Lake Huron
Primary Water Supply System

2019 COMPLIANCE REPORT

CONTACT INFO:

Owner:
Lake Huron Primary Water Supply System Board of Management
c/o City of London, Regional Water Supply Division
235 North Centre Road, Suite 200, London, ON N5X 4E7
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Operating Authority:
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PROFILE

WHO WE ARE

The Lake Huron Primary Water Supply System (LHPWSS) is owned by a Board of Management who governs the drinking water system. The Board of Management is made up of members appointed from each of the eight (8) member municipalities that are currently supplied with water from the LHPWSS. One of these member municipalities, the City of London, acts as the Administering Municipality. Accordingly, the City of London provides all associated administrative and management services on behalf of the Board. The Board of Management currently utilizes the services of an independent contracted Operating Authority.

The water system is operated and maintained by Ontario Clean Water Agency (OCWA) under contract to the Board of Management.

OPERATING AUTHORITY:

ONTARIO CLEAN WATER AGENCY
AGENCE ONTARIENNE DES EAUX

LHPWSS Board Member Municipalities:

- City of London (Administering Municipality)
- Municipality of Bluewater
- Municipality of Lambton Shores
- Township of Lucan Biddulph
- Municipality of Middlesex Centre
- Municipality of North Middlesex
- Municipality of South Huron
- Municipality of Strathroy-Caradoc

WHAT WE DO

Water Treatment & Supply

The LHPWSS is responsible for the treatment and transmission of drinking water to eight (8) municipalities in southwestern Ontario. The population served by this system is approximately 375,000. Water is provided bulk wholesale to the municipalities who then distribute it to their customers.

The Lake Huron Water Treatment Plant (WTP) has been in operation since 1967. The WTP employs pre-chlorination, screening, powder activated carbon addition (seasonally on an as-required basis), coagulation, flocculation, sedimentation, dual-media filtration, post-chlorination, and sodium hydroxide addition to treat raw water obtained from Lake Huron. After the water is treated it is pumped from the WTP to various communities or to storage reservoirs. The drinking water system is monitored at various locations throughout the system via a Supervisory Control and Data Acquisition (SCADA) system.

LHPWSS Assets:

- 1 water treatment plant
- 1 residuals management facility
- 3 water pumping stations
- 3 in-ground storage reservoirs
- 8 monitoring stations
- 151 km of watermain

Figure 1: McGillivray Booster Pumping Station
Figure 2: Pumps at the Lake Huron WTP

WHAT IS IMPORTANT

Values of the Water System

The values of the LHPWSS are the inherent beliefs or moral standards that generally reflect what the LHPWSS Board of Management stands for and believes in:

- **Sustainable** - be financially, environmentally, socially, and physically sustainable;
- **Inclusive** - provide access to bulk drinking water for current and prospective members, in accordance with Board policy;
- **Fair and equitable** - balance the interests of individual members with the best interests of all members, as well as the needs of existing members with the needs of new members;
- **Vigilant** - ensure an adequate supply of safe and reasonably priced drinking water is available to members;
- **Innovative** - be receptive to and supportive of new ideas and opportunities for improvement;
- **Cooperative** – be supportive to the needs of the Lake Huron Primary Water Supply System;
- **Open and transparent –** conduct business in a manner that enables member municipalities and the public to review and provide input into major decisions as appropriate;
- **Public Ownership –** retain ownership of the water system in public hands.

LHPWSS: AT A GLANCE

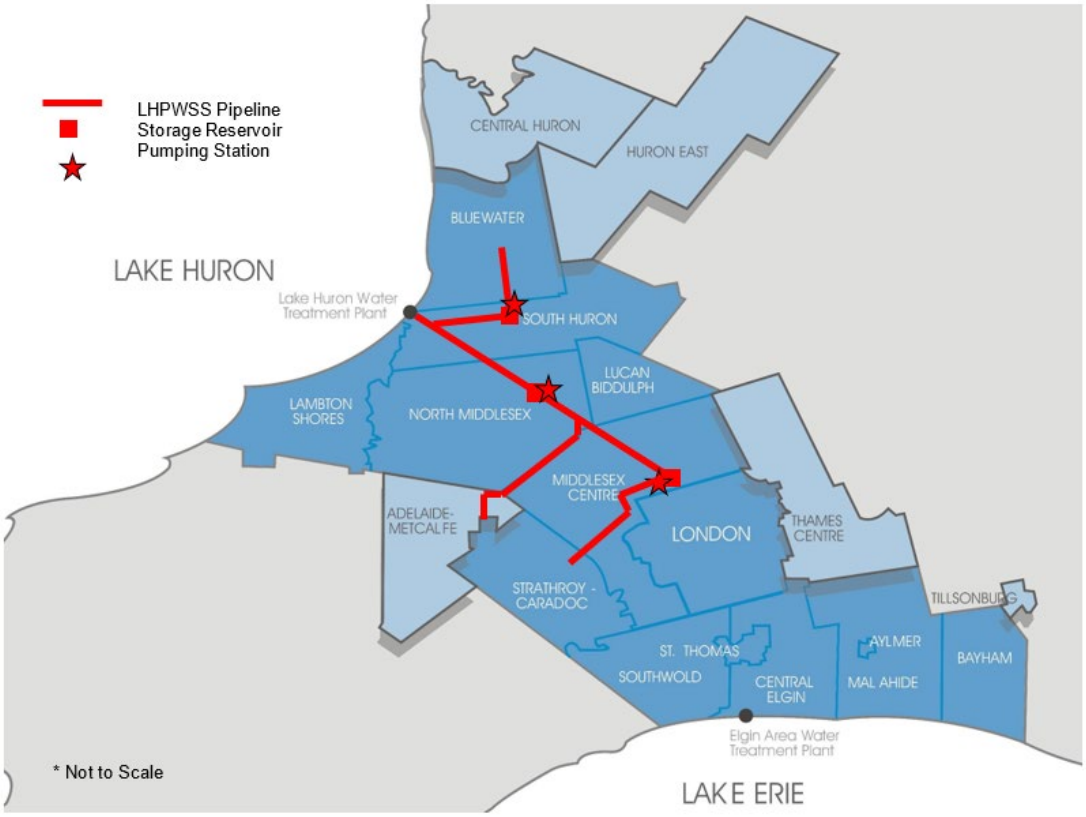

Figure 3: LHPWSS Major Infrastructure Locations

THE WATER TREATMENT PROCESS

The following figure provides a general overview of the conventional water treatment process. The processes outlined below are very similar to the treatment at the Lake Huron WTP, although they are not an exact representation. Some details may vary. Step 9 (fluoridation) does not take place at the Lake Huron WTP.

