RICHARDS LANDING
DRINKING WATER SYSTEM
WATERWORKS # 220007212

ANNUAL & SUMMARY
REPORTS 2017

Introduction

This Annual and Summary Report has been prepared in accordance with both Schedule 22 and section 11 of Ontario Regulation 170/03. In this manner, the requirements by regulation for each report have been consolidated into a single document. This Report is intended to brief the ownership and consumers of the Richards Landing Drinking Water System on the system's performance over the past calendar year January 1 to December 31, 2017.

This report encompasses all elements as required by O. Reg. 170/03. Each section explains what is required for the category Large Municipal Residential DWS (as it pertains to the Richards Landing DWS) and how limits were met or if shortfalls were revealed. The last section contains a list of tables and definition of terms identified in this report.

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System Description

The Richards Landing Well Pump house is owned by the Township of St. Joseph.

Richards Landing is located on the northern shore of St. Joseph Island, in the Township of St. Joseph. The Well Pumphouse was constructed in 1994 on the corner of Highway 548 and Lewellyn Street to replace the private well systems previously used in the community of Richard's Landing. The Township of St. Joseph Water Treatment facility is rated as a Class 1 Water Treatment subsystem, and is categorized under O. Reg. 170/03 as a Large Municipal Residential system. Approximately 400 of the Township's 1122 residents are provided with potable drinking water from the facility.

The system is comprised of the following equipment:

- Two wells equipped with submersible pumps, one monitoring well, instrumentation and controls
- Disinfection process including two filtration trains each consisting of one 10 micron bag filter system, disinfection facilities (two UV irradiation reactors and a sodium hypochlorite chemical feed system consisting of two chemical feed pumps),
- Corrosion control process including a blended phosphate chemical feed system consisting of two chemical feed pumps
- In-ground storage, four high lift pumps and one fire pump. A diesel generator is located on-site to provide emergency power, and two pressure tanks maintain distribution system pressure during low flow conditions.

The facility design capacity is 912 L/min and the high lift pumps maintain system pressure between 87 and 99 psi (600 to 680 kPa) under normal operating conditions (maximum daily flow)

Chemicals

Chemicals utilized at the Richards Landing Treatment plant during 2017 include:

- Sodium Hypochlorite for primary and secondary disinfection
- Blended Phosphates - Carus 8500™

2017 Expenditures

During the year of 2017, expenses were incurred to maintain treatment and distribution functions:

- Purchase and install of chemical pump
- Purchase and installed UV lamps and sleeves
- Engineering costs for highlift replacement

2017 Drinking Water System Changes

- Form 1 – Record of Watermains Authorized as a Future Alteration
  - N/A
- Form 2 – Record of Minor Modification or Replacements
  - Sodium Hypochlorite pump replacement
  - Replaced existing UV sensor on unit #2 with new sensor
- Form 3 – Record of addition, modification or replacement of equipment discharging a contaminant of concern to the atmosphere
  - N/A

Water Quality

Microbiological Sampling and Testing

Sampling is conducted weekly for the DWS at the frequencies and locations identified by Schedule 11 of O. Reg. 170/03 for Large Municipal Residential Systems.

Table 1: Microbiological sampling requirements

Location	Sample Analysis	# samples	Frequency
Raw	EC / TC	1 sample	weekly
Treated	EC/TC	1 sample	weekly
Distribution	EC / TC/ HPC-25%	8 samples	monthly

Richards Landing raw samples are collected from a sample tap from the raw water header. Treated samples are collected from a sample tap from the treated discharge header prior to distribution. Distribution samples are rotated weekly at the following locations representing areas throughout the village: 1669 Arthur, 1209 Catherine, 1211 Richards, 1250 Margarite. Other locations may be sampled as required.

Table 1a: Microbiological Sample Results

Type	# samples	EC (range)	TC (range)	# samples	HPC (range)
Raw	104	0 – 2	0 – 25	N/A	N/A
Treated	56	0	0	52	0 – 92
Distribution	144	0 – 2	0 – 8	44	0 – 540

Additional Treated samples were taken due to exceedances in distribution samples that had the presences of TC or EC. These additional samples did not have HPC analysis conducted on them.

Operational Checks and Testing

Operational testing is completed as per Schedules 6 & 7 of O. Reg. 170/03 for Large Municipal Residential Systems. These checks and testing are completed on site at the water treatment facility by licensed operators. Continuous monitoring analyzers (collecting at minimum 15 minute readings) are utilized for measurement of filter turbidity and chlorine residuals.

