

Ripley Annual and Summary Report

For the 2021 Operating Year

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1.0 EXECUTIVE SUMMARY

The purpose of this report is to provide information to system Owners and Stakeholders to satisfy the regulatory requirements of the following:

- *Safe Drinking Water Act (SDWA)*
- Drinking Water Quality Management Standard (DWQMS)
- Section 81 of the Clean Water Act (CWA)
- Reporting required under Ontario Regulation (O. Reg.) 170/03, Section 11
- Reporting required under O. Reg. 170/03, Schedule 22

The Operating Authority (Veolia), on behalf of the Owner (Township of Huron-Kinloss), has prepared this report as a compilation of information that demonstrates the ongoing provision of a safe, consistent supply of high quality drinking water to customers supplied by the Ripley Drinking Water System.

SAFE DRINKING WATER ACT

Following the Walkerton Tragedy in 2000, the Ontario Government developed a new, comprehensive legislative paradigm based on a source-to-tap, multi-barrier approach to the protection of drinking water. The *Safe Drinking Water Act (SDWA)*, 2002, and its Regulations, contain requirements for Municipalities that provide potable water to their residents.

Under Section 19 (Standard of Care of the *SDWA*), Owners of a Drinking Water System are required to:

- a) exercise the level of care, diligence and skill in respect of a Municipal Drinking Water System that a reasonably prudent person would be expected to exercise in a similar situation; and
- b) act honestly, competently and with integrity, with a view to ensuring the protection and safety of the users of the Municipal Drinking Water System.

2002, c. 32, s. 19(1).

The following chart outlines key aspects of the *SDWA* that relate to the Ripley Drinking Water System:

Legislative Framework for the Ripley Drinking Water System

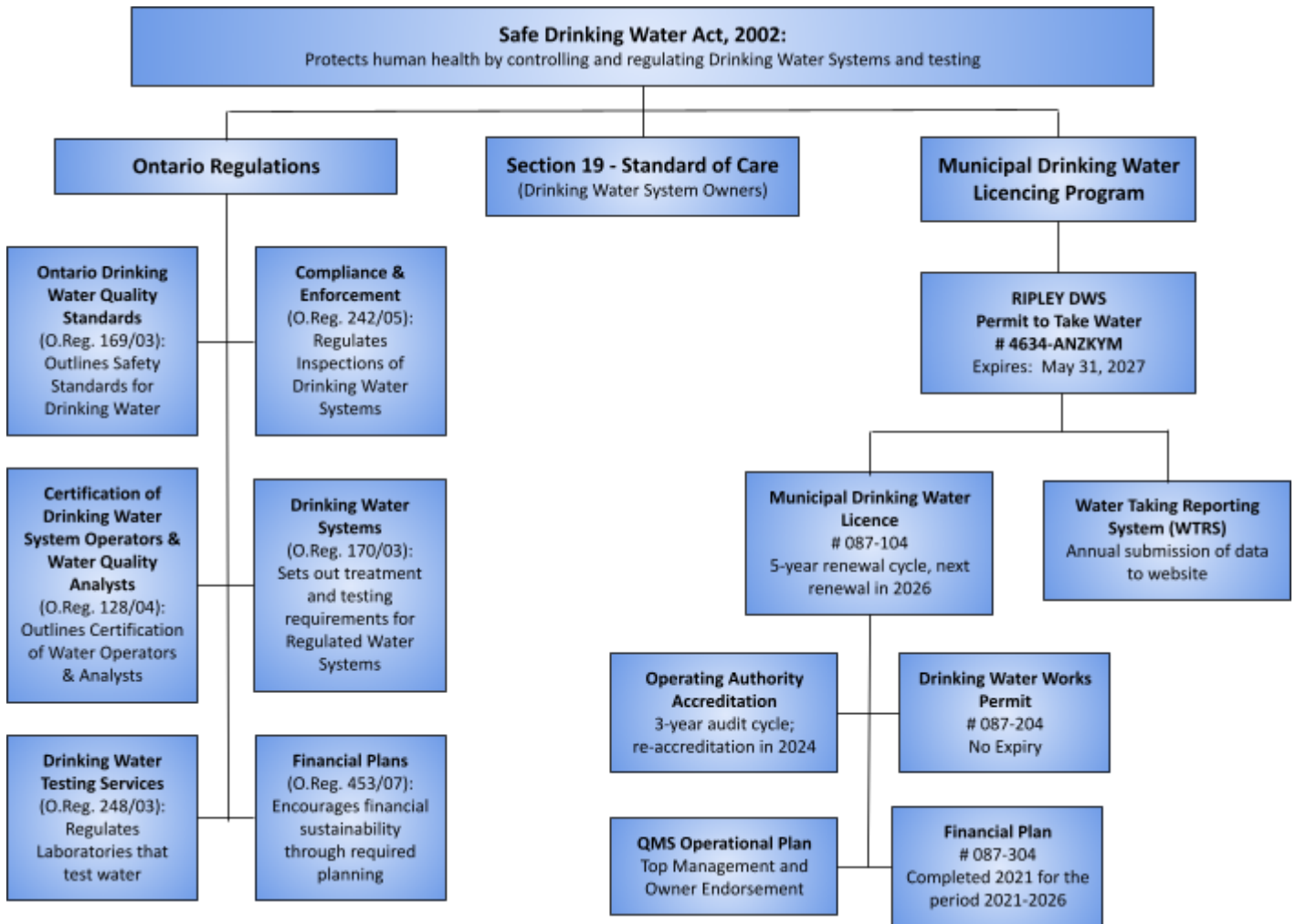


Figure 1

2.0 REPORTING REQUIREMENTS:

This report intends to provide relevant information to help the Township of Huron-Kinloss, its Council, as Owners of the Ripley Drinking Water System, meet the Standard of Care. Its contents are organized as follows, according to specific reporting requirements under the *SDWA*:

O. REG. 170/03, SECTION 11 - ANNUAL REPORT

- The Owner shall ensure an annual report is prepared as per O. Reg. 170/03, s. 11(1)
- The Owner of a Drinking Water System (DWS) that supplies water to another DWS shall provide a copy of the annual report to the system that receives the water
- The annual report must cover the period of January 1 to December 31 in a year and must be prepared not later than February 28 of the following year
- The annual report must:
 - Contain a brief description of the DWS, including a list of water treatment chemicals used
 - Summarize any reports made to the Ministry under s.s. 18(1) of the *Act*, or Sch. 16 (16-4)
 - Summarize the results of tests made under O. Reg. 170/03 and the Municipal Drinking Water Licence (MDWL)
 - Describe any corrective actions taken under Sch. 17
 - Describe any major expenses to install, repair or replace required equipment
 - Include a statement of where a report prepared as per Sch. 22 will be available for inspection under s.s. 12(4)
 - Specify the number of points sampled as per s.s. 15.1-4(2) or s.s. 15.1-5(5), the number of samples taken, and the number of points where a sample exceeded the prescribed standard for lead
- The Owner shall ensure that a copy of an annual report for a system is given, without charge, to every person who requests a copy
- If a DWS is connected to and receives all of its drinking water from another DWS, the Owner of the system that receives the water shall ensure that a copy of an annual report for the DWS that supplies water is given, without charge, to every person who requests a copy
- Every time that an annual report is prepared for a DWS, the Owner of the system shall ensure that effective steps are taken to advise users of water from the system that copies of the report are available, without charge, and of how a copy may be obtained

O. REG. 170/03, SCHEDULE 22 - SUMMARY REPORT FOR MUNICIPALITIES

- The Owner of a DWS shall ensure that, not later than March 31 of each year, a report is prepared as per s.s. (2) and (3) for the preceding year and is given to:
 - in the case of a DWS owned by a Municipality, the members of the Municipal Council;
 - in the case of a DWS owned by a Municipal Service Board established under s. 195 of the *Municipal Act, 2001*, the members of the Municipal Service Board; or
 - in the case of a DWS owned by a Corporation, the Board of Directors of the Corporation

- The summary report must,
 - list the requirements of the *Act*, the Regulations, the system's approval, Drinking Water Works Permit (DWWP), MDWL, and any Orders applicable to the system that were not met at any time during the period covered by the report; and
 - for each requirement referred to above that was not met, specify the duration of the failure and the measures that were taken to correct the failure.
- The summary report must also include the following information for the purpose of enabling the Owner of the DWS to assess the capability of the system to meet existing and planned uses of the system:
 - A summary of the quantities and flow rates of the water supplied during the period covered by the report, including monthly average and maximum daily flows;
 - A comparison of the summary referred to above to the rated capacity and flow rates approved in the system's approval, DWWP or MDWL, or if the system is receiving all of its water from another system under an agreement pursuant to subsection 5(4), to the flow rates specified in the written agreement.
- If a report is prepared under s.s. (1) for a system that supplies water to a Municipality under the terms of the contract, the Owner of the DWS shall give a copy of the report to the Municipality by March 31.

MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS (MECP) INSPECTION REPORT

- In 2006, the MECP introduced a comprehensive inspection program for Municipal Residential Drinking Water Systems. The objectives of this program are to determine compliance with the *SDWA* and associated regulations; to encourage the continuous improvement of the Drinking Water System; and to establish a process to measure these improvements.

MUNICIPAL DRINKING WATER MANAGEMENT REVIEW

- The *SDWA*, through the Municipal Drinking Water System Licensing Program, requires that the Township maintain an accredited Quality Management System (QMS) for its drinking water system. This review communicates to Council the key information related to the QMS and the Municipal Drinking Water Licencing Program.

QMS OPERATIONAL PLAN

- The *SDWA*, through the Municipal Drinking Water Licensing Program, requires that a Municipal Drinking Water System Owner (Council) endorse the most current version of the QMS Operational Plan. This document, once endorsed, is posted on the Township of Huron-Kinloss website and is available at the Operations Centre.

