canada guidelines for safe drinking water.

RÉSUMÉ

La présente note de service vise à fournir aux membres du Conseil municipal les rapports sommaires de 2020 de la Ville d’Ottawa sur l’eau potable, en application de l’annexe 22 du Règlement de l’Ontario 170/03, qui exige que, chaque année, des rapports sommaires soient préparés et remis aux membres du Conseil au plus tard le 31 mars de l’année civile suivante. Ces rapports répondent aussi à l’exigence selon laquelle les propriétaires de réseaux municipaux d’eau potable doivent être tenus informés, dans le cadre de leurs responsabilités en lien avec l’article 19 (degré de diligence) de la *Loi de 2002 sur la salubrité de l’eau potable*.

Les rapports couvrent la période qui va du 1^{er} janvier au 31 décembre 2020, et portent sur les huit réseaux municipaux d’eau potable qui appartiennent à la Ville d’Ottawa ou qui sont exploités par elle, soit :

- Usine de purification de l’eau de Britannia
- Usine de purification de l’eau de l’île Lemieux
- Réseau d’eau potable de Carp
- Réseau d’eau potable de Kings Park (Richmond)
- Réseau d’eau potable de Richmond Ouest (Richmond)
- Réseau d’eau potable de Munster Hamlet
- Réseau d’eau potable de Shadow Ridge (Greely)
- Réseau d’eau potable de Vars

Par ailleurs, les rapports détaillent tous les aspects des réseaux municipaux d’eau potable, notamment le rendement opérationnel, la qualité de l’eau, le débit, les projets

d'immobilisations, les inspections, les exigences réglementaires, ainsi que les points de non-conformité relevés au cours de l'année. Un examen rigoureux des licences, permis, règlements et rapports d'inspection du ministère a montré que l'eau potable consommée par les résidents d'Ottawa en 2020 était salubre.

Lors de la préparation des rapports, le personnel technique a examiné 35 séries d'exigences réglementaires visant les huit réseaux municipaux d'eau potable. Voici certains des principaux points forts et points à améliorer relevés en 2020.

- **Mesures d'intervention pour la COVID-19** : Ces mesures visaient principalement la protection de nos travailleurs essentiels qui exploitent ou entretiennent nos réseaux d'eau potable. En 2020, aucun cas positif de COVID-19 n'a été déclaré parmi les 282 employés responsables de la gestion de l'eau potable. Plusieurs mesures opérationnelles ont été mises en œuvre, dont la rotation des équipes d'entretien, le port d'EPI, la distanciation physique, l'amélioration de l'aération ou de la ventilation, les procédures de changement de quarts de travail ou de personnel, l'autodépistage, la désinfection des surfaces de travail et l'isolement des employés en attente d'un résultat de test de dépistage. Grâce à l'application de toutes ces mesures, un approvisionnement ininterrompu en eau potable salubre a été assuré aux résidents d'Ottawa tout au long de l'année 2020.
- **Échantillonnages et analyses effectués à domicile durant l'application des restrictions liées à la COVID-19** : Les activités d'échantillonnage et d'analyse ont été modifiées en 2020 afin de protéger le personnel et les résidents d'Ottawa. Les sites d'échantillonnage ont été démenagés dans des installations d'approvisionnement en eau dont l'accès au public était interdit, tout comme les contacts entre personnes. Toutes les activités d'analyse de la qualité de l'eau à domicile ont été suspendues le 16 mars 2020. Des modifications ont été adoptées pour que les analyses de qualité de l'eau puissent être effectuées sans entrer dans les résidences. À cet égard, quelque 682 demandes d'information et plaintes de la part des clients ont été traitées en cours d'année. Un assouplissement des règles a été accordé à la Ville d'Ottawa pour les analyses qui nécessitaient un prélèvement d'échantillon dans les résidences, notamment dans le cadre du Programme d'analyse de la teneur en plomb de l'eau potable dans les collectivités.
- **Surveillance de la qualité de l'eau** : En 2020, plus de 100 000 analyses en laboratoire et vérifications du fonctionnement ont été effectuées pour assurer la salubrité de l'eau potable distribuée à Ottawa. Le programme de surveillance

comprend 75 analyseurs continus et 8 laboratoires qui analysent plus de 315 paramètres. Les résultats confirment que les résidents d'Ottawa continuent d'avoir accès à une eau potable de qualité.

