2021

Annual Summary Report

The Corporation of the Township of Alnwick/Haldimand

Grafton Drinking Water System

Prepared by: Lakefront Utility Services Inc. (2022)

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1. PURPOSE

The purpose of the Annual Summary Report is to provide information to residents and stakeholders of the Township of Alnwick/Haldimand. Furthermore, satisfying the regulatory requirements of the *Safe Drinking Water Act*, *2002* including the Drinking Water Quality Management Standard (DWQMS) reports to the Owner, and regulatory reporting required under *Ontario Regulation 170/03*. This Annual Summary Report fulfills all requirements of *Ontario Regulation 170/03* Section 11 Annual Reports and Schedule 22 Summary Reports for Municipalities.

The Annual Summary Report is prepared by Lakefront Utility Services Inc. (Operating Authority) on behalf of the Township of Alnwick/Haldimand (Owner).

Scope

This Annual Summary Report includes information pertaining to the Village of Grafton's Drinking Water System (Grafton DWS) for the period of January 1, 2021 to December 31, 2021. *Ontario Regulation 170/03* requires reported information be provided to:

- **Drinking Water System Owners (Mayor and Council)**
- **Owner and Operating Authority Top Management**
- **The Public**

Availability

The Grafton DWS is a large municipal residential system that serves approximately 370 people. Copies of this Annual Summary Report are available online at https://www.lakefrontutilities.com/regulatory-water/. Hard copies are also available at the LUSI's office at 207 Division St, Cobourg ON, K9A 4L3.

Customers of the Grafton DWS are notified that the annual water quality report is available via "What's New" https://www.lakefrontutilities.com/whats-new/, social media posts, and "Stay Connected" LUSI bill insert.

Council Resolution

Ontario Regulation 170/03 requires Annual Summary Reports to be distributed to the municipal council no later than March 31 of each year. The Township of Alnwick/Haldimand must provide LUSI with a copy of the Council Resolution indicating the report has been accepted.

2. GRAFTON DRINKING WATER SYSTEM OVERVIEW

The Grafton Water Treatment Plant (WTP) takes water from two wells, Well #1 and Well #2. Well #1 is the standby well; operation is limited to sampling and emergencies only, as it is influenced by a natural source of ammonia. Well #2 is the duty well and has a rated capacity of 12.5L/s.

Sodium hypochlorite is injected for primary and secondary disinfection purposes. The WTP has two underground clear wells, and two high lift pumping wells, where water achieves the appropriate contact time. *Sodium silicate* is added as an iron sequestering agent.

Treated water is conveyed to the distribution system, and to a bulk water truck fill system installed on the exterior of the WTP.

The distribution system is split into four pressure zones that are regulated by four pressure reducing valves that maintain the pressure between 40 and 90 PSI. As of December 31, 2021, there are 347 metered customers. Water is conveyed to customers by approximately 13km of watermain ranging from 150mm to 300mm, made of PVC. There are 130 fire hydrants located within the system.

3. 2021 COMPLIANCE

3.1 MECP INSPECTION

The Grafton Drinking Water System underwent an announced focused MECP compliance inspection starting November 2, 2021 and achieved an inspection rating of 100.00%. No regulatory non-compliances, recommendations or best practice issues were identified in the 2021 MECP inspection.

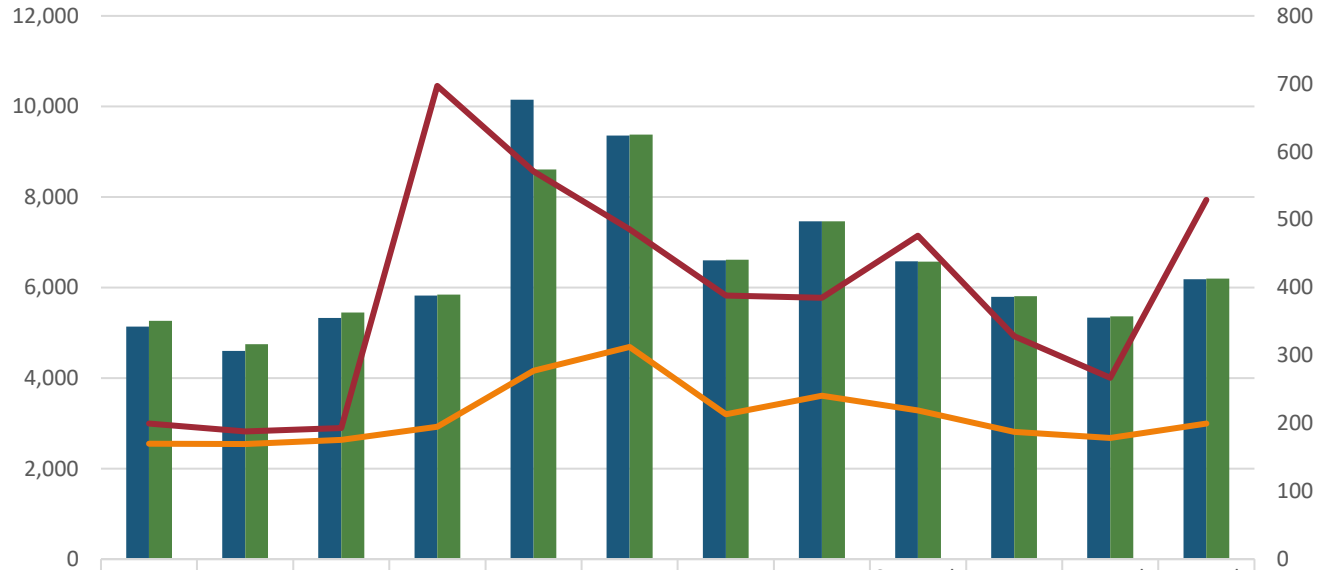
3.2 LICENSE & PERMIT COMPLIANCE

The Grafton DWS maintained compliance with all applicable legislation, and all terms and conditions of the Municipal Drinking Water License, Drinking Water Works Permit, and Permit to Take Water in 2021.

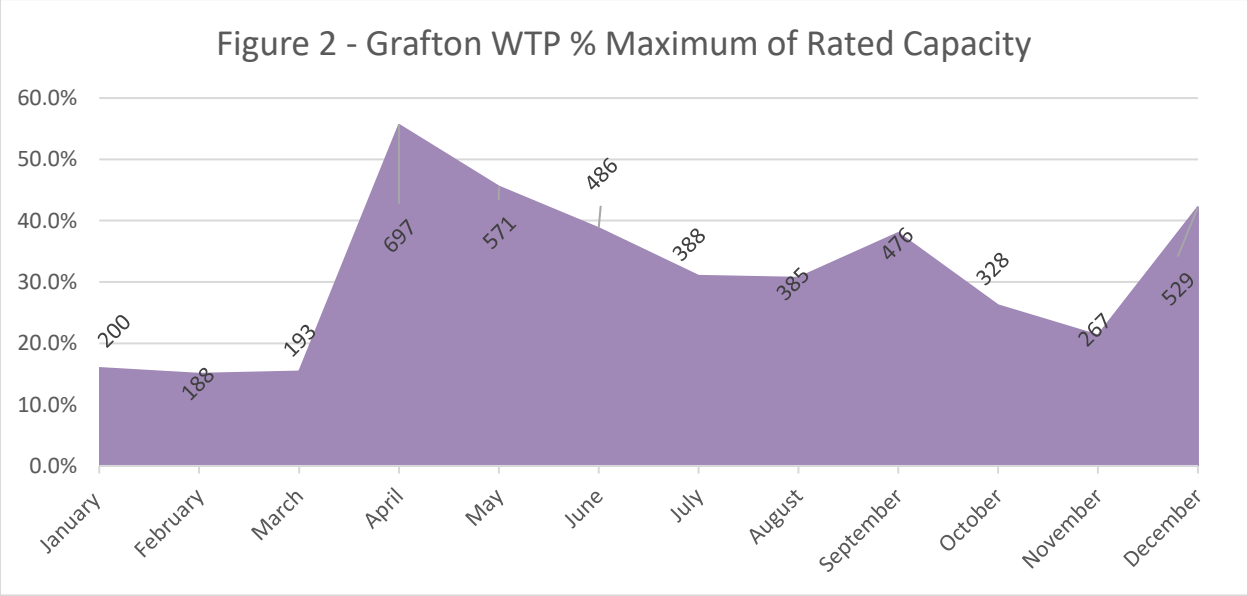
The Grafton DWS Permit to Take Water (Permit No. 3872-C8LQQF, December 2021,) allows the taking of 1,253 m^3 of water from each well per day at a rate of 870L/min. The average flow rate from production well #2 was 138L/min.

The total quantity of water taken and discharged from the WTP is illustrated in Figure 1. In 2021 there were no instances where the maximum volume of the Permit To Take Water was exceeded. In April 2021, the WTP operated at 56% of its maximum rated capacity, as shown in Figure 2. The labels presented in Figure 2 are representative of the maximum flow observed for the respective month (m^3).

Figure 1 - Flow Quantities Grafton Drinking Water System



	January	February	March	April	May	June	July	August	September	October	November	December
Water Taken (m3)	5,140	4,601	5,329	5,825	10,148	9,359	6,601	7,461	6,578	5,796	5,337	6,184
Water Discharge (m3)	5,266	4,746	5,445	5,847	8,608	9,375	6,615	7,461	6,573	5,812	5,360	6,196
Daily Average Discharge (m3)	170	170	176	195	278	312	213	241	219	187	179	200
Maximum Daily Discharge (m3)	200	188	193	697	571	486	388	385	476	328	267	529



3.3 ADVERSE WATER QUALITY INCIDENT(S)

Incident #1 – December 11, 2021
On Dec 11, 2021, UPS failure resulted in PLC shutdown and loss of trending (data gap) 19:31-19:49.
During this time the Highlift shut down resulting in a loss of pressure within pressure zone 1.
LUSI attended the site re-started the Highlift pump and switched out the new UPS.
the Haliburton, Kawartha, Pine Ridge Public Health Unit issued bacteriological sample and Boil Water Order (BWO).
Related Mains, Pipes, and Hydrants were Flushed and disinfected. The affected area received normal chlorine and turbidity values for the area.Users were Advised to Boil Water by social media and hand delivery of BWO. Upon completion of the flushing Hydrants, two consecutive bacteriological water samples were taken at two 24-hour intervals. Laboratory results were satisfying and indicated no presence of E. Coli or total coliform was obtained on Dec 12 and 13, 2021. Notices of Adverse and issue resolution (schedule 16) were reported to SAC as loss of system pressure.

4. CONTINUAL IMPROVEMENT

LUSI's commitment to continual improvement requires investigating and investing in, where appropriate, methods and technologies to improve

- The quality of processes used to ensure production of ample clean water, and
- The quality and effectiveness of the distribution system.

During the 2021 reporting year, LUSI demonstrated this commitment by completing all the activities listed in Table 1. Table 1 also satisfies O. Reg 170/03 requirement to describe major expenses that occurred during the reporting period.

Table 1 - 2021 Major Expenses Incurred at the Grafton WTP, Distribution System and Misc. Activities		
Grafton Water Treatment Plant	SCADA Upgrade	$12,500.00
	PRV- Control Valves Repair	$2,000.00
	Raw Water Header Replacement	$50,000.00
		$64,500.00

5. SAMPLING AND ANALYSIS

The Grafton DWS exhibited compliance with all sampling and testing as required by *Ontario Regulation 170/03* in the 2021 calendar year. Table 2 illustrates all microbiological testing done under Schedule 10 of *Ontario Regulation 170/03*. There were no instances of adverse water quality indicators due to exceeding a parameter maximum allowable concentration

Table 2 – Grafton DWS Microbiological Sampling

	E. Coli, (cfu/100mL)		**Total Coliform**, (cfu/100mL)	**HPC**, (cfu/1mL)	
	# of Samples	Range of Results (min # - max #)	Range of Results (min # - max #)	# of Samples	Range of Results (min # - max #)
Raw Well 1	52	0 – 0	0 – 0	N/A	N/A
Raw Well 2	52	0 – 0	0 – 0	N/A	N/A
Treated	52	0 – 0	0 – 0	52	0 – 4
Distribution	156	0 – 0	0 – 0	104	0 – 6

Operational testing completed under Schedule 7 of Ontario Regulation 170/03 during the 2021 reporting period are tabulated in Table 3.

Table 3 – Grafton DWS Schedule 7 Operational Monitoring Samples

	Number of Grab Samples	Range of Results (min # - max #)
Turbidity Well 1 (Raw)	12	0.08 – 0.43 (NTU)
Turbidity Well 2 (Raw)	12	0.06 – 0.51 (NTU)
Turbidity (Treated)	12	0.07 – 0.45 (NTU)
Chlorine (mg/L)	8760 (continuous monitoring)	1.21 – 2.14

Summary of additional testing and sampling:

Table 4 – Grafton DWS Summary of additional testing and sampling

Location	Date Sampled	Parameter	Result	Unit of Measure
Pump Well 2	Dec 10, 2021	E coli/Total Coliform	0/0	
		Total/Free chlorine	1.77/1.58	

DW Hydrant 105 Edwardson Rd	Dec 12, 2021	E coli/Total Coliform	0/0	cfu/100mL
		Total/Free chlorine	1.72/1.52	
	Dec 13, 2021	E coli/Total Coliform	0/0	
		Total/Free chlorine	1.45/1.30	

In addition to the microbiological sampling and testing requirements, sampling and testing is required for chemical, inorganic and organic parameters. Table 5 illustrates Schedule 13, Schedule 23, and Schedule 24 requirements. If there were multiple samples taken during the reporting period, the most recent sample result is provided. A parameter below the method detection limit indicated by (<), cannot be detected as the concentration is lower than the minimum concentration that can be measured and reported with 99% certainty.

Table 5 – Grafton DWS Schedule 13, 23 and 24 Sampling

PARAMETER	STANDARD (µg/L)	SAMPLE RESULT (µg/L)	SAMPLE DATE
Fluoride	1.5	0.21	16-Sept-19
Sodium	20	17	
Nitrite	1	0.003 < MDL	09-Nov-21
Nitrate	10	0.019	
THM: Annual Average	100	24.5	
HAA: Annual Average	80	5.3 < MDL	
Antimony	6	0.09 < MDL	13-Jan-20
Arsenic	10	0.3	
Barium	1000	146	
Boron	5000	30	
Cadmium	5	0.003 < MDL	
Chromium	50	0.09	
Mercury	1	0.01 <MDL	
Selenium	10	0.04 < MDL	
Uranium	20	0.057	
Benzene	1	0.32 <MDL	
Carbon tetrachloride	2	0.17 <MDL	
1,2-Dichlorobenzene	200	0.41 <MDL	
1,4-Dichlorobenzene	5	0.36 <MDL	
1,1-Dichloroethylene (vinylidene chloride)	14	0.33 <MDL	
1,2-Dichloroethane	5	0.35 <MDL	
Dichloromethane	50	0.35 <MDL	
Monochlorobenzene	80	0.3 <MDL	
Tetrachloroethylene (perchloroethylene)	10	0.35 <MDL	
Trichloroethylene	5	0.44 <MDL	
Vinyl Chloride	1	0.17 <MDL	
Diquat	70	1 <MDL	
Paraquat	10	1 <MDL	

Table 5 – Grafton DWS Schedule 13, 23 and 24 Sampling			
PARAMETER	**STANDARD (µg/L)**	**SAMPLE RESULT (µg/L)**	**SAMPLE DATE**
Glyphosate	280	1 <MDL	
Polychlorinated Biphenyls (PCBs) - Total	3	0.04 <MDL	
Benzo(a)pyrene	0.01	0.004 <MDL	
Alachlor	5	0.02 <MDL	
Atrazine + N-dealkylated metabolites	5	0.02 <MDL	
Atrazine	-	0.01 <MDL	
Desethyl atrazine	-	0.01 <MDL	
Azinphos-methyl	20	0.05 <MDL	
Carbaryl	90	0.05 <MDL	
Carbofuran	90	0.01 <MDL	
Chlorpyrifos	90	0.02 <MDL	
Diazinon	20	0.02 <MDL	
Dimethoate	20	0.06 <MDL	
Diuron	150	0.03 <MDL	
Malathion	190	0.02 <MDL	
Metolachlor	50	0.01 <MDL	
Metribuzin	80	0.02 <MDL	
Phorate	2	0.01 <MDL	
Prometryne	1	0.03 <MDL	
Simazine	10	0.01 <MDL	
Terbufos	1	0.01 <MDL	
Triallate	230	0.01 <MDL	
Trifluralin	45	0.02 <MDL	
2,4-dichlorophenoxyacetic acid (24-D)	100	0.19 <MDL	
Bromoxynil	5	0.33 <MDL	
Dicamba	120	0.20 <MDL	
Diclofop-methyl	9	0.40 <MDL	
MCPA	0.1	0.00012 <MDL	
Picloram	190	1 <MDL	
2,4-dichlorophenol	900	0.15 <MDL	
2,4,6-trichlorophenol	5	0.25 <MDL	
6-tetrachlorophenol	100	0.20 <MDL	
Pentachlorophenol	60	0.15 <MDL	

Summary of lead testing under Schedule 15.1 during this reporting period

Table 5 – Grafton DWS Schedule 15.1 Lead Sampling				
Location Type	**Number of Samples**	**Range of Lead Results (min#) – (max #) ug/L**	**Standard (MAC) ug/L**	**Number of Exceedances**
Distribution	4	0.02 - 0.24	10	0

APPENDIX- 1

The Corporation of the Township of Alnwick/Haldimand

Grafton DWS- MDWL 238-101 Issue 4

Ontario

MUNICIPAL DRINKING WATER LICENCE

Licence Number: 238-101
Issue Number: 4

Pursuant to the *Safe Drinking Water Act*, 2002, S.O. 2002, c. 32, and the regulations made thereunder and subject to the limitations thereof, I hereby issue this municipal drinking water licence under Part V of the *Safe Drinking Water Act*, 2002, S.O. 2002, c. 32 to:

The Corporation of the Township of Alnwick/Haldimand

10836 County Road 2
P.O. Box 70
Grafton ON, K0K 2G0

For the following municipal residential drinking water system:

Grafton Drinking Water System

This municipal drinking water licence includes the following:

Schedule	Description
Schedule A	Drinking Water System Information
Schedule B	General Conditions
Schedule C	System-Specific Conditions
Schedule D	Conditions for Relief from Regulatory Requirements
Schedule E	Pathogen Log Removal/Inactivation Credits

Upon the effective date of this drinking water licence #238-101, all previously issued versions of licence #238-101 are revoked and replaced by this licence.

DATED at TORONTO this 25th day of February, 2022

Signature

Aziz Ahmed, P.Eng.
Director
Part V, *Safe Drinking Water Act*, 2002

Schedule A: Drinking Water System Information

System Owner	**The Corporation of the Township of Alnwick/Haldimand**
Licence Number	**238-101**
Drinking Water System Name	**Grafton Drinking Water System**
Licence Effective Date	**February 25, 2022**

1.0 Licence Information

Licence Issue Date	February 25, 2022
Licence Effective Date	February 25, 2022
Licence Expiry Date	February 24, 2027
Application for Licence Renewal Date	July 25, 2026

2.0 Incorporated Documents

The following documents are applicable to the above drinking water system and form part of this licence:

2.1 Drinking Water Works Permit

Drinking Water System Name	Permit Number	Issue Date
Grafton Drinking Water System	238-201	February 25, 2022

2.2 Permits to Take Water

Water Taking Location	Permit Number	Issue Date
Well No. PW1 and PW2	5086-9BPM4A	September 26, 2013

2.3 Other Documents

Document Title	Version Number	Version Date
Not Applicable	Not Applicable	Not Applicable

3.0 Financial Plans

The Financial Plan Number for the Financial Plan required to be developed for this drinking water system in accordance with O. Reg. 453/07 shall be:	238-301
Alternately, if one Financial Plan is developed for all drinking water systems owned by the owner, the Financial Plan Number shall be:	238-301A

4.0 Accredited Operating Authority

Drinking Water System or Operational Subsystems	Accredited Operating Authority	Operational Plan No.	Operating Authority No.
Grafton Drinking Water System	Lakefront Utility Services Inc.	238-401	238-OA1

Schedule B: General Conditions

System Owner	**The Corporation of the Township of Alnwick/Haldimand**
Licence Number	**238-101**
Drinking Water System Name	**Grafton Drinking Water System**
Licence Effective Date	**February 25, 2022**

1.0 Definitions

1.1 Words and phrases not defined in this licence and the associated drinking water works permit shall be given the same meaning as those set out in the SDWA and any regulations made in accordance with that act, unless the context requires otherwise.

1.2 In this licence and the associated drinking water works permit:

"**adverse effect**", "**contaminant**" and "**natural environment**" shall have the same meanings as in the EPA;

"**alteration**" may include the following in respect of this drinking water system:

(a) An addition to the system,
(b) A modification of the system,
(c) A replacement of part of the system, and
(d) An extension of the system;

"**compound of concern**" means a contaminant described in paragraph 4 subsection 26 (1) of O. Reg. 419/05, namely, a contaminant that is discharged to the air from a component of the drinking water system in an amount that is not negligible;

"CT" means the CT Disinfection Concept, as described in subsection 3.1.1 of the Ministry's Procedure for Disinfection of Drinking Water in Ontario, dated July 29 2016.

"**Director**" means a Director appointed pursuant to section 6 of the SDWA for the purposes of Part V of the SDWA;

"**drinking water works permit**" means the drinking water works permit for the drinking water system, as identified in Schedule A of this licence and as amended from time to time;

"emission summary table" means a table described in paragraph 14 of subsection 26 (1) of O. Reg. 419/05;

"EPA" means the *Environmental Protection Act*, R.S.O. 1990, c. E.19;

"**financial plan**" means the financial plan required by O. Reg. 453/07;

"Harmful Algal Bloom (HAB)" means an overgrowth of aquatic algal bacteria that produce or have the potential to produce toxins in the surrounding water, when the algal

cells are damaged or die. Such bacteria are harmful to people and animals and include microcystins produced by cyanobacterial blooms.

"**licence**" means this municipal drinking water licence for the municipal drinking water system identified in Schedule A of this licence;

"**licensed engineering practitioner**" means a person who holds a licence, limited licence or temporary licence under the Professional Engineers Act;

"Ministry" means the Ontario Ministry of the Environment, Conservation and Parks;

"**operational plan**" means an operational plan developed in accordance with the Director's Directions – Minimum Requirements for Operational Plans made under the authority of subsection 15(1) of the SDWA;

"**owner**" means the owner of the drinking water system as identified in Schedule A of this licence;

"OWRA" means the *Ontario Water Resources Act*, R.S.O. 1990, c. 0.40;

"**permit to take water**" means the permit to take water that is associated with the taking of water for purposes of the operation of the drinking water system, as identified in Schedule A of this licence and as amended from time to time;

"**point of impingement**" has the same meaning as in section 2 of O. Reg. 419/05 under the EPA;

"**point of impingement limit**" means the appropriate standard from Schedule 2 or 3 of O. Reg. 419/05 under the EPA and if a standard is not provided for a compound of concern, the concentration set out for the compound of concern in the document titled "Air Contaminants Benchmarks (ACB) List: Standards, guidelines and screening levels for assessing point of impingement concentrations of air contaminants", as amended from time to time and published by the Ministry and available on a government of Ontario website;

"**provincial officer**" means a provincial officer designated pursuant to section 8 of the SDWA;

"**publication NPC-300**" means the Ministry publication titled "Environmental Noise Guideline: Stationary and Transportation Sources – Approval and Planning" dated August 2013, as amended;

"**SCADA system**" means a supervisory control and data acquisition system used for process monitoring, automation, recording and/or reporting within the drinking water system;

"**SDWA**" means the *Safe Drinking Water* Act, 2002, S.O. 2002, c. 32;

"**sensitive receptor**" means any location where routine or normal activities occurring at reasonably expected times would experience adverse effect(s) from a discharge to air from an emergency generator that is a component of the drinking water system, including one or a combination of:

(a) private residences or public facilities where people sleep (e.g.: single and multi-unit dwellings, nursing homes, hospitals, trailer parks, camping grounds, etc.),
(b) institutional facilities (e.g.: schools, churches, community centres, day care centres, recreational centres, etc.),
(c) outdoor public recreational areas (e.g.: trailer parks, play grounds, picnic areas, etc.), and
(d) other outdoor public areas where there are continuous human activities (e.g.: commercial plazas and office buildings).

"**sub-system**" has the same meaning as in Ontario Regulation 128/04 (Certification of Drinking Water System Operators and Water Quality Analysts) under the SDWA;

"**surface water**" means water bodies (lakes, wetlands, ponds - including dug-outs), water courses (rivers, streams, water-filled drainage ditches), infiltration trenches, and areas of seasonal wetlands;

"UV" means ultraviolet, as in ultraviolet light produced from an ultraviolet reactor.

2.0 Applicability

2.1 In addition to any other applicable legal requirements, the drinking water system identified above shall be established, altered and operated in accordance with the conditions of the drinking water works permit and this licence.

3.0 Licence Expiry

3.1 This licence expires on the date identified as the licence expiry date in Schedule A of this licence.

4.0 Licence Renewal

4.1 Any application to renew this licence shall be made on or before the date identified as the application for licence renewal date set out in Schedule A of this licence.

5.0 Compliance

5.1 The owner and operating authority shall ensure that any person authorized to carry out work on or to operate any aspect of the drinking water system has been informed of the SDWA, all applicable regulations made in accordance with that act, the drinking water works permit and this licence and shall take all reasonable measures to ensure any such person complies with the same.

6.0 Licence and Drinking Water Works Permit Availability

6.1 At least one copy of this licence and the drinking water works permit shall be stored in such a manner that they are readily viewable by all persons involved in the operation of the drinking water system.

7.0 Permit to Take Water and Drinking Water Works Permit

7.1 A permit to take water identified in Schedule A of this licence is the applicable permit on the date identified as the Effective Date of this licence.

7.2 A drinking water works permit identified in Schedule A of this licence is the applicable permit on the date identified as the Effective Date of this licence.

8.0 Financial Plan

8.1 For every financial plan prepared in accordance with subsections 2(1) and 3(1) of O. Reg. 453/07, the owner of the drinking water system shall:

8.1.1 Ensure that the financial plan contains on the front page of the financial plan, the appropriate financial plan number as set out in Schedule A of this licence; and

8.1.2 Submit a copy of the financial plan to the Ministry of Municipal Affairs and Housing within three (3) months of receiving approval by a resolution of municipal council or the governing body of the owner.

9.0 Interpretation

9.1 Where there is a conflict between the provisions of this licence and any other document, the following hierarchy shall be used to determine the provision that takes precedence:

9.1.1 The SDWA*;*

9.1.2 A condition imposed in this licence that explicitly overrides a prescribed regulatory requirement;

9.1.3 A condition imposed in the drinking water works permit that explicitly overrides a prescribed regulatory requirement;

9.1.4 Any regulation made under the SDWA;

9.1.5 Any provision of this licence that does not explicitly override a prescribed regulatory requirement;

9.1.6 Any provision of the drinking water works permit that does not explicitly override a prescribed regulatory requirement;

9.1.7 Any application documents listed in this licence, or the drinking water works permit from the most recent to the earliest; and

9.1.8 All other documents listed in this licence, or the drinking water works permit from the most recent to the earliest.

9.1.9 Any other technical bulletin or procedure issued by the Ministry from the most recent to the earliest.

9.2 If any requirement of this licence or the drinking water works permit is found to be invalid by a court of competent jurisdiction, the remaining requirements of this licence and the drinking water works permit shall continue to apply.

9.3 The issuance of and compliance with the conditions of this licence and the drinking water works permit does not:

9.3.1 Relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including the *Environmental Assessment Act*, R.S.O. 1990, c. E.18; and

9.3.2 Limit in any way the authority of the appointed Directors and provincial officers of the Ministry to require certain steps be taken or to require the owner to furnish any further information related to compliance with the conditions of this licence or the drinking water works permit.

9.4 For greater certainty, nothing in this licence or the drinking water works permit shall be read to provide relief from regulatory requirements in accordance with section 46 of the SDWA, except as expressly provided in the licence or the drinking water works permit.

10.0 Adverse Effects

10.1 Nothing in this licence or the drinking water works permit shall be read as to permit:

10.1.1 The discharge of a contaminant into the natural environment that causes or is likely to cause an adverse effect; or

10.1.2 The discharge of any material of any kind into or in any waters or on any shore or bank thereof or into or in any place that may impair the quality of the water of any waters.

10.2 All reasonable steps shall be taken to minimize and ameliorate any adverse effect on the natural environment or impairment of the quality of water of any waters resulting from the operation of the drinking water system including such accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.

10.3 Fulfillment of one or more conditions imposed by this licence or the drinking water works permit does not eliminate the requirement to fulfill any other condition of this licence or the drinking water works permit.

11.0 Change of Owner or Operating Authority

11.1 This licence is not transferable without the prior written consent of the Director.

11.2 The owner shall notify the Director in writing at least 30 days prior to a change of any operating authority identified in Schedule A of this licence.

11.2.1 Where the change of operating authority is the result of an emergency situation, the owner shall notify the Director in writing of the change as soon as practicable.

12.0 Information to be Provided

12.1 Any information requested by a Director or a provincial officer concerning the drinking water system and its operation, including but not limited to any records required to be kept by this licence or the drinking water works permit, shall be provided upon request.

13.0 Records Retention

13.1 Except as otherwise required in this licence or the drinking water works permit, any records required by or created in accordance with this licence or the drinking water works permit, other than the records specifically referenced in section 12 or section 13 of O. Reg. 170/03, shall be retained for at least 5 years and made available for inspection by a provincial officer, upon request.

14.0 Chemicals and Materials

14.1 All chemicals and materials used in the alteration or operation of the drinking water system that come into contact with water within the system shall meet all applicable standards set by both the American Water Works Association ("AWWA") and the American National Standards Institute ("ANSI") safety criteria standards NSF/60, NSF/61 and NSF/372.

14.1.1 In the event that the standards are updated, the owner may request authorization from the Director to use any on hand chemicals and materials that previously met the applicable standards.

14.2 The most current chemical and material product registration documentation from a testing institution accredited by either the Standards Council of Canada or by the American National Standards Institution ("ANSI") shall be available at all times for each chemical and material used in the operation of the drinking water system that comes into contact with water within the system.

14.3 Conditions 14.1 and 14.2 do not apply in the case of the following:

14.3.1 Water pipe and pipe fittings meeting AWWA specifications made from ductile iron, cast iron, PVC, fibre and/or steel wire reinforced cement pipe or high density polyethylene (HDPE);

14.3.2 Articles made from stainless steel, glass, HDPE or Teflon®;

14.3.3 Cement mortar for watermain lining and for water contacting surfaces of concrete structures made from washed aggregates and Portland cement;

14.3.4 Gaskets that are made from NSF approved materials;

14.3.5 Food grade oils and lubricants, food grade anti-freeze, and other food grade chemicals and materials that are compatible for drinking water use that may come into contact with drinking water, but are not added directly to the drinking water; or

14.3.6 Any particular chemical or material where the owner has written documentation signed by the Director that indicates that the Ministry is satisfied that the chemical or material is acceptable for use within the drinking water system and the chemical or material is only used as permitted by the documentation.

15.0 Drawings

15.1 All drawings and diagrams in the possession of the owner that show any treatment subsystem as constructed shall be retained by the owner unless the drawings and diagrams are replaced by a revised or updated version showing the subsystem as constructed subsequent to the alteration.

15.2 Any alteration to any treatment subsystem shall be incorporated into process flow diagrams, process and instrumentation diagrams, and record drawings and diagrams within one year of the alteration being completed or placed into service.

15.3 Process flow diagrams and process and instrumentation diagrams for any treatment subsystem shall be kept in a place, or made available in such a manner, that they may be readily viewed by all persons responsible for all or part of the operation of the drinking water system.

16.0 Operations and Maintenance Manual

16.1 An up-to-date operations and maintenance manual or manuals shall be maintained and applicable parts of the manual or manuals shall be made available for reference to all persons responsible for all or part of the operation or maintenance of the drinking water system.

