Lucknow Drinking Water System
2024 Operation and Maintenance Annual Report

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1.0 INTRODUCTION AND BACKGROUND

The purpose of the 2024 Annual Report is to document the operation and maintenance data for the Lucknow Drinking Water System for review by the Ministry of the Environment, Conservation and Parks (MECP) in accordance withO. Reg. 170/03. This report covers January 1, 2024 to December 31, 2024. A copy of this report will be submitted to the owner to be uploaded to the township's website and can be provided to interested parties upon request.

2.0 DESCRIPTION OF WATER SYSTEM

A summary of the Lucknow Drinking Water System description is outlined below:

Drinking Water System Number:	220002663
Drinking Water System Name:	Lucknow Water Distribution and Supply
Drinking Water System Owner:	Corporation of the Township of Huron-Kinloss
Drinking Water System Category:	Large Municipal Residential
Drinking Water System Classification:	Water Distribution and Supply Subsystem Class 2
Drinking Water System Certificate No.:	1381
Daily Maximum Water Supply Capacity:	1,500 m^3 (2,000 m^3 beginning Oct 12, 2022)
Disinfection Chemicals:	Sodium Hypochlorite, 12%
Population (Stats Can - 2021):	1,154
Total Number of Service Connections:	670
Estimated Seasonal Population:	1,675 (based on 2021 Census of 2.5 persons per household)
Average Day Demand:	587.96 m^3
Peak Day Demand:	1156.07 m^3
Average Capacity:	39.20%
Peak Capacity:	77.07%
Distribution Network:	15.78 km (from County of Bruce GIS)
Fire Hydrants:	63 (from County of Bruce GIS)
Blow-offs:	6 (from County of Bruce GIS)
Auto-flushing Device:	1 (Stauffer St)

The Lucknow Drinking Water Distribution and Supply Subsystem is characterized as a "secure groundwater system". It consists of two (2) well supplies and its equipment deliver potable water to the Village of Lucknow and ten (10) Lucknow South properties in the Township of Ashfield-Colborne-Wawanosh in Huron County. The Township of Huron-Kinloss has an agreement with The Township of Ashfield-Colborne-Wawanosh, where the Lucknow South distribution system is treated as part of the Lucknow Drinking Water System (By-Law 60-2014).

Each well supply is located within its own pumphouse in the Village of Lucknow. Both sites are controlled, monitored, and alarmed through a Supervisory Control and Data Acquisition (SCADA) system which is connected to the main controller, autodialer, and server at the Ripley Municipal Office. The desktop computer used by the system's operators is located at the Ripley Township Shed and is connected remotely to the SCADA server. As a redundancy, each site is also equipped with an auto-dialer that is independent of

the SCADA system, and is used to call out alarms in the event of communications/SCADA failure. This SCADA system provides the operator with the ability to monitor current operating status of the supply and treatment equipment throughout the water system at any given time via remote access by computer or Smartphone, and to have control over operations.

The two (2) well supplies are detailed as follows:

Site: Lucknow Well # 4 - 600 Havelock Street

- Water Source: Groundwater, Non-GUDI
- Number of Production Wells: 1 (drilled 1957)
- Depth of Wells: 54.8 m
- Well Pumps: 15 hp each (submersible)
- Disinfection: Sodium hypochlorite (12%)
- CT Requirement: 2-log, 5°C, contact watermain (1.0 BF)
- Permit To Take Water: 7631-AQYS3J, expires September 29, 2027

Site: Lucknow Well # 5 - 381 South Delhi Street

- Water Source: Groundwater, Non-GUDI
- Number of Production Wells: 1 (drilled 1967)
- Depth of Well: 58.8 m
- Well Pump: 50 hp (submersible)
- Disinfection: Sodium hypochlorite (12%)
- CT Requirement: 2-log, 5°C, contact watermain (1.0 BF)
- Permit To Take Water: 7631-AQYS3J, expires September 29, 2027

Both Lucknow wells are secure, deep bedrock wells that penetrate limestone aquifers. Due to the depth and structure of the aquifers, the water temperature is relatively constant (< 10°C), turbidity is low, and the water is relatively hard. The raw water is also relatively **high in naturally-occurring fluoride,** but the lead content of the raw water is well below the half-MAC (Maximum Allowable Concentration). Those who are supplied from the Lucknow DWS are made aware of the various concentrations in their drinking water by numerous means of communication from the Township of Huron-Kinloss.

Each pumphouse is equipped with a receptacle and manual transfer switch for a portable diesel generator in the event of an extended power outage. A stand-by propane generator is located at the Ripley Municipal Office for back-up power requirements for the office and SCADA server equipment.

The Lucknow DWS currently (December 2022) has a distribution network with a combination of PVC, copper, ductile, and cast iron water mains, in sizes varying between 1-inch and 12-inch diameter. A Standpipe is located at 656 Wheeler Street, is 6.7 m in diameter, 27.5 m high and has a total volume of 996 m^3. The well pumps at Well # 4 and Well # 5 are automatically controlled by the water level in the Standpipe via communications located at 482 Ross Street (former pumphouse).

