Collingwood Drinking Water System

2021 Annual Compliance Report

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Town of Collingwood

Environmental Services

Quality Management Policy

The Corporation of the Town of Collingwood owns and operates the Collingwood Drinking Water System and is committed to:

- Maintaining and continually improving our Quality Management System;
- Providing our consumers with a safe, reliable supply of potable drinking water;
- Meeting or exceeding all applicable legislation, regulations and other requirements;
- Communicating openly and effectively with employees, Council and the public; and
- Providing services in an environmentally responsible manner.

Issue Date: February 10, 2021

Revision: 4

MSF-P-01

1. Notification and Availability of Reports

This report has been prepared in accordance with the reporting requirements of the Safe Drinking Water Act 2002 O. Reg. 170/03, s 11 (1), (3), (6 – 10) and Schedule 22

This report is presented to Council on or before February 28th 2022.

A notice is placed in local newspapers notifying the public and any interested authority that the Collingwood Drinking Water System's 2021 Water Compliance Report (the Report) is complete and lists the locations where the report is available.

A printed copy will be provided free of charge when requested.

The Town of Collingwood website has a copy of the Report that can be viewed or downloaded in PDF format at: http://www.collingwood.ca/water/docs

2. Executive Summary

2021 was our second year of the pandemic experience. The Water Department continued to monitor local conditions, provincial legislation, health unit directives and corporate procedures to provide a safe environment for operations staff and the public. Interruptions in the global supply chain caused by the pandemic had some impacts on procurement in terms of cost and timing, and this is expected to continue into 2022.

Water usage this year showed the effects of the pandemic and also a cooler, wetter summer than normal. June was the hottest, driest month and consequently the maximum demand day occurred then. The overall annual consumption was up slightly from last year but not yet back to pre-Covid levels of 2019.

The annual Ministry Inspection was completed in July of 2021. The two adverse events that were reported in the 2020 Compliance Report were included in the 2021 Ministry Inspection and as a result the Town of Collingwood was given a 95.91% rating. There were no adverse events in 2021.

Our internal QMS audit was completed in May and found no minor non-conformances and four opportunities for improvement. The external QMS audit company, NSF, completed the external audit in August. No non-conformance items were identified in the audit and

three opportunities for improvement were provided.

In conclusion, the Town of Collingwood continues to provide a safe, reliable supply of potable drinking water to our customers, while meeting or exceeding all legislative requirements, even in these challenging times.

3. Drinking Water System Description

Drinking Water System Number	220001165
Drinking Water System Permit Number	100-201 Issue 4 April 28th 2021
Drinking Water System License Number	100-101 Issue 4 April 28th 2021
Permit to Take Water Number	5425-BVBS2K issued Nov 13th 2020 0385-C8CNW8 issued Nov 4th 2021
Drinking Water System Name	Collingwood Drinking Water System
Drinking Water System Owner	Town of Collingwood
Drinking Water System Category	Large Municipal Residential
Water Treatment Subsystem Class	Class 2 Certificate No. 3009 issued November 15, 2005
Water Distribution Subsystem Class	Class 3 Certificate No. 277 issued May 22, 2019
Rated Capacity	31,140 m^3/d
Period being Reported	January 1, 2021 to December 31, 2021

Other Drinking Water Systems that receive drinking water from Raymond A. Barker Ultrafiltration Plant:

Drinking Water System Owner	Drinking Water System Number
Town of New Tecumseth	220001174
Town of The Blue Mountains	220001762
Township of Essa (Baxter)	260086866
Township of Essa (Angus)	260001026
Clearview Township (New Lowell)	220003706

The Collingwood Drinking Water System (CDWS) consists of the Raymond A Barker Ultrafiltration Plant (RAB) and the Collingwood Distribution System. The raw water source is surface water from Georgian Bay, Lake Huron.

The Raymond A Barker Ultrafiltration Plant (RAB) is a direct filtration membrane surface water treatment plant.

Surface water is taken from Nottawasaga Bay through a submerged inlet structure, approximately 765m off shore. Chlorine can be applied at the intake for zebra mussel control although this system is currently not in use to prevent chlorinated water being released back into the bay. Raw water flows by gravity through a 1067 mm diameter intake pipe and surge chamber into the raw water well. The raw water then flows to the membrane distribution channel in the main building.

The raw water is then distributed to six (6) filter basins or treatment trains. Five (5) trains are fed by gravity. These house the 500 series ZeeWeed ultra-filtration membrane modules. One (1) train is fed with a low lift vertical turbine pump and a 5 micron strainer with automatic cleaner. This train houses the 1000 series ZeeWeed ultra-filtration membrane (Mobile Package Plant).

Each treatment train of the membrane filtration system has membrane modules and a permeate/backpulse pump. The permeate pump creates a slight vacuum which sucks clean (permeate) water through the membrane leaving any particulate matter greater than 0.035 microns in the process tank.

The permeate water is then disinfected with the addition of chlorine. The chlorinated water then flows into the two (2) 413 m^3 chlorine contact chambers (total volume 826 m^3) prior to flowing by gravity into the clearwell. The finished water is then pumped into two (2) separate systems, the Collingwood Distribution System and the Regional Pipeline, each with its own dedicated set of high lift pumps.

The membranes undergo a regular cleaning cycle that consists of reversing the flow of clean water stored in the backpulse tank back through the membranes under positive pressure. This process cleans the particles from the outer surface of the membranes and removes them to waste. This waste water can be discharged to the sewer or returned to the lake. Air is also used to keep the membranes clear. Air is injected at the bottom of the tank and scours the membranes with air bubbles as they rise to the surface. This air

scouring process also assists in keeping the concentrated solids in suspension, prior to reject.

The R. A. Barker Water Treatment Plant is continually monitored 24 hours a day 365 days a year through the SCADA (Supervisory Control And Data Acquisition) system. The SCADA will send an alarm to an on-call operator if any part of the process requires attention.

The Collingwood Distribution System is comprised of approximately 165.9 km of ductile and cast iron watermains, ranging in size from 50 mm to 600 mm in diameter, 1155 fire hydrants and 1927 isolation valves in two pressure zones. There are also 83.5 km of private watermains with 233 private hydrants.

The Tower is an elevated storage tank with a capacity of 2250 m^3 supplying pressure zone 1. The Tower has chlorine boosting capability and on-line monitoring.

The Carmichael Reservoir is an in-ground reservoir and booster pumping station with a capacity of 6800 m^3 supplying pressure zone 1. The Carmichael reservoir has chlorine boosting capability, on-line monitoring and standby generator back up.

The Davey Reservoir is an in-ground reservoir and booster pumping station with a capacity of 2500 m^3 supplying pressure zone 2. The Davey reservoir has chlorine boosting capability, on-line monitoring and standby generator back up.

The Osler Bluff Road booster station helps to regulate the pressure in the west side of zone 2. This station has standby generator back up.

The Georgian Meadows booster station helps to regulate the pressure in the Georgian Meadows subdivision.

