CITY OF LONDON

2021 DRINKING WATER SUMMARY REPORT

System Name: City Of London Drinking Water System

System Rating:
Water Distribution Subsystem Class IV
Water Treatment Subsystem Class II
Average Day Demand: 129.695 MLD
Peak Day Demand: 166.753 MLD (May 21, 2021)
Population Served: 400,000 (approx.)
Source Water: Surface Water (Lake Huron, Lake Erie)
Drinking Water System Number: 260004917
Municipal Drinking Water Licence: 006-101

London
CANADA

CONTACT INFO:
Owner:
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Reporting Requirements

Ontario Regulation 170/03 requires that municipalities prepare a Summary Report for their drinking-water system for the preceding calendar year and submit it to the members of the Municipal Council by March 31 of each year. This report, presented to Municipal Council's Civic Works Committee on February 1, 2022, fulfills that requirement.

O. Reg 170/03 also requires the preparation of an Annual Report on the operation of the drinking-water system to be made available to members of the public.

Before February 28, 2022, a copy of the 2021 Annual Report and Summary Report for the City of London's water works will be provided to the local office of the Ministry of the Environment, Conservation and Parks (MECP) as a courtesy for information purposes.

The Elgin-Middlesex Pumping Station (EMPS) is jointly owned by the St. Thomas Area Secondary Water Supply System, the Aylmer Area Secondary Water Supply System, and the City of London. EMPS is operated by the Ontario Clean Water Agency (OCWA). The Annual Report for the EMPS (London portion) was not yet available at the time of writing this report. Therefore, it will be provided to members of Council under separate memo prior to the reporting deadline of February 28, 2022.

Water Budget

The 2020-2023 operating and capital budgets represent financial sustainability for Londoners, whereby annual rate increases are approximately the average of the Consumer Price Index (CPI) and the Non-Residential Building Construction Price Index (NRBCPI). The 2020-2023 water operating and capital budgets support four core business objectives:

- Compliance
- Financial Management
- Customer Service
- Best Management Practices

The total Water budget for 2021 was $87.5 million, which includes long term infrastructure improvements. The Water Budget helps maintain London's advantage of a safe, clean, and secure water supply. The Water Service Area remains proactive in initiatives to ensure that this service continues to meet the demands and expectations of customers. Existing infrastructure requires ongoing renewal (replacement and rehabilitation) activities to manage the infrastructure gap, ensuring that future generations are not faced with a water system that is failing, unreliable, and expensive to maintain.

Impacts of Covid-19 on Operational Performance

The novel coronavirus (COVID-19), throughout 2021, has continued to cause unprecedented interruption to the daily activities of individuals, businesses, and institutions around the world. The City of London has experienced significant challenges, and there remains considerable uncertainty. The future availability of supply of essential stock, inventory, supplies, and material is concerning; therefore, the Water Service Area has already started taking steps to maintain product delivery. They are being closely monitored, with advanced procurement being implemented. The Water Service Area is an Essential Service that must maintain service continuity. Operationally throughout 2021, with all the impacts of Covid-19, the Water Service Area once again continued with "business-as-usual", with only minor service level impacts seen on non-critical work processes.

Staffing

Throughout 2021, due to the impacts of the Covid-19 pandemic, adjustments were made to ensure continuity of service. Water Operations staff remained fully dedicated to the delivery of safe, reliable drinking water. During this time, staff continued modified work arrangements and environments, implemented new and updated existing procedures (ie. Corporate Health and Safety Standard Operating Guidelines) and worked diligently to ensure uninterrupted supply of this essential service.

Business Continuity

During the early stages of the pandemic new processes and procedures were established to provide business continuity. Water Operations staff implemented a "start of day" procedure that strictly offset the working times between Water Operations staff and other City operations staff by 30 minutes. In addition, Water Operations staff quickly implemented a rotational shift system, social distancing protocols, eliminated shared/grouped vehicle travel by providing staff with separate vehicles to travel to and from work sites, and ensured proper personal protective equipment was available and used consistently. All these efforts were put forth to minimize inter-staff contact. The continuation of these combined efforts enabled the continued safe and reliable operation of the water distribution system throughout 2021 and over the course of the pandemic to date.

Budget

Due to the Covid-19 pandemic, there have been cost increases to operational material and supplies. The Water Service Area has continued to work within allocated budgets. Water demand has continued to be strong and essentially unaffected by the pandemic. There were no major budget implications to the Water Service Area in 2021.

Maintenance and Construction

With the effects of the pandemic controlling and altering daily activities, the Water Operations Division continued to deliver essential water services. Water Operations Division and Water Engineering Division staff maintained, whenever possible, a "business-as-usual" level of service. Staff adapted to mandated requirements and found ways to continue their tasks and duties. The Corporation continued to provide support to staff by way of allocating necessary supplies, additional vehicles, sourcing and providing personal protective equipment.

