THE MUNICIPALITY OF KINCARDINE

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Tiverton Drinking Water System

2019 Annual Water Summary Report

1. INTRODUCTION AND BACKGROUND

The municipality owns and operates drinking water systems to provide residents with safe, potable water. These municipal drinking water systems are regulated under various legislation and legal documents including the Safe Drinking Water Act and Ontario Regulation 170/03 Drinking Water Systems. O. Reg. 170 requires that the municipality complete an annual water report (Section 11) and an annual summary report (Schedule 22). The information required for each of these reports has been combined into this one report.

The reports are available free of charge on the municipal website at www.kincardine.ca or by contacting the Water Services Department at waterservice@kincardine.ca. Requests will also be received in person or by telephone at the Municipal Administration Centre (1475 Concession 5, 519-396-3468) or the Water Services Office (155 Durham Street, Kincardine, 519-396-4660).

1.1. System Description

Drinking-Water System Number:	220002609
Drinking-Water System Name:	Tiverton Drinking Water System
Drinking-Water System Owner:	Municipality of Kincardine
Drinking-Water System Category:	Large Municipal Residential
Period being reported:	Year 2019

The Tiverton Drinking Water System (DWS) is a non-GUDI groundwater supply (which means that it is a secure well and not under the influence of surface water) consisting of 3 active wells, Briar Hill Well #1, Briar Hill Well #2 and Dent Well #2. The newest well, Briar Hill Well #2, went on-line August 2007 and is a 220 diameter 93 m deep drilled well with a maximum water taking of 8.3 L/s or 720 m^3/d. Briar Hill Well #1 is a 150 mm diameter 93 m deep groundwater well rated at 6.1 L/s or 524.16 m^3/d. The third active well is Dent Well #2. This well was put in service on July 15, 2005 and replaced the original Dent Well. Dent Well #2 is an approximately 87 m deep drilled well with a 200 mm diameter steel casing. The flow rate is restricted to a maximum of 4.6 L/s and a maximum taking of 250.5 m^3/d. Both pumphouses are equipped with raw and treated flow meters, a disinfection system consisting of 2 sodium hypochlorite metering pumps with auto switchover capabilities and interlocked well shutdown, and a polyphosphate (Carus 1200) iron sequestering system. The sodium hypochlorite and Carus 1200 are NSF certified. Additional contact time is provided at both pumphouses by 600 mm diameter feeder watermain immediately leaving the pumphouse and prior to the first consumer. The water system is equipped with a 1500 m^3 standpipe. The both pumphouses are equipped with a standby generator.

1.2. Major Expenses

The system incurred expenses necessary to install, repair or replace required equipment as follows:

Standpipe Maintenance ($17,900.00)

Treatment Equipment ($6,100.00)

Distribution infrastructure ($12,500.00)

2. WATER QUALITY MONITORING

Each municipal drinking water system is required to do testing to ensure that the water supplied to consumers is safe for consumption. Some of these tests such as chlorine residuals are done on site while others, like microbiological testing, must be performed by a licenced laboratory.

2.1. Microbiological Testing

O. Reg. 170 Schedule 10, requires the Tiverton DWS to take a minimum of one sample per week of raw and treated water from each well. A minimum of one sample must be taken every week of distribution water with a total of eight required every month. All raw, treated and distribution samples must be tested for Escherichia coli (E. coli) and total coliforms (TC). All the treated samples and twenty five percent of the distribution samples must also be tested for heterotrophic plate count (HPC). Our internal sampling schedule exceeds the minimum requirements by having operations staff collect three raw, three treated and two distribution sample every week and have them tested for E. coli, total coliform and HPC. Dent well was off-line briefly for repairs to plumbing and could not be run for sampling one week.

Any E. coli or total coliform results above 0 in treated or distribution water must be reported to the Ministry of the Environment, Conservation and Parks (MECP) Spills Action Centre (SAC) and Medical Officer of Health (MOH).

Heterotrophic plate count is a colony count of general bacteria population. There is no adverse limit for HPC samples. Results over 500 colonies per 1 mL may indicate a change in water quality but it is not considered an indicator of unsafe water.

The results from the 2019 sampling program are shown in the table below.

Water Source	Number of EC/TC Samples	Range of Total Coliform Results (#-#)	Range of E. coli Results (#-#)	Number of HPC Samples	Range of HPC Results (#-#)
Raw	155	0 – 0	0 – 0	155	0 – 700
Treated	157	0 – 0	0 – 0	157	0 – <10
Distribution	109	0 – 16	0 – 14	109	0 – 79

2.2. Chemical Testing

The Safe Drinking Water Act Reg 170 Schedule 13 requires periodic testing of the water for chemical parameters. The Tiverton DWS is required to test for nitrite/nitrate, trihalomethanes and haloacetic acids on a quarterly basis. The tables below outline these as well as other inorganic and organic parameters that are required to be tested for every three years and include the date and result of the most recent test. Any result displayed as less than (<) are below the method detection limit of the lab.