16.2 The operations and maintenance manual or manuals, shall include at a minimum:

16.2.1 The requirements of this licence and associated procedures;

16.2.2 The requirements of the drinking water works permit for the drinking water system;

16.2.3 A description of the processes used to achieve primary and secondary disinfection within the drinking water system including where applicable:

a) A copy of the CT calculations that were used as the basis for primary disinfection under worst case operating conditions and other operating conditions, if applicable; and

b) The validated operating conditions for UV disinfection equipment, including a copy of the validation certificate;

16.2.4 Procedures for monitoring and recording the in-process parameters necessary for the control of any treatment subsystem and for assessing the performance of the drinking water system;

16.2.5 Procedures for the operation and maintenance of monitoring equipment;

16.2.6 Contingency plans and procedures for the provision of adequate equipment and material to deal with emergencies, upset conditions and equipment breakdown;

16.2.7 Procedures for dealing with complaints related to the drinking water system, including the recording of the nature of the complaint and any investigation and corrective action taken in respect of the complaint;

16.2.8 An inspection schedule for all wells associated with the drinking water system, including all production wells, standby wells, test wells and monitoring wells;

16.2.9 Well inspection and maintenance procedures that consider the entire well structure of each well including all above and below grade well components; and

16.2.10 Remedial action plans for situations where an inspection indicates non-compliance with respect to regulatory requirements and/or risk to raw well water quality.

16.3 Procedures necessary for the operation and maintenance of any alterations to the drinking water system shall be incorporated into the operations and maintenance manual or manuals prior to those alterations coming into operation.

16.4 All of the procedures included or referenced within the operations and maintenance manual must be implemented.

Schedule C: System-Specific Conditions

System Owner	**The Corporation of the Township of Alnwick/Haldimand**
Licence Number	**238-101**
Drinking Water System Name	**Grafton Drinking Water System**
Licence Effective Date	**February 25, 2022**

1.0 System Performance

Rated Capacity

1.1 For each treatment subsystem listed in column 1 of Table 1, the maximum daily volume of treated water that flows from the treatment subsystem to the distribution system shall not exceed the value identified as the rated capacity in column 2 of the same row.

Table 1: Rated Capacity

Column 1 Treatment Subsystem Name	Column 2 Rated Capacity (m^3/day)
Grafton Well Pumphouse	1,253

Maximum Flow Rates

1.2 For each treatment subsystem listed in column 1 of Table 2, the maximum flow rate of water that flows into a treatment subsystem component listed in column 2 shall not exceed the value listed in column 3 of the same row.

Table 2: Maximum Flow Rates

Column 1 Treatment Subsystem Name	Column 2 Treatment Subsystem Component	Column 3 Maximum Flow Rate (L/s)
Not Applicable	Not Applicable	Not Applicable

1.3 Despite conditions 1.1 and 1.2, a treatment subsystem may be operated temporarily at a maximum daily volume and/or a maximum flow rate above the values set out in column 2 of Table 1 and column 3 of Table 2 respectively for the purposes of fighting a large fire or for the maintenance of the drinking water system.

1.4 Condition 1.3 does not authorize the discharge into the distribution system of any water that does not meet all of the requirements of this licence and all other regulatory requirements, including compliance with the Ontario Drinking Water Quality Standards.

Residuals Management

1.5 In respect of an effluent discharged into the natural environment from a treatment subsystem or treatment subsystem component listed in column 1 of Table 3:

1.5.1 The annual average concentration of a test parameter identified in column 2 shall:

a) not exceed the value in column 3 of the same row; and

b) be calculated at least once monthly as the running annual average based on the previous twelve months of results;

1.5.2 Where the average concentration of a test parameter identified in column 2 exceeds the value in column 3, the concentration shall be reported to the local Ministry district office within 72 hours of receipt of the last lab result used in the calculation;

1.5.3 The maximum concentration of a test parameter identified in column 2 shall not exceed the value in column 4 of the same row;

1.5.4 Where the maximum concentration of a test parameter identified in column 2 exceeds the value in column 4, the discharge shall be reported in accordance with s.13.2 of O. Reg. 675.98 and recorded in accordance with s.12.2 of O. Reg. 675.98 within 24 hours of receipt of the lab result; and,

1.5.5 The test parameters listed in column 2 of Table 3 shall be sampled in accordance with conditions 5.2, 5.3 and 5.4 of Schedule C in this Licence.

Table 3: Residuals Management

Column 1 Treatment Subsystem or Treatment Subsystem Component Name	Column 2 Test Parameter	Column 3 Annual Average Concentration (mg/L)	Column 4 Maximum Concentration (mg/L)
Not Applicable	Not Applicable	Not Applicable	Not Applicable

UV Disinfection Equipment Performance

1.6 For each treatment subsystem or treatment subsystem component listed in column 1 of Table 4, and while directing water to the distribution system and being used to meet pathogen log removal/inactivation credits specified in Schedule E:

1.6.1 The UV disinfection equipment shall be operated within the validated limits for the equipment at all times such that a continuous pass-through UV dose is maintained throughout the life time of the UV lamp(s) that is at least the minimum continuous pass-through UV dose set out in column 2 of the same row

1.6.2 In addition to any other sampling, analysis and recording that may be required, the ultraviolet light disinfection equipment shall test for the test parameters set

out in column 4 of the same row at a testing frequency of once every five (5) minutes or less and record the test data at a recording frequency of once every four (4) hours or less;

1.6.3 If there is a UV disinfection equipment alarm signaling that the disinfection equipment is malfunctioning, has lost power, or is not providing the appropriate level of disinfection the test parameters set out in column 4 of the same row shall be recorded at a recording frequency of once every five minutes or less until the alarm condition has been corrected;

1.6.4 A monthly summary report shall be prepared at the end of each calendar month which sets out the time, date and duration of each UV equipment alarm described in condition 1.6.3, the volume of water treated during each alarm period and the actions taken by the operating authority to correct the alarm situation;

Table 4: UV Disinfection Equipment

Column 1 Treatment Subsystem or Treatment Subsystem Component Name	Column 2 Minimum Continuous Pass-Through UV Dose (mJ/cm^2)	Column 3 Control Strategy	Column 4 Test Parameter
Not Applicable	Not Applicable	Not Applicable	Not Applicable

2.0 Flow Measurement and Recording Requirements

2.1 For each treatment subsystem identified in column 1 of Table 1 and in addition to any other flow measurement and recording that may be required, continuous flow measurement and recording shall be undertaken for:

2.1.1 The flow rate (L/s) and daily volume (m^3/day) of treated water that flows from the treatment subsystem to the distribution system.

2.1.2 The flow rate (L/s) and daily volume (m^3/day) of water that flows into the treatment subsystem.

2.2 For each treatment subsystem component identified in column 2 of Table 2 and in addition to any other flow measurement and recording that may be required, continuous flow measurement and recording shall be undertaken for the flow rate and daily volume of water that flows into the treatment subsystem component.

2.3 Where a rated capacity from Table 1 or a maximum flow rate from Table 2 is exceeded, the following shall be recorded:

2.3.1 The difference between the measured amount and the applicable rated capacity or maximum flow rate specified in Table 1 or Table 2;

2.3.2 The time and date of the measurement;

2.3.3 The reason for the exceedance; and

2.3.4 The duration of time that lapses between the applicable rated capacity or maximum flow rate first being exceeded and the next measurement where the applicable rated capacity or maximum flow rate is no longer exceeded.

3.0 Calibration of Flow Measuring Devices

3.1 All flow measuring devices that are required by regulation, by a condition in the drinking water works permit 238-201, or by a condition otherwise imposed by the Ministry, shall be checked and where necessary calibrated in accordance with the manufacturer's instructions.

3.2 If the manufacturer's instructions do not indicate how often to check and calibrate a flow measuring device, the equipment shall be checked and where necessary calibrated at least once every 12 months during which the drinking water system is in operation.

3.2.1 For greater certainty, if condition 3.2 applies, the equipment shall be checked and where necessary calibrated not more than 30 days after the first anniversary of the day the equipment was checked and calibrated in the previous 12-month period.

4.0 Calibration of CT Monitoring System

4.1 Any measuring instrumentation that forms part of the monitoring system for CT shall be checked and where necessary calibrated at least once every 12 months during which the drinking water system is in operation, or more frequently in accordance with the manufacturer's instructions.

4.1.1 For greater certainty, if condition 4.1 applies, the instrumentation shall be checked and where necessary calibrated not more than 30 days after the first anniversary of the day the equipment was checked and calibrated in the previous 12-month period.

5.0 Additional Sampling, Testing and Monitoring

Drinking Water Health and Non-Health Related Parameters

5.1 For each treatment subsystem or treatment subsystem component identified in column 1 of Tables 5 and 6 and in addition to any other sampling, testing and monitoring that may be required, sampling, testing and monitoring shall be undertaken for a test parameter listed in column 2 at the sampling frequency listed in column 3 and at the monitoring location listed in column 4 of the same row.

Table 5: Drinking Water Health Related Parameters			
Column 1 Treatment Subsystem or Treatment Subsystem Component Name	**Column 2 Test Parameter**	**Column 3 Sampling Frequency**	**Column 4 Monitoring Location**
Not Applicable	Not Applicable	Not Applicable	Not Applicable

Table 6: Drinking Water Non-Health Related Parameters			
Column 1 Treatment Subsystem or Treatment Subsystem Component Name	**Column 2 Test Parameter**	**Column 3 Sampling Frequency**	**Column 4 Monitoring Location**
Not Applicable	Not Applicable	Not Applicable	Not Applicable

Environmental Discharge Parameters

5.2 For each treatment subsystem or treatment subsystem component identified in column 1 of Table 7 and in addition to any other sampling, testing and monitoring that may be required, sampling, testing and monitoring shall be undertaken for a test parameter listed in column 2 using the sample type identified in column 3 at the sampling frequency listed in column 4 and at the monitoring location listed in column 5 of the same row.

5.3 For the purposes of Table 7:

5.3.1 Manual Composite means the mean of at least three grab samples taken during a discharge event, with one sample being taken immediately following the commencement of the discharge event, one sample being taken approximately at the mid-point of the discharge event and one sample being taken immediately before the end of the discharge event; and

5.3.2 Automated Composite means samples must be taken during a discharge event by an automated sampler at a minimum sampling frequency of once per hour.

5.4 Any sampling, testing and monitoring for the test parameter Total Suspended Solids shall be performed in accordance with the requirements set out in the publication “Standard Methods for the Examination of Water and Wastewater”, 23rd Edition, 2017, or as amended from time to time by more recently published editions.

Table 7: Environmental Discharge Parameters				
Column 1 Treatment Subsystem or Treatment Subsystem Component Name	**Column 2 Test Parameter**	**Column 3 Sample Type**	**Column 4 Sampling Frequency**	**Column 5 Monitoring Location**
Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

5.5 Pursuant to Condition 10 of Schedule B of this licence, the owner may undertake the following environmental discharges associated with the maintenance and/or repair of the drinking water system:

5.5.1 The discharge of potable water from a watermain to a road or storm sewer;

5.5.2 The discharge of potable water from a water storage facility or pumping station:

a) To a road or storm sewer; or

b) To a watercourse where the discharge has been dechlorinated and if necessary, sediment and erosion control measures have been implemented.

5.5.3 The discharge of dechlorinated non-potable water from a watermain, water storage facility or pumping station to a road or storm sewer;

5.5.4 The discharge of raw water from a groundwater well to the environment where if necessary, sediment and erosion control measures have been implemented; and

5.5.5 The discharge of raw water, potable water or non-potable water from a treatment subsystem to the environment where if necessary, the discharge has been dechlorinated and sediment and erosion control measures have been implemented.

5.5.6 The discharge of any excess water to a road, storm sewer or the environment, associated with the management of materials excavated as part of watermain construction or repair, where necessary sediment, erosion and environmental control measures have been implemented.

6.0 Studies Required

6.1 Not Applicable

7.0 Source Protection

7.1 The owner of the drinking water system shall implement risk management measures, as appropriate, to manage any potential threat to drinking water that results from the operation of the drinking water system.

7.2 The owner of the system shall notify the Director in writing within thirty (30) days of any approved changes to an applicable source protection plan that impact the assessed threat level of a fuel oil system identified in Schedule A of drinking water works permit.

7.3 The notification required in condition 7.2 shall include:

7.3.1 A description of the changes and their impact on the assessed threat level of the fuel oil system(s); and,

7.3.2 A timeline for re-assessing the threat level and providing the results of the assessment to the Director.

Schedule D: Conditions for Relief from Regulatory Requirements

System Owner	**The Corporation of the Township of Alnwick/Haldimand**
Licence Number	**238-101**
Drinking Water System Name	**Grafton Drinking Water System**
Licence Effective Date	**February 25, 2022**

Effective February 25, 2022, no relief from regulatory requirements is authorized by the Director under section 46 of the SDWA in respect of the drinking water system.

Schedule E: Pathogen Log Removal/Inactivation Credits

System Owner	**The Corporation of the Township of Alnwick/Haldimand**
Licence Number	**238-101**
Drinking Water System Name	**Grafton Drinking Water System**
Licence Effective Date	**February 25, 2022**

1.0 Primary Disinfection Pathogen Log Removal/Inactivation Credits

Treatment Subsystem Name

Well No. PW-1 and PW-2 [GROUNDWATER]

Minimum Log Removal/ Inactivation Required	Cryptosporidium Oocysts	Giardia Cysts [a]	Viruses [b]
Grafton Well Pumphouse	0	0	2

Log Removal/Inactivation Credits Assigned [a]	Cryptosporidium Oocysts	Giardia Cysts	Viruses
Chlorination [CT: Clearwell]	-	-	2+

[a] Log removal/inactivation credit assignment is based on each treatment process being fully operational and the applicable log removal/inactivation credit assignment criteria being met.

Treatment Component	Log Removal/Inactivation Credit Assignment Criteria
Chlorination	1. Sampling and testing for free chlorine residual shall be carried out by continuous monitoring equipment in the treatment process at or near a location where the intended contact time has just been completed in accordance with the Ministry's *Procedure for Disinfection of Drinking Water in Ontario*; and 2. At all times, CT provided shall be greater than or equal to the CT required to achieve the log removal credits assigned.
Primary Disinfection Notes	

APPENDIX- 2

The Corporation of the Township of Alnwick/Haldimand

Grafton DWS- DWWP 238-201 Issue 3

Ontario

DRINKING WATER WORKS PERMIT

Permit Number: 238-201
Issue Number: 3

Pursuant to the *Safe Drinking Water Act*, 2002, S.O. 2002, c. 32, and the regulations made thereunder and subject to the limitations thereof, I hereby issue this drinking water works permit under Part V of the *Safe Drinking Water Act*, 2002, S.O. 2002, c. 32 to:

The Corporation of the Township of Alnwick/Haldimand

10836 County Road 2
P.O. Box 70
Grafton ON, K0K 2G0

For the following municipal residential drinking water system:

Grafton Drinking Water System

This drinking water works permit includes the following:

Schedule	Description
Schedule A	Drinking Water System Description
Schedule B	General
Schedule C	All documents issued as Schedule C to this drinking water works permit which authorize alterations to the drinking water system
Schedule D	Process Flow Diagrams

Upon the effective date of this drinking water works permit #238-201, all previously issued versions of permit #238-201 are revoked and replaced by this permit.

DATED at TORONTO this 25th day of February, 2022

Signature

Aziz Ahmed, P.Eng.
Director
Part V, *Safe Drinking Water Act*, 2002

Schedule A: Drinking Water System Description

System Owner	**The Corporation of the Township of Alnwick/Haldimand**
Permit Number	**238-201**
Drinking Water System Name	**Grafton Drinking Water System**
Permit Effective Date	**February 25, 2022**

1.0 System Description

1.1 The following is a summary description of the works comprising the above drinking water system:

Overview

The **Grafton Drinking Water System** consists of one (1) well pumphouse and approximately 13 kilometers of distribution watermains.

Grafton Water Supply Plant

Groundwater Wells Supply Plant

- Grafton Well Pumphouse

Grafton Distribution

Grafton Well Pumphouse

Location and System Type

Street Address	434 Edwardson Road, Grafton
UTM Coordinates	NAD27: UTM Zone 17: 738200.00 m E, 4876500.00 m N
System Type	Ground water with disinfection
Notes	

Ground Water Supply

Well Descriptions

Description	Well No. PW1
UTM Coordinates	NAD 27, Zone 17, 738200.00 m E, 4876500.00 m N
Diameter	200 mm
Depth	77.4 m
Pump Type	submersible
Well Pump Capacity	One (1) pump at 870 L/min. at 69 m TDH
Notes	

Description	Well No. PW2
UTM Coordinates	NAD 27, Zone 17, 738100.00 m E, 4876500.00 m N
Diameter	250 mm
Depth	78.2 m
Pump Type	submersible
Well Pump Capacity	One (1) pump at 870 L/min. at 79.2 m TDH
Notes	

Chemical Addition

Chlorine

Description	Sodium hypochlorite addition for disinfection
Feed Points	Raw water discharge header
Equipment	Two (2) metering pumps (duty and standby) complete with one (1) storage tank for primary disinfection
Notes	

Sodium Silicate

Description	Sodium silicate addition for iron sequestering
Feed Points	Raw water discharge header
Equipment	One (1) metering pump complete with one (1) storage tank
Notes	

On-Site Storage

Clearwells

Description	Two (2) interconnected underground clearwells complete with emergency overflow
Capacity	Each well 525 m^3
Notes	

High Lift Works

High Lift Pump Wells

Description	Two (2) interconnected high lift pump wells
Capacity	Each well 125 m^3
Equipment (Pump Well No. 1)	Two (2) vertical turbine high lift pumps with variable drive frequency rated at 450L/s at a TDH of 35.5 m
	One (1) constant speed vertical turbine fire pump at 4,800 L/min. at 245 kPa
	One (1) submersible pump at 600 L/min. at 6 m TDH for recirculation from pump well to clearwell No. 1
Equipment (Pump Well No. 2)	Two (2) vertical turbine high lift pumps with variable drive frequency rated at 450L/s at a TDH of 35 m
Notes	

Instrumentation and Control

SCADA System

Description	A Supervisory Control and Data Acquisition (SCADA) System
Notes	Controls, monitoring, recording and alarms. The SCADA system monitors the raw water flow, treated water flow, and chlorine residual.

Emergency Power

Backup Power Supply

Description	One (1) 235kW diesel engine standby power generator, two (2) 1,100L storage tanks with spill containment.
Notes	

Fuel Oil Systems

Fuel Storage Locations

Location	Grafton Well Pumphouse 434 Edwardson Road, Grafton UTM Zone 17, 738200.00 m E, 4876500.00 m N
Description	Two single wall tanks commonly connected, each tank capacity 1,110L, located inside a concrete containment dike
Fuel Type	Diesel
Source Protection Area	Lower Trent Source Protection Area
Notes	

Watermains

1.1 Watermains within the distribution system comprise:

1.1.1 Watermains that have been set out in each document or file identified in column 1 of Table 1.

Table 1: Watermains

Column 1 Document or File Name	Column 2 Date
2020-Grafton Distribution Map.pdf	December 2, 2020

1.1.2 Watermains that have been added, modified, replaced or extended further to the provisions of Schedule C of this drinking water works permit on or after the date identified in column 2 of Table 1 for each document or file identified in column 1.

1.1.3 Watermains that have been added, modified, replaced or extended further to an authorization by the Director on or after the date identified in column 2 of Table 1 for each document or file identified in column 1.

Schedule B: General

System Owner	**The Corporation of the Township of Alnwick/Haldimand**
Permit Number	**238-201**
Drinking Water System Name	**Grafton Drinking Water System**
Permit Effective Date	**February 25, 2022**

1.0 Applicability

1.1 In addition to any other applicable legal requirements, the drinking water system identified above shall be altered and operated in accordance with the conditions of this drinking water works permit and the licence #238-101.

1.2 The definitions and conditions of licence #238-101 are incorporated into this permit and also apply to this drinking water system.

2.0 Alterations to the Drinking Water System

2.1 Any document issued by the Director to be incorporated into Schedule C to this drinking water works permit shall provide authority to alter the drinking water system in accordance with the applicable conditions of this drinking water works permit and licence #238-101.

2.2 All documents issued by the Director as described in condition 2.1 shall form part of this drinking water works permit.

2.3 All parts of the drinking water system in contact with drinking water that are added, modified, replaced, extended shall be disinfected in accordance with a procedure approved by the Director or in accordance with the applicable provisions of the following documents:

a) Until August 25, 2022 the ministry's Watermain Disinfection Procedure, dated November 2015. As of August 26, 2022 the ministry's Watermain Disinfection Procedure, dated August 1, 2020;
b) Subject to condition 2.3.2, any updated version of the ministry's Watermain Disinfection Procedure;
c) AWWA C652 – Standard for Disinfection of Water-Storage Facilities;
d) AWWA C653 – Standard for Disinfection of Water Treatment Plants; and
e) AWWA C654 – Standard for Disinfection of Wells.

2.3.1 For greater clarity, where an activity has occurred that could introduce contamination, including but not limited to repair, maintenance, or physical / video inspection, all equipment that may come in contact with the drinking water system shall be disinfected in accordance with the requirements of condition 2.3. above.

2.3.2 Updated requirements described in condition 2.3 b) are effective six months from the date of publication of the updated Watermain Disinfection Procedure.

2.4 The owner shall notify the Director in writing within thirty (30) days of the placing into service or the completion of any addition, modification, replacement, removal or extension of the drinking water system which had been authorized through:

2.4.1 Schedule B to this drinking water works permit which would require an alteration of the description of a drinking water system component described in Schedule A of this drinking water works permit;

2.4.2 Any document to be incorporated in Schedule C to this drinking water works permit respecting works other than watermains; or

2.4.3 Any approval issued prior to the issue date of the first drinking water works permit respecting works other than watermains which were not in service at the time of the issuance of the first drinking water works permit.

2.5 The notification required in condition 2.4 shall be submitted using the "Director Notification Form" published by the Ministry.

2.6 For greater certainty, the notification requirements set out in condition 2.4 do not apply to any addition, modification, replacement, removal or extension in respect of the drinking water system which:

2.6.1 Is exempt from subsection 31(1) of the SDWA by subsection 9.(2) of O. Reg. 170/03;

2.6.2 Constitutes maintenance or repair of the drinking water system; or

2.6.3 Is a watermain authorized by condition 3.1 of Schedule B of this drinking water works permit.

2.7 The owner shall notify the legal owner of any part of the drinking water system that is prescribed as a municipal drinking water system by section 2 of O. Reg. 172/03 of the requirements of the licence and this drinking water works permit as applicable to the prescribed system.

2.8 For greater certainty, the owner may only carry out alterations to the drinking water system in accordance with this drinking water works permit after having satisfied other applicable legal obligations, including those arising from the *Environmental Assessment Act*, *Niagara Escarpment Planning and Development Act*, *Oak Ridges Moraine Conservation Act, 2001* and *Greenbelt Act, 2005*.

3.0 Watermain Additions, Modifications, Replacements and Extensions

3.1 The owner may alter the drinking water system, or permit it to be altered by a person acting on the owner's behalf, by adding, modifying, replacing or extending a watermain within the distribution system subject to the following conditions:

3.1.1 The design of the watermain addition, modification, replacement or extension:

a) Has been prepared by a licensed engineering practitioner;

b) Has been designed only to transmit water and has not been designed to treat water;

c) Satisfies the design criteria set out in the Ministry publication “Watermain Design Criteria for Future Alterations Authorized under a Drinking Water Works Permit – June 2012”, as amended from time to time; and

d) Is consistent with or otherwise addresses the design objectives contained within the Ministry publication “Design Guidelines for Drinking Water Systems, 2008”, as amended from time to time.

3.1.2 The maximum demand for water exerted by consumers who are serviced by the addition, modification, replacement or extension of the watermain will not result in an exceedance of the rated capacity of a treatment subsystem or the maximum flow rate for a treatment subsystem component as specified in the licence, or the creation of adverse conditions within the drinking water system.

3.1.3 The watermain addition, modification, replacement or extension will not adversely affect the distribution system’s ability to maintain a minimum pressure of 140 kPa at ground level at all points in the distribution system under maximum day demand plus fire flow conditions.

3.1.4 Secondary disinfection will be provided to water within the added, modified, replaced or extended watermain to meet the requirements of O. Reg. 170/03.

3.1.5 The watermain addition, modification, replacement or extension is wholly located within the municipal boundary over which the owner has jurisdiction.

3.1.6 The owner of the drinking water system consents in writing to the watermain addition, modification, replacement or extension.

3.1.7 A licensed engineering practitioner has verified in writing that the watermain addition, modification, replacement or extension meets the requirements of condition 3.1.1.

3.1.8 The owner of the drinking water system has verified in writing that the watermain addition, modification, replacement or extension meets the requirements of conditions 3.1.2 to 3.1.6.

3.2 The authorization for the addition, modification, replacement or extension of a watermain provided for in condition 3.1 does not include the addition, modification, replacement or extension of a watermain that:

3.2.1 Passes under or through a body of surface water, unless trenchless construction methods are used;

3.2.2 Has a nominal diameter greater than 900 mm;

3.2.3 Results in the fragmentation of the drinking water system; or

3.2.4 Connects to another drinking water system, unless:

a) Prior to construction, the owner of the drinking water system seeking the connection obtains written consent from the owner or owner’s delegate of the drinking water system being connected to; and

b) The owner of the drinking water system seeking the connection retains a copy of the written consent from the owner or owner's delegate of the drinking water system being connected to as part of the record that is recorded and retained under condition 3.3.

3.3 The verifications required in conditions 3.1.7 and 3.1.8 shall be:

3.3.1 Recorded on "Form 1 – Record of Watermains Authorized as a Future Alteration", as published by the Ministry, prior to the watermain addition, modification, replacement or extension being placed into service; and

3.3.2 Retained for a period of ten (10) years by the owner.

3.4 For greater certainty, the verification requirements set out in condition 3.3 do not apply to any addition, modification, replacement or extension in respect of the drinking water system which:

3.4.1 Is exempt from subsection 31(1) of the SDWA by subsection 9.(2) of O. Reg. 170/03; or

3.4.2 Constitutes maintenance or repair of the drinking water system.

3.5 The document or file referenced in Column 1 of Table 1 of Schedule A of this drinking water works permit that sets out watermains shall be retained by the owner and shall be updated to include watermain additions, modifications, replacements and extensions within 12 months of the addition, modification, replacement or extension.

3.6 The updates required by condition 3.5 shall include watermain location relative to named streets or easements and watermain diameter.

3.7 Despite clause (a) of condition 3.1.1 and condition 3.1.7, with respect to the replacement of an existing watermain or section of watermain that is 6.1 meters in length or less, if a licensed engineering practitioner has:

3.7.1 inspected the replacement prior to it being put into service;

3.7.2 prepared a report confirming that the replacement satisfies clauses (b), (c) and (d) of condition 3.1.1 (i.e. "Form 1 – Record of Watermains Authorized by a Future Alteration" (Form 1), Part 3, items No. 2, 3 and 4); and

3.7.3 appended the report referred to in condition 3.7.2 to the completed Form 1,

the replacement is exempt from the requirements that the design of the replacement be prepared by a licensed engineering practitioner and that a licensed engineering practitioner verify on Form 1, Part 3, item No. 1 that a licensed engineering practitioner prepared the design of the replacement.

3.8 For greater certainty, the exemption in condition 3.7 does not apply to the replacement of an existing watermain or section of watermain if two or more sections of pipe, each of which is 6.1 meters in length or less, are joined together, if the total length of replacement pipes joined together is greater than 6.1 meters.

4.0 Minor Modifications to the Drinking Water System

4.1 The drinking water system may be altered by adding, modifying or replacing the following components in the drinking water system:

4.1.1 Coagulant feed systems in the treatment system, including the location and number of dosing points:

a) Prior to making any alteration to the drinking water system under condition 4.1.1, the owner shall undertake a review of the impacts that the alteration might have on corrosion control or other treatment processes; and

b) The owner shall notify the Director in writing within thirty (30) days of any alteration made under condition 4.1.1 and shall provide the Director with a copy of the review.

c) The notification required in condition 4.1.1 b) shall be submitted using the "Director Notification Form" published by the Ministry

4.1.2 Instrumentation and controls, including new SCADA systems and upgrades to SCADA system hardware;

4.1.3 SCADA system software or programming that:

a) Measures, monitors or reports on a regulated parameter;
b) Measures, monitor or reports on a parameter that is used to calculate CT; or,
c) Calculates CT for the system or is part of the process algorithm that calculates log removal, where the impacts of addition, modification or replacement have been reviewed by a licensed engineering practitioner;

4.1.4 Filter media, backwashing equipment, filter troughs, and under-drains and associated equipment in the treatment system;

4.1.5 Spill containment works; or,

4.1.6 Coarse screens and fine screens

4.2 The drinking water system may be altered by adding, modifying, replacing or removing the following components in the drinking water system:

4.2.1 Treated water pumps, pressure tanks, and associated equipment;

4.2.2 Raw water pumps and process pumps in the treatment system;

4.2.3 Inline booster pumping stations that are not associated with distribution system storage facilities and are on a watermain with a nominal diameter not exceeding 200 mm;

4.2.4 Re-circulation devices within distribution system storage facilities;

4.2.5 In-line mixing equipment;

4.2.6 Chemical metering pumps and chemical handling pumps;

4.2.7 Chemical storage tanks (excluding fuel storage tanks) and associated equipment; or,

4.2.8 Measuring and monitoring devices that are not required by regulation, by a condition in the Drinking Water Works Permit, or by a condition otherwise imposed by the Ministry.

4.2.9 Chemical injection points;

4.2.10 Valves.

4.3 The drinking water system may be altered by replacing the following:

4.3.1 Raw water piping, treatment process piping or treated water piping within the treatment subsystem;

4.3.2 Measuring and monitoring devices that are required by regulation, by a condition in the Drinking Water Works Permit or by a condition otherwise imposed by the Ministry.

4.3.3 Coagulants and pH adjustment chemicals, where the replacement chemicals perform the same function;

a) Prior to making any alteration to the drinking water system under condition 4.3.3, the owner shall undertake a review of the impacts that the alteration might have on corrosion control or other treatment processes; and

b) The owner shall notify the Director in writing within thirty (30) days of any alteration made under condition 4.3.3 and shall provide the Director with a copy of the review.

c) The notification required in condition 4.3.3 b) shall be submitted using the "Director Notification Form" published by the Ministry.

4.4 Any alteration of the drinking water system made under conditions 4.1, 4.2 or 4.3 shall not result in:

4.4.1 An exceedance of a treatment subsystem rated capacity or a treatment subsystem component maximum flow rate as specified in the licence;

4.4.2 The bypassing or removal of any unit process within a treatment subsystem;

4.4.3 The addition of any new unit process other than coagulation within a treatment subsystem;

4.4.4 A deterioration in the quality of drinking water provided to consumers;

4.4.5 A reduction in the reliability or redundancy of any component of the drinking water system;

4.4.6 A negative impact on the ability to undertake compliance and other monitoring necessary for the operation of the drinking water system; or

4.4.7 An adverse effect on the environment.

4.5 The owner shall verify in writing that any addition, modification, replacement or removal of drinking water system components in accordance with conditions 4.1, 4.2 or 4.3 has met the requirements of the conditions listed in condition 4.4.

4.6 The verifications and documentation required in condition 4.5 shall be:

4.6.1 Recorded on "Form 2 – Record of Minor Modifications or Replacements to the Drinking Water System" published by the Ministry, prior to the modified or replaced components being placed into service; and

4.6.2 Retained for a period of ten (10) years by the owner.

4.7 For greater certainty, the verification requirements set out in conditions 4.5 and 4.6 do not apply to any addition, modification, replacement or removal in respect of the drinking water system which:

4.7.1 Is exempt from subsection 31(1) of the SDWA by subsection 9.(2) of O. Reg. 170/03; or

4.7.2 Constitutes maintenance or repair of the drinking water system, including software changes to a SCADA system that are not listed in condition 4.1.3

4.8 The owner shall update any drawings maintained for the drinking water system to reflect the modification or replacement of the works, where applicable.