4. Water treatment chemicals used in this reporting period:

Chlorine Gas
Sodium Hypochlorite (12%)

5. Significant expenses were incurred to:

a. [x] Install required equipment
b. [x] Repair required equipment
c. [x] Replace required equipment
d. [x] Studies / Engineering

6. Description and breakdown of monetary expenses incurred:

Description – Water Treatment	Amount
Ultrafiltration Membrane Replacement	$803,904
VFD Replacement Highlift Pump #2	$15,863
Water Treatment Plant – window replacements	$14,194
HLP VFD Repair	$7,303
Intake cleaning – zebra mussel removal	$5,953
Communications module replacement	$3,493
Train D Reject Pump repair	$2,499
Total:	**$853,209**

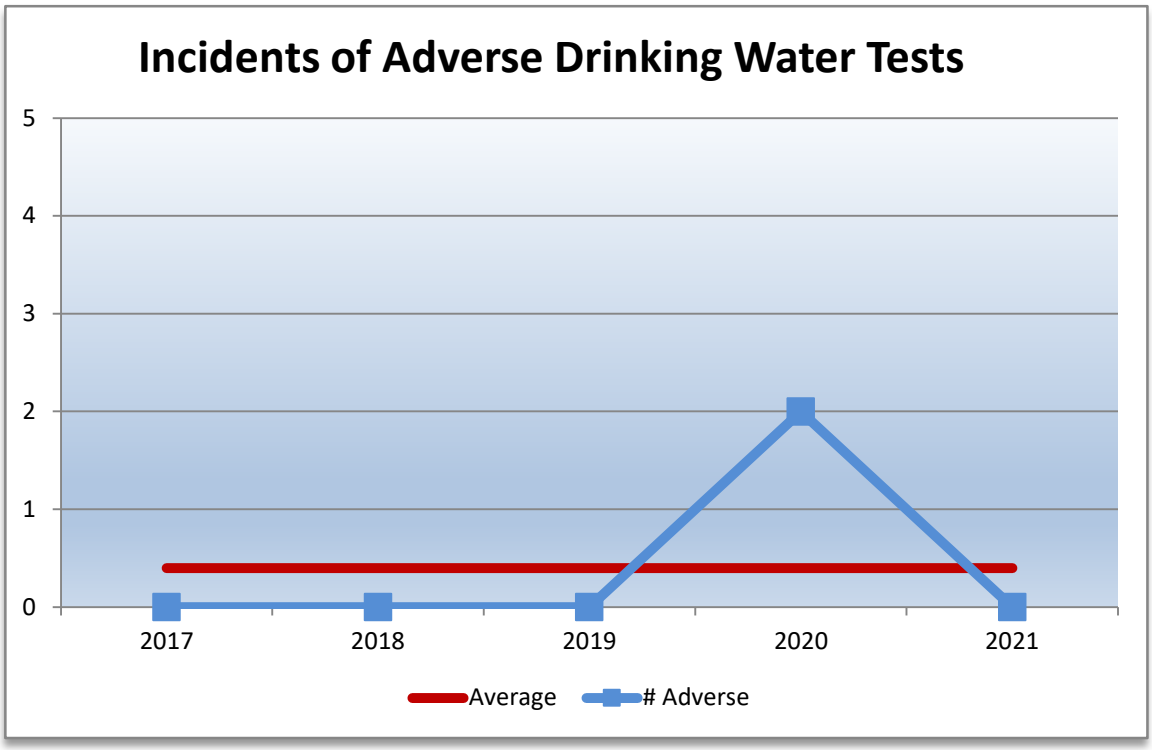
Description – Water Distribution	Amount
Stewart Rd – anti-icing cable for roof	$22,674
Stewart Rd – overhead door replacement	$4,565
Hydrant Painting	$20,568
System-wide watermain leak detection	$9,927
Wheeled Excavator	$284,674
Osler Bluff upgrades	$224,178
Davey Reservoir Controller	$12,183
GPS Controller / Datalogger	$4,485
Total:	**$583,254**

Description – Engineering Studies	Amount
Carmichael Reservoir Upgrades	$12,842
Osler Bluff Booster Station Improvements	$15,133
Steward Road Reservoir	$5,619
Pretty River Parkway Valve Repair	$14, 147
Water SCADA Improvements	$38,660
Davey Bulk Water System Replacement	$11,689
Water Treatment Plant Expansion	$301,192
Water Treatment Plant – Plant and Membrane	$12,276
Watermain Replacement	$7,223
Total:	**$418,781**

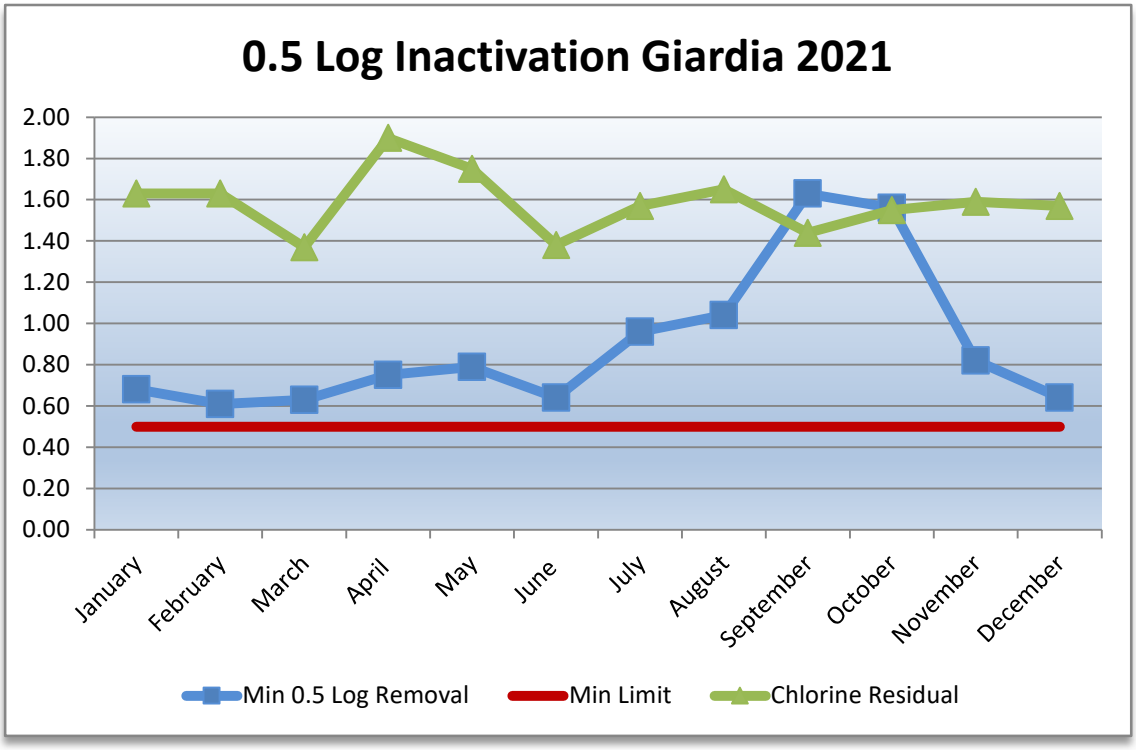
7. Details on the notices submitted in accordance with subsection 18(1) of the Safe Drinking- Water Act or section 16-4 of Schedule 16 of O.Reg.170/03 and reported to Spills Action Centre:

There were no adverse incidents in 2021.

Incident Date	Parameter	Result	Minimum Limit	Corrective Action	Corrective Action Date
none	n/a	n/a	n/a	n/a	n/a

