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SUBJECT: MUNICIPAL DRINKING WATER SYSTEMS – 2023 SUMMARY REPORT

OBJET : RÉSEAUX MUNICIPAUX D'ALIMENTATION EN EAU POTABLE – RAPPORT
SOMMAIRE DE 2023

EXECUTIVE SUMMARY

The purpose of this memorandum is to provide Members of Council with the City of Ottawa's 2023 Drinking Water Summary Report 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 31 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 1, 2023 to December 31, 2023, 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 key 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 Licences, Permits, Regulations, and Ministry Inspection Reports indicates that Ottawa residents were provided with safe drinking water during 2023.

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 2023 are summarized below.

- **Water Quality Monitoring** – during 2023, more than 100,000 laboratory and operational tests were conducted to ensure the safety of Ottawa's drinking water supply. The monitoring program includes more than 75 continuous analyzers and

eight laboratories analyzing more than 300 test parameters. The results confirm that Ottawa residents continue to be supplied with high quality drinking water.

- **Annual Inspection Ratings** – All eight Ottawa municipal water systems were inspected for 2023, but several ratings for these systems have not been received at the time of this report.
- **Radioactivity in the Ottawa River** – during 2023, radioactivity levels at both water treatment plants remained very low and representative of natural background levels, meeting all radiological drinking water standards. The licensing amendment for Chalk River Laboratories was approved by the Canadian Nuclear Safety Commission (CNSC) in January 2024 to authorize construction of a Near Surface Disposal Facility (NSDF). The CNSC ruled that the license amendment is protective of human health and the environment, including the Ottawa River, and that the proposed site is an acceptable and safe location for the NSDF.
- **Regulatory compliance** – Ottawa’s municipal water systems complied with all drinking water regulatory requirements with the exception of one area of non-compliance in two of the communal well systems. This non-compliance item did not affect the quality of drinking water supplied to the public.
- **Water production rates** – each day, an average of 293 million litres of drinking water was treated and distributed to Ottawa residents and businesses, which represents a small fraction of the Ottawa River flow (0.3 per cent).
- **Emerging issues in drinking water** – a number of substances continue to be highlighted in the media such as: microplastics, Perfluoroalkyl substances (PFAS), 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 a pour but de fournir aux membres du Conseil le rapport sommaire de 2023 sur l'eau potable de la Ville d'Ottawa, conformément à l'annexe 22 du Règlement de l'Ontario 170/03, qui exige qu'un rapport sommaire soit préparé chaque année et distribué à tous les membres du Conseil municipal au plus tard le 31

mars de l'année civile suivante. Ce rapport répond 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.

Le rapport couvre la période qui va du 1er janvier au 31 décembre 2023, et porte sur les huit réseaux municipaux d'eau potable qui appartiennent à la Ville d'Ottawa ou qui sont exploités par elle :

- Usine d'épuration des eaux 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

Le rapport détaille des aspects clés des réseaux municipaux d'eau potable d'Ottawa, 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 2023 était salubre.

Lors de la préparation de ce rapport, le personnel technique a examiné 35 séries d'exigences réglementaires visant les huit réseaux municipaux d'eau potable d'Ottawa. Voici certains des principaux points forts et points à améliorer relevés en 2023.

- **Surveillance de la qualité de l'eau** – En 2023, 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 comprend plus de 75 analyseurs continus et huit laboratoires qui analysent plus de 300 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 2023, mais plusieurs résultats pour ces réseaux n'ont pas été reçus au moment de rédiger ce rapport.