- **Notes d'inspections annuelles** : Les huit réseaux municipaux d'eau potable d'Ottawa ont été inspectés en 2020 et l'inspecteur en chef de l'eau potable de l'Ontario leur a tous accordé une note parfaite, 100 %.
- **Radioactivité dans la rivière des Outaouais** : Le vaste programme de surveillance de la radioactivité mené par la Ville aux deux usines de traitement n'a pas détecté d'incidences radiologiques provenant des activités menées en amont, notamment à Chalk River. L'eau potable d'Ottawa satisfaisait à toutes les normes de salubrité de l'eau potable en ce qui a trait aux paramètres radiologiques. Afin d'assurer la protection de notre eau de source, le personnel technique est à pied d'œuvre pour étudier et commenter le projet d'installation de gestion des déchets près de la surface à Chalk River.
- **Conformité aux règlements** : Les réseaux d'Ottawa répondent à toutes les exigences réglementaires en matière d'eau potable; seuls deux points de non-conformité mineurs ont été relevés. Il s'agit de points de nature technique ou administrative, et n'ont donc pas affecté la qualité de l'eau potable distribuée au public.
- **Taux de production d'eau** : Chaque jour, un volume moyen de 288 millions de litres d'eau potable a été traité et acheminé aux résidents et aux entreprises d'Ottawa, ce qui représente une faible proportion (0,27 %) du débit de la rivière des Outaouais.
- **Avis d'ébullition de l'eau** : En 2020, la médecin chef en santé publique a émis quatre avis d'ébullition de l'eau dans des secteurs précis du réseau de distribution; en tout, ils ont touché 75 ménages et deux 2 édifices commerciaux. Les quatre avis étaient de nature préventive et ont été levés une fois que les analyses ont confirmé que la qualité de l'eau n'avait pas été altérée.
- **Nouvelles préoccupations en matière d'eau potable** : Les médias ont signalé la présence de plusieurs substances préoccupantes, soit les microplastiques, les composés perfluoroalkylés, les produits pharmaceutiques et les produits radioactifs. Dans tous les cas, les résultats des analyses effectuées dans le cadre du programme de surveillance ont confirmé la salubrité de l'eau potable. Dans le secteur, Ottawa demeure un chef de file en matière de surveillance, d'évaluation et de résolution des problèmes émergents qui concernent la qualité de l'eau.

La Ville demeure résolue à améliorer de façon continue l'approvisionnement en eau, par la recherche, l'optimisation des processus, la gestion de la qualité, les rapports publics et le respect diligent de la réglementation provinciale et des directives de Santé Canada concernant la salubrité de l'eau potable.

DISCUSSION

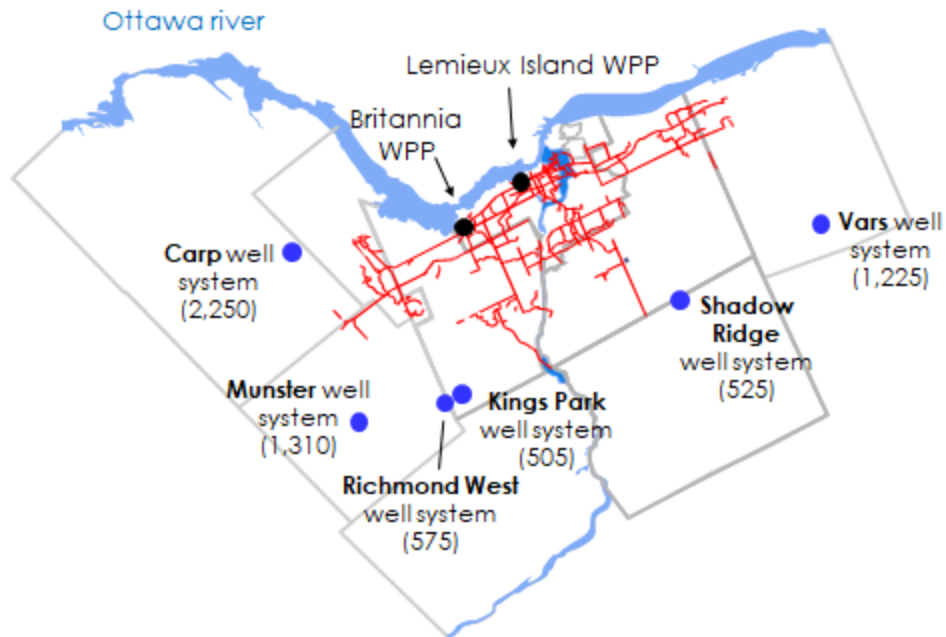
Description of Ottawa's Water Supply

The City of Ottawa provides treatment, storage, and distribution of drinking water to approximately 934,000 residents, businesses, and institutions. The central water system supplies roughly 90% of Ottawa's population and includes two surface water treatment plants, the Britannia Water Purification Plant (c.1961) and the Lemieux Island Water Purification Plant (c.1932). Both plants draw source water from the Ottawa River and utilize a multiple-barrier treatment process to remove microorganisms, particles, organic matter, and other impurities in order to produce safe drinking water for Ottawa residents and businesses.

Treated drinking water from both plants is pumped into a vast water distribution network that includes 14 pumping stations, 5 reservoirs, 4 elevated tanks, and over 3000 km of watermains. The total volume of water stored in reservoirs is 275 Million Litres, which is roughly equivalent to the daily amount of water consumed in Ottawa. All treatment, pumping, and storage systems are controlled by a dedicated computer control system and monitored by certified Water Treatment Operators 24 hours per day. The central system also provides a direct water supply to Russell Township.

In addition to the central water supply, the City operates six municipal well systems that provide drinking water to rural communities located in Carp, Richmond (Kings Park), Richmond West (West Development Lands), Munster, Greely (Shadow Ridge subdivision), and Vars. Collectively, these systems provide municipal water to approximately 1% of Ottawa's population, while approximately 9% use private wells.