Sampling & Water Quality Monitoring

In 2021, the MECP required large municipal drinking water systems to test for 70 different organic, inorganic, and chemical parameters. The City of London's water sampling regime includes monthly testing for microbiological indicators and chlorine residuals from 57 standard locations across the City, as well over 3,150 random grab samples. Analysis is also performed for up to 117 parameters, including organics, inorganics, chemicals, pesticides, and metals at 13 standard locations around the City. This level of testing far exceeds the MECP's minimum sampling requirements.

London also has 10 locations throughout the City where continuous in-line sampling of chlorine residual and pH is monitored. Staff also perform approximately 4,000 additional chlorine tests each year related to construction and maintenance activities. These efforts help ensure that the water within the distribution system is always of high quality, completely safe to consume, and consistent for manufacturing processes.

2021 Water Quality Sampling Summary

Parameter	Ontario Maximum Acceptable Concentration (MAC)	Units	Lab's Method Detection Limit (MDL)	Measured Concentrations 2021	MAC Exceedance (Y/N)
REGULATED INORGANICS					
Antimony	6	ug/L	0.09	**0.9 - 0.9**	No
Arsenic	25	ug/L	0.2	**0.3 - 0.5**	No
Barium	1000	ug/L	0.02	**16.5 - 23.9**	No
Boron	5000	ug/L	2	**17 - 23**	No
Cadmium	5	ug/L	0.003	**0.003 <MDL**	No
Chromium	50	ug/L	0.08	**0.27 - 0.27**	No
Fluoride	1.5	mg/L	0.06	**0.07 - 0.93**	No
Free Chlorine Residual	--	mg/L		**0.22 - 1.28**	No
Lead	10	ug/L	0.01	**0.01 0.06**	No
Mercury	1	ug/L	0.01	**0.01 <MDL**	No
Selenium	10	ug/L	0.04	**0.13 - 0.16**	No
Sodium	*20	mg/L	0.01	**10.8 - 18.3**	No
Uranium	20	ug/L	0.002	**0.038 - 0.059**	No

Parameter	Ontario Maximum Acceptable Concentration (MAC)	Units	Lab's Method Detection Limit (MDL)	Measured Concentrations 2021	MAC Exceedance (Y/N)
REGULATED ORGANICS					
Atrazine	--	ug/L	0.01	**0.02 - 0.04**	No
Atrazine + N-dealkylated metabolites	5	ug/L	0.01	**0.04 - 0.06**	No
De-ethylated Atrazine	--	ug/L	0.01	**0.01 - 0.02**	No
Azinphos-methyl	20	ug/L	0.05	**0.05 <MDL**	No
Benzene	5	ug/L	0.32	**0.32 <MDL**	No
Benzo(a)pyrene	0.01	ug/L	0.004	**0.004 <MDL**	No
Bromoxynil	5	ug/L	0.33	**0.33 <MDL**	No
Carbaryl	90	ug/L	0.05	**0.05 <MDL**	No
Carbofuran	90	ug/L	0.01	**0.01 <MDL**	No
Carbon tetrachloride	5	ug/L	0.17	**0.17 <MDL**	No
Chlorpyrifos	90	ug/L	0.02	**0.02 <MDL**	No
Diazinon	20	ug/L	0.02	**0.02 <MDL**	No
Dicamba	120	ug/L	0.2	**0.2 <MDL**	No
1,2-Dichlorobenzene	200	ug/L	0.41	**0.41 <MDL**	No
1,4-Dichlorobenzene	5	ug/L	0.36	**0.36 <MDL**	No
1,2-Dichloroethane	5	ug/L	0.35	**0.35 <MDL**	No
Dichloromethane	50	ug/L	0.35	**0.35 <MDL**	No
2,4-dichlorophenol	900	ug/L	0.15	**0.15 <MDL**	No
2,4-dichlorophenoxyacetic acid (2,4-D)	100	ug/L	0.19	**0.19 <MDL**	No
Diclofop-methyl	9	ug/L	0.4	**0.4 <MDL**	No
Dimethoate	20	ug/L	0.06	**0.06 <MDL**	No
Diquat	70	ug/L	1	**1 <MDL**	No
Diuron	150	ug/L	0.03	**0.03 <MDL**	No
Glyphosate	280	ug/L	1	**1 <MDL**	No
Malathion	190	ug/L	0.02	**0.02 <MDL**	No
MCPA	--	mg/L	0.00012	**0.00012 <MDL**	No
Metolachlor	50	ug/L	0.01	**0.01 - 0.02**	No
Metribuzin	80	ug/L	0.02	**0.02 <MDL**	No
Monochlorobenzene	80	ug/L	0.3	**0.3 <MDL**	No
Paraquat	10	ug/L	1	**1 <MDL**	No
Pentachlorophenol	--	ug/L	0.15	**0.15 <MDL**	No
Phorate	2	ug/L	0.01	**0.01 <MDL**	No
Picloram	190	ug/L	1	**1 <MDL**	No
Polychlorinated Biphenyls (PCBs)	3	ug/L	0.04	**0.04 <MDL**	No
Prometryne	1	ug/L	0.03	**0.03 <MDL**	No
Simazine	10	ug/L	0.01	**0.01 <MDL**	No
Terbufos	1	ug/L	0.01	**0.01 <MDL**	No
2,3,4,6-tetrachlorophenol	100	ug/L	0.2	**0.2 <MDL**	No
Triallate	230	ug/L	0.01	**0.01 <MDL**	No
Trichloroethylene	50	ug/L	0.44	**0.44 <MDL**	No
2,4,6-trichlorophenol	5	ug/L	0.25	**0.25 <MDL**	No
Trifluralin	45	ug/L	0.02	**0.02 <MDL**	No
Vinyl Chloride	2	ug/L	0.17	**0.17 <MDL**	No