The Township of Huron-Kinloss is approved by the MECP to operate a Class 2 Distribution and Supply System through its MDWL # 087-104, and to alter the system through its DWWP # 087-204.

The MECP "Municipal Drinking Water Systems" web portal provides the most current version of the *Act* and its regulations and can be found:

<https://www.ontario.ca/page/municipal-drinking-water-systems-licencing-registration-and-permits>

3.0 DESCRIPTION OF WATER SYSTEM (O. Reg. 170/03, s. 11 (6) (a))

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

Drinking Water System Number:	220002636
Drinking Water System Name:	Ripley 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.:	1849
Daily Maximum Water Supply Capacity:	4,266 m ³
Disinfection Chemicals:	Sodium Hypochlorite, 12%
Population:	640
Total Number of Service Connections:	366
Estimated Seasonal Population:	951 (based on Census data of 2.6 persons per household)
Average Day Demand:	357.40 m ³
Peak Day Demand:	1,147.22 m ³ (May 31, 2021)
Average Capacity:	8.38%
Peak Capacity:	26.89%
Distribution Network:	4.5 km
Fire Hydrants:	35
Blow-offs:	1

The Ripley Drinking Water Distribution and Supply Subsystem (Ripley DWS) is characterized as a “secure groundwater system”. It consists of two subsystems (four wells), that deliver potable water to the Village of Ripley.

The two subsystems are: Ripley Pumphouse (PH) and Ripley Elevated Tank (ET). Both of these sites are located within the Village of Ripley. The 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 subsystems are detailed as follows:

Site: Ripley Pumphouse - 74 Huron Street

- Water Source: Groundwater, Non-GUDI
- Number of Production Wells: 2 (Well # 1 - 1947; Well # 2 - 1994)
- Depth of Wells: 84.4 m; 85.3 m
- Well Pumps: 7.5 hp; 15 hp (submersible)
- Disinfection: Sodium hypochlorite (12%)
- CT Requirement: 2-log, 5°C, contact watermain (1.0 BF)
- High Lift Pumps: 2 (25 hp each)
- Reservoir: 53 m³
- Permit To Take Water: 4634-ANZKYM, expires May 31, 2027

Site: Ripley Elevated Tank - 93C Huron Street

- Water Source: Groundwater, Non-GUDI
- Number of Production Wells: 2 (#3, 2012, 10-inch; #4, 2011, 8-inch)
- Depth of Well: 89.9 m, 89.9 m
- Well Pumps: 2 (30 hp each, submersible)
- Disinfection: Sodium hypochlorite (12%)
- CT Requirement: 2-log, 5°C, 85 m x 600 mm Ø contact watermain (1.0 BF)
- Elevated Tank: 1,465 m³ total usable storage volume (636 m³ fire storage volume)
- Permit To Take Water: 4634-ANZKYM, expires May 31, 2027

The Ripley DWS currently (December 2021) has a 8.798 km distribution network with a combination of cast iron and PVC water mains, in sizes varying between 4-inch and 6-inch diameter.

All the Ripley 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 sodium, and fluoride**, but the lead content of the raw water is well below the half-MAC (Maximum Allowable Concentration). Those who are supplied from the Ripley DWS are made aware of the various concentrations in their drinking water by numerous means of communication from the Township of Huron-Kinloss.

A 250 kW diesel generator, located at the Ripley Fire Hall, adjacent to the Ripley Pumphouse, includes a 2,273 L capacity fuel storage tank and is used for emergency power supply. An Elevated Tank is constructed of bolted steel (2019). The 42 m (138 ft) high Elevated Tank has a total usable storage volume of approximately 1,465 m³ to supply the Village of Ripley. Periodic inspections of the Elevated Tank (exterior and interior) are conducted. The next inspection is due in 2026. The wells located at the Ripley Elevated Tank site (Well # 3 and Well # 4), were officially put into service in August 2020. A 200 kW diesel generator, located behind the Ripley-Huron Community Centre, adjacent to the Elevated Tank site, includes a 1,423 L capacity fuel storage tank and is used for emergency power supply for the Community Centre as well as the Elevated Tank Water Supply.

4.0 SUMMARY OF REPORTS MADE TO THE MINISTRY (O. Reg. 170/03, s. 11 (6) (b))

- There were two (2) Adverse Water Quality Incidents in 2021: For Sodium: O. Reg. 169/03 maximum allowable concentration (20 mg/L)
 - AWQI # 154964: Ripley Pumphouse: Sodium exceedances (32.1 mg/L and re-sample 28.6 mg/L)
 - AWQI # 154965: Ripley Elevated Tank: Sodium exceedances (30.0 mg/L and re-sample 28.4 mg/L)
- Flow meter signal malfunctions resulted in a non-compliance for Well # 3 flow at the Ripley Elevated tank between June 9 - July 13, 2021. Flow calculations were performed using the maximum allowable flow based on runtime hours. This was reported to the MECP Inspector.

5.0 SUMMARY OF WATER QUALITY MONITORING (O. Reg. 170/03, s. 11 (6) (c))

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

Table 1 - Monitoring Requirements:

Parameter	Description	Required # of Samples	Requirement Source
Chlorine Residual (grab)	For monitoring amount of residual in the system, and confirming of water quality following maintenance	365/year (1 daily)	O. Reg. 170/03, Sch. 7
Chlorine Residual (continuous monitoring)	Continuous monitoring equipment used to sample and test treated water at the location where intended contact time has been completed	5 minute intervals, minimum	O. Reg. 170/03, Sch. 7
E. Coli (EC) Total Coliform (TC) Heterotrophic Plate Count (HPC)	For testing presence of microbiological activity	96/year (Dist) 52/year (Raw) 52/year (Treated)	O. Reg. 170/03, Sch. 10
Inorganics and Organics	For testing presence of metals, pesticides and herbicides	36 month interval	O. Reg. 170, Sch 13, s. 13-2 (Sch 23), and s. 13-4 (Sch 24)
Trihalomethanes (THMs)	For testing presence of disinfection by-products (DBPs)	4/year (quarterly)	O. Reg. 170/03, Sch. 13, s. 13-6
Lead (Pb)	For testing presence of lead in the distribution system only - not private side	36 month interval (pH and alkalinity annually)	O. Reg. 170/03, Sch. 15; MDWL #087-104, Sch. D
Haloacetic Acids (HAAs)	For monitoring the formation of disinfection by-products (DBPs)	4/year (quarterly)	O. Reg. 170/03, Sch. 13, s. 13-6.1
Nitrate and Nitrite	For testing presence of nitrates and nitrites in the treated water at Point-of-Entry	4/year (quarterly)	O. Reg. 170/03, Sch. 13, s. 13-7
Sodium	For testing presence of sodium in the treated water at Point-of-Entry	60 month interval	O. Reg. 170/03, Sch. 13, s. 13-8
Fluoride	For testing presence of fluoride in the treated water at Point-of-Entry	60 month interval	O. Reg. 170/03, Sch. 13, s. 13-9

COMMUNICATIONS WHEN ADVERSE WATER SAMPLES ARE IDENTIFIED

Requirement - Laboratory

A water sample that does not meet Provincial water quality standards is considered “adverse”. When adverse water quality is detected, the accredited laboratory conducting the testing will immediately notify the Operating Authority, the Spills Action Centre (SAC), and the office of Grey Bruce Health Services. This notification is made by telephone through live communication to a person in authority. In addition to the phone calls, a fax of the sample results is sent to these agencies to verify the live communication made earlier.

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, 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.

5.1 Water Treatment Equipment Operation and Monitoring

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

In 2021, a total of 361 treated water grab samples from the Ripley Pumphouse were collected and analyzed for free chlorine residual at the point of entry (POE) using a Hach pocket chlorine colorimeter. A total of 52 treated water grab samples from the Ripley Elevated Tank site were collected and analyzed in the same manner. **Table 2** shows the grab samples monthly average of free chlorine residual values and the on-line continuous samples monthly average (as collected by SCADA) of the free chlorine residual values.

5.1.2 Distribution Free Chlorine Residuals (Grab Samples)

In 2021, a total of 424 distribution residuals were collected: 365 daily grab residuals and an additional 59 weekly grab residuals were taken in conjunction with the required weekly microbiological sampling. A summary of all the residuals collected is presented in **Table 2**.

Table 2 - Average Treated and Distribution Free Chlorine Residuals (Grab and SCADA Samples)

Month	Ripley Pumphouse (Grab)	Ripley Pumphouse (SCADA)	Ripley Elevated Tank (Grab)	Ripley Elevated Tank (SCADA)	Distribution (Grab)
Jan	1.69	1.76	1.92	1.54	1.59
Feb	1.71	1.77	1.83	1.49	1.52
Mar	1.73	1.78	1.74	1.81	1.55
Apr	1.66	1.70	1.68	1.84	1.43
May	1.61	1.66	1.87	1.70	1.46
Jun	1.61	1.62	1.46	1.59	1.49
Jul	1.45	1.50	1.59	1.49	1.33
Aug	1.50	1.52	1.44	1.57	1.36
Sep	1.55	1.57	1.90	1.62	1.34
Oct	1.58	1.63	1.77	1.47	1.38
Nov	1.60	1.62	1.81	1.62	1.49
Dec	1.62	1.65	1.87	1.67	1.63
CT Requirement	0.50	0.50	0.50	0.50	0.20
Annual Min	0.69	0.87	1.01	1.25	0.83
Annual Max	2.16	2.13	2.20	2.25	1.83
Annual Avg	1.61	1.65	1.74	1.62	1.46
# Samples	361	Continuous	52	Continuous	424

5.1.3 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.