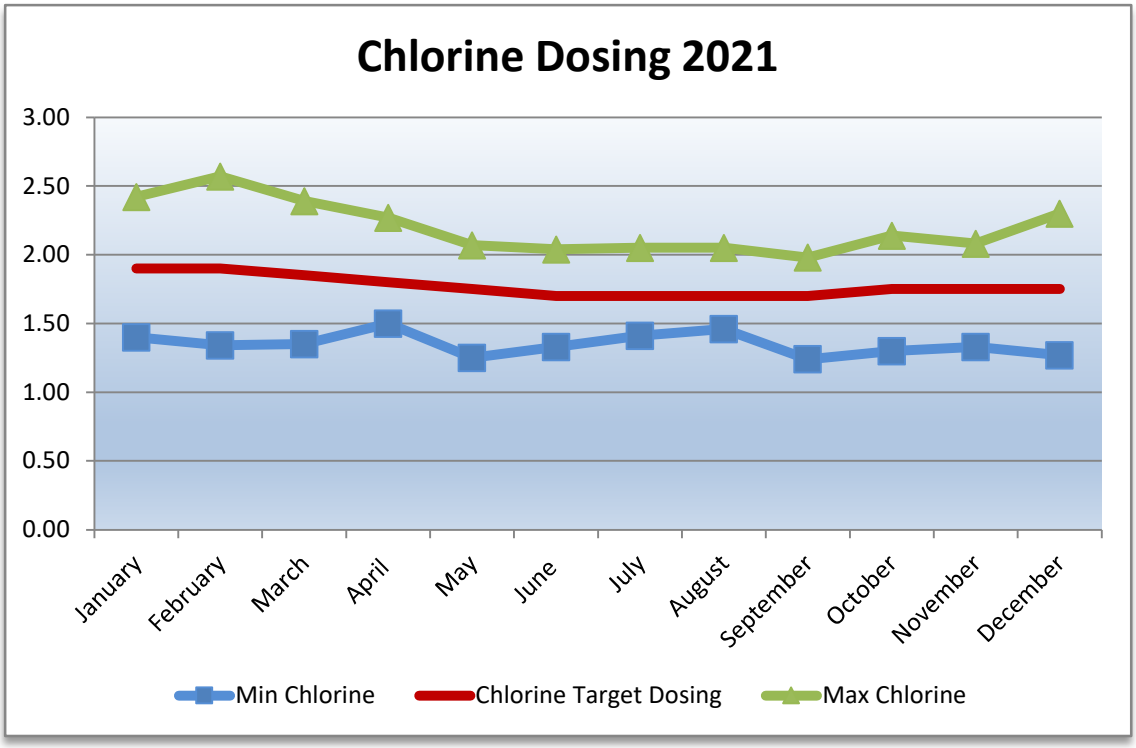


To meet CT requirements at the Water Treatment Plant, the chlorine system is required to achieve 0.5 Log removal or inactivation of Giardia Cysts through disinfection. The following chart shows the minimum log inactivation of Giardia Cysts each month and the corresponding chlorine residual when that inactivation was achieved.



Chlorine dosing is achieved through a set residual target dose and programming algorithms that continually adjust the amount of chlorine injected to meet the target. The set target dose was 1.75 mg/L in the summer months and 1.90 mg/L in January and February to meet CT requirements. The dosing is adjusted, normally in 0.05 – 0.10 mg/L increments, as required.

The final chlorine residual will vary above and below the dosing rate as shown in the graph below. Variance can be attributed to the amount of chlorine consumed in the disinfection process and to the response time of the system in adjusting to changing conditions.



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

Type	Number of Samples	Range of E. Coli Results Min	Max	Range of Total Coliform Results Min	Max	Number of HPC Samples	Range of HPC Results Min	Max
Raw	52	0	37	0	200	n/a	n/a	n/a
Treated	52	0	0	0	0	52	0	20
Distribution	470	0	0	0	0	470	0	30

Non-regulatory Test:

Parameter	Units	Number of Samples	Dates From	To	Result
Microcystin	µg/L	23	20 May	26 Oct	0.0 – 0.1

Note: Microcystin is used to detect harmful algal blooms in raw water samples. These tests are conducted as part of the Town's Harmful Algal Bloom monitoring program. To date, there have been no recorded incidences of harmful algal blooms in the Collingwood water supply.

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

Parameter	Units	Number of Samples	Range of Results Min	Max	Avg
Turbidity - Raw	NTU	Continuous Monitoring	0.16	100	0.91
Turbidity - Treated	NTU	Continuous Monitoring	0	0.91	0.03
Free Chlorine - Treated	mg/L	Continuous Monitoring	1.24	1.98	1.73
Free Chlorine – Distribution Davey Reservoir	mg/L	Continuous Monitoring	0.76	3.40	1.54
Free Chlorine – Distribution The Tower	mg/L	Continuous Monitoring	0.27	4.02	1.62
Free Chlorine – Distribution Carmichael Reservoir	mg/L	Continuous Monitoring	0.85	2.78	1.36
Free Chlorine – Distribution Grab Samples	mg/L	470	0.31	1.94	1.17

10. Summary of additional testing and sampling carried out in accordance with the requirement of an approval, order or other legal instrument:

Date of Legal Instrument Issued	Date Sampled	Total Chlorine Residual	Suspended Solids	Unit of Measure
Municipal Drinking Water License April 28, 2021 Schedule C Residue Management Table 3	Jan	n/a	2	mg/L
	Feb	n/a	4	mg/L
	Mar	n/a	19	mg/L
	April	n/a	4	mg/L
	May	0.04	5	mg/L
	June	0.04	13	mg/L
	July	0.05	34	mg/L
	Aug	0.04	8	mg/L
	Sept	0.01	3	mg/L
	Oct	0.05	13	mg/L
	Nov	0.04	12	mg/L
	Dec	0.05	23	mg/L
	Annual Average:	**0.04**	**11.5**	**mg/L**
	Maximum Limit:	0.02	25	mg/L

Residue Management refers to the raw water waste stream. Raw water enters the membrane filter basins and is drawn through the membrane. Concentrate pumps continuously draw unfiltered water out of the filter basins to remove particles that are too large to flow through the membrane. A portion of this water goes to the sewer, but due to limited sewer capacity at the treatment plant, a larger portion is returned to Nottawasaga Bay.

Total chlorine residual sampled in the raw water waste stream is a new requirement under the Municipal Drinking Water License. The current facility design is not capable of meeting this requirement. Chlorine is introduced into the raw water during the backpulse cycle when chlorinated water flows in reverse direction through the membrane as part of the cleaning process.

Prior to this new requirement, chlorine was introduced into the raw water at the intake structure, where it was used to control the zebra mussel population. This system was not used in 2021 to minimize the chlorine residual levels in the filter basins. The annual intake inspection found 95% coverage of zebra mussels on the intake structure and they were physically removed by a qualified contractor.

The samples of total chlorine are grab samples taken with a colorimeter. The colorimeter is an industry standard for measuring chlorine samples but is not always accurate when reading levels as low as 0.02 mg/L.

The Town is currently working towards an expansion of the existing water treatment plant that will include a de-chlorination process for the raw water waste stream.

In accordance with the requirements of the Municipal Drinking Water License, the exceedance of total chlorine in the raw water waste stream was reported in writing to the local Ministry of the Environment, Conservation and Parks Office. The Ministry Office accepted the report with no further actions required.

11. Summary of inorganic parameters tested during this reporting period or the most recent sample results:

Note: ND = not detected

Parameter	Aug 12 Results	Nov 4 Results	Units	Max Limit	Exceedence
Antimony	ND	ND	µg/L	**6**	**No**
Arsenic	0.4	0.4	µg/L	**10**	**No**
Barium	11.7	13.3	µg/L	**1000**	**No**
Boron	9	14	µg/L	**5000**	**No**
Cadmium	0.003	ND	µg/L	**5**	**No**
Chromium	0.31	0.25	µg/L	**50**	**No**
Mercury	ND	ND	µg/L	**1**	**No**
Selenium	0.11	0.10	µg/L	**50**	**No**
Uranium	0.149	0.181	µg/L	**20**	**No**

Parameter	Sample Date	Results	Units	Max Limit	Exceedence
Nitrite	2021	ND	mg/L	**1.0**	**No**
Nitrate	2021	0.006 – 0.263	mg/L	**10.0**	**No**
Flouride	09 Aug 2018	ND	mg/L	**1.5**	**No**
Sodium	09 Aug 2018	5.80	mg/L	**20**	**No**
***Lead**	2021	0.02 – 2.46	µg/L	**10**	**No**
***Alkalinity**	2021	68 – 75	mg/L	**30 - 500**	**No**
***pH**	2021	7.91 – 8.09	n/a	**6.5 – 8.5**	**No**

