2016 Summary Report

for the

Town of Minto

HARRISTON DRINKING WATER SYSTEM

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Date: March 2, 2017

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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 Harriston Drinking Water System Summary Report 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 members of the Municipal Council for the Town, to assess the water work's capability to meet existing and future planned uses of the system.

1.3 Description of Drinking Water System

Harriston is a community with a population of approximately 2108 persons, located within the Town of Minto within the northwest corner of Wellington County, at the intersection of Provincial Hwy. No. 9 and Hwy. No. 89.

Harriston is serviced by a waterworks that consists of: three drilled bedrock wells, three pumphouses, an elevated 1915 m^3 steel storage tank and a distribution network of watermains, ranging in diameter from 100 mm to 300mm. In the event of a power outage, pump #1 & #3 is equipped with automatic back-up power supply. Well #2 has the capacity of connecting to a portable generator.

The bedrock wells are equipped with submersible pumps. Water from Wells #1 and #3 discharge into pumphouse #3, and water from Well #2 discharges into pumphouse #2, respectively, for flow measurement and treatment. In the pumphouse, the raw water supply is injected with 12% sodium hypochlorite for disinfection and the chemical PW1680, for iron sequestering. The treated water leaves the pumphouse and enters an underground contact pipe and is discharged into the distribution system after adequate contact time is achieved.

The wells are controlled (*start/stop*) automatically based on elevated storage tank liquid levels and pressures in the distribution system. Each pumphouse is equipped with alarms for chlorination system failure (*and corresponding lockout of well pumps*), low water level and intrusion. Each wellhouse has a continuous monitoring analyzer for chlorine.

The treated water leaves the wellhouse and enters an underground contact pipe and is discharged into the distribution system after adequate contact time is achieved.

The Harriston Drinking Water System operates under the MDWL 106-102 and DWWP 106-202 and PTTW #8430-85KS2X until April 25th and PTTW #3012-A8QRPF commencing April 26th.

2.0 SUMMARY OF UPGRADES

2.1 Upgrades Completed in 2016

The disinfection treatment system in the Harriston 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, $211,750 was spent on the Elora Street, Arthur Street to William Street old watermain replacement and $75,000 was spent on Well #2 upgrades to increase water quality.
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 replace watermain on George St. S. at an estimated cost of $450,000.00 as well as complete upgrades to Well #2 at an estimated cost of $17,000.00.
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 Harriston'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, #2 and #3 respectively, on a monthly basis. Well #1 is located in the Young Street wellhouse, but the raw water is directed to the King Street wellhouse for treatment. As such, raw supplies from Well #1 and Well #3 are treated in the King Street wellhouse, and raw water supply from Well #2 is treated in the John Street wellhouse.

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

	Raw Water Flow (Max Flow Rate = 11.3 L/s)			Chlorine	Monthly Averages				Distribution System Disinfectant
					Treated Water Turbidity		Treated Water Disinfectant Point of Entry		
Month	Instantaneous Peak Flow (L/s)	Maximum Day Flow (m^3/day)	Monthly Total (m^3)	Monthly Total (L)	No. of Samples Collected	Monthly Average Turbidity	No. of Treated Samples Collected	Average Residual (mg/L)	No. of Samples Collected
January	10.7	94	1,354	34	1	0.39	32	1.30	See Harriston Well #3 Data
February	10.3	108	1,678	37	3	0.37	29	1.29	
March	10.2	97	1,623	31	1	0.34	31	1.31	
April	10.2	79	1,427	48	4	0.28	30	1.22	
May	10.4	140	1,818	48	13	0.39	31	1.39	
June	10.2	157	1,617	42	9	0.25	30	1.23	
July	10.2	72	1,307	27	5	0.38	31	1.23	
August	10.1	67	1,799	0	8	0.4	30	1.24	
September	10.1	226	1,697	33	5	0.37	30	1.32	
October	10.3	101	1,315	27	3	0.31	30	1.27	
November	10.2	71	1,288	22	4	0.35	28	1.27	
December	10.2	87	1,354	44	4	0.4	31	1.31	
Total			18,277	393	60		363		
Average			1,523			0.35		1.28	
Maximum	10.7	226							