Table 3 - Raw and Treated Water Turbidity Results (Grab Samples)

Month	Ripley Well # 1	Ripley Well # 2	Ripley Pumphouse Treated	Ripley Well # 3	Ripley Well # 4	Ripley Elevated Tank Treated
Jan	0.21	0.24	0.31	0.18	0.16	0.19
Feb	0.20	0.23	0.29	0.20	0.20	0.20
Mar	0.27	0.19	0.34	0.26	0.25	0.29
Apr	0.27	0.28	0.25	0.17	0.17	0.27
May	0.25	0.30	0.33	0.18	0.20	0.27
Jun	0.20	0.24	0.31	0.19	0.15	0.25
Jul	0.20	0.25	0.43	0.18	0.22	0.21
Aug	0.20	0.23	0.29	0.17	0.21	0.26
Sep	0.22	0.19	0.23	0.21	0.13	0.22
Oct	0.21	0.19	0.25	0.23	0.19	0.26
Nov	0.23	0.23	0.27	0.19	0.18	0.23
Dec	0.24	0.23	0.28	0.30	0.23	0.16
Annual Min	0.11	0.15	0.22	0.10	0.12	0.12
Annual Max	0.49	0.43	0.47	0.57	0.36	0.34
Annual Avg	0.23	0.23	0.30	0.21	0.19	0.23
# Samples	50	50	31	52	52	40

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

5.2.1 Raw Water Samples

Raw water samples are collected every week. In 2021, a total of 208 samples were collected and analyzed for E. Coli and Total Coliform. **Tables 4, 5, 6 and 7** provide a summary of microbiological results performed on each raw water source.

Table 4 - Microbiological Results for Raw Water - Well # 1

Month	Total Coliform			E. Coli		
	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples "0"	# Samples ≥1
Jan	4	4	0	4	4	0
Feb	4	4	0	4	4	0
Mar	5	5	0	5	5	0
Apr	4	4	0	4	4	0
May	4	4	0	4	4	0
Jun	5	5	0	5	5	0
Jul	4	4	0	4	4	0
Aug	5	5	0	5	5	0
Sep	4	3	1	4	4	0
Oct	4	4	0	4	4	0
Nov	5	5	0	5	5	0
Dec	4	4	0	4	4	0
TOTAL	52	52	1	52	52	0

Table 5 - Microbiological Results for Raw Water - Well # 2

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

Table 6 - Microbiological Results for Raw Water - Well # 3

Month	Total Coliform			E. Coli		
	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples "0"	# Samples ≥1
Jan	4	4	0	4	4	0
Feb	4	4	0	4	4	0
Mar	5	5	0	5	5	0
Apr	4	4	0	4	4	0
May	4	3	1	4	4	0
Jun	5	4	1	5	4	1
Jul	4	3	1	4	4	0
Aug	5	5	0	5	2	0
Sep	4	3	1	4	3	1
Oct	4	0	4	4	4	0
Nov	5	5	0	5	5	0
Dec	4	2	2	4	4	0
TOTAL	52	42	10	52	50	2

May 3: 1 TC
 Jun 29: 23 TC, 3 EC
 Jul 5: 1 TC
 Sep 28: 45 TC, 1 EC
 Oct 5: 8 TC; Oct 12: 33 TC; Oct 19: 10 TC; Oct 25: 1 TC
 Dec 14: 1 TC; Dec 20: 1 TC

Table 7 - Microbiological Results for Raw Water - Well # 4

Month	Total Coliform			E. Coli		
	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples "0"	# Samples ≥1
Jan	4	3	1	4	4	0
Feb	4	4	0	4	4	0
Mar	5	3	2	5	5	0
Apr	4	4	0	4	4	0
May	4	4	0	4	4	0
Jun	5	3	2	5	4	1
Jul	4	4	0	4	4	0
Aug	5	3	2	5	5	0
Sep	4	3	1	4	4	0
Oct	4	0	4	4	3	1
Nov	5	1	4	5	5	0
Dec	4	4	0	4	4	0
TOTAL	52	36	16	52	50	2

Jan 12: 1 TC
 Mar 9: 2 TC; Mar 16: 1 TC
 Jun 8: 1 TC; Jun 29: 22 TC, 3 EC
 Aug 3: 1 TC; Aug 24: 1 TC
 Sep 28: 36 TC
 Oct 5: 3 TC; Oct 12: 4 TC, 1 EC; Oct 19: 8 TC; Oct 25: 3 TC
 Nov 2: 3 TC; Nov 9: 1 TC; Nov 16: 1 TC; Nov 30: 1 TC

5.2.2 Treated Water (Point of Entry) Samples

One (1) treated water sample from the point of entry is taken every week and analyzed for E. Coli, Total Coliform, and Heterotrophic Plate Count (HPC). In 2021, a total of 52 treated water samples from the Ripley Pumphouse were collected and analyzed for the above parameters. A total of 52 treated water samples from the Ripley Elevated Tank were collected and analyzed for TC and EC, and HPC. Each EC and TC result from the treated water was 0 cfu/100 mL. The range of HPC results were 0 - 20 cfu/100 mL.

Tables 8 and 9 provide a summary of all microbiological results performed on treated water.

Table 8 - Microbiological Results for Treated Water (Point of Entry) - Ripley Pumphouse

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

Table 9 - Microbiological Results for Treated Water (Point of Entry) - Ripley Elevated Tank

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

5.2.3 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. In 2021, a total of 105 distribution samples were collected and analyzed for TC and EC, which is above the required number of samples (n=96, based on 951 estimated residents). A total of 52 distribution samples were analyzed for HPC (n=24, 25% of 96). Each TC and EC result from the distribution water was 0 cfu/100 mL. The range of HPC results were 0 - 20 cfu/100 mL. **Table 10** provides a summary of all microbiological samples taken in the distribution system.

Table 10 - Microbiological Results for Distribution System

Month	Total Coliform			E. Coli			HPC		
	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples "0"	# Samples 1 - 20
Jan	8	8	0	8	8	0	4	0	4
Feb	8	8	0	8	8	0	4	0	4
Mar	10	10	0	10	10	0	5	0	5
Apr	8	8	0	8	8	0	4	0	4
May	8	8	0	8	8	0	4	0	4
Jun	11	11	0	11	11	0	5	0	5
Jul	8	8	0	8	8	0	4	0	4
Aug	10	10	0	10	10	0	5	0	5
Sep	8	8	0	8	8	0	4	0	4
Oct	8	8	0	8	8	0	4	0	4
Nov	10	10	0	10	10	0	5	0	5
Dec	8	8	0	8	8	0	4	0	4
TOTAL	105	105	0	105	105	0	52	0	52

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

5.3.1 Inorganics (Schedule 13, s. 13-2; Schedule 23)

Treated water samples are collected every 36 months and analyzed for inorganics. The most recent samples for the Ripley DWS were collected on June 21, 2021 at the Ripley Pumphouse and submitted to the laboratory for analysis of inorganics as listed in Schedule 23 (see **Table 11**). All parameters were found to be within compliance, however, the Arsenic level 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 2024.

Table 11 - Inorganics (Schedule 13, s. 13-2; Schedule 23) Results

Parameter	Ripley Pumphouse (µg/L)	Maximum Allowable Concentration (µg/L)	Exceedance
Antimony	0.9 <MDL	6	No
Arsenic	5.1	10	No
Barium	79.4	1000	No
Boron	123	5000	No
Cadmium	0.01	5	No
Chromium	0.26	50	No
Mercury	0.01 <MDL	1	No
Selenium	0.34	50	No
Uranium	5.72	20	No

*MDL = Laboratory Minimum Detection Limit

5.3.2 Organics (Schedule 13, s. 13-4; Schedule 24)

Treated water samples are collected every 36 months and tested for Schedule 24 organic parameters. The most recent samples were collected on June 21, 2021. All parameters were found to be within compliance. Organics will be sampled and analyzed again in June 2024. Samples results can be found in **Table 12**.

Table 12 - Organics (Schedule 13, s. 13-4; Schedule 24) Results

Parameter	Ripley Pumphouse (µg/L)	Maximum Allowable Concentration (µg/L)	Aesthetic Objective / Operational Guideline (µg/L)	Exceedance
Benzene	0.32 <MDL	1	--	No
Carbon Tetrachloride	0.17 <MDL	2	--	No
1,2-Dichlorobenzene	0.41 <MDL	200	3	No
1,4-Dichlorobenzene	0.36 <MDL	5	1	No
1,1-Dichloroethylene	0.33 <MDL	14	--	No
1,2-Dichloroethane	0.35 <MDL	5	--	No
Dichloromethane	0.35 <MDL	50	--	No
Monochlorobenzene	0.3 < MDL	80	30	No
Tetrachloroethylene	0.35 <MDL	10	--	No
Trichloroethylene	0.44 <MDL	5	--	No
Vinyl Chloride	0.17 <MDL	1	--	No

*MDL = Laboratory Minimum Detection Limit

Table 12 - Organics (Schedule 13, s. 13-4; Schedule 24) Results - Continued

Parameter	Ripley Pumphouse (µg/L)	Maximum Allowable Concentration (µg/L)	Aesthetic Objective / Operational Guideline (µg/L)	Exceedance
Diquat	1 <MDL	70	--	No
Paraquat	1 <MDL	10	--	No
Glyphosate	1 <MDL	280	--	No
Polychlorinated Biphenyls	0.04 <MDL	3	--	No
Benzo(a)pyrene	0.004 <MDL	0.01	--	No
Alachlor	0.02 <MDL	5	--	No
Atrazine+N-dealkylated metabolites	0.01 <MDL	5	--	No
Atrazine	0.01 <MDL	--	--	No
Desethyl Atrazine	0.01 <MDL	--	--	No
Azinphos-methyl	0.05 <MDL	20	--	No
Carbaryl	0.05 <MDL	90	--	No
Carbofuran	0.01 <MDL	90	--	No
Chlorpyrifos	0.02 <MDL	90	--	No
Diazinon	0.02 <MDL	20	--	No
Dimethoate	0.06 <MDL	20	--	No
Diuron	0.03 <MDL	150	--	No
Malathion	0.02 <MDL	190	--	No
Metolachlor	0.01 <MDL	50	--	No
Metribuzin	0.02 <MDL	80	--	No
Phorate	0.01 <MDL	2	--	No
Prometryne	0.03 <MDL	1	--	No
Simazine	0.01 <MDL	10	--	No
Terbufos	0.01 <MDL	1	--	No
Triallate	0.01 <MDL	230	--	No
Trifluralin	0.02 <MDL	45	--	No
2,4-Dichlorophenoxyacetic acid	0.19 <MDL	100	--	No
Bromoxynil	0.33 <MDL	5	--	No
Dicamba	0.20 <MDL	120	--	No
Diclofop-methyl	0.40 <MDL	9	--	No
MCPA	0.00012 <MDL	0.1	--	No
Picloram	1 <MDL	190	--	No
2,4-Dichlorophenol	0.15 <MDL	900	0.3	No
2,4,6-Trichlorophenol	0.25 <MDL	5	2	No
2,3,4,6-Tetrachlorophenol	0.20 <MDL	100	1	No
Pentachlorophenol	0.15 <MDL	60	30	No

*MDL = Laboratory Minimum Detection Limit

5.3.3 Trihalomethanes (Schedule 13, s. 13-6)

Two distribution samples are collected every three months from a representative point in the distribution system and tested for Trihalomethanes (THMs). In 2021, 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 13 and 14** for the summary of Trihalomethane results and the RAA.