**Distribution system sample*

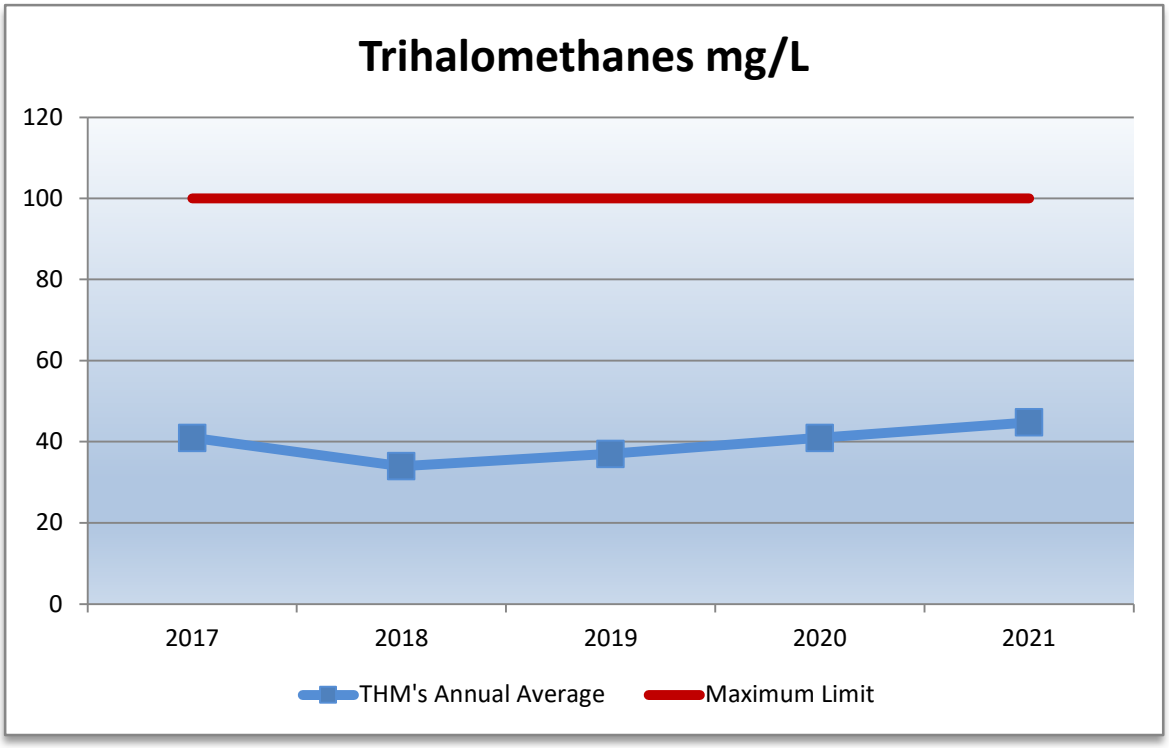
12. Summary of organic parameters tested during this reporting period or the most recent sample results:

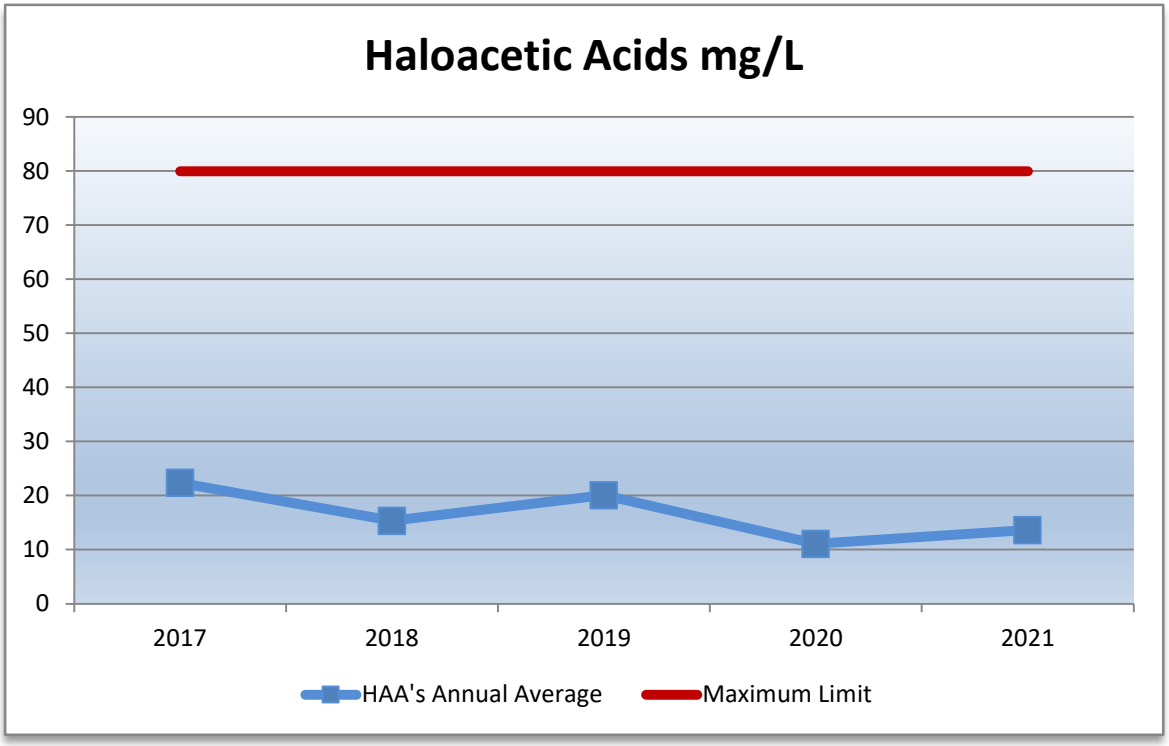
Note: ND = not detected

Parameter	Aug 12 Results	Nov 4 Result	Units	Max Limit	Exceedence
Alachlor	ND	ND	µg/L	**5**	**No**
Atrazine + N-dealkylated metabodies	0.01	ND	µg/L	**5**	**No**
Azinphos-methyl	ND	ND	µg/L	**20**	**No**
Benzene	ND	ND	µg/L	**1**	**No**
Benzo(a)pyrene	ND	ND	µg/L	**0.01**	**No**
Bromoxynil	ND	ND	µg/L	**5**	**No**
Carbaryl	ND	ND	µg/L	**90**	**No**
Carbofuran	ND	ND	µg/L	**90**	**No**
Carbon Tetrachloride	ND	ND	µg/L	**2**	**No**
Chlorpyrifos	ND	ND	µg/L	**90**	**No**
Diazinon	ND	ND	µg/L	**20**	**No**
Dicamba	ND	ND	µg/L	**120**	**No**
1,2-Dichlorobenzene	ND	ND	µg/L	**200**	**No**
1,4-Dichlorobenzene	ND	ND	µg/L	**5**	**No**
1,2-Dichloroethane	ND	ND	µg/L	**5**	**No**
1,1-Dichloroethylene	ND	ND	µg/L	**14**	**No**
Dichloromethane	ND	ND	µg/L	**50**	**No**
2,4-Dichlorophenol	ND	ND	µg/L	**900**	**No**
2,4-D	ND	ND	µg/L	**100**	**No**
Diclofop-methyl	ND	ND	µg/L	**9**	**No**
Dimethoate	ND	ND	µg/L	**20**	**No**
Diquat	ND	ND	µg/L	**70**	**No**
Diuron	ND	ND	µg/L	**150**	**No**
Glyphosate	ND	ND	µg/L	**280**	**No**
Malathion	ND	ND	µg/L	**190**	**No**
2-Methyl-4-chlorophenoxyacetic acid (MCPA)	ND	ND	µg/L	**100**	**No**

Organics (cont'd)	Aug 12 Results	Nov 4 Results	Units	Max Limits	Exceedence
Metolachlor	ND	ND	µg/L	**50**	**No**
Metribuzin	ND	ND	µg/L	**80**	**No**
Monochlorobenzene	ND	ND	µg/L	**80**	**No**
Paraquat	ND	ND	µg/L	**10**	**No**
Pentachlorophenol	ND	ND	µg/L	**60**	**No**
Phorate	ND	ND	µg/L	**2**	**No**
Picloram	ND	ND	µg/L	**190**	**No**
PCB	ND	ND	µg/L	**3**	**No**
Prometryne	ND	ND	µg/L	**1**	**No**
Simazine	ND	ND	µg/L	**10**	**No**
Terbufos	ND	ND	µg/L	**1**	**No**
Tetrachloroethylene (perchloroethylene)	ND	ND	µg/L	**10**	**No**
2,3,4,6-Tetrachlorophenol	ND	ND	µg/L	**100**	**No**
Triallate	ND	ND	µg/L	**230**	**No**
Trichloroethylene	ND	ND	µg/L	**5**	**No**
2,4,6,-Trichlorphenol	ND	ND	µg/L	**5**	**No**
Trifluralin	ND	ND	µg/L	**45**	**No**
Vinyl Chloride	ND	ND	µg/L	**1**	**No**