Disinfectant Compound Used: **12% Sodium Hypochlorite**
Form of Residual Displayed: **Free**
Quantity of Disinfectant Used During 2016: **393 L**
Distribution System Minimum Target Residual: **0.2 mg/L**

Table 3.2
Harriston Drinking Water System – Well #2
Treated Water Flow, Turbidity, and Disinfectant Residual
January 1, 2016 – December 31, 2016

	Raw Water Flow (Max Flow Rate = 23.9 L/s)			Chlorine	Monthly Averages				Distribution System Disinfectant
					Treated Water Turbidity		Treated Water Disinfectant Point of Entry		
Month	Average Day Flow (L/s)	Maximum Day Flow (m^3/day)	Monthly Total (m^3)	Monthly Total (L)	No. of Samples Collected	Monthly Average Turbidity	No. of Treated Samples Collected	Average Residual (mg/L)	No. of Samples Collected
January	16.7	412	6,651	198	2	0.70	31	1.26	See Harriston Well #3 Data
February	16.9	576	7,211	201	3	0.53	29	1.18	
March	17.0	358	7,331	240	1	0.86	31	1.18	
April	16.7	673	5,942	170	4	0.80	23	1.1	
May	21.3	554	3,049	66	1	0.82	20	0.91	
June	18.5	504	9,281	331	8	0.55	30	1.34	
July	17.9	569	9,147	259	3	0.78	31	1.18	
August	18.0	428	8,476	263	7	0.76	31	1.13	
September	17.7	451	7,878	240	4	0.86	30	1.25	
October	17.4	589	9,772	292	4	0.73	31	1.17	
November	17.4	558	7,830	234	5	0.83	30	1.21	
December	17.4	611	8,319	253	5	0.75	31	1.19	
Total			90,887	2,747	47		348		
Average			7,574			0.75		1.18	
Maximum	21.3	673							

Disinfectant Compound Used: **12% Sodium Hypochlorite**
Form of Residual Displayed: **Free**
Quantity of Disinfectant Used During 2016: **2,747 L**
Distribution System Minimum Target Residual: **0.2 mg/L**

Table 3.3
Harriston Drinking Water System – Well #3
Treated Water Flow, Turbidity, and Disinfectant Residual
January 1, 2016 – December 31, 2016

	Raw Water Flow (Max Flow Rate = 18.9 L/s)			Chlorine	Monthly Averages				Distribution System Disinfectant
					Treated Water Turbidity		Treated Water Disinfectant Point of Entry		
Month	Instantaneous Peak Flow (L/s)	Maximum Day Flow (m^3/day)	Monthly Total (m^3)	Monthly Total (L)	No. of Samples Collected	Monthly Average Turbidity	No. of Treated Samples Collected	Average Residual (mg/L)	No. of Samples Collected
January	16.8	769	13,695	285	3	0.20	32	1.31	47
February	16.7	720	14,462	315	5	0.30	28	1.26	48
March	16.8	687	14,756	322	3	0.23	31	1.29	46
April	16.4	836	14,979	383	6	0.37	30	1.28	48
May	16.2	910	20,403	505	12	0.35	31	1.38	49
June	16.1	837	14,642	352	9	0.26	30	1.18	52
July	16.2	734	15,591	361	5	0.32	31	1.33	45
August	16.2	859	15,641	430	8	0.31	31	1.30	48
September	16.2	702	14,023	313	5	0.51	30	1.29	51
October	16.2	632	12,536	294	4	0.30	31	1.31	47
November	16.1	763	14,342	342	6	0.27	30	1.21	45
December	16.2	672	12,865	308	5	0.29	31	1.25	51
Total			177,935	4,210	71		366		577
Average			14,828			0.31		1.28	
Maximum	16.8	910							

Disinfectant Compound Used: **12% Sodium Hypochlorite**
Form of Residual Displayed: **Free**
Quantity of Disinfectant Used During 2016: **4,210 L**
Distribution System Minimum Target Residual: **0.2 mg/L**