The Standpipe was built in 1930, making it approximately 92 years old. The Standpipe is in a state of disrepair, but is currently in operable condition. The Township of Huron-Kinloss was presented with funding

from Huron-Bruce M.P.P. Lisa Thompson on Monday, April 25th, 2022 from the Investing in Canada Infrastructure Green Stream. With $1.9 million in federal funds, another $1.5 million from the province, and the remaining funds to be provided by the Township itself, this essential infrastructure project includes:

- approximately 225 meters of watermain replacement;
- construction of a new, elevated water storage facility;
- demolition of the existing standpipe.

3.0 SUMMARY OF WATER QUALITY MONITORING

The purpose of sampling and testing is to confirm that water is safe for human consumption and to provide a comprehensive track record.

Requirement - Drinking Water System Owner/Operating Authority

The *SDWA* also requires the Drinking Water System Owner/Operating Authority to immediately notify the MECP and the Grey Bruce Health Services office and the Huron Perth Public Health office (if applicable), that the laboratory notice has been received and that "corrective actions" are being initiated. The method of contact is by telephone to a person of authority. The Operating Authority also faxes Form 2A - Notices of Adverse Test Results and Issue Resolution (Schedule 16) within 24 hours to both agencies first to verify previous live communication. Once the issue has been resolved and to confirm that corrective actions have been completed, the Operating Authority also faxes Form 2B - Notices of Adverse Test Results and Issue Resolution (Schedule 16) within 7 days to the agencies. This reporting system provides assurance that the DWS Owner is complying with the applicable regulations and that appropriate corrective actions are being taken and are being reported.

3.1 Water Treatment Equipment Operation and Monitoring

3.1.1 Treated Water (Point of Entry) Free Chlorine Residuals (Grab Samples)

A total of 732 treated water grab samples were collected and analyzed for free chlorine residual at the point of entry (POE) using a Hach pocket chlorine colorimeter. **Table 1** shows the grab samples monthly average of free chlorine residual values. **Table 2** shows the on-line continuous samples monthly average (as collected by SCADA) of the free chlorine residual values.

3.1.2 Distribution Free Chlorine Residuals (Grab Samples)

A total of 504 distribution residuals were collected: 366 daily grab residuals and an additional 138 weekly grab residuals were taken in conjunction with the required weekly microbiological sampling. A summary of all the residuals collected is presented in **Table 1**. South Lucknow in ACW is included in the distribution residuals.

Table 1 - Average Treated and Distribution Free Chlorine Residuals (Grab Samples)

Month	Lucknow # 4 Treated Water	Lucknow # 5 Treated Water	Lucknow Distribution
Jan	1.64	1.71	1.55
Feb	1.80	1.68	1.55
Mar	1.73	1.64	1.59
Apr	1.69	1.56	1.48
May	1.69	1.66	1.48
Jun	1.49	1.58	1.42
Jul	1.49	1.50	1.32
Aug	1.47	1.60	1.36
Sep	1.48	1.63	1.38
Oct	1.51	1.63	1.44
Nov	1.67	1.83	1.53
Dec	1.61	1.82	1.49
CT Requirement	0.26	0.27	0.20
Annual Min	1.19	1.38	1.47
Annual Max	2.00	2.14	1.97
Annual Avg	1.61	1.65	0.98
# Samples	366	366	504

Table 2 - Average Treated Free Chlorine Residuals (On-Line Continuous from SCADA)

Month	Lucknow # 4 Treated Water	Lucknow # 5 Treated Water
Jan	1.64	1.75
Feb	1.83	1.70
Mar	1.73	1.64
Apr	1.64	1.55
May	1.68	1.68
Jun	1.50	1.58
Jul	1.50	1.50
Aug	1.47	1.62
Sep	1.46	1.65
Oct	1.50	1.66
Nov	1.67	1.87
Dec	1.61	1.83
CT Requirement	0.26	0.27
Annual Min	0.18	0.11
Annual Max	4.44	4.90
Annual Avg	1.60	1.67

3.1.3 Raw and Treated Water Turbidity

Raw water and treated water grab samples were collected and analyzed for turbidity using a portable turbidity analyzer. **Table 3** provides a summary of raw and treated water turbidity results for 2024. O. Reg. 170/03 requires raw turbidity samples to be analyzed at least once per month from each well for groundwater systems.

Table 3 - Raw and Treated Water Turbidity Results (Monthly Average)

Month	Lucknow # 4		Lucknow # 5	
	Raw	Treated	Raw	Treated
Jan	0.22	–	0.19	–
Feb	0.23	–	0.18	–
Mar	0.22	0.31	0.25	0.47
Apr	0.23	0.27	0.26	0.32
May	0.19	0.23	0.20	0.22
Jun	0.28	0.31	0.25	0.24
Jul	0.23	0.21	0.29	0.23
Aug	0.16	0.27	0.22	0.27
Sep	0.19	0.26	0.38	0.24
Oct	0.24	0.25	0.30	0.26
Nov	0.24	0.28	0.32	0.84
Dec	0.22	0.27	0.34	0.30
Annual Min	0.09	0.21	0.18	0.22
Annual Max	0.34	0.34	0.38	0.84
Annual Avg	0.22	0.27	0.27	0.34
# Samples	13	11	13	11

3.2 Microbiological Sampling per Schedule 10, O. Reg. 170/03

3.2.1 Raw Water Samples

Raw water samples are collected every week. A total of 216 samples were collected and analyzed for E. Coli and Total Coliform. **Tables 4 and 5** provide a summary of microbiological results performed on the raw water.