	Date of Samples				
	1st Quarter	**2nd Quarter**	**3rd Quarter**	**4th Quarter**	**Max Limit**
Haloacetic Acids	0	23.2	16.7	14.5	**n/a**
Haloacetic Acids Average	11.1	12.5	12.8	13.6	**80**
Trihalomethanes	23	42	52	62	**n/a**
Trihalomethanes Average	40.3	40.8	48.0	44.8	**100**
Note: All samples are well within allowable limits, no exceedences to report					


Trihalomethanes mg/L
120
100
80
60
40
20
0
2017
2018
2019
2020
2021
THM's Annual Average
Maximum Limit


Haloacetic Acids mg/L
90
80
70
60
50
40
30
20
10
0
2017
2018
2019
2020
2021
HAA's Annual Average
Maximum Limit

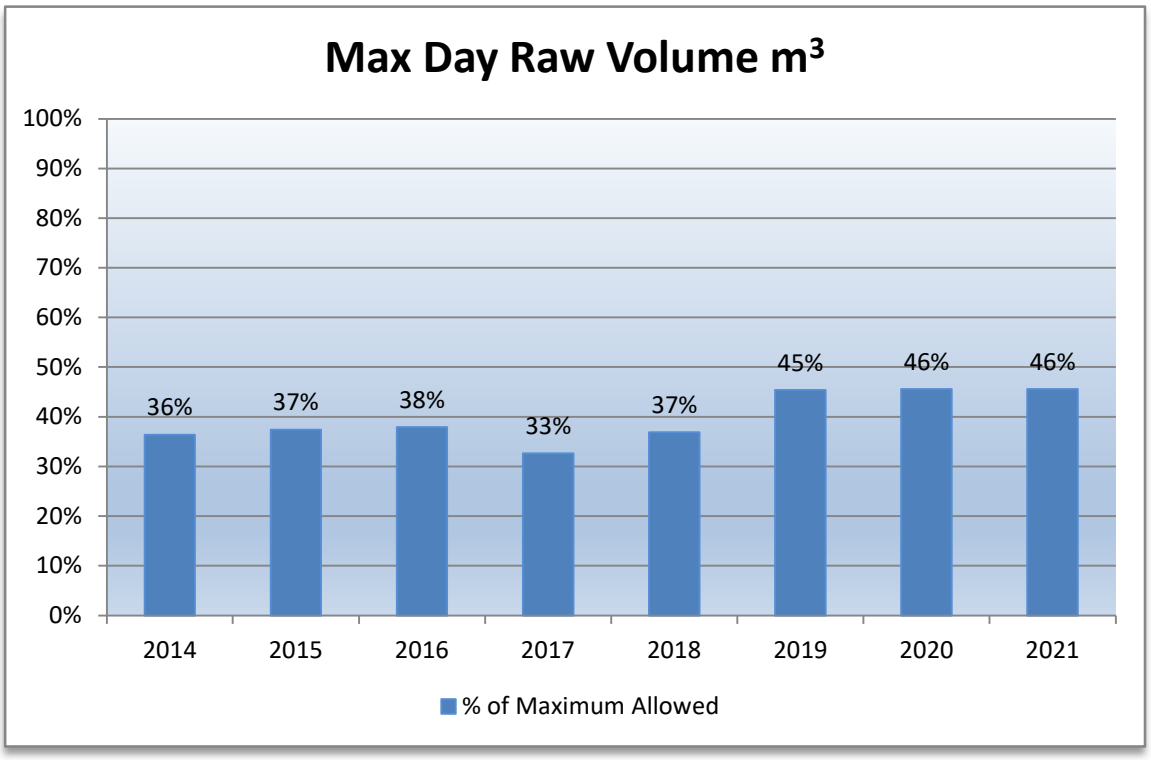
13. The following inorganic or organic parameter(s) exceeded half the standard prescribed in Schedule 2 of Ontario Drinking Water Quality Standards:

Parameter	Result Value	Unit of Measure	Date of Sample
None	***n/a***	***n/a***	***n/a***

14. Raw water taking vs capacity per Permit to Take Water:

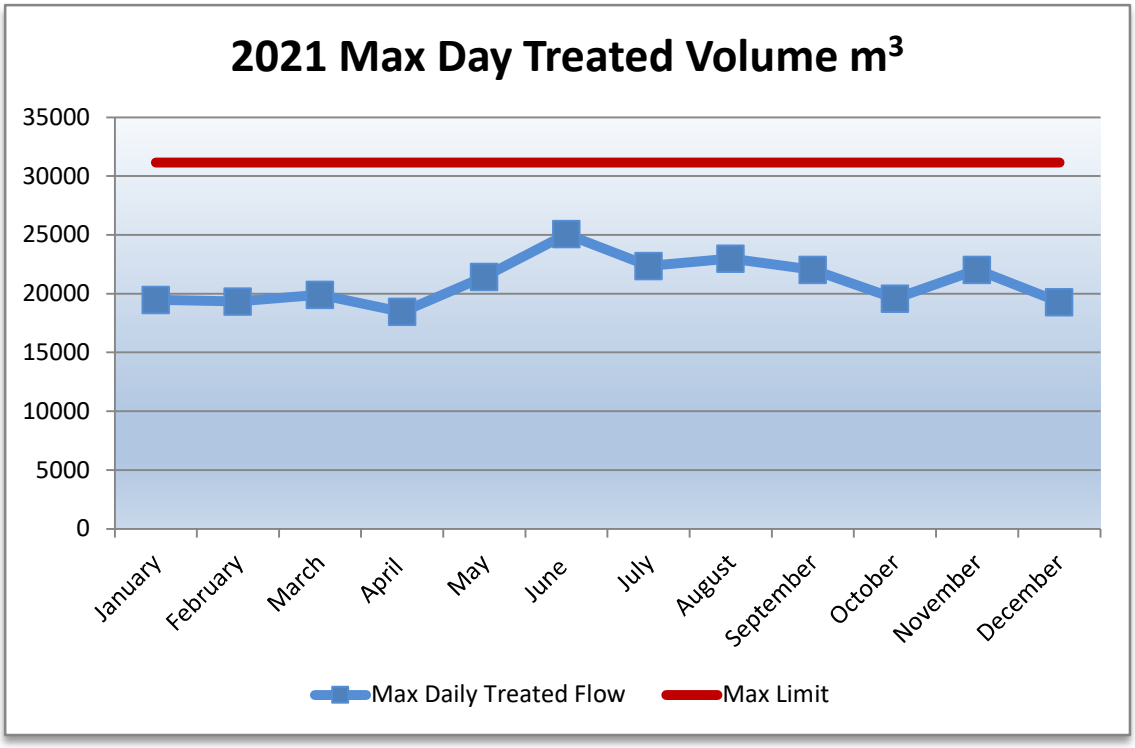
The raw water supply is more than adequate to provide a reliable source of potable water to meet the demands of the system. The source is Nottawasaga Bay, part of Lake Huron in the Georgian Bay region.