- **Radioactivité dans la rivière des Outaouais** — Au cours de l'année 2023, les indices de radioactivité dans les deux usines de traitement de l'eau sont restés très faibles et représentatifs des concentrations naturelles, respectant toutes les normes de salubrité de l'eau potable en ce qui a trait aux paramètres radiologiques. La modification du permis des Laboratoires de Chalk River a été approuvée par la Commission canadienne de sûreté nucléaire (CCSN) en janvier 2024 afin d'autoriser la construction d'une installation de gestion des déchets près de la surface. La CCSN a déclaré que la modification du permis vise à protéger la santé humaine et l'environnement, y compris la rivière des Outaouais, et que le projet de site est situé dans un endroit acceptable et sécuritaire pour l'installation de gestion des déchets près de la surface.
- **Conformité aux règlements** – Les réseaux municipaux d'eau potable d'Ottawa ont répondu à toutes les exigences réglementaires en matière d'eau potable; seul un point de non-conformité a été relevé dans les deux systèmes de puits collectifs. Ce point de non-conformité n'a pas touché la qualité de l'eau potable distribuée au public.
- **Taux de production d'eau** – Chaque jour, ce sont en moyenne 293 millions de litres d'eau potable qui ont été traités et acheminés aux résidents et aux entreprises d'Ottawa, ce qui représente une petite fraction du débit (0,3 %) de la rivière des Outaouais.
- **Nouvelles préoccupations en matière d'eau potable** — Les médias continuent de signaler la présence de plusieurs substances préoccupantes comme : les microplastiques, les substances perfluoroalkylées, 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 d'Ottawa.

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 l'eau potable.

DISCUSSION

Description of Ottawa's Water Supply

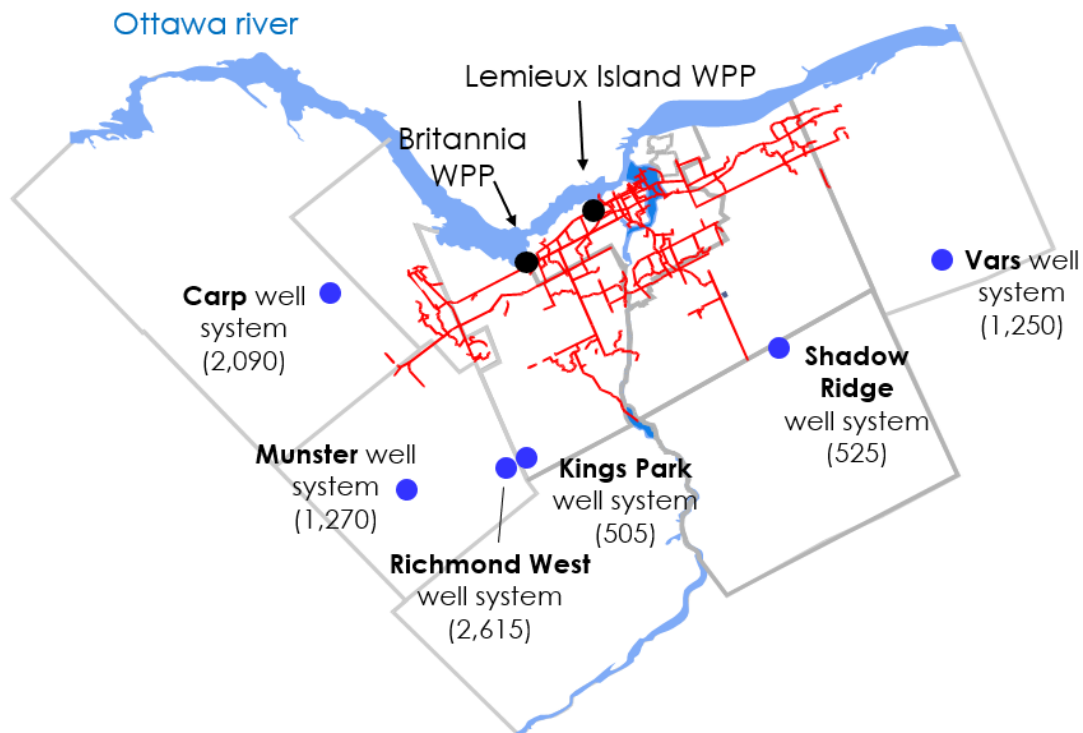
The City of Ottawa provides treatment, storage, and distribution of drinking water to approximately 981,000 residents, businesses, and institutions. The central water system supplies roughly 90 per cent of Ottawa's population and includes two surface water treatment plants, the Britannia Water Purification 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 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 16 pumping stations, five reservoirs, four elevated tanks, and over 3000 kilometers 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 one per cent of Ottawa's population, while approximately nine per cent use private wells.

