



2016 Summary Report

for the

Town of Minto

CLIFFORD DRINKING WATER SYSTEM

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1.0 INTRODUCTION

1.1 Background

In December 2002, the Safe Drinking Water Act (SDWA) was enacted. Subsequently, on June 1, 2003, under the SDWA, a new '*Drinking-Water Systems Regulation*', Ontario Regulation 170/03 (O. Reg. 170/03), was enacted. In addition, several supporting regulations and procedures were also enacted to assist with the administration of O. Reg. 170/03. The list of relevant drinking-water legislation is presented in Appendix A.

The SDWA identifies the responsibilities of owners and operating authorities of municipal drinking water systems (SDWA, Sections 11 and 19). Their duties include ensuring that:

- All water provided by the drinking-water system meets prescribed drinking-water quality standards;
- The drinking-water system is operated in accordance with the Act and regulations and is kept in a good state of repair;
- All facilities are appropriately staffed and supervised;
- All sampling, testing and monitoring requirements are complied with;
- All reporting requirements are complied with; and
- Only persons holding valid operator's certificates operate the drinking-water-system.

O. Reg. 170/03 establishes the standard for protection of drinking water. It includes sets of schedules, specific to municipal residential systems that define requirements for:

- Minimum treatment levels;
- Operational checks;
- Chemical and microbiological sampling and testing;
- Adverse results reporting;
- Corrective procedures; and
- Report documentation and retention.

The system's Municipal Drinking Water Licence (MDWL), Drinking Water Works Permit (DWWP) and Permit To Take Water (PTTW) imposes system specific rules and conditions applicable to the standards set out in O. Reg. 170/03.

1.2 Objective

This Summary Report for the Clifford Drinking Water System is being prepared in fulfillment of Schedule 22 of O. Reg. 170/03, and will be given to Members of the Municipal Council. It covers the period from January 1, 2016 to December 31, 2016.

This Summary Report lists any requirements of the Act, the regulations, the PTTW, the MDWL, the DWWP and any order that the system failed to meet during the period of this report. For any such failure, the measures that were taken to correct the failure are detailed. The report also includes relevant information that will assist the Town of Minto to assess the water work's capability to meet existing and future planned uses of the system.

1.3 Description of Drinking Water System

Clifford is a community with a population of approximately 804 persons, located within the Town of Minto at the northwest corner of Wellington County, along the route of Provincial Hwy. No. 9.

Clifford is serviced by a municipal Drinking Water System that is comprised of: three drilled well supplies, two pumphouses, an elevated 1,275 m³ storage tank and a distribution network of watermains. The watermains range in diameter from 100 mm to 250 mm. The municipal water system is also used for fire protection and has approximately 46 fire hydrants throughout the distribution system. In the event of a prolonged power outage, a portable generator can be moved to Wells #1, #3 & #4 to supply back-up power.

Well #3 is a deep overburden well, and serves as the primary production well for the system. Wells #1 and #4 are bedrock wells and provide peak flows and redundancy to the system. Wells #3 and #4 are a *combined supply*, and are not allowed to operate together. All three operating wells are equipped with submersible pumps; the pump in Well #3 is a variable speed pump.

The pumphouse on Allan Street serves Well #1. The second pumphouse is in the base of the elevated storage tank on Nelson Street and serves Wells #3 and #4. The treatment employed in both pumphouses includes the use of sodium silicate for the sequestering of iron and sodium hypochlorite for disinfection of the raw water. A continuous online analyser measures the levels of free chlorine residual at point of entry (POE). When the alarm for chlorination system failure is activated, there is a corresponding lockout of well pumps. Subsequent to treatment, supply from Well #1 is discharged from the chlorine contact pipe into the distribution system, while supply from Wells #3 and #4 is discharged from the chlorine contact pipe directly into the elevated storage tank from the Cl₂ contact pipe.

The Clifford Drinking Water System operates under MDWL 106-101, DWWP 106-201 and PTTW #1704-9XBH9S (all wells).

