Goderich Annual Report 2021

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1.0 Executive Summary

The purpose of the 2021 Annual Report is to document the operation and maintenance data for the Goderich Drinking Water System for review by the Ministry of the Environment,Conservation and Parks (MECP) in accordance with O. Reg. 170/03. This report covers January 1, 2021 to December 31, 2021. A copy of this report will be submitted to the owner to be uploaded to the Town's website and can be provided to interested parties upon request.

This report is a collection of information that demonstrates the production of safe and high-quality drinking water for the residents of the Town of Goderich. . The Goderich Drinking Water System met all regulatory compliance requirements of the Safe Drinking Water Act.

In order to prevent equipment failures from occurring, Veolia implements a preventative maintenance program that is managed using a CMMS (Computerized Maintenance Management System). These records can be requested for viewing at any time. As part of the DWQMS (Drinking Water Quality Management System), Veolia has developed a contingency plan that includes procedures that can be followed for a number of emergency situations. These procedures are reviewed by staff annually as a part of our Emergency Exercise in order to continually improve our emergency responses. In addition to the above, the Goderich Drinking Water System has a number of redundancies in the event of equipment failure, i.e. multiple stand-by pumps, backup generators, multiple chlorine injection points, equipment lockouts, etc. As well, a large storage reservoir and elevated tank ensure that Town residents are always supplied with safe drinking water.

The Town's Council Members have responsibilities to ensure safe drinking water is supplied to the community. Under Section 19 of the Safe Drinking Water Act, "the owners of a drinking water system shall 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 act honestly, competently and with integrity, with a view to ensuring the protection and safety of the users of the municipal drinking water system." Council Members can learn more about their role and responsibilities in ensuring safe drinking water by reading "Taking Care of Your Drinking Water: a guide for municipal Councilors", a publication written by the MECP. A copy of the document can be provided upon request. Additionally, the Walkerton Clean Water Centre offers a course called "Standard of Care: Safe Drinking Water Act" where council members and officials can learn more about their oversight responsibilities under Section 19 of the Safe Drinking Water Act.

2.0 DESCRIPTION OF WATER SYSTEM

The Goderich Drinking Water System (DWS # 210000238), located at 100 Cove Road, Goderich, Ontario is classified as a large municipal residential system. The system is operated by Veolia Water Canada, the Operating Authority, and provides a potable water supply to the residents and businesses of the Corporation of the Town of Goderich. The system also provides water to a commercial development and a distribution sub-system serving an institutional complex (Property Management Group) in the Municipality of Central Huron, at the eastern edge of the Town.

The facilities, consisting of a Class III conventional design Water Treatment Plant having an approved rate capacity of 12,000 m^3/d,(cubic meters per day) and a Class III water distribution system consisting of a Booster station with a capacity of 5000 $m3$, the Water Tower with a capacity of 941 $m3$, which are owned by the Town of Goderich and operated by Veolia Water Canada, the Operating Authority.

The raw water for the treatment process is drawn from a surface water source (Lake Huron) located directly west of the town. The raw water is treated by the following processes:

- Pre-chlorination
- Flash Mixing, Flocculation, Coagulation, and Sedimentation
- Filtration and Backwash
- Post-chlorination
- Fluoridation
- Distribution system chlorination

Water is drawn from Lake Huron, from a depth of approximately 5.5 m, approximately 518 m west of the Water Treatment Plant, and is fed by gravity through a 750 mm pipeline to a high traveling raw water screen in the Water Treatment Plant. The water then flows into a two celled concrete low lift pump well.

The major influences on raw water quality are rough lake conditions which can increase turbidity levels rapidly, and weather conditions which can cause a plume of turbid discharge from the Maitland River, which empties into the lake north of the Water Treatment Plant intake, to be directed over the intake.

Additional potential impacts on raw water could come from operations at the Goderich Harbour located north of the intake, and the outfall from the Goderich Sewage Treatment Plant located south of the intake.

The intake of the Plant is situated upstream (north) from the outfall of the Goderich sewage treatment plant and is not influenced by it. The characterization of the raw water from the lake is very good and chemical contamination is not a factor. A complete list of the contents of the source water is available in the First Engineer's Report which was completed by BM Ross and Associates.

