



RICHARDS LANDING  
DRINKING WATER SYSTEM  
WATERWORKS # 220007212







ANNUAL & SUMMARY  
REPORTS 2021



## 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, 2021.

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 Richards 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 2021 include:

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

## 2021 Expenditures

During the year of 2021, expenses were incurred to maintain treatment and distribution functions:

- ESA services
- 12-month surveillance audit (SAI Global)
- two new filter turbidimeters (Hach laser)
- Remote monitoring access software for SCADA and reports
- UPS back-ups for SCADA computer
- new chemical tank for sodium hypochlorite

## 2021 Drinking Water System Changes

Form 1 – Record of Watermains Authorized as a Future Alteration

- n/a

Form 2 – Record of Minor Modification or Replacements

- 2021-02-18 Replacement of filter #1 turbidimeter
- 2021-06-23 Replacement of filter #2 turbidimeter

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	N/A	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)
Well #1	52	0	0 - 146	-	-
Well #2A	52	0	0 - 143	-	-
Treated	52	0	0	52	0 – 40
Distribution	104	0	0	26	0 - 10

### 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	0.52	0.11 – 2.0	0.23	0.04 – 2.0
February	0.16	0.02 – 2.0	0.22	0.05 – 2.0
March	0.27	0.03 – 2.0	-	Filter off-line
April	0.23	0.03 – 2.0	-	Filter off-line
May	0.20	0.04 – 2.0	-	Filter off-line
June	0.29	0.03 – 2.0	-	Filter off-line
July	0.57	0.03 – 2.0	0.28	0.02 – 2.0
August	0.26	0.03 – 2.0	0.28	0.03 – 2.0
September	0.40	0.03 – 2.0	0.32	0.03 – 2.0
October	0.36	0.03 – 2.0	0.29	0.08 – 2.0
November	0.44	0.03 – 2.0	0.29	0.06 – 2.0
December	0.59	0.03 – 2.0	0.23	0.09 – 2.0



**Table 3: Treated Chlorine Residuals**

Month	Average Chlorine Residual (mg/L)	Chlorine Residual Range (mg/L)
January	1.45	0.44 – 1.58
February	1.39	0.23 – 1.49
March	1.29	0.46 – 1.37
April	1.31	0.47 – 1.37
May	1.19	0.32 – 1.70
June	1.38	0.41 – 1.80
July	1.25	0.47 – 1.56
August	1.17	0.28 – 1.35
September	1.17	0.29 – 1.42
October	1.99	0.40 – 3.76
November	1.01	0.12 – 1.37
December	1.31	0.17 – 1.52

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, THMs, and HAAs. 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	9-Jun-21	<0.5	µg/L	6
Arsenic	9-Jun-21	<1	µg/L	25
Barium	9-Jun-21	17	µg/L	1000
Boron	9-Jun-21	25	µg/L	5000
Cadmium	9-Jun-21	<0.1	µg/L	5
Chromium	9-Jun-21	<1	µg/L	50
Fluoride	9-Jun-21	0.07	mg/L	1.5
Mercury	9-Jun-21	<0.1	µg/L	1
Selenium	9-Jun-21	0.4	µg/L	10
Sodium	9-Jun-21	57.8	mg/L	20
Uranium	9-Jun-21	<1	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. Notifications are completed to MOH and the residents of the DWS.

**Table 5: Nitrite/ Nitrate Results**

Date	ODWS	4-Jan-21	6-Apr-21	5-Jul-21	18-Oct-21
Unit	mg/L	mg/L	mg/L	mg/L	mg/L
Nitrite	1.0	<0.05	<0.05	<0.05	<0.05
Nitrate	10	1.23	1.13	1.60	1.60

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	53	29.7	40	34.7	39.4
HAA	80	36	47	31	41	31.8