2.0 SUMMARY OF UPGRADES

2.1 Upgrades Completed in 2016

The disinfection treatment system in the Clifford Drinking Water System meets all of the standards imposed by O. Reg. 170/03 and the MOE's "*Procedures for Disinfection of Drinking Water in Ontario*".

Typically, maintaining the system includes repairs and/or replacement of individual components as necessary. In 2016, \$356,700 was spent installing watermain on Ann Street to replace the mains in the backyards and \$6,050 installing watermain on Brown Street. The water tower was drained for inspection and paint; this was paid by a Third Party. The following purchases were also made on equipment that is shared between all of Minto's water systems. \$44,500.00 to replace old service truck, \$43,000 to replace a pick-up truck, \$92,000 on SCADA equipment upgrades to improve data reporting and computer upgrades, \$20,000 on the water meter installation program.

Preventative maintenance measures are being followed to ensure proper operation of the Drinking Water System.

2.2 Upgrades Scheduled to be Completed in 2017

In 2017, the Town of Minto is planning to spend \$112,000.00 replacing watermain on Ann St. S. from Park to Nelson.

In 2017 the following will be purchased to be shared within the water department. \$10,000.00 for further upgrades to the SCADA system as well as \$14,750.00 for an electronic data management system. \$20,000 will be spent on water meters, \$15,000.00 on engineering for future projects, \$5,000.00 on hydrant maintenance and \$12,000.00 on equipment.

3.0 OPERATION OF THE DRINKING WATER SYSTEM

3.1 Summary of the Quantities and Flow Rates of Water Supplied

O. Reg. 170/03 stipulates that a summary of the quantities and flow rates of the water supplied from each of Clifford's wells be included in the Summary Report. Tables 3.1, 3.2 and 3.3 provide a summary of quantities and flow rates supplied during 2016, for Wells #1, #3 and #4 respectively, on a monthly basis. Well #1 supplies the Allan Street Wellhouse. Wells #3 and #4 supply the Nelson Street Wellhouse; they are a *combined* supply and are not allowed to operate together.

Table 3.1
Clifford Drinking Water System – Well #1
Treated Water Flow, Turbidity, and Disinfectant Residual
January 1, 2016 – December 31, 2016

Month	Raw Water Flow (Max Daily Volume = 1,309 m ³ /day (Max Flow Rate = 15.15 L/s)			Chlorine	Monthly Averages				Distribution System Disinfectant
	Instantaneous Peak flows (L/s)	Maximum Day Flow (m ³ /day)	Monthly Total (m ³)		Monthly Total (L)	Treated Water Turbidity		Treated Water Disinfectant Point of Entry	
				No. of Samples Collected		Monthly Average Turbidity	No. of Treated Samples Collected	Average Residual (mg/L)	
January	13.2	171	2,976	66	8	0.26	31	1.37	See Clifford Well #3 Data
February	13.3	208	3,133	63	6	0.27	29	1.23	
March	13.2	199	3,315	110	6	0.28	31	1.29	
April	13.2	157	3,580	108	9	0.57	30	1.27	
May	13.2	207	3,632	65	8	0.46	31	1.26	
June	13.1	192	4,098	129	8	0.44	30	1.23	
July	13.1	205	4,410	130	5	0.36	31	1.34	
August	13.1	162	3,522	88	7	0.39	30	1.26	
September	13.2	141	2,885	128	6	0.41	30	1.27	
October	13.1	1132	7,287	124	5	0.42	31	1.29	
November	13.1	340	3,578	98	8	0.38	30	1.41	
December	13.1	177	3,762	88	9	0.41	31	1.25	
Total			46,178	1,197	85		365		
Average			3,848			0.39		1.29	
Maximum	13.3	1132							

Disinfectant Compound Used: **12% Sodium Hypochlorite**
 Form of Residual Displayed: **Free**
 Quantity of Disinfectant Used During 2016: **1,197 L**
 Distribution System Minimum Target Residual: **0.2 mg/L**