Table 4 - Microbiological Results for Raw Water - LUCKNOW # 4

Month	Total Coliform			E. Coli		
	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples "0"	# Samples ≥1
Jan	5	5	0	5	5	0
Feb	4	4	0	4	4	0
Mar	4	4	0	4	4	0
Apr	5	5	0	5	5	0
May	4	4	0	4	4	0
Jun	4	4	0	4	4	0
Jul	5	5	0	5	5	0
Aug	4	4	0	4	4	0
Sep	5	5	0	5	5	0
Oct	4	4	0	4	4	0
Nov	4	4	0	4	4	0
Dec	5	5	0	5	5	0
TOTAL	**53**	**53**	**0**	**53**	**53**	**0**

Table 5 - Microbiological Results for Raw Water - LUCKNOW # 5

Month	Total Coliform			E. Coli		
	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples "0"	# Samples ≥1
Jan	5	5	0	5	5	0
Feb	4	4	0	4	4	0
Mar	4	4	0	4	4	0
Apr	5	4	1	5	4	1
May	4	4	0	4	4	0
Jun	4	4	0	4	4	0
Jul	5	5	0	5	5	0
Aug	4	4	0	4	4	0
Sep	5	5	0	5	5	0
Oct	4	4	0	4	4	0
Nov	4	4	0	4	4	0
Dec	5	5	0	5	5	0
TOTAL	**53**	**53**	**0**	**53**	**52**	**1**

3.2.2 Treated Water (Point of Entry) Samples

One (1) treated water sample from each point of entry is taken every week and analyzed for E. Coli, Total Coliform, and Heterotrophic Plate Count (HPC). A total of 318 treated water samples were collected and analyzed for the above parameters. All samples had EC and TC results that were 0 cfu/100 mL. The range of HPC results were 0 - 30 cfu/100 mL. **Tables 6 and 7** provide a summary of all microbiological results performed on treated water.

Table 6 - Microbiological Results for Treated Water (Point of Entry) - LUCKNOW # 4

Month	Total Coliform			E. Coli			HPC	
	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples > 10
Jan	5	5	0	5	5	0	5	0
Feb	4	4	0	4	4	0	4	0
Mar	4	4	0	4	4	0	4	1
Apr	5	5	0	5	5	0	5	0
May	4	4	0	4	4	0	4	1
Jun	4	4	0	4	4	0	4	0
Jul	5	5	0	5	5	0	5	0
Aug	4	4	0	4	4	0	4	0
Sep	5	5	0	5	5	0	5	0
Oct	4	4	0	4	4	0	4	0
Nov	4	4	0	4	4	0	4	0
Dec	5	5	0	5	5	0	5	0
TOTAL	**53**	**53**	**0**	**53**	**53**	**0**	**53**	**2**

Table 7 - Microbiological Results for Treated Water (Point of Entry) - LUCKNOW # 5

Month	Total Coliform			E. Coli			HPC	
	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples > 10
Jan	5	5	0	5	5	0	5	0
Feb	4	4	0	4	4	0	4	0
Mar	4	4	0	4	4	0	4	1
Apr	5	5	0	5	5	0	5	0
May	4	4	0	4	4	0	4	0
Jun	4	4	0	4	4	0	4	0
Jul	5	5	0	5	5	0	5	0
Aug	4	4	0	4	4	0	4	0
Sep	5	5	0	5	5	0	5	0
Oct	4	4	0	4	4	0	4	0
Nov	4	4	0	4	4	0	4	0
Dec	5	5	0	5	5	0	5	0
TOTAL	**53**	**53**	**0**	**53**	**53**	**0**	**53**	**6**

3.2.3 Distribution Samples

Distribution samples are collected every week and tested for E. Coli, Total Coliform, and 25% of the samples are also analyzed for Heterotrophic Plate Count (HPC). Ontario Regulation 170/03 requires 8 distribution samples plus one additional sample for every 1,000 people served by the system. A total of 165 distribution samples were collected and analyzed for TC and EC, which is above the required number of samples (n=108, based on 1,675 potential residents). A total of 111 distribution samples were analyzed for HPC (n=27, 25% of 108). Each TC and EC result from the treated water was 0 cfu/100 mL. The range of HPC results were 0 - 70 cfu/100 mL. **Table 8** provides a summary of all microbiological samples taken in the distribution system.

Table 8 - Microbiological Results for Distribution System

Month	Total Coliform			E. Coli			HPC	
	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples >10
Jan	15	15	0	15	15	0	10	0
Feb	12	12	0	12	12	0	8	0
Mar	12	12	0	12	12	0	8	1
Apr	21	20	1	21	20	1	15	1
May	12	12	0	12	12	0	8	1
Jun	12	12	0	12	12	0	8	1
Jul	15	15	0	15	15	0	10	2
Aug	12	12	0	12	12	0	8	1
Sep	15	15	0	15	15	0	10	0
Oct	12	12	0	12	12	0	8	1
Nov	12	12	0	12	12	0	8	2
Dec	15	15	0	15	15	0	10	2
TOTAL	**165**	**165**	**1**	**165**	**165**	**1**	**111**	**12**

3.3 Chemical Sampling and Testing as per Schedule 13, O. Reg. 170/03

3.3.1 Inorganics

Treated water samples are collected every 36 months (3 years) and analyzed for inorganics. The most recent samples for the Lucknow Drinking Water System were collected on June 18, 2024 and submitted to the laboratory for analysis of inorganics as listed in Schedule 23 (see **Table 9**). All parameters were found to be within compliance, however, the Arsenic level at both Lucknow #4 and Lucknow #5 exceeded the Half-Maximum Allowable Concentration (half-MAC). Any half-MAC exceedance must be sampled on a quarterly basis to comply with O. Reg. 170/03, Schedule 13-5(1) - Increased frequency under s.s 13-2 and 13-4. Inorganics will be sampled and analyzed again in June 2027.