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



Table 6: Schedule 24 – Organics

Parameter	Date	Result	Unit	ODWS
Alachlor	9-Jun-21	<0.241	µg/L	5
Atrazine + N-dealkylated metabolites	9-Jun-21	<0.5	µg/L	5
Azinphos-methyl	9-Jun-21	<0.181	µg/L	20
Benzene	9-Jun-21	<0.1	µg/L	5
Benzo(a)pyrene	9-Jun-21	<0.01	µg/L	0.01
Bromoxynil	9-Jun-21	<0.101	µg/L	5
Carbaryl	9-Jun-21	<1	µg/L	90
Carbofuran	9-Jun-21	<2	µg/L	90
Carbon Tetrachloride	9-Jun-21	<0.2	µg/L	5
Chlorpyrifos	9-Jun-21	<0.181	µg/L	90
Diazinon	9-Jun-21	<0.181	µg/L	20
Dicamba	9-Jun-21	<0.0885	µg/L	120
1,2-Dichlorobenzene	9-Jun-21	<0.2	µg/L	200
1,4-Dichlorobenzene	9-Jun-21	<0.3	µg/L	5
1,2-Dichloroethane	9-Jun-21	<0.2	µg/L	5
1,1-Dichloroethylene (vinylidene chloride)	9-Jun-21	<0.3	µg/L	14
Dichloromethane	9-Jun-21	<1	µg/L	50
2-4 Dichlorophenol	9-Jun-21	<0.2	µg/L	900
2,4-Dichlorophenoxy acetic acid	9-Jun-21	<0.379	µg/L	100
Diclofop-methyl	9-Jun-21	<0.126	µg/L	9
Dimethoate	9-Jun-21	<0.181	µg/L	20
Diquat	9-Jun-21	<0.2	µg/L	70
Diuron	9-Jun-21	<5	µg/L	150

Parameter	Date	Result	Unit	ODWS
Glyphosate	9-Jun-21	<20	µg/L	280
Malathion	9-Jun-21	<0.181	µg/L	190
2-Methyl-4-Chlorophenoxyacetic Acid (MCPA)	9-Jun-21	<6.32	µg/L	100
Metolachlor	9-Jun-21	<0.121	µg/L	50
Metribuzin	9-Jun-21	<0.121	µg/L	80
Monochlorobenzene	9-Jun-21	<0.5	µg/L	80
Paraquat	9-Jun-21	<0.3	µg/L	10
Pentachlorophenol	9-Jun-21	<0.3	µg/L	60
Phorate	9-Jun-21	<0.121	µg/L	2
Picloram	9-Jun-21	<0.0885	µg/L	190
Polychlorinated Byphenols (PCB)	9-Jun-21	<0.08	µg/L	3
Prometryne	9-Jun-21	<0.0603	µg/L	1
Simazine	9-Jun-21	<0.181	µg/L	10
Terbufos	9-Jun-21	<0.121	µg/L	1
Tetrachloroethylene	9-Jun-21	<0.3	µg/L	30
2,3,4,6-Tetrachlorophenol	9-Jun-21	<0.2	µg/L	100
Triallate	9-Jun-21	<0.121	µg/L	230
Trichloroethylene	9-Jun-21	<0.2	µg/L	5
2,4,6-Trichlorophenol	9-Jun-21	<0.2	µg/L	5
Trifluralin	9-Jun-21	<0.121	µg/L	45
Vinyl Chloride	9-Jun-21	<0.1	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	Lead results, ug/L	Alkalinity, mg/L	pH
Distribution-Winter	<0.1	280	7.2
Distribution-Summer	0.3	300	7.1

*Based on historical results Richards Landing DWS is exempt for the plumbing lead sampling program, however monitoring of distribution alkalinity and pH every winter and summer collection periods and Lead every 3 years is required.*

## Compliance

### Adverse Water Quality Incidents

During 2021, the Richards Landing DWS reported two incidents of adverse water quality.

**Table 8: Adverse Water Quality Incidents**

Date	Incident Reported
2021-01-01	Filter turbidity exceeding 1 NTU (greater than 15 min)
2021-02-28	Filter turbidity exceeding 1 NTU (greater than 15 min)

### Annual Drinking Water System Inspection

The last annual DWS inspection took place on March 21, 2021 by MECP Drinking Water inspector Stephen Rouleau. Zero non-conformances and zero 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 1,037 m<sup>3</sup>/d.