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

Month	Treated Water Flow (Well #1 Max Flow Rate = 11.3 L/s) (Well #3 Max Flow Rate = 18.9 L/s) (Max Daily Volume = 2,613 m³/d)				Chlorine
	Instantaneous Peak flow (L/s)	Instantaneous Peak flow (L/s)	Maximum Day Flow (m³/day)	Monthly Total (m³)	Monthly Total (l)
January	10.7	16.8	769	15,049	319
February	10.3	16.7	720	16,140	352
March	10.2	16.8	687	16,379	353
April	10.2	16.4	836	16,406	431
May	10.4	16.2	910	22,221	553
June	10.2	16.1	837	16,259	394
July	10.2	16.2	734	16,898	388
August	10.1	16.2	859	17,440	430
September	10.1	16.2	702	15,720	346
October	10.3	16.2	632	13,851	321
November	10.2	16.1	763	15,630	364
December	10.2	16.2	672	14,219	352
Total				196,212	4,603
Average				16,351	
Maximum	10.7	16.8	910		

3.2 Comparison of Actual Flow and Maximum Allowable Rates

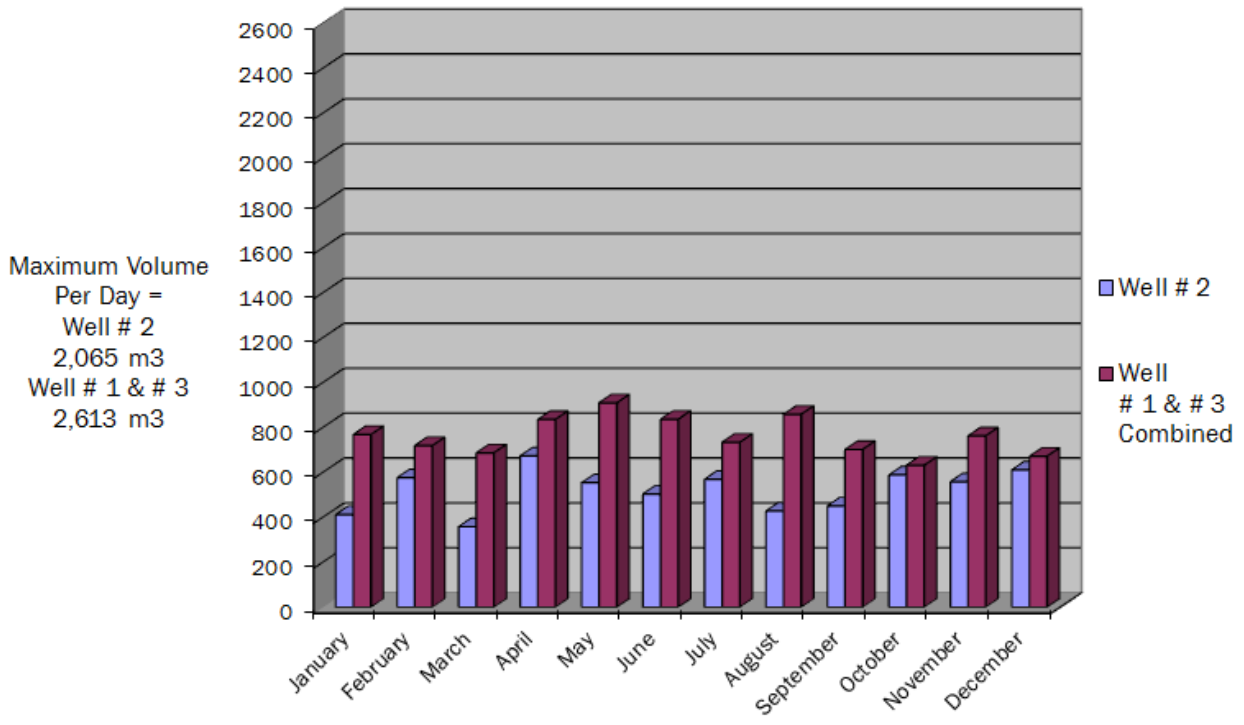
O. Reg. 170/03 stipulates that a summary of the quantities and flow rates of the water supplied from each of Harriston's wells be included in the Summary Report and compared against the rated capacity and flow rate for the system. As such, a comparison of the instantaneous peak flow to the PTTW's rated capacity is included and a comparison of the maximum daily flow to the MDWL's rated capacity is included in Table 3.5. Table 3.4 reflects the comparisons between the PTTW and MDWL.