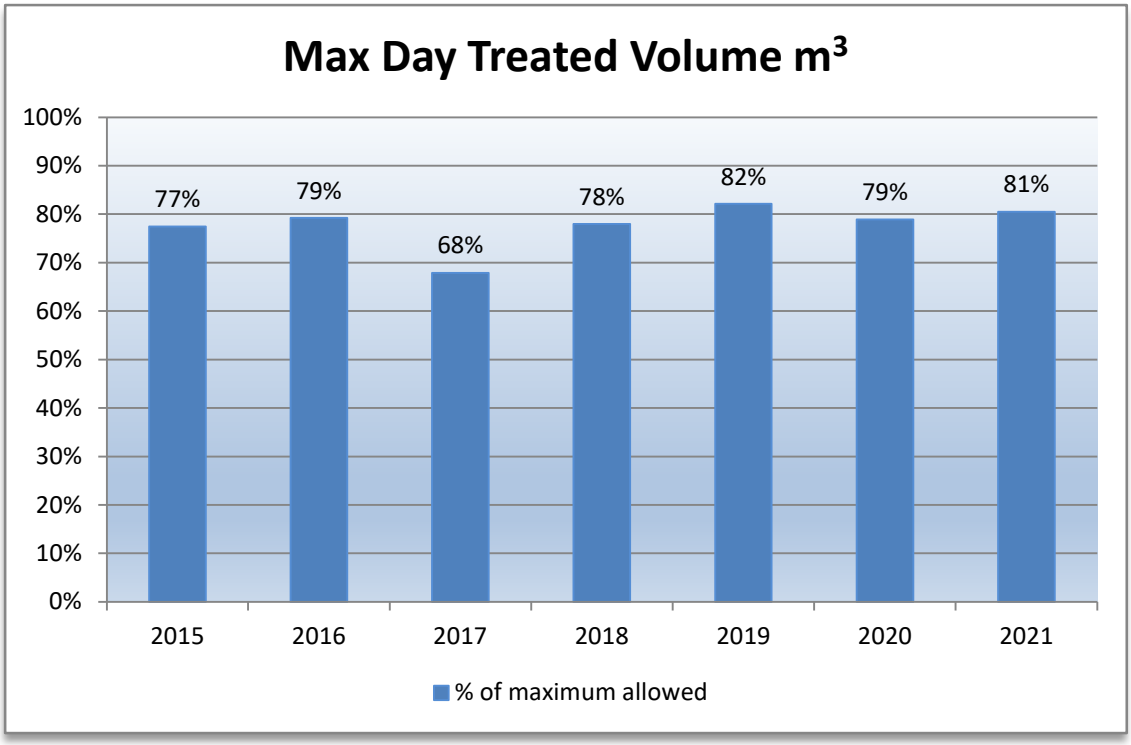
Raw Water Taking					
Month	**Monthly Total m^3**	**Daily Ave m^3**	**Min Day m^3**	**Max Day m^3**	Max Day **Capacity**
January	756,849	24,414	22,030	27,590	40%
February	669,133	23,898	16,562	26,314	39%
March	776,141	25,037	21,290	28,057	41%
April	691,740	23,058	18,572	25,707	38%
May	709,426	22,885	17,044	28,188	41%
June	834,039	27,801	21,175	31,128	46%
July	799,185	25,780	28,478	21,937	42%
August	832,965	26,870	22,231	29,509	43%
September	772,631	25,754	23,170	29,325	43%
October	710,378	22,915	19,232	25,315	37%
November	705,630	23,521	19,631	27,179	40%
December	732,465	23,628	19,348	27,589	40%
Total	**8,990,582**				
Max	**834,039**			**31,128**	**46%**
Note: Maximum allowable taking is 68,250 m^3 per day					


Max Day Raw Volume m³
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
36%
37%
38%
33%
37%
45%
46%
46%
2014
2015
2016
2017
2018
2019
2020
2021
% of Maximum Allowed

15. Treated water taking vs capacity per Municipal Drinking Water License:

Treated Water Flows					
Month	Monthly **Total m^3**	Daily Ave **m^3**	Min Day **m^3**	Max Day **m^3**	Max Day **Capacity**
January	541,672	17,473	15,548	19,475	63%
February	499,292	17,832	11,940	19,341	62%
March	555,988	17,935	14,567	19,902	64%
April	495,981	16,533	13,054	18,457	59%
May	529,902	17,094	12,409	21,421	69%
June	661,218	22,041	17,295	25,069	81%
July	620,005	20,000	22,358	22,358	72%
August	647,405	20,884	16,598	22,969	74%
September	582,746	19,425	16,927	22,025	71%
October	542,936	17,514	14,613	19,578	63%
November	541,327	18,044	14,086	22,035	71%
December	525,873	16,964	14,395	19,291	62%
Total:	**6,744,345**				
Max:	**661,218**			**25,069**	**81%**
Note: Maximum allowable taking is 31,140 m^3 per day					

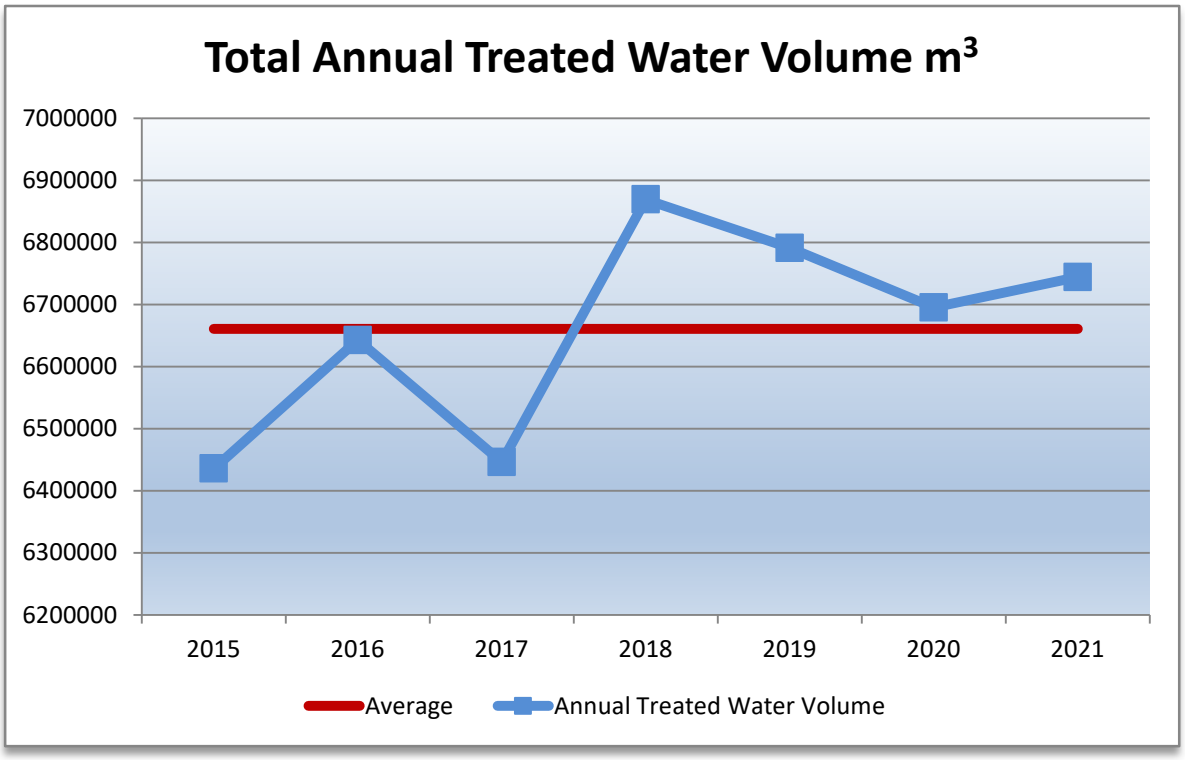

2021 Max Day Treated Volume m3
35000
30000
25000
20000
15000
10000
5000
0
January
February
March
April
May
June
July
August
September
October
November
December
Max Daily Treated Flow
Max Limit


Max Day Treated Volume m3
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
77%
79%
68%
78%
82%
79%
81%
2015
2016
2017
2018
2019
2020
2021
% of maximum allowed

16. Total Treatment Plant Production

Water usage this year was up slightly from last year as the pandemic restrictions were eased. However, an unusually cool and wet summer created a lower demand than usual in July and August.

The water treatment plant supplied 6,744,345 m^3 of safe, potable water in 2021. That is up 1% from 6,694,997 m^3 in 2020. Production is based solely on demand.