Table 3.2
Clifford Drinking Water System – Well #3
Treated Water Flow, Turbidity, and Disinfectant Residual
January 1, 2016 – December 31, 2016

Month	Raw Water Flow (Max Flow Rate = 7.6 L/s) (Max Daily Volume = 1,309 m ³ /d) This is the allowable combined limits for Well # 3 & Well # 4			Chlorine	Monthly Averages				Distribution System Disinfectant
	Instantaneous Peak Flow (L/s)	Maximum Day Flow (m ³ /day)	Monthly Total (m ³)		Monthly Total (L)	Treated Water Turbidity		Treated Water Disinfectant Point of Entry	
				No. of Samples Collected		Monthly Average Turbidity	No. of Treated Samples Collected	Average Residual (mg/L)	
January	4.5	148	2,600	43	7	0.31	31	1.39	47
February	4.5	196	3,903	111	6	0.25	29	1.27	49
March	4.5	180	3,479	93	6	0.27	31	1.27	46
April	4.5	195	2,551	66	8	0.28	30	1.21	48
May	4.5	149	3,323	88	9	0.36	31	1.28	49
June	4.5	168	3,021	95	9	0.37	30	1.29	49
July	4.5	137	2,995	44	5	0.33	31	1.2	46
August	4.5	147	2,611	87	7	0.46	31	1.23	49
September	4.6	222	1,755	45	6	0.36	30	1.35	49
October	4.6	121	1,736	133	5	0.42	30	1.32	48
November	4.6	113	2,031	68	7	0.30	30	1.27	47
December	4.6	112	2,433	66	7	0.30	31	1.21	51
Total			32,438	939	82		365		578
Average			2,703			0.33		1.27	
Maximum	4.6	222							

Disinfectant Compound Used: **12% Sodium Hypochlorite**
 Form of Residual Displayed: **Free**
 Quantity of Disinfectant Used During 2016 for Wells #3 and #4 combined: **939 L** *(Wells #3 and #4 share the same Cl₂ storage container)
 Distribution System Minimum Target Residual: **0.2 mg/L**

Table 3.3
Clifford Drinking Water System – Well #4
Treated Water Flow, Turbidity, and Disinfectant Residual
January 1, 2016 – December 31, 2016

Month	Raw Water Flow (Max Flow Rate = 15.15 L/s) (Max Daily Volume = 1,309 m ³ /d) This is the allowable combined limits for Well # 3 & Well # 4			Chlorine	Monthly Averages				Distribution System Disinfectant
	Instantaneous Peak flow (L/s)	Maximum Day Flow (m ³ /day)	Monthly Total (m ³)		Monthly Total (L)	Treated Water Turbidity		Treated Water Disinfectant Point of Entry	
				No. of Samples Collected		Monthly Average Turbidity	No. of Treated Samples Collected	Average Residual (mg/L)	
January	11.5	47	1,065	See Clifford Well #3 Data	7	0.49	30	1.43	See Clifford Well #3 Data
February	11.2	69	1,444		6	0.46	28	1.30	
March	11.4	79	1,200		5	0.25	31	1.30	
April	11.4	94	1,337		7	0.48	29	1.24	
May	11.3	85	1,281		9	0.51	30	1.42	
June	11.4	63	1,233		8	0.45	30	1.16	
July	11.4	78	1,351		5	0.50	31	1.25	
August	11.4	71	1,346		7	0.62	30	1.21	
September	11.4	53	1,326		5	0.45	30	1.18	
October	11.4	551	3,865		5	0.42	31	1.30	
November	11.5	78	1,236		7	0.45	29	1.38	
December	11.5	50	1,229		6	0.51	31	1.18	
Total			17,913	939	77		360		
Average			1,493			0.47		1.28	
Maximum	11.5	551							

Disinfectant Compound Used: **12% Sodium Hypochlorite**

Form of Residual Displayed: **Free**

Quantity of Disinfectant Used During 2016 for Wells #3 and #4 combined: **939 L** *(Wells #3 and #4 share the same Cl₂ storage container)