Figure 1 provides a map that shows the layout of Ottawa's water supply and municipal well systems, with the service population for each system:

Figure 1: Map of Ottawa's Water Supply and Municipal Well Systems



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 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 Licences, Permits, Provincial Officer Orders, and Annual Inspections conducted by the Ministry. This report reviews the 2023 operational performance of Ottawa’s municipal water systems in comparison to these regulatory requirements.

Licenses & Permits

In Ontario, all owners of municipal drinking water systems are required to obtain a Municipal Drinking Water Licence (MDWL) for each drinking water system. Each licence 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 Licences for each municipal system are issued for a five-year period and renewed by the Ministry through a comprehensive application and review process every five years. Renewals were submitted for all eight systems in December 2023 and are anticipated to be updated in Spring 2024. The current Licences and Permits are valid until June 19, 2024, as listed in table 1 below:

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

Water System	Municipal Drinking Water Licence 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
Shadow Ridge Well System	008-106	008-206	1867-8NAQXQ

Provincial Officer Orders and Regulatory Relief

No Provincial Officer Orders were issued in 2023.

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 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 one 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.

Table 2 below summarizes the most recent annual inspection results, which include any Provincial Officer Orders, Non-Compliance Items, Best Practice Recommendations, and per cent Inspection Ratings. At the time of this report, all systems have been inspected and, while completed inspection reports have only been received for Vars and Shadow Ridge; the corresponding ratings for these systems have been released documented below. Inspection Reports for the remainder of the systems have not yet been completed.

Table 2 – Summary of Most Recent Ministry Annual Inspection Results for Ottawa’s Drinking Water Systems

Water System	Inspection Date	Prov. Officer Orders	Non-Compliance Items	Best Practice Items	Inspection Rating
Britannia	Jan. 31, 2024	-	-	-	100%*
Lemieux	Jan. 25, 2024	-	-	-	100%*
Carp	Dec. 21, 2023	-	-	-	100%*
Kings Park	Dec. 20, 2023	-	-	-	100%*
Munster	Dec. 20, 2023	-	-	-	100%*
Richmond West	Dec. 20, 2023	-	-	-	100%*
Shadow Ridge	Oct. 25, 2023	0	0	0	100%

Water System	Inspection Date	Prov. Officer Orders	Non-Compliance Items	Best Practice Items	Inspection Rating
Vars	Oct. 25, 2023	0	0	0	100%

*2022 inspection rating cited since 2023 inspection rating not yet received

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 1 to December 31, 2023. To achieve this, a staff team of engineers, technologists, and managers spend approximately two to three weeks each year during the first quarter of the year 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 eight water systems is presented in Document 1. This table illustrates both the comprehensive nature of provincial drinking water regulations and the diligence of staff in measuring and tracking compliance.

During 2023, Ottawa’s municipal water systems met all regulatory requirements under Ontario’s *Safe Drinking Water Act* with the exception of two items noted below.

Items of Non-Compliance

During 2023, there was one non-compliance issue that was identified in two of Ottawa’s municipal drinking water systems. This regulatory non-compliance did not affect the quality of drinking water supplied to the public. The issue found is described below for both systems, including corrective actions taken and the impact on water quality.

1. Required amount of monthly Distribution samples not taken in two well systems: Distribution samples, at two facilities, were only sampled once a week instead of twice, for the months of August and November for the Munster and Carp systems. This resulted in only eight Distribution samples being taken instead of the nine or ten required by regulation based on the population of these systems. Both communities experienced recent population growth which required more frequent sampling not communicated effectively to field staff. These systems are

monitored 24/7 by online analyzers and the relevant sampling schedule has been updated and reiterated to operations staff.

Once these non-compliance items were identified, staff took corrective actions to promptly address each of the issues.