Table 13 - RIPLEY PUMPHOUSE SUPPLY - Trihalomethane (Schedule 13, s. 13-6) Results

Month	THMs (µg/L)	Bromodichloro methane (µg/L)	Bromoform (µg/L)	Chloroform (µg/L)	Dibromochloro methane (µg/L)
Feb	9.3	2.90	<0.34	5.1	1.3
May	9.6	2.90	<0.34	5.3	1.4
Aug	11.0	3.50	<0.34	5.9	1.5
Nov	15.0	4.50	<0.34	8.0	2.1
RAA	11.2	3.45	<0.34	6.1	1.6
Maximum	15.0	4.50	<0.34	8.0	2.1
MAC (µg/L)	100	---	---	---	---
Exceedance	No	---	---	---	---

Table 14 - RIPLEY ELEVATED TANK SUPPLY - Trihalomethane (Schedule 13, s. 13-6) Results

Month	THMs (µg/L)	Bromodichloro methane (µg/L)	Bromoform (µg/L)	Chloroform (µg/L)	Dibromochloro methane (µg/L)
Feb	8.0	2.50	<0.34	4.4	1.1
May	17.0	4.30	<0.34	11.0	1.7
Aug	11.0	3.60	<0.34	6.3	1.6
Nov	18.0	4.80	<0.34	11.0	2.0
RAA	12.4	3.80	<0.34	8.2	1.6
Maximum	18.0	4.80	<0.34	11.0	2.0
MAC (µg/L)	100	---	---	---	---
Exceedance	No	---	---	---	---

5.3.4 Haloacetic Acids (Schedule 13, s. 13-6.1)

Ontario Regulation 170/03 has been amended to include quarterly testing for Haloacetic Acids (HAAs). One distribution sample is collected every three months from a representative point in the distribution system and tested for Haloacetic Acids (HAAs). In 2021, samples were collected during the months of February, May, August, and November and results are expressed as a running annual average (RAA). Results and RAA are summarized in **Tables 15 and 16**.

Table 15 - RIPLEY PUMPHOUSE SUPPLY - Haloacetic Acid (Schedule 13, s. 13-6.1) Results

Month	Total HAAs (µg/L)	Bromo acetic acid (µg/L)	Chloro acetic acid (µg/L)	Dichloro acetic acid (µg/L)	Dibromo acetic acid (µg/L)	Trichloro acetic acid (µg/L)
Feb	<5.3	<2.9	<4.7	<2.6	<2.0	<5.3
May	<5.3	<2.9	<4.7	<2.6	<2.0	<5.3
Aug	<5.3	<2.9	<4.7	<2.6	<2.0	<5.3
Nov	<5.3	<2.9	<4.7	<2.6	<2.0	<5.3
RAA	<5.3	<2.9	<4.7	<2.6	<2.0	<5.3
Max	<5.3	<2.9	<4.7	<2.6	<2.0	<5.3
MAC (µg/L)	80	---	---	---	---	---
Exceedance	No	---	---	---	---	---

Table 16 - RIPLEY ELEVATED TANK SUPPLY - Haloacetic Acid (Schedule 13, s. 13-6.1) Results

Month	Total HAAs (µg/L)	Bromo acetic acid (µg/L)	Chloro acetic acid (µg/L)	Dichloro acetic acid (µg/L)	Dibromo acetic acid (µg/L)	Trichloro acetic acid (µg/L)
Feb	<5.3	<2.9	<4.7	<2.6	<2.0	<5.3
May	<5.3	<2.9	<4.7	<2.6	<2.0	<5.3
Aug	<5.3	<2.9	<4.7	<2.6	<2.0	<5.3
Nov	<5.3	<2.9	<4.7	<2.6	<2.0	<5.3
RAA	<5.3	<2.9	<4.7	<2.6	<2.0	<5.3
Max	<5.3	<2.9	<4.7	<2.6	<2.0	<5.3
MAC (µg/L)	80	---	---	---	---	---
Exceedance	No	---	---	---	---	---

5.3.5 Nitrate and Nitrite (Schedule 12, s. 13-7)

Treated water samples are collected every three months and tested for nitrate and nitrite. In 2021, 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. Refer to **Table 17**.

Table 17 - Nitrate and Nitrite (Schedule 13, s. 13-7) Results

Month	RIPLEY PUMPHOUSE		RIPLEY ELEVATED TANK	
	Nitrite (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Nitrate (mg/L)
Feb	<0.003	0.402	<0.003	0.336
May	<0.003	0.078	0.003	0.692
Aug	<0.003	0.322	<0.003	0.430
Nov	<0.003	0.079	<0.003	0.744
Average	<0.003	0.220	0.003	0.551
Maximum	<0.003	0.402	0.003	0.744
MAC (mg/L)	1	10	1	10
Exceedance	No	No	No	No

5.3.6 Sodium (Schedule 13, s. 13-8)

One (1) water sample is collected from each Point of Entry (treated water) every 60 months and analyzed for Sodium. The *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. The Sodium results for both well supplies exceeded 20 mg/L and was reported to the Grey Bruce Health Unit and the Ministry’s Spills Action Centre (AWQI # 154964 and 154965). Results can be found in **Table 18**. The next sampling date for Sodium will be in 2026.

5.3.7 Fluoride (Schedule 13, s. 13-9)

One (1) water sample is collected from each Point of Entry (treated water) every 60 months and analyzed for Fluoride. The Ontario Drinking Water Quality Standards (ODWQS) have set a Maximum Allowable Concentration (MAC) of 1.5 mg/L. On August 15, 2017, a sample was collected from the Ripley Pumphouse for this analysis. The fluoride result exceeded the MAC due to naturally occurring fluoride in the aquifers. This exceedance was reported to the Grey Bruce Health Unit and the Ministry’s Spills Action Centre (AWQI # 135640). The results are summarized in **Table 18**. The next sampling date for Fluoride will be in 2022. Note: The fluoride results for the Elevated Tank are from the original Raw Water Quality testing on December 14, 2011.

Table 18 - Sodium (Schedule 13, s. 13-8) and Fluoride (Schedule 13, s. 13-9) Results

Location	Sodium	Fluoride
	Result (mg/L)	Result (mg/L)
Ripley Pumphouse Treated Water	32.1, 28.6	2.10
Ripley Elevated Tank	30.0, 28.4	2.10
MAC (mg/L)	20	1.50
Exceedance	Yes	Yes

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

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. The Ripley Drinking Water System is currently under a reduced sampling program for lead where lead, pH and alkalinity are sampled in each season every 36 months (3 years). In the interim, pH and alkalinity are tested during each sampling season. Two (2) were collected on January 11, 2021 and two (2) samples were collected on July 12, 2021. These parameters are required to be sampled and analyzed again between the months of December 2020 and April 2021, and again between June and October 2021. Lead samples are required next in the 2024 sampling season. Results for 2021 can be found in **Table 19**.

Table 19 - Lead Sampling Program (Schedule 15.1) Results

Season	Alkalinity (mg/L)	pH	Lead (µg/L)
Dec-Apr	221	7.46	0.04
	210	7.53	0.15
Jun-Oct	203	7.80	0.03
	199	7.78	0.15
MAC (µg/L)	---	---	10
Exceedance	---	---	No

5.3.9 Non-Regulatory Testing - Aesthetic Objectives and Operational Guidelines (AO/OG)

Samples were collected from each of the four (4) Points of Entry (treated water) on November 21, 2016 and tested for parameters listed in the *MOECC Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines, June 2006, PIBS 4449e01*. These results are included in **Table 20** for information purposes.

Table 20 - Aesthetic Objectives and Operational Guideline Results

Parameter	AO/OG	Ripley Pumphouse Treated
pH	6.5 - 8.5	7.86
Alkalinity (mg/L as CaCO ₃)	30 - 500	204
Colour (TCU)	5	3 <MDL
Total Dissolved Solids (mg/L)	500	377
Organic Nitrogen (mg/L)	0.15	0.05 <MDL
Total Kjeldahl Nitrogen (mg/L)	---	0.05 <MDL
Ammonia + Ammonium (mg/L)	---	0.07
Hydrogen Sulphide (mg/L)	0.05	0.006 <MDL
Sulphide (mg/L)	0.05	0.006 <MDL
Chloride (mg/L)	250	21
Sulphate (mg/L)	500	83
Hardness (mg/L as CaCO ₃)	80 - 100	212
Aluminum (µg/L)	100	1.3
Copper (µg/L)	1000	1.65
Iron (µg/L)	300	197
Manganese (µg/L)	50	16.3
Zinc (µg/L)	5000	34
Dissolved Organic Carbon (mg/L)	5	1 <MDL
Methane (L/m ³)	3	0.02 <MDL
Ethylbenzene (µg/L)	2.4	0.33 <MDL
Toluene (µg/L)	24	0.36 <MDL
Xylene (µg/L)	300	0.43 <MDL
m/p-xylene (µg/L)	---	0.43 <MDL
o-xylene (µg/L)	---	0.17 <MDL

*NOTE: AO/OG - aesthetic objective / operational guideline
MDL = Laboratory Minimum Detection Limit

6.0 WATER AND CHEMICAL USE (O. Reg. 170/03, s. 11 (6) (a); Schedule 22-2 (3))

6.1 Chemical Usage (O. Reg. 170/03, s. 11 (6) (a))

In 2021, the total amount of 12% sodium hypochlorite (NaOCl) used to treat the water that was provided to the distribution system is tabulated in **Table 21** with the average chlorine dosage.