The map below shows the layout of Ottawa's water supply and municipal well systems, with the service population for each system:



Regulation of Municipal Drinking Water

In Canada, municipal drinking water is regulated by provincial legislation, and governed by the Ministry of Environment, Conservation and Parks (MECP, or “Ministry”). In Ontario, the *Safe Drinking Water Act (2002)* was created in response to the waterborne outbreak in Walkerton in order to ensure the provision of safe drinking water throughout the province. Under the authority of the *Safe Drinking Water Act*, several key regulations for drinking water have been established:

- O.Reg.170/03 – Drinking Water Systems Regulation
- O.Reg.169/03 – Ontario Drinking Water Quality Standards
- O.Reg.248/03 – Drinking Water Testing Services
- O.Reg.128/04 – Certification of Drinking Water Systems Operators
- O.Reg.188/07 – Licensing of Municipal Drinking Water systems
- O.Reg.170/03 (Sch.15.1) – Community Lead Testing Program
- O.Reg.287/07 – Source Water Protection Regulation
- O.Reg.588/17 – Asset Management Planning for Municipal Infrastructure

These regulations cover all aspects of municipal water supply, including treatment requirements, quality standards, test frequency, operations and maintenance, operator qualifications, laboratory testing, inspections, reports, and public notification.

Regulatory directions for each municipal drinking water system are provided through O.Reg.170/03 and a combination of Licenses, Permits, Provincial Officer Orders, and Annual Inspections conducted by the Ministry. This report reviews the 2020 operational performance of Ottawa’s municipal water systems in comparison to these regulatory requirements.

License & Permits

In Ontario, all owners of municipal drinking water systems are required to obtain a Municipal Drinking Water License (MDWL) for each drinking water system. Each license is comprised of five elements: Permit To Take Water (PTTW), Drinking Water Works Permit (DWWP), Operational Plan, Accreditation as an Operating Authority, and a Financial Plan.

Municipal Drinking Water Licenses for each municipal system are issued for a 5-year period and renewed by the Ministry through a comprehensive application and review process every five years. On June 13th, 2019 the City received updated MDWL licenses and DWWP permits for all eight municipal water systems, as listed in the table below:

Table 1 – Ottawa’s Municipal Drinking Water Licenses and Permits

Water System	Municipal Drinking Water License No.	Drinking Water Works Permit No.	Permit to Take Water
Britannia Water Purification Plant	008-102	008-202	8782-8AEJKS
Lemieux Island Water Purification Plant	008-102	008-202	7340-BBHRLT
Carp Well System	008-101	008-201	2167-9PAN8Y
Kings Park Well System	008-103	008-203	8507-9PAHKL
Richmond West Well System	008-107	008-207	3821-AF9PUV
Munster Well System	008-104	008-204	4044-AASLU7
Vars Well System	008-108	008-208	5156-9HDRJ7

Water System	Municipal Drinking Water License No.	Drinking Water Works Permit No.	Permit to Take Water
Shadow Ridge Well System	008-106	008-206	1867- 8NAQXQ

Provincial Officer Orders and Regulatory Relief

At the City's request, the Ministry granted temporary relief for daily chlorine testing in the Vars distribution system, until new sample locations could be installed by March 31st, 2020. Regulatory relief was provided in the form of a Provincial Officer Order. The previous sample sites were decommissioned on December 12th, 2019 due to concerns about back-flow protection. In the interim, City staff are collecting chlorine measurements daily from a dedicated hydrant. Due to COVID-19, the plan for an alternate sampling location was put on hold and will resume once restrictions are lifted. In this way, chlorine levels are being routinely monitored in the system.

Results of Ministry Annual Inspections

Through the office of Ontario's Chief Drinking Water Inspector, each of Ottawa's municipal water systems undergoes an annual inspection by the Ministry. The inspection process is indeed comprehensive and includes approximately two days of on-site review with technical staff in each water system. It is important to note that each of the eight inspections require a significant amount of staff time (about 1 week) for the collection and submission of water quality data, documentation, and operating records.

The inspection focuses on regulatory compliance, plant operations, data records, process trends, operator certification, record keeping, and management practices over the past year. Following each inspection, the Ministry issues a full inspection report of findings, including a final Inspection Rating, which is a risk-weighted score derived from approximately 100 regulatory questions covering 15 operational categories.

The table below summarizes the annual inspection results for 2020, which include any Provincial Officer Orders, Non-Compliance Items, and Best Practice Recommendations, along with a final % Inspection Rating. During 2020, all water systems received an excellent inspection rating of 100%.

Table 2 – Summary of Ministry Annual Inspection Results for (8) Water Systems

System	Inspection Date	Prov. Officer Orders	Non-Compliance Items	Best Practice Items	Final Inspection Rating
Britannia	Feb. 12, 2021	0	0	0	100%
Lemieux	Jan. 21, 2021	0	0	0	100%
Carp	Oct 13, 2020	0	0	0	100%
Kings Park	Nov. 10, 2020	0	0	0	100%
Munster	Oct 13, 2020	0	0	0	100%
Richmond West	Nov. 10, 2020	0	0	0	100%
Shadow Ridge	Sept. 9, 2020	0	0	1	100%
Vars	Sept. 9, 2020	0	0	1	100%

The best practice recommendation noted in the Shadow Ridge and Vars reports was to streamline the City’s log-book procedure and consolidate records into one on-site log sheet located at the well system. In response, City staff created a new single log-book for each well system, which was implemented in December, 2020.

Compliance with Drinking Water Regulations

The primary purpose of this report is to review Ottawa’s compliance with provincial drinking water regulations during the period January 1st to December 31st, 2020. To achieve this, a staff team of engineers, technologists, and managers spend approximately 2-3 weeks each year during Q1 to conduct a comprehensive review of operational performance of each water system in relation to 35 categories of regulatory requirements.