Chlorine gas is used from two on-line gas cylinders, with auto switch-over, to treat the water intake (for zebra mussel control if needed) and to provide primary and secondary disinfection. The addition of chlorine gas to the raw water supply is referred to as pre-chlorination, and serves primarily as a measure to prevent microbiological growth within the raw water pipeline and the two celled low lift pump well. Pre-chlorine residual is measured continuously in the water leaving the filters.

A coagulant is added to the incoming raw water in the flash mixing tank which is mixed and then flows to two flocculation tanks equipped with walking beam flocculation mechanisms. Detention time allows the formation of floc masses which attract and gather debris present in the influent raw water.

The suspension then flows to two settling tanks equipped with chain and flight sludge collectors. The detention time here allows large particles to settle by gravity in the settling tanks. Supernatant (the clear liquid above the settled floc) overflows from the settling tanks to the top of the dual media filters.

Most of the particulate matter that was present in the raw water is captured by the floc particles and is removed by gravity in the settling tanks, however, during normal operations, some floc passes from the settling tanks to the top of the filters.

The water treatment plant has two parallel dual media filters. The top layer of the filter is granular anthracite, while the filter media below the anthracite layer is sand. As debris accumulates in the filters and limits flow, the filters must be cleaned by reversing the flow (referred to as backwashing) and directing the backwash to a waste holding tank (settling tank and two sludge lagoons).

Turbidity, a measure of the cloudiness of water, is measured continuously in the effluent from each filter to monitor the effectiveness of the filtration process. If the turbidity rises above a set point value, an alarm warns staff that corrective actions are needed.

Filtered water passes through the filter under-drain into the treated water clearwells. The clearwells are tanks located beneath the filters and are used to store filtered water prior to entering the chlorine contact reservoir.

Primary disinfection (pre-chlorination) occurs before filtration, immediately upstream from the filtered water. Primary chlorination disinfects the water, ensuring that no potentially pathogenic organisms remain after sedimentation and filtration and are rendered harmless prior to distribution to consumers. Consistent disinfection is ensured by continuous monitoring of the chlorine residual at three points in the process of the treated water leaving the facility. If the residual drops below a safe level, pumping to the distribution system is automatically interrupted and an operator is notified to correct the problem.

Secondary disinfection is accomplished during post-chlorination by adding sufficient chlorine at the water treatment plant to maintain a residual throughout the entire distribution system. Secondary disinfection prevents regrowth of microorganisms within the distribution system. Chlorine residual analyzers allow continuous monitoring of chlorine residual in the treatment plant effluent, and in the water upstream of the flash mixer (seasonally, in conjunction with zebra mussel control operation). A provision is available to top up residual chlorine levels using sodium hypochlorite injection at the booster station when required.

A two celled in-ground reservoir containing inlet and outlet diffusers and a baffle wall in each cell is also designed into the system to provide adequate CT (Concentration, mg/L x Time, min) to ensure pathogen removal and disinfection requirements have been met. When calculating CT, the baffle factor is 0.6.

The raw water source is low in naturally occurring fluoride, and hydrofluosilicic acid is able to be added at the post-chlorination point. Equipment is also available to provide continuous monitoring of fluoride concentrations in the treatment plant effluent, and includes a high level alarm.

Taste and odour control facilities are installed consisting of a powdered activated carbon feed system at the flash mixing tank.

Standby power is provided by a 425 kW diesel generator and automatic transfer switch.

Filter backwash water and accumulated floc from the sedimentation tanks is directed to a waste settling tank from where they are pumped to the settling beds (lagoons).

Treated water is pumped from the high lift pump wells into the distribution sub-system. Distribution piping typically ranges in size from 100 mm to 400 mm in diameter, and may consist of cast iron, ductile iron, concrete, or PVC, depending on the location and date of installation.

One ground level, two cell storage reservoir provides reserve storage. The booster station is used to ensure adequate system pressure to zones 1 and 2.

The booster station is used to provide water to zone 2 and in addition supplies water to zone 1 when the Water Treatment Plant is not in operation. An elevated storage tank is also an integral part of the distribution system and used to provide constant pressure for zone 1.

Typical system pressure ranges from 40 P.S.I. to 80 P.S.I., depending on zone and elevation.