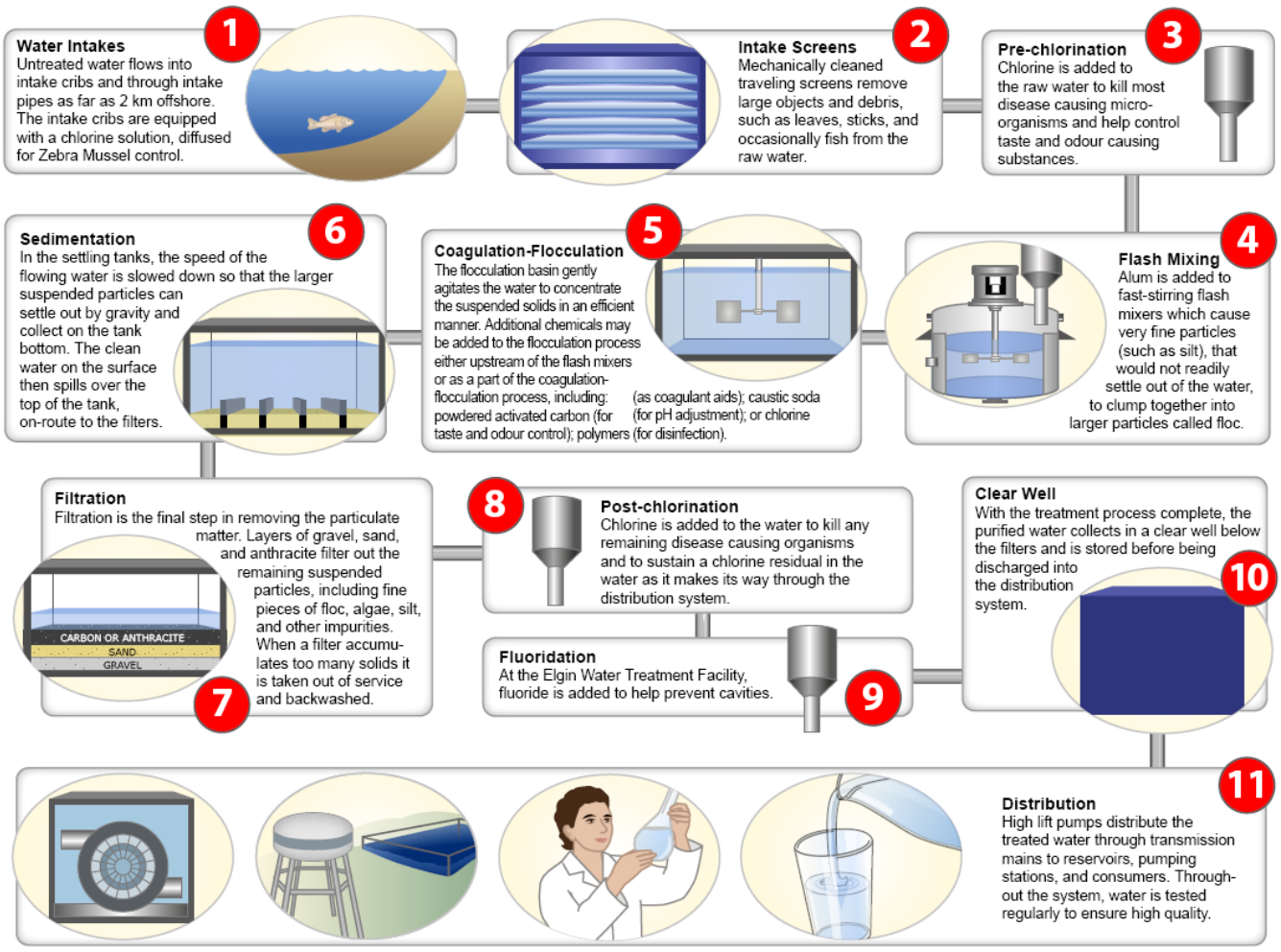

Figure 4: Overview of the Water Treatment Process

At the Lake Huron WTP, Step 9 (Fluoridation) does not take place.

At the Lake Huron WTP, one additional treatment step takes place:

Sodium Hydroxide is added as the treated water leaves the WTP and enters the transmission system (Step 11) to raise the treated water pH, resulting in reduced corrosion potential.

2019 HIGHLIGHTS - GENERAL

PROCESS OPTIMIZATION & RESEARCH DAY

On March 29, 2019, the Lake Huron & Elgin Area Primary Water Supply Systems co-hosted a Process Optimization and Research Day. The purpose was to share information on the research programs currently being undertaken by the water systems in affiliation with the two partner Natural Science and Engineering Council (NSERC) chairs at the University of Waterloo and University of Toronto.

Although the NSERC chairs periodically hold “technology transfer days” to share information on their research projects with their contributing partners, this Research Day is unique in that it is hosted by a water system, and the water systems’ research partners presented their work on the Lake Huron and Elgin Area Water Supply Systems to associated guests. Guests included staff from the Ontario Clean Water Agency (OCWA), the Ministry of the Environment, Conservation and Parks (MECP), the local Health Units, Board staff, and staff of the benefiting municipalities supplied by the Lake Huron & Elgin Area Water Supply Systems.

Topics presented on Research Day included various investigations related to microplastics, cyanobacteria, lead corrosion control strategies, storm event monitoring, treatment studies and other research initiatives. It was an extremely valuable day of sharing project work, research and optimization for the water systems and an opportunity for attendees to network.

DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS) ACCREDITATION

The continued utilization and accreditation of a Quality Management System (QMS) is a regulatory requirement. The *Safe Drinking Water Act* (SDWA) and the water system’s Municipal Drinking Water Licence (MDWL) require that an accredited Operating Authority be in operational charge of the drinking water system. In order to become accredited, the Operating Authority must utilize and maintain an Operational Plan that meets the requirements of the Drinking Water Quality Management Standard (DWQMS). An external re-accreditation audit is required every three years. OCWA received full scope DWQMS re-accreditation in November 2019 and is currently accredited for another three-year period ending in 2022.

2019 CAPITAL PROJECT HIGHLIGHTS

RAW WATER FLOW METER REPLACEMENTS

Flow meters throughout the Water Treatment Plant (WTP) are necessary to control and monitor the various treatment processes. In addition to process controls, the raw water flow meters are also required for regulatory reporting related to the water system's Permit To Take Water (PTTW). The systemic replacement of the old and failing non-revenue meters throughout the WTP ensures continued process control and regulatory compliance. In 2019, both the north and south raw water flow meters were replaced.

Figure 5: New raw water flow meter, north side.

CHEMICAL FILL PANELS

Bulk chemicals delivered to the Water Treatment Plant are supplied via tanker truck and unloaded at the loading dock. This exterior location previously did not include any alarms or indicators as to how full/empty the bulk storage tanks are, increasing the risk for overfilling the tanks and creating spills. This project involved installing new chemical delivery panels at the loading dock, which include display panels to indicate tank levels in order to eliminate the risk of spills.

HIGH LIFT PUMPS #3 AND #6 SUCTION VALVES INSTALLATION

In anticipation of the upcoming High Lift Pump (HLP) replacement project, work on the suction valves was required. HLP #3 suction valve was original to the plant. The valve was no longer maintainable, did not seat properly, and therefore would not be able to be isolated during construction/installation of the new pumps. HLP #6 is a new pump to be added, requiring the installation of a suction isolation valve in advance of the HLP construction. As the lead time was long on these valves, it was decided to have them replaced early to prevent any construction delays once the HLPs arrive on site. Installation of the new HLPs is anticipated to take place in 2021-2022.

Figures 6a and 6b: Replacement of the 36" suction isolation valve on HLP #3.

FILTER MEDIA REPLACEMENTS

The twelve (12) dual-media filters at the Lake Huron Water Treatment Plant were from the original construction in the mid-1960s. All filters were showing signs of deterioration due to age. This project undertakes the systemic replacement of the media within the filter boxes, as well as the filter rate valves and control valves, with an allowance for any repairs to the existing filter block and drains as needed. The filter media replacement project is a multi-year project. The filter media is being replaced in several filters per year, with 2019 being the fifth and final year of the replacement program. In 2019, filters #5 and #12 were rebuilt.

FILTER FLOW METER REPLACEMENTS

The filter flow meters are used to manage and control the rate of filtration on each of the twelve (12) filters. The flow meters were original to the plant, well past their useful life, and their inaccuracies were becoming increasingly problematic for the reliable operation of the Water Treatment Plant. This project involved replacement of the filter flow meters, including piping modifications, control wiring, SCADA configuration and commissioning.

UNINTERRUPTIBLE POWER SUPPLY (UPS) REPLACEMENT

The UPS system at the WTP is used to supply clean electrical power to plant instrumentation, Programmable Logic Controllers (PLCs), computers, and other critical equipment throughout the facility. It is a system that is used to mitigate risk to critical equipment and to ensure operational continuity during the time between the onset of a power outage and the time it takes for emergency generators to start and provide backup emergency power. The previously existing UPS system was no longer supported by the manufacturer and parts were difficult to obtain. In 2019, a modern UPS was installed and integrated into the plant's SCADA system to ensure that the critical plant instrumentation and computerized systems will operate seamlessly during power failures.

PIPELINE SECTION REPLACEMENT

In 2019, a leak was discovered on the 48” primary transmission pipeline, next to a chamber. An inspection and repair were subsequently undertaken on April 24, 2019. The segment of pipe that was removed showed evidence of corrosion, which caused the leak.

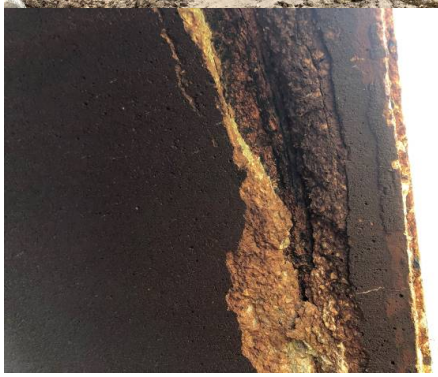

Figure 7a: After excavation to expose the pipeline and leaking joint, an inspection occurs.
Figure 7b: Cutting into the pipe to perform the repair.
Figure 7c: Inside the old pipe, evidence of corrosion which caused the leak.

TRANSIENT PRESSURE MONITORING SYSTEM

The occurrence of pressure transients within a pressure pipeline can have adverse effects on the integrity of a pipe section as they can cause damage such as fatigue stress or even a pipe failure depending on the magnitude of the transient and current condition of the pipe. Accumulated damage of this nature can eventually decrease the structural integrity of the pipe. Therefore, it is important to understand the frequency and magnitude of pressure transients in a pipeline to ensure that operational protocols can be implemented to maintain the pressures below the specified design. An understanding of the actual pressure in a line will also permit knowledgeable decisions regarding future modifications to the line or facilities that affect the performance of the pipeline.