Each year, staff prepare a detailed compliance tracking table for each municipal water system, listing all 35 categories of regulatory requirements in comparison to results achieved during the previous year. A summary table of compliance for all (8) water systems is presented in Document 1. A quick perusal of this table illustrates both the comprehensive nature of provincial drinking water regulations and the diligence of staff in measuring and tracking compliance.

During 2020, Ottawa’s municipal water systems met all regulatory requirements under Ontario’s *Safe Drinking Water Act* with the exception of (2) items noted below.

Items of Non-Compliance

During 2020, there were (2) incidents of non-compliance noted for Ottawa's municipal drinking water systems. Each incident is described below, including corrective actions taken and the impact on water quality.

(1) Chlorine residual in waste effluent outside target range at Britannia WPP – the continuous chlorine analyzer on the main drain recorded two events on April 29th with a measurement above the effluent chlorine target of <0.02 mg/L. The events lasted for 27 minutes and 20 minutes respectively, exceeding the 15 minute criteria. The events were the result of unstable standby power operations. In both events, the operator adjusted the sodium bisulphite dose to neutralize chlorine in the effluent, but the process took longer than 15 minutes to respond. These events were reviewed with technical staff and instructions were provided to plant operators to prevent future occurrences.

(2) Required number of distribution bacteriological samples were not achieved in Carp and Vars well systems: Due to COVID-19, sampling at some distribution locations was suspended to minimize contact with public and protect staff and residents. Therefore, only 8 bacteriological samples were taken during the months of May and September, while 9 monthly samples are required by regulations. In response, the Carp Fire Hall was added to provide an additional sample point for Carp, and the sample frequency at the Vars fire hydrant was increased to meet regulatory requirements. This minor correction had no impact on drinking water quality.

In each case, staff took corrective actions to promptly address each of the non-compliance issues. Most importantly, the non-compliance incidents noted were technical and/or administrative in nature and did not affect the quality of drinking water supplied to the public.

Impact of COVID-19 on water operations

During 2020, drinking water operations were required to respond to COVID-19 restrictions, primarily in relation to protecting the essential workers that operate and maintain our drinking water systems. Since the start of the pandemic, there have been no positive cases of COVID19 for the 282 staff that work in drinking water.

A number of operational measures were implemented including: rotating maintenance crews, PPE, physical distancing, air/ventilation improvements, shift-change procedures, self-screening, disinfection of work surfaces, and staff isolation while awaiting test results.

Through these efforts, an uninterrupted supply of safe drinking water was delivered to Ottawa residents throughout 2020.

In addition, water quality sampling and testing activities were modified during 2020 in order to better protect staff and Ottawa residents. Routine sampling sites were shifted to water facility locations without public access or person-to-person contact. All in-home water quality testing activities were suspended on March 16th, 2020. Modified procedures were then adopted to test water quality without entering the resident's home. In this way, a total of 682 customer inquiries and complaints were handled during the year. Regulatory relief was granted to the City of Ottawa for testing that required in-home sampling, such as Community Lead Testing.

Regulatory relief due to COVID19 restrictions

In March of 2020, as a result of the COVID-19 pandemic, all in-home lead sampling was suspended in order to protect both residents and City staff. Since the MECP lead sampling requires water operators to enter the resident's home to conduct testing, the City of Ottawa applied for and received regulatory relief for the winter and summer sessions of lead sampling in the Richmond West well system (Dec 15, 2019 – Apr 15, 2020 and Jun 15 – Oct 15, 2020). Similarly, regulatory relief was granted for the summer session of lead testing in the central water system.

Water Quality

The Ontario Drinking Water System Regulation O.Reg.170/03 defines requirements for water quality sampling and testing based on categories of test parameters: microbiological, operational, inorganic, and organic. Water quality is carefully monitored from source-to-tap using on-line analyzers, field instruments, process lab instruments, Ottawa's ROPEC Laboratory, along with eight external laboratories that provide specialized water quality analysis. Certified operators and water quality technologists also perform routine water tests at over 70 sample locations throughout the distribution system (eg. pump stations, reservoirs, fire halls) and respond directly to customer inquiries and concerns about water quality.

In order to fully characterize drinking water quality, the City of Ottawa conducts additional testing for many other trace organic, inorganic, pharmaceutical, and radiological substances. In total, more than 100,000 water quality tests are conducted each year covering over 315 specific test parameters. Ottawa's water quality monitoring program is one of the most comprehensive in Canada and goes well beyond

the minimum regulatory requirements. All water quality test results are reported annually and posted on www.ottawa.ca for public awareness and transparency.

During 2020, all test results were well within safe drinking water standards, with any exceptions noted in the Adverse Water Quality Incident section of the report. All chemical and radiological test results (organic, inorganic, metals, radiological) were within the Maximum Acceptable Concentration (MAC) levels as per Ontario Drinking Water Standards.