3.0 SUMMARY OF WATER QUALITY MONITORING

3.1 Water Treatment Equipment Operation and Monitoring as per Schedule 7, O. Reg. 170/03

3.1.1 Point of Entry Chlorine Residual

Chlorine residuals are continuously measured using a HACH CL17 online chlorine analyzer and verified for accuracy using a DR900 Spectrophotometer. There are **5** online analyzers monitored by SCADA (Supervisory Control and Data Acquisition).
Table 1 shows the monthly average of free chlorine residual values on the treated water at the point of entry.

3.1.2 Distribution Chlorine Residual

Chlorine residuals in the distribution system are checked daily using a HACH pocket colorimeter. Chlorine residuals are also continuously monitored in the distribution system using a HACH CL17 online chlorine analyzer at the Booster Station and the Water Tower.

Table 1. – Treated and Distribution Free Chlorine Residuals for Goderich Drinking Water System

Date	Average Treated Chlorine Residual (mg/L)	Average Distribution Chlorine Residual (mg/L) (Booster Station)
Jan	1.56	1.20
Feb	1.36	1.22
Mar	1.28	1.12
Apr	1.36	1.09
May	1.49	1.17
Jun	1.47	1.13
Jul	1.47	1.19
Aug	1.50	1.15
Sep	1.48	1.15
Oct	1.45	1.07
Nov	1.64	1.15
Dec	1.61	1.15
Average	**1.47**	**1.15**
Min	**1.04**	**0.78**
Max	**1.83**	**1.80**
# Samples	**363**	**361**

3.1.3 Turbidity

Turbidity is measured continuously using online turbidity analyzers and daily comparisons to a TU5200 Turbidimeter. The MECP *Procedure for Disinfection of Drinking Water in Ontario* requires that the turbidity on each filter effluent line is less than or equal to 0.3 NTU at least 95% of the time each month. The Goderich WTP consistently performed at 100% in 2021. The maximum turbidity measured in the treated water was 0.16 NTU.
Table 2. provides a summary of filter and treated turbidity results.

Table 2. – Raw, Filtered and Treated Water Turbidites for Goderich Drinking Water System

Date	Average Filter #1 Turbidity (NTU)	Average Filter #2 Turbidity (NTU)	Average Treated Turbidity (NTU)	Average Raw Turbidity (NTU)
Jan	0.11	0.08	0.07	41.50
Feb	0.07	0.06	0.03	13.97
Mar	0.12	0.08	0.06	22.38
Apr	0.09	0.08	0.05	24.51
May	0.05	0.04	0.03	12.00
Jun	0.04	0.04	0.03	12.78
Jul	0.04	0.05	0.03	11.78
Aug	0.09	0.06	0.03	7.39
Sep	0.05	0.06	0.04	17.54
Oct	0.06	0.06	0.05	9.18
Nov	0.05	0.06	0.05	18.10
Dec	0.05	0.06	0.04	29.30
Average	**0.07**	**0.06**	**0.04**	**18.37**
Min	**0.03**	**0.03**	**0.02**	**2.08**
Max	**0.72**	**0.18**	**0.16**	**100**
# Samples	**365**	**365**	**365**	**365**

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

3.2.1 Raw Water Samples

Raw water samples are taken every week. A total of 52 samples were collected and analyzed for E. Coli and Total Coliforms. The range of E. Coli results obtained were 0 - 400 cfu/100 ml. The range of Total Coliform results were 0 – 9,000 cfu/100 ml.
Table 3. provides a summary of bacteriological results performed on the raw water.

Table 3. – Microbiological Results for Raw Water at Goderich Drinking Water System

	E. Coli			Total Coliform			
Date	# Samples	# Samples 0-10	# Samples <10	# Samples	# Samples 0-100	# Samples 101-9000	# Samples >9000
Jan	4	3	1	4	3	1	0
Feb	4	4	0	4	4	0	0
Mar	5	2	3	5	2	3	0
Apr	4	3	1	4	3	1	0
May	4	4	NDOG	4	3	0	NDOG
Jun	5	2	2+NDOG	5	4	0	NDOG
Jul	4	2	2	4	4	0	0
Aug	5	5	0	5	5	0	0
Sep	4	3	1	4	2	2	0
Oct	4	2	2	4	0	4	0
Nov	5	1	4	5	1	4	0
Dec	4	1	3	4	0	4	0
Total	**52**	**32**	**20**	**52**	**31**	**19**	**2**