Table 9 - Inorganics Results

Parameter	Lucknow # 4 Treated Water (µg/L)	Lucknow # 5 Treated Water (µg/L)	Maximum Allowable Concentration (µg/L)
Antimony	0.6 < MDL	0.6< MDL	6
Arsenic	**4.3**	**4.8**	10
Barium	269	277	1000
Boron	34	34	5000
Cadmium	0.004	0.012	5
Chromium	0.10	0.15	50
Mercury	0.01 < MDL	0.01 < MDL	1
Selenium	0.09	0.09	50
Uranium	0.958	0.782	20

*MDL = Laboratory Minimum Detection Limit

3.3.2 Organics

Treated water samples are collected every 36 months and tested for Schedule 24 organic parameters. The most recent samples were collected on June 18, 2024. All parameters were found to be within compliance. Organics will be sampled and analyzed again in June 2027. Samples results can be found in **Table 10**.

Table 10 - Organics Results

Parameter	Lucknow # 4 Treated Water (µg/L)	Lucknow # 5 Treated Water (µg/L)	Maximum Allowable Concentration (µg/L)
Benzene	0.32 < MDL	0.32 < MDL	1
Carbon Tetrachloride	0.17 < MDL	0.17 < MDL	2
1,2-Dichlorobenzene	0.41 < MDL	0.41 < MDL	200
1,4-Dichlorobenzene	0.36 < MDL	0.36 < MDL	5
1,1-Dichloroethylene	0.33 < MDL	0.33 < MDL	14
1,2-Dichloroethane	0.35 < MDL	0.35 < MDL	5
Dichloromethane	0.35 < MDL	0.35 < MDL	50
Monochlorobenzene	0.3 < MDL	0.3 < MDL	80
Tetrachloroethylene	0.35 < MDL	0.35 < MDL	10
Trichloroethylene	0.44 < MDL	0.44 < MDL	5
Vinyl Chloride	0.17 < MDL	0.17 < MDL	1
Diquat	1 < MDL	1 < MDL	70
Paraquat	1 < MDL	1 < MDL	10
Glyphosate	1 < MDL	1 < MDL	280
Polychlorinated Biphenyls	0.04 < MDL	0.04 < MDL	3

*MDL = Laboratory Minimum Detection Limit

Table 10 - Organics Results - Continued

Parameter	Lucknow # 4 Treated Water (µg/L)	Lucknow # 5 Treated Water (µg/L)	Maximum Allowable Concentration (µg/L)
Benzo(a)pyrene	0.004 < MDL	0.004 < MDL	0.01
Alachlor	0.02 < MDL	0.02 < MDL	5
Atrazine+N-dealkylated metabolites	0.01 < MDL	0.01 < MDL	5
Atrazine	0.01 < MDL	0.01 < MDL	--
Desethyl Atrazine	0.01 < MDL	0.01 < MDL	--
Azinphos-methyl	0.05 < MDL	0.05 < MDL	20
Carbaryl	0.05 < MDL	0.05 < MDL	90
Carbofuran	0.01 < MDL	0.01 < MDL	90
Chlorpyrifos	0.02 < MDL	0.02 < MDL	90
Diazinon	0.02 < MDL	0.02 < MDL	20
Dimethoate	0.06 < MDL	0.06 < MDL	20
Diuron	0.03 < MDL	0.03 < MDL	150
Malathion	0.02 < MDL	0.02 < MDL	190
Metolachlor	0.01 < MDL	0.01 < MDL	50
Metribuzin	0.02 < MDL	0.02 < MDL	80
Phorate	0.01 < MDL	0.01 < MDL	2
Prometryne	0.03 < MDL	0.03 < MDL	1
Simazine	0.01 < MDL	0.01 < MDL	10
Terbufos	0.01 < MDL	0.01 < MDL	1
Triallate	0.01 < MDL	0.01 < MDL	230
Trifluralin	0.02 < MDL	0.02 < MDL	45
2,4-Dichlorophenoxyacetic acid	0.19 < MDL	0.19 < MDL	100
Bromoxynil	0.33 < MDL	0.33 < MDL	5
Dicamba	0.20 < MDL	0.20 < MDL	120
Diclofop-methyl	0.40 < MDL	0.40 < MDL	9
MCPA	0.00012 < MDL	0.00012 < MDL	0.1
Picloram	1 < MDL	1 < MDL	190
2,4-Dichlorophenol	0.15 < MDL	0.15 < MDL	900
2,4,6-Trichlorophenol	0.25 < MDL	0.25 < MDL	5
2,3,4,6-Tetrachlorophenol	0.20 < MDL	0.20 < MDL	100
Pentachlorophenol	0.15 < MDL	0.15 < MDL	60