Table 21 - Sodium Hypochlorite Usage

Month	Ripley Pumphouse Treated Water		Ripley Elevated Tank Treated Water	
	Usage (kg)	Average Dosage (mg/L)	Usage (kg)	Average Dosage (mg/L)
Jan	8.83	3.13	18.92	5.29
Feb	12.75	3.18	12.89	2.61
Mar	8.69	3.22	25.51	3.20
Apr	7.01	3.38	16.40	2.76
May	11.07	3.15	19.62	2.90
Jun	19.48	3.30	25.37	3.09
Jul	10.65	3.52	24.53	3.40
Aug	8.27	3.60	32.80	3.03
Sep	12.47	3.52	26.35	3.62
Oct	6.73	3.49	27.89	3.54
Nov	0.56	2.49	39.24	3.25
Dec	0.42	4.43	35.32	3.45
TOTAL	106.94	---	304.85	---
Average	---	3.37	---	3.34

Sodium Hypochlorite Grand Total Usage: 411.79 kg

Sodium Hypochlorite Average Dosage: 3.36 mg/L

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

A summary of the water supplied to the distribution system in 2021 from each well supply is provided in **Tables 22, 23, 24, and 25**. The volumes reported for the Ripley well supply are taken from the SCADA continuous monitoring system. The flow meter was verified on the following date:

Ripley Pumphouse:	Raw water flow meter	June 10, 2021
Ripley Elevated Tank:	Raw Well # 3 flow meter	June 10, 2021
Ripley Elevated Tank:	Raw Well # 4 flow meter	June 10, 2021

Table 22 - Flow Rates, Annual Volumes, and Capacities - Ripley Pumphouse

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 Monthly Max (%)
Jan	20.29	17.58	2,844.73	627.07	91.77	72.6%
Feb	18.76	17.21	4,038.34	624.69	144.23	72.3%
Mar	20.04	17.84	2,723.53	885.53	87.86	102.5%
Apr	21.14	17.66	2,095.66	594.57	69.86	68.8%
May	23.66	11.75	3,781.58	627.02	121.99	72.6%
Jun	20.05	12.87	5,747.81	690.04	191.59	79.9%
Jul	20.86	18.72	3,074.55	570.47	99.18	66.0%
Aug	20.08	18.74	2,880.27	566.31	92.91	65.5%
Sep	20.18	18.60	3,062.13	695.81	102.07	80.5%
Oct	20.15	18.42	1,963.31	589.13	63.33	68.2%
Nov	19.98	14.27	228.65	140.41	7.62	16.3%
Dec	19.33	13.29	96.63	27.71	3.12	3.2%
PTTW Max	30.30	30.30	26,280.00	864.00	---	---
Annual Max	23.66	---	5,748.1	885.53	---	102.5%
Annual Avg	---	16.41	2,711.43	---	89.14	10.32%
Annual Total	---	---	32,537.19	---	---	---

* NOTE: The flow exceedance in March was due to an extended run.

Table 23 - Flow Rates, Annual Volumes, and Capacities - Ripley Elevated Tank - Well # 3

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 Monthly Max (%)
Jan	22.20	19.95	1,907.05	590.53	61.52	29.3%
Feb	22.31	20.98	1,874.10	595.37	66.93	29.5%
Mar	22.55	19.21	2,552.98	631.21	82.35	31.3%
Apr	25.02	20.59	1,709.97	571.68	57.00	28.4%
May	27.97	20.54	4,363.25	781.68	140.75	38.8%
Jun	23.30	17.34	2,535.74	931.07	84.52	46.2%
Jul	30.90	20.32	4,391.78	645.88	141.67	32.0%
Aug	27.36	19.00	3,428.17	664.11	110.59	32.9%
Sep	22.47	20.35	3,562.29	635.59	118.74	31.5%
Oct	38.20	21.41	5,418.81	612.15	174.80	30.4%
Nov	30.86	21.47	5,263.01	1,011.64	175.43	50.2%
Dec	22.96	21.86	5,947.27	631.67	191.85	31.3%
PTTW Max	23.33	23.33	61,320.00	2,016	---	---
Annual Max	38.20	---	5,947.27	1011.64	---	50.18%
Annual Avg	---	20.25	1,709.97	---	117.68	5.84%
Annual Total	---	---	42,954.42	---	---	---

* NOTE: The flow exceedances were instantaneous peaks at pump start up.

Table 24 - Flow Rates, Annual Volumes, and Capacities - Ripley Elevated Tank - Well # 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)	Raw Max Hours Daily Runtime (h)	Capacity Monthly Max (%)
Jan	23.03	8.51	4,285.64	573.98	138.25	7.30	41.4%
Feb	23.66	22.00	3,024.93	670.37	108.03	8.50	48.4%
Mar	23.10	21.97	4,798.96	594.50	154.81	7.50	42.9%
Apr	23.08	21.71	4,148.02	590.55	138.27	7.60	42.6%
May	22.59	20.79	2,658.89	598.66	192.72	7.70	43.2%
Jun	22.72	20.99	5,292.68	903.33	176.42	12.00	65.2%
Jul	22.63	21.08	4,553.64	674.02	146.89	8.70	48.6%
Aug	22.32	20.47	6,052.18	775.21	195.23	10.40	55.9%
Sep	22.51	21.01	4,452.64	640.76	148.42	8.40	46.2%
Oct	22.77	21.83	3,623.59	598.82	116.89	7.60	43.2%
Nov	30.77	21.73	6,551.92	776.00	218.40	9.80	56.0%
Dec	22.88	21.53	5,515.04	616.42	177.90	7.90	44.5%
PTTW Max	23.33	23.33	42,273.00	1,386.00	---	17.0	---
Annual Max	30.77	---	6,551.92	903.33	---	12.00	65.18%
Annual Avg	---	20.30	4,579.84	---	150.57	---	10.86%
Annual Total	---	---	54,958.13	---	---	---	---

* NOTE: The flow exceedances in February and November were instantaneous peaks at pump start up.

Table 25 - Flow Rates, Annual Volumes and Capacities - RIPLEY WELLS COMBINED (1, 2, 3 and 4)

Month	Raw Volume Monthly Total (m ³)	Raw Volume Daily Max (m ³)	Raw Volume Monthly Avg (m ³)	Capacity Monthly Max (%)
Jan	9,037.42	627.07	291.53	14.7%
Feb	8,937.37	670.37	319.19	15.7%
Mar	10,075.47	885.53	325.02	20.8%
Apr	7,953.65	594.57	265.12	13.9%
May	10,803.72	1,147.22	348.51	26.9%
Jun	13,576.23	1,146.93	452.54	26.9%
Jul	12,019.97	983.63	387.74	23.1%
Aug	12,360.62	775.21	398.73	18.2%
Sep	11,077.06	695.81	369.24	16.3%
Oct	11,005.71	617.34	355.02	14.5%
Nov	12,043.58	1,011.64	401.45	23.7%
Dec	11,558.94	641.04	372.87	15.0%
PTTW Max	130,113.00	4,266.00	---	---
Annual Max	13,576.23	1,147.22	---	26.9%
Annual Avg	10,870.81	---	357.40	8.38%
Annual Total	130,449.75	---	---	---

6.3 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 26**. The visual representations of each well and the Ripley total capacity are presented in Figures 2, 3, 4 and 5.

Table 26 - Total Volumes of All Well Supplies

Location (Well Supply)	Total Volume for 2020 (m ³)
Ripley Pumphouse (Well #1 and #2)	32,537.19
Ripley Elevated Tank (Well #3)	42,954.42
Ripley Elevated Tank (Well # 4)	54,958.13
Total Annual Rated Capacity, PTTW (m³)	1,557,090.00
Grand Total Water Taking (m ³)	130,449.74
Overall Operating Capacity, Actual %	8.38%