17. Quality Management System (QMS) – Management Review:

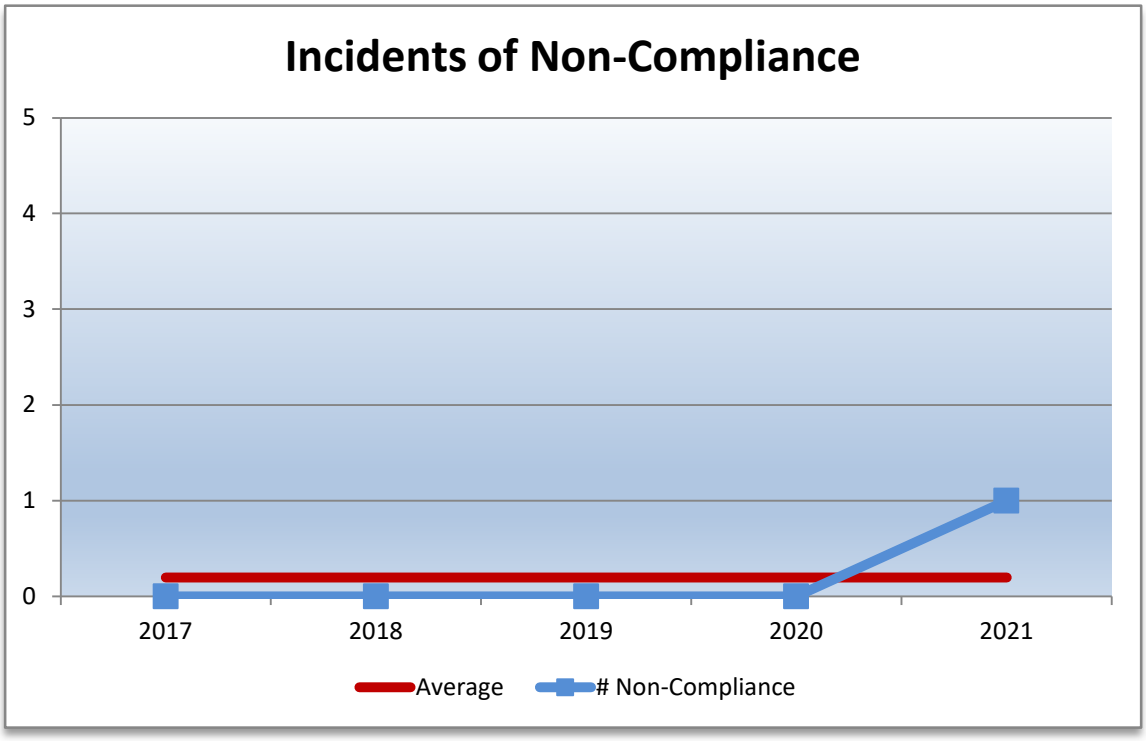
A QMS Management Review was conducted on January 20, 2022. Data from 2021 was considered and action items were identified as appropriate to improve the operation and efficiency of the system. A summary of some key items can be found below.

a) Incidents of Regulatory Non-Compliance

A Ministry of the Environment, Conservation and Parks (MECP) annual inspection was completed in July 2021. The Ministry is using a new inspection template. The previous template evaluated the system on a 440 point system, this has now been increased to 514 points.

Findings: The two adverse events reported in December of 2020 were noted during the inspection. These incidents were reported in the 2020 Water Compliance Report. During regular flushing maintenance, the free chlorine residual was found to be below 0.05 mg/L free. Both were found on dead-ends and the mains were flushed immediately to restore disinfection residual. Seasonal auto-flushers have been purchased to provide regular flushing of these mains.

Based on the Ministry established risk rating methodology the Collingwood Drinking Water System received a 95.91% rating for 2021.



b) Internal and Third-Party Audit Results

2021 Internal Audit

The Internal Audit was completed on May 3-5, 2021 by a qualified consultant. Many strengths were identified during the audit including staff commitment, a culture of continual improvement, risk-based thinking and use of technology.

No non-conformances were identified by the auditor.

Four opportunities for improvement (OFI) were provided for consideration. All items were reviewed and actions implemented.

Reference	Opportunity for Improvement – Description
Resources and procurement (El.3, 13)	While significant efforts were made over the past year in obtaining equipment needed for continuity of operations, the existing procurement by-law and policies regarding non-standard supplies continues to be a challenge for water operations staff. [auditor noted records of meetings for this ongoing issue].
Risk Assessment Outcomes (El. 8)	Consider including references to cyber terrorism in the risk assessment, as it's occurred in area municipalities in recent years (with a water-specific example in Tampa Bay area in February 2021).
Competencies (El. 10)	Consider setting the expectation to maintain pace with the annual training hours listed in s.29 of O. Reg. 128/04 (even with the provision to average over three years). While most operators are on pace with the required annual training hours, some are behind.
Communications (El. 12, 14, 15)	Consider re-establishing consultations with operational team members to discuss annual and long-term budget plans ensuring they continue to reflect the system's highest risks. Ongoing sharing of knowledge / information could also be improved (especially related to new developments).

2021 External Audit

The External Audit was a remote desktop audit of documentation completed on July 5, 2021 by NSF.

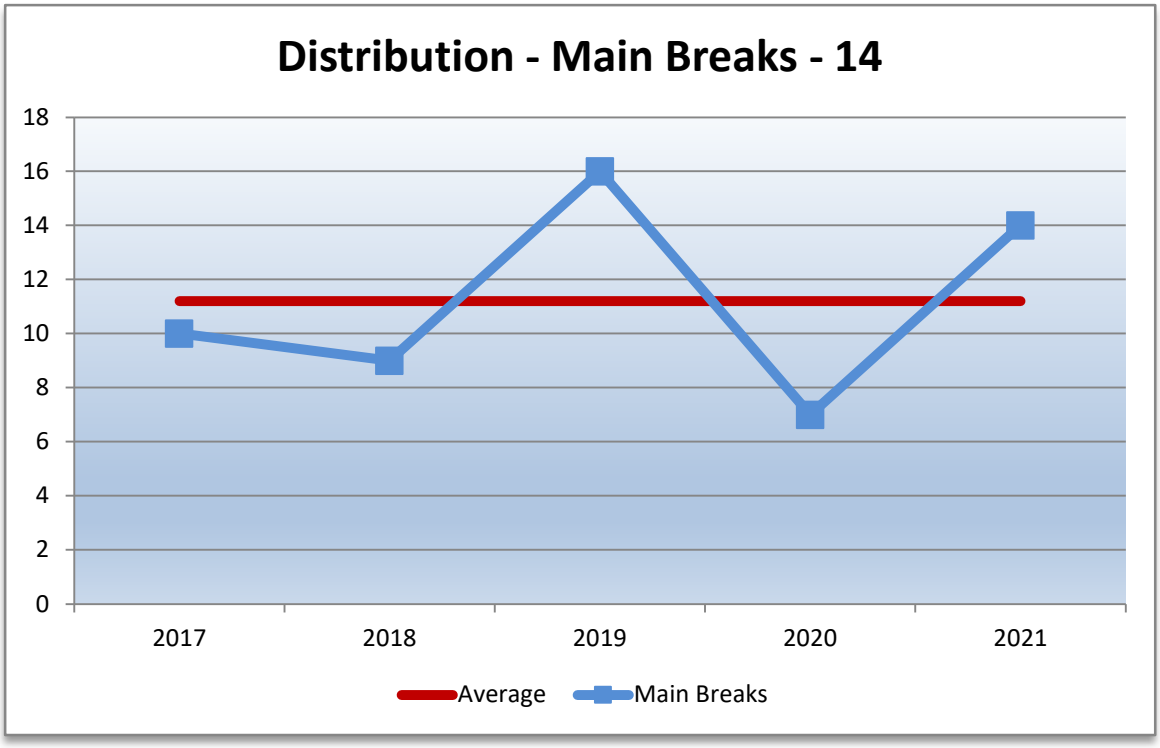
No non-conformances were identified by the auditor.

There were 3 opportunities for improvement offered for consideration. All items were reviewed and have been implemented.