Distribution System Minimum Target Residual: **0.2 mg/L**

Table 3.4
Clifford Drinking Water System – Well #3 & #4 Combined
Treated Water Flow
January 1, 2016 – December 31, 2016

Month	Treated Water Flow (Well #3 Max Flow Rate = 7.6 L/s) (Well #4 Max Flow Rate = 15.1 L/s) (Max Daily Volume = 1309 m ³ /d)				Chlorine
	Instantaneous Peak flow (L/s)	Instantaneous Peak flow (L/s)	Maximum Day Flow (m ³ /day)	Monthly Total (m ³)	Monthly Total (l)
January	4.5	11.5	148	3,665	43
February	4.5	11.2	196	5,347	111
March	4.5	11.4	180	4,679	93
April	4.5	11.4	195	3,888	66
May	4.5	11.3	149	4,604	88
June	4.5	11.4	168	4,254	95
July	4.5	11.4	137	4,346	44
August	4.5	11.4	147	3,957	87
September	4.6	11.4	222	3,081	45
October	4.6	11.4	551	5,601	133
November	4.6	11.5	113	3,267	68
December	4.6	11.5	112	3,662	66
Total				50,351	939
Average				4,196	
Maximum	4.6	11.5	551		

3.2 Comparison of Actual Rates and Maximum Allowable Rates

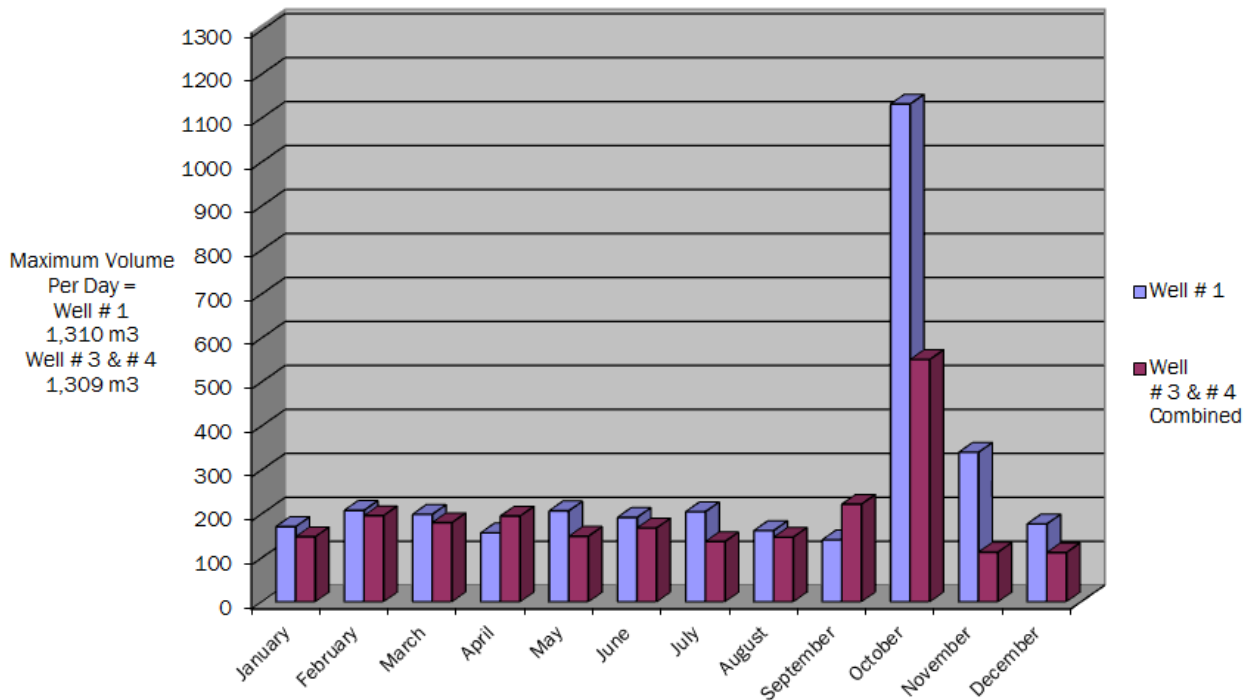
O. Reg. 170/03 stipulates that a summary of the quantities and flow rates of the water supplied from each of Clifford’s wells be included in the Summary Report and compared against the rated capacity and flow rate for the system. As such, a comparison of the instantaneous peak flow to the PTTW’s rated capacity is included and a comparison of the maximum daily flow to the MDWL’s rated capacity is included in Table 3.5.