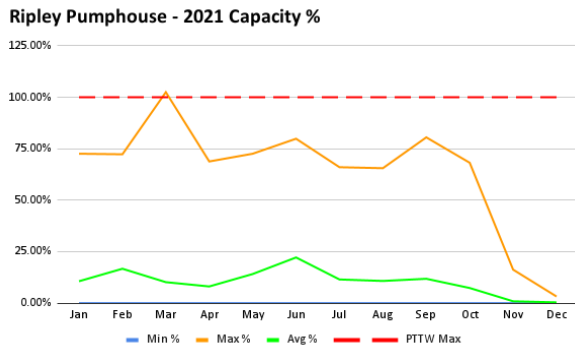


Figure 2

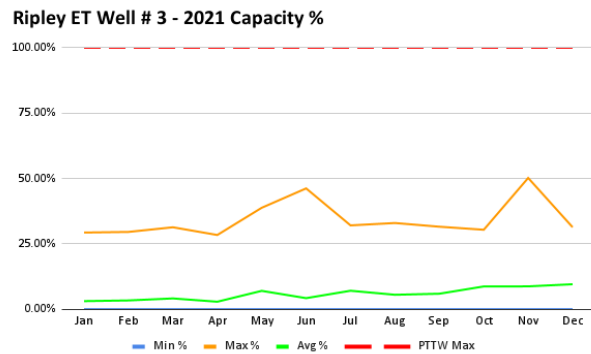


Figure 3

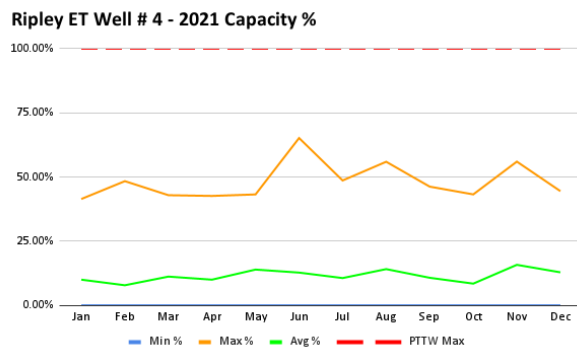


Figure 4

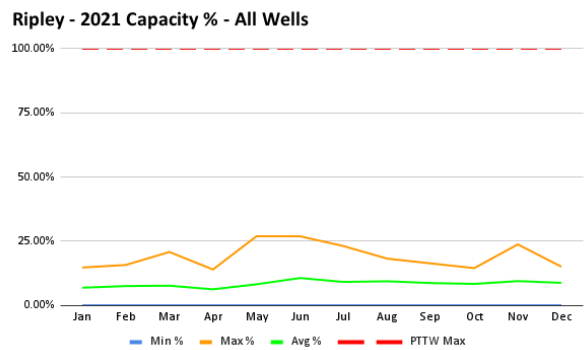


Figure 5

7.0 IMPROVEMENTS TO SYSTEM AND ROUTINE AND PREVENTATIVE MAINTENANCE (s. 11 (6) (e))

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

Ripley Drinking Water System:

Routine and preventative maintenance performed as per Jobs Plus schedule.
Flow meter calibrations completed.
Georgian Bay Fire and Safety inspections completed.
Sommers Generators on-site for annual servicing.
Semi-annual flushing and annual valve turning completed.
Backflow preventer testing completed.

Ripley Pumphouse:

January: Stantec on-site to paint end supports for the lift rail.
March: Reservoir drained, cleaned and inspected.
April: High Lift Pump 2 fault; replaced breaker.
September: Hoist inspection.
Floor grating was replaced.
October: Water coming into the basement pump gallery from outside.
November: Well pump contactor failed and didn't shut off which caused flooding in the basement pump gallery.
High lift pumps removed for repair. The flow meter was damaged and will be replaced in 2022.
New chlorine analyzer installed.
December: One HLP was re-installed; Eramosa on-site for control repairs.

Ripley Elevated Tank:

April: MicroAge on-site for communications repair.
May: Elevated Tank drained for warranty inspection.
September: Safety harness inspection.

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

- MECP Drinking Water Inspection was conducted on October 4, 2021 and awarded a rating of 100.00% (previous rating was 98.14%).
- A list of Capital Items for 2022 was submitted to the Township of Huron-Kinloss on October 29, 2021.
- DWQMS Management Review was conducted on June 24, 2021.
- DWQMS Internal Audit was conducted between November 25 - December 3, 2021.
- DWQMS External Audit (off-site) was conducted on July 12 -13, 2021.
- DWQMS Complete Risk Assessment was conducted on December 30, 2021.
- An Emergency Response Exercise was conducted by the Township, however, Veolia was not asked to participate. Veolia staff conducted a tabletop After Action Report on October 12, 2021 for a break-in and theft that occurred in Goderich.

9.0 REGULATORY CHANGES

- Proposed amendments to drinking water operator and water quality analyst certification regulations have been issued to address the impacts of emergencies. These include:
 - allowing the Ministry to act quickly to ensure the Province’s drinking water is protected during an emergency
 - extending Operator certificates and allowing certain qualified but non-certified staff to temporarily maintain system operations, and would only be enacted during an emergency
 - allowing temporary relief from training and certification requirements

This proposal has been registered with the Environmental Registry of Ontario and the consultation process was closed on July 2, 2021. The outcome of this proposal is expected to be published in 2022.

- Proposed updates to the Director’s Directions - Minimum Requirements for Operational Plans - May 2021. The Director’s Directions have updated the following:
 - Content Requirements - all referenced documents will be considered part of the Operational Plan.
 - Procedures for version control - version number and revision date is to be embedded in every electronic copy, and recorded on every page of any physical copy
 - Completed copy of Subject System Description Form in Schedule “C” of the Director’s Directions
 - Operational Plans are to be submitted to the Director electronically
 - Retention of Operational Plans - Operational Plans that were the subject of an audit by an auditor for the accreditation body shall be retained for a minimum of 10 years
 - Public Disclosure of Operational Plans - shall be made available for viewing by the public either electronically (website) or at the principal place of business, but not in a manner that would threaten the safety, health or quality of the drinking water, or create significant prejudice with the contractual obligations of the Operating Authority or other organization.
 - Operational Plans shall be updated to meet the requirements of the Director’s Directions no later than April 1, 2022.

9.1 Arsenic Sampling

In January 2018, O. Reg. 169/03 - Ontario Drinking Water Quality Standard for Arsenic was changed to 0.010 mg/L from 0.025 mg/L, making the new Half-MAC (Maximum Allowable Concentration) 0.005 mg/L. The Ripley Pumphouse supply has had some previous Arsenic levels in exceedance of the Half-MAC and therefore, this site was sampled on a quarterly basis to satisfy O. Reg. 170/03, Schedule 13-5(1) - Increased frequency under s.s 13-2 and 13-4. See **Table 27** for Ripley Arsenic results. In 2021, no sample results exceeded the Half-MAC and therefore, quarterly Arsenic sampling is no longer required.

Table 27 - Arsenic Results

Sample Date	Arsenic Concentration (µg/L)
Feb 22, 2021	3.6
May 3, 2021	4.4
Aug 10, 2021	2.4
Nov 8, 2021	3.9
MAC (µg/L)	10
Exceedance	No

NOTE:

O. Reg. 170/03, Schedule 13: Increased frequency under s.s 13-2 and 13-4

13-5. (1) If a test result obtained under section 13-2 or 13-4 for a parameter **exceeds half of the standard prescribed** for the parameter in Schedule 2 to the Ontario Water Quality Standards, the frequency of sampling and testing for that parameter under that section shall be **increased** so that at least one sample is taken and tested **every three months**.

10.0 WELL LEVELS (PTTW)

The Permit To Take Water (PTTW) 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 monthly basis at the Ripley Pumphouse (Well 1 and Well 2) to monitor the performance of the aquifer. The well levels at the Ripley Elevated Tank site are continuously monitored, therefore the monthly average of the minimum levels are reported (i.e highest recovered level below grade). **Table 28** provides a summary of the static well levels recorded in 2021.

Table 28 - Static Well Levels (PTTW)

Month	Ripley Pumphouse Well 1 (m)	Ripley Pumphouse Well 2 (m)	Ripley Elevated Tank Well 3 Minimum level (m)	Ripley Elevated Tank Well 4 Minimum level (m)
Jan	15.85	14.80	12.25	13.54
Feb	16.46	15.55	11.63	12.99
Mar	14.63	14.46	12.37	13.71
Apr	15.80	15.05	11.77	12.83
May	16.76	15.75	10.01	11.34
Jun	18.59	17.45	8.90	9.63
Jul	17.98	16.85	9.38	10.48
Aug	17.67	17.17	7.80	8.44
Sep	17.37	17.48	7.96	8.62
Oct	16.45	15.68	10.34	11.69
Nov	14.63	14.25	11.54	12.69
Dec	14.63	14.25	12.00	13.49
Min	14.63	14.25	7.80	8.44
Max	18.59	17.48	12.37	13.71
Avg	16.4	15.73	10.50	11.62
# Readings	12	12	Continuous	Continuous

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

A Drinking Water Source Protection Assessment (DWSPA) Report was generated for the Saugeen Valley Source Protection Area 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/wp-content/uploads/2018/12/SVSPA_Ch4_2017_Clean.pdf

The Well Head Protection Areas (WHPAs) within the Ripley Drinking Water System have 4 designations:

- WHPA-A: 100 m radius around the well head
- WHPA-B: 2-year time-of-travel capture zone
- WHPA-C: 5-year time-of-travel capture zone
- WHPA-D: 25-year time-of-travel capture zone

The Ripley wells are NOT classified as groundwater under direct influence of surface water (GUDI).

The DWSPA report states: “A WHPA for the Ripley System was first developed as part of the Grey Bruce Groundwater Study (WHI, 2003). The initial WHPA was updated using the existing groundwater model for the area, in order to account for revised pumping rates as part of the Round 1 Technical Study for the Saugeen Grey Sauble Northern Bruce Peninsula Source Protection Region (CRA, 2007). The WHPA for Well Nos. 3 and 4 was developed after the Township decided to increase capacity by drilling new wells. The groundwater study and delineations were completed by Matrix Solutions Inc. in 2016.”

This report also states: “ The intrinsic susceptibility index for the Ripley WHPA is low to moderate due to the approximately 30 metres of low permeability overburden overlying the bedrock aquifer, which provides natural protection to the aquifer. Review of the water well records confirms the presence of approximately 30 m of low permeable overburden (e.g., clay, hardpan) throughout the area. There are 88 significant drinking water threats in the Ripley (Well Nos. 1, 2, 3 and 4) wellhead protection area A-D. These threats include 28 activities related to contamination with hazardous chemicals and 60 activities related to DNAPLs. The total number of properties with threats is 69, of which 29 are residential, 30 are agricultural and 9 are other land uses.” **Table 29** summarizes the significant threats identified.

Table 29 - Ripley WHPA: Summary of Significant Drinking Water Threats

WHPA A-D	Number of “are or would be significant” threats				Number of properties with “are or would be significant” threats			
	Chemical	DNAPL	Pathogen	Total	Agricultural	Residential	Others	Total
WHPA A-D	28	60	0	88	29	31	9	69

In conclusion, as stated in the DWSPA Report: “Based on available data and knowledge on raw water quality, no drinking water quality issues were identified for this water system that would result from ongoing or past activities.”