NDOG - Non Determined Overgrowth

3.2.2 Treated Water (Point of Entry) Samples

One treated water sample from the point of entry is taken every week and analyzed for E.Coli, Total Coliforms and for Heterotrophic Plate Count (HPC). A total of 52 treated water samples were collected and analyzed for the above parameters. All E. Coli and Total Coliform results from the treated water were 0 cfu/100 ml. The range of HPC results were 0 - <10 cfu/100 ml.

Table 4 provides a summary of all bacteriological results performed on treated water.

Table 4. – Microbiological Results for Point of Entry at Goderich Drinking Water System

Date	E. Coli			Total Coliform			HPC		
	# Samples	# Samples 0	# Samples ≥1	# Samples	# Samples 0	# Samples ≥1	# Samples	Safe	Deteriorating
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**

3.2.3 Distribution Samples

Distribution samples are collected every week and tested for E.Coli, Total Coliform and for Heterotrophic Plate Count (HPC). A total of 297 distribution samples were collected and analyzed for the above parameters and all samples were found to be safe. E. Coli and Total Coliform results from the treated water were 0 cfu/100 ml.The range of HPC results were 0 - 40 cfu/100 ml.
Table 5. provides a summary of all bacteriological samples taken in the distribution system.

Table 5. – Microbiological Results for Goderich Distribution System

Date	E. Coli			Total Coliform			HPC		
	# Samples	# Samples 0	# Samples ≥1	# Samples	# Samples 0	# Samples ≥1	# Samples	Safe	Deteriorating
Jan	23	23	0	23	23	0	8	8	0
Feb	23	23	0	23	23	0	9	9	0
Mar	19	19	0	19	19	0	8	8	0
Apr	24	24	0	24	24	0	8	8	0
May	18	18	0	18	18	0	8	8	0
Jun	28	28	0	28	28	0	10	10	0
Jul	24	24	0	24	24	0	8	8	0
Aug	31	31	0	31	31	0	12	12	0
Sep	26	26	0	26	26	0	8	8	0
Oct	23	23	0	23	23	0	8	8	0
Nov	29	29	0	29	29	0	10	10	0
Dec	23	23	0	23	23	0	8	8	0
Total	**291**	**291**	**0**	**291**	**291**	**0**	105	**105**	**0**

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

3.3.1 Inorganics

One treated water sample is taken every 12 months and tested for inorganics. The most recent samples for the Goderich Drinking Water System were collected on February 11, 2021 and submitted to the laboratory for analysis of inorganics as listed in Schedule 23. All parameters were found to be within compliance. Inorganics will be sampled and analyzed again on or before *February 11, 2022*.
Results from 2021 can be found in **Table 6.**

Table 6. – Schedule 23 Results for Goderich Drinking Water System

Parameter	Result (µg/L)	Maximum Allowable Concentration (µg/L)
Antimony	<0.90	6
Arsenic	0.20	10
Barium	15.50	1000
Boron	16.00	5000
Cadmium	<0.003	5
Chromium	0.32	50
Mercury	<0.01	1
Selenium	0.18	50
Uranium	0.062	20

3.3.2 Lead

Schedule 15.1 of Ontario Regulation 170/03 requires that Distribution samples be taken during two seasons: once between December 15 and April 15 and once between June 15 and October 15. The Maximum Allowable Concentration for Lead is 10 µg/L. In the two previous lead sampling seasons, pH and alkalinity samples were taken on January 11, 2021 and again on July 9, 2021. Lead samples were taken January 13, 2021 the next sample is Scheduled for January 2022.
2021 results can be found in **Table 7a.**

Table 7a. – Lead Sampling Program Results for Goderich Drinking Water Distribution System

	pH	Alkalinity (mg/L)	Lead µg/L)
Dec-Apr	7.86	113	--
	7.85	105	--
	7.77	113	--
			0.04
			0.17
Jun-Oct	7.91	76	–
	7.94	74	--
	7.89	73	--
	8.08	75	1.38
	8.03	75	