Table 2: Monthly Filter Turbidity Results

Month	Filter #1		Filter #2	
	Average (NTU)	Range (NTU)	Average (NTU)	Range (NTU)
January	0.19	0 – 2.04	0.17	0 – 2.03
February	0.17	0 – 2.04	0.15	0 – 2.03
March	0.13	0 – 2.04	0.14	0 – 2.03
April	0.17	0 – 2.04	0.15	0 – 2.03
May	0.15	0 – 2.04	0.14	0 – 2.03
June	0.16	0 – 2.04	0.16	0 – 2.03
July	0.15	0 – 2.04	0.16	0 – 2.03
August	0.15	0 – 2.04	0.15	0 – 2.03
September	0.15	0 – 2.04	0.14	0 – 2.03
October	0.16	0 – 2.04	0.12	0 – 2.03
November	0.50	0 – 2.04	0.12	0 – 2.03
December	0.25	0 – 2.04	0.15	0 – 2.03

Table 3: Treated Chlorine Residuals

Month	Average Chlorine Residual (mg/L)	Chlorine Residual Range (mg/L)
January	1.17	0.07 – 1.44
February	1.08	0.29 – 1.23
March	1.03	0.17 – 1.66
April	0.80	0.09 – 1.12
May	1.16	0.03 – 1.44
June	1.12	0.23 – 1.27
July	1.06	0.29 – 1.22
August	1.08	0.31 – 1.30
September	1.20	0.21 – 1.37
October	1.22	0.12 – 1.56
November	1.13	0.11 – 1.74
December	0.92	0.23 – 1.41

Chlorine residuals are continuously monitored and data is recorded at a minimum 5 minute intervals.

Chemical Sampling and Testing

Schedule 13 of O. Reg. 170/03 outlines chemical sampling regiments for Large Municipal Residential systems. Schedules 23 (inorganics) and 24 (organics) are collected every 12 months as well as sodium and fluoride every 60 months. This system requires quarterly sampling for Nitrites/Nitrates and THM's. Schedule 15.1 outlines the requirements for semi-annual lead testing (2 periods per year). Richards Landing Lead sampling follows the reduced sampling requirements every third year.

Table 4: Schedule 23 - Inorganics

Parameter	Sample Date	Result Value (µg/L)	Units	ODWS
Antimony	15-May-17	0.05	µg/L	6
Arsenic	15-May-17	<0.2	µg/L	25
Barium	15-May-17	17.1	µg/L	1000
Boron	15-May-17	26.0	µg/L	5000
Cadmium	15-May-17	<0.003	µg/L	5
Chromium	15-May-17	0.93	µg/L	50
Fluoride	15-May-17	0.08	mg/L	1.5
Mercury	15-May-17	0.04	µg/L	1
Selenium	15-May-17	0.17	µg/L	10
Sodium	15-May-17	55.0	mg/L	20
Uranium	15-May-17	0.368	µg/L	20

All results for inorganic parameters are within the maximum acceptable concentrations (MAC) of the Ontario Drinking Water Quality Standards as defined in O. Reg. 169/03. No result is above the half MAC with the exception of sodium which has an aesthetic objective (AO) of 200 mg/L, but has a limit of 20 mg/L for medical reasons and would require notifications if exceeded.

Table 5: Nitrite/ Nitrate Results

Date	ODWS	24-Jan-17	15-May-17	10-Jul-17	25-Oct-17
Unit	mg/L	mg/L	mg/L	mg/L	mg/L
Nitrite	1.0	0.003	0.003	0.003	0.003
Nitrate	10	1.57	1.63	1.63	1.65

All quarterly results for Nitrites and Nitrates are well below ODWS.

Table 5a: THM/HAA Results

Date	ODWS	Q1	Q2	Q3	Q4	RAA
Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
THM	100	37	36	40	38	37.7
HAA	80	22	27.2	25.7	27.1	25.5

ODWS established a MAC of 80 for HAAs effective January 1, 2020.