As a general comparison of water quality, the table below shows 2020 test results for common parameters in each of Ottawa's municipal water systems. The test results are expressed as an average concentration measured in the treated drinking water. Differences between systems reflect the unique source waters used for treatment in each case (eg. groundwater well vs. river source):

Table 3 – Comparison table of water quality in Ottawa’s municipal water systems

	Units	Drinking water guideline	Britannia	Lemieux	Carp	Kings Park	Munster	Richmond West	Shadow Ridge	Vars
Physical										
Turbidity	NTU	5	0.06	0.05	0.70	0.39	0.39	0.32	0.03	0.25
Temperature	°C	15	10.1	11.0	10.9	10.1	10.4	10.5	9.3	11.4
Conductivity	µmhos/cm		148	152	623	1174	880	717	890	541
Microbiological (number of exceedances)										
Total coliforms	cfu/100mL	0	0	0	0	0	0	0	0	0
E.coli	cfu/100mL	0	0	0	0	0	0	0	0	0
HPC bacteria	cfu/mL	500	0	0	0	0	0	1	0	0
Chemical										
pH	log ₁₀	7.0 – 10.5	9.41	9.47	7.92	7.39	7.58	7.70	7.65	7.71
Alkalinity	mg/L	30 – 500	31	31	214	275	269	238	195	223
Total Hardness	mg/L	80 - 100	32	33	197	374	285	296	320	228
Calcium	mg/L		9.2	9.4	51.5	81.2	61.5	75.8	90.4	70.5
Magnesium	mg/L		2.2	2.3	16.7	41.1	31.8	25.9	22.8	12.6
Potassium	mg/L		0.7	0.7	4.7	6.5	5.4	3.2	3.2	3.9
Chloride	mg/L	250	5.5	5.5	54.2	177.9	80.5	63.0	108.8	19.5
Fluoride	mg/L	1.5	0.68	0.68	0.55	0.41	0.64	0.27	0.05	0.14
Phosphate	mg/L		0	0	0.05	0	0	0	0	0.02
Sodium	mg/L	20 / 200	18.2	19.6	58.5	96.6	79.1	37.1	59.3	27.7
Sulphate	mg/L	500	23.2	23.5	29.0	57.2	71.1	44.4	87.7	34.6
Nitrate	mg/L	10	0.15	0.15	0	0	0	0	3.18	0
Nitrite	mg/L	1	0	0	0	0	0	0	0	0
Iron	mg/L	0.3	0	0	0.01	0.48	0.23	0.20	0	0.02
Manganese	mg/L	0.12	0	0	0.02	0.02	0.01	0.01	0	0.02
Trihalomethanes	mg/L	100	30.9	37.3	43.7	8.2	52.7	29.1	3.7	14.1
Haloacetic acids	mg/L	80	23.2	30.8	14.4	2.8	17.3	5.6	0	9.4
Radiological										
Alpha activity	Bq/L	0.5	<0.04	<0.04	<0.10	0.12	<0.10	<0.10	<0.10	<0.10
Beta activity	Bq/L	1.0	<0.10	<0.10	<0.10	0.20	<0.10	<0.10	<0.10	0.11
Tritium	Bq/L	7000	2.4	2.3	1.2	1.2	1.1	<1.1	1.8	<1.1

Note: < indicates below laboratory detection limit

Overall, the 2020 test results demonstrate that drinking water supplied from Ottawa’s municipal water systems was of high quality and met the Ontario Drinking Water Standards (O.Reg.169/03) and the Health Canada Guidelines for Canadian Drinking Water Quality.

For further details on water quality, please refer to the 2020 Annual Reports which are posted on the www.ottawa.ca website for each municipal water system. The website also provides a detailed Water Quality Summary Table for each water system, which lists for all test parameters analysed during the year.

Adverse Water Quality Incidents

O.Reg.170/03 identifies several “Indicators of Adverse Water Quality” for which the waterworks must immediately notify health officials and the Ministry. An Adverse Water Quality Incident (AWQI) refers to any operational measurement or laboratory test result that does not meet a provincial water quality standard. During 2020, there were a total of 14 AWQI results reported in Ottawa’s municipal water systems, which is similar to previous years and not unexpected given the size of the system and the number of tests conducted (100,000 tests per year). Of the 14 events, 12 occurred in the central water distribution system, and 2 in the Shadow Ridge well system.

For each Adverse Water Quality Incident (AWQI), City of Ottawa staff must immediately notify the Ottawa Public Health Department and the Ministry as required by regulations. Corrective actions, re-sampling, reporting, and documentation are required in each case.

The AWQI events for 2020 are summarized in the table below for laboratory test results and operational field measurements, including corrective actions taken and resolution of the incident.

Table 4 – Summary of 2020 Adverse Water Quality Incidents (AWQI)

Test parameter and number of occurrences	Summary of Reported Events
Total coliform bacteria (6 samples)	<ul style="list-style-type: none"> • (3) routine samples following watermain breaks in the distribution system, re-samples were clear; • (1) sample from a temporary service line, re-samples were clear; • (2) routine distribution samples in Shadow Ridge well system, re-samples were clear;

Low chloramine <0.25 mg/L
(4 events)

- (2) events due to a closed valve in distribution system; valve opened, and the system flushed;
- (2) events due to low water flow in watermain near Carlsbad Springs; system was flushed;

Improperly disinfected water
directed to system
(4 events)

- (1) backflow event of a private irrigation system pushing air into the central distribution system; Boil Water Advisory issued until area flushed and clear results obtained;
 - (1) water service pipe installed without proper disinfection. Boil Water Advisory was issued until area flushed and clear results obtained;
 - (1) low water pressure event in the Pinecrest area during a plant shutdown;
 - (1) broken sewer pipe found near repair site of broken watermain; Boil Water Advisory was issued until clear test results obtained;
-

For the AWQI events observed during 2020, there were no indications of unsafe drinking water being directed to residents. In a few cases, drinking water advisories were issued as a precaution to warn residents until water quality could be verified as safe.