***The maximum daily volume taken was 372 m<sup>3</sup>, 35.9% of the permit limit.***

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

***The max flow rate reported was 294 m<sup>3</sup>/d, 29.1 % of the rated capacity.***

The Richards Landing WTP treated and distributed a total of 40,103 m<sup>3</sup> (40.1 ML) during the year of 2021. The average day treated flow demand was 109.8 m<sup>3</sup>/d, and maximum day flow was 294 m<sup>3</sup>/d on June 7, 2021.

Chart 1: 5-year Production History

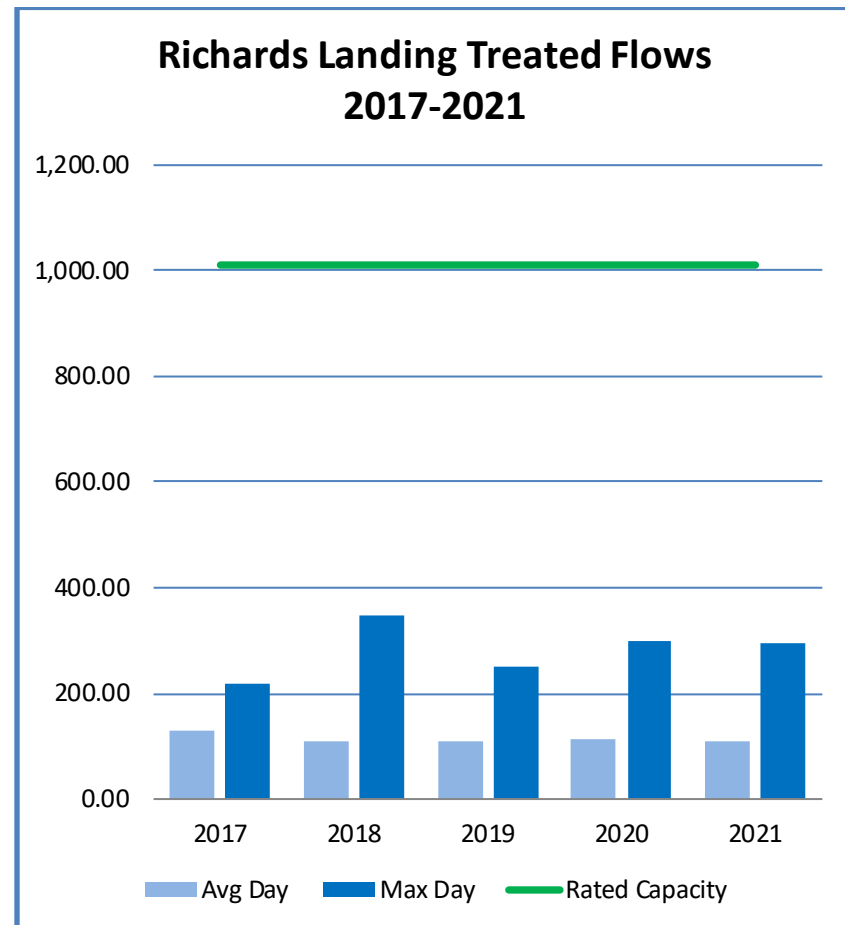


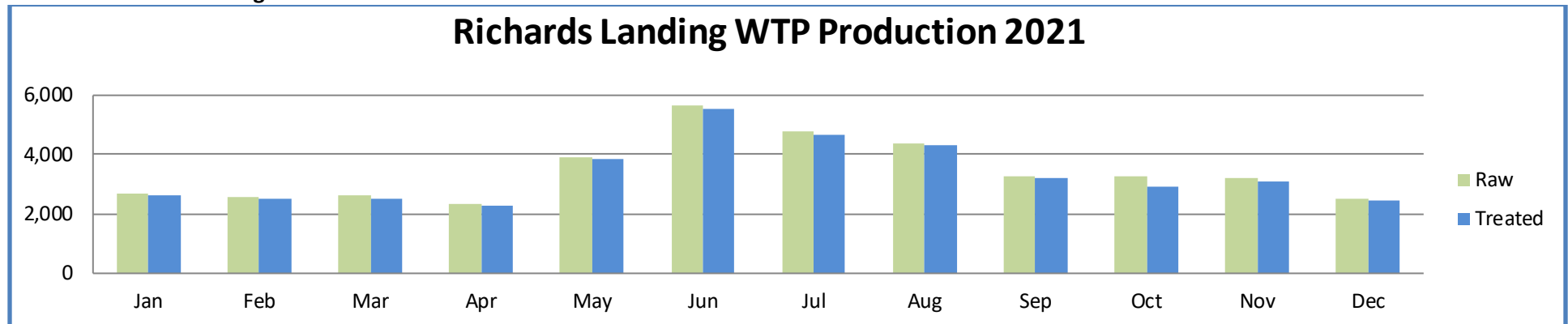




Table 9: Raw and Treated Water Flows 2021

2021	Raw Water Flows					Treated Water Flows			
Month	Raw Water (m <sup>3</sup> )	Minimum Day (m <sup>3</sup> /d)	Maximum Day (m <sup>3</sup> /d)	Average Day (m <sup>3</sup> /d)	% Max. Flow Day of rated Capacity	Treated Water (m <sup>3</sup> )	Minimum Day (m <sup>3</sup> /d)	Maximum Day (m <sup>3</sup> /d)	Average Day (m <sup>3</sup> /d)
January	2,680	43	149	86.5	14.7	2,605	76	97	84.0
February	2,574	42	148	91.9	14.6	2,535	81	105	90.5
March	2,629	0	153	84.8	15.1	2,521	70	95	81.3
April	2,364	0	129	78.8	12.8	2,285	70	87	76.2
May	3,893	36	242	125.6	23.9	3,875	71	237	125.0
June	5,653	91	372	188.4	36.8	5,544	106	294	184.8
July	4,766	83	288	153.7	28.5	4,678	110	232	150.9
August	4,401	99	245	142.0	24.2	4,332	107	193	139.7
September	3,260	59	128	108.7	12.7	3,197	97	120	106.6
October	3,257	0	272	105.1	26.9	2,936	70	157	94.7
November	3,239	0	235	108.0	23.2	3,112	71	143	103.7
December	2,502	0	127	80.7	12.5	2,483	69	96	80.1