5.0 Equipment with Emissions to the Air

5.1 The drinking water system may be altered by adding, modifying or replacing any of the following drinking water system components that may discharge or alter the rate or manner of a discharge of a compound of concern to the air:

5.1.1 Any equipment, apparatus, mechanism or thing that is used for the transfer of outdoor air into a building or structure that is not a cooling tower;

5.1.2 Any equipment, apparatus, mechanism or thing that is used for the transfer of indoor air out of a space used for the production, processing, repair, maintenance or storage of goods or materials, including chemical storage;

5.1.3 Laboratory fume hoods used for drinking water testing, quality control and quality assurance purposes;

5.1.4 Low temperature handling of compounds with a vapor pressure of less than 1 kilopascal;

5.1.5 Maintenance welding stations;

5.1.6 Minor painting operations used for maintenance purposes;

5.1.7 Parts washers for maintenance shops;

5.1.8 Emergency chlorine and ammonia gas scrubbers and absorbers;

5.1.9 Venting for activated carbon units for drinking water taste and odour control;

5.1.10 Venting for a stripping unit for methane removal from a groundwater supply;

5.1.11 Venting for an ozone treatment unit;

5.1.12 Natural gas or propane fired boilers, water heaters, space heaters and make-up air units with a total facility-wide heat input rating of less than 20 million kilojoules per hour, and with an individual fuel energy input of less than or equal to 10.5 gigajoules per hour; or

5.1.13 Emergency generators that fire No. 2 fuel oil (diesel fuel) with a sulphur content of 0.5 per cent or less measured by weight, natural gas, propane, gasoline or biofuel, and that are used for emergency duty only with periodic testing.

5.2 The owner shall not make an addition, modification, or replacement described in condition 5.1 in relation to an activity that is not related to the treatment and/or distribution of drinking water.

5.3 The emergency generators identified in condition 5.1.13 shall not be used for non-emergency purposes including the generation of electricity for sale or for peak shaving purposes.

5.4 The owner shall prepare an emission summary table for nitrogen oxides emissions only, for each addition, modification or replacement of emergency generators identified in condition 5.1.13.

Performance Limits

5.5 The owner shall ensure that a drinking water system component identified in conditions 5.1.1 to 5.1.13 is operated at all times to comply with the following limits:

5.5.1 For equipment other than emergency generators, the maximum concentration of any compound of concern at a point of impingement shall not exceed the corresponding point of impingement limit;

5.5.2 For emergency generators, the maximum concentration of nitrogen oxides at sensitive receptors shall not exceed the applicable point of impingement limit, and at non-sensitive receptors shall not exceed the Ministry half-hourly screening level of 1880 ug/m^3 as amended; and

5.5.3 The noise emissions comply at all times with the limits set out in publication NPC-300, as applicable.

5.6 The owner shall verify in writing that any addition, modification or replacement of works in accordance with condition 5.1 has met the requirements of the conditions listed in condition 5.5.

5.7 The owner shall document how compliance with the performance limits outlined in condition 5.5.3 is being achieved, through noise abatement equipment and/or operational procedures.

5.8 The verifications and documentation required in conditions 5.6 and 5.7 shall be:

5.8.1 Recorded on “Form 3 – Record of Addition, Modification or Replacement of Equipment Discharging a Contaminant of Concern to the Atmosphere”, as published by the Ministry, prior to the additional, modified or replacement equipment being placed into service; and

5.8.2 Retained for a period of ten (10) years by the owner.

5.9 For greater certainty, the verification and documentation requirements set out in conditions 5.6 and 5.8 do not apply to any addition, modification or replacement in respect of the drinking water system which:

5.9.1 Is exempt from subsection 31(1) of the SDWA by subsection 9.(2) of O. Reg. 170/03; or

5.9.2 Constitutes maintenance or repair of the drinking water system.

5.10 The owner shall update any drawings maintained for the works to reflect the addition, modification or replacement of the works, where applicable.

6.0 Previously Approved Works

6.1 The owner may add, modify, replace or extend, and operate part of a municipal drinking water system if:

6.1.1 An approval was issued after January 1, 2004 under section 36 of the SDWA in respect of the addition, modification, replacement or extension and operation of that part of the municipal drinking water system;

6.1.2 The approval expired by virtue of subsection 36(4) of the SDWA; and

6.1.3 The addition, modification, replacement or extension commenced within five years of the date that activity was approved by the expired approval.

7.0 System-Specific Conditions

7.1 Not Applicable

8.0 Source Protection

8.1 Not Applicable

Schedule C: Authorization to Alter the Drinking Water System

System Owner	**The Corporation of the Township of Alnwick/Haldimand**
Permit Number	**238-201**
Drinking Water System Name	**Grafton Drinking Water System**
Permit Effective Date	**February 25, 2022**

1.0 General

1.1 Table 2 provides a reference list of all documents to be incorporated into Schedule C that have been issued as of the date that this permit was issued.

1.1.1 Table 2 is not intended to be a comprehensive list of all documents that are part of Schedule C. For clarity, any document issued by the Director to be incorporated into Schedule C after this permit has been issued is considered part of this drinking water works permit.

Table 2: Schedule C Documents

Column 1 Issue #	Column 2 Issued Date	Column 3 Description	Column 4 Status	Column 5 DN#
Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

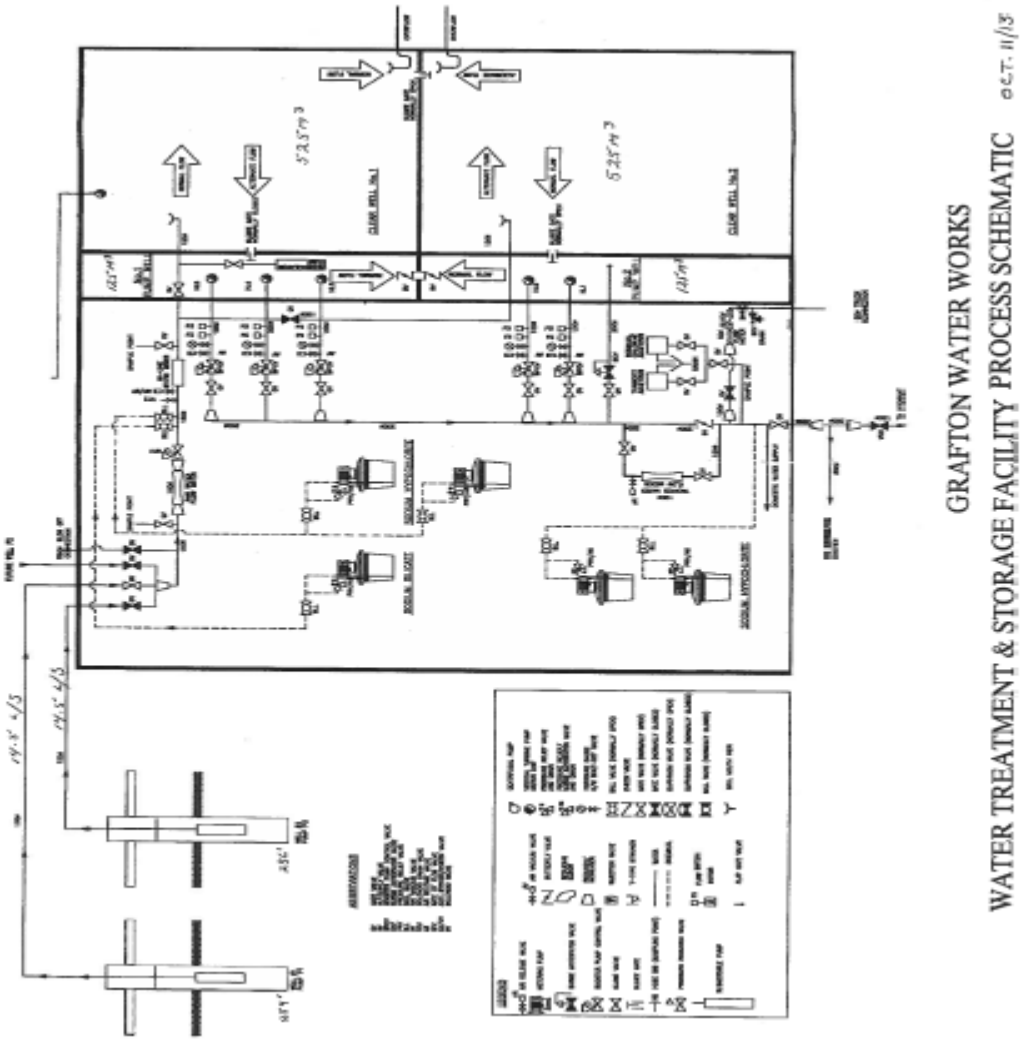
1.2 For each document described in columns 1, 2 and 3 of Table 2, the status of the document is indicated in column 4. Where this status is listed as 'Archived', the approved alterations have been completed and relevant portions of this permit have been updated to reflect the altered works. These 'Archived' Schedule C documents remain as a record of the alterations.

Schedule D: Process Flow Diagrams

System Owner	**The Corporation of the Township of Alnwick/Haldimand**
Permit Number	**238-201**
Drinking Water System Name	**Grafton Drinking Water System**
Permit Effective Date	**February 25, 2022**

1.0 Process Flow Diagrams

Grafton Well Pumphouse



[Source: Grafton Communal Water System – Operational Plan, October 2015]

Note: this process flow diagram is for reference only, and represents a high level overview of the system as of October 2015.

APPENDIX- 3

The Corporation of the Township of Alnwick/Haldimand

Grafton DWS- PTTW No. 3872-401

AMENDED PERMIT TO TAKE WATER
Ground Water
NUMBER 3872-C8LQQF

Pursuant to Section 34.1 of the Ontario Water Resources Act, R.S.O. 1990 this Permit To Take Water is hereby issued to:

The Corporation of the Township of Alnwick/Haldimand
Post Office Box 70
Grafton, Ontario, K0K 2G0
Canada

For the water taking from: PW1 (east well), PW2 (east well)

Located at: Lot 22 and 23, Concession 1, Geographic Township of Haldimand
Alnwick/Haldimand, County of Northumberland

For the purposes of this Permit, and the terms and conditions specified below, the following definitions apply:

DEFINITIONS

(a) "Director" means any person appointed in writing as a Director pursuant to section 5 of the OWRA for the purposes of section 34.1, OWRA.

(b) "Provincial Officer" means any person designated in writing by the Minister as a Provincial Officer pursuant to section 5 of the OWRA.

(c) "Ministry" means Ontario Ministry of the Environment, Conservation and Parks.

(d) "District Office" means the Peterborough District Office.

(e) "Permit" means this Permit to Take Water No. 3872-C8LQQF including its Schedules, if any, issued in accordance with Section 34.1 of the OWRA.

(f) "Permit Holder" means The Corporation of the Township of Alnwick/Haldimand.

(g) "OWRA " means the *Ontario Water Resources Act,* R.S.O. 1990, c. O. 40, as amended.

You are hereby notified that this Permit is issued subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. Compliance with Permit

1.1 Except where modified by this Permit, the water taking shall be in accordance with the application for this Permit To Take Water, dated June 21, 2013 and signed by Terry Korotki, and all Schedules included in this Permit.

1.2 The Permit Holder shall ensure that any person authorized by the Permit Holder to take water under this Permit is provided with a copy of this Permit and shall take all reasonable measures to ensure that any such person complies with the conditions of this Permit.

1.3 Any person authorized by the Permit Holder to take water under this Permit shall comply with the conditions of this Permit.

1.4 This Permit is not transferable to another person.

1.5 This Permit provides the Permit Holder with permission to take water in accordance with the conditions of this Permit, up to the date of the expiry of this Permit. This Permit does not constitute a legal right, vested or otherwise, to a water allocation, and the issuance of this Permit does not guarantee that, upon its expiry, it will be renewed.

1.6 The Permit Holder shall keep this Permit available at all times at or near the site of the taking, and shall produce this Permit immediately for inspection by a Provincial Officer upon his or her request.

1.7 The Permit Holder shall report any changes of address to the Director within thirty days of any such change. The Permit Holder shall report any change of ownership of the property for which this Permit is issued within thirty days of any such change. A change in ownership in the property shall cause this Permit to be cancelled.

2. General Conditions and Interpretation

2.1 Inspections
The Permit Holder must forthwith, upon presentation of credentials, permit a Provincial Officer to carry out any and all inspections authorized by the OWRA, the *Environmental Protection Act* , R.S.O. 1990, the *Pesticides Act* , R.S.O. 1990, or the *Safe Drinking Water Act,* S. O. 2002.

2.2 Other Approvals
The issuance of, and compliance with this Permit, does not:

(a) relieve the Permit Holder or any other person from any obligation to comply with any other applicable legal requirements, including the provisions of the *Ontario Water Resources Act* , and

the *Environmental Protection Act* , and any regulations made thereunder; or

(b) limit in any way any authority of the Ministry, a Director, or a Provincial Officer, including the authority to require certain steps be taken or to require the Permit Holder to furnish any further information related to this Permit.

2.3 Information

The receipt of any information by the Ministry, the failure of the Ministry to take any action or require any person to take any action in relation to the information, or the failure of a Provincial Officer to prosecute any person in relation to the information, shall not be construed as:

(a) an approval, waiver or justification by the Ministry of any act or omission of any person that contravenes this Permit or other legal requirement; or

(b) acceptance by the Ministry of the information's completeness or accuracy.

2.4 Rights of Action

The issuance of, and compliance with this Permit shall not be construed as precluding or limiting any legal claims or rights of action that any person, including the Crown in right of Ontario or any agency thereof, has or may have against the Permit Holder, its officers, employees, agents, and contractors.

2.5 Severability

The requirements of this Permit are severable. If any requirements of this Permit, or the application of any requirements of this Permit to any circumstance, is held invalid or unenforceable, the application of such requirements to other circumstances and the remainder of this Permit shall not be affected thereby.

2.6 Conflicts

Where there is a conflict between a provision of any submitted document referred to in this Permit, including its Schedules, and the conditions of this Permit, the conditions in this Permit shall take precedence.

3. Water Takings Authorized by This Permit

3.1 **Expiry**

This Permit expires on **September 30, 2023**. No water shall be taken under authority of this Permit after the expiry date.

3.2 Amounts of Taking Permitted

The Permit Holder shall only take water from the source, during the periods and at the rates and amounts of taking specified in Table A. Water takings are authorized only for the purposes specified in Table A.

Table A

	Source Name / Description:	Source: Type:	Taking Specific Purpose:	Taking Major Category:	Max. Taken per Minute (litres):	Max. Num. of Hrs Taken per Day:	Max. Taken per Day (litres):	Max. Num. of Days Taken per Year:	Zone/ Easting/ Northing:
1	PW1 (east well)	Well Drilled	Other - Water Supply	Water Supply	870	24	1,252,800	365	17 738200 4876500
2	PW2 (east well)	Well Drilled	Other - Water Supply	Water Supply	870	24	1,252,800	365	17 738200 4876500
						Total Taking:	1,252,800		

4. Monitoring

4.1 The Permit Holder shall, on each day water is taken under the authority of this Permit, record the date, the volume of water taken on that date and the rate at which it was taken. The daily volume of water taken shall be measured by a flow meter or calculated in accordance with the method described in the application for this Permit or as otherwise accepted by the Director. A separate record shall be maintained for each source. The Permit Holder shall keep all records required by this condition current and available at or near the site of the taking and shall produce the records immediately for inspection by a Provincial Officer upon his or her request. The Permit Holder, unless otherwise required by the Director, shall submit, on or before March 31st in every year, the daily water taking data collected and recorded for the previous year to the ministry's Water Taking Reporting System. The total amounts of water pumped shall be measured using a calibrated flow meter and totalizer.

4.2 Representative groundwater samples shall be collected from the municipal production wells and the three sentinel monitoring wells located between the municipal production wells and the Closed Grafton Landfill site on an annual basis. Raw groundwater samples shall also be collected from the municipal production wells on an annual basis. Samples from locations referenced in this Condition shall be analyzed for the following parameters: chloride, sodium, calcium, magnesium, potassium, hardness, pH, alkalinity, iron, conductivity, nitrite, nitrate, total kjeldahl nitrogen, ammonia, organic nitrogen, dissolved reactive phosphorus, total organic carbon, benzene, toluene, ethylbenzene and xylene.

4.3 Water level measurements shall be taken (at minimum) from a deep monitoring well next to the municipal production wells, three representative landfill site monitoring well locations, and at least six representative local wells. The frequency of these water level measurements shall be (at minimum) quarterly. Water level data shall be examined by a qualified hydrogeologist on an annual basis.

4.4 Water level measurements of Cranberry Lake shall be taken at a minimum of three representative Cranberry Lake monitoring stations. The frequency of these water level measurements shall be quarterly. Water level data shall be examined by a qualified hydrogeologist on an annual basis.

4.5 An interpretive report shall be submitted to the Director on an annual basis. Annual interpretive reports shall include: analysis of the hydrogeology of the area, the aquifer characteristics, the natural and induced flow directions, the changes and trends in hydraulics, water levels, well yields and water quality; and evaluations of the potential for future contamination of the municipal production wells, the potential for interference with wells outside the serviced area and the adequacy of the monitoring program along with any proposed changes to the monitoring program based on current information.

4.6 If water level monitoring completed in accordance with Conditions 4.3 and 4.4 indicates a potential for groundwater flow towards the municipal production wells from the landfill site and / or any other contaminant source, then the Director shall be notified immediately by the Permit Holder. In addition, the Permit Holder shall provide a proposed Action Plan to further monitor and assess the situation in order to determine any potential for adverse impact to the water quality at the municipal production wells. The proposed Action Plan shall be provided in writing to the Director and shall only be implemented upon written acceptance from the Director. The results of monitoring and assessment completed in accordance with the accepted Action Plan shall be presented in a Technical Report and submitted to the Director.

4.7 If water quality monitoring completed in accordance with Condition 4.2 indicates contamination from the landfill site and / or any other potential contaminant source that may adversely impact water quality at the municipal production wells, then the Director shall be notified immediately by the Permit Holder. In addition, the Permit Holder shall provide a proposed Action Plan to further monitor and assess the situation in order to determine any potential for adverse impact to the water quality at the municipal production wells. The proposed Action Plan shall be provided in writing to the Director and shall only be implemented upon written acceptance from the Director. The results of monitoring and assessment completed in accordance with the accepted Action Plan shall be presented in a Technical Report and submitted to the Director.

4.8 In addition to the general requirements specified in Condition 4.7, this condition sets out particular requirements related to the following water quality parameters: benzene, toluene, ethylbenzene, xylenes and chloride.

i) Detections of toluene and xylenes have been observed at sentinel monitoring wells MW-i and MW-s during 2020 and 2021. The concentrations of toluene and xylenes have been consistently lower than provincial health-based drinking water standards. However, if an increasing trend for any of benzene, toluene, ethylbenzene and xylenes is observed at any of the three sentinel monitoring wells referenced in Condition 4.2 and / or if the concentration(s) of benzene, toluene, ethylbenzene and / or xylenes exceeds one half (1/2) of the applicable health-based standard then the Director shall be notified immediately by the Permit Holder. The Director shall also be notified immediately by the Permit Holder if chloride is observed at a concentration greater than 125 mg/L in any of the three sentinel monitoring wells referenced in Condition 4.2.

ii) In the event that increasing trends are observed and / or the concentrations of benzene, toluene, ethylbenzene, xylenes and / or chloride exceed the levels set out in this Condition at the three sentinel wells then the Permit Holder shall provide a proposed Action Plan to further

monitor and assess the situation in order to determine any potential for adverse impact to the water quality at the municipal production wells. The proposed Action Plan shall be provided in writing to the Director and shall only be implemented upon written acceptance from the Director. The results of monitoring and assessment completed in accordance with the accepted Action Plan shall be presented in a Technical Report and submitted to the Director.

4.9 In the event that benzene, toluene, ethylbenzene and / or xylenes are detected at the municipal production wells, then the Permit Holder shall immediately notify the Director and shall provide a proposed Action Plan to further monitor and assess the situation in order to determine any potential for adverse impact to the water quality at the municipal production wells. The proposed Action Plan shall be provided in writing to the Director and shall only be implemented upon written acceptance from the Director. The results of monitoring and assessment completed in accordance with the accepted Action Plan shall be presented in a Technical Report and submitted to the Director.

4.10 Water levels at the municipal production well shall be recorded on a continuous basis.

5. Impacts of the Water Taking

5.1 Notification

The Permit Holder shall immediately notify the local District Office of any complaint arising from the taking of water authorized under this Permit and shall report any action which has been taken or is proposed with regard to such complaint. The Permit Holder shall immediately notify the local District Office if the taking of water is observed to have any significant impact on the surrounding waters. After hours, calls shall be directed to the Ministry's Spills Action Centre at 1-800-268-6060.

5.2 For Groundwater Takings

If the taking of water is observed to cause any negative impact to other water supplies obtained from any adequate sources that were in use prior to initial issuance of a Permit for this water taking, the Permit Holder shall take such action necessary to make available to those affected, a supply of water equivalent in quantity and quality to their normal takings, or shall compensate such persons for their reasonable costs of so doing, or shall reduce the rate and amount of taking to prevent or alleviate the observed negative impact. Pending permanent restoration of the affected supplies, the Permit Holder shall provide, to those affected, temporary water supplies adequate to meet their normal requirements, or shall compensate such persons for their reasonable costs of doing so.

If permanent interference is caused by the water taking, the Permit Holder shall restore the water supplies of those permanently affected.

6. Director May Amend Permit

The Director may amend this Permit by letter requiring the Permit Holder to suspend or reduce

the taking to an amount or threshold specified by the Director in the letter. The suspension or reduction in taking shall be effective immediately and may be revoked at any time upon notification by the Director. This condition does not affect your right to appeal the suspension or reduction in taking to the Ontario Land Tribunal under the *Ontario Water Resources Act* , Section 100 (4).

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is included to ensure that the conditions in this Permit are complied with and can be enforced.

2. Condition 2 is included to clarify the legal interpretation of aspects of this Permit.

3. Conditions 3 through 6 are included to protect the quality of the natural environment so as to safeguard the ecosystem and human health and foster efficient use and conservation of waters. These conditions allow for the beneficial use of waters while ensuring the fair sharing, conservation and sustainable use of the waters of Ontario. The conditions also specify the water takings that are authorized by this Permit and the scope of this Permit.

In accordance with Section 100 of the *Ontario Water Resources Act, R.S.O. 1990,* you may by written notice served upon me and the Ontario Land Tribunal within 15 days after receipt of this notice, require a hearing by the Tribunal. Section 101 of the *Ontario Water Resources Act, R.S.O. 1990,* as amended, provides that the notice requiring the hearing ("the Notice") shall state:

1. The portions of the Permit or each term or condition in the Permit in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

In addition to these legal requirements, the Notice should also include:

a. The name of the appellant;
b. The address of the appellant;
c. The Permit to Take Water number;
d. The date of the Permit to Take Water;
e. The name of the Director;
f. The municipality within which the works are located;

This notice must be served upon:

*Registrar**
Ontario Land Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5
OLT.Registrar@ontario.ca

AND

The Director, Section 34.1,
Ministry of the Environment, Conservation and Parks
Floor 1, 135 St Clair Ave W
Toronto, ON
M4V 1P5

*** Further information on the Ontario Land Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: (416) 212-6349 or 1 (866) 448-2248, or www.olt.gov.on.ca.**

This Permit cancels and replaces Permit Number 5086-9BPM4A, issued on 2013/09/26.

Dated at Toronto this 16th day of December, 2021.

Gregory Meek
Director, Section 34.1
Ontario Water Resources Act , R.S.O. 1990

Schedule A

This Schedule “A” forms part of Permit To Take Water 3872-C8LQQF, dated December 16, 2021.

APPENDIX- 4

The Corporation of the Township of Alnwick/Haldimand

Grafton DWS- QMS Operation Plan 238-401

Ministry of the Environment, Conservation and Parks

Environmental Assessment and Permissions Branch

2nd Floor
40 St. Clair Ave W
Toronto ON M4V 1M2

Ministère de l'Environnement, de la Protection de la nature et des Parcs

Direction des évaluations et des permissions environnementales

2e étage
40, avenue St. Clair Ouest
Toronto (Ontario) M4V 1M2

February 25, 2022

Gail Latchford
Mayor
The Corporation of the Township of Alnwick/Haldimand
10836 County Road 2
P.O. Box 70
Grafton ON, K0K 2G0

Dear Gail Latchford:

Re: Acceptance of Operational Plan for the Grafton Drinking Water System

This letter is to inform you that the Operational Plan identified below for the Grafton Drinking Water System meets the requirements of the Director's Directions - Minimum Requirements for Operational Plans made under the *Safe Drinking Water Act*, 2002 (SDWA) and has been accepted.

Number	Operational Plan Name	Date
238-401	QMS Operational Plan Grafton Drinking Water System	June 2019

If you should have any questions, please contact Holly Wirth, P.Eng., Senior Water Engineer, at (437) 219-6724.

Sincerely,

A. Ahmed

Aziz S. Ahmed, P.Eng.
Manager, Municipal Water & Wastewater Permissions

c: Water Compliance Supervisor, Peterborough

APPENDIX- 5

The Corporation of the Township of Alnwick/Haldimand

Grafton DWS- NSF Certification of Registration DWQS

Certificate of Registration

This certifies that the Quality Management System of

Lakefront Utility Services Inc.

207 Division Street
Cobourg, Ontario, K9A 4L3, Canada

has been assessed by NSF-ISR and found to be in conformance to the following standard(s):

Ontario's Drinking Water Quality Management Standard Version 2

Scope of Registration:
Grafton Drinking Water System, 238-OA1, Entire Full Scope Accreditation

Certificate Number:	C0128646-DWQ7
Certificate Issue Date:	07-DEC-2020
Registration Date:	08-FEB-2021
Expiration Date *:	07-FEB-2024

Tom Chestnut,
Sr Vice President - ISR,
NSF-ISR, Ltd.

NSF International Strategic Registrations
789 North Dixboro Road, Ann Arbor, Michigan 48105 | (888) NSF-9000 | www.nsf-isr.org

APPENDIX- 6

The Corporation of the Township of Alnwick/Haldimand

Grafton DWS- MECP Inspection 2021

Ministry of the Environment, Conservation and Parks
Eastern Region
Peterborough District Office
300 Water Street
2nd Floor, South Tower
Peterborough ON K9J 3C7
Phone: 705.755.4300
or 800.558.0595

Ministère de l'Environnement, de la Protection de la nature et des Parcs
Région de l'Est
Bureau du district de Peterborough
300, rue Water
2e étage, Tour Sud
Peterborough (Ontario) K9J 3C7
Tél: 705 755-4300
558-0595230,

Ontario

December 6, 2021

Mr. Troy Gilmour
Township of Alnwick/Haldimand
Chief Administrative Officer
10836 County Road 2
P.O. Box 70 Grafton ON
K0K 2G0

Dear Mr. Gilmour,

Re: Compliance Inspection Report for the Grafton Drinking Water System

The enclosed report documents findings of the inspection that was performed at the Grafton Drinking Water System on November 2, 2021.

"Non-Compliances", are found on page 3 of the report, are linked to incidents of non-compliance with regulatory requirements contained within an Act, a Regulation, or site-specific approvals, licenses, permits, orders, or instructions. Such violations could result in the issuance of mandatory abatement instruments including Orders, tickets, penalties, or referrals to the ministry's Investigations and Enforcement Branch. Please note that the required actions may contain required dates for completion.

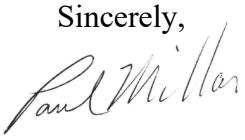
"Recommended Actions", as Other Inspection Findings are found also on page 3 of the report, convey information that the owner or operating authority should consider implementing in order to advance efforts already in place to address such issues as emergency preparedness, the fulsome availability of information to consumers, and conformance with existing and emerging industry standards. Please note that items which appear as recommended actions do not, in themselves, constitute violations.

"Please note that due to a change in IT systems, the Inspection Rating Report (IRR) cannot be generated at the same time as the inspection report. The IRR will be sent separately and prior to any public release (typically within 1-2 month of the completion of the inspection)".

Thank you for the assistance afforded to me during the conduct of the compliance assessment.

Should you have any questions regarding the content of the enclosed report please do not hesitate to contact me.

Sincerely,



Paul Millar
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Enclosure (1)

SI NO AH GR ED 540 (2021/22)

c:

Mr. Larry Spyrka, Operating Authority, Lakefront Utilities – Manager

Dr. Natalie Bocking, Medical Officer of Health, Haliburton, Kawartha, Pine Ridge District Health Unit

Ms. Rhonda Bateman, CAO/Treasurer, Lower Trent Conservation Authority, 714 Murray Street, RR1, Trenton, ON K8V 5P4

Ms. Jacqueline Fuller, Water Supervisor, Ministry of Environment, Conservation & Parks, Peterborough

TABLE OF CONTENTS

Grafton Drinking Water System
434 EDWARDSON RD, ALNWICK-HALDIMAND, ON,

Inspection Report

System Number:	220009158
Inspection Start Date:	11/02/2021
Inspection End Date:	12/06/2021
Inspected By:	Paul Millar
Badge #:	1130

(signature)

NON-COMPLIANCE/NON-CONFORMANCE ITEMS

The following item(s) have been identified as non-compliance/non-conformance, based on a "No" response captured for a legislative or best management practice (BMP) question (s), respectively.

Question Group: Other Inspection Findings

Question ID	MRDW1116000	
Question	**Question Type**	**Legislative Requirement**
Were the inspection questions sufficient to address other identified best practice issues?	BMP	Not Applicable

Observation/Corrective Action(s)

The following issues were also noted during the inspection:

It is recommended that the Drinking Water System Owner &/or Operating Authority consider acting on the following;

1.) Discussing the elevated ammonia concentrations identified in production well #1 with the local Health Unit prior to it being called into service.

2.) Determine where the floor drains and water from the exterior WW holding tank discharges to & ensure that any effluent is de-chlorinated before reaching the natural environment.

3.) Revising the O/M Manual to include a "Table of Contents" referencing where the Municipal License, Sch. B, Condition 16.0 - O/M Manual conditions can be located within, as well as the Contingency Plans, SOPs, and the new 2020 - Watermain Disinfection Procedure.

4.) Formalize internal efforts in writing taken to prevent falsification of training & log records
.
5.) Amend the current DWWP, Schedule A, Chlorine Addition section the next time amendments are being sought so as to remove reference to; Two (2) metering pumps (duty and standby) each capable of 4 L/hr. complete with one (1) storage tank for secondary disinfection

6.) Remove reference to the data obtained from the chlorine residual analyzer located near the bulk water fill station, incorrectly identified as a secondary chlorine unit (AIT 822).

7.) Revise ERP-02 - Raw Water Contamination, dated July 24, 2019, to include contacting MECP & local Health unit.

8.) Enhance the existing Emergency Contact List to include reference to Health unit, MECP, Equipment & Electrical Contractors & Suppliers,, Bulk Water Haulers & Hydro One for example.

9.) It is recommended that whenever numerical flow data is above the PTTW limit that staff capture the number of these event per 72 Reviews, and duration, where possible. Should the events be > 5 minutes in duration the O/A shoud capture, the number of events, the cause, where know, and actions taken to address, where applicable.

INSPECTION DETAILS

This section includes all questions that were assessed during the inspection.

Ministry Program: Regulated Activity: DRINKING WATER : DW Municipal Residential

Question ID	MRDW1001000	
Question	**Question Type**	**Legislative Requirement**
What was the scope of this inspection?	Information	Not Applicable

Observation

The primary focus of this inspection is to confirm compliance with Ministry of the Environment, Conservation and Parks (MECP) legislation as well as evaluating conformance with ministry drinking water policies and guidelines during the inspection period. The ministry utilizes a comprehensive, multi-barrier approach in the inspection of water systems that focuses on the source, treatment, and distribution components as well as management practices.

This drinking water system is subject to the legislative requirements of the Safe Drinking Water Act, 2002 (SDWA) and regulations made therein, including Ontario Regulation 170/03, "Drinking Water Systems" (O.Reg. 170/03). This inspection has been conducted pursuant to Section 81 of the SDWA.