Reference	Opportunity for Improvement – Description
Opportunities for Improvements (DWQMS)-01	Location of OFI Instrument calibration process; Discussed With Marie Richardson; Description Although found to be generally conforming with the Standard, consideration could be given to reviewing / reducing instrument calibration intervals when 'as found' condition is 'fail';
Opportunities for Improvements (DWQMS)-02	Location of OFI Chemical Receiving Checklist; Discussed With Marie Richardson; Description Although found to be generally conforming with the Standard, consideration could be given to adding Certificate of Analysis & Lot number verification to the Chemical Receiving Checklist.;
Opportunities for Improvements (DWQMS)-03	Location of OFI Management Review procedure; Discussed With Marie Richardson; Description Although found to be generally conforming with the Standard, consideration could be given to clarifying how identified deficiencies, decision and actions resulting from management review are reported to the Owner.;

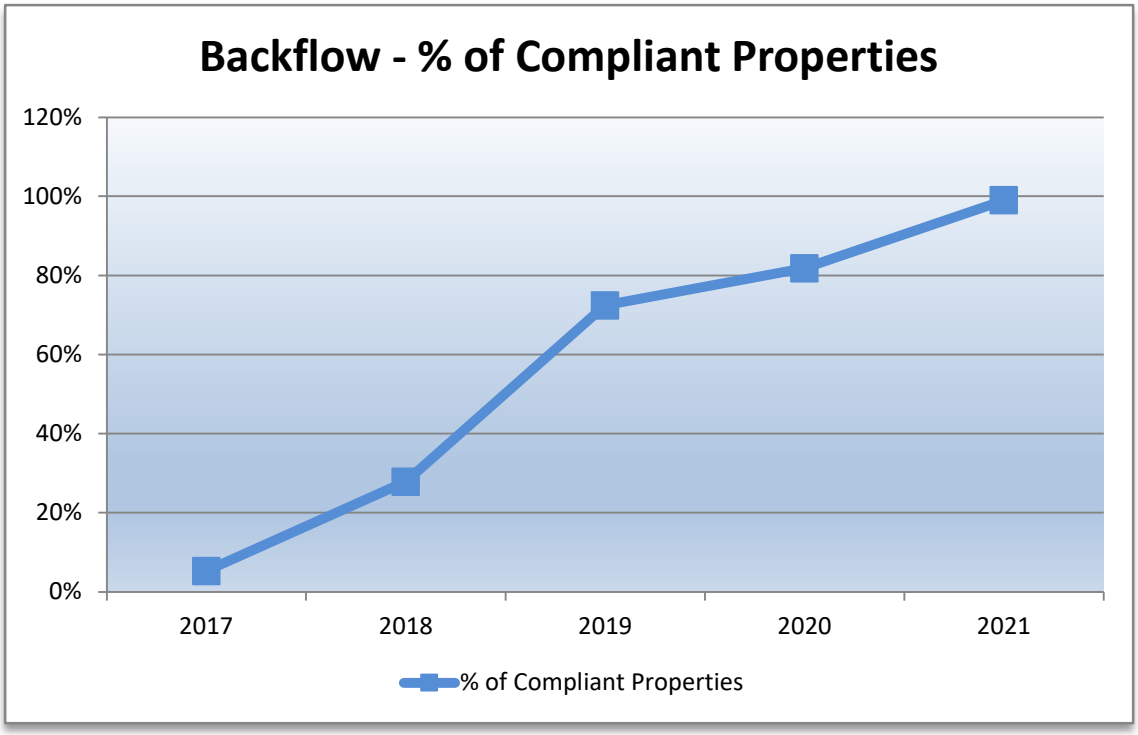
c) Watermain Breaks

There were 14 watermain breaks in 2021, up from 7 last year. Repairs were completed with minimal service interruption to consumers.



d) Backflow Prevention Program

The Backflow Prevention Program has completed the fourth full year of operation. There are currently 626 premises identified for the program and 620 premises (99%) are now compliant. This moves the program from the implementation phase to the maintenance phase for industrial, commercial and institutional (ICI) premises.



e) Results of the Infrastructure Review

The annual Infrastructure Review, used to review the adequacy of infrastructure necessary to operate and maintain the system, was held July 14, 2021.

The review considered the outcomes of the risk assessment and evaluated infrastructure at the R.A.B. Water Treatment Plant, the 2 reservoir / booster stations, the 2 booster pumping stations, the elevated tower and the distribution system linear works.

During the review, 38 action items were identified including 2 health and safety items, 15 budget items, 14 projects, 3 items related to upgrades and 4 long term planning items.

The Action Item meetings are held monthly to provide updates, review the status of each item and identify next steps for completion. It was clarified that all 38 items were not made into Action Items to be reviewed at the meetings. For example, long-term projects that won't be implemented for several years will not benefit from monthly reviews. There are currently 15 open Infrastructure Action Items, 7 of which are capital projects and therefore long-term in nature.

f) Follow up on items from previous Management Reviews

At the previous Management Review, seven action items were identified, two are ongoing actions regarding communication to keep staff updated on pandemic-related issues and the remainder have been completed.

g) Action Items Identified Between Reviews

One Action Item was identified between reviews was to look at water treatment plant capacity prior to upgrades. A consultant was hired to evaluate the appropriateness of using 2.20 mg/L as the upper chlorine residual limit. The consultant had a site visit and was provided additional information upon request. The draft report is in progress.

Two infrastructure items were identified between reviews, one is the water treatment plant expansion project and the other is to repair and/or mitigate subsidence and a leak in the chlorine contact chambers at the water treatment plant.

There were 14 Preventive / Corrective Action Reports (PCAR's) issued in 2021, 7 were the opportunities for improvement identified in the internal and external audits.

h) Changes that could affect the Quality Management System

The Covid Pandemic that began to affect operations in March 2020 is continuing into 2022. In addition to potential staffing issues as increasingly transmissible variants are introduced, the pandemic and other factors have affected the global supply chain. Equipment and materials are becoming more difficult to source and wait times and costs are increasing.

The new Water Supervisor position was filled in January 2022. This is an added resource but will also create a learning curve for all positions as new roles and responsibilities are assumed. Procedures will need to be updated with changes to roles and responsibilities.

A new Engineering Technologist position has been approved in the budget for 2022. This position will assist in capital projects and provide an important resource for distribution projects.

Capital projects will require additional staff time and new and/or revised procedures and forms. Some of the larger projects include:

- R.A.B. Water Treatment Plant UV installation
- Carmichael Reservoir upgrades
- R.A.B. Water Treatment Plant expansion
- SCADA Software Replacement

i) Action Items arising from the Management Review

There were 10 Action Items identified during the most recent Management Review held January 20, 2022. These items will be reviewed and tracked during departmental Action Item Review Meetings.

The primary challenges identified in the Management Review for the Water Department in 2022 are changes both in personnel and in the completion of capital projects, and the resources required to manage these changes. Action Items were identified to review changes to processes and procedures, and ensure roles and responsibilities are clearly defined. Action items are listed below.

	Management Review Actions Required:	Person Responsible:
1	Annual review of the risk assessment	Marie Richardson
2	Plan for Emergency Response Testing 2022 – chlorine tonner leak scenario.	Marie Richardson
3	Review requirements of reporting water outages with operators	Marie Richardson
4	Roles, responsibilities of the Water Supervisor and those affected by the position to be clarified.	Heather McGinnity
5	Update SOP's and management procedures to incorporate the new Water Supervisor position.	Marie Richardson
6	Create / update SOP's and management forms to incorporate the UV installation	Marie Richardson
7	Create / update SOP's and management forms to incorporate the SCADA upgrades	Marie Richardson
8	Evaluate and improve the tracking system for consumer feedback.	Heather McGinnity
9	Arrange objective review of changes to Compliance Officer / QMS Representative position	Peggy Slama
10	Implement the ONWARN agreement	Marie Richardson

Conclusion:

The Water Department is undergoing significant and positive changes in 2022 and with change comes a level of increased risk. Being aware of the risks and working together to manage the change, we will continue to provide a safe, reliable source of potable water to our consumers and continue to meet or exceed all legislative requirements.

Report Prepared by:

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