Table 3.5
Comparison of Flow Rates and Flow Capacities
To
Rated Flow Rate (PTTW) and Rated Capacity (MDWL)

Well Supply	PTTW Max. Flow Rate	Maximum Instantaneous Peak Flow	Percent of Maximum Allowable	MDWL Schedule Maximum Daily Quantity	Maximum Daily Flow	Percent of Maximum Allowable
	L/s	L/s	%	m ³ /day	m ³ /day	%
Well #1	15.1	13.3	88	1,310	1,132	86
Well #3	7.6	4.6	60	655	222	34
Well #4	15.1	11.5	76	1,309	551	42

The MDWL stipulates, “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 Schedule C Table 1.”

Table 3.6
Maximum Water Usage Per Day by Month



Short-term peaks, in excess of permitted values, may occur at pump start up, while doing specific maintenance procedures or during emergency demand situations. An occurrence of this nature is not considered an exceedance.

The time and duration of any flow exceedance is recorded for each event along with the reason for the occurrence. There were **no exceedances** of the allowable flow rates in the Clifford Drinking Water System.

3.3 Raw Water Qualities and Required Treatment

The Clifford Drinking Water System has no naturally occurring chemical parameters that exceed MAC or IMAC limits.

The Allan Street Wellhouse (*Well #1*) and the Nelson Street Wellhouse (*Wells #3 and #4*) are equipped with continuous monitoring analyzers for measuring free chlorine residuals. The chlorine analyzer is equipped with an alarm to a monitoring centre who will call the on-call water operator to notify of a critical alarm. The average monthly turbidity and free chlorine residual measurements for treated water are presented in Tables 3.1, 3.2 and 3.3.

There were no high turbidity readings (>1.0 NTU) experienced in 2016. The minimum, maximum, and average turbidity readings for raw water from each well are presented in Table 3.7.

Sodium Hypochlorite is the disinfectant used for Wells #1, #3 and #4. Free chlorine residual is monitored continuously at the “*Point of Entry*” (POE) into the distribution system. Additional “*grab samples*” are taken daily (*excluding weekends and holidays*) within the distribution system and tested for the free chlorine residual. The minimum, maximum and average values of free chlorine residual at the POE are presented Table 3.7. Also included in Table 3.7 is the range of free chlorine residual within the distribution system.

The free chlorine residual in the distribution system ranged between 0.50 mg/L and 1.70 mg/L. O. Reg. 170/03, Schedule 1-2 stipulates that the free chlorine residual can never be less than 0.05 mg/L. In addition, O. Reg. 170-03, Schedule 1-4 stipulates that the water treatment equipment must be “*...capable of achieving, at all locations within the distribution system, a free chlorine residual of 0.2 mg/L ...*”. The Clifford Drinking Water System meets both of these requirements.

Table 3.7
2016 Annual Summary of
Raw Water Turbidity and Free Chlorine Residual
for Clifford Drinking Water System

Location	Range	Raw Water Turbidity	Free Chlorine Residual at POE
		NTU	mg/L
Well #1	Minimum	0.09	0.95
	Maximum	0.74	1.65
	Average	0.30	1.29
Well #3	Minimum	0.09	0.97
	Maximum	0.87	1.66
	Average	0.29	1.27
Well #4	Minimum	0.09	0.71
	Maximum	0.76	1.71
	Average	0.37	1.28

3.4 Summary of Treatment Chemicals Used

The disinfectant chemical used in the Clifford Drinking Water System is 12% sodium hypochlorite (CL₂). Measurements of free residual are recorded on a continuous basis. Wells #3 and #4 share the same CL₂ storage container; 939 L of CL₂ is the combined usage for Wells #3 and #4. In 2016, a total of 2,136 L of CL₂ was used for all three wells. The annual average dosage rates for Well #1, and Wells #3 and #4 are presented in Table 3.8.