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	Instantaneous Peak Flow	Percent of Maximum Allowable	MDWL Schedule C Maximum Daily Quantity	Maximum Daily Flow	Percent of Maximum Allowable
	L/s	L/s	%	m^3/day	m^3/day	%
Well #1	11.3	10.7	94	979	226	23
Well #2	23.9	21.3	89	2,065	673	32
Well #3	18.9	16.8	89	1,634	910	57

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 Harriston Drinking Water System.

3.3 Raw Water Quality and Required Treatment

The Harriston Drinking Water System has no chemical parameters that exceed MAC or IMAC limits. The Harriston Drinking Water System uses PW1680 to improve the disinfection process by controlling corrosion in water that is considered very hard and or contains high levels of iron. This is considered an aesthetic issue which is included in the technical support document for Ontario's Drinking Water Standards, Objectives and Guidelines.

The Harriston Drinking Water System utilizes continuous monitoring analyzers for free chlorine residual. The chlorine analyzer is equipped with an alarm. In the event of an adverse chlorine residuals reading, a signal is sent to the SCADA system, which in turn, shuts down the respective well pump. The average monthly turbidity and free chlorine residual measurements for treated water are presented in Tables 3.1, 3.2 and 3.3 for Well #1, Well #2 and Well # 3, respectively.

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

12% sodium hypochlorite is the disinfectant used. 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 3.5. Also included in Table 3.5 is the range of free chlorine residual within the distribution system.

The free chlorine residual in the distribution system ranged between 0.39 mg/L and 1.39 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 Harriston Drinking Water System meets both of these requirements.

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

Location	Range	Raw Water Turbidity	Free Chlorine Residual at POE
		NTU	mg/L
Well #1	Minimum	0.12	0.79
	Maximum	0.67	1.69
	Average	0.37	1.28
Well #2	Minimum	0.11	0.51
	Maximum	0.77	1.67
	Average	0.41	1.18
Well #3	Minimum	0.12	0.79
	Maximum	0.68	1.72
	Average	0.36	1.28

3.4 Summary of Treatment Chemicals Used

The disinfectant chemical used in the Harriston Drinking Water System is 12% Sodium Hypochlorite. Measurements of free chlorine are recorded on a continuous basis. In 2016, 7,350 L of 12% Sodium Hypochlorite was used. The average dosage rates are presented in Table 3.8.

In 2016, 1,106 L of PW1680 was used for the sequestering of iron. Wells #1 and #3 share a common tank of PW1680. The average dosage rates are presented in Table 3.8.

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

Treatment Chemical	Well	Volume Used	Mass Used	Annual Flow	Dosage Rate
		L	kg	m^3	mg/L
12 % Sodium Hypochlorite (NaOCl)	Well #1	393	47.2	18,277	2.58
	Well # 2	2,747	329.6	90,887	3.63
	Well # 3	4,210	505.2	177,935	2.84
	Total	**7,350**	**882.0**	**287,099**	**3.07**

Treatment Chemical	Well	Volume Used	Mass Used	Annual Flow	Dosage Rate
		L	kg	m^3	mg/L
PW1680	Well #1 & Well #3	252	352.8	196,212	1.80
	Well # 2	854	1,195	90,887	13.15
	Total	1,106	1,548	287,099	5.39

Note:
- *12% Sodium Hypochlorite = 120,000 mg/L = 120 kg/m^3*
- *PW1680 has a specific gravity = 1.4*

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 Harriston 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 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 Harriston Water Work's MDWL 106-102, DWWP 106-202 and PTTW #8430-85KS2X until April 25th and PTTW #3012-A8QRPF commencing April 26th. 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
HARRISTON 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 # 106-102	*Harriston Drinking Water System is in compliance with all of the requirements of the MDWL*	
DWWP # 106-202	*Harriston Drinking Water System is in compliance with all of the requirements of the DWWP*	
O. Reg. 170/03	*Harriston Drinking Water System is in compliance with all of the requirements of O. Reg. 170/03*	
SDWA	*Harriston Drinking Water System is in compliance with all of the requirements of the SDWA*	

Dated this 2nd day of March 2017.

Brian Hansen
Public Works Director