This inspection report does not suggest that all applicable legislation and regulations were evaluated. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

On November 2, 2021, the undersigned Ministry of the Environment, Conservation and Parks (MECP) Water Inspector visited the Grafton Drinking Water System (DWS) for the purpose of performing a focused, announced drinking-water system inspection. The MECP Inspector was accompanied during the physical inspection of the water treatment plant by Mr. Larry Spyrka, Manager of Water Capital Projects, as well as Mr. Ryan Smith, Duty Operator/Operator In Charge & Ms. Mina Aminnejad, recently hired to support compliance.

The Corporation of the Township of Alnwick/Haldimand is the owner of the drinking water system, with Lakefront Utility Services Incorporated (L.U.S.I.) identified as the Operating Authority of the entire drinking water system, including the distribution system.

The Grafton Drinking Water system serves approximately ~1000 residents, and under the Regulation is therefore considered to be a large municipal residential system, subject to the Regulation.

The drinking water inspection included a physical inspection of the treatment plant, production wells and plant exterior, as well as a document review for the period of Oct.1, 2020 to Oct. 31, 2021, hereafter, referred to as the inspection period in this report.

Last year's inspection did not cite any Issues of Non-Compliances or Best Practice Issues and

Recommendations.

Question ID	MRDW1000000		
Question		**Question Type**	**Legislative Requirement**
Does this drinking water system provide primary disinfection?		Information	Not Applicable
Observation			
This Drinking Water System provides for both primary and secondary disinfection and distribution of water. Primary disinfection is achieved utilizing chlorination coupled with sufficient contact times.			

Question ID	MRDW1007000		
Question		**Question Type**	**Legislative Requirement**
Is the owner maintaining the production well(s) in a manner sufficient to prevent entry into the well of surface water and other foreign materials?		Legislative	SDWA | O. Reg. 170/03 | 1-2 | (1)
Observation			
The owner was maintaining the production well(s) in a manner sufficient to prevent entry into the well of surface water and other foreign materials. During the physical inspection of the water treatment plant and the wells, it was identified that each of the production wells were surrounded by chain link fencing, that was topped with barbed wire and each were equipped with padlocks on the entry gates. Further, all steel well casings were capped with suitable well caps, with the exception of the older former production well-TW3. This well is being utilized for water level monitoring purposes. Sloping around each of the wells appeared adequate and all casing were above grade. Further, it was reported that on a monthly basis a work order is generated and assigned to staff to inspect the above ground components to confirm integrity. According to records provided the below ground component and casing were video inspected, with well#2 having a new pump installed. The work was carried out by International Water Supply Limited in 2019 (July, Oct. & Nov.).			

Question ID	MRDW1009000		
Question		**Question Type**	**Legislative Requirement**
Are measures in place to protect the groundwater and/or GUDI source in accordance with any MDWL and DWWP issued under Part V of the SDWA?		Legislative	SDWA | 31 | (1)
Observation			
Measures were in place to protect the groundwater and/or GUDI source in accordance with any the Municipal Drinking Water Licence and Drinking Water Works Permit issued under Part V of the SDWA.			

Measures to protect the source water have been identified in Municipal License and Permit #238-101/238-201, as well as Permit To Take Water #5086-9BPM4A. Each of the aforementioned documents prescribes limits as to the water treatment plant's rated capacity &/or the amounts of water that can be taken from either potential well source. In addition, as previously mentioned the O/A undertakes monthly inspections of the wells.

Question ID	MRDW1014000	
Question	**Question Type**	**Legislative Requirement**
Is there sufficient monitoring of flow as required by the MDWL or DWWP issued under Part V of the SDWA?	Legislative	SDWA | 31 | (1)

Observation

There was sufficient monitoring of flow as required by the Municipal Drinking Water Licence or Drinking Water Works Permit issued under Part V of the SDWA.

Municipal License #238-101, Schedule C, section 2.0, states that the Drinking Water System (DWS) shall ensure continuous flow measurement and recording for;
2.1.1) the flow rate and daily volume of treated water that flows from the treatment system conveyed into the treatment sub system to the distribution system and;
2.1.2) the flow rate and daily volume of water that flows into the treatment subsystem.

During the field inspection of the water treatment pumphouse three (3) flow meters were identified, to include two (2) ABB mag meters, monitoring the raw & treated waters, as well as a third Siemens mag meter unit monitoring the bulk water fill station.

Question ID	MRDW1016000	
Question	**Question Type**	**Legislative Requirement**
Is the owner in compliance with the conditions associated with maximum flow rate or the rated capacity conditions in the MDWL issued under Part V of the SDWA?	Legislative	SDWA | 31 | (1)

Observation

The owner was in compliance with the conditions associated with maximum flow rate or the rated capacity conditions in the Municipal Drinking Water Licence issued under Part V of the SDWA.

A review of the treated water flow data recorded over the inspection period (Oct.1/20-Oct. 31/21) indicates that there were not any incidences where the flows exceeded the limit of 1253 M3/day. Flows ranged from 144 - 864 m3/d. These values equate to 12% - 69%, of the MDWL maximum allowable daily takings.

Of note, in review of the raw water instantaneous flow data provided, multiple flow exceedances were identified, greater than 14.5 L/s or 870 L/min as stipulated within Permit To Take Water #5086-9PBM4A, Condition 3.2 - Table A. Investigation into these elevated flows has determined that they are of very short duration <5 minutes and considered inconsequential. The reason as reported for these occurrences is that the water in the piping from the well head to the flow meter

drains when the well pump goes off-line thereby affecting flows into the process once the well pump is restarted as there would be no "head" during this period, resembling a condition of open pipe. The issue was discussed with the O/A and the undersigned was advised that an "engineered orifice plate", rated at 12.5 L/s was installed some years back ahead of the flow meter to eliminate the potential for raw water flow exceedances. While numerical records do capture the elevated flow values, trending fails to reveal any spikes or changes.

Question ID	MRDW1030000	
Question	**Question Type**	**Legislative Requirement**
Is primary disinfection chlorine monitoring being conducted at a location approved by MDWL and/or DWWP issued under Part V of the SDWA, or at/near a location where the intended CT has just been achieved?	Legislative	SDWA | O. Reg. 170/03 | 7-2 | (1), SDWA | O. Reg. 170/03 | 7-2 | (2)

Observation

Primary disinfection chlorine monitoring was conducted at a location approved by Municipal Drinking Water Licence and/or Drinking Water Works Permit issued under Part V of the SDWA, or at/near a location where the intended CT has just been achieved.

Chlorine residual monitoring was observed in place just downstream of the highlift pump discharge header via a Siemens pH compensated continuous monitoring chlorine residual analyzer, reading 1.47 mg/L at the time of review. Records provided indicate that primary chlorine residuals ranged from 0.59 mg/L (May 21) - 2.40 mg/L (Apr.21).

Question ID	MRDW1033000	
Question	**Question Type**	**Legislative Requirement**
Is the secondary disinfectant residual measured as required for the large municipal residential distribution system?	Legislative	SDWA | O. Reg. 170/03 | 7-2 | (3), SDWA | O. Reg. 170/03 | 7-2 | (4)

Observation

The secondary disinfectant residual was measured as required for the distribution system.

According to records and reports from staff, secondary disinfectant residuals are sampled & tested "daily", seven (7) days a week.

Question ID	MRDW1037000	
Question	**Question Type**	**Legislative Requirement**
Are all continuous monitoring equipment utilized for sampling and testing required by O. Reg.170/03, or MDWL or DWWP or order, equipped with alarms or shut-off mechanisms that satisfy the standards described in Schedule	Legislative	SDWA | O. Reg. 170/03 | 6-5 | (1) 1-4,SDWA | O. Reg. 170/03 | 6-5

6?		| (1)5-10,SDWA | O. Reg. 170/03 | 6-5 | (1.1)

Observation

All continuous monitoring equipment utilized for sampling and testing required by O. Reg.170/03, or Municipal Drinking Water Licence or Drinking Water Works Permit or order, were equipped with alarms or shut-off mechanisms that satisfy the standards described in Schedule 6.

The Grafton DWS utilizes chlorine to satisfy primary & secondary disinfection needs. Consequentially, three (3) Siemens (Wallace & Tiernan) continuous monitoring analyzers are utilized to measure the disinfectant residuals of the water pre-clearwell & at the point where primary disinfection is achieved, as well as a backup unit also capable of measuring the primary disinfectant, incorrectly identified as a "secondary" chlorine residual analyzer.

The alarm set-points, as reported are;

- pre Cl2 lolo alarm of 0.70 mg.L

- lo Cl2 alarm of 0.75 mg/L

- hi Cl2 alarm of 2.40 mg/L.

The pre clearwell analyzer is also reportedly inter-locked with the well pumps and will interrupt their operation should the lolo or hi alarms values be reached.

The primary or CT alarm set-points are reported as;

- lolo Cl2 alarm of 0.60 mg/L,

- lo Cl2 alarm of 0.70 mg/L

- hi Cl2 alarm of 2.15 mg/L.

The redundant primary analyzer will reportedly alarm out at;

- lolo Cl2 alarm of 0.60 mg/L,

- lo Cl2 alarm of 0.70 mg/L

- hi Cl2 alarm of 2.0 mg/L.

Further, the clearwells are understood to be equipped with ultrasonic level measurement devices with a reported low alarm set-point of 4.0 m.

It should be mentioned that the well water levels are also monitored and could be configured to alarm if desired.

Question ID	MRDW1038000		
Question		**Question Type**	**Legislative Requirement**
Is continuous monitoring equipment that is being utilized to fulfill O. Reg. 170/03 requirements performing tests for the parameters with at least the minimum frequency specified in the Table in Schedule 6 of O. Reg. 170/03 and recording data with the prescribed format?		Legislative	SDWA | O. Reg. 170/03 | 6-5 | (1) 1-4
Observation			
Continuous monitoring equipment that was being utilized to fulfill O. Reg. 170/03 requirements was performing tests for the parameters with at least the minimum frequency specified in the Table in Schedule 6 of O. Reg. 170/03 and recording data with the prescribed format. Information provided by the Operating Authority indicates that the raw analyzer recorded data is read continuously, with the min/max and mean data sets being captured as per legislation, i.e: Sch. 6-5(1)2i, i.e.: every 5 minutes for primary disinfection chlorine continuous monitoring units,			

Question ID	MRDW1035000		
Question		**Question Type**	**Legislative Requirement**
Are operators examining continuous monitoring test results and are they examining the results within 72 hours of the test?		Legislative	SDWA | O. Reg. 170/03 | 6-5 | (1) 1-4,SDWA | O. Reg. 170/03 | 6-5 | (1)5-10
Observation			
Operators were examining continuous monitoring test results and they were examining the results within 72 hours of the test. Based upon log sheets provided and reports given during the field inspection, staff visit the drinking water system daily, seven (7) days a week, at which time data is captured and reviewed as necessary.			

Question ID	MRDW1040000		
Question		**Question Type**	**Legislative Requirement**
Are all continuous analysers calibrated, maintained, and operated, in accordance with the manufacturer's instructions or the regulation?		Legislative	SDWA | O. Reg. 170/03 | 6-5 | (1) 1-4,SDWA | O. Reg. 170/03 | 6-5 | (1)5-10
Observation			
All continuous analysers were calibrated, maintained, and operated, in accordance with the manufacturer's instructions or the regulation.			

During the field inspection three (3) Siemens (W/T) continuous monitoring chlorine residual analyzers were identified. They are monitoring the pre (x1) and, post (x2) disinfectant residual concentrations. According to records provided staff will standardize the analyzers daily if need be, otherwise Nichols Water Services is solicited and performs a calibration on an annual basis. Records indicate that this was last completed on June 2/21.
According to records all of the units successfully passed the calibrations.

Question ID	MRDW1108000	
Question	**Question Type**	**Legislative Requirement**
Where continuous monitoring equipment used for the monitoring of free chlorine residual, total chlorine residual, combined chlorine residual or turbidity, required by Regulation 170, an Order, MDWL, or DWWP issued under Part V, SDWA, has triggered an alarm or an automatic shut-off, did a qualified person respond in a timely manner and take appropriate actions?	Legislative	SDWA | O. Reg. 170/03 | 6-5 | (1) 1-4,SDWA | O. Reg. 170/03 | 6-5 | (1)5-10,SDWA | O. Reg. 170/03 | 6-5 | (1.1)
Observation		
Where required continuous monitoring equipment used for the monitoring of chlorine residual and/or turbidity triggered an alarm or an automatic shut-off, a qualified person responded in a timely manner and took appropriate actions. Based upon information provided there were a total of five (5) alarms that resulted in an operator responding to site. Four (4) of those were as it relates to chlorine residual alarm, with three (3) of those for the pre-disinfectant lo alarm, and one (1) post or primary chlorine residual alarm. The other alarm went out for an elevated discharge flow due to fire department activities. All alarms were address by certified operational staff and without further issue.		

Question ID	MRDW1018000	
Question	**Question Type**	**Legislative Requirement**
Has the owner ensured that all equipment is installed in accordance with Schedule A and Schedule C of the Drinking Water Works Permit?	Legislative	SDWA | 31 | (1)
Observation		
The owner had ensured that all equipment was installed in accordance with Schedule A and Schedule C of the Drinking Water Works Permit.		

Question ID	MRDW1023000	
Question	**Question Type**	**Legislative Requirement**
Do records indicate that the treatment equipment was operated in a manner that achieved the design capabilities required under Ontario Regulation 170/03 or a DWWP	Legislative	SDWA | O. Reg. 170/03 | 1-2 | (2)

and/or MDWL issued under Part V of the SDWA at all times that water was being supplied to consumers?		

Observation

Records indicated that the treatment equipment was operated in a manner that achieved the design capabilities required under Ontario Regulation 170/03 or a Drinking Water Works Permit and/or Municipal Drinking Water Licence issued under Part V of the SDWA at all times that water was being supplied to consumers.

A raw water supply which is ground water means water located in subsurface aquifer(s) where the aquifer overburden and soil act as an effective filter that removes micro-organisms and other particles by straining and antagonistic effect, to a level where the water supply may already be potable but disinfection is required as an additional health risk barrier. Where the drinking-water system obtains water from a raw water supply which is ground water, the treatment process must, as a minimum, consist of disinfection and must be credited with achieving an overall performance that provides, at a minimum 2-log (99%) removal or inactivation of viruses before the water is delivered to the first consumer, as is the case for the Grafton Drinking Water System. The treatment system includes two inter-connected underground clearwells (ea 525 m3 - with dimension of ~7.35 M x ~17.55 x ~4-5.8 m), at a minimum level of 4.0 m, along with chlorination,
which together has been credited with 2.0+-log R/I of Viruses, based on Municipal License #238-101, (issue 3) Schedule E, providing that the CT provided shall be greater than or equal to the CT required to achieve the log removal credits assigned. Liquid sodium hypochlorite (~12%) is injected immediately upstream of clearwell #1 for purposes of satisfying primary & secondary disinfection.

CT calculations generated by the undersigned utilizing worst case variables of; max flow rate of 106.25 L/s, baffle factor of 0.3, the lowest free chlorine residual recorded over the inspection period of 0.59 ppm, a max pH of ~8, min clearwell volume of 1050 m3, and a min temperature of ~10 degrees Celsius, yielded CT achieved value of ~29.13 mg.min/L.

The required CT value, according to the Ministry's-Procedure for Disinfection of Drinking Water in Ontario, indicates that a CT Required value of 3 mg.min/L is necessary.

Please keep in mind that it is highly unlikely that worst case variables like those noted above would all occur at the same time, and as such CT achieved values are expected to be much higher.

Question ID	MRDW1024000	
Question	**Question Type**	**Legislative Requirement**
Do records confirm that the water treatment equipment which provides chlorination or chloramination for secondary disinfection purposes was operated so that at all times and all locations in the distribution system the chlorine residual was never less than 0.05 mg/l free or 0.25 mg/l combined?	Legislative	SDWA | O. Reg. 170/03 | 1-2 | (2)

Observation

Records confirmed that the water treatment equipment which provides chlorination or chloramination for secondary disinfection purposes was operated so that at all times and all locations in the distribution system the chlorine residual was never less than 0.05 mg/l free or 0.25 mg/l combined.

In review of monthly log sheets provided the secondary disinfectant residuals ranged from 0.50 mg/L (Dec. 13/20 @ 11012 Hwy #2) - 1.77 mg/L (Apr. 18/21 @ Brimley rd).

Question ID	MRDW1062000	
Question	**Question Type**	**Legislative Requirement**
Do records or other record keeping mechanisms confirm that operational testing not performed by continuous monitoring equipment is being done by a certified operator, water quality analyst, or person who meets the requirements of O. Reg. 170/03 7-5?	Legislative	SDWA | O. Reg. 170/03 | 7-5
Observation		
Records or other record keeping mechanisms confirmed that operational testing not performed by continuous monitoring equipment was being done by a certified operator, water quality analyst, or person who suffices the requirements of O. Reg. 170/03 7-5.		

Question ID	MRDW1060000	
Question	**Question Type**	**Legislative Requirement**
Do the operations and maintenance manuals meet the requirements of the DWWP and MDWL issued under Part V of the SDWA?	Legislative	SDWA | 31 | (1)
Observation		
The operations and maintenance manuals met the requirements of the Drinking Water Works Permit and Municipal Drinking Water Licence issued under Part V of the SDWA. Collectively the O/M Manual & documents satisfy the requirements of the ML/DWWP, but it is strongly recommended that all components of the O/M be compiled into one large file or binder for purposes of satisfying the control document in this regard.		

Question ID	MRDW1071000	
Question	**Question Type**	**Legislative Requirement**
Has the owner provided security measures to protect components of the drinking water system?	BMP	Not Applicable
Observation		
The owner had provided security measures to protect components of the drinking water system. Security was identified during the physical inspection of the Works to include;		

- chain link fencing with locked gates and topped with barbed wire around the 3 wells in proximity to the well house.

- motion sensor cameras inside (x1) and outside (x3).

- locked exterior doors, fitted with alarm contacts.

- staff attendance seven (7) days a week.

Question ID	MRDW1073000		
Question		**Question Type**	**Legislative Requirement**
Has the overall responsible operator been designated for all subsystems which comprise the drinking water system?		Legislative	SDWA | O. Reg. 128/04 | 23 | (1)

Observation

The overall responsible operator has been designated for each subsystem.

Mr. Spyrka has been identified as the Overall Responsible Operator (ORO) for the entire drinking water system over the inspection period, while Mr. Taggart & Mr. Clarey also served to a lesser extent in this capacity during the term.

The Grafton DWS has been categorized as a Class III - Water Distribution & Supply Subsystem, certificate #3012. All parties noted above are acknowledged to possess valid Class III certificates in Water Distribution & Supply Subsystems.

Question ID	MRDW1074000		
Question		**Question Type**	**Legislative Requirement**
Have operators in charge been designated for all subsystems for which comprise the drinking water system?		Legislative	SDWA | O. Reg. 128/04 | 25 | (1)

Observation

Operators-in-charge had been designated for all subsystems which comprised the drinking water system.

Lakefront Utilities operational staff are all designated as Operator/s-In-Charge (OIC), to include; Mr. Branden Wherry, Mr. Darren Hanbidge, Mr. Nick Cunnigham, Mr. Ryan Smith, Mr. Scott Noble, Mr. Scott Prins, Mr. Shawn Bolendar (left employ), Mr. Shawn Neilson and Mr. Tim Clarey, with the exception of the Compliance Coordinator, Mr. Spyrka and Mr. Taggart.

Question ID	MRDW1075000		
Question		**Question Type**	**Legislative Requirement**
Do all operators possess the required certification?		Legislative	SDWA | O. Reg.

		128/04 | 22
Observation		
All operators possessed the required certification.		

Question ID	MRDW1076000	
Question	**Question Type**	**Legislative Requirement**
Do only certified operators make adjustments to the treatment equipment?	Legislative	SDWA | O. Reg. 170/03 | 1-2 | (2)
Observation		
Only certified operators made adjustments to the treatment equipment.		

Question ID	MRDW1099000	
Question	**Question Type**	**Legislative Requirement**
Do records show that all water sample results taken during the inspection review period did not exceed the values of tables 1, 2 and 3 of the Ontario Drinking Water Quality Standards (O. Reg.. 169/03)?	Information	Not Applicable
Observation		
Records showed that all water sample results taken during the inspection review period did not exceed the values of tables 1, 2 and 3 of the Ontario Drinking Water Quality Standards (O.Reg. 169/03).		

Question ID	MRDW1096000	
Question	**Question Type**	**Legislative Requirement**
Do records confirm that chlorine residual tests are being conducted at the same time and at the same location that microbiological samples are obtained?	Legislative	SDWA | O. Reg. 170/03 | 6-3 | (1)
Observation		
Records confirmed that chlorine residual tests were being conducted at the same time and at the same location that microbiological samples were obtained. A sporadic review of Chain of Custody records provided confirms that staff are capturing chlorine residuals at the same time as microbial sample collection.		

Question ID	MRDW1081000	
Question	**Question Type**	**Legislative Requirement**
Are all microbiological water quality monitoring requirements for distribution samples being met?	Legislative	SDWA | O. Reg. 170/03 | 10-2 | (1),SDWA | O.

		Reg. 170/03 | 10-2 | (2),SDWA | O. Reg. 170/03 | 10-2 | (3)

Observation

All microbiological water quality monitoring requirements for distribution samples were being met.

According to records, sampling has been carried out as prescribed by legislation, with three (3) distribution samples being captured every week under review.

Each of the samples collected returned results for total coliforms, E.coli and 33% were sampled & tested for HPC.

The population of the Town of Grafton is ~1000 persons, and according to O.Reg. 170/03, Sch. 10, subsection 10-2 (1a) drinking water systems with populations of under 100,000 are required to sample & test from 8 dist sites, plus 1 per thousand population, translating to 9 samples as it relates to the Grafton DWS.

Records indicate that Lakefront Utilities (LUSI) on behalf of the Township of Alnwick/Haldimand specific to the Grafton DWS, sampled and tested at least twelve (12) samples per month under review.

Question ID	MRDW1083000	
Question	**Question Type**	**Legislative Requirement**
Are all microbiological water quality monitoring requirements for treated samples being met?	Legislative	SDWA | O. Reg. 170/03 | 10-3

Observation

All microbiological water quality monitoring requirements for treated samples were being met.

Question ID	MRDW1084000	
Question	**Question Type**	**Legislative Requirement**
Are all inorganic water quality monitoring requirements prescribed by legislation conducted within the required frequency?	Legislative	SDWA | O. Reg. 170/03 | 13-2

Observation

All inorganic water quality monitoring requirements prescribed by legislation were conducted within the required frequency.

Schedule 23 - Inorganic sampling was last carried out on January 13, 2020.

Please be advised that a large municipal drinking water system with true groundwater is obligated to sample & test the treated water every thirty-six (36)months, as per O.Reg. 170/03, Schedule 13-

2 (1b).

Question ID	MRDW1085000		
Question		**Question Type**	**Legislative Requirement**
Are all organic water quality monitoring requirements prescribed by legislation conducted within the required frequency?		Legislative	SDWA | O. Reg. 170/03 | 13-4 | (1),SDWA | O. Reg. 170/03 | 13-4 | (2),SDWA | O. Reg. 170/03 | 13-4 | (3)

Observation

All organic water quality monitoring requirements prescribed by legislation were conducted within the required frequency.

Schedule 24 - Organic sampling was last carried out on January 13, 2020.

Please be advised that a large municipal drinking water system with true groundwater is obligated to sample & test the treated water every thirty-six (36)months, as per O.Reg. 170/03, Schedule 13-4 (1b).

Question ID	MRDW1086000		
Question		**Question Type**	**Legislative Requirement**
Are all haloacetic acid water quality monitoring requirements prescribed by legislation conducted within the required frequency and at the required location?		Legislative	SDWA | O. Reg. 170/03 | 13-6.1 | (1),SDWA | O. Reg. 170/03 | 13-6.1 | (2),SDWA | O. Reg. 170/03 | 13-6.1 | (3), SDWA | O. Reg. 170/03 | 13-6.1 | (4),SDWA | O. Reg. 170/03 | 13-6.1 | (5),SDWA | O. Reg. 170/03 | 13-6.1 | (6)

Observation

All haloacetic acid water quality monitoring requirements prescribed by legislation are being conducted within the required frequency and at the required location.

Records provided indicate that sampling for HAAs last occurred on July 12, 2021, yielding a

result of 5.3 ug/L <MDL and consistently every quarter over the inspection period.

Question ID	MRDW1087000		
Question		**Question Type**	**Legislative Requirement**
Have all trihalomethane water quality monitoring requirements prescribed by legislation been conducted within the required frequency and at the required location?		Legislative	SDWA | O. Reg. 170/03 | 13-6 | (1)
Observation			
All trihalomethane water quality monitoring requirements prescribed by legislation were conducted within the required frequency and at the required location. Records provided indicate that sampling for HAAs last occurred on July 12/ 21, yielding a result of 21 ug/L, with sample results over the inspection period ranging from 21 - 24 ug/L, as sampled every quarter.			

Question ID	MRDW1088000		
Question		**Question Type**	**Legislative Requirement**
Are all nitrate/nitrite water quality monitoring requirements prescribed by legislation conducted within the required frequency for the DWS?		Legislative	SDWA | O. Reg. 170/03 | 13-7
Observation			
All nitrate/nitrite water quality monitoring requirements prescribed by legislation were conducted within the required frequency for the DWS. Records indicate that sampling for Nitrite (N02) and Nitrates (N03) were last conducted on July 15, 2021, from the treated water. Prior to this, samples were collected quarterly. Based on the above sampling Nitrate results ranged from 0.19 - 0. 22 mg/L, with Nitrite results remained steady at 0.03 mg/L <MDL			

Question ID	MRDW1089000		
Question		**Question Type**	**Legislative Requirement**
Are all sodium water quality monitoring requirements prescribed by legislation conducted within the required frequency?		Legislative	SDWA | O. Reg. 170/03 | 13-8
Observation			
All sodium water quality monitoring requirements prescribed by legislation were conducted within the required frequency. Sampling for Sodium last occurred on September 16, 2019 and yielded a result of 17 mg/L. According to O.Reg. 170/03 - Schedule 13, subsection 13-8, sampling shall be carried out every			

sixty (60) months.

Question ID	MRDW1090000		
Question		**Question Type**	**Legislative Requirement**
Where fluoridation is not practiced, are all fluoride water quality monitoring requirements prescribed by legislation conducted within the required frequency?		Legislative	SDWA | O. Reg. 170/03 | 13-9
Observation			
All fluoride water quality monitoring requirements prescribed by legislation were conducted within the required frequency. Sampling for Fluoride last occurred on September 16, 2019 and yielded a result of 0.21 mg/L. According to O.Reg. 170/03 - Schedule 13, subsection 13-9 sampling shall be carried out every sixty (60) months.			

Question ID	MRDW1100000		
Question		**Question Type**	**Legislative Requirement**
Did any reportable adverse/exceedance conditions occur during the inspection period?		Information	Not Applicable
Observation			
There were no reportable adverse/exceedances during the inspection period.			

Question ID	MRDW1113000		
Question		**Question Type**	**Legislative Requirement**
Have all changes to the system registration information been provided to the Ministry within ten (10) days of the change?		Legislative	SDWA | O. Reg. 170/03 | 10.1 | (3)
Observation			
All changes to the system registration information were provided within ten (10) days of the change.			

Question ID	MRDW1116000		
Question		**Question Type**	**Legislative Requirement**
Were the inspection questions sufficient to address other identified best practice issues?		BMP	Not Applicable
Observation			
The following issues were also noted during the inspection: It is recommended that the Drinking Water System Owner &/or Operating Authority consider			

acting on the following;

1.) Discussing the elevated ammonia concentrations identified in production well #1 with the local Health Unit prior to it being called into service.

2.) Determine where the floor drains and water from the exterior WW holding tank discharges to & ensure that any effluent is de-chlorinated before reaching the natural environment.

3.) Revising the O/M Manual to include a "Table of Contents" referencing where the Municipal License, Sch. B, Condition 16.0 - O/M Manual conditions can be located within, as well as the Contingency Plans, SOPs, and the new 2020 - Watermain Disinfection Procedure.

4.) Formalize internal efforts in writing taken to prevent falsification of training & log records
.
5.) Amend the current DWWP, Schedule A, Chlorine Addition section the next time amendments are being sought so as to remove reference to; Two (2) metering pumps (duty and standby) each capable of 4 L/hr. complete with one (1) storage tank for secondary disinfection

6.) Remove reference to the data obtained from the chlorine residual analyzer located near the bulk water fill station, incorrectly identified as a secondary chlorine unit (AIT 822).

7.) Revise ERP-02 - Raw Water Contamination, dated July 24, 2019, to include contacting MECP & local Health unit.

8.) Enhance the existing Emergency Contact List to include reference to Health unit, MECP, Equipment & Electrical Contractors & Suppliers,, Bulk Water Haulers & Hydro One for example.

9.) It is recommended that whenever numerical flow data is above the PTTW limit that staff capture the number of these event per 72 Reviews, and duration, where possible. Should the events be > 5 minutes in duration the O/A shoud capture, the number of events, the cause, where know, and actions taken to address, where applicable.

Question ID	MRDW1117000	
Question	**Question Type**	**Legislative Requirement**
Are there any other DWS related items that should be recognized in this report?	Information	Not Applicable

Observation

The following items are noted as being relevant to the Drinking Water System:

1.) Sampling efforts to comply with Permit To Take Water #5086-9BPM4A, Condition 4.2 as completed on behalf of the Owner by the Owner's Consultant - GeoKamp Limited yielded detections of toluene and xylene at low concentrations.

An interpretive Report was prepared as required by GeoKamp Ltd, that was submitted to MECP for review.

Additional sampling efforts were carried out subsequent to the initial detections (Dec. 2020), with the last most recent sampling event completed in September of 2021, with all repeatedly confirming the presence of low level concentrations of toluene and xylenes at two of the monitoring wells.

The Ministry's - Kingston District Office - Technical Support Services section was engaged although no definitive source of these chemical parameters could be identified.

A Permit To Take Water amendment is underway given the aforementioned and is expected address future sampling requirements, especially if continued or increasing concentrations.of toluene & xylene are encountered.

2.) Data provided for review indicates that the raw water has been sampled & tested monthly as per regulatory requirements for turbidity.

Records indicate that over the inspection period, turbidty levels have ranged from 0.06 - 0.51 NTU.

3.) It is understood that the Township engaged GM BluePlan Engineering Limited to evaluate options in light of the ammonia concentrations identified within production well #1.

The report, entitled "Evaluation of Alternatives For Water Supply Upgrades"dated September 2019, identifies several options to include looking into the viability of utilizing one of the existing monitoring wells; having a new well constructed; installing different treatment options; using GAC media; blending from different sources; connecting to the Cobourg drinking water system or do nothing.

At the time of writing this report it has been reported that the Township of Alnwick/Haldimand have applied to the Ontario Community Infrastructure Fund for purposes of replacing Well #1 with a new production well.

It is expec ted that should funding be denied, then the matter will be taken back to council to re-evaluate options.

Question ID	MRDW1059000	
Question	**Question Type**	**Legislative Requirement**
Do the operations and maintenance manuals contain plans, drawings and process descriptions sufficient for the safe and efficient operation of the system?	Legislative	SDWA | O. Reg. 128/04 | 28
Observation		
The operations and maintenance manuals contained plans, drawings and process descriptions sufficient for the safe and efficient operation of the system.		

Question ID	MRDW1061000	
Question	**Question Type**	**Legislative Requirement**
Are logbooks properly maintained and contain the required information?	Legislative	SDWA | O. Reg. 128/04 | 27 | (1), SDWA | O. Reg. 128/04 | 27 | (2), SDWA | O. Reg. 128/04 | 27 | (3), SDWA | O. Reg. 128/04 | 27 | (4), SDWA | O. Reg. 128/04 | 27 | (5), SDWA | O. Reg. 128/04 | 27 | (6), SDWA | O. Reg. 128/04 | 27 | (7)
Observation		
Logbooks were properly maintained and contained the required information. Logbooks identified were large rectangular bound books, with the pages identified as "Waterworks Daily log Sheet" and the pages were numbered, & included locations, for operator details or logs, their names, times in/out, & location for operator's signatures.		