Table 7b. – Lead Sampling Program Results for Goderich Child Care Centre

	pH	Lead (µg/L)
Child Care Centre	7.52	0.07
	7.65	0.04
	7.41	0.13
	7.47	0.06
	7.61	0.18
	7.59	0.09
	7.54	1.11
	7.49	0.18
	7.50	0.03
	7.46	0.02
	7.54	0.03
	7.56	<0.01
	7.61	0.05
	7.58	0.03

Lead sampling for Daycare Facilities

Section 5 of Reg 243/07 requires that every drinking water fountain and any tap that provides drinking water or is used to prepare food or drink for children under 18 are scheduled to be sampled by January 2022. Due to the Pandemic (COVID19) the Childcare Center was closed. All required samples were completed in August.

3.3.3 Organics

One treated water sample is taken every 12 months and tested for schedule 24 organic parameters. The most recent samples were collected on February 11, 2021. All parameters were found to be within compliance. Organics will be sampled and analyzed again on or before February 11, 2022.
2021 sample results can be found in **Table 8.**

Table 8. – Schedule 24 Results for Goderich Drinking Water System

Parameter	Result (µg/L)	Maximum Allowable Concentration (µg/L)
Benzene	<0.32	1
Carbon Tetrachloride	<0.17	2
1,2-Dichlorobenzene	<0.41	200
1,4-Dichlorobenzene	<0.36	5
1,1-Dichloroethylene	<0.33	14
1,2-Dichloroethane	<0.35	5
Dichloromethane	<0.35	50
Monochlorobenzene	<0.3	80
Tetrachloroethylene	<0.35	30
Trichloroethylene	<0.44	50
Vinyl Chloride	<0.17	1
Diquat	<1	70
Paraquat	<1	10
Glyphosate	<1	280
Polychlorinated Biphenyls	<0.04	3
Benzo(a)pyrene	<0.004	0.01
2,4-dichlorophenol	<0.15	900
2,4,6-trichlorophenol	<0.25	5
2,3,4,6-tetrachlorophenol	<0.20	100
Pentachlorophenol	<0.15	60
Alachlor	<0.02	5
Atrazine+N-dealkylated metabolites	0.03	5
Atrazine	0.01	0.01
Desethyl atrazine	0.01	0.01
Azinphos-methyl	<0.05	20
Carbaryl	<0.05	90
Carbofuran	<0.01	90
Chlorpyrifos	<0.02	90
Diazinon	<0.02	20
Dimethoate	<0.06	20
Diuron	<0.03	150

Con't

Parameter	Result (µg/L)	Maximum Allowable Concentration (µg/L)
Malathion	<0.02	190
Metolachlor	<0.01	50
Metribuzin	<0.02	80
Phorate	<0.01	2
Prometryne	<0.03	1
Simazine	<0.01	10
Terbufos	<0.01	1
Triallate	<0.01	230
Trifluralin	<0.02	45
2,4-dichlorophenoxyacetic acid	<0.19	100
Bromoxynil	<0.33	5
Dicamba	<0.20	120
Diclofop-methyl	<0.40	9
MCPA	<0.00012	0.00012
Picloram	<1	190

Microcystin Testing

Harmful Algal Blooms (HABs) may contain Cyanobacteria, commonly known as Blue-Green Algae. Cyanobacteria are a group of microorganisms that are known to produce a variety of toxins that can cause a range of effects from simple skin rashes to liver and nerve damage and even mortality of fish, wildlife, pets, and rarely, humans. The onset of a bloom may be rapid and unexpected, therefore, it is important to monitor for the HABs and treat all algae blooms as potentially toxic.

As directed by the Ministry of the Environment, Conservation and Parks (MECP), monthly RAW and TREATED samples shall be collected beginning in June until October each year.

