

2016 Summary Report

for the

Town of Minto

PALMERSTON DRINKING WATER SYSTEM

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Date: March 2, 2017

2016 Summary Report for the Town of Minto PALMERSTON DRINKING WATER SYSTEM

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 Palmerston 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

Palmerston is located in the Town of Minto within the northwest corner of Wellington County, along the route of Provincial Hwy. No. 23.

The Palmerston Drinking Water System services a permanent population of approximately 2,579, comprised of approximately 910 residential premises, as well as Industrial, Commercial, Institutional premises. The municipal water system is also used for fire protection.

Palmerston is currently serviced by a waterworks that consists of: four drilled bedrock wells, two wellhouses, an elevated 2500 m³ steel storage tank and a distribution network of watermains, ranging in diameter from 100 mm to 350 mm. There are approximately 102 fire hydrants in the Town of Palmerston. In the event of a prolonged power outage, a portable generator is available to either wellhouse to supply back-up power.

The bedrock wells are equipped with submersible pumps that discharge directly into the William Street Wellhouse (Wells #1 and #2) or the Whites Road Wellhouse (Well #3 and #4). In the wellhouse, the raw water supply is injected with 12% sodium hypochlorite for disinfection and the chemical PW1680 for iron sequestering.

The wells are controlled (start/stop) automatically based on elevated storage tank liquid levels and pressures in the distribution system. Each wellhouse is equipped with alarms for chlorination system failure (and corresponding lockout of well pumps), low water level and intrusion. Each wellhouse has continuous monitoring analyzers 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 Palmerston Drinking Water System operates under MDWL 106-103, 106-203 Schedule C (proposed alterations), DWWP 106-203 and PTTW #8374-8HSPD5.

2.0 SUMMARY OF UPGRADES

2.1 Upgrades Completed in 2016

The disinfection treatment system in the Palmerston 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, \$147,500 was spent on replacing old case iron watermain on James Street and \$257,000 was spent replacing shallow, old cast iron watermain on Jane Street from Inkerman Street to the dead end.

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 \$60,000.00 on watermain on Jane St. from Inkerman to Main, \$200,000.00 on watermain replacement on Inkerman St. and \$70,000.00 on William St. \$5,000.00 will be spent on valve replacements and \$6,000.00 on heating upgrades.

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 Palmerston's wells be included in the Summary Report. Tables 3.1, 3.2, 3.3 and 3.4 provide a summary of quantities and flow rates supplied during 2016 for Wells #1, #2, #3 and #4 respectively, on a monthly basis. Wells #1 and #2 supply the William Street Wellhouse and the two wells alternate duties as primary supply. As such, Wells #1 and #2 are permitted as one and provide standby duty to each other. Well #3 and #4 supply the White's Road Wellhouse and the two wells alternate duties as primary supply.

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

	D -	M				/ Averages		Distribution	
		w Water Flow w Rate = 22.8	L/s)	Chlorine		d Water pidity	Treated Water Disinfectant Point of Entry		System Disinfectant
Month	Instantaneous Peak Flow (L/s)	Maximum Day Flow (m³/day)	Monthly Total (m³)	Monthly Total (L)	No. of Samples Collected	Monthly Average Turbidity	No. of Treated Samples Collected	Average Residual (mg/L)	No. of Samples Collected
January	15.0	99	1,657	11	3	0.55	31	1.34	
February	14.9	85	1,935	45	6	0.57	29	1.31	
March	14.9	84	1,882	44	0		31	1.38	
April	15.0	87	1,744	44	15	0.58	30	1.35	
May	15.0	96	2,006	45	16	0.62	31	1.38	See
June	15.0	91	1,793	45	15	0.81	30	1.24	See Palmerston Well
July	15.0	90	1,896	23	10	0.64	31	1.34	#2 Data
August	15.0	103	2,462	44	16	0.73	30	1.37	#2 Dala
September	15.1	93	1,790	65	15	0.68	30	1.47	
October	15.1	83	1,867	22	13	0.72	31	1.42	
November	15.1	105	1,771	66	9	0.68	28	1.48	
December	15.1	100	1,927	22	13	0.69	31	1.28	
Total			22,730	476	131		363		
Average			1,894			0.66		1.36	
Maximum	15.1	105	,						