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APPENDIX A

RISK METHODLOGY

APPLICATION OF THE RISK METHODOLOGY USED FOR MEASURING MUNICIPAL RESIDENTIAL DRINKING WATER SYSTEM INSPECTION RESULTS

The Ministry of the Environment (MOE) has a rigorous and comprehensive inspection program for municipal residential drinking water systems (MRDWS). Its objective is to determine the compliance of MRDWS with requirements under the Safe Drinking Water Act and associated regulations. It is the responsibility of the municipal residential drinking water system owner to ensure their drinking water systems are in compliance with all applicable legal requirements.

This document describes the risk rating methodology, which has been applied to the findings of the Ministry's MRDWS inspection results since fiscal year 2008-09. The primary goals of this assessment are to encourage ongoing improvement of these systems and to establish a way to measure this progress.

MOE reviews the risk rating methodology every three years.

The Ministry's Municipal Residential Drinking Water Inspection Protocol contains 15 inspection modules consisting of approximately 100 regulatory questions. Those protocol questions are also linked to definitive guidance that ministry inspectors use when conducting MRDWS inspections.

PIBS 6797e

Ontario

The questions address a wide range of regulatory issues, from administrative procedures to drinking water quality monitoring. The inspection protocol also contains a number of non-regulatory questions.

A team of drinking water specialists in the ministry assessed each of the inspection protocol regulatory questions to determine the risk (not complying with the regulation) to the delivery of safe drinking water. This assessment was based on established provincial risk assessment principles, with each question receiving a risk rating referred to as the Question Risk Rating. Based on the number of areas where a system is deemed to be non-compliant during the inspection, and the significance of these areas to administrative, environmental, and health consequences, a risk-based inspection rating is calculated by the ministry for each drinking water system.

It is important to be aware that an inspection rating less than 100 per cent does not mean the drinking water from the system is unsafe. It shows areas where a system's operation can improve. The ministry works with owners and operators of systems to make sure they know what they need to do to achieve full compliance.

The inspection rating reflects the inspection results of the specific drinking water system for the reporting year. Since the methodology is applied consistently over a period of years, it serves as a comparative measure both provincially and in relation to the individual system. Both the drinking water system and the public are able to track the performance over time, which encourages continuous improvement and allows systems to identify specific areas requiring attention.

The ministry's annual inspection program is an important aspect of our drinking water safety net. The ministry and its partners share a common commitment to excellence and we continue to work toward the goal of 100 per cent regulatory compliance.

Determining Potential to Compromise the Delivery of Safe Water

The risk management approach used for MRDWS is aligned with the Government of Ontario's Risk Management Framework. Risk management is a systematic approach to identifying potential hazards, understanding the likelihood and consequences of the hazards, and taking steps to reduce their risk if necessary and as appropriate.

The Risk Management Framework provides a formula to be used in the determination of risk:

RISK = LIKELIHOOD × CONSEQUENCE
(of the consequence)

Every regulatory question in the inspection protocol possesses a likelihood value (L) for an assigned consequence value (C) as described in **Table 1** and **Table 2**.

TABLE 1:

Likelihood of Consequence Occurring	Likelihood Value
0% - 0.99% (Possible but Highly Unlikely)	L = 0
1 – 10% (Unlikely)	L = 1
11 – 49% (Possible)	L = 2
50 – 89% (Likely)	L = 3
90 – 100% (Almost Certain)	L = 4

TABLE 2:

Consequence	Consequence Value
Medium Administrative Consequence	C = 1
Major Administrative Consequence	C = 2
Minor Environmental Consequence	C = 3
Minor Health Consequence	C = 4
Medium Environmental Consequence	C = 5
Major Environmental Consequence	C = 6
Medium Health Consequence	C = 7
Major Health Consequence	C = 8

The consequence values (0 through 8) are selected to align with other risk-based programs and projects currently under development or in use within the ministry as outlined in **Table 2**.

The Question Risk Rating for each regulatory inspection question is derived from an evaluation of every identified consequence and its corresponding likelihood of occurrence:

- All levels of consequence are evaluated for their potential to occur
- Greatest of all the combinations is selected.

The Question Risk Rating quantifies the risk of non-compliance of each question relative to the others. Questions with higher values are those with a potentially more significant impact on drinking water safety and a higher likelihood of occurrence. The highest possible value would be 32 (4×8) and the lowest would be 0 (0×1).

Table 3 presents a sample question showing the risk rating determination process.

TABLE 3:

Does the Operator in Charge ensure that the equipment and processes are monitored, inspected and evaluated?							
Risk = Likelihood × Consequence							
C=1	C=2	C=3	C=4	C=5	C=6	C=7	C=8
Medium Administrative Consequence	**Major** Administrative Consequence	**Minor** Environmental Consequence	**Minor** Health Consequence	**Medium** Environmental Consequence	**Major** Environmental Consequence	**Medium** Health Consequence	**Major** Health Consequence
L=4 (Almost Certain)	L=1 (Unlikely	L=2 (Possible)	L=3 (Likely)	L=3 (Likely)	L=1 (Unlikely	L=3 (Likely)	L=2 (Possible)
R=4	**R=2**	**R=6**	**R=12**	**R=15**	**R=6**	**R=21**	**R=16**

Application of the Methodology to Inspection Results

Based on the results of a MRDWS inspection, an overall inspection risk rating is calculated. During an inspection, inspectors answer the questions related to regulatory compliance and input their "yes", "no" or "not applicable" responses into the Ministry's Laboratory and Waterworks Inspection System (LWIS) database. A "no" response indicates non-compliance. The maximum number of regulatory questions asked by an inspector varies by: system (i.e., distribution, stand-alone); type of inspection (i.e., focused, detailed); and source type (i.e., groundwater, surface water).

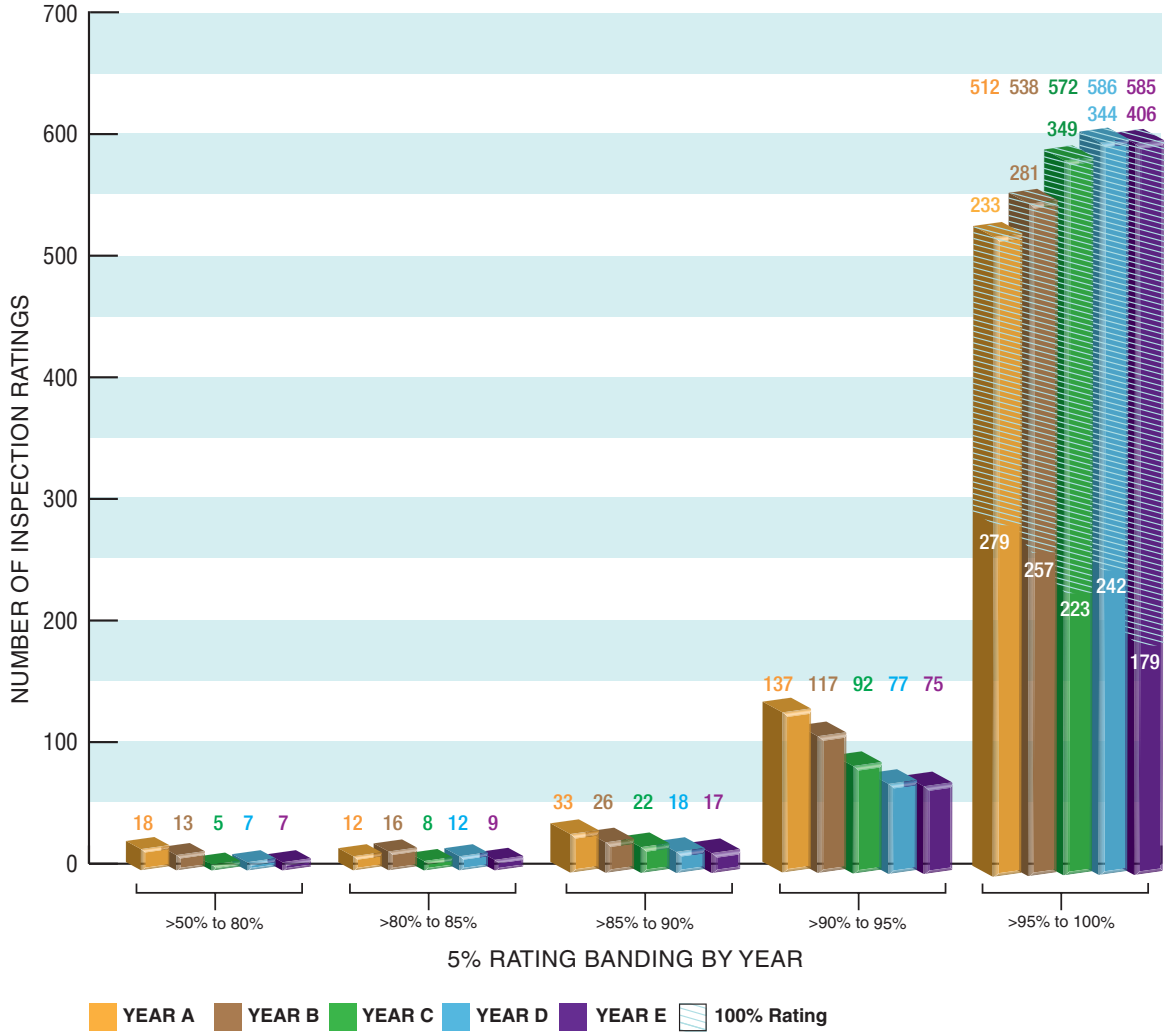
The risk ratings of all non-compliant answers are summed and divided by the sum of the risk ratings of all questions asked (maximum question rating). The resulting inspection risk rating (as a percentage) is subtracted from 100 per cent to arrive at the final inspection rating.

Application of the Methodology for Public Reporting

The individual MRDWS Total Inspection Ratings are published with the ministry's Chief Drinking Water Inspector's Annual Report.

Figure 1 presents the distribution of MRDWS ratings for a sample of annual inspections. Individual drinking water systems can compare against all the other inspected facilities over a period of inspection years.

Figure 1: Year Over Year Distribution of MRDWS Ratings



Reporting Results to MRDWS Owners/Operators

A summary of inspection findings for each system is generated in the form of an Inspection Rating Record (IRR). The findings are grouped into the 15 possible modules of the inspection protocol, which would provide the system owner/operator with information on the areas where they need to improve. The 15 modules are:

1. Source
2. Permit to Take Water
3. Capacity Assessment
4. Treatment Processes
5. Treatment Process Monitoring
6. Process Wastewater
7. Distribution System
8. Operations Manuals
9. Logbooks
10. Contingency and Emergency Planning
11. Consumer Relations
12. Certification and Training
13. Water Quality Monitoring
14. Reporting, Notification and Corrective Actions
15. Other Inspection Findings

For further information, please visit **www.ontario.ca/drinkingwater**

Ministry of the Environment, Conservation and Parks - Inspection Summary Rating Record (Reporting Year - 2021-2022)

DWS Name:	Grafton Drinking Water System
DWS Number:	220009158
DWS Owner:	THE CORPORATION OF THE TOWNSHIP OF ALNWICK-HALDIMAND
Municipal Location:	ALNWICK-HALDIMAND
Regulation:	O.REG. 170/03
DWS Category:	DW Municipal Residential
Type of Inspection:	Focused
Inspection Date:	Nov-2-21
Ministry Office:	Peterborough District Office

Maximum Risk Rating: 437

Inspection Module	Non Compliance Rating
Source	0 / 14
Capacity Assessment	0 / 30
Treatment Processes	0 / 168
Operations Manuals	0 / 28
Logbooks	0 / 18
Certification and Training	0 / 42
Water Quality Monitoring	0 / 112
Reporting & Corrective Actions	0 / 25
Overall - Calculated	**0 / 437**

Inspection Risk Rating:	**0.00%**

Final Inspection Rating:	**100.00%**

Inspection Rating Record Generated On 2022-01-11 (Inspection ID: 1-36450319)

DWS Name:	Grafton Drinking Water System
DWS Number:	220009158
DWS Owner Name:	THE CORPORATION OF THE TOWNSHIP OF ALNWICK-HALDIMAND
Municipal Location:	ALNWICK-HALDIMAND
Regulation:	O.REG. 170/03
DWS Category:	DW Municipal Residential
Type of Inspection:	Focused
Inspection Date:	Nov-2-21
Ministry Office:	Peterborough District Office

All legislative requirements were met. No detailed rating scores.

Maximum Question Rating: 437

Inspection Risk Rating:	**0.00%**

FINAL INSPECTION RATING:	**100.00%**

APPENDIX- 7

The Corporation of the Township of Alnwick/Haldimand

Grafton DWS- 2021 DWQMS Internal Audit Report August

Drinking Water Quality Management Standard (DWQMS 2.0)

Internal Audit Report

For the period of:

August 1, 2020 to June 25, 2021

For:

Lakefront Utility Services Inc.,
as operating authority for:

Alnwick / Haldimand Township
Grafton Drinking Water System

Conducted by:

acclaims ENVIRONMENTAL
acclaims.ca

Audit dates: June 21-25, 2021
Report date: June 25, 2021

1.0 Overview & Objectives

Acclaims Environmental Inc. was retained to conduct an internal audit of the Lakefront Utility Services Inc.'s (LUSI's) quality management system (QMS) on June 21-25, 2021 to determine whether it conforms to the requirements of the Drinking Water Quality Management Standard (DWQMS 2.0); and to assess whether the QMS is effectively implemented.

The internal audit was conducted with one lead auditor, Brigitte Roth of Acclaims Environmental Inc.

This report summarizes the audit results in section 2.0 Audit Findings, categorizing positive findings, non-conformities and opportunities for improvement.

1.1 Risks and Opportunities

The risk-based approach was used in conducting this audit; which considers risks and opportunities to ensure that the audit focuses on matters that are significant for the auditee and for achieving the audit program objectives.

In any audit, potential risks can include those related to *ineffective*: planning / identification of external and internal issues; resources; audit team; communication; audit program implementation / monitoring / improvement; control of documented information; and availability of auditee and/or evidence.

Also, opportunities can include *efficiencies* such as: allowing multiple audits to be conducted in a single visit; minimizing time and distances travelling to sites; matching competencies of audit team to competencies needed; and aligning audit dates with the availability of auditee's staff.

This audit was conducted remotely, using information and communications technology (ICT) for audit interviews. Potential risks in conducting audits remotely include: issues related to ICT availability / capability / reliability; auditee knowledge and familiarity with ICT; evidence presented might not be representative; and additional follow-up may be required. Opportunities in conducting this audit remotely: supports business continuity, allows for internal audits to be conducted in extraordinary times; improved efficiency with auditees' time; can follow-up with requested information.

1.2 Scope

This internal audit was performed remotely, using information and communications technology (ICT). The COVID-19 pandemic response (in implementing measures to prevent the spread of the virus) has presented unique opportunities for organizations to explore alternative approaches for business continuity. Conducting audits remotely was one of these opportunities and is a permitted practice under normal operating conditions through the province's Municipal Drinking Water Licensing Program and through ISO 19011:2018 Guidelines for auditing management systems.

The Operational Plan and related documented information for the Grafton Drinking Water System was reviewed for conformity to the DWQMS 2.0. This audit also reviewed the LUSI's planned processes and programs to evaluate how well QMS requirements are integrated into them.

Process audits examine the resources (equipment, materials and people) used to transform the inputs into outputs, the methods (procedures and instructions) followed and the measures collected to determine process performance. Process audits check the adequacy and effectiveness of the process controls established by procedures, work instructions, training and process specifications.

As the last internal audit was conducted on July 27-31, 2020, this audit focused on the period between August 1, 2020 and June 25, 2021.

1.3 Methodology

The audit was conducted in accordance with ISO 19011:2018 – Guidelines for auditing management systems.

The list of all auditing criteria is included in Appendix "A" – Audit Plan. Appendix "B" – Interviews, Documents and Records lists persons interviewed, along with documents and processes reviewed. Appendix "C" – Audit Checklists includes the checklists used to conduct the audit.

In order to conduct audits within scope, time and budgetary constraints, audit evidence is based on a sampling of processes, programs, and information available. The size of the sample selected is appropriate to the size and scale of the operation and information available. Objective evidence collected is based upon the sampling.

The conclusions presented in this report are based on information presented during the internal audit.

1.4 Audit Program Monitoring and Reviewing

The implementation of the audit program was monitored and, at appropriate intervals, reviewed to assess whether the objectives have been met and to identify opportunities for improvement. The results of this review will be included in this report, if applicable.

Performance indicators were used to monitor characteristics such as:

- conformity with the audit program, schedules and audit objectives,
- the ability to implement the audit plan,
- feedback from top management, auditees, auditors and other interested parties, and
- adequacy of documented information in the whole audit process.

The audit program review considered:

a) results and trends from monitoring,
b) conformity with procedures,
c) evolving needs and expectations of relevant interested parties,
d) audit program records,
e) alternative or new auditing methods / practices,
f) effectiveness of the actions to address the risks and opportunities, and internal and external issues associated with the audit program, and
g) confidentiality and information security issues relating to the audit program.

Corrective actions and opportunities for improvement from the results of audit program reviews, if any, are included in the internal audit report's section 2.0 Audit Findings.

1.5 Auditors

The Lead Auditor was Brigitte Roth, who has extensive auditing experience and is a certified auditor with the Environmental Careers Organization of Canada (ECO Canada). Auditor qualifications are included in Appendix "D" – Auditor CV and Training Certificates.

1.6 Confidentiality

The information gathered by Acclaims Environmental Inc. is the property of Lakefront Utility Services Inc. and the drinking water system owners only and will not be transmitted to any third party without the prior written consent of an authorized representative. All documents provided by the organization prior to and during the assessment are kept only for the purpose of audit review and audit report preparation.

2.0 Audit Findings

2.1 Positive Findings

The following positive audit findings were noted during the audit:

Commitment

- Staff interviewed were knowledgeable about their processes and programs and their roles' impacts on achieving the commitments included in the QMS Policy.
- Training is consistently provided to new leaders about the roles regarding the Statutory Standard of Care (s.19 of the SDWA), also providing an overview of the drinking water system.

Culture of continual improvement

- Consistently throughout the audit, improvements were noted with regards to achieving intended outcomes of drinking water system processes and programs (e.g. updated: process control narratives, chlorine analyzers, work order system now includes distribution system assets, repair truck).
- Water master plan recently approved by council helps prioritize infrastructure needs and timeframes.
- All opportunities for improvement identified in the previous internal and external audits have been verified as completed or are in progress.

Risk-based thinking

- Root cause analysis and corrective action processes were effectively completed or are ongoing for recent issues encountered (e.g. spill, chlorine analyzer alarm, changes in source water characteristics).
- Risk assessment workshops recently hosted with staff resulted in new preventive actions identified and logged in QMS Tracking spreadsheets.
- The updated water model helps ensure adequate water flows, supply vs. demand, fire flows.

Use of technology

- In-field capable technology is deployed (e.g. tablets, SpryPoint asset management system, remote meter reading) electronically records operational, maintenance, and compliance information, optimizing staff resources and helping to identify water losses.
- The upgrade of chlorine analyzers involved operational staff in the pilot testing and selection process.

2.2 Non-Conformities

No non-conformities were noted during the audit.

2.3 Opportunities for Improvement

The following is a list of opportunities for improvement noted in conducting this audit:

Reference	Opportunity for Improvement – Description
Director's Directions …Operational Plans (updated May 2021)	Consider describing in s.2.2 of QMS-P02 that ***Operational Plans audited by the accreditation body*** are kept for ***10 years***, as required by Director's Directions.

Reference	Opportunity for Improvement – Description
Financial Plans (as one of the five parts of the MDWL)	Consider placing the current ***owner-approved Financial Plan*** for the drinking water system ***online***, as required by O. Reg. 453/07 s.3.(1)5. (or linking to the location of current one available at the municipality's website).
QMS Representative (Elements 4 + 9)	Consider updating the position title appointed as the ***QMS Representative*** to "***Compliance Coordinator***", as it was confirmed through audit interview with the Manager of Water Capital Projects that the QMS Representative's duties are actually performed by the Compliance Coordinator. This also aligns with the responsibilities and authorities described in Appendix E of the Operational Plan.
Personnel Coverage (Element 11)	Consider adding references (in QMS-P08) to ***O. Reg. 128/04*** provisions (proposed through ERO notice no. 019-3513) regarding ***staff coverage in out-of-ordinary conditions*** (such as in pandemics and strikes / lock-outs).
Infrastructure Upgrade Records (Element 12, MDWL Sched. B s.5)	Consider ***establishing templates*** to help facilitate effective ***communication of requirements*** related to infrastructure improvement projects, as required by MDWL Schedule B s.5 Compliance. Templates would also enable consistent ***project record-keeping*** to prove project specifications are consistently met.
Procurement of essential supplies (Element 13)	Consider establishing a ***min/max inventory management system*** to ensure procurement of essential supplies and minimum critical stock levels on-hand. The existing work order system has the capability to ensure min/max levels are established and implemented.
Lead Sampling (Element 16 + O. Reg. 170/03 Sched. 15.1)	Consider describing in the introductory paragraph of QMS-D05-Lead Sampling that the ***table is aligned to regulatory relief*** provided in the MDWL Sched. D (O. Reg. 170/03's standard and reduced lead sampling tables are different).
Post-Emergency Incident Report Form (Element 18)	Consider including "***Date and time of emergency start***", "***Date and time of emergency end***", and "***name of person completing the form***" prompts under Emergency Details section of the Post-Emergency Incident Report form.
Staff suggestions (Elements 20 + 21)	Staff interviews have identified the following suggestions to consider: - ***Hiring OIT's seasonally*** to assist with personnel coverage for increased activities every spring and summer (e.g. GIS updates, hydrant inspections & maintenance, valve exercising, locates, re-construction & new projects). - ***Addressing on-call rotation*** (one week out of every 3 weeks) by ***cross-training staff*** across the water division. - ***Scheduling daily tailboard meetings*** to discuss priorities, assignment of work orders, tasks, etc. - ***Scheduling monthly water-specific meetings*** to help improve communications and staff engagement (e.g. look back / forward – OTJ hrs could be logged) – to share past successes, lessons learned, opportunities, plans forward, project statuses, changing conditions, etc. - Setting objectives & targets (KPI's) for ***annual valve exercising*** programs - Establishing ***operationally relevant objectives & targets*** for sampling, monitoring and tracking KPI's – improving planning & control of operations.

3.0 Conclusions

The results of the internal audit performed for the Alnwick / Haldimand Township regarding the Grafton Drinking Water System confirm that the quality management system established is effective in conforming with the requirements of the Drinking Water Quality Management Standard (DWQMS 2.0).

While opportunities for improvement are cited in this audit report, they do not undermine the positive programs and attitudes already in place among Lakefront Utility Services staff.

Brigitte Roth, BES, EP(EMSLA)

Appendix "A" – Audit Plan

Internal Audit Start Date:	June 21, 2021	Internal Audit End Date:	June 25, 2021

Date	Time	Auditor	Auditee	Process / Program	DWQMS Element – Standard and version: DWQMS 2.0																				
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
06-21 /06-22	8:00 – 4:00	BR	Doc. Info.	Desktop review – all systems' OP's	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
06-22	10:00	BR	ALL	Opening Meeting	x																		x		x
06-22	12:30	BR	SB	Water supply & treatment ops		x			x		x	x	x	x	x	x	x			x		x			x
06-23	8:00	BR	LS	Construction & disinfection		x			x	x	x	x	x	x	x	x	x	x	x	x	x	x			x
06-23	10:00	BR	DP	Top Management responsibilities		x	x		x		x	x	x	x	x	x		x	x			x		x	x
06-23	1:00	BR	SW	Compliance Management		x		x	x	x	x	x	x	x	x	x	x					x	x	x	x
06-23	2:00	BR	SW	Sampling, testing, monitoring		x			x		x	x	x	x	x	x	x			x	x	x		x	x
06-24	8:00	BR	DH	Distribution system O&M		x			x		x	x	x	x	x	x	x		x	x	x	x			x
06-24	9:30 – 3:30	BR	Doc. Info.	Desktop review – all systems' OP's	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
06-24	3:30	BR	SN	Supply & treatment maintenance		x			x		x	x	x	x	x	x	x		x	x	x	x			x
06-25	10:00	BR	ALL	Closing Meeting	x																		x		x

Legend for QMS Elements: **1**-Quality Management System, **2**-Quality Management System Policy, **3**-Commitment and Endorsement, **4**-QMS Representative, **5**-Document and Records Control, **6**-Drinking Water System, **7**-Risk Assessment, **8**-Risk Assessment Outcomes, **9**-Organizational Structure, Roles, Responsibilities and Authorities, **10**-Competencies, **11**-Personnel Coverage, **12**-Communications, **13**-Essential Supplies and Services, **14**-Review and Provision of Infrastructure, **15**-Infrastructure Maintenance, Rehabilitation and Renewal, **16**-Sampling, Testing and Monitoring, **17**-Measurement and Recording Equipment Calibration and Maintenance, **18**-Emergency Management, **19**-Internal Audits, **20**-Management Review, **21**-Continual Improvement

Auditee initials: **DH** – Darren Hanbidge (Distribution Operator), **DP** – Dereck Paul (President & CEO), **LS** – Larry Spyrka (Manager of Capital Water Projects), **SB** – Shawn Bolender (Manager of Water Operations), **SN** – Scott Noble (WTP Operator), **SW** – Sarah Whitton (Water Compliance Coordinator), **ALL** – all interested.

Appendix "B" – Documents and Records

The list of documents and records were reviewed, and observations made during the audit include:

- Lakefront Utility Services Inc. staff interviews June 22-24, 2021, organized by last name:
  - Shawn Bolender (Manager of Water Operations)
  - Darren Hanbidge (Distribution Operator)
  - Scott Noble (WTP Operator)
  - Dereck Paul (President & CEO)
  - Larry Spyrka (Manager of Capital Water Projects)
  - Sarah Whitton (Water Compliance Coordinator)
- QMS Operational Plan (OP) for the Grafton Drinking Water System, dated May 25, 2021
- availability of the February 2021 version of the OP (deemed current, with minor revision since) at LUSI's website at https://www.lakefrontutilities.com/regulatory-water/ accessed on June 21, 2021
- QMS Policy for the Grafton Drinking Water System, signed December 21, 2020
- QMS Policy is available at https://www.lakefrontutilities.com/water/, accessed on June 21, 2021
- Commitment and Endorsement by Top Management (in April 2019)
- Commitment and Endorsement signed by the drinking water system Owner, Township of Alnwick/Haldimand in June 2019
- Quality Management System Representative appointment, dated May 6, 2019
- OP Element 5 Document and record control
- QMS-P01-Document Control, dated May 27, 2021
- QMS-P02-Record Control, dated May 27, 2021
- QMS-D01-Records, dated July 20, 2020
- OP Element 6 Drinking Water System
- OP Appendix B
- OP Element 7 Risk Assessment
- QMS-P03-Risk Assessment procedure, dated May 27, 2021
- QMS-P06-Critical Control Points procedure, dated May 27, 2021
- QMS-D02-Risk Assessment Outcomes for the Grafton Drinking Water System, dated May 12, 2021
- QMS-CRP01-Primary Disinfection, dated April 8, 2021
- QMS-CRP02-System Pressure, dated June 3, 2019
- QMS-CRP03-Secondary Disinfection, dated August 17, 2020
- QMS-D03-CCP & CCL, dated November 19, 2020
- OP Element 9
- OP Element 10 Competencies
- QMS-P08-Operator Duties, dated June 10, 2021
- On-the-job training records related to SpryPoint Introduction on May 4, 2021, Grafton ERP & CRP Meeting on April 27, 2021, and Grafton DWQMS Risk Assessment on May 12, 2021
- OP Element 11 Personnel Coverage
- QMS-P08-Operator Duties, dated June 10, 2021
- OP Element 12 Communications
- QMS-P09-Communications, dated June 14, 2021
- OP Element 13 Essential supplies and services
- QMS-P10-Essential Supplies + Services, dated June 14, 2021
- QMS-D11-Essential Supplies & Services, dated May 28, 2021
- QMS-FR03-Notice to essential supplies and service providers, dated November 4, 2020

- OP Element 14 Review and provision of infrastructure
- OP Element 15 Infrastructure maintenance, rehabilitation and renewal
- OP Element 16 Sampling, testing and monitoring
- QMS-P07-Sampling, Testing + Monitoring, dated June 3, 2021
- QMS-D04-Sampling Protocol, dated June 17, 2021
- QMS-D05-Lead Sampling, dated May 10, 2021
- QMS-D06-SCADA Monitoring, dated January 3, 2019
- QMS-D07-Operator Monitoring, dated July 20, 2020
- OP Element 17 Measuring & recording equipment calibration & maintenance
- QMS-P13-Calibration and Maintenance, dated June 14, 2021
- QMS-D08-Instrument Calibration, dated April 28, 2021
- OP Element 18 Emergency management
- Water Systems Emergency Plan (WSEP), dated September 28, 2020
- Emergency Contact List, dated May 20, 2021
- Post-Emergency Incident Report, dated July 25, 2019
- Grafton's ERP & CRP Meeting – Virtual Agenda on April 27, 2021
- Spill to the natural environment, dated May 18, 2021
- MECP letter re: May 18, 2021 Spill Event, dated May 31, 2021 (that includes the Post-Emergency Incident Report and SGS Certificate of Analysis, dated May 20, 2021).
- OP Element 19 Internal audits
- QMS-P04-Internal Audit, dated July 16, 2020
- 2020 External Audit reports by NSF International Strategic Registrations for the Grafton Drinking Water System, dated November 25, 2020 (for audit on Nov. 19, 2020).
- 2020 Internal Audit Report by Acclaims Environmental Inc., dated August 3, 2020
- OP Element 20 Management review
- QMS-P05-Management Review, dated May 27, 2021
- DWQMS Annual Management Review report for the Grafton Drinking Water System (January – December 2020)
- LUSI Board Report – Water Operations, dated April 2021, February 2021, and December 2020
- Grafton Water Committee reports, dated October-November 2020, August-September 2020, December 2020-January 2021, February-March 2021, and April-May 2021.
- MECP Communications re: Hamlet of Grafton Municipal Well Monitoring Program – 2021 BTEX Detection and OW16-I Drawdown Report, dated May 10, 2021
- OP Element 21 Continual improvement
- QMS-P11-Continual Improvement, dated April 30, 2021
- QMS-FR01-Corrective Action Report, dated April 30, 2019
- QMS Tracking spreadsheet

Appendix "C" – Audit Checklists

DOCUMENT REVIEW – DWQMS 2.0 *(Condition Expected)*	DOCUMENT REVIEW – Auditor Comments *(Condition Found)*

1. Quality Management System (QMS)
PLAN – The OP shall ***document a QMS*** that ***meets the requirements*** of this Standard.
DO – The OA shall ***establish and maintain the QMS*** in accordance with the requirements of this Standard and the ***policies and procedures*** documented in the OP.
 	
Director's Directions – Minimum Requirements for Operational Plans **(updated May 2021, no later than April 1, 2022)** also specifies:
- Each municipal residential drinking water system shall have OP's that ***apply to all parts of the DWS***, that can ***incorporate by reference*** other documents deemed necessary by the owner or OA.
- A ***single OP*** may be prepared for multiple DWS that have ***same owner*** and operated by ***same OA***.
- For ***Limited Scope – Transitional*** (if applicable), shall contain Schedule B parts of DWQMS PLAN.
- All OP's shall have:
  - ***procedure for version control*** – ensuring ***version # and/or revision date*** on every page of any ***physical*** copy; ***version # and/or revision date*** recorded on or ***otherwise embedded*** in every ***electronic*** copy; or if in ***separate files***, up-to-date ***list or index*** maintained of ***all OP documents***, including ***version #'s and dates.***
  - ***a title*** that generally describes the ***municipal DWS('s)*** to which the OP's apply.
  - ***A completed copy of Subject System Description Form in Schedule "C"*** that includes name of DWS's, MDWL #'s, operational subsystem to which plans apply
- OP's submitted to Director shall be submitted ***electronically as a single file in PDF or other format acceptable*** to the Director; and be ***copied to the OA*** in charge of the DWS, if the OA is not the owner.
- OP's subject to an audit by an accreditation auditor shall be ***retained for a minimum of 10 years*** by the ***owner*** of the OP's and the ***accredited OA***.
Owners shall make OP's ***current version*** (hard copy) or reflecting "***major revision***" (electronic on website) of ***available for viewing*** by the public – at ***principal office*** of owner within the area served by the DWS and/or ***on a website*** that is accessible to the public (but not any part that could threaten H&S of an individual or safety and quality of drinking water, competitive position, or trade secrets, etc.)
	Viewed the QMS Operational Plan (OP) for the Grafton Drinking Water System, dated May 25, 2021.
	