If, at ANY time, HABs are suspected, the monitoring will increase to include:

- Microscopic examination of a RAW grab sample
- Sample collection and testing of the Raw and Treated water for Microcystin

Table 9. Microcystin Results

2021	MAC	Raw Water (1.5)	Treated Water (1.5)
May - 25		<0.1	<0.1
June -22		<0.1	<0.1
July - 20		<0.1	<0.1
Aug - 17		<0.1	<0.1
Sept - 14		<0.1	<0.1

3.3.4 Trihalomethanes and Haloacetic Acids

One distribution sample is taken every three months from a point in the distribution system and tested for Trihalomethanes (THMs) and Haloacetic Acids (HAAs). In 2021, samples were collected during the months of February, May, August and November. The Ontario Drinking Water Quality Standard (ODWQS) has set a Maximum Allowable Concentration (MAC) of 100 µg/L for THMs and it is expressed as a running annual average. The MAC for HAAs is 80 µg/L. In 2021, the average THM was found to be 26.25 µg/L, which is within compliance.
Refer to **Table 10** for the summary of trihalomethane and haloacetic acid results.

3.3.5 Nitrate & Nitrite

One treated water sample is taken 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 Standard (ODWQS) has set a Maximum Allowable Concentration (MAC) of 1 mg/L for nitrites and 10 mg/L for nitrates. The results were found to be within compliance.
Refer to **Table 10.**

Table 10. – Nitrate, Nitrite, THM and HAA Results at Goderich Drinking Water System

Date	Nitrate		Nitrite		THMs		HAAs	
	# Samples	Result (mg/L)	# Samples	Result (mg/L)	# Samples	Result (µg/L)	# Samples	Result (µg/L)
Feb	1	1.04	1	<0.003	1	16	1	<5.3
May	1	0.722	1	<0.003	1	18	1	28.5
Aug	1	0.297	1	<0.003	1	46	1	13.6
Nov	1	0.852	1	<0.003	1	25	1	<5.3
Total	4		4		4		4	
Average		0.728		<0.003		26.25		13.17
Maximum		1.04		<0.003		46		28.5

3.3.6 Sodium

One water sample is collected every 60 months and tested for Sodium. The Ontario Drinking Water Standards (ODWQS) has an aesthetic objective concentration of 200 mg/L for Sodium and requires the Medical Office of Health be notified if the concentration exceeds 20 mg/L. These samples were last collected on November 14, 2017 and were found to be 5.43 mg/L, which is in compliance. The next water sample for Sodium will be collected and analyzed on or before November 14, 2022.

3.3.7 Fluoride

One water sample is collected at least once every 60 months and tested for Fluoride. The Ontario Drinking Water Quality Standards (ODWQS) have set a MAC of 1.5 mg/L. In August, 2017, a sample was collected for this analysis. The sample was found to have a concentration of 0.55 mg/L, which is within compliance. The next water sample for Fluoride will be collected and analyzed on or before *August, 2022.*

Hydrofluosilicic acid is added to the finished water. Fluoride dosages are continually monitored with online equipment. See **Table 12**. for fluoride usage and dosages. Below, **Table 11.** summarizes the fluoride residuals measured in-house with a table-top spectrophotometer.

Table 11. – Treated Water Fluoride Concentration for Goderich Drinking Water System

Date	Average Treated Water Fluoride Concentration (mg/L)
Jan	0.62
Feb	0.62
Mar	0.68
Apr	0.65
May	0.65
Jun	0.64
Jul	0.62
Aug	0.64
Sep	0.62
Oct	0.64
Nov	0.64
Dec	0.65
Average	**0.64**
Min	**0.45**
Max	**0.89**
# samples	**365**

4.0 WATER AND CHEMICAL USAGE

4.1 Chemical Usage

Refer to **Table 12.**
3046.89 kg of chlorine gas was used to ensure proper disinfection in the distribution system with an average dosage of 2.31mg/L.

Table 12. – Chemical Usage at Goderich Drinking Water System

	SternPac		Chlorine Gas		Fluoride		Sodium Hypochlorite
Date	Usage (kg)	Average Dosage (mg/L)	Usage (kg)	Average Dosage (mg/L)	Usage (kg)	Dosage (mg/L)	Usage (kg)
Jan	2457.20	19.24	210.47	2.06	67.77	0.53	9.32
Feb	1205.70	9.91	250.79	2.06	67.59	0.55	7.59
Mar	1882.30	13.05	316.12	2.24	80.13	0.67	6.62
Apr	2095.30	15.63	313.35	2.34	68.67	0.52	15.46
May	1423.00	10.51	288.93	2.10	75.25	0.65	10.35
Jun	1145.50	8.13	232.95	2.11	71.05	0.64	20.98
Jul	982.10	7.55	225.09	2.28	68.84	0.53	23.60
Aug	793.30	5.99	216.10	2.39	72.76	0.55	34.16
Sep	768.20	7.87	246.48	2.52	59.46	0.60	34.85
Oct	768.60	7.75	266.86	2.69	60.03	0.60	20.08
Nov	642.40	8.58	225.00	2.52	53.36	0.60	12.59
Dec	1064.00	11.63	209.75	2.29	55.43	0.61	9.80
Total	**15227.60**		**3046.89**		**800.31**		**205.4**
Average		**10.49**		**2.31**		**0.56**	