Four (4) transient monitors have been installed along the Lake Huron primary pipeline. If the device detects a transient it will sample and record data at a high rate. This data will be used to inform operations of transient events in the system before and after the new high lift pumps are installed in 2021/2022.

Figure 8: Pressure transient monitor installed in the primary transmission main.

2019 FLOW SUMMARY

As per the water system's current Permit To Take Water (PTTW), the amount of raw water taken into the Lake Huron WTP cannot exceed 454.98 million litres/day or 5266 litres/second.

The water taking PTTW for 2019 was # 4725-87SS3J.

As per the water system's current Municipal Drinking Water License, the rated capacity of the WTP is 340.0 million litres/day, which converts to 3935 litres/second. The maximum daily volume of treated water that flows from the treatment plant into the transmission system shall not exceed this value.

The following table contains a flow summary, with comparison to the system's rated capacity and permit limits in order to assess the capability of the system to meet existing and planned uses.

	Total Daily Flow (ML/day)	Total Daily Flow (% of Capacity)	Daily Instantaneous Peak Flow (L/s)
PTTW – permitted raw water taking amount	454.98	100%	5266
Raw Water Flow – Average Day	125.7	27.6%	2427
Raw Water Flow – Max. Day	166.2	36.5%	4096
WTP Rated Capacity	340.0	100%	3935
Treated Water Flow – Average Day	121.2	35.6%	1933
Treated Water Flow – Max. Day	161.6	47.5%	2847

A complete flow summary for the LHPWSS can be found in Appendix A.

The majority of the volume of treated drinking water from the LHPWSS is used by the City of London. As shown in Figure 9, London takes 83.78% of the volume, with the other seven municipalities using the remaining 16.22%.

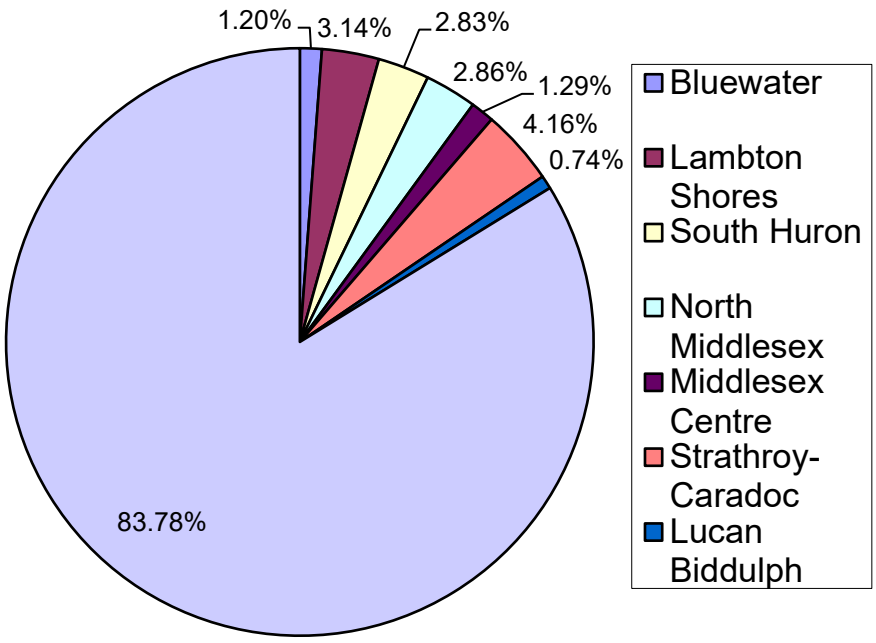

Figure 9: 2019 Treated Water Volumes per Municipality

2019 CHEMICAL CONSUMPTION

A variety of water treatment chemicals are used at the Lake Huron WTP to ensure safe, clean drinking water. The following table outlines the chemicals most frequently used for the LHPWSS. As part of the system's registered ISO14001 Environmental Management System, objectives and targets are currently in place to optimize chemical usage.

Chemical	Used for	Total Amount Used in 2019
Aluminum sulphate	Coagulation	842,969 kg
Powdered activated carbon	Taste and odour control (seasonally)	30,478 kg
Chlorine gas	Mussel control	33,853 kg
Chlorine gas	Primary disinfection	59,606 kg
Sodium hydroxide	pH adjustment for corrosion control	614,673 kg
Polymer	Filter aid (used on an as-required basis)	N/A
Polymer	Residuals Management Facility – dewatering aid	6,606 kg
Sodium Bisulphite	Residuals Management Facility - dechlorination	68,426 kg

2019 WATER QUALITY SAMPLING AND MONITORING

The LHPWSS consistently provides treated drinking water with water quality above the standards required by provincial regulation. Where desirable, the LHPWSS standards are more stringent than what is required by regulation. For example, the target at the Lake Huron WTP for treated water turbidity (a measure of the cloudiness of water) is 10 times more stringent than the provincial standard. The LHPWSS is practicing continual improvement to ensure that high drinking water standards are maintained and enhanced where possible.

All water quality sampling at the LHPWSS is performed in accordance with the *Safe Drinking Water Act* and its associated regulations. All samples are collected by licensed operating authority personnel and are submitted to Canadian Association for Laboratory Accreditation (CALA)/Standards Council of Canada (SCC) accredited laboratories for both bacterial and chemical analysis.

In 2019, a total of 596 microbiological samples were collected from raw, treated and distribution system water, and were tested for E Coli, total coliforms and heterotrophic plate count (HPC). There was one incident of an adverse microbiological test result in 2019. For more information please see the Annual Report, which is attached as Appendix B.

Annual samples are collected and tested for inorganics (metals) and organics which include herbicides, pesticides and volatile organic parameters. Quarterly sampling is also conducted for trihalomethanes and haloacetic acids (disinfection by-products), nitrates and nitrites.

Seasonal samples are collected and tested for total microcystin from June through to the end of October. A total of 22 raw water samples were tested for total microcystin. There were no detectable results in the raw water.

In addition, the WTP operator samples the raw, in-process and treated water six times per day and carries out an array of physical and chemical tests for operational control.

As required by regulation, the LHPWSS also prepares an Annual Report which includes a summary of water quality test results and a maintenance report. The 2019 Annual Report can be found in Appendix B.

RESEARCH & PARTNERSHIPS

The LHPWSS acknowledges the importance of scientific research on water quality and the effects on human health. The LHPWSS has partnered with the Natural Sciences and Engineering Research Council (NSERC) Chair in Drinking Water Research at the University of Waterloo and University of Toronto to pursue research opportunities, as well as Western University, and is a member of the Water Research Foundation (WRF). In addition, the LHPWSS continues to evaluate and conduct specific research on the efficacy of the existing treatment processes, optimizing and improving treatment systems, and evaluating the potential and need of more advanced treatment alternatives.

The LHPWSS also participates in the Ministry of the Environment, Conservation and Parks (MECP) Drinking Water Surveillance Program (DWSP) and intake monitoring studies.

MINISTRY INSPECTION

ANNUAL INSPECTION

The Ontario Ministry of the Environment, Conservation and Parks (MECP) conducts an inspection of the LHPWSS annually. A MECP inspection took place on November 19, 2019. The final inspection report was issued on February 3, 2020. A total of two (2) non-compliances identified in the inspection report. The details of the non-compliances can be found in Appendix C. The final inspection rating received for the 2019-2020 reporting year was 93.25%.

Lake Huron
Primary Water Supply System

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APPENDIX A – 2019 FLOW SUMMARY