	Evaluated the OP's conformity to the Director's Directions as noted in this section of the checklist (updated May 2021). Noted availability of the February 2021 versions of the OP (deemed current, with minor revision since) at LUSI's website at https://www.lakefrontutilities.com/regulatory-water/ accessed on June 21, 2021. Confirmed the Subject System Description is completed and available by reference.
	
	OFI: Consider describing in s.2.2 of QMS-P02 that Operational Plans audited by the accreditation body are kept for 10 years, as required by Director's Directions (referenced in Element 1 of the DWQMS checklist).
	
	Confirmed MDWL renewals for each system are underway (Cobourg DWS, exp. June 22, 2021 and Hamilton Township Dist. System, exp. Aug. 17, 2021; Colborne DWS, exp. June 22, 2021 (new OA); Grafton DWS, exp. July 19, 2021 – extended to March 2022).
	
	OFI: Consider placing the current owner-approved Financial Plan for the drinking water system online, as required by O. Reg. 453/07 s.3.(1)5. (or linking to the location of current one available at the municipality's website).
	
	Confirmed documented information meets the requirements of the DWQMS with supporting information provided in each of the sections of this checklist. Through the process / program audit interviews conducted, confirmed the QMS is implemented, well-maintained and effectively meets the requirements of the Operational Plans and the updated DWQMS 2.0.
	
	The documented QMS conforms to the requirements of the standard with noted **positive audit findings (POS)**, **non-conformities (NC's)** and **opportunities for improvement (OFI's)** within the designated areas of this checklist.

2. QMS Policy **PLAN** – The OP shall ***document a QMS Policy*** that provides the foundation for the QMS, and: a) includes a ***commitment*** to the ***maintenance and continual improvement of the QMS***, b) includes a commitment to the ***Consumer to provide safe drinking water***, c) includes a commitment to ***comply with applicable legislation and regulations***, and d) is in a form that ***can be communicated*** to all OA ***personnel***, the ***Owner*** and the ***Public***. **DO** – The OA shall ***establish and maintain a QMS*** that is consistent with the QMS Policy.	Viewed the QMS Policy for the Grafton Drinking Water System, signed December 21, 2020. Signed by President & Manager of Water Operations December 21, 2020. Confirmed the text of the QMS Policy is available at https://www.lakefrontutilities.com/water/, accessed on June 21, 2021.
3. Commitment and Endorsement **PLAN** – The OP shall contain a ***written endorsement*** of its contents by ***Top Management*** and the ***Owner***. **DO** – Top Management shall provide ***evidence*** of its ***commitment*** to an effective QMS by: a) ensuring that a ***QMS is in place that meets*** the requirements of this Standard, b) ***ensuring*** that the OA is aware of all applicable ***legislative and regulatory requirements***, c) ***communicating*** the ***QMS*** according to the procedure for communications, d) ***determining, obtaining or providing*** the ***resources needed*** to maintain and continually improve the QMS.	Viewed the signed Commitment and Endorsement by Top Management (in April 2019) for the drinking water system and signed by the drinking water system Owner: - Township of Alnwick/Haldimand in June 2019
4. QMS Representative **PLAN** – The OP shall ***identify*** a ***QMS representative***. **DO** – Top Management shall ***appoint and authorize*** a QMS representative who, irrespective of other responsibilities, shall: a) ***administer*** the QMS by ***ensuring that processes and procedures needed*** for the QMS are ***established and maintained***, b) ***report to Top Management*** on the ***performance*** of the QMS and any need for ***improvement***, c) ensure that ***current versions of documents*** required by the QMS are being ***used at all times***,	Viewed the Quality Management System Representative appointment, dated May 6, 2019 and included within each of the drinking water system's operational plans; appointing the Manager of Water Systems as the QMS Representative. **OFI**: Consider updating the position title appointed as the QMS Representative to "Compliance Coordinator', as it was confirmed through audit interview with the Manager of Water Capital Projects that the QMS Representative's duties are actually performed by the Compliance Coordinator. This also aligns with the responsibilities and authorities described in Appendix E of the Operational Plan.

DOCUMENT REVIEW – DWQMS 2.0 *(Condition Expected)*	DOCUMENT REVIEW – Auditor Comments *(Condition Found)*
d) ensure that ***personnel*** are ***aware*** of all applicable ***legislative and regulatory requirements*** that pertain to their duties for the operation of the Subject System, and e) promote ***awareness of the QMS*** throughout the OA.	
5. Document and Records Control **PLAN** – The OP shall document a procedure for Document and Records control that describes how: a) ***Documents required*** by QMS are: i. kept ***current, legible*** and readily ***identifiable*** ii. ***retrievable*** iii. ***stored, protected, retained and disposed of***, and b) ***Records required*** by the QMS are: i. kept ***legible***, and readily ***identifiable*** ii. ***retrievable*** iii. ***stored, protected, retained and disposed of***. **DO** – The OA shall implement and conform to the procedure for Document and Records control and shall ensure that QMS documentation for the Subject System includes: a) the ***OP*** and its associated ***policies and procedures***, b) Documents and Records determined by the OA as ***being needed*** to ensure the effective ***planning, operation and control*** of its operations, and c) the results of ***internal and external Audits*** and ***management reviews.***	Viewed OP Element 5 Document and record control. Links to QMS-P01 – Document Control and QMS-P02 – Record Control. Viewed QMS-P01-Document Control, dated May 27, 2021 and QMS-P02-Record Control, dated May 27, 2021. QMS-P01 includes a table that lists internal QMS documentation, who it is issued and/or maintained by, and copies / locations. QMS-P02 links to QMS-D01-Records, dated July 20, 2020 – which provides a listing of all records associated with the requirements of the DWQMS. Confirmed documented information meets requirements of this element.
6. Drinking Water System (DWS) **PLAN** – The OP shall ***document***, as applicable: a) for the Subject System: i. the name of the ***Owner*** and ***OA***, ii. if the system includes equipment that provides ***Primary Disinfection*** and/or ***Secondary Disinfection***: A. a ***description of the system*** including all applicable ***Treatment System processes*** and ***Distribution System components***, B. a Treatment System ***process flow chart***, C. a description of the ***water source***, including: I. general ***characteristics of the raw water*** supply, II. ***common event-driven fluctuations***, and III. any resulting ***operational challenges and threats.*** iii. if the system does not include equipment that provides Primary Disinfection or Secondary Disinfection: A. a description of the system including all Distribution System components, and B. a description of any ***procedures*** that are in place to ***maintain disinfection residuals***. b) if the Subject System is an Operational Subsystem, a summary ***description*** of the ***Municipal Residential Drinking Water System it is a part of*** including the name of the ***OA(OA's)*** for the other Operational Subsystems. c) if the Subject System is ***connected to one or more*** other Drinking Water Systems owned by different ***Owners***, a summary description of those systems which: i. indicates whether the Subject System ***obtains water from or supplies water to*** those systems, ii. names the ***Owner*** and ***OA(OA's)*** of those systems, and iii. identifies which, if any, of those systems that the Subject System ***obtains*** water from are relied upon to ***ensure the provision of safe drinking water.*** **DO** – The OA shall ensure that the ***description*** of the Drinking Water System is ***kept current.***	OP Element 6 Drinking Water System links to Appendix B, providing details on: - Drinking water system owner, - Drinking water system operator, - Applicable licences, - Raw water source description, - SCADA, - Water treatment process, - Process flow diagrams (included in Appendix C), - Distribution system (included in Appendix D), - Operational challenges and threats.
7. Risk Assessment **PLAN** – The OP shall document a risk assessment process that: a) Considers potential hazardous events and associated hazards, as identified in MOECC document titled ***Potential Hazardous Events for Municipal Residential Drinking Water Systems***, dated February 2017 as it may be amended. A copy of this document is available at www.ontario.ca/drinkingwater. b) ID's ***additional potential*** hazardous events & associated hazards, c) ***assesses*** the ***risks*** assoc. w/ the ***occurrence*** of hazardous events, d) ***ranks*** the hazardous events according to the ***associated risk***, e) ***identifies control measures*** to address the potential hazards and hazardous events, f) identifies ***Critical Control Points***,	Viewed OP Element 7 Risk Assessment links to QMS-P03-Risk Assessment procedure, dated May 27, 2021. Confirmed documented information meets requirements of this element. Every calendar year, the currency and validity of the assumptions in the risk assessment process considers: significant equipment or process changes, changes to applicable regulations, increases in demand, and changes in raw water characteristics. Links to QMS-P06-Critical Control Points and QMS-D02-Risk Assessment Outcomes (both of which are reviewed as a part of Element 8). Noted consideration of the Ministry's potential hazardous events and associated hazards included as part of QMS-D02-Risk Assessment Outcomes, including:

DOCUMENT REVIEW – DWQMS 2.0 *(Condition Expected)*	DOCUMENT REVIEW – Auditor Comments *(Condition Found)*
g) identifies a method to ***verify, at least once every calendar year***, the ***currency*** of the information and the ***validity of the assumptions*** used in the risk assessment, h) ensures that the risks are ***assessed at least once every thirty-six months***, and i) considers the ***reliability and redundancy of equipment***. **DO** – The OA shall ***perform*** a risk assessment ***consistent with the documented*** process.	- long term impacts of climate change, water supply shortfall, extreme weather events, sustained extreme temperatures, chemical spill impacting source water, terrorism and vandalism, sustained pressure loss, backflow (cross-connection), sudden changes to raw water characteristics, failure of primary disinfection, failure of secondary disinfection, and additional potential hazardous events.
8. Risk Assessment Outcomes **PLAN** – The OP shall document: a) the ***identified potential hazardous events and associated hazards***, b) the ***assessed risks associated with the occurrence*** of hazardous events, c) the ***ranked*** hazardous events, d) the ***identified control measures*** to address the potential hazards and hazardous events, e) the identified ***Critical Control Points*** and their respective ***Critical Control Limits***, f) procedures and/or processes to ***monitor the Critical Control Limits***, g) procedures to ***respond to deviations from the Critical Control Limits***, and h) procedures for ***reporting and recording deviations*** from the Critical Control Limits. **DO** – The OA shall ***implement and conform*** to the procedures.	Viewed OP Element 8 Risk Assessment Outcomes, which links to QMS-D02-Risk assessment outcomes and QMS-P06-Critical Control Points procedure, dated May 27, 2021. Noted that the procedure describes minimum requirements (e.g. items required by O. Reg. 170/03 and the PDDW in Ontario, independent of the risk assessment ranking). Most CCL's are monitored via SCADA (with HIHI and LOLO alarm setpoints), some are monitored manually (e.g. distribution chlorine residuals). Any changes to CCL limits are tracked through the SpryPoint work order management system – documenting the changes to the limits and reasons for changes. Viewed QMS-D02-Risk Assessment Outcomes for the Grafton Drinking Water System, dated May 12, 2021. Highest risk priority numbers fall in the "moderate" range, with critical response procedures listed in the table: (primary disinfection (QMS-CRP01-Primary Disinfection, dated April 8, 2021), system pressure (QMS-CRP02-System Pressure, dated June 3, 2019), and secondary disinfection (QMS-CRP03-Secondary Disinfection, dated August 17, 2020). Viewed QMS-D03-CCP & CCL, dated November 19, 2020. Confirmed documented information meets requirements of this element.
9. Org. Structure, Roles, Responsibilities and Authorities **PLAN** – The OP shall: a) describe the ***organizational structure*** of the OA including ***respective roles, responsibilities and authorities***, b) delineate ***corporate oversight*** roles, responsibilities, authorities in the case where the OA operates multiple Subject Systems, c) identify the ***person, persons or group of people*** within the management structure of the org. responsible for undertaking the ***Management Review*** described in Element 20, d) identify the person, persons or group of people, having ***Top Management responsibilities*** required by this Standard, along with their responsibilities, & e) identify the ***Owner*** of the Subject System. **DO** – The OA shall ***keep current*** the description of the organizational structure including respective roles, responsibilities and authorities, and shall ***communicate*** this information to OA ***personnel*** and the ***Owner***.	OP Element 9 includes the organizational chart, defining who is Owner, which roles are part of "top management", who is the QMS Representative. **OFI**: [links to OFI identified in Element 4] Consider correcting the "QMS Representative" references (currently assigned to the Manager of Water Capital Projects, however the Compliance Coordinator is the person responsible for the duties). This update would better reflect actual roles, responsibilities and authorities carried-out within the organization, and improve alignment with Appendix E lists of responsibilities and authorities by role / job title.
10. Competencies **PLAN** – The OP shall ***document***: a) ***competencies*** required for personnel performing duties directly ***affecting drinking water quality***, b) activities to ***develop and/or maintain competencies*** for personnel performing duties directly affecting drinking water quality, and c) activities to ensure that personnel are ***aware of the relevance of their duties*** and ***how they affect*** safe drinking water. **DO** – The OA shall undertake ***activities*** to: a) ***meet and maintain competencies*** for personnel directly affecting drinking water quality and shall ***maintain records*** of these activities, and b) ***ensure that personnel are aware*** of the relevance of their duties and how they affect safe drinking water and shall ***maintain records*** of these activities.	OP Element 10 Competencies references QMS-P08-Operator Duties, dated June 10, 2021, which provides an overview of required Operator certification and training requirements; duties of ORO and alternate ORO; and personnel coverage. OP Appendix F describes some additional competency requirements – many of which are soft-skills related (e.g. budget prep, contract management, research, verbal / written communications, technical writing, supervisory, computer skills, etc.). Viewed On-the-job training records related to the following: - SpryPoint Introduction, May 4, 2021 – reviewed reports for water quality, watermain break repairs, new / re-construction, hydrant flushing, callout incidents; with noted opportunities for improvement in the meeting. - Grafton ERP & CRP Meeting, April 27, 2021 – reviewed ERP03-Chlorination Failure (re: failure of chemical dosing system) and CRP01-Primary Disinfection (re: low chlorine residual and high chlorine residual events). Noted OFI's identified in discussion with participants. - Grafton DWQMS Risk Assessment, May 12, 2021 re: risk assessment conducted
11. Personnel Coverage **PLAN** – The OP shall document a procedure to ensure that ***sufficient personnel meeting identified competencies*** are available for duties that ***directly affect*** drinking water quality. **DO** – The OA shall ***implement and conform*** to the procedure.	OP Element 11 Personnel Coverage and QMS-P08-Operator Duties, dated June 10, 2021– section 4 Personnel coverage addresses normal work hours, on-call coverage, and non-scheduled on-call coverage. Confirmed it meets the requirements of this element.

DOCUMENT REVIEW – DWQMS 2.0 *(Condition Expected)*	DOCUMENT REVIEW – Auditor Comments *(Condition Found)*
	OFI: Consider adding references (in QMS-P08) to O. Reg. 128/04 provisions (proposed through ERO notice no. 019-3513) regarding staff coverage in out-of-ordinary conditions (such as in pandemics and strikes / lock-outs, previously presented under O. Reg. 75/20).
12. Communications **PLAN** – The OP shall document a ***procedure*** for communications that describes ***how*** the ***relevant aspects of the QMS*** are ***communicated*** between Top Management and: a) the ***Owner***, b) OA ***personnel***, c) ***Suppliers*** that have been identified as essential under Plan (a) of Element 13 of this Standard, and d) the ***Public***. **DO** – The OA shall ***implement and conform*** to the procedure.	OP Element 12 Communications links to QMS-P09-Communication and QMS-P10-Essential Supplies and Services. Viewed QMS-P09-Communications, dated June 14, 2021. Describes open communication relationship with Owners, OA personnel, the public, stakeholders – and communicating "relevant aspects" of the QMS. Top Mgmt / Owner – meetings, water committee, council meetings, annual/summary reports, management review (incl. infrastructure review), electronic / verbal / written communication. With each newly elected council, members of council receive an introduction to the QMS and the OP, a copy of the OP is provided, ensuring awareness of their roles, responsibilities under the Standard of Care, sign Commitment to Quality & Endorsement. Top Mgmt / Board – through regular board meetings, between members of top management through Management Review, Infrastructure Review, electronic / verbal / written communication. Top Mgmt / Staff – through QMS references and related procedures, operational activities' alignment with procedures; QMS orientation; document review / development sessions; internal audit interviews; risk assessment; emergency response plan review and testing. (CSR's understand where policy and OP are available, if requested). Top Mgmt / Essential Suppliers / Service Providers – meet requirements defined in QMS-P10-Essential Supplies and Services, must understand their impacts on the QMS policy commitments, complete QMS-FR03. Top Mgmt / Public –references "relevant aspects" communicated to residential, commercial, and industrial consumers. Links to QMS Policy, OP, Annual report, billing inserts; phone / e-mail / in-person. Communications during emergencies are referenced in the Water Systems Emergency Plan under section 5. Emergency Notificaiton. Confirmed documented information meets the requirements of this element.
13. Essential Supplies and Services **PLAN** – The OP shall: a) identify all ***supplies and services essential*** for the delivery of ***safe drinking water*** and shall state, for each supply or service, the ***means to ensure its procurement***, and b) include a procedure by which the OA ***ensures the quality*** of essential supplies and services, in as much as they may affect drinking water quality. **DO** – The OA shall implement and conform to the procedure.	OP Element 13 Essential supplies and services links to QMS-P10-Essential Suppliers + Services. Viewed QMS-P10-Essential Supplies + Services, dated June 14, 2021 – which outlines how providers are selected, and minimum quality standards (with reference to MDWL s.14.0 Chemicals and Materials' specifications and O. Reg. 248/03 re: labs). Includes references to stock items, purchase requisition (general statement included), capital projects (e.g. contractors supplying supplies and services). The verification of purchased supplies is carried-out through visual inspection, with accompanying documentation reviewed to ensure compliance with applicable minimum standards; distribution and supply parts are inspected to ensure accompanying documentation is available (re: quality / regulatory requirements met); and services must meet quality and regulatory requirements. Links to QMS-D10-Essential Supplies and Services and QMS-FR03 – Essential Supplies and Services. Viewed QMS-D11-Essential Supplies & Services, dated May 28, 2021. Confirmed documented information meets the requirements of this element. Lists suppliers / service providers (with contacts, means of procurement, minimum quality requirements, dates of last signed QMS-FR03's) for: chemicals, fuel, distribution / supply parts, generator, instrumentation calibration, excavation, hydrovac, lab, well pump services. Viewed QMS-FR03-Notice to essential supplies and service providers, dated November 4, 2020. Includes quality expectations re: chemicals and materials (and evidence of product registrations); as well as lab testing requirements. Every two years, plan to have the forms re-signed-off by essential suppliers and service providers. Depending on the work they're doing, impacting DWS operations – the form is still completed re: expectations.
14. Review and Provision of Infrastructure **PLAN** – The OP shall document a procedure for ***reviewing the adequacy of the infrastructure necessary*** to operate and maintain the Subject System that: a) ***Considers the outcomes of the risk assessment*** documented under Element 8, and	OP Element 14 Review and provision of infrastructure links to water master plan, water model, asset management model, risk assessment outcomes, maintenance reports (re: reliability / capability of equipment), maintenance and inspection reports (treatment and distribution), SCADA performance, regulatory changes, condition assessments, operating budgets, water quality complaints.

DOCUMENT REVIEW – DWQMS 2.0 *(Condition Expected)*	DOCUMENT REVIEW – Auditor Comments *(Condition Found)*
b) ***Ensures that the adequacy of the infrastructure necessary*** to operate and maintain the Subject System is reviewed ***at least once every Calendar Year.*** **DO** – The OA shall ***implement and conform*** to the procedure and ***communicate the findings*** of the review to the ***Owner***.	Management Review meetings discuss results of Infrastructure Review in a table format – stating the review of risk assessment, maintenance reports, inspection reports and condition reports are considered. Management Review documents the infrastructure improvements carried-out in the calendar year.
15. Infrastructure Maintenance, Rehabilitation and Renewal **PLAN** – The OP shall document: a) a ***summary*** of the OA's ***infrastructure maintenance, rehabilitation and renewal programs*** for the Subject System, and b) a ***long term forecast of major infrastructure maintenance, rehabilitation and renewal activities***. **DO** – The OA shall: a) ***keep the summary*** of the infrastructure maintenance, rehabilitation and renewal programs ***current***, b) ensure that the ***long term forecast*** is ***reviewed at least once every Calendar Year***, c) ***communicate*** the programs ***to the Owner***, and d) ***monitor the effectiveness*** of the maintenance program.	OP Element 15 Infrastructure maintenance, rehabilitation and renewal links to Element 14 and the council-approved Financial Plan that outlines capital maintenance, rehabilitation and renewal needs for a 10-year period, with annual review of projects planned and adjustments to reflect changing conditions and priorities, along with opportunities to coordinate projects with the municipalities. Ongoing communications of project statuses are communicated via the water committee. Planned and unplanned maintenance activities are described (e.g. hydrant maintenance and flushing, valve exercising, equipment PM's, calibrations, responding to water quality complaints). Viewed LT Infrastructure Tracking – Grafton DWS that includes a summary of infrastructure maintenance, rehabilitation and renewal programs, listing the various types of equipment (e.g. as applicable: generators, PRV's, reservoirs, wells, tanks, pumps, etc.), recording the frequency of the activity along with the previous dates the activities took place. A summary of findings, recommendations and corrective actions are recorded. Confirmed with Compliance Coordinator that outstanding items are underway and awaiting reports prior to entering new dates; or risk-based decisions for deferrals have been made by the owners.
16. Sampling, Testing and Monitoring **PLAN** – The OP shall document: a) a ***sampling, testing and monitoring procedure*** for ***process control and finished drinking water quality*** including requirements for sampling, testing and monitoring at the ***conditions most challenging*** to the Subject System, b) a description of ***relevant sampling, testing or monitoring*** activities, if ***any***, that take place ***upstream*** of the Subject System, and c) a procedure that describes how sampling, testing and monitoring results are ***recorded and shared*** between the ***OA*** and the ***Owner***, where applicable. **DO** – The OA shall implement and conform to the procedures.	OP Element 16 Sampling, testing and monitoring links to QMS-P07-Sampling, testing + monitoring. Viewed QMS-P07-Sampling, Testing + Monitoring, dated June 3, 2021; which describes samples taken in accordance with O. Reg. 170/03 by certified operators in accordance with the Ministry's document "Practices for the Collection & Handling of Drinking Water Samples". Viewed the following for each drinking water system (as applicable): - QMS-D04-Sampling Protocol, dated June 17, 2021 provides an overview of raw water sampling; water treatment plant sampling; water distribution system sampling. - QMS-D05-Lead Sampling, dated May 10, 2021 summarizes the lead sampling requirements, based on regulatory relief for samples from plumbing provided through the updated MDWL. **OFI**: Consider describing in the introductory paragraph of QMS-D05-Lead Sampling that the table is aligned to regulatory relief provided in the MDWL Schedule D (O. Reg. 170/03's standard or reduced lead sampling tables are different). - QMS-D06-SCADA Monitoring, dated January 3, 2019 includes a list of the instruments continuously monitoring parameters. - QMS-D07-Operator Monitoring, dated July 20, 2020 describes the monitoring points and observations made for each process. Accredited labs are used where needed in the testing of drinking water samples. Monitoring is carried-out via SCADA and through visual inspections of the systems. The sharing of any sample results with Owner is carried out through the water committee and management review; and annually through the Annual Report. Any adverse sampling, testing and monitoring results are shared on an as-needed basis (noted communication with owner section added to the QMS-P07 procedure in the latest revision).
17. Measurement and Recording Equipment Calibration and Maintenance **PLAN** – The OP shall document a ***procedure*** for the ***calibration and maintenance*** of ***measurement and recording*** equipment. **DO** – The OA shall ***implement and conform*** to the procedure.	OP Element 17 Measuring & recording equipment calibration & maintenance links to QMS-P13-Calibration and maintenance. Viewed QMS-P13-Calibration and Maintenance, dated June 14, 2021 and describes in-house verification and calibration processes. QMS-D08-Instrument Calibration lsits the equipment that requires in-house verification and/or calibration conducted on a routine basis. Noted expiration date check on the primary / secondary standards when used for verification / calibration purposes – prior to use. SpryMobile Work Orders used to track and manage the status of equipment's internal verification, calibration and maintenance; and third-party contractors are hired to conduct verification and/or calibration of equipment listed on QMS-D08-Instrument Calibration. This list is verified annually to ensure it is accurate. Viewed QMS-D08-Instrument Calibration, dated April 28, 2021 (Grafton) – noted the following information: instrument / model, manufacturer, tag ID,

DOCUMENT REVIEW – DWQMS 2.0 *(Condition Expected)*	DOCUMENT REVIEW – Auditor Comments *(Condition Found)*
	serial number, location / process, calibration frequencies (in-house vs. third-party, as applicable). Noted evidence of regular list reviews (often multiple times / year)
18. Emergency Management **PLAN** – The OP shall document a ***procedure*** to ***maintain a state of emergency preparedness*** that includes: a) a ***list of potential emergency situations*** or service interruptions, b) ***processes*** for emergency ***response and recovery***, c) emergency response ***training and testing*** requirements, d) ***Owner and OA responsibilities*** during emergency situations, e) ***references to municipal*** emergency planning measures as appropriate, and f) an ***emergency communication protocol*** and an ***up-to-date list*** of emergency ***contacts***. **DO** – The OA shall ***implement and conform*** to the procedure.	OP Element 18 Emergency management currently links to Coburg & Hamilton Township DWS – Emergency Plan, Colborne DWS – Emergency Plan, Grafton DWS – Emergency Plan and Emergency Response Procedures (ERPs). Viewed LUSI's Water Systems Emergency Plan (WSEP), dated September 28, 2020, that includes drinking water system-specific information within section 1. Noted the link to each DWS's OP to obtain additional operator coverage information (which could include emergency / strike / lock-out coverage provisions of O. Reg. 170/03). The WSEP describes emergency classifications: Level 1 (alert); Level 2 (minor); Level 3 (major); Level 4 (disaster), Emergency Task Force contact list (and Emergency Contact List, dated May 20, 2021 – aligned with the ETF contact list (minus other departments' support members), complete with all current staff names encountered during the audit). ERP's exist specific to each DWS, as applicable: raw water supply main failure, raw water contamination, chlorination failure, chemically assisted filtration (alum) failure, treated water discharge main failure, SCADA-PLC failure, prolonged power failure, chemical leaks + spills, broken watermain, distribution system contamination, loss of distribution water storage, major fire flow condition, terrorism-vandalism. Plan over the next year to establish single set of LUSI ERP's where possible. Viewed Post-Emergency Incident Report, dated July 25, 2019 that is a form used for evaluating an emergency – describing what happened, procedures / actions taken, emergency action team's response evaluation, communications response evaluation, recommendations, and suggested amendments to the ERP. Viewed records of emergency responses activated and training / tests conducted since the last audit, including the following: - Grafton's ERP & CRP Meeting – Virtual Agenda on April 27, 2021 – evaluating ERP03 – Chlorination Failure; CRP01 – Primary Disinfection (based on recent events for low and high residuals). Noted action items tracked in the DWS-specific QMS Tracking spreadsheet. - Spill to the natural environment, dated May 18, 2021. Stormwater- / Wastewater-related spill event found during inspection of stormwater line to manmade lagoon (with cause identified as faulty float switch, and overflow lateral connection to stormwater line not previously known to operational staff). - MECP letter re: May 18, 2021 Spill Event, dated May 31, 2021 (that includes the Post-Emergency Incident Report and SGS Certificate of Analysis, dated May 20, 2021). **OFI**: consider including "Date and time of emergency start", "Date and time of emergency end", and "name of person completing the form" prompts under Emergency Details section of the Post-Emergency Incident Report form.

19. Internal Audits **PLAN** – The OP shall document a ***procedure for internal Audits*** that: a) ***evaluates conformity of the QMS*** with the requirements of this Standard, b) identifies internal Audit ***criteria, frequency, scope, methodology and record-keeping*** requirements, c) considers ***previous internal and external Audit results***, and d) describes ***how QMS Corrective Actions are identified and initiated***. **DO** – The OA shall ***implement and conform*** to the procedure and shall ensure that internal Audits are conducted at ***least once every Calendar Year***.	OP Element 19 Internal audits links to QMS-P04-Internal audit. Viewed QMS-P04-Internal Audit, dated July 16, 2020. Includes a description of all required aspects of this element. Viewed the 2020 External Audit reports by NSF International Strategic Registrations for the Grafton Drinking Water System, dated November 25, 2020 (for audit on Nov. 19, 2020). No non-conformities and the following opportunities for improvement were noted (updates are underlined): - El. 4/9 – clarify the current position / title for the QMS Representative. (ongoing) - El. 17 – clearly and consistently identify all instruments with serial number and/or asset tag in associated records. (re: SCADA tag for one instrument – SpryPoint updated with instrument details; ongoing process – noted tag ID's and serial numbers recorded in QMS-D08) - El. 21 – clarify types of potential non-conformities that would trigger a preventive action to be initiated – and – clarify how effectiveness of corrective / preventive action is verified / recorded. (updated Element 21 to reflect the current and existing practice – see Element 21 section for more information). Viewed the 2020 Internal Audit Report by Acclaims Environmental Inc., dated August 3, 2020. No non-conformities were identified, and the following opportunities for improvement were noted (updates are underlined): - El. 1 – Consider referencing the SDWA in OP El. 1 section. Noted OP El. 1 now includes SDWA reference.
DOCUMENT REVIEW – DWQMS 2.0 *(Condition Expected)*	**DOCUMENT REVIEW – Auditor Comments *(Condition Found)***
	- El. 5 – Cross-reference files re: consistency of references (e.g. risk assessment outcomes ref's in QMS-D02, QMS-D05, QMS-P03), risk assessment ratings for L, S, D inconsistent in QMS-P03 and QMS-D02), Ministry document date, "Feb. 2017", Cobourg / Hamilton RPN's and CCP's, OP El. 8 link to QMS-D03, QMS-D03 link to QMS-FR10 (now FR06), OP El. 9 link to App. D (now E), OP El. 10 link to App E (now F). Noted in the updated QMS-P03 correct reference to QMS-D02, correct Ministry doc date of Feb. 2017 and consistent risk ratings for L,S,D. Noted QMS-P03 and QMS-D02 alignment; correct QMS-FR10 reference. Confirmed OP El. 9 and El. 10 properly reference appendices. - El. 8 – CCP for distribution free chlorine (e.g. 0.20 mg/L) – Noted free chlorine residual CCL's now defined. - El. 14 – OP El. 14 ref re: infrastructure reviews during Management Reviews with prioritization spreadsheet and priorities reflect RA outcomes) – noted completed through the tracking spreadsheet. - El. 17 – QMS-D08 "once every 12 months" re: update MDWL terms & conditions re: flows & CT. Confirmed completed through the updated QMS-D08.