In 2016, 1,183 L of sodium silicate was used for the sequestering of iron. The annual average dosage rates for Well #1, Well #3 and Well #4 are presented in Table 3.8.

Table 3.8
Clifford Drinking Water System
2016 Annual Summary of
Treatment Chemicals Used

Treatment Chemical	Well	Volume Used	Mass Used	Annual Flow	Dosage Rate
		L	kg	m ³	mg/L
12 % Sodium Hypochlorite (NaOCl)	Well #1	1,197	143.6	46,178	3.11
	Well #3 & Well #4	939	112.7	50,351	2.24
	Total	2,136	256.3	96,529	2.66
Sodium Silicate (NaSi)	Well #1	289	401.7	46,178	8.70
	Well # 3 & Well #4	894	1242.7	50,351	24.68
	Total	1,183	1,644	96,529	17.03

- Note:**
- Wells #3 and #4 share the same NaOCl storage container; 745 L is the combined NaOCl usage for both wells.
 - Wells #3 and #4 share the same storage container for the sequestering agent, sodium silicate (NaSi); 799 L is the combined NaSi usage for both wells
 - 12% Sodium Hypochlorite = 120,000 mg/L = 120 kg/m³
 - Sodium Silicate has a specific gravity = 1.39

4.0 COMPLIANCE

4.1 Assessment of Compliance

The objective of the Summary Report is to list any requirements of the Act, the regulations, the PTTW, the MDWL, the DWWP and any MOE order that the system failed to meet from January 1, 2016 to December 31, 2016, and the corresponding corrective measure(s) taken. Compliance was assessed as follows:

- There were **no MOE Orders** issued to the Clifford Drinking Water System in 2016.
- The MDWL imposes the specific rules and conditions governing the standards set out in O. Reg. 170/03. It is an important instrument in defining the requirements of compliance of a Drinking Water System.
- O. Reg. 170/03 establishes the standard for protection of drinking water; specifically, through 12 schedules that municipal residential drinking systems must follow to meet the requirements of the regulation.
- The SDWA clearly identifies the responsibilities of owners and operating authorities of municipal drinking water systems. It places a recommended statutory standard of

care on those who have oversight of municipal drinking-water systems. In essence, the standard of care has two themes: be informed and exercise diligent oversight.

4.2 Summary of Compliance

To the best of our knowledge and ability we are in, or diligently working towards, compliance, with all of the requirements of the SDWA, O. Reg. 170/03, as well as the Clifford Water Work's MDLW 106-101, DWWP 106-201 and PTTW #1704-9XBH9S. Every attempt has been made to ensure this document is an accurate representation of how the Drinking Water System is operated

To the best of our knowledge, Table 4.1 identifies all of the requirements of the SDWA, the regulations, the MDWL, the DWWP. and the PTTW.

Table 4.1
Clifford Drinking Water System
Requirements the System Failed to Meet

Compliance With	Description of Item the System Failed to Meet	Correction of This Situation How/When
MDWL # 106-101	<i>Clifford Drinking Water System is in compliance with all of the requirements of the MDWL</i>	
DWWP # 106-201	<i>Clifford Drinking Water System is in compliance with all of the requirements of the DWWP</i>	
O. Reg. 170/03	<i>Clifford Drinking Water System is in compliance with all of the requirements of O. Reg. 170/03</i>	
SDWA	<i>Clifford Drinking Water System is in compliance with all of the requirements of the SDWA.</i>	

Dated this 2nd day of March 2017.



Brian Hansen
Public Works Director