For further details on AWQI events, please refer to the 2020 Annual Report for each municipal water system, which are posted on www.ottawa.ca.

Drinking Water Advisories

Advisories are issued by Ottawa's Medical Officer of Health in consultation with Water Services, in cases where there is potential for contamination of the drinking water supply. In most cases, advisories are issued on a precautionary basis rather than in response to evidence of contamination. Drinking Water Advisories are typically in effect for several days and help to safeguard public health until water quality tests can be taken to verify safe drinking water.

During 2020, there were four Drinking Water Advisories (DWA) issued for localized portions of the water distribution system. The four events are summarized below:

Erie Ave watermain break (February 20th, 2020) - this event occurred as result of a broken sewer pipe that was observed in the excavation during a watermain break repair on Simpson Road. Since this represented a Category 3 main break, Ottawa Public Health issued a precautionary boil water advisory for the localized portion of the distribution

system that was isolated for the watermain repair. The advisory affected approximately 15 households and was lifted after three days once two sets of clear bacteriological samples were obtained.

797 Richmond Rd (April 16th, 2020) – A broken watermain on Richmond Rd at Cleary was isolated and depressurized for over 24 hours before it could be repaired, affecting the water supply to a dental office. A precautionary Boil Water Advisory was issued until clear bacteriological test results were obtained.

Smoketree Crescent (October 30th, 2020) – this event was a result of an irrigation system that was being “blown out” for winter at a private residence and improper valving inside the home caused air to be pushed into the central system. A precautionary Boil Water Advisory was issued for approximately 60 homes. The advisory was lifted after 1 day after the system was flushed and clear bacteriological test results were obtained.

Fifth Avenue (November 23rd, 2020) – a portion of pipe to be installed on the water service to a commercial building was left unattended overnight and was not re-disinfected before installation as required by regulation. A precautionary Boil water was issued for the building which contained two restaurants, a bakery and a dental office. The advisory was lifted after two days, once clear bacteriological test results were received.

In each case, as soon as clear water quality test results were obtained, the advisories were lifted and residents were directly notified. It is important to note that all advisories were issued on a precautionary basis and there was no evidence of contamination in the water supply.

Lead in Drinking Water

The City of Ottawa's treated drinking water is lead-free. The watermains throughout the distribution system are also lead-free. Trace amounts of lead, however, can be dissolved in water as it travels through a lead service line or when it comes in contact with household plumbing components such as lead solder and brass fittings. The water service line refers to the small pipe that transports water from the watermain to the house. It is estimated that there are approximately 30,000 homes in Ottawa, built prior to 1955, that are currently supplied with a lead service pipe. Each year, City staff conduct testing every winter and summer in these older homes to verify lead concentrations in household tap water. For regulatory purposes, two 1-Litre samples are taken from the customer's tap following a 30-minute stagnation period.

For decades, the City's water treatment process has included corrosion control using pH adjustment to minimize the dissolution of metals from household plumbing and fixtures. As a result, Ottawa lead concentrations have consistently met the Ontario regulatory standard of 10 (ppb) measured at the customer's tap. However, in March 2019, Health Canada lowered the acceptable concentration to 5 ppb for lead in drinking water due to increasing concerns about health effects in children. It is expected that Ontario will lower the provincial lead standard from 10 ppb to 5 ppb accordingly, although an implementation date has not yet been announced.

Over twenty-five rounds of testing between 2007 – 2020, the average lead concentrations measured in older Ottawa homes with lead supply pipes are 2.5 (ppb) parts per billion in Litre-1 and 2.6 (ppb) in Litre-2. The 90th percentile concentrations are 4.3 (ppb) and 5.4 (ppb) in Litre-1 and Litre-2 respectively. The 90th percentile lead concentrations comply with the current Ontario Drinking Water Standard of 10 (ppb) for lead in drinking water but would be slightly above the revised Health Canada guideline of 5 ppb. Accordingly, a strategy has been developed to address the more stringent health target of 5 ppb. Following a 4-year pilot study (2015 – 2018), the City has decided to implement a new corrosion control strategy with the addition of low-level phosphate. The City is currently in the design phase and is hoping to implement this new treatment strategy in 2022.

The City has also renewed and expanded its Lead Pipe Replacement Program (LPRP) to better assist homeowners in replacing their lead service pipes. The revised program was approved by Council on September 25th, 2019 and between February and March 5,300 out of 30,000 letters were mailed out to affected homeowners for the program launch in April 2020. Due to COVID-19 restrictions and the suspension of in-home testing, letter mail-outs were put on hold until spring 2021. In the interim period, City staff used a modified sample procedure to measure tap water lead concentrations for 460 homes. In addition, residents have been provided with phone and website advice on practical measures to minimize their exposure to lead from drinking water.

Partnership with Ottawa Public Health

Ottawa Public Health is a key partner in the provision of safe drinking water for Ottawa residents and businesses. Over the years, a strong relationship has developed between Water Services and OPH to review and respond to potential risks related to drinking water, such as drinking water advisories. Both Water Services and OPH maintain a 24/7 response system to address potential water quality issues. In the event of a water emergency or Adverse Water Quality Incident, procedures are in place to ensure close

cooperation between the Medical Officer of Health, the City of Ottawa, and the Ministry to provide effective communication and protection of public health.