20. Management Review **PLAN** – The OP shall document a ***procedure for management review*** that ***evaluates*** the continuing ***suitability, adequacy and effectiveness*** of the QMS and that includes consideration of: a) incidents of ***regulatory non-compliance***, b) incidents of ***adverse drinking water tests***, c) ***deviations from Critical Control Point limits*** and ***response actions***, d) the ***effectiveness of the risk assessment*** process, e) ***internal and third-party Audit*** results, f) ***results of emergency response testing***, g) ***operational performance***, h) ***raw water supply and drinking water quality trends***, i) follow-up on ***action items*** from ***previous management reviews***, j) the ***status*** of management ***action items*** identified between reviews, k) ***changes that could affect*** the QMS, l) ***Consumer feedback***, m) the ***resources needed*** to maintain the QMS, n) the ***results of the infrastructure review***, o) ***OP currency, content and updates***, and p) ***staff suggestions***. **DO** – Top Management shall ***implement and conform*** to the procedure and shall: a) ensure that a management review is conducted ***at least once every Calendar Year***, b) consider the ***results of the management review*** and identify ***deficiencies and actions*** items to address the ***deficiencies***, c) provide a ***record of any decisions and action items*** related to the management review including the ***personnel responsible*** for delivering the action items and the ***proposed timelines*** for their implementation, and d) ***report*** the ***results of the management review, the identified deficiencies, decisions and action items to the Owner***.	OP Element 20 Management review links to QMS-P05-Management Review. Viewed QMS-P05-Management Review, dated May 27, 2021 which describes the responsibility for planning / scheduling management reviews every Q1 per calendar year (by Compliance Coordinator). It defines quorum for management reviews (4 of 6 people), with agenda provided 2-3 weeks in advance with items a) to p) addressed in the Management Review Report. Viewed the DWQMS Annual Management Review report for the Grafton Drinking Water System (January – December 2020). Confirmed the report included items a) to p). Viewed examples of communications with Owner with LUSI Board Report – Water Operations, dated April 2021, February 2021, and December 2020 – which summarizes system performance by drinking water system and highlights treated water statistics, major maintenance activities, lead sample results and any special areas of focus for each. Grafton Water Committee reports, dated October-November 2020, August-September 2020, December 2020-January 2021, February-March 2021, and April-May 2021. MECP Communications re: Hamlet of Grafton Municipal Well Monitoring Program – 2021 BTEX Detection and OW16-I Drawdown Report, dated May 10, 2021 – with a summary of the issue with leachate impacted groundwater with BTEX detected at low levels (December 2020 to April 2021) and response actions based on Geo Kamp / MECP recommendations re: ongoing sampling and monitoring + PFAS as well.
21. Continual Improvement **PLAN** – The OA shall develop a ***procedure*** for ***tracking and measuring continual improvement*** of its QMS by: a) ***reviewing and considering*** applicable ***best management practices***, including any published by the Ministry of the Environment and Climate Change and available on www.ontario.ca/drinkingwater, at least once every thirty-six months; b) documenting a process for ***identification and management*** of QMS ***Corrective Actions*** that includes: i. ***investigating the cause***(s) of an identified non-conformity, ii. ***documenting the action(s) that will be taken*** to correct the non-conformity and prevent the non-conformity from re-occurring, and iii. ***reviewing the action(s) taken*** to correct the non-conformity, ***verifying that they are implemented*** and ***are effective in correcting and preventing*** the re-occurrence of the non-conformity. c) documenting a process for identifying and implementing ***Preventive Actions*** to eliminate the occurrence of potential non-conformities in the QMS that includes:	OP Element 21 Continual improvement links to QMS-P11-Continual Improvement, dated April 30, 2021. The procedure describes the process for corrective and preventive actions – accounting for best management practices within each and links to the QMS-FR01-Corrective Action Report. Viewed the QMS-FR01-Corrective Action Report, dated April 30, 2019 – which includes describing the non-conformity, issue description, root cause analysis (5 why's), corrective action plan – including containment plan and permanent action plan, and acceptance by QMS Rep. Through an external audit finding, this is now a work order in SpryPoint that includes prompt for defining the measure of success and "pending" status until the measure of success is achieved. The sign-off of the work order is "field complete" status. The tracking spreadsheets include measure of success column. Noted references from QMS-P11-Continual Improvement to SpryPoint for recording corrective and preventive actions. Viewed the QMS Tracking spreadsheet and reviewed the identified continual improvement items since the last audit. Items tracked include:
DOCUMENT REVIEW – DWQMS 2.0 *(Condition Expected)*	**DOCUMENT REVIEW – Auditor Comments *(Condition Found)***
i. ***reviewing potential non-conformities*** that are identified to determine if preventive actions may be necessary, ii. ***documenting the outcome of the review***, including the action(s), if any, that will be taken to prevent a non-conformity from occurring, and iii. ***reviewing the action(s) taken to prevent*** a non-conformity, ***verifying that they are implemented and are effective*** in preventing the occurrence of the non-conformity. **DO –** The OA shall ***strive to continually improve the effectiveness of its QMS*** by implementing and conforming to the procedure.	- one DWQMS non-conformity (adjustments to CCL's in SCADA, now linked to SpryPoint for tracking and preventive action with SCADA updates in CCL alarm history page and popup window); - all previous internal audit findings are logged with actions and their completion dates logged; - one opportunity for standard of care training presentation to new CAO (completed in December); - all external audit findings logged with actions and completion dates logged (for items completed); - management review outcomes action items (initiated Feb. 5, 2021 for Colborne); - risk assessment outcomes preventive actions (initiated April 12, 2021); and - emergency scenario outcomes preventive actions / OFI's (initiated April 13, 2021 and April 27, 2021).

<table>
<tr><th>Process:</th><th>Auditee(s):</th><th>Audit Date:</th></tr>
<tr><td rowspan="2">1.0 Adequate Resources? (s. 9, 11, 13, 14-15)
1.1 What are the different roles and responsibilities involved?
1.2 What are the resources required to carry out this/these tasks? Such as:
a. Staff (and adequate staff coverage)
b. Supplies
c. Equipment
d. Facilities / space
1.3 Are there enough resources?
1.4 Are there special requirements for the resources?
a. How do we ensure the quality of supplies / equipment?</td><td rowspan="2">4.0 Process Under Control? (s. 5, 17)

4.1 Do you rely on documents to provide details of what tasks are required?

a. SOPs? Forms? WO’s? MRF’s? Standards or Guidelines?
b. Are they current / legible / identifiable / retrievable / stored / protected / retained?

4.2 Are documents disposed of? Why? When?

4.3 Does the work area appear safe, organized and clean?

4.4 If resources include measurement and recording equipment, is this equipment calibrated and maintained? How?</td><td>6.0 Who? (s. 2, 3-4, 10)
6.1 What are the competencies for these duties?

6.2 What types of activities can develop competencies / experience?

6.3 Do staff involved know how their duties affect drinking water quantity / quality?

6.4 Do staff know what the quality policy states?

6.5 How do staff know what legal requirements apply to their tasks?</td></tr>
<tr><td>2.0 Process Input?
2.1 What are your process inputs?
a. Legal/other requirements
b. Work orders or maintenance requests
c. Internal or external customers
2.2 Is there a “previous process step” that feeds into this one?
2.3 Are you happy with the supplies / data / information provided by the previous step?</td><td>7.0 Output? (s. 5)
7.1 What is the output of your process?
7.2 What records do you produce?
a. Are they legible / identifiable / retrievable / stored / protected / retained?
b. Are they complete?
7.3 Are records disposed of? Why? When?</td></tr>
<tr><td rowspan="2">3.0 Measured? (s. 8, 12, 16)

3.1 What things do you check, sample, monitor or test?

3.2 Where do you record results? Are records complete?

3.3 Is the information reviewed, analyzed or checked for effectiveness (in meeting requirements)?

3.4 Do you communicate results? To whom? verbally? In Writing?</td><td rowspan="2">5.0 What If Out-of-Control? (s. 7-8, 12, 18)

5.1 What types of things can go wrong? (out-of-ordinary / emergencies / service interruptions)
5.2 What actions are taken when they do go wrong?
5.3 What notifications? To whom?
5.4 What do you document? Where?
5.5 Is there an emergency contact list? Is it maintained?</td><td>8.0 Stakeholder Satisfaction? (s. 12, 20)
8.1 Are relevant stakeholders satisfied with this work?
a. internal / external customers,
b. government agencies,
c. public,
d. owner,
e. top management
8.2 How do you know?</td></tr>
<tr><td>9.0 Evidence of Continual Improvement? (s. 21)
9.1 What are some improvements related to this process that you have seen / implemented in the past year?

9.2 Is there anything you’d like to change about this process?</td></tr>
</table>

Process: Water supply & treatment O&M	**Auditee(s):** Shawn Bolender (Mgr. Water Ops.)	**Audit Date:** June 22, 2021 12:30 PM
1.0 Adequate Resources? (s. 9, 11, 13, 14-15) Have adequate resources to do job well. Process to obtain resources – could be improved (e.g. disconnect with ORO / QMS / Supervisor roles) – e.g. filling roles with vacancies, designating in line with requirements. Consistently meet compliance, expectations. Adequate buy-in for safety, equipment, etc. Staffing is challenging with recent layoffs – to be reevaluated. Have reliable local contractors (e.g. excavations).	**4.0 Process Under Control?** (s. 5, 17) SpryPoint asset management system – recurring monthly maintenance programs (at their frequencies) – staff using the system more easily now, more of a habit. Sarah – Compliance Coordinator keeps a close eye on SpryPoint. New SWAN analyzers – previous analyzers are end-of-life, three units' cost analysis incl. maintenance requirements – ahead of other competing products. All operational staff were involved in the process to evaluate what would work well. Training tracking (past year with pandemic, carrying over unused budget from 2020) – online training ongoing.	**6.0 Who?** (s. 2, 3-4, 10) Supportive, open for staff can come with issues and suggestions; proactive with the information (e.g. broken now or may break later) – influencing risk. Analyse issues – determine funding (whether immediate or for future budgets). Open / training budget has improved in recent years. Manager position higher level re: efficiencies / improvements – therefore, rely on staff to have openness / mindset. Class III Treatment and Class III Distribution & supply. Other competencies: collaborative, openness, professional (with stakeholders, public), operational and regulatory knowledgeable / experience.
2.0 Process Input? Water master plan presented to council last night – well laid out map of infrastructure needs (18 mos) – helped to fill a gap – e.g. zone one tower (1,300 m3); now planning 5,000 m3 reservoir. Good roadmap for next year, and next 20 years. Financial plan (for MDWL renewal) is aligned with the Water master plan (Cobourg).		**7.0 Output?** (s. 5) SCADA trending, alarms, all associated (historians) Logbooks Call-out reports Certification / training records
3.0 Measured? (s. 8, 12, 16) Reconstruction – involved as Manager (e.g. water model completed) – ensure it is being used in all reconstruction activities (whether municipality's, or private). Watermain disinfection procedure – re: upgrades to requirements SCADA – all operators / Compliance Coordinator reviewed process control narrative – adjustments year by year – now better aligns with requirements OP's been updated to ensure alignment with processes / procedures.	**5.0 What If Out-of-Control?** (s. 7-8, 12, 18) e.g. probe re: new SWAN – inserted too far in? - possibly paddle struck; pulled reference electrode out of raw water and no spare (realized and corrected). May's spill event – lucky to have been discovered (e.g. stormwater – manhole check for dechlorination unit). Corrective actions implemented (designed overflow pipe from storm to sanitary – intended; however sloped from sanitary to storm – plugged) – would now surface in parking lot instead. Adjusted floats / replaced – now set-up to spill in parking lot (visual indicator). Ensure high level alarms in place as well. Watermain breaks ("NOC")	**8.0 Stakeholder Satisfaction?** (s. 12, 20) Public, Board and council, Upper management Typical KPI's presented through the board – re: work orders, samples – WO system helps to prove. A&S reports made public. Lack of complaints – ensure "thank you" for calling. **9.0 Evidence of Continual Improvement?** (s. 21) larger scale maintenance items; SpryPoint implementation – previously treatment only – now includes distribution programs (e.g. flushing information updated) Repair truck for water distribution team (previously only pick-up truck) – now have proper-sized truck – design of workbench, cabinets, lighting, etc. – delayed slightly for pandemic – resources needed for responding to breaks, distribution system issues.

Process: (QMS Rep) / Construction Projects	**Auditee(s):** Larry Spyrka, Mgr. Water Capital Proj	**Audit Date:** June 23, 2021 8:00 AM
1.0 Adequate Resources? (s. 9, 11, 13, 14-15) Have adequate resources – e.g. 250 new homes per year for next few years – have internal wish list for replacement projects. Harden street, St. Clair street – starting next month - $1.2 M – water / sewer replacements – Albert St. old Asbestos cement; next year – Blake, Birke, Victoria – watermain replacements. Twinning (12" and 6") – replacing 12" – 1.2 km's in 2022. Water quality related projects for improved water quality. (e.g. Matthew from King to University; Spring Street – now planning cross streets). Project-related resources (CIMA+ and GHD are PM's, staff will review 50% / 90% drawings and send tenders (prepared by consultants, reviewed by team to ensure requirements are all included) – oversee projects – ensure numbers / requirements make sense prior to issuing tenders. On-site supervision – verification of quality requirements met is done by consultant. Operators oversee projects – e.g. major connection back to system – operators oversee. Work controlled by PM's prior to connections (new system to existing). If anything goes wrong, then water system can be isolated / shutdown. Contractor Behans hires a third party for the "Operator" role, Liquid Logic "Operator" and LUSI's own "Operator" also observes. Supplies essential for projects (F3) Notice to Essential Supplies and Service Providers – NSF 60 / 61/ 372 / AWWA standards, accredited lab – jobs coming up, Behan have contract – will sign-off on the form – re: water quality requirements.	**4.0 Process Under Control?** (s. 5, 17) Larger projects – Manager of Ops also involved – hands-on support (e.g. water modelling) – proving watermain pipes are adequate; verifying the system plans meet demand requirements (e.g. one area's 200 mm main is not adequate to meet fire flows). Manager of Ops will oversee connections – ensuring staff are on-site to witness this. Darren – Supervisor – oversees projects meeting requirements as well. Set of tender documents – ensuring up-to-date, reflecting requirements. Need to budget to ensure third party for the "operator" role. Municipal Drinking Water Licence - new requirements (e.g. updated watermain disinfection procedure) are communicated to consultants overseeing PM's. Latest MECP watermain disinfection procedure is provided with LUSI's procedure as well. Consultants will oversee (e.g. GAC) the disinfection procedure for facilities' upgrades. For all systems – pre-construction meeting among team members, samples, ensuring disinfection requirements are met (e.g. concentration met, sample results indicate no bacti, etc.). System start-up procedure re: GAC replacement – taken out-of-service, backwash GAC 3x, following samples confirmed req'ts met, etc. Water tower project in 2019 – ensured booster station pumps would function as intended – verified 3 booster pumps were in good condition – zone two above tracks; also ensured good condition of back-up generator. Planned for second generator in case it was necessary to hook-up.	**6.0 Who?** (s. 2, 3-4, 10) Larry belongs to Development Review Team – representing LUSI's water side (other representatives for other in-ground infrastructure). Any development in town – will receive drawings, reports, Wednesday meetings – CA's present, fire, other reps – bring drawing – ensure valves, hydrants in correct spacings, water services (not in driveway location) – separation between water and sewer, if too close – need to move one or other. Water model is used to prove flows for subdivision would be adequate (max day flow under fire condition). Set of drawings marked up – reviewed by Shawn who marks up – then provide comments (e.g. backflow preventers following plumbing code, shut-off water scenarios, new service for fire suppression – disinfection requirements and swabbing, etc.) Appointed QMS Representative – reviewed DWQMS responsibilities listed under Element 4 (Sarah - Compliance Coordinator / keyholder – is the QMS Rep essentially) – she'll make adjustments. All QMS duties listed in Element 4 are Sarah's. In WFH scenarios, able to access latest documents through VPN's – recommendations from auditors; MECP changes proposed through e-mails and ERO (EBR) – Sarah (with support from Shawn) has implemented all changes – she's very thorough. Management Reviews are held (for reports to top management) – Derek is well-informed regarding needs for improvement (Larry will participate in these discussions). Larry ensures the communication to contractors (res. Development) re: policies and OPS standards.

Process: (QMS Rep) / Construction Projects	**Auditee(s):** Larry Spyrka, Mgr. Water Capital Proj	**Audit Date:** June 23, 2021 8:00 AM
2.0 Process Input? Water master plan – includes 1 to 5-year projects (e.g. new water tower, water plant replacements of analyzer); 5- to 10-year plan; beyond 10-year plan – e.g. tower rehabilitation (invested in better quality, next maintenance – 25 years) ROV inspections (1/10 years); 15 years wash outside; 25 years – more work… WTP – analyzers (chlorine replacements); flow meters (maintenance program) Financial Plan – budgets, group efforts for planning re: what staff needs are to do job (chlorine tonner monorail system hoists; generator inspections – upgrades to TSSA). Cobourg growth (doubling pop'n in 20 yrs) Infrastructure needs – e.g. mains, boosters, towers, reconstruction Infrastructure reviews – take a look at the 5-year plan – sometimes driven by the town (e.g. sewer collapse, planned in a future year) – design is always planned the prior year to the construction year – to plan costing / take to budget. Changing risks will move up timelines (if infrastructure breaks sooner). May reverse – e.g. 7 year plan – based on funds available. Water board – 7 year capital budget – aware of improvements required (only significantly changed once in past 6 years).	Anticipate risks / impacts (through risk analysis) and take actions to prevent the risks from happening or mitigate impacts when they happen. With the plant / water distribution operators – all together with different perspectives considered. e.g. time with water tower out of service – normal flushing activities were deferred due to water supply in this project timeframe. As-constructed / as-builts diagrams are normally obtained within a timely manner (with CIMA+ / GHD) – inserted into GIS (e.g. 1.2 km's new watermains, new valve locations, etc.). Larry will review all projects and ensure all Form 1's and Form 2's are completed and kept on file (verified prior to MECP inspections every year). Water Master Plan – plans for development, water demand issues, etc. MDWL, DWWP, PTTW's, water supply, treatment capacity, etc. Water master play – redundancies considered (looking to other systems when replacing one-of's) e.g. today – gas station lot, condo – disconnect service at main, ensure water services meet the requirements for the building matrix. Multi-plex to disconnect abandoned services back to the main (prevent leaks, not only at curb stop).	**7.0 Output?** (s. 5) Consultants submit plans – Liquid Logics (e.g. temporary watermains, swabbing prior to commissioning). CIMA+ reviews plans – Behan does majority of construction in town. Sampling records Tender documents – showing requirements Progress meetings on bi-weekly basis – agenda, updates on what has occurred, progress reports on major projects on bi-weekly basis. Project files – including e-mails, tote box by project number and project name. Stakeholder communications records Final documents – as-builts, etc. – forwarded to Sarah – placed on shared drive. Inspection reports (videos, etc.) – placed in shared drive. Crib intake
3.0 Measured? (s. 8, 12, 16) 8,500 Water meters – residential and ICI – changing to RF's – Water rates pay for most projects (not borrowing most times for projects) Look at all water sample report that comes in for all three systems – samples taken every week, each sample reports is reviewed (e.g. HPC's)	**5.0 What If Out-of-Control?** (s. 7-8, 12, 18) Unknowns are ongoing challenges in projects – e.g. thought 2" service; but actually 6" – things added, legacy issues. Valves' or watermains' locations. Drawings from decades ago are not correct. Keep a percent for contingencies.	**8.0 Stakeholder Satisfaction?** (s. 12, 20) Council, "Engage Cobourg" for Public engagement, Developers (e.g. Zone 3) – reports provided re: size watermains – will use water model to provide information to developers. Town projects underway vs. development water allocations – tracking growth. Phase 1 vs. Phase 2 developments – Phase 2 requires water tower infrastructure in place – reviewing with Planning division.

Process: (QMS Rep) / Construction Projects	**Auditee(s):** Larry Spyrka, Mgr. Water Capital Proj	**Audit Date:** June 23, 2021 8:00 AM
Track of when hydrant flushing is carried-out – re: customer calls Projects – cost monitoring (CIMA+ does PM) – smaller projects (e.g. hoist replacement) – PO's, ensuring cost within budget given (unless unforeseen situation) – cost adjustments and sign-off	Design work helps mitigate some of the unknowns – e.g. Geotech, drawings shared (in house information) – 50% drawings – e.g. hydrants within four valves of intersection, providing reasons why. 90% drawings – reviewed – blue lines show services, red circles for valves / hydrants – ensuring all follows criteria.	New water tower, new booster station – Class EA's required – consider long process, so need to start water tower consultations. Design 1 year, construction 1.5 years, etc. Other competing projects to allocate water to.
		9.0 Evidence of Continual Improvement? (s. 21) Inspections program related to capital projects – e.g. ROV of infrastructure – now a regular program. E.g. Clarifier – now once per 2 years inspections (reviewed annual performance of past 4 years); verified "base" is good. Newer equipment – e.g. turbidity, chlorine analyzer (SWAN) – with operators' input – implemented for raw water to test (e.g. zebra mussel control) – O&M for SWAN to existing equipment – all SWAN chlorine analyzers. Experience-based improvements. Water meter program – RF – better handle water losses (have more information to go on). Towers re: instantaneous readings – see water use on daily basis – transparency for consumers – also supporting water efficiency. Bulk water station removed – only used for projects (not to public anymore, large trucks in residential neighbourhoods – improving system) – access to water plant grounds 24/7 – security concern. Bulk water delivery stations in other towns.

Process: Top Management responsibilities	**Auditee(s):** Dereck Paul, President	**Audit Date:** June 23, 2021 10:00 AM
1.0 Adequate Resources? (s. 9, 11, 13, 14-15) Mgr. of Operations resignation, Larry as back-up. ORO of ops and capital. ORO for ops resided with Shawn. Opportunity to reassess structure. Align with the direction of the organization's goal to modernize and be best small utility. Need actions to back-up strategic plans. Currently have posting for Supervisor, hoping to have knowledge / experience to develop into Manager – outsourcing design, capital works (e.g. watermain breaks supported by service providers with operator oversight; locates; meter installation / reading) – blended resources – staff maintenance activities with support by providers. Flexibility to ramp-up activities and implementation of projects and programs. Core group of operators covering 24/7 operation and ensuring certified operator coverage. Capital work supported by vendors. Procurement policy process helps to qualify the service providers – supporting "stewards of community" – all vetted prior to work carried out. Master plan using an expert (CIMA+) to vet the process – elements filtered into the water rates study – ensuring adequate revenues to cover the infrastructure needs (capital investments per year). Now "bibles" – measuring the effectiveness of the organization – did we do what we said we should… Management have performance plans to (quarterly / 2x per year) – reviews, with objectives planned year-to-year; and again in June as a progress report.	**4.0 Process Under Control?** (s. 5, 17) Dashboard – essential tool for top management to quickly see what's happening. e.g. locates – very busy May to September – within required timeframe (otherwise non-compliant) – need to verify meet SpryPoint – allows Manager of Ops to see MCare – work orders – service requests with customer – turnaround time – 24 hrs / 48 hrs / 72… Dashboard consolidates all information.	**6.0 Who?** (s. 2, 3-4, 10) As president, promote the vision – prime communicator and conduit between council and the organization. Top management (directors, management staff) and with employees – Tuesday 29th – all employee meeting. Where we're going as organization (e.g. GIS, Smart map -KPI's – to reduce line losses). Hydrant flushing, backwash processes, reduce water loss. Working towards same direction.

<table>
<tr><td>Process: Top Management responsibilities</td><td>Auditee(s): Dereck Paul, President</td><td>Audit Date: June 23, 2021 10:00 AM</td></tr>
<tr><td>2.0 Process Input?
Water rate study – presented to council Jan/21 – recommendations for spending on capital for 5+ years, development charges.

June 21/21 – Water master plan – 18 months' work – 5, 10, 15, 20 and beyond plan. Infrastructure assessment – age, condition, value ($100M investment over 20-30 yrs) – ID'd critical infrastructure, towers / storage capacity, watermains. Plan for approval next meeting – transparency with public – "shovel ready" projects for federal / provincial grants, designed projects in advance – could shuffle projects.

Financial plan (as part of MDWL) recently updated – ensuring funding ($84M – rates, development charges); budgets – annual, rolling 5- and 7-year budgets.

Schedules – e.g. program based – hydrants flushed, valves exercised… ensuring work-life balance (approving vacations) – ensuring work is done.</td><td></td><td>7.0 Output? (s. 5)

Reports to the board, to water committees
Water master plan
Water rates study
Financial plan
Budgets

Operational records + corrective actions taken

MECP inspection results – 100% compliance in all systems</td></tr>
<tr><td>3.0 Measured? (s. 8, 12, 16)

Dashboard ongoing organizational performance

Critical – projects completed on an annual basis in accordance with master plan

Improving KPI's and reputation – e.g. reducing advisories, watermain breaks, line losses – provincial average 30%; 26% of world's freshwater supply – objective to reduce this water loss.

Water loss – less than 25% - accounting for backwash, hydrant flushing programs, fire dept – measuring tools – losses should be evaporation… should be between 10-15% max. want to set SMART goals (specific, measurable, achievable…)</td><td>5.0 What If Out-of-Control? (s. 7-8, 12, 18)

Mould growth in WTP – repairs had to be carried-out ensuring all spores addressed – impacting staff H&S. Need to do it correctly / once.

Reputable engineering firm to do work – including HVAC to ensure airflow to prevent this.

Statement of claim issued – in legal process. If paying for service providers, expect good work that meet requirements.

Plan to exercise valves on a frequency – not carried-out as effectively as planned – conversations to correct these (need external support to complete?)

Staff shuffling – e.g. WTP to distribution – changing conditions (one less system to oversee) – had to reduce staff. Decisions needed to be made.</td><td>8.0 Stakeholder Satisfaction? (s. 12, 20)
Board, water committee, council – reminders about responsibilities under standard of care – SDWA s.19.

New staff, new boards, new councils – all go through standard of care.
One-on-one conversations with stakeholders; always holding to higher standards – customer surveys have indicated satisfaction.

9.0 Evidence of Continual Improvement? (s. 21)
SCADA, GIS, mobile applications (operator tools), automation in different areas (e.g. refurbishment of tower – stirrer), electric heaters changed to gas, solar panels installed on rooftops – looking at reduction of cost, improved efficiencies. Car charging stations implemented – 2030 goal of electric fleet.</td></tr>
</table>

Process: QMS Rep / Compliance Management	**Auditee(s):** Sarah Whitton, Compliance Coord.	**Audit Date:** June 23, 2021 1:00 PM
1.0 Adequate Resources? (s. 9, 11, 13, 14-15) Need to ensure support for effectively carrying-out job's roles / responsibilities (especially, recognizing change in operational management role). Not only in documenting – but who will implement the requirements and ensure they aredone consistently…to support operations. Buy-in at all levels is important for the success of the system, and understands what needs to be done – a level of competency to understand and recognize the importance (not only a "paper" exercise). Have adequate time (if missed, usually affiliated with time – vacations, leaves, etc.). Staff departures, retirements…WFH scenarios – now more access to info, more webinars. Document resources (e.g. AWWA, standards, training) -are readily provided. Any service providers / suppliers on-site receive a form.	**4.0 Process Under Control?** (s. 5, 17) Temporary Mat Leave List for new person. Tracking spreadsheet re: MDWL, contracts ending, etc. Quarterly reporting to water committees and board – help ensure these are always ongoing as required. Training program for board, CAO – "top management" and higher. Communications with owner on any out-of-ordinary conditions – in a timely fashion – with resolutions. Corrective action process communicated with all owners – "problem statement", "containment", "corrective action", "preventive action", etc. Internal communications – ensuring highlights on activities of both groups – distribution very busy in summer, water treatment busy in various points – coordination of activities, projects, monthly tasks, etc.	**6.0 Who?** (s. 2, 3-4, 10) Everything! Ultimately – operational documents established to ensure high quality, safe, clean drinking water. Preparing for events before they happen. Reflections on past events – ensuring continual improvement is assured. Shift in culture – "doing things right" moving forward. Communication with smaller systems (e.g. Grafton) – more involved in decision-making, preparing reports and being transparent about ongoing issues. Competencies (for upcoming temporary replacement) – looking for someone with ISO experience to critically look at things, drinking water experience ideally (e.g. process control narrative, SOP's updated / created). Sheets for daily operations, well-organized person, ensuring each part / every box ticked. Confident person and steadfast in ensuring the requirements are always met.
2.0 Process Input? Schedule – e.g. A&S report – incl. all requirements (complete monthly), Management Review Work orders – update QMS on website (w A&S) Monthly tasks Quarterly sampling requirements, lead sampling Board reports – quarterly normally Sampling schedule for operators – ensuring quarterly, lead QMS tracking – CA's, OFI's – into a work order	"all employee" meeting once per year; more often in work-from-home / remote work conditions. **OFI**: Monthly water-specific meetings to help improve communications and staff engagement (look back / forward – OTJ hours could be logged for meaningful discussions aspects - savings) – sharing past successes, lessons learned from challenges, discussions on opportunities, answer questions on upcoming projects / plans, receive staff feedback / suggestions, align with operational activities.	**7.0 Output?** (s. 5) Login / sign-in sheets – printed at the plant, signed / scanned back. File-folders online – shared drive – others can find information (logically organized to find info) SCADA record, paper records (monthly) New operator very supportive in organizing information – central location of information. Awareness by temp replacement of records required and their locations.

3.0 Measured? (s. 8, 12, 16)	**5.0 What If Out-of-Control?** (s. 7-8, 12, 18)	**8.0 Stakeholder Satisfaction?** (s. 12, 20)
Sampling completed according to plan; MDWL requirements and DWWP Form 2's (Form 1's by Engineering); regulatory requirements are consistently met. Emergency response testing – improved in recent years (scenario-based previously) – using	May 2021 Spill event CCL response procedures – deviations previously occurred regularly – now a work order established to track changes. E.g. low chlorine response procedure, indicators (SCADA trends) – data review / assessment with a critical eye on information.	Everyone! Operationally depend on work done together; reporting to owner – all information is for compliance – good rapport with the owner.
Process: QMS Rep / Compliance Management	**Auditee(s):** Sarah Whitton, Compliance Coord.	**Audit Date:** June 23, 2021 1:00 PM
weather-related events; more realistic. Created SOP re: regulatory vs. process and any power or communications outages – how to ensure the ongoing monitoring of requirements continues in these outage scenarios. KPI's established – e.g. 100% hydrants flushed every year; any required maintenance; valve turning non-existent (for staffing-related reasons); work order - #locates, WQ complaints. Stakeholder engagement – board-level, new CAO, new board member, improving public communications about water-related information – allows public to ask questions – promote engagement. Sharing about plans in an organized fashion.		**9.0 Evidence of Continual Improvement?** (s. 21) **OFI**: Consider establishing operationally relevant objectives & targets for sampling, monitoring and tracking KPI's – influencing planning & control of operations (El. 5 DO b), El. 16). **OFI**: Consider establishing templates to help facilitate effective communication of requirements related to infrastructure improvement projects, as required by MDWL Schedule B s.5 Compliance. Templates would also enable consistent project record-keeping to prove project specifications are consistently met.

Process: Distribution O&M	**Auditee(s):** Darren Hanbidge, Distribution Operator	**Audit Date:** June 24, 2021 08:00 AM
1.0 Adequate Resources? (s. 9, 11, 13, 14-15) For this time of year, and with recent changes, feel light on staff resources – could use student(s) with OIT's to carry-out hydrant, valve programs, keeping GIS up-to-date (previously taking paper records and placing electronically – now need to keep up-to-date). GIS information is beneficial for field access to asset locations and other information; complete water quality complaint, watermain break response. This has impacted the ability to get valve turning program completed (normally a staff person and student). Succession planning is in the works, not currently being carried-out (e.g. Manager of Water Ops, Compliance Coord, Distribution Operator / Supervisor – all leaving within next few months) – job posted for Water Operations Supervisor. Ability to link with other project work with exercising valves (with records on which have been exercised), but only these situations. Have adequate resources – well-equipped with tools, trucks – recently updated. Stock levels are well-maintained, however lead time for stock is quite a bit longer – reassessed the stock levels and placed a large order 4 weeks ago (still awaiting the delivery) – stock is hard to get these days as experienced and communicated by contractors, supply companies, etc. Informal conversation with Manager of Ops regarding infrastructure upgrades and related budgets – have seen budgets allocated to group's equipment needs. Some projects had to be delayed / deferred for budget issues (unanticipated issues). Support projects related to valve turning (Operators do this) and tie-ins – operators inspect as the work is carried out.	**4.0 Process Under Control?** (s. 5, 17) Disinfection of new / reconstructed watermains is carried-out by third party, reports sent to the Manager – certified operators to carry this out. Disinfection of watermain breaks is carried-out by operators – group meeting to review all changes to the updated watermain disinfection procedure – OIC decides what class of break it is – ensuring steps required. SOP's Information, as required Watermain break form – to complete – lists several things – complete the information, hand-in to Sarah. Valve turning is recorded as you're completing these – completed on iPads or on phone. MCare – customer-driven orders through customer service department – information completed on an iPad in the field. Experienced operators help ensure consistency in work as well. Colorimeter and turbidimeter – each truck has one of each. Devices have an annual calibration by an outside company; and verification of the devices also occurs at the plant against a titrator.	**6.0 Who?** (s. 2, 3-4, 10) Make suggestions on what improvements need to be done, equipment updated, etc. Doing job every day helps achieve policy commitments, i.e. provide safe water and comply with requirements. Keeping records up-to-date – e.g. broken watermain, tie-in for new section – inputting the information, submitted to Sarah who files and keeps information. Class III Distribution & Supply (Grafton, Colborne, Cobourg) – minimum Class I, can operate and have advice from other more senior operators.