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 Robert O. Pickard Environmental Centre (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 fifty sample locations throughout the central system and ten to fifteen locations in the well systems. (eg. pump stations, reservoirs, fire halls) and respond directly to customer inquiries and concerns about water quality.

The City 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 300 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 2023, all test results were well within safe drinking water standards, with any exceptions noted in the Adverse Water Quality Incident section of this report. All chemical test results (organic, inorganic, metals, radiological) were well within the Maximum Acceptable Concentration (MAC) levels as per Ontario Drinking Water Standards.

As a general overview of water quality, table 3 below shows 2023 test results for common parameters in each of Ottawa's municipal water systems. The values in the table represent average concentrations 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 (average values)

		Britannia	Lemieux	Carp	Kings Park	Munster	Richmond West	Shadow Ridge	Vars
Physical									
Turbidity	NTU	0.04	0.05	0.43	0.44	0.62	0.28	0.10	0.27
Temperature	°C	12.2 (1.3–27.9)	11.2 (0.5–26.3)	11.7	10.5	10.4	10.3	10.8	10.6
Conductivity	µmhos/cm	152	144	670	1190	883	723	915	555
Microbiological (number of exceedances)									
Total coliforms	cfu/100mL	0	0	0	0	0	0	0	0
E.coli	cfu/100mL	0	0	0	0	0	0	0	0
HPC bacteria	cfu/mL	0	0	0	0	0	0	0	1
Chemical									
pH	log ₁₀	9.41	9.43	7.90	7.41	7.60	7.63	7.64	7.72
Alkalinity	mg/L	28.3	33.8	218	285	278	246	206	232
Total Hardness	mg/L	31.7	29.8	214	387	296	300	321	219
Calcium	mg/L	9.1	8.5	56.5	85.2	63.5	77.3	92.1	68.3
Magnesium	mg/L	2.2	2.1	18.6	42.7	32.5	26.3	23.0	12.4
Potassium	mg/L	0.7	0.7	5.0	6.5	5.5	3.1	3.2	4.2
Chloride	mg/L	6.4	6.4	65.3	189.4	80.5	60.5	110.3	20.6
Fluoride	mg/L	0.67	0.65	0.53	0.39	0.61	0.26	0.05	0.17
Phosphate	mg/L	0	0	NA	NA	NA	NA	NA	NA
Sodium	mg/L	18.6	17.4	56.7	95.4	74.3	36.4	62.4	32.1
Sulphate	mg/L	26.2	25.2	33.4	58.7	70.0	46.3	86.9	30.5
Nitrate	mg/L	0.19	0.18	0	0	0.03	0	3.2	0
Nitrite	mg/L	0	0	0	0	0	0	0	0
Iron	mg/L	0.002	0.002	0.06	0.49	0.23	0.19	0	0.04
Manganese	mg/L	0.003	0.003	0.02	0.02	0.01	0.01	0	0.01
Trihalomethane	mg/L	29.8	39.9	11.0	7.8	26.7	13.7	3.9	41.1
Haloacetic acids	mg/L	23.9	32.2	2.8	3.8	7.6	3.0	0	37.4
Radiological									
Alpha activity	Bq/L	<0.04	<0.04	<0.10	0.12	<0.10	<0.10	<0.10	<0.10
Beta activity	Bq/L	<0.1	<0.1	0.11	0.21	0.14	0.11	<0.10	<0.10
Tritium	Bq/L	2.2	2.1	<1.47	<1.47	<0.71	<1.53	<1.47	<1.47

Note: < indicates below laboratory detection limit; NA indicates no sample required

Overall, the 2023 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 2023 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 results 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 2023, there were a total of 20 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). All these occurred in the central water distribution 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 2023 are summarized in Table 4 including corrective actions taken and resolution of the incident.