Parameter	Ontario Maximum Acceptable Concentration (MAC)	Units	Lab's Method Detection Limit (MDL)	Measured Concentrations 2021	MAC Exceedance (Y/N)
NITRATES					
Nitrate (as nitrogen)	--	mg/L	0.006	**0.033 - 0.566**	No
Nitrate + Nitrite (as nitrogen)	--	mg/L	0.006	**0.033 - 0.566**	No
Nitrite (as nitrogen)	--	mg/L	0.003	**0.005 - 1.7**	No

Parameter	Ontario Maximum Acceptable Concentration (MAC)	Units	Lab's Method Detection Limit (MDL)	Measured Concentrations 2021	MAC Exceedance (Y/N)
TRIHALOMETHANES & HALOACETIC ACIDS					
Total Haloacetic Acids	--	ug/L	5.3	**5.3 - 19.1**	No
Dibromoacetic Acid	--	ug/L	2	**2 <MDL**	No

Dichloroacetic Acid	--	ug/L	2.6	**2.6 - 14.3**	No
Monobromoacetic acid	--	ug/L	2.9	**2.9 <MDL**	No
Monochloroacetic Acid	--	ug/L	4.7	**4.7 <MDL**	No
Trichloroacetic Acid	--	ug/L	5.3	**5.3 - 7.1**	No
Trihalomethanes (total)	--	ug/L	0.37	**17 - 58**	No
Bromodichloromethane	--	ug/L	0.26	**5.5 - 13**	No
Bromoform	--	ug/L	0.34	**0.34- 0.34**	No
Chloroform	--	ug/L	0.29	**8.6 - 40**	No
Dibromochloromethane	--	ug/L	0.37	**2 - 4.8**	No

Parameter	Ontario Maximum Acceptable Concentration (MAC)	Units	Lab's Method Detection Limit (MDL)	Measured Concentrations 2021	MAC Exceedance (Y/N)
MICROBIOLOGICAL					
E. coli	0	cfu/100 mL	0	**0 - 0**	No
Total Coliform	0	cfu/100 mL	0	**0 - 260**	Yes
Heterotrophic Plate Count	N/A	cfu/1 mL	10	**10 - 2000**	No