Form of Residual Displayed: Free

Quantity of Disinfectant Used During 2016: 476 L Distribution System Minimum Target Residual: 0.2 mg/L

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

	Dec	w Water Flow			Monthly Averages				Distribution
		w Water Flow w Rate = 22.8	L/s)	Chlorine		d Water pidity	Treated Water Disinfectant Point of Entry		System Disinfectant
Month	Instantaneous Peak Flow (L/s)	Maximum Day Flow (m³/day)	Monthly Total (m³)	Monthly Total (L)	No. of Samples Collected	Monthly Average Turbidity	No. of Treated Samples Collected	Average Residual (mg/L)	No. of Samples Collected
January	18.2	319	6,724	142	4	0.55	31	1.34	48
February	18.1	306	6,547	109	7	0.57	29	1.24	48
March	18.6	331	6,946	155	0		31	1.22	45
April	18.9	449	6,754	130	15	0.58	30	1.20	48
May	19.0	300	7,498	140	17	0.72	31	1.26	49
June	19.0	534	8,423	198	17	0.82	30	1.22	49
July	19.0	353	8,384	158	11	0.75	31	1.19	46
August	19.3	593	8,392	174	16	0.69	31	1.19	49
September	19.4	387	8,454	175	16	0.71	31	1.21	49
October	19.4	594	9,035	176	13	0.79	31	1.21	48
November	18.9	385	8,325	155	9	0.68	30	1.29	46
December	18.6	852	9,386	198	13	0.67	31	1.24	51
Total			94,868	1,910	138		367		576
Average	18.8		7,906			0.68		1.23	
Maximum		852							

Form of Residual Displayed: Free

Quantity of Disinfectant Used During 2016: **1,910 L** Distribution System Minimum Target Residual: **0.2 mg/L**

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

	Dec	w Water Flow		Monthly Averages				Distribution	
		w Water Flow w Rate = 26.7	L/s)	Chlorine	Treated Water Turbidity		Treated Water Disinfectant Point of Entry		System Disinfectant
Month	Instantaneous Peak Flow (L/s)	Maximum Day Flow (m³/day)	Monthly Total (m³)	Monthly Total (L)	No. of Samples Collected	Monthly Average Turbidity	No. of Treated Samples Collected	Average Residual (mg/L)	No. of Samples Collected
lonuoni	22.9	473	10,731	219	2	0.53	31	1.31	
January	23.1	536	11.579	219	2	0.55	29	1.31	
February			,			0.00			
March	23.1	448	10,983	287	0		31	1.33	
April	23.1	685	11,941	242	14	0.65	30	1.31	
May	23.0	496	12,494	279	16	0.72	31	1.34	See
June	23.1	709	12,981	287	17	0.83	30	1.29	Palmerston Well
July	23.4	553	13,913	277	11	0.72	31	1.31	#2 Data
August	22.9	666	13,467	308	16	0.72	31	1.27	#2 Data
September	23.0	572	13,161	331	15	0.74	30	1.33	
October	23.3	761	14,354	349	13	0.79	31	1.33	
November	24.4	1,038	15,269	307	9	0.74	30	1.25	
December	24.0	639	13,851	306	13	0.7	31	1.18	
Total			154,724	3,414	128		366		
Average	23.3		12,894			0.71		1.30	
Maximum		1,038							

Form of Residual Displayed: Free

Quantity of Disinfectant Used During 2016: **3,414** L Distribution System Minimum Target Residual: **0.2** mg/L

Table 3.4
Palmerston Drinking Water System – Well #4
Treated Water Flow, Turbidity, and Disinfectant Residual
January 1, 2016 – December 31, 2016

					Monthly Averages				Distribution
		w Water Flow w Rate = 26.7	L/s)	Chlorine	Treated Water Turbidity		Treated Water Disinfectant Point of Entry		System Disinfectant
Month	Instantaneous Peak Flow (L/s)	Maximum Day Flow (m³/day)	Monthly Total (m³)	Monthly Total (L)	No. of Samples Collected	Monthly Average Turbidity	No. of Treated Samples Collected	Average Residual (mg/L)	No. of Samples Collected
January	21.7	156	2,339		3	0.53	31	1.30	
February	22.2	120	2.801		2	0.64	29	1.30	
March	22.7	133	2,684		0		30	1.25	
April	22.8	116	2,613		14	0.61	30	1.26	
May	22.9	142	2,931	1 _	16	0.63	31	1.27	
June	22.9	121	2,541	See	17	0.80	30	1.21	Palmerston Well
July	22.8	128	2,731	Palmersto	11	0.67	31	1.24	#2 Data
August	22.7	141	2,747	n Well #3	16	0.63	30	1.21	
September	22.6	107	2,508	Data	15	0.63	31	1.34	
October	22.5	118	2,663		13	0.59	31	1.35	
November	22.7	126	2,539		9	0.68	28	1.35	
December	22.7	151	2,819		13	0.68	31	1.28	
Total			31,916	3,414	129		363		
Average			2,660			0.64		1.28	
Maximum	22.9	156							