Table 4 – Summary of 2023 Adverse Water Quality Incidents (AWQI)

Test parameter and number of occurrences	Summary of Reported Events
Total coliform bacteria (6 events)	<ul style="list-style-type: none"> • (1) routine sample following watermain breaks in the distribution system, follow up samples were clear; • (4) routine samples, (2) at the central distribution & (1 each) in the distribution locations in the Shadow Ridge & Vars well systems, re-samples were clear; • (1) routine sample from a temporary service, resamples were clear;

<p>Low chloramine <0.25 mg/L (12 events)</p>	<ul style="list-style-type: none"> • (4) events due to a closed valve in distribution system; valve opened, and the system flushed;(8) events due to low water flow in watermain; system was flushed.
<p>Sodium > 20 mg/L (1 event)</p>	<ul style="list-style-type: none"> • (1) sodium exceedance event. Sodium is required to be reported every five years. Event resulted from routine reporting for Shadow Ridge.
<p>Improperly disinfected water directed to system (1 event)</p>	<ul style="list-style-type: none"> • (1) Contractor opened a valve on temporary service hose hooked up for watermain replacement. Flushed and took samples.

For the AWQI events observed during 2023, there were no indications of unsafe drinking water being directed to residents.

For further details on AWQI events, please refer to the 2023 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 relevant drinking water staff, 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 2023, there were no Drinking Water Advisories issued.

Perfluorinated alkyl substances (PFAS) in drinking water

Perfluorinated alkyl substances (PFAS) have become an increasing concern for the environment and human health. These substances are stable and persistent organic

compounds that are widely used in industry and consumer products including firefighting foams and stain-resistant fabrics. Health Canada previously established guidelines and maximum acceptable concentrations (MAC) for two PFAS substances: PFOS with a MAC of 600 nanograms per litre and PFOA with a MAC of 200 nanograms per litres. In 2023, Health Canada sought public consultation on updates to their MAC values as they strive to be consistent with other jurisdictions that have established more stringent MAC. While there are no provincial regulations for PFAS, the City collects treated water samples quarterly from all eight municipal water systems. These samples are analyzed for up to forty different PFAS by accredited laboratories. Further monitoring was completed for the Carp well system to evaluate performance following the installation of the granular activated carbon (GAC) filter system which was installed to address taste/odour concerns and has since been shown to be effective for the removal of PFAS substances that were found in the raw water source in that system.

Sodium in Drinking Water

Ground water systems tend to have elevated levels of sodium due to naturally occurring geological formations. In cases where the sodium level exceeds 20 milligrams per litre, the City of Ottawa is required to notify the MECP and the Medical Officer of Health on a five-year basis. While these concentrations are not a concern for most residents, it may be a contributing source of sodium for those on sodium-restricted diets. City Staff are working with Ottawa Public Health representatives and the Medical Officer of Health to better communicate the potential health implications associated with elevated sodium in drinking water for homeowners served by the communal well systems.

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 a subset of 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 ten parts per billion measured at the customer's tap. However, in March 2019, Health Canada lowered the acceptable concentration to five parts per billion 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 ten parts per billion to five parts per billion accordingly, although an implementation date has not yet been announced.

The City of Ottawa received relief for both sessions of lead testing in 2021 & 2022 for the Central system and Richmond West well system and resumed testing in 2023. Combining results for all twenty-seven rounds of testing between 2007 – 2020, 2023 (COVID relief in 2020-2022) the average lead concentrations measured in Ottawa homes with lead supply pipes 2.5 parts per billion in litre-1 and 2.6 parts per billion in litre-2. The 90th percentile concentrations are 4.3 parts per billion and 5.2 parts per billion in litre-1 and litre-2 respectively. The 90th percentile lead concentrations comply with the current Ontario Drinking Water Standard of ten parts per billion for lead in drinking water but would be slightly above the revised Health Canada guideline of five parts per billion. Accordingly, a strategy has been developed to address the more stringent health target of five parts per billion. The City is prepared to implement a new corrosion control strategy with the addition of low-level phosphate if drinking water regulations shift in Ontario. The City is currently in the design phase for this project and would be prepared to implement this new treatment strategy when required.

Partnership with Ottawa Public Health

Ottawa Public Health (OPH) 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 drinking water staff and OPH to review and respond to potential risks related to drinking water, such as drinking water advisories. Drinking water staff 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, drinking water staff and OPH staff meet 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, to review the water quality results achieved over the last year. The joint review meeting for 2023 was held in person on December 15.