4.2 Annual Flows

A summary of the water supplied to the distribution system in 2021 is provided in **Table 13.** This Table provides a breakdown of the monthly flow provided to the distribution system.
Flow meters were calibrated on June 18, 2021 by Indus Control and were found to be acceptable.

Table 13. – Treated Water Flows for Goderich Drinking Water System

Date	Average Daily Flow (m^3)	Maximum Daily Flow (m^3)	Total Monthly Flow (m^3)
Jan	4284	7141	132790
Feb	4330	6285	112576
Mar	4367	5128	135365
Apr	4350	6208	130492
May	4385	6072	135929
Jun	4720	6647	141614
Jul	4260	5937	132050
Aug	4378	5174	135716
Sep	3539	4930	106180
Oct	3207	4515	99410
Nov	2926	3967	87776
Dec	2849	4104	88314
Average	**3966**		
Max		**7141**	
Total			**1,438,212**

5.0 IMPROVEMENTS TO SYSTEM AND ROUTINE AND PREVENTATIVE MAINTENANCE

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

January

- WTP and Booster Station generators were inspected by Sommers:
  - Booster station (generator?) is in need of repair
  - WTP generator is in need of service

February

- DATA Soft and Electrician in to transfer signal cables for the SCADA
- Samples for petroleum hydrocarbons in the Treated and Raw water after the train derailment
- Schedule 23 and 24 samples were taken

March

- Ferguson's repaired leaking line to the Chlorine room
- Hays Electric did electrical work on flow meter #1 and the roto valve and to hook up SCADA
- Yearly checks on:
  - Stern pac pumps #1 and #2
  - Gate valve (high and low pumps)

April

- Raw water wet well inspected - East and West gate valves in need of repair

May

- Flocculator chains were greased
- West settling tank was cleaned
- Semi annual flushing completed
- Microcystin sampling resumed for the summer

June

- ClearTech completed calibrations for analyzers and hand held meter calibrations.
- Hetek completed chlorine room sensor Calibrations
- Storm drain to the Lagoons was cleaned out
- Discussions with MECP included:
  - clay from erosion caused from the new subdivision construction,(which resulted in abnormally high SternPac use)
  - Lead removal program plan.

- New waterline installed for Pickleball court

July

- East side surface wash valve replaced
- Valve turning started
- Broken curb stops replaced throughout town
- Water Main shut off to the OPP building
- Roof over the generator room was repaired
- Bruinsma Contracting cleaned out West Lagoon
- Hydrants and blow-offs were flushed

August

- Hydrants and deadends were flushed

September

- Settling tanks were desludged
- Generator issues at the Booster Station and Water Treatment Plant

October

- Low Lift pump #2 and High lift pump #1 motor from the Water plant were sent out to be rebuilt
- East Lagoons were cleaned out
- The plant outfall was cleaned out and a new cover put on
- Management Review conducted
- Break in at the Booster Station

November

- Microcystin sampling finished for the season
- Great Lakes Intake Program started (monthly samples)
- SCADA computer change over
- Heat element installed for the generator block heater at the Water Plant

December

- Low Lift pump #2 back online

There were 7 water main breaks and 5 water service repairs in 2021.

6.0 MINISTRY OF THE ENVIRONMENT INSPECTIONS AND REGULATORY ISSUES

The most recent Ministry of Environment, Conservation and Parks (MECP) Inspection was completed by Matthew Shannon on December 7, 2020.
There were no non-compliances noted. The rating was 100%.

There were no Instances of adverse water quality:

There were 9 Precautionary Boil Water Notices issued for 2021 due to repairs/valve replacements.

7.0 MECP 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 ever 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.