*MDL = Laboratory Minimum Detection Limit

3.3.3 Trihalomethanes and Haloacetic Acids

Distribution samples are taken every three months from representative points in the distribution system and tested for Trihalomethanes (THMs) and Haloacetic Acids (HAAs). In 2024, samples were collected during the months of February, May, August, and November and results are expressed as a running annual average (RAA). The Ontario Drinking Water Quality Standards (ODWQS) has set a Maximum Allowable Concentration (MAC) of 100 µg/L for THMs and it is expressed as a running annual average (RAA). The RAA for THMs was found to be 4.4 µg/L for the Well nº 4 and 4.6 µg/L for the well nº 5. The HAA MAC is 80 µg/L.
Refer to **Tables 11 and 12** for the summary of trihalomethane and haloacetic acid results.

3.3.4 Nitrate and Nitrite

Treated water samples are taken every three months and tested for nitrate and nitrite. In 2024, samples were collected during the months of February, May, August, and November. The Ontario Drinking Water Quality Standards (ODWQS) have set a Maximum Allowable Concentration (MAC) of 10 mg/L for nitrates and 1 mg/L for nitrites. The results were found to be within compliance and are summarized in **Tables 11 and 12**.

Table 11 - Nitrate, Nitrite, THM and HAA Results at Lucknow Drinking Water System - LUCKNOW # 4

Month	Nitrite (mg/L)	Nitrate (mg/L)	THMs (µg/L)	Total HAAs (µg/L)
Feb	< 0.003	0.009	2.2	<5.3
May	<0.003	0.053	4.9	<5.3
Aug	< 0.003	0.008	5.6	<5.3
Nov	<0.003	0.008	4.9	<5.3
Average	<0.003	0.020	4.4 RAA	<5.3
Maximum	<0.003	0.053	5.6	<5.3
MAC (mg/L)	**1.0**	**10**	**100**	**80**

Table 12 - Nitrate, Nitrite, THM and HAA Results at Lucknow Drinking Water System - LUCKNOW # 5

Month	Nitrite (mg/L)	Nitrate (mg/L)	THMs (µg/L)	Total HAAs (µg/L)
Feb	< 0.003	<0.006	2.0	<5.3
May	<0.003	1.79	4.1	<5.3
Aug	< 0.003	<0.006	6.2	<5.3
Nov	<0.003	<0.006	6.0	<5.3
Average	<0.003	<0.452	4.6 RAA	<5.3
Maximum	<0.003	1.79		<5.3
MAC (mg/L)	**1.0**	**10**	**100**	**80**

3.3.5 Sodium

One (1) water sample is collected from each Point of Entry (treated water) every 60 months (5 years) and analyzed for Sodium. The Ministry's *Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines, PIBS 4449e01, June 2006*, states: "The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the sodium concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets." These samples were collected on July 27, 2021. Results can be found in **Table 13**. The next sampling date for Sodium will be in ***2026***.

3.3.6 Fluoride

One (1) water sample is collected from each Point of Entry (treated water) every 60 months (5 years) and analyzed for Fluoride. The Ontario Drinking Water Quality Standards (ODWQS) have set a Maximum Allowable Concentration (MAC) of 1.5 mg/L. On September 6, 2022, samples were collected for this analysis. Both treated water samples exceeded the MAC due to naturally occurring fluoride in the aquifers. These exceedances were reported to the Grey Bruce Health Unit and the Ministry's Spills Action Centre (AWQI # 159910 and 159911). The results are summarized in **Table 13**. The next sampling date for Fluoride will be in 2027.

Table 13 - Sodium and Fluoride Results

Location	Sodium	Fluoride	
	Sample Date: July 27, 2021	Sample Date: September 6, 2022	
	Result (mg/L)	Result (mg/L)	Resample Result (mg/L)
Lucknow # 4 TW	11.1	**1.69**	**1.76**
Lucknow # 5 TW	12.8	**1.59**	**1.70**
MAC (mg/L)	**20**	**1.50**	

3.3.7 Lead

Schedule 15.1 of Ontario Regulation 170/03 requires that samples be taken during two seasons: once between December 15 and April 15, and once between June 15 and October 15. Two (2) Lead, pH and alkalinity samples were collected on January 15, 2024. Two (2) Lead, pH and alkalinity samples were collected on November 7, 2024. These parameters are required to be sampled and analyzed again next in the 2025-2026 sampling season. Results can be found in **Table 14**.

Table 14 - Lead Sampling Program Results

Season	Alkalinity (mg/L)	pH	Lead (µg/L)
Dec-Apr	220 227	7.96 7.99	0.33 0.04
Jun-Oct	225 243	7.97 7.91	0.10 0.01
MAC (µg/L)	–	–	**10**

4.0 WATER AND CHEMICAL USE

4.1 Chemical Usage

The total amount of 12% sodium hypochlorite (NaOCl) used to treat the water supplied by the Lucknow wells is tabulated in **Table 15** with the average chlorine dosage.