To maintain continuity and responsiveness, Water Services and OPH staff meet bi-monthly to review water quality test results, adverse incidents, communication protocols, and potential risks of new and emerging issues in drinking water. In addition, a formal meeting is held each year during Q2 to review the water quality results achieved over the last year. The joint review meeting for 2020 was held virtually on June 11th.

Flow Rates and System Capacity

The license and permit documents for each municipal water system set out maximum rates of water taking and treatment capacity. During 2020, all drinking water systems operated within the permitted volume and capacity limits. The table below shows the daily flowrates observed during 2020 including the average and maximum values, in relation to the system rated capacity.

Table 5 – Summary of 2020 water production rates vs. rated capacity

Water System	Average daily flow	Maximum daily flow	Rated capacity
Britannia Water Purification Plant	141.3 ML/d	225.7 ML/d	360 ML/d
Lemieux Water Purification Plant	146.5 ML/d	207.8 ML/d	400 ML/d
Carp Well System	592 m ³ /d	1356 m ³ /d	2782 m ³ /d
Kings Park Well System	147 m ³ /d	251 m ³ /d	2620 m ³ /d
Munster Well System	248 m ³ /d	555 m ³ /d	2160 m ³ /d
Richmond West Well System	164 m ³ /d	1238 m ³ /d	2420 m ³ /d
Shadow Ridge Well System	201 m ³ /d	455 m ³ /d	550 m ³ /d
Vars Well System	283 m ³ /d	591 m ³ /d	2290 m ³ /d

ML/d = Megalitres per day = Million Litres per day

During 2020, the combined flowrate from Britannia and Lemieux Island treatment plants was 287.8 ML/d which represents the water demand for Ottawa’s urban water supply. While this is a large volume of water, it represents only 0.27 % of the Ottawa River flowrate.

For a detailed table of 2020 water flowrates for each municipal water system, please refer to Document 2.

Financial Expenditures

For the City of Ottawa to maintain the safe and efficient operation of the waterworks, capital expenditures are required above baseline operating and maintenance costs. The

table below lists some of the major expenditures for upgrades and new capital investment in Ottawa’s municipal water systems during 2020:

Table 6 – 2020 Expenditures for Maintenance and Capital Improvements

System	Project	Time period
Britannia & Lemieux	<ul style="list-style-type: none"> • Chemical System Upgrades: (\$610,000) • G2 Generator Replacements (\$750,000) 	<ul style="list-style-type: none"> • 2016-2021 • 2019-2022
Britannia	<ul style="list-style-type: none"> • Settling Basin 4/5 Upgrade (\$7,200,000) • High-lift flowmeter replacement (\$800,000) • Roof Repair/Renewal Project (\$1,120,000) 	<ul style="list-style-type: none"> • 2020-2021 • 2018-2021 • 2020
Lemieux	<ul style="list-style-type: none"> • Plant Intake Functional Design (\$8.2 million) • Roof Repairs Waste Building (\$57,000) • Montreal Road Pump Station Upgrades (\$3.7 million) 	<ul style="list-style-type: none"> • 2016-2020 • 2020 • 2020-2022
Carp	<ul style="list-style-type: none"> • Diesel Pump (\$1,000,000) • Granular Activated Carbon treatment and Electrical Upgrades (\$4,900,000) 	<ul style="list-style-type: none"> • 2020-2021 • 2018-2021
Vars	<ul style="list-style-type: none"> • Process Equipment Upgrade (\$132,000) • GAC Tank Hatch Modifications (\$130,000) 	<ul style="list-style-type: none"> • 2020 • 2020-2021
Shadow Ridge	<ul style="list-style-type: none"> • New, Deeper Source Wells (\$1.6 million) 	<ul style="list-style-type: none"> • 2020-2022
Kings Park	<ul style="list-style-type: none"> • Electrical Service Upgrade (\$200,000) 	<ul style="list-style-type: none"> • 2020-2021

Source Water Protection

Under the authority of the Clean Water Act, the Source Water Protection Regulation O.Reg.287/07 was established to assess and manage potential contamination risks and protect source waters that are used for municipal drinking water supply. The City submitted its annual report on February 1st, 2021, to local Source Protection Authorities (Conservation Authorities) on the status of the Source Protection Plan policy implementation. The implementation of Risk Management Official activities and municipal activities is ongoing, and the City continues to be compliant with the requirements of the regulation. The Negotiation of Risk Management Plans with private landowners, engaged

in significant drinking water threat activities, is ongoing and expected to be complete in 2021.

Notable work accomplished in 2020 to support the City's Source Protection program was the completion of source protection technical studies for the new water intake pipe at the Lemieux Island Water Purification Plant (WPP). The City is undergoing a project to relocate the primary intake for the Lemieux Island WPP within the Ottawa River due to issues related to frazil ice buildup at the existing intake; the new intake will be located deeper within the Ottawa River and on the Quebec side of the river. Source protection technical work to map the Intake Protection Zone for the new intake was completed in November 2020 and reviewed by the Source Protection Region and the MECP; in January 2021 the work was deemed complete to the satisfaction of the Rideau Valley Source Protection Authority. Amendments to the Rideau Valley Source Protection Area Assessment Report and the Mississippi-Rideau Source Protection Plan are expected to be completed in 2021 for approval by the MECP.