1. RAW WATER INTAKE – FLOW (ML/DAY)

Day	Jan. (ML)	Feb. (ML)	Mar. (ML)	Apr. (ML)	May (ML)	June (ML)	July (ML)	Aug. (ML)	Sep. (ML)	Oct. (ML)	Nov. (ML)	Dec. (ML)	Total
1	116.89	116.41	106.75	132.24	115.61	115.12	148.49	145.35	128.95	131.17	114.43	115.96	
2	110.06	134.88	112.70	138.88	114.98	134.37	143.63	152.59	116.12	133.40	125.11	110.15	
3	111.03	127.88	125.43	106.13	115.43	116.42	143.12	151.93	153.55	126.09	125.19	121.92	
4	107.74	137.83	109.73	112.58	116.84	133.20	165.49	154.44	100.74	125.61	119.60	130	
5	108.94	114.29	118.75	126.96	115.08	117.92	166.17	148.92	160.90	121.93	117.35	113.32	
6	112.58	144.37	139.02	113.78	113.39	133.76	157.80	143.45	145.07	120.56	112.69	115.58	
7	116.96	117.73	106.31	128.17	132.93	128.69	130.02	128.70	144.13	116.03	124.89	115.65	
8	119.03	116.61	125.16	112.48	116.80	139.40	154.76	155.16	137.37	152.41	117.42	114.66	
9	116.08	117.43	115.23	133.95	114.46	143.54	150.88	135.00	147.44	133.67	110.71	114.83	
10	114.99	121.81	122.68	112.67	119.27	137.22	149.88	146.74	135.21	121.22	117.04	101.49	
11	116.13	132.59	120.57	126.67	113.88	114.46	151.50	151.03	125.72	140.44	115.82	127.82	
12	116.52	117.04	117.86	113.65	113.56	134.59	148.15	152.62	149.42	127.70	136.56	142.33	
13	141.32	138.12	113.63	112.96	113.59	115.45	143.28	147.08	124.14	118.32	60.63	106.50	
14	116.27	84.46	117.72	112.68	114.84	139.63	144.10	144.77	127.29	113.09	156.09	137.13	
15	112.67	128.92	112.25	142.92	111.25	116.49	147.92	152.92	136.11	109.16	129.83	121.40	
16	127.32	108.52	123.08	90.45	132.62	130.70	151.42	154.45	149.69	124.21	113.81	95.42	
17	116.19	109.82	113.23	125.20	116.51	116.58	145.72	149.96	140.23	101.25	132.62	140.45	
18	116.30	109.16	113.54	98.77	130.98	117.15	146.49	146.80	148.65	149.36	116.77	108.26	
19	116.40	115.15	132.12	134.17	115.56	138.33	156.60	136.80	134.18	132.68	132.20	115.47	
20	115.75	131.34	106.31	113.73	115.50	135.02	145.77	152.58	148.41	114.84	112.39	113.91	
21	117.53	99.54	136.26	112.77	116.89	131.38	117.93	113.91	147.43	126.27	115.77	113.36	
22	115.08	121.12	111.54	108.68	115.12	131.38	136.25	148.28	135.60	88.67	115.87	114.20	
23	134.93	115.70	113.42	111.68	125.79	144.29	143.32	127.21	135.91	140.19	114.99	115.84	
24	123.15	115.47	115.78	115.84	129.93	133.06	145.46	131.34	112.83	120.12	115.66	111.44	
25	116.21	114.48	112.50	115.11	116.32	132.33	159.32	139.53	152.92	130.91	115.60	104.54	
26	116.43	115.85	112.20	121.66	115.62	146.35	165.41	134.57	116.58	113.46	114.68	105.54	
27	116.53	110.62	128.72	119.32	133.08	136.30	163.12	137.11	133.55	114.68	135.83	98.86	
28	115.33	128.48	102.37	121.41	130.45	153.40	154.86	127.06	140.92	102.18	115.82	102.78	
29	129.66		128.36	115.63	115.19	155.65	151.44	144.19	123.27	106.18	114.08	109.91	
30	97.31		113.33	121.37	127.32	149.27	123.74	137.95	123.00	138.78	115.66	109.31	

Day	Jan. (ML)	Feb. (ML)	Mar. (ML)	Apr. (ML)	May (ML)	June (ML)	July (ML)	Aug. (ML)	Sep. (ML)	Oct. (ML)	Nov. (ML)	Dec. (ML)	Total
31	139.57		96.74		131.78		141.10	143.58		129.39		100.84	
Total	3650.9	3345.6	3623.3	3552.5	3710.6	3971.5	4593.1	4436.0	4075.3	3824.0	3565.1	3548.9	45896.8
Min.	97.3	84.5	96.7	90.5	111.3	114.5	117.9	113.9	100.7	88.7	60.6	95.4	60.6
Max.	141.3	144.4	139.0	142.9	133.1	155.7	166.2	155.2	160.9	152.4	156.1	142.3	166.2
Avg.	117.8	119.5	116.9	118.4	119.7	132.4	148.2	143.1	135.8	123.4	118.8	114.5	125.7

Note: (i) As per the water system's current Permit To Take Water (PTTW), the amount of raw water taken into the Lake Huron Water Treatment Plant cannot exceed 454.98 million litres/day.

2. RAW WATER INSTANTANEOUS PEAK FLOW (L/s)

Day	Jan. (L/s)	Feb. (L/s)	Mar. (L/s)	April (L/s)	May (L/s)	June (L/s)	July (L/s)	Aug. (L/s)	Sep. (L/s)	Oct. (L/s)	Nov. (L/s)	Dec. (L/s)	Total
1	1953.7	1944.2	2205.3	2878.6	2815.3	1909.5	2884.7	2905.1	2219.0	2774.8	2180.7	1931.1	
2	1951.0	2871.2	1915.6	2453.4	1935.4	3254.9	2887.4	2974.3	1938.0	2887.4	2146.1	2188.3	
3	1946.5	2217.6	1920.8	1950.9	1915.6	1907.1	3090.5	2987.3	3027.4	2841.6	2082.6	2878.4	
4	1946.8	2946.3	2174.7	1892.8	1916.7	2520.8	3185.4	2942.2	2933.4	2774.2	1907.6	2847.7	
5	1941.6	2216.8	1925.3	2093.9	1900.1	1955.3	2968.2	2659.1	3068.2	2831.5	1937.0	1918.9	
6	1957.3	3032.8	2311.1	2040.4	1946.4	3004.9	2967.7	2910.1	2922.5	2731.8	1880.2	1918.3	
7	1939.0	1944.2	2872.2	2064.6	2703.4	2851.6	3773.1	3033.4	2948.0	2840.7	1910.2	1859.3	
8	1934.6	1945.9	2922.7	2031.7	1920.0	2851.6	3200.0	2908.6	2992.0	2811.2	1891.4	1899.4	
9	1940.7	1953.8	1829.7	2176.5	1885.8	2888.5	2947.0	3091.6	2812.3	2740.5	1921.3	1897.9	
10	1946.8	2168.8	1899.1	1927.9	2452.0	2876.2	2862.0	3114.2	2198.0	2821.1	1909.7	2873.6	
11	113.1	2906.1	3166.7	2826.2	1861.8	1960.1	3083.1	2898.6	2202.3	2773.0	1907.3	2155.8	
12	1945.8	2543.5	1927.5	1952.8	1929.7	3298.1	2871.4	2982.6	2946.1	2908.3	2872.1	2293.3	
13	2830.1	2305.8	1862.3	1873.5	1891.2	1851.4	2965.2	2923.1	2175.9	2140.0	2767.4	1991.7	
14	1942.4	2190.5	2177.3	1916.1	1947.7	3153.6	3125.7	2805.4	2488.4	1945.1	2881.3	2388.9	
15	1988.8	2214.1	2019.7	3033.8	2210.0	1912.2	2931.3	2903.7	2925.1	2208.6	2865.0	2115.0	
16	2129.6	1926.6	2067.9	2840.9	2938.5	2199.5	2764.0	2958.4	2811.6	2538.0	1890.0	2719.7	
17	2008.8	1924.1	1860.8	2091.7	1920.2	1945.5	2999.9	2888.1	2960.5	3297.9	2871.4	2940.4	
18	2004.5	1927.5	1865.6	2058.8	2194.8	2832.6	2963.5	2906.1	2937.6	2830.0	2797.6	2118.4	
19	2055.9	1932.9	2678.9	2936.0	1919.3	2832.6	2882.8	2627.0	2956.6	2180.7	2659.0	1915.6	
20	1992.1	2533.9	4096.4	1892.6	1936.9	2216.4	2928.5	2998.4	3099.5	1861.6	2235.3	1931.5	
21	2007.2	2943.1	3015.5	1868.1	1870.3	2915.7	1926.4	2908.3	2445.4	2902.1	1915.3	1923.8	
22	1997.3	4045.9	1925.3	1928.7	1907.3	1931.5	2898.3	2949.0	2316.7	1903.5	1976.3	1912.5	
23	2175.7	1916.7	1884.4	2930.3	2828.6	2952.3	3250.6	2759.7	2726.9	2905.8	1882.8	1908.9	
24	2952.4	2161.2	2172.8	2089.5	2806.1	2243.5	2842.9	3130.2	2876.6	2171.3	1891.8	1915.7	
25	1947.6	1956.9	2944.1	2738.1	1922.5	2888.1	2819.9	2769.1	2874.3	2222.2	1890.0	1926.9	
26	1950.2	1993.8	1864.8	2576.2	1923.6	2957.2	2931.4	2868.3	2139.7	1843.9	2042.4	1923.8	
27	1946.8	1999.1	2288.7	1923.1	2940.4	3008.9	2957.8	2925.3	2888.1	1872.5	2181.9	2012.4	
28	1930.2	2802.0	3996.4	1939.9	2192.0	2956.7	2994.2	3394.6	2854.2	1881.5	2099.2	2019.1	
29	2301.5		2794.9	2152.7	1925.3	2908.0	2836.6	3098.0	2848.7	1879.6	1905.1	1954.6	
30	1997.5		1867.2	3112.2	2265.0	3304.1	2766.2	2934.1	2223.3	2096.1	1895.5	1969.8	

Day	Jan. (L/s)	Feb. (L/s)	Mar. (L/s)	April (L/s)	May (L/s)	June (L/s)	July (L/s)	Aug. (L/s)	Sep. (L/s)	Oct. (L/s)	Nov. (L/s)	Dec. (L/s)	Total
31	2961.9		1884.6		2158.4		2889.9	2946.4		3076.6		1980.7	
Minimum	113	1,917	1,830	1,868	1,862	1,851	1,926	2,627	1,938	1,844	1,880	1,859	113
Maximum	2,962	4,046	4,096	3,112	2,940	3,304	3,773	3,395	3,100	3,298	2,881	2,940	4,096
Average	2,021	2,338	2,334	2,273	2,157	2,610	2,948	2,939	2,692	2,500	2,173	2,136	2,427

Note: (i) As per the water system's current Permit To Take Water (PTTW), the amount of raw water taken into the Lake Huron Water Treatment Plant cannot exceed 454.98 million litres/day. This converts to 5266 litres/second.