Chart 2: Richards Landing WTP Production 2021





## Report Availability

### Annual Report

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

### Summary Report

This Summary report for the Richards Landing Drinking Water System for the period of January 1st to December 31<sup>st</sup>, 2021 has been prepared in accordance to Schedule 22 of O. Reg. 170/03.

In accordance with Schedule 22 of O. Reg. 170/03, this Summary Report has been provided to the Township of St. Joseph.



## Tables, Definition of Terms

### Appendix A: List of Tables/ Charts

**Table 1:** Microbiological sampling requirements

**Table 1a:** Microbiological Sample Results

**Table 2:** Monthly Filter Turbidity Results

**Table 3:** Treated Chlorine Residuals

**Table 4:** Schedule 23 - Inorganics

**Table 5:** Nitrite/Nitrate Results

**Table 6:** Schedule 24 - Organics

**Table 7:** Community Lead Sampling Results

**Table 8:** Adverse Water Quality Incidents

**Table 9:** Raw and Treated Water Flows 2021

**Chart 1:** 5-year Production History

**Chart 2:** Richards Landing WTP Production 2021

**Appendix A:** List of Tables / Charts

**Appendix B:** Definition of Terms

### Appendix B: Definition of Terms

Acronym	Definition
AWQI	Adverse water quality incident
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 <sup>3</sup>	Cubic metres
m <sup>3</sup> /d	Cubic metres per day
mg/L	Milligram per litre (part per million)
ML	Megalitre (1,000 m <sup>3</sup> )
MOH	Medical Officer of Health
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