Form of Residual Displayed: Free

Quantity of Disinfectant Used During 2016 for Wells #3 and #4 combined: **3,414 L** *(Wells #3 and #4 share the same Cl₂ storage container)

Distribution System Minimum Target Residual: 0.2 mg/L

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 Palmerston'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 and Table 3.6 reflect the comparisons between the PTTW and MDWL.

Table 3.5
Palmerston Drinking Water System
Well #1 & 2 Combined
Treated Water Flow
January 1, 2016 – December 31, 2016

Table 3.6
Palmerston Drinking Water System
Well #3 & 4 Combined
Treated Water Flow
January 1, 2016 – December 31, 2016

Month		Treated Wat Daily Volume - Tow Rate = 22. 22.3	1964 m3/da	1	Chlorine
	Instantaneous Peak flow Well #1	Instantaneous Peak flow Well #2	Maximum Day Flow	Monthly Total	Monthly Total
	(L/s)	(L/s)	(m³/day)	(m³)	(I)
January	15.0	18.2	319	8,381	153
February	14.9	18.1	306	8,482	154
March	14.9	18.6	331	8,828	199
April	15.0	18.9	449	8,498	174
May	15.0	19.0	300	9,504	185
June	15.0	19.0	534	10,216	243
July	15.0	19.0	353	10,280	181
August	15.0	19.3	593	10,854	218
September	15.1	19.4	387	10,244	240
October	15.1	19.4	594	10,902	198
November	15.1	18.9	385	10,096	221
December	15.1	18.6	852	11,313	220
Total	_			117,598	2,386
Average				9,800	
Maximum	15.1	19.4	852		

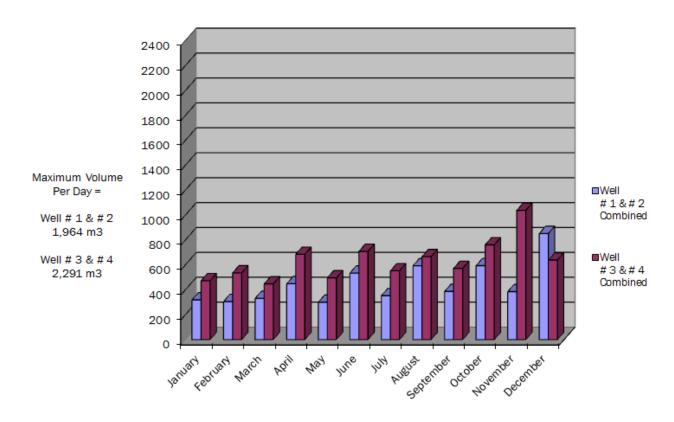
	Max		Chlorine		
	Max	Flow Rate = 26	•		55
Month			7 L/s Well #	4	
	Instantaneous Peak flow Well #3	Instantaneous Peak flow Well #4	Maximum Day Flow	Monthly Total	Monthly Total
	(L/s)	(L/s)	(m³/day)	(m³)	(I)
January	22.9	21.7	473	13,070	219
February	23.1	22.2	536	14,380	222
March	23.1	22.7	448	13,667	287
April	23.1	22.8	685	14,554	242
May	23.0	22.9	496	15,425	279
June	23.1	22.9	709	15,522	287
July	23.4	22.8	553	16,644	277
August	22.9	22.7	666	16,214	308
September	23.0	22.6	572	15,669	331
October	23.3	22.5	761	17,017	349
November	24.4	22.7	1,038	17,808	307
December	24.0	22.7	639	16,670	306
Total				186,640	3,414
Average			_	15,553	
Maximum	24.4	22.9	1,038		

Table 3.7
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 C Maximum Daily Quantity	Maximum Daily Flow	Percent of Maximum Allowable
	L/s	L/s	%	m³/day	m³/day	%
Well #1	22.8	15.1	66	1,964	105	5
Well #2	22.8	19.4	73	1,964	852	43
Well #3	26.7	24.4	91.5	2,291	1,038	45
Well #4	26.7	22.9	86	2,291	156	8

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 3.8
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 Palmerston Drinking Water System.