Table 6: Schedule 24 – Organics

Parameter	Date	Result	Unit	ODWS
Alachlor	15-May-17	<0.02	µg/L	5
Atrazine + N-dealkylated metobolites	15-May-17	<0.01	µg/L	5
Azinphos-methyl	15-May-17	<0.05	µg/L	20
Benzene	15-May-17	<0.32	µg/L	5
Benzo(a)pyrene	15-May-17	<0.004	µg/L	0.01
Bromoxynil	15-May-17	<0.33	µg/L	5
Carbaryl	15-May-17	<0.05	µg/L	90
Carbofuran	15-May-17	<0.01	µg/L	90
Carbon Tetrachloride	15-May-17	<0.16	µg/L	5
Chlorpyrifos	15-May-17	<0.02	µg/L	90
Diazinon	15-May-17	<0.02	µg/L	20
Dicamba	15-May-17	<0.20	µg/L	120
1,2-Dichlorobenzene	15-May-17	<0.41	µg/L	200
1,4-Dichlorobenzene	15-May-17	<0.36	µg/L	5
1,2-Dichloroethane	15-May-17	<0.35	µg/L	5
1,1-Dichloroethylene (vinylidene chloride)	15-May-17	<0.33	µg/L	14
Dichloromethane	15-May-17	<0.35	µg/L	50
2-4 Dichlorophenol	15-May-17	<0.15	µg/L	900
2,4-Dichlorophenoxy acetic acid	15-May-17	<0.19	µg/L	100
Diclofop-methyl	15-May-17	<0.40	µg/L	9
Dimethoate	15-May-17	<0.03	µg/L	20
Diquat	15-May-17	<1	µg/L	70
Diuron	15-May-17	<0.03	µg/L	150
Glyphosate	15-May-17	<1	µg/L	280
Malathion	15-May-17	<0.02	µg/L	190
2-Methyl-4-Chlorophenoxyacetic Acid (MCPA)	15-May-17	<0.00012	µg/L	100
Metolachlor	15-May-17	<0.01	µg/L	50
Metribuzin	15-May-17	<0.02	µg/L	80
Monochlorobenzene	15-May-17	<0.3	µg/L	80
Paraquat	15-May-17	<1	µg/L	10
Pentachlorophenol	15-May-17	<0.15	µg/L	60
Phorate	15-May-17	<0.01	µg/L	2
Picloram	15-May-17	<1	µg/L	190
Polychlorinated Byphenols (PCB)	15-May-17	<0.04	µg/L	3
Prometryne	15-May-17	<0.03	µg/L	1
Simazine	15-May-17	<0.01	µg/L	10
Terbufos	15-May-17	<0.01	µg/L	1
Tetrachloroethylene	15-May-17	<0.35	µg/L	30
2,3,4,6-Tetrachlorophenol	15-May-17	<0.20	µg/L	100
Triallate	15-May-17	<0.01	µg/L	230
Trichloroethylene	15-May-17	<0.44	µg/L	5
2,4,6-Trichlorophenol	15-May-17	<0.25	µg/L	5
Trifluralin	15-May-17	<0.02	µg/L	45
Vinyl Chloride	15-May-17	<0.17	µg/L	2

All results for organic sampling of schedule 24 are below the MAC.

Lead Sampling: The maximum acceptable concentration for lead in drinking water is 10µg/L. This applies to water at the point of consumption since lead is only present as a result of corrosion of lead solder, lead containing brass fittings or lead pipes which are found close to or in domestic plumbing and the service connection to buildings.

Table 7: Community Lead Sampling Results

Location Type	Number of Samples	Range of Lead Results (min#) – (max #)	Number of Exceedances
Plumbing			
Distribution			

Lead samples are collected during the two prescribed periods each year (Dec 15 – Mar15 and June 15 – Oct 15).

Sample results revealed zero exceedances during year 2015, sampling relief extends to 2018.

Compliance

Adverse Water Quality Incidents

During 2017, the Richards Landing DWS reported 5 incidents of adverse water quality.

Table 8: Adverse Water Quality Incidents

Date	Incident Reported
2017-05-06	AWQI# 133013 Mechanical failure of turbidity analyzer
2017-09-07	AWQI# 136478 Total Coliform 1
2017-10-04	AWQI# 137053Total Coliform 1
2017-11-01	AWQI# 137745 Total Coliform 8, E Coli 2
2017-11-22	AWQI# 138154 Total Coliform 1

Annual Drinking Water System Inspection

The annual DWS inspection took place on April 13, 2017 by MOECC Drinking Water inspector Stephanie Robbins. Zero non-conformances and no additional recommendations and best practice were identified.