3. TREATED WATER FLOW (ML/DAY)

Day	Jan. (ML)	Feb. (ML)	Mar. (ML)	Apr. (ML)	May (ML)	June (ML)	July (ML)	Aug. (ML)	Sep. (ML)	Oct. (ML)	Nov. (ML)	Dec. (ML)	Total
1	111.39	110.75	103.58	128.87	109.81	110.67	144.48	137.57	122.67	127.13	110.70	111.97	
2	104.56	129.17	108.99	136.46	108.83	131.67	139.34	149.05	110.32	130.78	121.69	107.33	
3	106.47	122.17	121.60	103.29	112.01	112.14	138.85	147.87	147.41	122.30	121.04	118.07	
4	101.93	133.48	104.70	108.58	112.09	127.55	155.24	150.07	94.74	121.81	116.19	127.31	
5	103.54	108.65	109.58	124.16	112.16	112.15	161.59	143.54	155.52	119.29	110.41	110.58	
6	108.20	139.02	135.52	109.90	111.46	130.86	153.41	137.44	140.18	116.66	105.61	112.16	
7	111.13	111.96	95.83	125.25	126.03	123.00	125.05	119.61	136.74	113.20	118.26	111.96	
8	111.23	112.02	121.31	109.58	110.42	135.68	149.56	150.26	130.10	149.97	106.86	111.9	
9	110.40	112.01	111.53	130.11	110.50	139.89	147.01	130.04	137.95	129.99	105.22	111.05	
10	109.19	116.09	118.58	110.01	114.48	133.53	145.89	140.95	130.67	115.14	112.31	98.06	
11	110.33	127.17	116.23	124.09	110.74	110.40	147.39	145.69	120.05	138.10	112.07	123.05	
12	110.83	112.35	115.01	109.81	110.56	130.42	144.28	147.71	143.30	123.93	133.53	138	
13	135.98	132.52	109.64	110.14	110.36	111.01	137.99	141.91	117.31	115.60	57.35	103.12	
14	110.85	77.96	109.87	110.01	110.73	135.67	139.46	140.11	121.99	109.15	152.59	134.23	
15	106.71	126.26	109.69	139.42	106.17	112.24	143.63	148.59	132.28	104.93	126.20	117.79	
16	121.92	104.51	120.44	85.44	129.66	126.68	147.06	149.96	142.82	120.09	111.04	92.07	
17	110.82	105.91	109.37	122.48	112.31	112.35	140.94	145.01	134.87	93.63	128.81	137.08	
18	110.68	106.06	109.65	95.26	126.86	112.72	141.66	141.45	142.18	146.75	113.09	104.52	
19	110.69	111.06	129.04	130.56	112.58	134.11	151.80	130.63	125.79	129.72	128.35	111.93	
20	110.23	127.79	95.83	109.92	112.46	130.71	139.19	146.24	143.68	110.89	109.25	110.02	
21	110.65	83.79	132.62	109.85	111.64	127.23	112.32	108.02	141.63	123.02	111.78	111.83	
22	109.78	115.74	109.82	105.75	112.08	112.48	130.35	142.41	130.73	83.41	111.91	111.79	
23	128.67	112.06	109.75	107.63	122.71	140.27	136.47	120.78	129.78	136.50	112.10	111.97	
24	116.43	112.02	111.99	112.23	124.94	128.87	142.12	129.01	108.71	117.21	111.89	107.98	
25	110.58	112.01	106.71	111.23	112.19	126.63	154.83	134.41	150.07	128.57	111.66	101.22	
26	110.74	111.84	109.65	117.68	112.35	142.26	160.69	129.64	109.58	110.69	111.73	101.23	
27	110.77	103.82	125.29	116.44	129.17	131.17	158.28	134.42	129.97	113.17	132.39	95.17	
28	110.66	123.55	97.94	118.60	126.49	148.29	148.77	120.56	136.54	99.14	111.87	99.39	
29	124.71		126.25	110.39	111.98	151.15	144.34	139.71	119.30	100.61	111.55	105.55	

Day	Jan. (ML)	Feb. (ML)	Mar. (ML)	Apr. (ML)	May (ML)	June (ML)	July (ML)	Aug. (ML)	Sep. (ML)	Oct. (ML)	Nov. (ML)	Dec. (ML)	Total
30	90.07		109.85	115.59	123.22	145.27	118.72	132.42	119.96	121.26	112.12	105.55	
31	135.24		91.47		127.53		135.64	137.82		126.80		97.97	
Total	3475.4	3201.7	3487.3	3448.7	3584.5	3827.1	4436.4	4272.9	3906.8	3699.4	3439.6	3441.9	44221.7
Minimum	90.1	78.0	91.5	85.4	106.2	110.4	112.3	108.0	94.7	83.4	57.4	92.1	57.4
Maximum	136.0	139.0	135.5	139.4	129.7	151.2	161.6	150.3	155.5	150.0	152.6	138.0	161.6
Average	112.1	114.3	112.5	115.0	115.6	127.6	143.1	137.8	130.2	119.3	114.7	111.0	121.2

Note: (i) As per the water system's current Municipal Drinking Water Licence, the rated capacity of the Water Treatment Plant is 340.0 million litres/day.