Table 15 - Sodium Hypochlorite Usage

Month	LUCKNOW # 4		LUCKNOW # 5	
	Usage (kg)	Average Dosage (mg/L)	Usage (kg)	Average Dosage (mg/L)
Jan	22.29	4.15	48.07	4.10
Feb	28.03	4.08	42.47	3.94
Mar	33.36	3.95	26.60	4.00
Apr	29.71	3.89	72.46	8.94
May	37.42	4.15	33.92	4.90
Jun	38.82	3.98	31.68	4.09
Jul	46.81	3.98	39.38	4.05
Aug	36.16	3.99	46.95	4.02
Sep	47.51	4.03	43.59	4.13
Oct	42.61	4.04	40.93	4.78
Nov	32.94	4.04	34.76	4.17
Dec	32.66	3.90	31.26	4.16
TOTAL	428.32	–	492.07	–
Average	35.57	4.02	41.01	4.61

Sodium Hypochlorite Grand Total Usage: **920.39 kg**
Sodium Hypochlorite Average Dosage: **4.31 mg/L**

4.2 Summary of Flow Rates, Annual Volumes and Capacities

A summary of the water supplied to the distribution system in 2024 from each well supply is provided in **Tables 16 and 17**. The combined annual volumes and capacities are provided in **Table 19**. The volumes reported for each well supply are taken from the SCADA continuous monitoring system. The following flow meters were calibrated on July 16, 2024:

Lucknow # 4: Raw water flow meter
Lucknow # 5: Raw water flow meter

Table 16 - Flow Rates, Annual Volumes, and Capacities - LUCKNOW # 4

Month	Raw Flow Daily Max (L/s)	Raw Flow Monthly Avg (L/s)	Raw Volume Monthly Total (m^3)	Raw Volume Daily Max (m^3)	Raw Volume Monthly Avg (m^3)	Capacity Avg Monthly (%)
Jan	**12.28**	6.53	5,397.17	565.204	174.10	18.6
Feb	12.18	8.41	6,947.43	536.21	239.57	25.6
Mar	12.20	10.80	8,347.24	416.20	269.27	28.8
Apr	12.19	10.32	7,593.74	436.07	253.12	27.1
May	12.17	10.80	9,209.23	516.94	297.07	31.8
Jun	12.13	10.83	9,747.25	459.41	324.91	34.7
Jul	25.00	10.58	11,729.31	577.30	378.36	40.5
Aug	13.33	9.41	9,392.17	463.89	302.97	32.4
Sep	11.98	10.79	11,932.25	520.27	397.74	42.5
Oct	12.42	10.74	10,422.81	464.36	336.22	36.0
Nov	12.00	10.64	7,966.71	348.22	265.56	28.4
Dec	12.12	10.62	8090.64	346.38	260.99	27.9
PTTW Max	**14.42**	**14.42**	**28,439.58**	**935**		
Annual Max	**25.00**	–	–	577.30	–	61.70
Annual Avg	–	10.04	–	–	291.74	31.3
Annual Total	–	–	**106,776.30**	–	–	–

*Flow exceedances are due to instantaneous spikes related to pump startup.

Table 17 - Flow Rates, Annual Volumes, and Capacities - LUCKNOW # 5

Month	Raw Flow Daily Max (L/s)	Raw Flow Monthly Avg (L/s)	Raw Volume Monthly Total (m^3)	Raw Volume Daily Max (m^3)	Raw Volume Monthly Avg (m^3)	Capacity Avg Monthly (%)
Jan	**37.13**	31.15	12,293.95	843.89	396.58	26.4%
Feb	**37.19**	33.16	10,580.48	727.40	364.84	24.3%
Mar	**37.01**	32.27	6,627.95	277.57	213.80	14.3%
Apr	37.23	31.31	7,113.26	502.71	237.11	15.8%
May	37.31	32.18	7,594.52	640.95	244.98	16.3%
Jun	37.28	32.48	7,762.36	398.48	258.75	17.2%
Jul	166.70	32.32	10,030.76	744.85	323.57	21.6%
Aug	39.93	33.38	11,627.92	769.08	375.09	25.0%
Sep	36.91	33.29	10,571.32	584.81	352.38	23.55
Oct	36.71	32.78	8,293.00	391.00	267.50	17.85
Nov	36.90	32.36	8,294.00	639.00	276.48	18.4%
Dec	36.73	32.54	7,576.00	357.00	244.36	16.3%
PTTW Max	**41.66**	**37.90**	**45,625**	**2,000**	–	–
Annual Max	**166.70**	–	–	844.00	–	56.3%
Annual Avg	–	32.43	–	–	296.08	19.8%
Annual Total	–	–	**106,776**	–	–	–

*Flow exceedances are due to instantaneous spikes related to pump startup or shutdown, July exceedance was due to Flow Meter calibration

Table 18 - Flow Rates, Annual Volumes and Capacities - LUCKNOW # 4 AND # 5 COMBINED

Month	Raw Volume Monthly Total (m^3)	Raw Volume Daily Max (m^3)	Raw Volume Monthly Avg (m^3)	Capacity Avg Monthly (%)
Jan	17,691	1,156.07	570.68	38.0%
Feb	17,528	782.26	604.41	40.3%
Mar	14,975	595.77	483.07	32.2%
Apr	14,707	597.48	490.23	32.7%
May	16,804	940.53	542.06	36.1%
Jun	17,510	778.22	583.65	38.9%
Jul	21,760	933.52	701.94	46.8%
Aug	21,020	791.49	678.07	45.2%
Sep	22,504	888.89	750.12	50.0%
Oct	18,181	729.54	606.03	40.4%
Nov	16,261	973.70	542.03	36.1%
Dec	15,667	608.22	505.38	33.7%
PTTW Max	**45,625**	**1,500.00**	–	
Annual Max	–	1,156.07	–	77.07%
Annual Avg	–	–	597.96	39.02%
Annual Total	**214,606.75**	–	–	–

4.3 System Capacity (O. Reg. 170/03, Schedule 22-2 (3) Continued)

The following is a comparison of the annual volumes to the rated capacity and flow rates approved in the systems' PTTW, DWWP and MDWL. The total system capacity represents the percentage capacity of the sum of all the water produced in relation to the total system volume permitted. A summary of the totals for all the well supplies is presented in **Table 19**.