11.1 Source Water Protection - Municipal Drinking Water Licence Requirements

The Municipal Drinking Water Licence (MDWL) has stipulations regarding the fuel storage for the standby generator located in the Fire Hall adjacent to the Ripley Pumphouse since it is in the WHPA and is considered to be a significant drinking water threat. The fuel tank is below grade and contains 2,273 L of diesel fuel. These stipulations from Schedule C, Sec. 6, Table 8 are:

6.0 Source Protection

Table 8: Fuel Oil Systems in Source Protection Areas Considered a Significant Drinking Water Threat

Storage Location	Storage Location Description of Fuel	Protection Plan & Effective Date	Source Protection Area
74 Huron Street, Ripley NAD 83: Zone 17 0453640 m Em 4879808 m N	Below Grade Storage Tank Capacity: 2,273 L Diesel	Saugeen Valley Grey Sauble Northern Bruce Peninsula, July 1, 2016	Saugeen Valley

- 6.1** The owner shall implement risk management measures for the fuel oil systems identified in Table 8, that ensure fuel is appropriately stored and managed to protect the raw water source of supply for the drinking water system or subsystem. The measures shall include the following:
- 6.1.1** The storage tank(s) associated with the fuel oil systems shall be inspected on or before June 15, 2018 and at least once every twelve months thereafter, or more frequently as recommended by the manufacturer or required by the Technical Standards and Safety Act (TSSA) 2000, and applicable regulations, codes and standards.
- 6.1.2** The inspection required by condition 6.1.1 shall be performed by a person certified for that purpose under the TSSA and shall include, at a minimum,
- A. Visual inspection of the fuel oil tank, tubing, and piping for leaks:
 - a. where the tank is below grade (underground), visible components of the tank should be inspected, including the fill pipe and vent;
 - B. Visual inspection of any grade-level secondary containment;
 - C. Inspection of any equipment installed to monitor or measure fuel levels;
 - D. Inspection of any cut-off or control valves and associated equipment;
 - E. Visual inspection of any fuel pumps and/or sumps and testing of such devices for proper operation;
 - F. Inspection of any installed corrosion protection systems;
 - G. Testing for water at the bottom of storage tanks that are not bottom outlet tanks; and
 - H. Inspection of any installed electronic or mechanical leak-detection equipment.
- 6.1.3** A record of the inspections performed in accordance with condition 6.1.1 and a record of any associated repairs, maintenance or upgrades shall be kept on-site and available for review by Ministry staff.
- 6.1.4** Spill or leak detection and spill response procedures shall be incorporated into the Operations and Maintenance Manual required under condition 16 of this licence.
- 6.2** The owner shall undertake alterations and/or develop operating procedures as appropriate to ensure that the storage and handling of fuel is adequately managed to protect the source of drinking water.

11.2 Source Water Protection - Risk Management Plan Requirements

A Risk Management Plan for the Handling and Storage of Dense Non-Aqueous Phase Liquids (DNAPLs) and the Storage of Fuel has been agreed to under the authority of the Risk Management Official appointed for the Township of Huron-Kinloss. This Risk Management Plan was developed in accordance with the *Clean Water Act, 2006*, Section 58, O. Reg. 287/07 and the Saugeen Valley Source Protection Plan.

This document states: *“Note that the generator is considered an “appliance” and, therefore, does not fall under Section 14 of the CAN/CSA-B139-00 Installation Code for Oil Burning Equipment and does not require an annual inspection of the storage tank.”*

The generator is tested regularly for functionality and the spill containment area around the fuel storage tank is checked visually during each test. These tests are documented as required by the Risk Management Plan and the MDWL.

NOTE: The 2020 MECP Drinking Water Inspection Report has issued the following Non-Compliance:

1. Measures were not in place to protect the groundwater and/or GUDI source in accordance with the Municipal Drinking Water Licence and Drinking Water Works Permit issued under Part V of the SDWA.

- Insufficient fuel tank inspection

Action(s) Required:

By March 1, 2021, the owner will provide the author of this report with documentation that the Ripley DWS fuel storage tank has been inspected as per MDWL 087-104, Issue 3, Schedule C Condition 6.

Sommers Generators retained the services of a certified TSSA Inspector for a TSSA fuel tank inspection on February 12, 2021. The TSSA Inspector, Bill Adams, verbally reported the following:

1. The tank is a single-walled tank, not a double-walled tank.
2. It is in a concrete pit, but the pit is required to be epoxy coated for leak protection (it is not).
3. There is no leak detection in the pit.
4. The pit does not have appropriate clearance for the fuel tank.
5. The E-Vent (emergency vent) is not vented to the outside. Currently, the E-Vent hole has a stopper in it.
6. There is no overfill protection outside. There is no spill box outside.

He recommended abandoning the current tank and installing a proper tank outside. He did not provide an official report.

12.0 OBSERVATIONS AND HISTORICAL TRENDS

Raw Water Quality

- Microbiological:
 - Ripley Pumphouse: There was one positive microbiological test result in 2021 - 2 Total Coliforms were reported on September 14, 2021 from Well # 1.

Table 30 - 10-Year Historical results:

Year	Well Source	Positive microbiological Result
2009 - 2020	Ripley Well # 1	None
2009 - 2020	Ripley Well # 2	None

There are no concerns regarding the Ripley Pumphouse wells at this time.

12.0 OBSERVATIONS AND HISTORICAL TRENDS - continued

Raw Water Quality

- Microbiological:
 - Ripley Elevated Tank: There is only 1 year of historical data for Well # 3 or Well # 4. There were several positive results for Total Coliform in 2021, as well as 2 positive results for E. Coli.

Table 31 - 2021 Summary of Positive TC and EC Results

Date	Ripley Elevated Tank Well # 3		Ripley Elevated Tank Well # 4	
	Total Coliform	E. Coli	Total Coliform	E. Coli
Jan 12	0	0	1	0
Mar 9	0	0	1	0
Mar 16	0	0	1	0
May 3	1	0	0	0
Jun 8	0	0	1	0
Jun 29	23	3	22	3
Jul 5	1	0	0	0
Aug 3	0	0	1	0
Aug 24	0	0	1	0
Sep 14	2	0	0	0
Sep 28	45	1	36	0
Oct 5	8	0	3	0
Oct 12	33	0	4	1
Oct 19	10	0	8	0
Oct 25	1	0	3	0
Nov 2	0	0	3	0
Nov 9	0	0	1	0
Nov 16	0	0	1	0
Nov 22	0	0	0	0
Nov 30	0	0	1	0
Dec 14	1	0	0	0
Dec 20	1	0	0	0

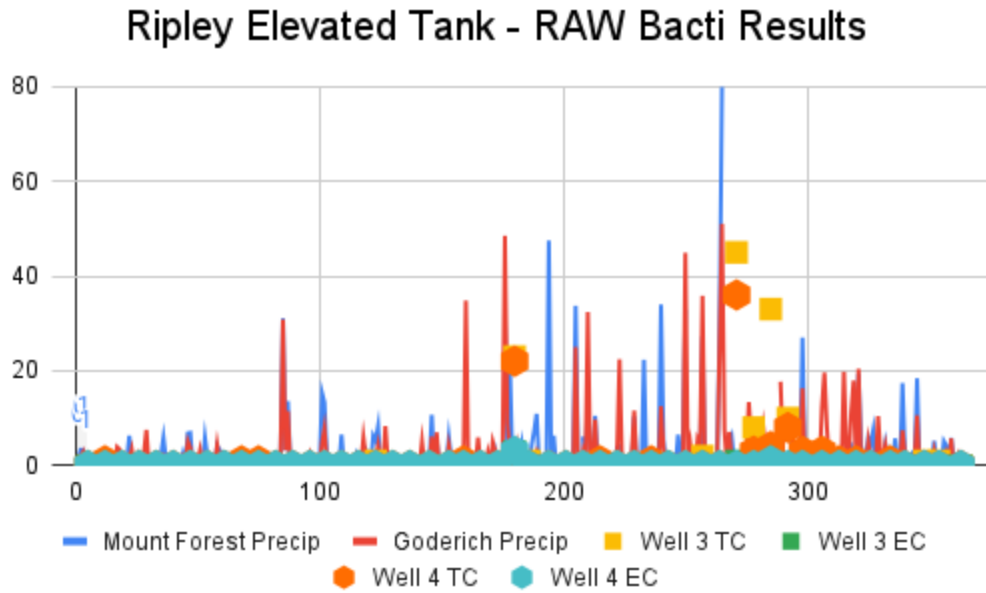


Figure 6

RECOMMENDATIONS:

In 2021, the increased frequency of Total Coliforms in both wells seems to coincide with rain events and the development of storm ponds located north of the site. Additional investigation is being conducted by B.M. Ross and Associates, Wilson Associates and W.D. Hopper to determine the source of the contamination.

- **Chemical Parameters:**
 - Ripley Pumphouse: There were no exceedances for Arsenic in 2021, and historically, Sodium and Fluoride are always in exceedance. Sodium and Fluoride are tested every 60 months and only Sodium was required in 2021. Fluoride will be sampled in 2022, and Sodium will be again in 2026.
 - Ripley Elevated Tank: Fluoride will be sampled in 2022.