The DWS received a final inspection rating of 100%

Flows

The Permit to Take Water authorizes the municipality to draw water from the wells at a rate not to exceed 1,037m^3/d.

The maximum daily volume taken was 334 m^3, 32.2 % of the permit limit.

Municipal Drinking Water Licence: 205-101 specifies a maximum rated flow of 1,011m^3/d.

The max flow rate reported was 220m^3/d, 21.8 % of the rated capacity.

The Richards Landing WTP treated and distributed a total of 47 769 m^3 during the year of 2017. The average day treated flow was 130.7m^3/d, and maximum day flow was 220m^3/d on July 21, 2017.

Chart 1: 5 year Flow Comparison

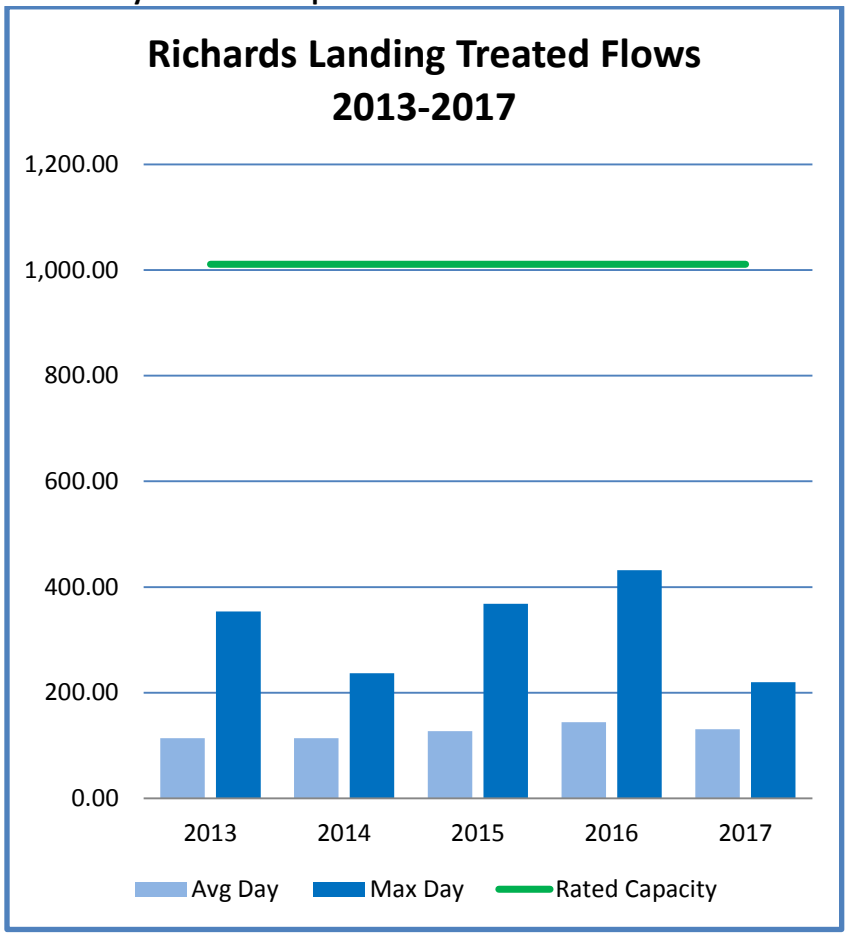
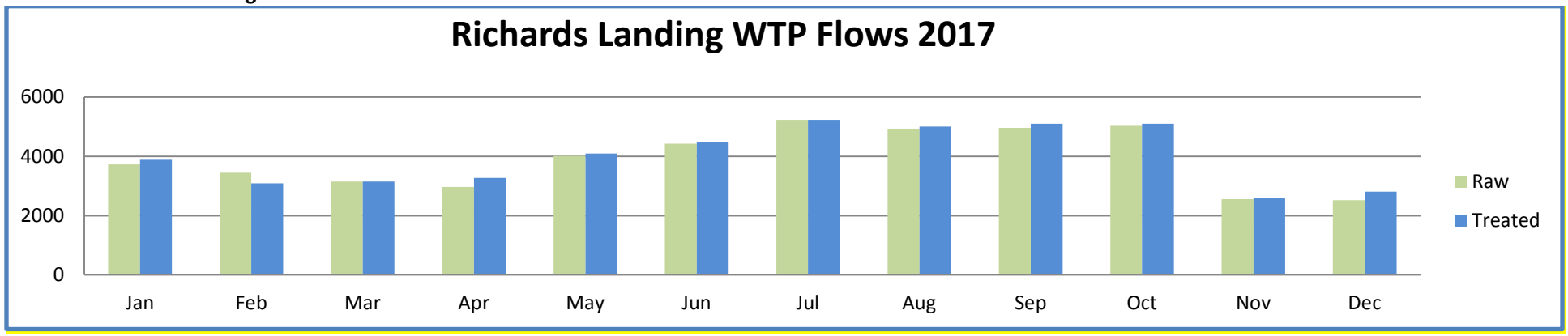