Table 19 - Total Volumes of All Well Supplies

Location (Well Supply)	Total Volume for 2023 (m^3)
Lucknow Well # 4	**106,775.95**
Lucknow Well # 5	**108,365**
Total Rated Capacity, PTTW (m^3)	**547,500.00**
Grand Total (all well supplies), Actual (m^3)	**214,606.75**
Overall Operating Capacity, Actual %	**39.20%**

5.0 IMPROVEMENTS TO SYSTEM AND ROUTINE AND PREVENTATIVE MAINTENANCE

The following summarizes water system improvements and routine and preventative maintenance for the Lucknow Drinking Water System Supply:

Both Sites:

Routine and preventative maintenance performed as per Jobs Plus schedule.
Flow meter calibrations completed.
Georgian Bay Fire and Safety inspections completed.
Ministry Drinking Water Inspection conducted - 100%.
Semi-annual flushing and annual valve turning completed.
Backflow preventer testing completed.
online analyzers were calibrated
Annual generator Inspections were completed
Manhole repairs were completed
Wheeler ST watermain project was completed

Lucknow # 4:

Lucknow # 5:

March: -Roof was repaired
- New controller to the analyzer was installed
-Curbstop was repaired at 389 Havelock

6.0 MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS INSPECTIONS AND REGULATORY ISSUES (Schedule 22-2 (2))

- A list of Capital Items for 2024 was submitted to the Township of Huron-Kinloss December 11, 2023.
- DWQMS Management Review was conducted on October 24, 2024.
- DWQMS Internal Audit was completed November 19, 2024.
- DWQMS Complete Risk Assessment was started but not completed in 2024
- DWQMS External Audit (off-site) was conducted on August 27, 2024
- An Emergency Response Exercise was conducted by the Township in 2024 and Veolia participated.
- MECP Drinking Water Inspection of South Lucknow (ACW) was conducted on May 16, 2024 and awarded a rating of **100.00%**.
- MECP Drinking Water Inspection was conducted May 16 to July 3, 2024 and awarded a rating of **100%**

-

There was (1) Adverse Water Quality Incident in the Lucknow DWS in 2024:

- AWQI #164789 - The distribution (Lucknow Firehall) had a 1 Total Coliform and 1 E. coli 2 sets of resamples (24hrs apart) came back safe.

7.0 WELL LEVELS (PTTW)

The Lucknow DWS has a Permit To Take Water (PTTW), which dictates the capacity that each well is permitted to supply, as well as specific monitoring parameters. In addition to flow, static well levels are taken on a weekly basis to monitor the performance of the aquifer. **Table 20** provides a summary of the static well levels recorded in 2024.

Table 20 - Static Well Levels (PTTW) - Monthly Averages

Month	Lucknow Well # 4	Lucknow Well # 5
	Average	Average
Jan	6.28	5.92
Feb	6.15	5.77
Mar	5.99	6.07
Apr	6.48	5.82
May	6.21	5.07
Jun	6.24	6.69
Jul	6.86	6.23
Aug	6.69	7.29
Sep	7.42	6.97
Oct	7.49	6.72
Nov	7.35	6.65
Dec	6.30	6.64
Min	**5.99**	**5.07**
Max	**7.49**	**7.29**
Avg	**6.65**	**6.36**

8.0 SOURCE WATER PROTECTION (*Clean Water Act, 2006*)

A Drinking Water Source Protection Assessment (DWSPA) Report was generated for the Ausable Bayfield Maitland Valley Source Protection Region by the Conservation Authority Source Protection Office. This report identifies vulnerable areas, recharge areas, and potential threats to help protect existing and future sources of drinking water from contamination and overuse. This report can be found on-line at:

http://home.waterprotection.ca/source-protection-plan/assessment-reports/saugeen-valley/

The DWSPA report states: "The WHPA extends south-eastward from the wells to include about 7.7 km along the south Huron-Kinloss border and into Ashfield-Colborne-Wawanosh. WHPA-A, the 100 m radius around

the wells, falls entirely within Huron-Kinloss. However, a small portion of WHPA-B, located in ACW, has a vulnerability score of 10. The remainder of WHPA-B has a vulnerability score of 8 or 6. The section of WHPA-C that falls into ACW has a vulnerability score of 8, 6 or 4. Finally, WHPA-D has a vulnerability score of 6 or less."

In conclusion, as stated in the DWSPA Report: "No issues with wells or conditions resulting from past activities were identified within the WHPA."