12.0 OBSERVATIONS AND HISTORICAL TRENDS - Continued

Table 32 - 10-Year Historical results:

Year	Ripley Pumphouse		
	Sodium	Fluoride	Arsenic
2009	--	1.92	5.7
2010	--	2.13, 2.24	5.0, 4.8, 5.0
2011	23.9	2.07, 2.23	5.0, 4.9
2012	--	2.02, 2.11	4.8, 5.1, 4.6
2013	--	2.14, 2.22	4.9, 4.5
2014	--	2.02, 2.07	4.9, 5.5
2015	--	2.03	4.4
2016	30.8	--	---
2017	--	2.10	---
2018	---	---	6.7, 5.6
2019	---	---	4.9, 7.4, 4.8, 4.7, 3.9
2020	--	--	4.2, 5.2, 16.3 , 4.0, 4.0
2021	32.1, 28.6	--	3.6, 4.4, 2.4, 3.9

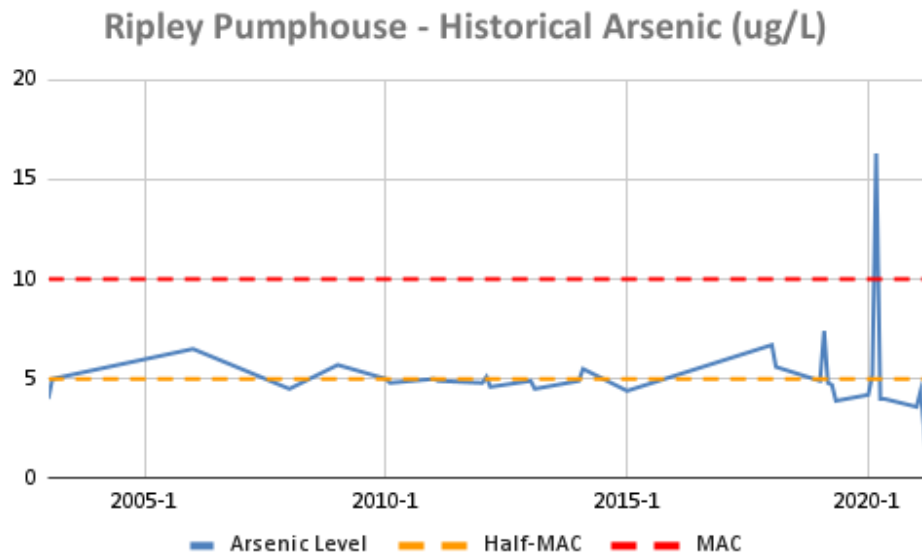


Figure 7

12.0 OBSERVATIONS AND HISTORICAL TRENDS - Continued

- Raw Turbidity:

Table 33 - 10-Year Historical results:

Well Source	10-Year Historical Average (2011 to 2020) (NTU)	2021 Average (NTU)	Comments
Ripley Well # 1	0.20	0.22	The raw turbidity has remained consistent based on the 10-year historical average. There is no concern at this time.
Ripley Well # 2	0.20	0.23	The raw turbidity has remained consistent based on the 10-year historical average. There is no concern at this time.
Ripley Well # 3	0.21	0.20	There is no historical data for Well # 3, just 1 year.
Ripley Well # 4	0.20	0.19	There is no historical data for Well # 4, just 1 year.

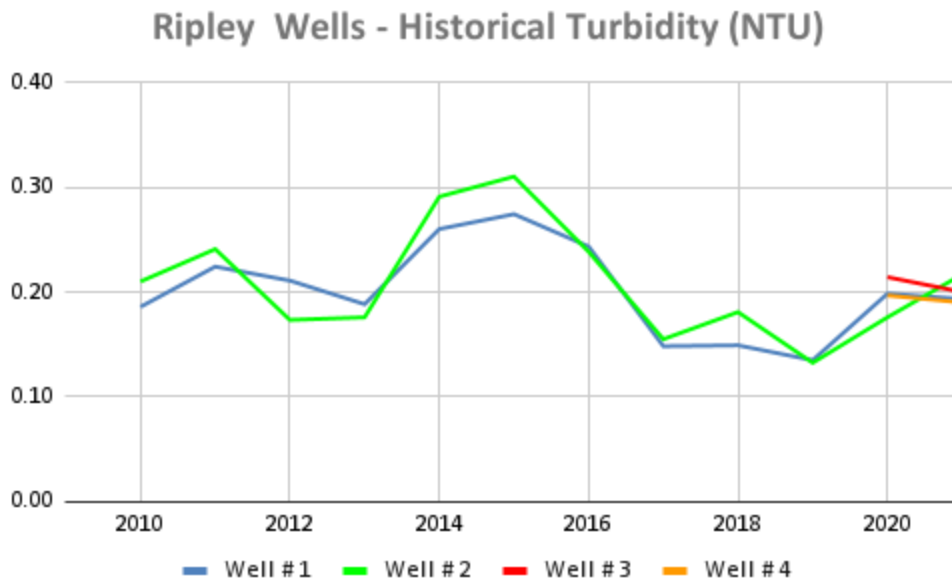


Figure 8

12.0 OBSERVATIONS AND HISTORICAL TRENDS - Continued

- Well Levels:

Table 34 - 10-Year Historical Results:

Well Source	10-Year Historical Average (2011 to 2020) (m)	2021 Average (m)	Comments
Ripley Well # 1	16.93 m below grade	16.40 m below grade	The well level has remained consistent based on the 10-year historical average. There is no concern at this time.
Ripley Well # 2	17.44 m below grade	15.73 m below grade	The well level has remained consistent based on the 10-year historical average. There is no concern at this time.
Ripley Well # 3	12.69 m below grade	10.50 m below grade	There is no historical data for Well # 3, just 1 year.
Ripley Well # 4	13.14 m below grade	11.62 m below grade	There is no historical data for Well # 4, just 1 year.

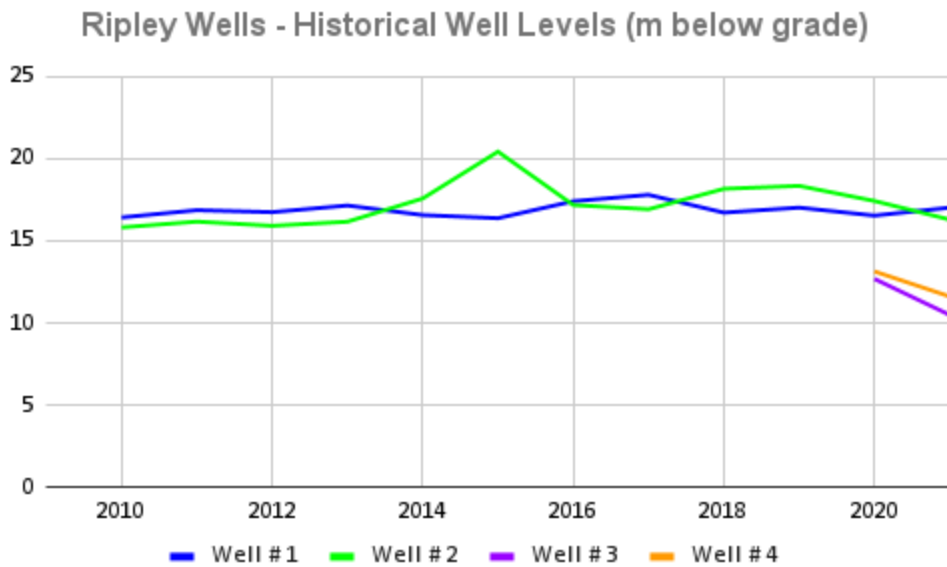


Figure 9

12.0 OBSERVATIONS AND HISTORICAL TRENDS - Continued

- Well Flows and Pump Performance:

Table 35 - 5-Year Historical Results

Well Source	5-Year Historical Average (2016 to 2020)	2021 Average	Comments
Ripley Pumphouse (Well # 1 and # 2 combined)	Avg flow: 8.10 L/s Capacity: 33.28%	Avg flow: 16.41 L/s Capacity: 10.29%	Flows are consistent based on the 5-year historical average. The operation of the well cycling has been changed with the addition of the Elevated Tank and the average flows are reflective of this change. There are no concerns at this time.
Ripley Well # 3	Avg flow: 20.40 L/s Capacity: 1.69%	Avg flow: 20.25 L/s Capacity: 5.82%	There is no historical data for Well # 3, just 1 year.
Ripley Well # 4	Avg flow: 21.25 L/s Capacity: 4.22%	Avg flow: 20.30 L/s Capacity: 10.83%	There is no historical data for Well # 4, just 1 year.

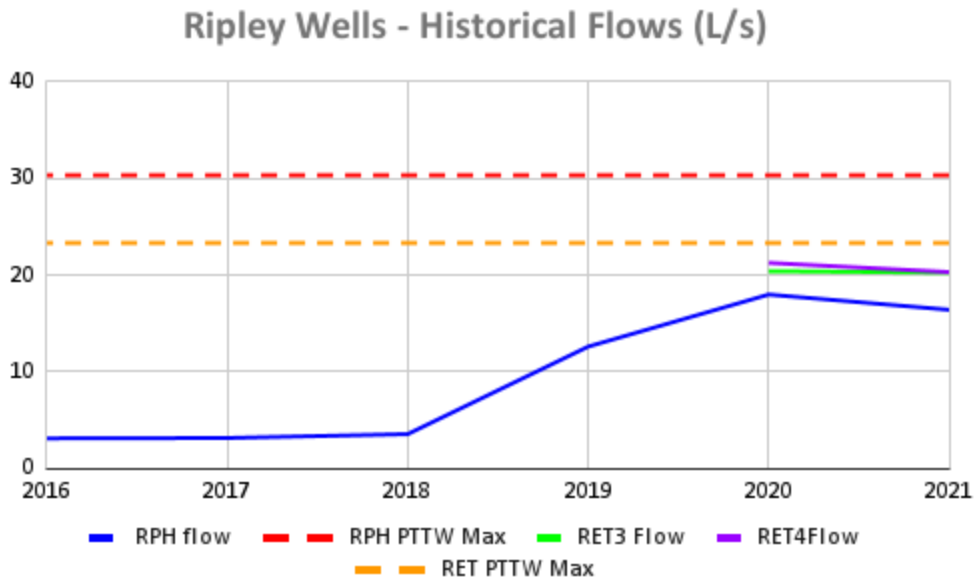


Figure 10