4. TREATED WATER INSTANTANEOUS PEAK FLOW (L/s)

Day	Jan. (L/s)	Feb. (L/s)	Mar. (L/s)	April (L/s)	May (L/s)	June (L/s)	July (L/s)	Aug. (L/s)	Sep. (L/s)	Oct. (L/s)	Nov. (L/s)	Dec. (L/s)	Total
1	1330.6	1312.5	1230.1	2058.0	2072.6	1319.2	2709.6	2317.7	2219.4	2151.7	2117.7	1335.2	
2	1330.6	2387.8	1319.2	2045.5	1323.8	2176.5	2705.1	2462.3	1331.7	2209.3	2151.7	2150.0	
3	1321.5	2094.2	1837.8	1308.1	1325.0	1355.4	2679.2	2726.6	2211.6	2146.1	2062.5	2156.1	
4	1308.1	2089.5	1303.5	1335.6	1327.2	2167.5	2715.3	2697.2	2660.0	2155.1	1927.1	2322.3	
5	1321.5	2212.7	1306.9	2049.0	1335.2	1330.6	2847.2	2675.8	2667.8	2169.8	1636.8	1345.3	
6	1329.4	2391.2	2098.6	1310.2	2148.5	2228.5	2730.0	2714.1	2704.5	2225.1	1260.6	1334.0	
7	1316.0	1322.7	2014.0	2037.7	2174.3	1536.3	2177.7	2660.0	2661.0	2193.5	1612.2	1338.4	
8	1328.2	1322.7	2067.0	1309.0	1314.8	2474.7	2737.8	2703.9	2189.0	2214.9	1341.9	1334.0	
9	1325.0	1325.0	1551.9	2047.9	1310.2	2230.8	2731.0	2222.8	2355.0	2331.3	1331.0	1337.3	
10	1304.6	2128.1	1534.7	1304.6	2137.0	2239.8	2728.8	2718.6	2193.5	2226.2	1340.7	2153.9	
11	1309.0	2131.5	1915.7	2068.2	1306.9	1345.3	2723.1	2719.8	2159.6	2180.0	1340.7	2152.8	
12	1314.8	2083.0	1968.8	1296.8	1313.7	2239.8	2690.4	2716.4	2166.3	2094.2	2739.0	2175.3	
13	2151.9	2168.8	1308.1	1299.0	1313.7	1316.0	2710.8	2671.2	2164.4	2158.7	2181.0	1965.4	
14	1314.8	2170.9	1299.0	1336.2	2133.8	2198.0	2709.6	2260.2	2160.8	1323.8	2172.1	2226.3	
15	1326.2	2165.4	1301.2	2078.5	2187.8	1327.2	2271.4	2692.7	2550.3	2129.2	2156.3	2107.6	
16	2116.8	1328.2	2056.9	1990.2	2159.6	2191.2	2722.0	2716.4	2207.1	2151.9	1325.0	2124.7	
17	1309.0	1316.0	1305.8	2080.4	1336.2	1332.9	2717.5	2707.4	2491.7	2647.7	2152.8	2165.3	
18	1309.0	1329.6	1310.2	2025.2	2168.6	2344.9	2239.8	2687.0	2683.7	2669.1	2115.6	2105.6	
19	1323.8	1323.8	2080.4	2060.3	1334.0	2356.0	2664.5	2227.3	2224.0	2129.2	2121.3	1326.2	
20	1313.7	2204.7	2092.9	1539.9	1329.4	1560.6	2666.7	2713.0	2676.9	1323.8	1356.5	1329.4	
21	1345.3	2182.3	2040.0	1323.8	1330.6	2153.9	1340.7	2234.1	2453.7	2525.7	1349.8	1328.2	
22	1312.5	2120.1	1312.5	1302.3	1329.4	1336.2	2208.1	2676.9	2166.3	1729.4	1339.6	1225.5	
23	2186.7	1332.9	1306.9	2040.0	2257.9	2640.9	2713.0	2204.7	2158.4	2147.2	1335.2	1360.0	
24	2212.7	1328.2	2017.2	2027.5	2185.5	2198.0	2683.7	2231.8	2231.8	2122.5	1328.2	1334.0	
25	1296.8	1328.2	2033.1	2125.8	1325.0	2544.0	2723.1	2685.9	2186.7	2143.9	1317.1	1327.2	
26	1313.7	1325.0	1299.0	2120.0	1334.0	2614.7	2703.9	2212.7	2135.9	1325.0	1332.9	1335.2	
27	1314.8	1300.0	2046.6	1915.7	2178.0	2636.2	2277.1	2219.4	2191.2	1925.8	2218.3	1331.7	
28	1310.2	2011.7	1305.8	1911.2	2143.8	2580.9	2241.0	2500.7	2239.6	1280.8	1337.3	1312.5	
29	2123.6		2032.1	1328.2	1334.0	2237.5	2388.9	2705.1	2233.8	1837.8	1329.4	1338.4	
30	1317.1		1297.9	2095.4	2159.6	2711.9	2680.2	2698.3	2205.9	1959.8	1337.3	1335.2	

Day	Jan. (L/s)	Feb. (L/s)	Mar. (L/s)	April (L/s)	May (L/s)	June (L/s)	July (L/s)	Aug. (L/s)	Sep. (L/s)	Oct. (L/s)	Nov. (L/s)	Dec. (L/s)	Total
31	2149.5		1295.6		2141.6		2236.3	2233.0		2417.2		1322.7	
Total	45,887	49,737	50,890	52,770	52,772	60,925	79,073	78,613	68,881	64,246	50,668	51,036	705,499
Minimum	1,297	1,300	1,230	1,297	1,307	1,316	1,341	2,205	1,332	1,281	1,261	1,225	1,225
Maximum	2,213	2,391	2,099	2,126	2,258	2,712	2,847	2,727	2,705	2,669	2,739	2,322	2,847
Average	1,480	1,776	1,642	1,759	1,702	2,031	2,551	2,536	2,296	2,072	1,689	1,646	1,933

Note: (i) As per the water system's current Municipal Drinking Water Licence, the rated capacity of the Water Treatment Plant is 340.0 million litres/day. This converts to 3935 litres/second. The maximum daily volume of treated water that flows from the treatment plant into the distribution system shall not exceed this value.

APPENDIX B – 2019 ANNUAL REPORT

Ontario

Drinking-Water Systems Regulation O. Reg. 170/03

Drinking-Water System Number:	210000791
Drinking-Water System Name:	Lake Huron Primary Water Supply System
Drinking-Water System Owner:	Lake Huron Primary Water Supply System Joint Board of Management
Drinking-Water System Operating Authority:	Ontario Clean Water Agency (OCWA)
Drinking-Water System Category:	Large Municipal Residential
Period being reported:	January 1, 2019 through December 31, 2019

Complete if your Category is Large Municipal Residential or Small Municipal Residential	**Complete for all other Categories.**
Does your Drinking-Water System serve more than 10,000 people? **Yes [X] No [ ]** **Is your annual report available to the public at no charge on a web site on the Internet?** **Yes [X] No [ ]** **Location where Summary Report required under O. Reg. 170/03 Schedule 22 will be available for inspection.** Lake Huron and Elgin Area Water Supply Systems c/o Regional Water Supply Division 235 North Centre Road, Suite 200 London, ON N5X 4E7 https://huronelginwater.ca/ Lake Huron Water Treatment Plant 71155 Bluewater Hwy. Grand Bend, ON	**Number of Designated Facilities served:** N/A **Did you provide a copy of your annual report to all Designated Facilities you serve?** **Yes [ ] No [ ]** **Number of Interested Authorities you report to:** N/A **Did you provide a copy of your annual report to all Interested Authorities you report to for each Designated Facility?** **Yes [ ] No [ ]**

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

Systems that receive their drinking water from the LHPWSS:

Drinking Water System Name	Drinking Water System Number
City of London	260004917
Municipality of Bluewater	260006542
Municipality of Lambton Shores (East Lambton Shores Water Distribution System)	260006568
Township of Lucan-Biddulph	260003071
Municipality of Middlesex Centre (Middlesex Centre Distribution System)	260004202
Municipality of North Middlesex	260006529
Municipality of Strathroy-Caradoc (Strathroy-Caradoc Distribution System)	260080106
Municipality of South Huron (South Huron Water Distribution System)	220001520

Systems that may receive their drinking water from the LHPWSS:

Drinking Water System Name	Drinking Water System Number
Municipality of Lambton Shores (West Lambton Shores Distribution System) *Normally supplied by the Lambton Area Water Supply System (LAWSS) but a connection to the LHPWSS exists	260006581

Did you provide a copy of your annual report to all Drinking-Water System owners that are connected to you and to whom you provide all of its drinking water?

Yes [X] No [ ]

Indicate how you notified system users that your annual report is available, and is free of charge.

- **[X] Public access/notice via the web**
- **[X] Public access/notice via Government Office**
- **[ ] Public access/notice via a newspaper**
- **[ ] Public access/notice via Public Request**
- **[ ] Public access/notice via a Public Library**
- **[X] Public access/notice via other method News Release**

Describe your Drinking-Water System

The Lake Huron Water Treatment Plant (WTP) employs pre-chlorination, screening, powder activated carbon addition (seasonally on an as-required basis), coagulation, flocculation, sedimentation, dual-media filtration, post-chlorination, and pH adjustment using sodium hydroxide to treat raw water obtained from Lake Huron. The WTP intake crib and raw water intake pipe have an estimated gross capacity of 454.6 Megalitres/day (MLD). The WTP rated capacity is 340.0 MLD.

A Residuals Management Facility (RMF) providing equalization, clarification, sediment thickening and dechlorination is also housed in the main complex where thickened sediment is dewatered by centrifuges and the sediment is sent to the landfill for final disposal. Clarified and dechlorinated liquid streams are sent back to Lake Huron through the plant drain via the Diversion Chamber.

The transmission system is comprised of the McGillivray Booster Pumping Station and Reservoir, the Exeter-Hensall Booster Pumping Station and Reservoir, the Arva Terminal Reservoir, the Komoka-Mt. Brydges Booster Pumping Station (PS#4) and the associated interconnecting transmission water mains, which includes the primary, Strathroy, Exeter-Hensall, and Komoka-Mt. Brydges transmission water mains.

The drinking water system is monitored at various locations throughout the system via a Supervisory Control and Data Acquisition (SCADA) system.

List all water treatment chemicals used over this reporting period

Filter Aid Polymer (on an as-required basis)
Aluminum Sulphate
Powder Activated Carbon
Chlorine Gas
Sodium Hydroxide
Sodium Hypochlorite (Exeter Hensall Pumping Station)
Dewatering Polymer (Residuals Management Facility)
Sodium Bisulphite (Residuals Management Facility)

Were any significant expenses incurred to?