Process: Distribution O&M	**Auditee(s):** Darren Hanbidge, Distribution Operator	**Audit Date:** June 24, 2021 08:00 AM
2.0 Process Input? Customer-driven – meter changes (large project), complaints on meters, water quality, locates requests (esp. this time of year, slows down November due to frost). Hydrant flushing program timeline (currently ongoing) – SpryPoint system will identify hydrants that require attention – and will repair hydrants that require maintenance. Reactively-driven days – some plans, but can veer off-course when complaints, etc. come in. Schedule – sampling program – follow this (generally Mondays and Tuesdays following long weekends). Weekly bacti's, quarterlies, annual samples, lead sampling program in distribution		**7.0 Output?** (s. 5) Hydrant flushing records – start, stop, time, residual and turbidity records Logbooks at booster stations and water towers Plant logbooks No distribution logbook (forms on iPads record everything distribution operators do, like water quality complaint responses, etc.) Annual inspections – mostly involve Sarah, Shawn, Larry – could be called-in to help answer questions Operator certificates are posted in all plants (Colborne, Grafton, Cobourg / Hamilton Township – with Cobourg) Operator training hours have been obtained during pandemic through correspondence, online courses, H&S-related training (confined space entry, etc.) – if in-person, physically sep.
3.0 Measured? (s. 8, 12, 16) Track everything Any low chlorine (CCL is above 0.2 mg/L, reg. is 0.05 mg/L) or high turbidity (CCL is below 5 NTU) found in the system, results from a sample, water quality complaints. Also what's representative for the area – always aim for what's representative, and especially where possible better than CCL's listed. E.g. 1 mg/L free chlorine in some areas; and less than 1 NTU turbidity – so would aim for these figures. Will monitor for pressure through hydrants – if installing new pressure reducing valves (have annual checks as well – checking pressures upstream and downstream, contractor hired to	**5.0 What If Out-of-Control?** (s. 7-8, 12, 18) Nothing so far out-of-control that couldn't be handled by staff or have support to handle the situation within a 24-hour period. "Watermain breaks" are normal, have a good process in place. Tabletop sessions for reviewing mock emergencies – group discussion on what would happen. Experienced operators, contractors are also excellent with equipment operators, could always address in a short period of time. In an AWQI – would hand off to Manager / Compliance – but operators could carry- this out as well – numbers are available on the procedure for reporting to MECP SAC and local MOH. Once sample	**8.0 Stakeholder Satisfaction?** (s. 12, 20) Everyone with a tap is a stakeholder. Customer complaints – recorded and followed-up. No calls about the work of operators. Board, town **9.0 Evidence of Continual Improvement?** (s. 21) Equipment updates have enabled efficiency of work. GIS – having access to this – from operator standpoint. Able to complete forms / reports electronically – have helped prevent the loss of information – can very easily access through the intranet.

Process: Distribution O&M	**Auditee(s):** Darren Hanbidge, Distribution Operator	**Audit Date:** June 24, 2021 08:00 AM
carry-out maintenance as required on PRV's) – when there's a concern (customer-driven).	results returned, AWQI form completed within the timeframe.	OFI: Staffing levels could be improved with OIT students. Re-consider on-call rotation as operators are aware that this is going to be shortened – which impacts the work-life balance (going to be on-call 1:3weeks – currently 1:4 weeks). Manager could assist on-call, if required.

Process: WTP Operations & Maintenance	**Auditee(s):** Scott Noble, WTP Operator	**Audit Date:** June 24, 2021 3:30 PM
1.0 Adequate Resources? (s. 9, 11, 13, 14-15) Have ability to see operators' perspective / management perspective – tolerance in operations – have vehicles, clothing resources. **OFI**: inventory management – ensuring spare parts on hand – to have critical stock. Asset tagging / listing through work order system has been built-up over past few years. WO system has capability to ensure min/max system for stock levels (e.g. emergency – part removed from shelf – work order created to select asset; inventory integrated with asset – what parts used – running tally of quantities) – minimum levels for triggering reordering parts. Quarterly basis – inventory check (against work orders). Infrastructure / equipment conditions – treatment aspects implemented over time to improve water quality; works well – complex system. E.g. new analyzers installed, SCADA system is great – confidence in the infrastructure.	**4.0 Process Under Control?** (s. 5, 17) Senior operator knowledge SOP system in place – all accessible on V:\ shared drive – 12-13 SOP's – such as low chlorine response; clearwell out of service SOP, etc. CRP's – critical response procedures ERP's for out-of-ordinary conditions Working towards streamlining all operational documentation Process control narrative updates are ongoing (not since 2012) – incorporating operational knowledge – ensuring an understanding of all interlocks (at what point does it get triggered, what response takes place, what returns it…etc.) SpryPoint tracks and keeps records on measurement instruments and their calibration / verification statuses – analyzers listings – process-based or regulatory-based.	**6.0 Who?** (s. 2, 3-4, 10) To provide clean, safe potable water to the community. Activities are always keeping the high-level goal in mind - #1 priority in the decision making we do on daily basis. Class II Treatment and Distribution & Supply (Class III Distribution & Supply written). WW licences as well II in collection I in treatment. Class III Treatment plant. Plan on updating Treatment certificate in the fall. Personal goal to have Class III by year-end. **OFI**: On-call rotation only includes three team members (once every three weeks, on-call means only "off-call" two out of every three weeks). Learn the plant, new staff should be comfortable with operating the plant prior to going on-call. Especially with recent staffing level changes. Distribution / treatment – cross-training teams would be beneficial to improve on-call rotation for the entire system.
2.0 Process Input? Each operator leads their own day-to-day work – the way things are set-up. Colleagues – great operators – wealth of knowledge, understand daily requirements; could use some prioritization (based on risks, criticality) – "Supervisor of Water Systems" – **OFI:** daily tailboards to discuss priorities, assignment of WO's, tasks.		**7.0 Output?** (s. 5) Logbook entries – very descriptive Flip notebook to record personal notes (quick references with time; to later transcribe in logbook) SpryPoint WO system – (previously call-out sheet) – now in system – can document what incident was, what was done to correct it, follow-up requirements – yes order parts (for probe-related corrective actions).
3.0 Measured? (s. 8, 12, 16) Labs every day to verify accuracy of chlorine analyzers (some are process analyzers, some are regulatory) – process labs every day. Influent analyzer – water dosed into the contact tank 1.60 mg/L on way in; pH / temperatures /	**5.0 What If Out-of-Control?** (s. 7-8, 12, 18) e.g. this past Friday – first day on-call – call-out at 3pm – low chlorine on influent analyzer. Have laptop, could remote-in from home – could shutdown the plant, ensuring no water directed into clearwell / out of it. Shutdown booster station	**8.0 Stakeholder Satisfaction?** (s. 12, 20) Self, entire team (especially plant-related, and when on-call) – currently some transition with changing; Sarah – Compliance Coordinator – needs a pulse on the operations and changing conditions.

Process: WTP Operations & Maintenance	**Auditee(s):** Scott Noble, WTP Operator	**Audit Date:** June 24, 2021 3:30 PM
flows – regulatory CT analyzer will drift between 0.1 to 0.15 - Reservoir – discharge analyzer controls post chlorinator (trim system) – so that water never leaves the plant below 1.45 mg/L. CCP alarms for secondary – 0.55 mg/L in Cobourg at towers / booster station (slightly higher). Aluminum residuals at least weekly. Raw turbidity / temperatures taken daily – references for manual CT calculation (otherwise done on SCADA continuously online all the time). Have references for calculating CT manually. Verify analyzers at towers for secondary chlorine residuals – every M, W, F Weekly checks on all diesel generators – run monthly – check for battery, fuel, oil, record run hours on weekly in WO system.	(small tower) – prior to commuting for 30 minutes to work. Chlorine analyzers – no spare parts on-hand – through troubleshooting – determined the probe sensor had broken on the end (optic eye was loose / gone). Knew it wasn't the effluent analyzer – not used to prove CT – only used for process verification that dosing is correct. Needed to take a probe from another process analyzer – "live without" for the weekend – risk-based decision to keep the treated analyzer online – took from the zebra control analyzer – even with daily checks (still verifying raw water dosing, and conditions are correct). CRP-Low Chlorine was recently discussed / reviewed – checked the gas chlorination system, checked the tonner room for leaks, etc. ensuring everything aligned for average usage – grabbed samples to verify the root cause was actually the analyzer's probe.	**9.0 Evidence of Continual Improvement?** (s. 21) First 4-5 months – shifted from distribution to WTP – comfortable with knowledge, experience, background. Good changes implemented since then – updated ERP's, CRP's, SOP's, Process Control Narrative updated – good momentum to get these updates made and aligned. Scott brings past experiences, knowledge to the utility.

Appendix "D" – Auditor CV and Training Certificates

Curriculum Vitae: Brigitte Roth, BES, EP(EMSLA)

SUMMARY:

A management systems, compliance and risk management professional with 25 years' experience in:
- achieving legislative compliance,
- optimizing and integrating management systems,
- conducting risk assessments and analysis,
- preparing and improving emergency response plans,
- planning and executing annual emergency test exercises and debrief sessions,
- leading and carrying out compliance and management system audits, and
- developing and delivering training related to the above areas of expertise.

A certified environmental professional with ECO Canada, as EP(CEA) from 2005-2015 and currently as EP(EMSLA) since 2015; she has conducted environmental compliance, pollution prevention and management system audits at over 95 unique organizations of various industries in Ontario and at 66 golf courses under the Integrated Pest Management Accreditation Program. She has overseen the implementation and integration of management systems in conformity with ISO 14001, ISO 9001, ISO 17025, OHSAS 18001 and Ontario's Drinking Water Quality Management Standard.

Also experienced as an alternate Community Emergency Management Coordinator (CEMC) for the City of Guelph from 2015 to 2017 and a Planning Section Chief in the City's Emergency Operations Centre from 2014 to 2017.

PROFESSIONAL DESIGNATIONS:

2015, Environmental Professional – Environmental Management Systems Lead Auditor, ECO Canada
2005-2015, Environmental Professional – Compliance Auditor, ECO Canada

EDUCATION & KEY TRAINING:

2018, ISO/IEC 17025:2017, Waher Consulting Services
2016, Community Emergency Management Coordinator, Emergency Management Ontario
2014-2017, Emergency Management Certificate program courses, Justice Institute of British Columbia
2013, Project Management Certificate (with High Honours), Sheridan College
1998, Environmental Management System Lead Auditor, KPMG (Certificate No. E0034)
1997, Quality Management System Lead Auditor, KPMG (Certificate No. K193)
1996, Certificate of Environmental Assessment, University of Waterloo
1996, Bachelor of Environmental Studies (Honours Geography), University of Waterloo

EMPLOYMENT HISTORY:

Principal Consultant at Acclaims Environmental Inc.
January 2018 - present

Helping optimize the effectiveness of customers' integrated management systems through audits and facilitated sessions to improve:
- legislative compliance (e.g. emissions reporting, approvals and environmental protection plans)
- conformance to management system standards (e.g. DWQMS, ISO 14001, ISO 9001, ISO 45001)
- risk assessment and management
- emergency preparedness and business continuity

Trainer at Walkerton Clean Water Centre
October 2016 - present

Contract trainer for the following courses:
- Drinking Water Quality Management Standard (DWQMS)
- Internal Auditing for DWQMS
- Responsibilities under the Statutory Standard of Care
- Risk Assessment & Emergency Preparedness

Program Coordinator – Project and Program Management at City of Guelph
March 2017 – January 2018

For the City's Corporate Project Management Office (CPMO):
- Developed and promoted methodologies and standards,
- Reported to the Executive Team and city Council on the CPMO's performance,
- Promoted and trained on project management processes,
- Implemented project document and records control, and
- Researched and implemented best practices.

Quality Assurance Coordinator at City of Guelph
October 2008 – March 2017

Managed the processes related to:
- Municipal Drinking Water Licensing,
- Drinking Water Quality Management Standard (DWQMS) accreditation,
- Leading the audit team in internal audits and coordinating external audits,
- Risk assessment, analysis and emergency response plans, and
- Regular compliance reports to Top Management and city Council.

Pollution Prevention Coordinator / Senior Environmental Auditor at CASF
2001 – 2008

- Conducted over fifty pollution prevention and/or compliance audits at metal finishing sites.
- Designed and delivered Advanced Environmental Management Series of courses (Auditing 101; Pollution Prevention Planning & Materials Accounting; Regulatory Compliance; Spills Prevention, Emergency Preparedness and Response).
- Chaired annual Metal Finishing Conference committee from 2000-2008.

Environmental Management System Specialist at WESA Group Inc. (BluMetric Environmental Inc.)
2004 – 2006

- Conducted compliance and management system audits at industrial and municipal drinking water sites.
- Assisted with management system implementations (ISO 9001, ISO 14001, OHSAS 18001, DWQMS).
- Assisted industrial clients with Canada's National Pollutant Release Inventory annual reporting.
- Assisted in the application process for industrial facilities' Certificates of Approval (Air & Noise).

Quality and Environmental Coordinator at Kuntz Electroplating Inc.
1996 – 2001

- Project manager for ISO 9001, ISO 14001 and ISO 17025 implementation and maintenance.
- Facilitated annual reviews of quality policies, risk assessments and emergency response plans.
- Kept up-to-date on all changes in regulatory / customer requirements and reported to management.
- Developed and delivered various quality and environmental management system training programs.
- Managed external and internal audit plans for all management systems and functioned as lead auditor.

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Brigitte **Roth**

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Environmental Professional - Environmental Management Systems Lead Auditor EP(EMSLA)

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CERTIFICATE OF ACHIEVEMENT

BRIGITTE ROTH

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Internal Auditing for the Drinking Water Quality Management Standard course

WWOCS Course 10 # 8194

September 24. 2020 to September 25, 2020

Oirec1or Approved Continuing Education Units: 1.4

Cal1 Kuhnke

CEO

5eptember 25, 2020

Date

WWWWCNC,ca

APPENDIX- 8

The Corporation of the Township of Alnwick/Haldimand

Grafton DWS- 2021 DWQMS NSF Surveillance Audit Report December

NSF International Strategic Registrations Audit Report

Lakefront Utility Services Inc.

207 Division Street
Cobourg, Ontario K9A 4L3 CAN

C0128646

Audit Type

Surveillance Audit

Auditor

Rose Johnson

Standard

Ontario's Drinking Water Quality Management Standard Version 2
(Exp Date: 07-FEB-2024)

Audit Date(s):

12/15/2021 - 12/15/2021

Recommendation

Ontario's Drinking Water Quality Management Standard Version 2 : Continue Certification, NO CARs

Executive Summary

Ontario's Drinking Water Quality Management Standard Version 2	This was an annual off site system audit of the Lakefront Utility Services / Alnwick - Haldimand Township - Grafton Drinking Water System to the Ontario Drinking Water Quality Management System (DWQMS v.2) Standard. The quality management system was found to be effectively implemented. There were numerous strengths observed during the audit, including: - internal audit - risk assessment - communications - overall commitment to the QMS. There were no major or minor nonconformities (NCs) identified during this audit. There were five opportunities for improvement (OFIs) identified which do not require a formal response, but are included in this report for consideration by the DWQMS team. The support and cooperation of all involved in the audit is acknowledged and appreciated. Thank you for choosing NSF for your DWQMS accreditation.

Opportunities

Ontario's Drinking Water Quality Management Standard Version 2	See below

Corrective Action Requests

There is NO Corrective Action Request in this audit.

Site Information

The audit was based on a sampling of the company's management system.

Industry Codes

NACE:E 41

Scope of Registration

Ontario's Drinking Water Quality Management Standard Version 2 : Grafton Drinking Water System, 238-OA1, Entire
Full Scope Accreditation

Opportunities for Improvements

Ontario's Drinking Water Quality Management Standard Version 2

Opportunity	Observations / Auditor Notes
Opportunities for Improvements (DWQMS)-01	**Location of OFI** Documents - various; **Discussed With** Larry Spyrka & Mina Aminnejad; **Description** Documentation was found to generally meet the requirements of the Standard. Consideration could be given to: 1. clearly differentiating which documents apply to which system, e.g. QMS-D11 2. ensuring header/footers reflect current version, consistent with revision history, e.g. QMS-P08, Operational Plans 3. clearly referencing linked documents in procedures,;
Opportunities for Improvements (DWQMS)-02	**Location of OFI** N/A; **Discussed With** Larry Spyrka & Mina Aminnejad; **Description** The risk assessment process was found to be overall effectively implemented. Consideration could be given to recording meeting minutes to clearly indicate the type of review (12 or 36 month), as well as names of review participants;
Opportunities for Improvements (DWQMS)-03	**Location of OFI** QMS-D11 Essential Supplies & Services; **Discussed With** Larry Spyrka & Mina Aminnejad; **Description** Processes to identify essential supplies and services were found to be overall effective. Consideration could be given to identifying primary and secondary suppliers, where applicable.;
Opportunities for Improvements (DWQMS)-04	**Location of OFI** QMS-D08 Instrument Calibration; **Discussed With** Larry Spyrka & Mina Aminnejad; **Description** Processes to verify / calibrate measuring equipment were found to be overall effectively implemented. An opportunity exists to clarify the frequency of performing internal pocket colorimeter verifications, e.g. quarterly.;
Opportunities for Improvements (DWQMS)-05	**Location of OFI** QMS-P11 Continual Improvement; **Discussed With** Larry Spyrka & Mina Aminnejad; **Description** Continual improvement processes were found to be overall effectively implemented. Consideration could be given to: 1. identifying all potential triggers for issuing CARs, e.g. internal observation, emergency situation 2. clarifying where root cause is recorded for corrective action investigations (e.g. QMS Tracking spreadsheet);

General Information

Operating Authority: Legal Name & Address	**Lakefront Utility Services Inc.** **207 Division Street**

	Cobourg, ON K9A 4L3
Language Preference: Correspondence	English
Language Preference: Audit	English
Owner: Legal Name and Address	The Corporation of the Township of Alnwick/Haldimand 10836 Cty. Rd. 2 PO Box 70 Grafton, ON K0K 2G0
Owner Language Preference: Correspondence	English
Owner Language Preference: Audit	English
Applicant Representative Information; Include Name, Title, Phone, Fax, Email & Website	Larry Spyrka - Manager of Water Capital Projects / QMS Representative Lspyrka@lusi.on.ca Tel: 905-372-2193 Xt. 5238 www.lakefrontutilities.com
Accreditation Option	Full Scope - Entire DWQMS
Date of Previous Systems Audit:	December 13, 2019
Date of Previous On-Site Verification Audit:	November 19, 2020

Processes

Summary of Findings	
Requirement	**Finding**
1. Quality Management System	**C**
2. Quality Management System Policy	**C**
3. Commitment and Endorsement	**C**
4. Quality Management System Representative	**C**
5. Document and Record Control	**OFI**
6. Drinking-Water System	**C**
7. Risk Assessment	**OFI**
8. Risk Assessment Outcomes	**C**
9. Organizational Structure, Roles, Responsibilities, and Authorities	**C**
10. Competencies	**C**
11. Personnel Coverage	**C**
12. Communications	**C**
13. Essential Supplies and Services	**OFI**
14. Review and Provision of Infrastructure	**C**
15. Infrastructure Maintenance, Rehabilitation & Renewal	**C**
16. Sampling, Testing & Monitoring	**C**
17. Measurement & Recording Equipment, Calibration & Maintenance	**OFI**
18. Emergency Management	**C**
19. Internal Audits	**C**
20. Management Review	**C**
21. Continual Improvement	**OFI**

Mj	Major Non-Conformity. The auditor has determined one of the following: (a) a required element of the DWQMS has not been incorporated into a QMS: (b) a systemic problem with a QMS is evidenced by two or more minor conformities; or (c) a minor non-conformity identified in a corrective action request has not been remedied.
Mn	Minor Non-Conformity. In the opinion of the auditor, part of a required element of the DWQMS has not been incorporated satisfactorily into a QMS.
OFI	Opportunity for Improvement. Conforms to requirement, but there is opportunity for improvement.
C	Conforms to requirement.
	Not Applicable to this audit
*	Additional Comment added by auditor in the body of the report.

APPENDIX- 9

The Corporation of the Township of Alnwick/Haldimand

Grafton DWS Annual Report 2021. February 2022

GRAFTON DRINKING WATER SYSTEM 2021 ANNUAL REPORT FOR WATER WORKS (R.170/03, Sec.11)

Drinking-Water System Number:	220009158
Drinking-Water System Name:	Grafton Drinking Water System
Drinking-Water System Owner:	Corporation of the Township of Alnwick/Haldimand
Drinking-Water System Category:	Large Municipal Residential
Period being reported:	January 1, 2021 to December 31, 2021

Complete if your Category is Large Municipal Residential or Small Municipal Residential

Does your Drinking-Water System serve more than 10,000 people? Yes [ ] No [X]

Is your annual report available to the public at no charge on a web site on the Internet? Yes [x] No [ ]

Location where Summary Report required under O. Reg. 170/03 Schedule 22 will be available for inspection.

Lakefront Utility Services Inc. Office
207 Division Street, Cobourg Ontario

https://www.lakefrontutilities.on.ca/regulatory/water/

Complete for all other Categories.

Number of Designated Facilities served:

Did you provide a copy of your annual report to all Designated Facilities you serve? Yes [ ] No [ ]

Number of Interested Authorities you report to:

Did you provide a copy of your annual report to all Interested Authorities you report to for each Designated Facility? Yes [ ] No [ ]

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

Drinking Water System Name	Drinking Water System Number
N/A	

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

Yes [ ] No [ ]

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

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

Describe your Drinking-Water System

The Hamlet of Grafton Communal Water System supplies water to approximately 1000 residents.
Water is taken from 2 wells located at the water plant on Edwardson Road. The water is disinfected with sodium hypochlorite and sodium silicate is added to sequester the iron as the water enters the plant. After the appropriate contact time, water is pumped to the distribution system with variable speed pumps, which modulate to maintain the distribution system pressure.

List all water treatment chemicals used over this reporting period

Sodium Hypochlorite
Sodium Silicate

Were any significant expenses incurred to?

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

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

PROJECT	ESTIMATED COST
SCADA Upgrade	$12,500.00
PRV- Control Valves Repair	$2,000.00
Raw Water Header Replacement	$50,000.00
	$64,500.00

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

Incident Date	Parameter	Result	Unit of Measure	Corrective Action	Corrective Action Date
On Dec 11, 2021, UPS failure resulted in PLC shutdown and loss of trending (data gap) 19:31-19:49. During this time the Highlift shut down resulting in a loss of pressure within pressure zone 1. LUSI attended the site re-started the Highlift pump and switched out the new UPS. the Haliburton, Kawartha, Pine Ridge Public Health Unit issued bacteriological sample and Boil Water Order (BWO). Related Mains, Pipes, and Hydrants were Flushed and disinfected. The affected area received normal chlorine and turbidity values for the area. Users were Advised to Boil Water by social media and hand delivery of BWO. Upon completion of the flushing Hydrants, two consecutive bacteriological water samples were taken at two 24-hour intervals. Laboratory results were satisfying and indicated no presence of E. Coli or total coliform was obtained on Dec 12 and 13, 2021. Notices of Adverse and issue resolution (schedule 16) reported to SAC As Loss of System Pressure.					

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

	Number of Samples	Range of E.Coli Or Fecal Results (min #)-(max #)	Range of Total Coliform Results (min #)-(max #)	Number of HPC Samples	Range of HPC Results (min #)-(max #)
Raw Well 1	52	0 – 0	0 – 0	N/A	N/A
Raw Well 2	52	0 – 0	0 – 0	N/A	N/A
Treated	52	0 – 0	0 – 0	52	0 – 4
Distribution	156	0 – 0	0 – 0	104	0 – 6

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

	Number of Grab Samples	Range of Results (min #)-(max #)
Turbidity Well 1 (Raw)	12	0.08 – 0.43 (NTU)
Turbidity Well 2 (Raw)	12	0.06 – 0.51 (NTU)
Turbidity (Treated)	12	0.07 – 0.45 (NTU)
Chlorine (mg/L)	8760	1.21 – 2.14

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

Location	Date Sampled	Parameter	Result	Unit of Measure
Pump Well 2	Dec 10, 2021	E coli/Total Coliform	0/0	cfu/100mL
		Total/Free chlorine	1.77/1.58	
DW Hydrant 105 Edwardson Rd	Dec 12, 2021	E coli/Total Coliform	0/0	
		Total/Free chlorine	1.72/1.52	
	Dec 13, 2021	E coli/Total Coliform	0/0	
		Total/Free chlorine	1.45/1.30	

Summary of Inorganic parameters tested during this reporting period or the most recent sample results

NOTE: Grafton Water System only requires Inorganic Parameters to be tested once every three years. Sodium and Fluoride are sampled once every 5 years.

Parameter	Result Value	Standard (MAC)	Unit of Measure	Sample Date	Exceedance
Antimony	0.09 < MDL	6	ug/l	Jan 13, 2020	no
Arsenic	0.3	25	ug/l	Jan 13, 2020	no
Barium	146	1000	ug/l	Jan 13, 2020	no
Boron	30	5000	ug/l	Jan 13, 2020	no
Cadmium	0.003 < MDL	5	ug/l	Jan 13, 2020	no
Chromium	0.09	50	ug/l	Jan 13, 2020	no
Mercury	0.01 < MDL	1	ug/l	Jan 13, 2020	no
Selenium	0.04 < MDL	10	ug/l	Jan 13, 2020	no
Uranium	0.057	20	ug/l	Jan 13, 2020	no
Nitrite	0.003 <MDL	1	ug/l	Nov 9, 2021	no
Nitrate	0.019	10	ug/l	Nov 9, 2021	no
Fluoride	0.21	1.5	mg/L	Sep 16, 2019	no
Sodium	17	20	mg/l	Sep 16, 2019	no

Summary of lead testing under Schedule 15.1 during this reporting period

Location Type	Number of Samples	Range of Lead Results (min#) – (max #) ug/L	Standard (MAC) ug/L	Number of Exceedances
Distribution	4	0.02 - 0.24	10	0

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

Parameter	Sample Date	Result Value	Standard (MAC)	Unit of Measure	Exceedance
Benzene [ug/L]	Jan 13, 2020	0.32 <MDL	5	ug/L	No
Carbon tetrachloride [ug/L]	Jan 13, 2020	0.17 <MDL	5	ug/L	No
2-Dichlorobenzene [ug/L]	Jan 13, 2020	0.41 <MDL	200	ug/L	No
4-Dichlorobenzene [ug/L]	Jan 13, 2020	0.36 <MDL	5	ug/L	No
1-Dichloroethylene (vinylidene chloride) [ug/L]	Jan 13, 2020	0.33 <MDL	14	ug/L	No
2-Dichloroethane [ug/L]	Jan 13, 2020	0.35 <MDL	5	ug/L	No
Dichloromethane [ug/L]	Jan 13, 2020	0.35 <MDL	50	ug/L	No
Monochlorobenzene `[ug/L]	Jan 13, 2020	0.3 <MDL	80	ug/L	No
Tetrachloroethylene (perchloroethylene) [ug/L]	Jan 13, 2020	0.35 <MDL	30	ug/L	No
Trichloroethylene [ug/L]	Jan 13, 2020	0.44 <MDL	5	ug/L	No
Vinyl Chloride [ug/L]	Jan 13, 2020	0.17 <MDL	2	ug/L	No
Diquat [ug/L]	Jan 13, 2020	1 <MDL	70	ug/L	No
Paraquat [ug/L]	Jan 13, 2020	1 <MDL	10	ug/L	No
Glyphosate [ug/L]	Jan 13, 2020	1 <MDL	280	ug/L	No
Polychlorinated Biphenyls (PCBs) - Total [ug/L]	Jan 13, 2020	0.04 <MDL	3	ug/L	No
Benzo(a)pyrene [ug/L]	Jan 13, 2020	0.004 <MDL	0.01	ug/L	No
Alachlor [ug/L]	Jan 13, 2020	0.02 <MDL	5	ug/L	No
Atrazine + N-dealkylated metabolites [ug/L]	Jan 13, 2020	0.02 <MDL	5	ug/L	No
Atrazine [ug/L]	Jan 13, 2020	0.01 <MDL	-	ug/L	No
Desethyl atrazine [ug/L]	Jan 13, 2020	0.01 <MDL	-	ug/L	No
Azinphos-methyl [ug/L]	Jan 13, 2020	0.05 <MDL	20	ug/L	No
Carbaryl [ug/L]	Jan 13, 2020	0.05 <MDL	90	ug/L	No
Carbofuran [ug/L]	Jan 13, 2020	0.01 <MDL	90	ug/L	No
Chlorpyrifos [ug/L]	Jan 13, 2020	0.02 <MDL	90	ug/L	No
Diazinon [ug/L]	Jan 13, 2020	0.02 <MDL	20	ug/L	No
Dimethoate [ug/L]	Jan 13, 2020	0.06 <MDL	20	ug/L	No
Diuron [ug/L]	Jan 13, 2020	0.03 <MDL	150	ug/L	No
Malathion [ug/L]	Jan 13, 2020	0.02 <MDL	190	ug/L	No
Metolachlor [ug/L]	Jan 13, 2020	0.01 <MDL	50	ug/L	No
Metribuzin [ug/L]	Jan 13, 2020	0.02 <MDL	80	ug/L	No
Phorate [ug/L]	Jan 13, 2020	0.01 <MDL	2	ug/L	No
Prometryne [ug/L]	Jan 13, 2020	0.03 <MDL	1	ug/L	No
Simazine [ug/L]	Jan 13, 2020	0.01 <MDL	10	ug/L	No
Terbufos [ug/L]	Jan 13, 2020	0.01 <MDL	1	ug/L	No
Triallate [ug/L]	Jan 13, 2020	0.01 <MDL	230	ug/L	No
Trifluralin [ug/L]	Jan 13, 2020	0.02 <MDL	45	ug/L	No
4-dichlorophenoxyacetic acid (24-D) [ug/L]	Jan 13, 2020	0.19 <MDL	100	ug/L	No
Bromoxynil [ug/L]	Jan 13, 2020	0.33 <MDL	5	ug/L	No
Dicamba [ug/L]	Jan 13, 2020	0.20 <MDL	120	ug/L	No
Diclofop-methyl [ug/L]	Jan 13, 2020	0.40 <MDL	9	ug/L	No
MCPA [mg/L]	Jan 13, 2020	0.00012 <MDL	-	ug/L	No
Picloram [ug/L]	Jan 13, 2020	1 <MDL	190	ug/L	No
4-dichlorophenol [ug/L]	Jan 13, 2020	0.15 <MDL	900	ug/L	No
6-trichlorophenol [ug/L]	Jan 13, 2020	0.25 <MDL	5	ug/L	No
6-tetrachlorophenol [ug/L]	Jan 13, 2020	0.20 <MDL	100	ug/L	No
Pentachlorophenol [ug/L]	Jan 13, 2020	0.15 <MDL	60	ug/L	No
THM: Annual Average	Nov 9, 2021	24.5	100	ug/L	No

Parameter	Sample Date	Result Value	Standard (MAC)	Unit of Measure	Exceedance
HAA: Annual Average	Nov 9, 2021	5.3<MDL	80	ug/L	No

List any Inorganic or Organic parameter(s) that exceeded half the standard prescribed in Schedule 2 of Ontario Drinking Water Quality Standards.

Parameter	Result Value	Unit of Measure	Date of Sample
N/A			