Flow Rates and System Capacity

The licence and permit documents for each municipal water system set out maximum rates of water taking and treatment capacity. During 2023, all drinking water systems operated within the permitted volume and capacity limits. Table 5 below shows the daily flowrates observed during 2023 including the average and maximum values, in relation to the system rated capacity.

Table 5 – Summary of 2023 water production rates vs. rated capacity

Water System	Average daily flow	Maximum daily flow	Rated capacity
Britannia Water Purification Plant	148.6 ML/d	223.8 ML/d	360 ML/d
Lemieux Water Purification Plant	144.7 ML/d	205.6 ML/d	400 ML/d
Carp Well System	632.8 m ³ /d	1286.7 m ³ /d	2782 m ³ /d
Kings Park Well System	112.5 m ³ /d	196.2 m ³ /d	2620 m ³ /d
Munster Well System	216.8 m ³ /d	480.9 m ³ /d	2160 m ³ /d
Richmond West Well System	333.8 m ³ /d	1077.4 m ³ /d	2420 m ³ /d
Shadow Ridge Well System	132.8 m ³ /d	293.9 m ³ /d	550 m ³ /d
Vars Well System	317.8 m ³ /d	975.9 m ³ /d	2290 m ³ /d

ML/d = Megalitres per day = million litres per day

m³/d = cubic meters per day

During 2023, the combined average flowrate from the Britannia and Lemieux Island purification plants was 293.2 megalitres per day which represents the water demand for Ottawa’s urban water supply. While this is a large volume of water, it represents only 0.3 per cent of the Ottawa River flowrate.

For a detailed table of 2023 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. Table 6 lists some of the major expenditures, for upgrades and new capital investment in Ottawa’s municipal water treatment systems, recently completed or ongoing in 2023:

Table 6 – Expenditures for Maintenance and Capital Improvements

Water System	Project	Duration
Britannia & Lemieux	• Chemical System Upgrades: (\$610,000)	• 2016-2023
	• G2 Generator Replacements (\$10,400,000)	• 2019-2024
	• Phosphoric Acid and Aqueous Ammonia upgrade (\$13,000,000)	• 2020-2028
	• Audible Process Alarm System Upgrade (\$650,000)	• 2022-2023
	• SCADA HMI Upgrade Project (\$3,500,000)	• 2023-2024
	• Britannia & Lemieux Surge Protection Devices Upgrade (\$1,000,000)	• 2021-2024
Britannia	• High lift/Low Lift pump replacement (\$2,500,000)	• 2020-2024
	• High-lift flowmeter replacement (\$1,200,000)	• 2020-2023
	• Roof Repair/Renewal Project (\$1,800,000)	• 2018-2023
	• Asphalt Surface Repairs (\$500,00)	• 2023
	• Carlington Heights Pumping Station Upgrade (\$13,500,000)	• 2021-2024
Lemieux	• Plant Intake Replacement Project (\$38,000,000)	• 2016-2025
	• Lemieux Island WPP Settled Water Conduit Repairs (\$3.3 million)	• 2022-2023
	• Lemieux Island WPP High Lift Pumping Station Suction Header Condition Assessment and Function Design	• 2023-2024
	• Lemieux Island WPP Basins 4 and 5 Gate Valve Replacements (\$2,300,000)	• 2023-2024
	• Turbidity Analyzer Replacement (\$159,000)	• 2023-2024
	• Brittany Drive Pumping Station Replacement (\$7,700,000)	• 2020-2023
	• Hurdman's Bridge Pumping Station Upgrades (\$18,100,000)	• 2021-2024
	• Ottawa South Pumping Station Upgrades (\$16,300,000)	• 2021-2024
Carp	• Granular Activated Carbon treatment and Electrical Upgrades (\$4,900,000)	• 2018-2024
Vars	• GAC Contact Tank A & B Side Entry Hatch Modification (\$130,000)	• 2020-2023