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

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

Capital Projects:

- Pipeline section replacement
- Instrumentation replacements
- Filter flow meter replacements
- North and South raw water flow meter replacements
- Filters #5 and #12 rebuilds
- Filters #5 and #12 backwash valve rebuilds

- Security upgrades
- Chemical fill panel installation
- Operations & Maintenance Manual updates
- Concrete crack injection
- Replacement of Uninterruptible Power Supply (UPS) and related breaker panels
- B-Line Monitoring Station relocation
- High lift pump #5 control valve installation
- Travelling screen wash water pipe replacement
- High lift pump #3 and #6 suction valves installation
- Sodium hydroxide (NaOH) pump system replacement
- Transient pressure monitoring system installation
- Chamber rehabilitation and improvements
- Sluice gate repairs – Clearwell 2 outlet
- Erosion control at the beach chamber
- Replaced Grand Bend flow meter

Maintenance Projects:

- Installed air release valve at Exeter-Hensall Pumping Station
- Installed grit pump variable frequency drive (VFD)
- Replaced filter effluent analyzers piping
- Installed Residuals Management Facility (RMF) transfer pump wear plates and lobes
- Various building envelope replacements and maintenance
- Drain and service water piping replacement
- Power cables replaced at Exeter-Hensall Pumping Station
- Chlorine line repair

Provide details on the notices submitted in accordance with subsection 18(1) of the Safe Drinking-Water Act or section 16-4 of Schedule 16 of O.Reg.170/03 and reported to Spills Action Centre

Incident Date	Parameter	Result	Unit of Measure	Corrective Action	Corrective Action Date
August 7, 2019 AWQI #147116	E.coli and Total Coliforms	1 E.coli & 1 Total Coliforms	CFU/ 100 mL	Resampled and tested. All resample results were clear.	August 8, 2019 and August 9, 2019

Microbiological testing done under the Schedule 10, 11 or 12 of Regulation 170/03, during this reporting period.

	Number of Samples	Range of E.Coli Results (CFU/100mL) (min #)-(max #)	Range of Total Coliform Results (CFU/100mL) (min #)-(max #)	Range of HPC Results (CFU/1mL) (min #)-(max #)
Raw Water	101	(0)-(100)	(0)-(12,500)	(<10)-(>2,000)
Treated Water (WTP)	224	(0)-(1)	(0)-(1)	(0)-(>2,000)
Distribution (McGillivray PS)	55	(0)-(0)	(0)-(0)	(<10)-(80)
Distribution (North Exeter)	55	(0)-(0)	(0)-(0)	(<10)-(340)
Distribution (South Exeter)	54	(0)-(0)	(0)-(0)	(<10)-(70)
Distribution (Exeter-Hensall Reservoir)	54	(0)-(0)	(0)-(0)	(<10)-(20)
Distribution (Komoka-Mt. Brydges PS)	53	(0)-(0)	(0)-(0)	(<10)-(40)

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

Parameter	Number of Grab Samples	Range of Results (min #)-(max #)
Treated Water Free Chlorine (mg/L)	Continuous Monitoring	(0.61) – (1.97)
Treated Water Free Chlorine (mg/L)	2135	(0.77) - (1.58)
Treated Water Turbidity (NTU)	Continuous Monitoring	(0.010) – (2.00)
Treated Water Turbidity (NTU)	2135	(0.021) - (0.171)
Filter #1 - Filtered Water Turbidity (NTU)	Continuous Monitoring	(0.014) - (0.842)
Filter #2 - Filtered Water Turbidity (NTU)	Continuous Monitoring	(0.012) -*(1.383)
Filter #3 - Filtered Water Turbidity (NTU)	Continuous Monitoring	(0.019) - (0.575)
Filter #4 - Filtered Water Turbidity (NTU)	Continuous Monitoring	(0.020) - (0.167)

Filter #5 - Filtered Water Turbidity (NTU)	Continuous Monitoring	(0.017) - (0.870)
Filter #6 - Filtered Water Turbidity (NTU)	Continuous Monitoring	(0.019) - (0.396)
Filter #7 - Filtered Water Turbidity (NTU)	Continuous Monitoring	(0.017) - (0.817)
Filter #8 - Filtered Water Turbidity (NTU)	Continuous Monitoring	(0.021) - (0.719)
Filter #9 - Filtered Water Turbidity (NTU)	Continuous Monitoring	(0.014) - (0.704)
Filter #10- Filtered Water Turbidity (NTU)	Continuous Monitoring	(0.024) - (0.380)
Filter #11- Filtered Water Turbidity (NTU)	Continuous Monitoring	(0.014) - (0.792)
Filter #12- Filtered Water Turbidity (NTU)	Continuous Monitoring	(0.019) - (0.452)
Combined Filtered Water Turbidity (NTU)	2135	(0.021) - (0.123)

* On March 22nd, Filter #2 went above 1.0 NTU on two occasions due to filter related upgrades. Both events were above 1.0 NTU for less than 5 minutes, therefore both events were not reportable (not an adverse result).

Summary of Inorganic parameters tested during this reporting period
*(*All tests were conducted on treated water leaving the WTP unless otherwise noted)*

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony	January 29, 2019	0.00012	mg/L	NO
Arsenic	January 29, 2019	Not Detected	mg/L	NO
Barium	January 29, 2019	0.0157	mg/L	NO
Boron	January 29, 2019	0.016	mg/L	NO
Cadmium	January 29, 2019	0.000003	mg/L	NO
Chromium	January 29, 2019	0.00012	mg/L	NO
Lead *(Komoka Mt-Brydges Monitoring Station #2)*	January 30, 2019 April 29, 2019 July 25, 2019 October 24, 2019	Not Detected Not Detected 0.00004 0.00002	mg/L mg/L mg/L mg/L	NO
Mercury	January 29, 2019	Not Detected	mg/L	NO
Selenium	January 29, 2019	0.00013	mg/L	NO
Sodium	January 29, 2019	10.2	mg/L	NO
Uranium	January 29, 2019	0.000072	mg/L	NO
Fluoride	January 29, 2019	0.07	mg/L	NO
Nitrite	January 30, 2019 April 29, 2019 July 25, 2019 October 24, 2019	Not Detected Not Detected Not Detected Not Detected	mg/L mg/L mg/L mg/L	NO

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Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Nitrate	January 30, 2019 April 29, 2019 July 25, 2019 October 24, 2019	1.11 1.29 0.341 0.278	mg/L mg/L mg/L mg/L	NO

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

*(*All tests were conducted on treated water leaving the WTP unless otherwise noted)*

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor	January 29, 2019	Not Detected	mg/L	NO
Atrazine + N-dealkylated metabolites	January 29, 2019	0.00001	mg/L	NO
Azinphos-methyl	January 29, 2019	Not Detected	mg/L	NO
Benzene	January 29, 2019	Not Detected	mg/L	NO
Benzo(a)pyrene	January 29, 2019	Not Detected	mg/L	NO
Bromoxynil	January 29, 2019	Not Detected	mg/L	NO
Carbaryl	January 29, 2019	Not Detected	mg/L	NO
Carbofuran	January 29, 2019	Not Detected	mg/L	NO
Carbon Tetrachloride	January 29, 2019	Not Detected	mg/L	NO
Chlorpyrifos	January 29, 2019	Not Detected	mg/L	NO
Diazinon	January 29, 2019	Not Detected	mg/L	NO
Dicamba	January 29, 2019	Not Detected	mg/L	NO
1,2-Dichlorobenzene	January 29, 2019	Not Detected	mg/L	NO
1,4-Dichlorobenzene	January 29, 2019	Not Detected	mg/L	NO
1,2-Dichloroethane	January 29, 2019	Not Detected	mg/L	NO
1,1-Dichloroethylene (vinylidene chloride)	January 29, 2019	Not Detected	mg/L	NO
Dichloromethane	January 29, 2019	Not Detected	mg/L	NO
2-4 Dichlorophenol	January 29, 2019	Not Detected	mg/L	NO
2,4-Dichlorophenoxy acetic acid (2,4-D)	January 29, 2019	Not Detected	mg/L	NO
Diclofop-methyl	January 29, 2019	Not Detected	mg/L	NO
Dimethoate	January 29, 2019	Not Detected	mg/L	NO
Diquat	January 29, 2019	Not Detected	mg/L	NO
Diuron	January 29, 2019	Not Detected	mg/L	NO
Glyphosate	January 29, 2019	Not Detected	mg/L	NO