Table 9: Raw and Treated water Flows 2017

2017	Raw Water Flows					Treated Water Flows			
Month	Raw Water (m^3)	Minimum Day (m^3/d)	Maximum Day (m^3/d)	Average Day (m^3/d)	% Max. Flow Day of rated Capacity	Treated Water (m^3)	Minimum Day (m^3/d)	Maximum Day (m^3/d)	Average Day (m^3/d)
January	3,723	55	162	120.1	15.6	3,886	102	154	125.4
February	3,447	64	334	123.1	32.2	3,091	102	121	110.4
March	3,153	55	147	101.7	14.2	3,146	93	110	101.5
April	2,969	54	144	99.0	13.9	3,272	94	141	109.1
May	4,017	40	198	129.6	19.1	4,095	97	160	132.1
June	4,421	82	224	147.4	21.6	4,479	121	184	149.3
July	5,232	105	247	168.8	23.8	5,228	140	220	168.7
August	4,932	101	221	159.1	21.3	4,998	141	185	161.2
September	4,955	109	224	165.2	21.6	5,094	147	191	169.8
October	5,029	63	284	162.2	27.4	5,096	67	215	164.4
November	2,558	33	144	85.3	13.9	2,578	62	136	85.9
December	2,521	45	115	81.3	11.1	2,806	67	115	90.5

Chart 2: Richards Landing WTP Flows 2017



Report Endorsement

Report Availability

Section 11 of O. Reg. 170/03 defines that this Annual Report must be given, without charge, to every person who requests a copy. Effective steps must also be taken to advise users of water from the system that copies of the report are available, without charge, and of how a copy may be obtained. This Annual Report shall be made available for inspection by the public on the Town Office.

Township of St. Joseph
P.O. Box 187
1669 Arthur Street
Richards Landing, Ontario Canada
P0R 1J0

In accordance with Schedule 22 of O. Reg. 170/03, this Annual Report must be given to the members of the municipal council. Section 19 (Standard of care, municipal drinking-water system) of Ontario's Safe Drinking Water Act also places certain responsibilities upon those municipal officials who oversee an accredited operating authority or exercise decision-making authority over a system.

Report Endorsement

This Summary report for The Richards Landing Drinking Water System for the period of January 1st to December 31st 2017 has been prepared in accordance to Schedule 22 of O. Reg. 170/03. The report has been reviewed and accepted by the Township of St. Joseph council.

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Date

Tables, Definition of Terms

Appendix A: List of Tables/ Charts

Table 1:	Microbiological sampling requirements
Table 1a:	Microbiological Sample Results
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Table3:	Treated Chlorine Residuals
Table 4:	Schedule 23 - Inorganics
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Appendix B: Definition of Terms

Acronym	Definition
AWQI	Adverse water quality incident
DM	Dual Media
DWS	Drinking water system
EC	E. Coli
GUDI	Groundwater under direct influence of surface water
HAA	Haloacetic acids
HPC	Heterotrophic plate count
MAC	Maximum Acceptable Concentration
m^3	Cubic metres
m^3/d	Cubic metres per day
mg/L	Milligram per litre (part per million)
ML	Megalitre (1000 m^3)
NTU	Nephelometric turbidity unit
ODWS	Ontario Drinking Water Standards
O. Reg. 170/03	Ontario Regulation 170/03
PTTW	Permit to take water
SCADA	Supervisory control and data acquisition
TC	Total coliforms
THM	Trihalomethane
µg/L	Microgram per litre (part per billion)
WD	Water distribution
WT	Water treatment
WTP	Water treatment plant