9.0 SOUTH LUCKNOW - SUMMARY OF DATA

9.1 Water Treatment Equipment, Operation and Monitoring

9.1.1 Distribution Free Chlorine Residuals (Grab Samples)

A total of 51 distribution residuals were collected in conjunction with weekly microbiological sampling. A summary of all the residuals collected is presented in **Table 21**.

TABLE 21 - Average Distribution Free Chlorine Residuals - SOUTH LUCKNOW (ACW)

Month	Residual (mg/L)
Jan	1.57
Feb	1.56
Mar	1.62
Apr	1.51
May	1.39
Jun	1.38
Jul	1.22
Aug	1.19
Sep	1.31
Oct	1.32
Nov	1.48
Dec	1.54
CT REQUIREMENT	0.20
Annual Min	**1.08**
Annual Max	**1.80**
Annual Avg	**1.42**

9.1.2 Microbiological Results for Distribution System

Distribution samples are collected every week and tested for E. Coli (EC), Total Coliform (TC), and at least 25% of the samples are also analyzed for Heterotrophic Plate Count (HPC). South Lucknow is regarded as part of the Lucknow Drinking Water System as outlined in ACW Municipal By-Law 60-2014. Results are shown in **Table 22.**

Table 22 - Microbiological Results - Distribution - SOUTH LUCKNOW (ACW)

Month	Total Coliform			E. Coli			HPC	
	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples >10
Jan	5	5	0	5	5	0	3	0
Feb	4	4	0	4	4	0	3	0
Mar	4	4	0	4	4	0	2	0
Apr	5	5	0	5	5	0	5	0
May	4	4	0	4	4	0	4	0
Jun	4	4	0	4	4	0	3	0
Jul	5	5	0	5	5	0	3	0
Aug	4	4	0	4	4	0	4	1
Sep	4	4	0	4	4	0	4	0
Oct	4	4	0	4	4	0	4	0
Nov	4	4	0	4	4	0	4	0
Dec	4	4	0	4	4	0	4	0
TOTAL	**51**	**51**	**0**	**51**	**51**	**0**	**51**	**1**

9.2 Chemical Sampling and Testing as per Schedule 13, O. Reg. 170/03

9.2.1 Trihalomethane (Schedule 13, s. 13-6)

Distribution samples are taken quarterly (every 3 months) from representative points in the distribution system and tested for Trihalomethanes (THMs). In 2024, samples were collected during the months of February, May, August, and November. The Ontario Drinking Water Quality Standards (ODWQS) have set a Maximum Allowable Concentration (MAC) of 100 µg/L for this parameter and it is expressed as a Running Annual Average (RAA). Refer to **Table 23** for the summary of the THM results and RAA for the South Lucknow samples.

Table 23 - Trihalomethane (Schedule 13, s. 13-6) Results - SOUTH LUCKNOW (ACW)

Month	THMs (µg/L) 2023	THMs (µg/L) 2024	RAA
February	7.5	7.8	10.95
May	10	12	11.5
August	14	16	12.0
November	12	12	12.0
MAC (µg/L)	100	100	100

9.2.2 Lead (Schedule 15.1) - O. Reg. 170/03, s. 11 (6) (g)

Schedule 15.1 of Ontario Regulation 170/03 requires that the samples be taken during two (2) seasons: once between December 15 and April 15, and once between June 15 and October 15. By-Law 60-2014 was amended in November 2015 to ensure that this lead sampling requirement is included in the Agreement between Ashfield-Colborne-Wawanosh and Huron-Kinloss. In 2024, samples were collected from South Lucknow and analyzed for lead, pH, and alkalinity. These results are presented in **Table 24.**

Table 24 - Lead Sampling Program (Schedule 15.1) Results

Season	Location	Alkalinity	pH	Lead (µg/L)
Dec -Apr	South Lucknow (ACW)	228	7.99	0.13
Jun - Oct	South Lucknow (ACW)	235	7.96	
MAC (µg/L)		–	–	10

***Lead sample was missed for South Lucknow in July (Non compliance)*

10.0 Summary of Flow Rates, Annual Volumes and Capacities (O. Reg. 170/03, Schedule 22-2(3))

Water supplied to South Lucknow in 2024 is monitored by flow meters located at residences on Lucknow Line. These meter readings are viewed quarterly. A summary of these volumes is provided in **Table 25**.

Table 25 - Flow Meter Readings - SOUTH LUCKNOW (ACW)

Location	Previous	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual Usage (m^3)
86637	No Meter	No Meter	No Meter	No Meter	No Meter	No Meter
86663	12,336	12,500	12,550	12,579	12,627	291
86667	11,006	11,091	11,234	11,398	11,623	617*
86673	10,948	10,993	11,038	11,083	11,128	180
86681	4,115	4,187	4,272	4,345	4,418	303
86687	4,903	4,951	4,991	5,021	5,060	157
86699	7,530	7,551	7,577	7,601	7,627	97
86705	8,768	8,799	8,830	8,864	8,895	127
86690	6,210	n/a	7	37	58	51
86658-B	No Meter	No Meter	No Meter	No Meter	No Meter	No Meter
86714-1	1,141	1,173	1,199	1,230	1,263	122
86714-2	1,115	1,134	1,147	1,157	1,161	46
86714-3	1,219	1,242	1,269	1,293	1,313	94
					GRAND TOTAL	2,085