More information about Drinking Water Source Protection and the City's Source Protection Program can be found at: www.Ottawa.ca/SourceProtection

Operator Certification and Licenses

The City of Ottawa ensures that all municipal water systems are operated by certified operators, licensed by the Ministry (MECP). Operator certification levels range from Level I to Level IV and are attained through a combination of education, operating experience, training, and examinations. Ottawa's treatment plants and distribution system are classified as Level IV and III respectively due to their size and complexity.

In Water Services, there are approximately 75 certified operators working in water treatment and 50 in the water distribution system. To maintain their operating license, each operator must receive 40 to 50 hours per year of job-related training. Water Services has developed a training program involving a combination of mandatory training courses, on-the-job training, and certified CEU courses on relevant topics in drinking water. The training program represents a major undertaking in staff time and financial support to ensure that operators receive the required hours of training to maintain their certification.

During 2020 all operators operating within the treatment facilities and distribution system maintained the required certification.

Between March 17th and July 31st, 2020, the Ministry initiated the Emergency Management and Civil Protection Act (EMCPA) which allowed an operator to operate with

an expired license since training courses had been cancelled due to COVID19. There was one operator who used this provision to perform operating duties while awaiting renewal of their operator license.

Quality Management System

Ottawa's municipal drinking water systems operate under a comprehensive quality management system, which is a provincially mandated requirement under Ontario's *Safe Drinking Water Act, 2002*. The Standard for the Drinking Water Quality Management Standard (DWQMS) was established in 2007 to ensure proper oversight and management of the drinking water supply.

The DWQMS is composed of 21 Elements that cover all aspects of drinking water supply including: plant operations, infrastructure, maintenance, risk assessment, water quality testing, staff training, documentation, and continual improvement. Collectively, these elements help to ensure the provision of safe drinking water to the public.

The City of Ottawa is the Operating Authority for all of the municipal water systems. It has received and maintained its Full Scope accreditation since 2011 through annual external audits completed by an external accreditation body. In 2020, NSF International Strategic Registrations completed an on-site audit (virtually) between August 31st – September 4th and found the City's DWQMS to be in full conformance with the Drinking Water Quality Management Standard.

The annual DWQMS Management Review Report was completed following a series of meetings held between April – June 2020. The report presented a comprehensive review of the City's drinking water systems and its operational performance during the previous year. In accordance with DWQMS requirements, the report was reviewed by Top Management on July 8th and was subsequently summarized and presented to the Standing Committee on Environmental Protection, Water and Waste Management (SCEPWWM) on September 15th and City Council on September 23rd.

New and Emerging Issues in Drinking Water

The City of Ottawa has always been a leader in evaluating new and emerging issues for drinking water. Technical staff from Water Services work closely with industry experts and university researchers to evaluate new substances of concern and to anticipate future regulations and standards for drinking water. Results from exploratory testing are made available to the public through annual reporting and through specific data requests.

During 2020, some of the current issues and concerns that have garnered attention within the drinking water industry include the following:

- Cyanobacterial toxins
- Perfluoroalkyl substances (PFAS)
- Microplastics
- Legionella bacteria in vacant building water systems (COVID-19)
- Radioactivity
- Manganese
- Strontium

Water Quality staff have conducted testing for these emerging substances in Ottawa's municipal water systems, including both source and treated water samples. In most cases, the substances have not been detected or have been found at natural background levels. Water Quality staff continue to watch developments for these emerging areas of concern and evaluate any new and proposed drinking standards and guidelines. Staff also provide comments on new drinking water guidelines through industry associations and committees such as the Water Quality Committee of the Canadian Water and Wastewater Association (CWWA) and the Ontario Drinking Water Advisory Council.

If further information is desired on any of these substances of concern, please contact the Drinking Water Quality Branch for more details or up to date test results.

Research and Optimization

For many decades, the City of Ottawa has been recognized as a North American leader in drinking water quality and process optimization. A pilot plant research facility (located within the Britannia WPP) was built in 1992 to allow for on-site research experiments to optimize the treatment process and evaluate new methods of treatment. Many of the research studies have been carried out in collaboration with a number of universities and external research agencies.

Over the last 25 years, the research program has resulted in treatment process upgrades, improved water quality, and operating/capital cost savings in the range of \$80 million. In addition, Ottawa's technical staff have presented over 75 technical papers at water industry conferences covering all aspects of treatment, risk analysis, management, and drinking water quality. These efforts in research and optimization align with the Quality Management System directive for continual improvement of drinking water quality.

Overall Review

We are pleased to report that a thorough review of Licenses, Permits, Regulations, and Ministry Inspection Reports indicates the provision of safe drinking water during 2020. During the preparation of this report, technical staff intensively reviewed all 35 sets of regulatory requirements in relation to the operating performance for the eight municipal water systems.

From the review, several items of non-compliance were noted and described in the report. These incidents were minor and did not affect the quality of drinking water supplied to the community. In all cases, staff took appropriate response actions, and reported the incidents to the Ministry and Ottawa Public Health. The City remains committed to continual improvement of our drinking water supply through research, process optimization, public reporting, and diligence in complying with provincial regulations.

Overall, the findings confirm that residents of the City of Ottawa continue to be supplied with reliable and high quality drinking water. Should you have any questions, please contact the undersigned at 613-580-2424 extension 21528 or marilyn.journeaux@ottawa.ca.

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SUPPORTING DOCUMENTATION

Document 1	2020 Summary Table of Regulatory Compliance
Document 2	2020 Flow Summary