3.3 Raw Water Quality and Required Treatment

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

The William Street Wellhouse (*Well #1 and #2*) and the Whites Road Wellhouse (*Well #3 and #4*) are equipped with continuous monitoring analyzers for measuring free chlorine residual. The chlorine analyzers are equipped with alarms. In the event of an adverse chlorine residual 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 <u>treated</u> water are presented in Tables 3.1, 3.2, 3.3 and 3.4 for Well #1, Well #2, Well # 3 and Well # 4, respectively.

There were no high turbidity readings (>1.0 NTU) experienced in 2016. The minimum, maximum and average turbidity readings for \underline{raw} water from each well are presented in Table 3.9.

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 3.9. Also included in Table 3.9 is the range of free chlorine residual within the distribution system.

The free chlorine residual in the distribution system ranged between 0.62 mg/L and 1.50 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 with the distribution system, a free chlorine residual of 0.2 mg/L ...". The Palmerston Drinking Water System meets both of these requirements.

Table 3.9 Palmerston Drinking Water System 2016 Annual Summary of Raw Water Turbidity and Free Chlorine Residual

Location	Range	<u>Raw</u> Water Turbidity	Free Chlorine Residual at POE
		NTU	mg/L
	Minimum	0.37	1.04
Well #1	Maximum	0.89	1.67
	Average	0.63	1.36
	Minimum	0.23	0.90
Well #2	Maximum	0.90	1.61
	Average	0.63	1.23
	Minimum	0.36	0.86
Well #3	Maximum	0.91	1.70
	Average	0.63	1.30
	Minimum	0.26	0.92
Well #4	Maximum	0.88	1.55
	Average	0.59	1.28

3.4 Summary of Treatment Chemicals Used

The disinfectant chemical used in the Palmerston Drinking Water System is 12% Sodium Hypochlorite. Measurements of free chlorine residual are recorded on a continuous basis. In 2016, 5,800 L of 12% Sodium Hypochlorite was used. The average dosage rates are presented in Table 3.10.

In 2016, 2,872 L of PW1680 was used for the sequestering of iron. Wells #1 and #2 share a common tank of PW1680. The average dosage rates are presented in Table 3.10.

Table 3.10 Palmerston Drinking Water System 2016 Annual Summary of Treatment Chemicals Used

Treatment Chemical	Well	Volume Used	Mass Used	Annual Flow	Dosage Rate
		L	kg	m³	mg/L
	Well #1	476	57.1	22,730	2.51
12 % Sodium	Well #2	1,910	229.2	94,868	2.42
Hypochlorite (NaOCI)	Well #3 & 4	3,414	409.7	186,640	2.20
	Total	5,800	696.0	304,238	2.29
	Well #1 & Well #2	1,305	1,827.0	117,598	15.54
PW1680	Well #3 & Well #4	1,567	2,193.8	186,640	11.75
	Total	2,872	4,020.8	304,238	13.22

Note:

- Wells #1 and #2 share the same PW1680 storage container; 2,365 L is the combined PW1680 usage for both wells
 - Wells #3 and #4 share the same PW1680 storage container; 2,285 L is the combined PW1680 usage for both wells
- 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 Palmerston Drinking Water System in 2016.
- 1 AWQI "Adverse Water Quality Incident" #128230 Loss of system pressure during a valve repair. Extra flushing residuals and micro samples were taken and results were OK.
- 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 Palmerston Water Work's MDWL 106-103, DWWP 106-203 and PTTW #8374-8HSPD5. 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
Palmerston 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 # 106-103	Palmerston Drinking Water System is in the requirements of the	•			
DWWP # 106-203	Palmerston Drinking Water System is in compliance with all of the DWWP.				
O. Reg. 170/03	Palmerston Drinking Water System is in compliance wit the requirements of O. Reg. 170/03.				
SDWA	Palmerston 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