	<ul style="list-style-type: none"> Greensand Filter Media Replacement (\$33,000) 	<ul style="list-style-type: none"> 2022-2023
Shadow Ridge	<ul style="list-style-type: none"> New, Deeper Source Wells (\$3,600,000) 	<ul style="list-style-type: none"> 2020-2024
Kings Park	<ul style="list-style-type: none"> Electrical Service Upgrade (\$260,000) 	<ul style="list-style-type: none"> 2020-2023
Munster	<ul style="list-style-type: none"> Well systems Aquifer Assessment and Inspection (\$700,000) 	<ul style="list-style-type: none"> 2023
Richmond West	<ul style="list-style-type: none"> Well systems Aquifer Assessment and Inspection (\$700,000) Communal Well system Expansion (\$5,500,000*) 	<ul style="list-style-type: none"> 2022-2023 2023-2024

* Developer-funded

Source Water Protection

Under the authority of the *Clean Water Act*, the Source Water Protection General 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 reports on February 1, 2023, to the Mississippi Valley, Rideau Valley, and South Nation Source Protection Authorities on the status of Source Protection Plan policy implementation. Implementation of Risk Management Official activities and municipal activities is ongoing, and the City continues to be compliant with the requirements of the regulation and works cooperatively with local Source Protection Regions and the Conservation and Source Protection Branch at the Ontario Ministry of the Environment, Conservation and Parks.

Notable work accomplished in 2023 to support the City of Ottawa's Source Protection program:

1. Fuel Tank (Home Heating Oil) Incentive Program: Home heating oil (fuel storage) is considered a significant drinking water threat within the highest vulnerable areas near municipal supply wells. Source Protection Plan policies require Risk Management Plans (RMP) for fuel storage within these zones to manage the threat.

The Fuel Tank Incentive Program was approved by the [Agricultural and Rural Affairs Committee on May 5, 2022](#) and Council on May 11, 2022 and is expected to be complete

by 2024. The program offers financial incentives to remove existing fuel oil tanks that are located near municipal wells and replace them with an alternate heating source (air source heat pump or natural gas), that are not considered a significant drinking water threat. Additional incentives were included to support a green energy option (air source heat pump), to coincide with the City's climate change initiatives. The goal of the fuel tank incentive program is to eliminate existing fuel threats and protect rural communal drinking water resources.

The program launched in June 2023, with all eligible residents receiving program information and invitations to participate; in-person visits were scheduled with interested residents.

In summary, of the 12 existing fuel tank threats: eight threats have been removed, two threats will be removed in 2024, and there are negotiated RMPs for the two remaining fuel tank threats, thus all fuel tank threats will be eliminated or managed by 2024.

2. Greely – Shadow Ridge Municipal Well Update: The existing municipal supply wells for the Shadow Ridge development in Greely extracts water from the overburden sand aquifer. The supply wells have experienced issues related to elevated nitrate levels (approaching, but not exceeding, half of the Maximum Acceptable Concentration for drinking water). The nitrate source is likely anthropogenic due to shallow contamination potentially from private septic systems, agricultural nutrient application (manure or chemical fertilizer) and storage of non-agricultural source material (i.e. compost) within the existing wellhead protection area.

The Raisin-South Nation Source Protection Plan includes a policy which recommends that the City of Ottawa explore the opportunity to deepen the Shadow Ridge Municipal Well to the Nepean Aquifer to reduce the significant threats related to septic systems and septic system holding tanks in the Village of Greely (Policy SEWG-4c), as such the City has committed to exploring the option.

After appropriate planning, the City moved forward with drilling two 250mm diameter, 150m deep production wells. The first production well was completed in January 2023 and the second production well was completed in April 2023. Aquifer testing (pump tests) was completed in May 2023. Test results identified that the two wells would be sufficient to support the necessary yield and a third well would not be needed. Water quality data and findings, from testing of the Nepean aquifer, is currently being analyzed to support

decision-making related to the future water supply for the existing Shadow Ridge subdivision. Detailed assessment and design of pump station and treatment system modifications and upgrades necessary to treat the deeper aquifer groundwater supply would still be required, should the City move forward with the option of an alternate deep well supply.