Parameter	Ontario Maximum Acceptable Concentration (MAC)	Units	Lab's Method Detection Limit (MDL)	Measured Concentrations 2021	MAC Exceedance (Y/N)
NON-REGULATED INORGANICS/ORGANICS					
Alkalinity	--	mg/L as CaCO3	2	**75 - 90**	No
Aluminum	--	ug/L	1	**14 - 51**	No
Ammonia+Ammonium (N)	--	mg/L	0.04	**0.04 <MDL**	No
Calcium	--	mg/L	0.01	**28.4 - 35.6**	No
Chloride	--	mg/L	0.04	**10 - 18**	No
Cobalt	--	ug/L	0.004	**0.004 - 0.01**	No
Colour	--	TCU	3	**3 - 4**	No
Conductivity	--	uS/cm	2	**237 - 307**	No
Copper	--	ug/L	0.2	**1.7 - 2.7**	No
Cyanide	200.0	ug/L	2	**2 <MDL**	No
1,1-Dichloroethylene (vinylidene chloride)	14	ug/L	0.33	**0.33 <MDL**	No
Dissolved Organic Carbon	--	mg/L	1	**1 - 2**	No
Ethylbenzene	--	ug/L	0.33	**0.33 <MDL**	No
Hardness	--	mg/L as CaCO3	0.05	**108 - 129**	No
Iron	--	ug/L	7	**7 <MDL**	No
Magnesium	--	mg/L	0.001	**8.92 - 9.77**	No
Manganese	--	ug/L	0.01	**0.15 - 0.36**	No
Nickel	--	ug/L	0.1	**0.1 - 0.4**	No
Nitrogen-Kjeldahl (N)	--	mg/L	0.05	**0.05 - 0.09**	No
Organic Nitrogen	--	mg/L	0.01	**0.05 - 0.09**	No
pH	--	no unit	0.05	**7.45 - 7.97**	No
Phosphorus	--	mg/L	0.003	**0.003 <MDL**	No
Potassium	--	mg/L	0.009	**1.08 - 1.49**	No
Silicon; reactive silicate	--	mg/L	0.02	**1.03 - 2.05**	No
Silver	--	ug/L	0.05	**0.05 <MDL**	No
Solids (Total Dissolved)	--	mg/L	30	**131 - 183**	No
Sulphate	--	mg/L	0.04	**25 - 33**	No
Sulphide	--	mg/L	6	**6 <MDL**	No
Surr 1,2-Dichloroethane-d4	--	Surr Rec %	--	**115 - 115**	No
Surr 4-Bromofluorobenzene	--	Surr Rec %	--	**81 - 82**	No
Surr Decachlorobiphenyl	--	%	--	**90 - 93**	No
Tetrachloroethylene (perchloroethylene)	30	ug/L	0.35	**0.35 <MDL**	No
Toluene	--	ug/L	0.36	**0.36 <MDL**	No
Total Chlorine-Field	--	mg/L	--	**0.96 - 1.05**	No
2,4,5-TP (Silvex)	--	ug/L	0.18	**0.18 <MDL**	No
Turbidity	1	NTU	0.1	**0.1 - 0.18**	No
Xylene (Total)	--	ug/L	0.43	**0.43 <MDL**	No
m/p-xylene	--	ug/L	0.43	**0.43 <MDL**	No
o-xylene	--	ug/L	0.17	**0.17 <MDL**	No
Zinc	--	ug/L	2	**2 - 3**	No

In 2021, there were nine (9) adverse microbiological results out of 3,156 samples taken. Seven involved the detection of Total Coliform bacteria (ranging from 1 to 260 cfu/100 mL), two were the result of NDOG (No Data Overgrown). In each case, staff implemented the mandatory adverse response procedure, which included notifying the MECP and the Middlesex-London Health Unit, and immediately re-sampled at each location. The re-sample results revealed no adverse indicators.

In all instances it is highly unlikely that there were 'actual' water quality issues at these sites, as all adverse samples were identified as having free chlorine residuals which were well above the minimum acceptable level at the time of the sampling (ranging between 0.38 to 0.93 mg/L). E. coli and Coliform bacteria cannot survive in chlorinated water; therefore, it is suspected that post-sampling contamination occurred. The re-sampling results support this conclusion. The microbiological testing procedure is extremely sensitive; accidental sample contamination can occur through operator or laboratory error, despite the specific procedures and precautions being adhered to while processing samples.

System Statistics and Major Events

During the period from January 1, 2021, through to December 31, 2021, a total of 47,334,160,000 litres of water were purchased, at a cost of $27,223,484, from the Joint Water Boards and subsequently pumped into London via the Arva Pumping Station and the London components within the Elgin Middlesex Pumping Station. Average day demand was 129,695,490 litres. Peak day consumption was down significantly from the 194,876,000 litres that occurred on July 6, 2020, the highest in a decade, to 166,753,000 on May 21, 2021, returning to within the normal range.

A summary of system pumpage can be found in the full version of the Summary Report. The data includes monthly average and maximum daily flows. These values are also compared to the rated flow rate capacities identified in London's Municipal Drinking Water Licence. There were no occurrences of flow rate exceedance during the specified time period.

Listed below are some 2021 statistics for the City of London Distribution System:

Approximate Replacement Value of Drinking Water System	**$5,900,000,000**
Number of Pumping Stations	**9**
Total Number of Water Services	**>120,000**
Length of Watermain	**1,635 km**
Number of Watermain Breaks	**77**
Number of Water Service Leaks	**286**

Municipalities Receiving London Water

In the Municipality of Middlesex Centre, the villages of Arva, Ballymote, and Delaware continued to receive their drinking water under contract from the City of London during 2021. The Municipality of Middlesex Centre has been provided a copy of the Annual Report as per O. Reg 170/03.

Several residences within Central Elgin also continued to receive drinking water from the transmission watermain that supplies the City of London from the EMPS. For this reason, Central Elgin has also been provided a copy of the report.