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Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Haloacetic Acids (HAA's) *(Arva Reservoir)*	January 30, 2019 April 29, 2019 July 25, 2019 October 24, 2019	Not Detected 0.0164 0.0134 Not Detected	mg/L mg/L mg/L mg/L	NO
Haloacetic Acids (HAA's) *(Arva Reservoir)* Running Annual Average	2019	0.0075	mg/L	NO
Haloacetic Acids (HAA's) *(Exeter-Hensall Monitoring Station #3)*	January 30, 2019 April 29, 2019 July 25, 2019 October 24, 2019	0.0197 0.0191 0.0206 0.0075	mg/L mg/L mg/L mg/L	NO
Haloacetic Acids (HAA's) *(Exeter-Hensall Monitoring Station #3)* Running Annual Average	2019	0.0167	mg/L	NO
Haloacetic Acids (HAA's) *(Komoka Mt-Brydges Monitoring Station #2)*	January 30, 2019 April 29, 2019 July 25, 2019 October 24, 2019	0.0121 0.0202 0.0177 0.0063	mg/L mg/L mg/L mg/L	NO
Haloacetic Acids (HAA's) *(Komoka Mt-Brydges Monitoring Station #2)* Running Annual Average	2019	0.0141	mg/L	NO
Haloacetic Acids (HAA's) *(Strathroy-Caradoc Monitoring Station #2)*	January 30, 2019 April 29, 2019 July 25, 2019 October 24, 2019	0.0105 0.0168 0.0156 Not Detected	mg/L mg/L mg/L mg/L	NO
Haloacetic Acids (HAA's) *(Strathroy-Caradoc Monitoring Station #2)* Running Annual Average	2019	0.0107	mg/L	NO
Malathion	January 29, 2019	Not Detected	mg/L	NO
2-Methyl-4-chlorophenoxyacetic acid	January 29, 2019	Not Detected	mg/L	NO

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Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Metolachlor	January 29, 2019	Not Detected	mg/L	NO
Metribuzin	January 29, 2019	Not Detected	mg/L	NO
Monochlorobenzene	January 29, 2019	Not Detected	mg/L	NO
Paraquat	January 29, 2019	Not Detected	mg/L	NO
Pentachlorophenol	January 29, 2019	Not Detected	mg/L	NO
Phorate	January 29, 2019	Not Detected	mg/L	NO
Picloram	January 29, 2019	Not Detected	mg/L	NO
Polychlorinated Biphenyls (PCB)	January 29, 2019	Not Detected	mg/L	NO
Prometryne	January 29, 2019	Not Detected	mg/L	NO
Simazine	January 29, 2019	Not Detected	mg/L	NO
Total Trihalomethanes *(Arva Reservoir)*	January 30, 2019 April 29, 2019 July 25, 2019 October 24, 2019	0.015 0.024 0.028 0.020	mg/L mg/L mg/L mg/L	NO
Total Trihalomethanes (THMs) *(Arva Reservoir)* Running Annual Average	2019	0.022	mg/L	NO
Total Trihalomethanes *(Exeter-Hensall Monitoring Station #3)*	January 30, 2019 April 29, 2019 July 25, 2019 October 24, 2019	0.031 0.033 0.045 0.035	mg/L mg/L mg/L mg/L	NO
Total Trihalomethanes *(Exeter-Hensall Monitoring Station #3)* Running Annual Average	2019	0.036	mg/L	NO
Total Trihalomethanes *(Komoka Mt-Brydges Monitoring Station #2)*	January 30, 2019 April 29, 2019 July 25, 2019 October 24, 2019	0.021 0.028 0.039 0.026	mg/L mg/L mg/L mg/L	NO
Total Trihalomethanes *(Komoka Mt-Brydges Monitoring Station #2)* Running Annual Average	2019	0.029	mg/L	NO
Total Trihalomethanes *(Strathroy-Caradoc Monitoring Station #2)*	January 30, 2019 April 29, 2019 July 25, 2019	0.018 0.026 0.029	mg/L mg/L mg/L	NO

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Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
	October 24, 2019	0.023	mg/L	
Total Trihalomethanes *(Strathroy-Caradoc Monitoring Station #2)* Running Annual Average	2019	0.024	mg/L	NO
Terbufos	January 29, 2019	Not Detected	mg/L	NO
Tetrachloroethylene	January 29, 2019	Not Detected	mg/L	NO
2,3,4,6-Tetrachlorophenol	January 29, 2019	Not Detected	mg/L	NO
Triallate	January 29, 2019	Not Detected	mg/L	NO
Trichloroethylene	January 29, 2019	Not Detected	mg/L	NO
2,4,6-Trichlorophenol	January 29, 2019	Not Detected	mg/L	NO
Trifluralin	January 29, 2019	Not Detected	mg/L	NO
Vinyl Chloride	January 29, 2019	Not Detected	mg/L	NO

NOTE: *During 2019, no Inorganic or Organic parameter(s) exceeded half the standard prescribed in Schedule 2 of Ontario Drinking Water Quality Standards.*

APPENDIX C –
2019 MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS (MECP) INSPECTION SUMMARY

Ministry of the Environment, Conservation and Parks (MECP) Inspection Report – Issued February 3, 2020

Summary of Non-compliances (NC)

#	MECP Inspection Module	MECP Non-compliance (Summary)	Corrective Action Required by MECP (Summary)
NC #1	Treatment Processes	**Where an activity has occurred that could introduce contamination, all parts of the drinking water system were not disinfected in accordance with Schedule B, Condition 2.3 of the Drinking Water Works Permit.** Drinking Water Works Permit # 001-201, Issue # 5 Section 2.3 of Schedule B stipulates that all parts of the drinking water system in contact with drinking water which are added, modified, replaced, extended; or taken out of service for inspection, repair or other activities that may lead to contamination, shall be disinfected before being put into service in accordance with a procedure approved by the Director or in accordance with the applicable provisions of the following documents: a) The ministry's Watermain Disinfection Procedure, dated November 2015; b) Subject to condition 2.3.2, any updated version of the ministry's Watermain Disinfection Procedure; c) AWWA C652 – Standard for Disinfection of Water-Storage Facilities; d) AWWA C653 – Standard for Disinfection of Water Treatment Plants; and e) AWWA C654 – Standard for Disinfection of Wells.	From herein, the Operating Authority shall ensure that the procedures outlined in the Drinking Water Works Permit # 001- 201 Issue # 5, Section 2.3 of Schedule B are complied with. An internal operational document should be developed indicating the Standard to be used regarding disinfection and bacteriological sampling, pending the location of work to be completed and mandatory record keeping to ensure compliance. The Operating Authority shall provide additional training to the operators regarding the requirements of Drinking Water Works Permit # 001- 201 Issue # 5 specifically Section 2.3. a) The ministry's Watermain Disinfection Procedure, dated November 2015; b) Subject to condition 2.3.2, any updated version of the ministry's Watermain Disinfection Procedure; c) AWWA C652 – Standard for Disinfection of Water-Storage Facilities; d) AWWA C653 – Standard for Disinfection of Water Treatment Plants; and e) AWWA C654 – Standard for Disinfection of Wells. In addition to the above the

#	MECP Inspection Module	MECP Non-compliance (Summary)	Corrective Action Required by MECP (Summary)
		Documentation provided for the inspection period indicates that not all bacteriological sampling was conducted during replacement/repair of treatment plant components as per AWWA C653 – Standard for Disinfection of Water Treatment Plants Sec. 5.1 Bacteriological Sampling "After the disinfection procedure is completed, and before the treatment unit or facility is placed in service, two or more samples shall be taken from the unit or facility not less than 30 min apart and shall be tested for the presence of total coliform" In addition to the above, records provided fail to document the time line of disinfection regarding the spray method as a minimum contact time of 30 minutes.	Operating Authority shall submit documentation including an operator sign off sheet to the undersigned inspector no later than March 31, 2020.
NC #2	Reporting and Corrective Actions	Documentation provided by the Operating Authority indicated that a treated microbial water sample collected on August 6, 2019, was reported by the testing laboratory on August 7, 2019 at 14:55 to the OCWA Senior Operations Manager with adverse E. Coli and Total Coliform. Ontario Regulation 170 – Schedule 17-5 (1) stipulates that the appropriate corrective actions associated with adverse E. Coli require the Owner / Operating Authority to immediately resample and test. However, the Operating Authority did not initiate	The Owner/Operating Authority shall immediately develop and implement appropriate protocols to ensure that staff responsible for the operations and maintenance of the drinking water system are provided with direction and training regarding the following: - Regulatory compliance related issues as prescribed by legislation; - Requirements for appropriate reporting and record keeping mechanisms as prescribed by legislation; - Requirements for operational monitoring and corrective action

#	MECP Inspection Module	MECP Non-compliance (Summary)	Corrective Action Required by MECP (Summary)
		mandatory corrective action resampling until August 8, 2019.	requirements as prescribed by legislation. In addition, from herein, the Owner/Operating Authority, Overall Responsible Operator (ORO) and the Operator-in-Charge (OIC) of the drinking water system must be notified regarding any concerns with operations of the water system that may compromise public health and/or water quality compliance. The Owner/Operating Authority shall forward a copy of the aforementioned protocols to the author of this report by March 1, 2020. In addition to the above report, the Owner/Operating Authority shall provide a signoff sheet indicating that each person responsible for the operations of the facility have been given the appropriate training by March 31, 2020.