Results from the pump tests are also used to support the source protection technical work, which includes the delineation of a new Wellhead Protection Area (WHPA) for the deeper wells using 3D numerical groundwater modelling. Source protection technical studies commenced in August 2023 with a project initiation meeting with the Technical Advisory Team. Background information, a conceptual model and numerical model development were discussed with the Technical Advisory team through a series of meetings and memos during Q4 2023. Preliminary model results will be presented in winter 2024, and it is anticipated the source protection technical work will be completed in the first half of 2024.

3. Addition of a third well to Source Protection Plan for the Richmond West well system: The Richmond West well system consists of three wells, yet only two wells have been used as production wells to date and are included in the Mississippi-Rideau Source Protection Plan. The third well will be added to production to help support the increasing demand. Prior to the provision of water to the public, the well must be included in the local Source Protection Plan. An assessment was completed in 2023 and determined that new wellhead modelling did not need to be completed, however the well location needs to be added to Figures in the Source Protection Plan, and the text needs to be updated. This update will be included in the Source Protection Plan amendments that the Mississippi-Rideau Source Protection Region is undertaking under Section 36 of the *Clean Water Act*, which will be sent to the MECP for approval in late 2024.

4. Zoning By-Law Conformity: The City's new Official Plan was adopted by Council in October 2021 and approved by the Ministry of Municipal Affairs and Housing in November 2022. Source protection policies in the Official Plan conform to local Source Protection Plans, see Section 4.9.5 of under the heading, "Implement the policies of the Mississippi-Rideau Source Protection Plan and the Source Protection Plan for the Raisin-South Nation Source Protection Region". Source protection policies were developed in consultation with local Source Protection Regions.

In 2023, the City initiated the process of developing new Zoning By-Laws to implement the policies in the new Official Plan, including implementing new zone provisions to conform to source protection policies. New zoning by-laws related to the source protection policy conformity will be drafted in 2024 in consultation with Source Protection Regions.

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, licenced by the Ministry. 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.

There are approximately 72 certified operators working in water treatment and 86 in the water distribution system. To maintain their operating licence, each operator must receive 40 to 50 hours per year of job-related training. The department has developed a training program involving a combination of mandatory training courses, on-the-job training, and certified Continuing Education Unit 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 2023 all operators operating within the treatment facilities and distribution system maintained the required certification.

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 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. The City has received and maintained its Full Scope accreditation since 2011 through annual external audits completed by an external accreditation body. In 2023, NSF International Strategic Registrations completed a re-accreditation audit on September 28 and 29 and on October 4 to 6 2023 and found the City's drinking water quality management system to be in full conformance with the Drinking Water Quality Management Standard. As a result, the City was issued renewed Certificates of Accreditation (Entire Full Scope Accreditation) for all of its drinking water systems.

The annual DWQMS Management Review Report was completed following a series of meetings held between March – May 2023. The report presented a comprehensive review of the City's drinking water quality management system and its operational performance during the previous year. In accordance with DWQMS requirements, the report was reviewed by Top Management on May 3, 2023 and was subsequently summarized and presented to the Environment and Climate Change Committee (ECCC) on September 19, 2023 and City Council on September 27, 2023.

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 Infrastructure and 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 2023, some of the current issues and concerns that have garnered attention within the drinking water industry include the following:

- Cyanobacterial toxins
- Perfluoroalkyl substances (PFAS)
- Pharmaceuticals and Personal Care Products
- Microplastics
- Radioactivity
- Manganese
- MPA (Microscopic Particulate Analysis)

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 (radioactivity). 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 Treatment Committee of the Ontario Water Works Association.

If further information is desired on any of these substances of concern, please contact the Drinking Water Quality Unit 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 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 Licences, Permits, Regulations, and Ministry Inspection Reports indicates the provision of safe drinking water during 2023. 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, 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:

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SUPPORTING DOCUMENTATION

Document 1	2023 Summary Table of Regulatory Compliance
Document 2	2023 Flow Summary