Sodium and fluoride levels exceed the Ontario Drinking Water Quality Standards, but they are naturally occurring in the groundwater and do not need to be tested more frequently than every five years.

If the concentration of a parameter is above half of the Maximum Acceptable Concentration (MAC) under the Ontario Drinking Water Quality Standards, an increased testing frequency of once every three months is required by O. Regulation 170. Historically, arsenic levels at Dent Well have been around the half MAC and was tested for more frequently in 2019.

Briar Hill Well #1

Inorganic Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony	July 16/18	< 0.2	ug/L	No
Arsenic	July 16/18	2.2	ug/L	No
Barium	July 16/18	10.7	ug/L	No
Boron	July 16/18	192	ug/L	No
Cadmium	July 16/18	0.013	ug/L	No
Chromium	July 16/18	0.09	ug/L	No
Mercury	July 16/18	< 0.01	ug/L	No
Selenium	July 16/18	< 0.04	ug/L	No
Sodium	October 16/17 October 25/17	45.8 35.2	mg/L	Yes
Uranium	July 16/18	0.457	ug/L	No
Fluoride	April 9/18 April 17/18	2.02 1.96	mg/L	Yes
Nitrite	January 14/19 April 8/19 July 8/19 October 7/19	< 0.003 < 0.003 < 0.003 < 0.003	mg/L	No
Nitrate	January 14/19 April 8/19 July 8/19 October 7/19	0.018 < 0.006 0.009 < 0.006	mg/L	No

Briar Hill Well #2

Inorganic Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony	July 15/19	<0.09	ug/L	No
Arsenic	July 15/19	2.1	ug/L	No
Barium	July 15/19	10.7	ug/L	No
Boron	July 15/19	163	ug/L	No
Cadmium	July 15/19	0.004	ug/L	No
Chromium	July 15/19	0.13	ug/L	No
Mercury	July 15/19	<0.01	ug/L	No
Selenium	July 15/19	< 0.06	ug/L	No
Sodium	October 16/17 October 25/17	44.4 34.4	mg/L	Yes
Uranium	July 15/19	0.558	ug/L	No
Fluoride	April 9/18 April 17/18	2.02 2.01	mg/L	Yes
Nitrite	January 14/19 April 8/19 July 8/19 October 7/19	< 0.003 < 0.003 < 0.003 < 0.003	mg/L	No
Nitrate	January 14/19 April 8/19 July 8/19 October 7/19	0.009 0.006 0.007 0.012	mg/L	No

Dent Well #2

Inorganic Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony	July 17/17	<0.02	ug/L	No
Arsenic	January 14/19 April 8/19 July 8/19 October 7/19	4.3 5.3 4.2 4.5	ug/L	No
Barium	July 17/17	10.1	ug/L	No
Boron	July 17/17	191	ug/L	No
Cadmium	July 17/17	0.012	ug/L	No
Chromium	July 17/17	0.66	ug/L	No
Mercury	July 17/17	<0.01	ug/L	No
Selenium	July 17/17	0.05	ug/L	No
Sodium	Oct 16/17 Oct 25/17	46.2 36.8	mg/L	Yes
Uranium	July 17/17	0.814	ug/L	No
Fluoride	April 9/18 April 17/18	2.07 2.13	mg/L	Yes
Nitrite	January 14/19 April 8/19 July 8/19 October 7/19	< 0.003 < 0.003 < 0.003 < 0.003	mg/L	No
Nitrate	January 14/19 April 8/19 July 8/19 October 7/19	< 0.006 < 0.006 < 0.006 0.058	mg/L	No

Briar Hill Well #1

Organic Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor	July 16/18	< 0.02	ug/L	No
Atrazine + N-dealkylated metabolites	July 16/18	< 0.01	ug/L	No
Azinphos-methyl	July 16/18	< 0.05	ug/L	No
Benzene	July 16/18	< 0.32	ug/L	No
Benzo(a)pyrene	July 16/18	< 0.004	ug/L	No
Bromoxynil	July 16/18	< 0.33	ug/L	No
Carbaryl	July 16/18	< 0.05	ug/L	No
Carbofuran	July 16/18	< 0.01	ug/L	No
Carbon Tetrachloride	July 16/18	< 0.16	ug/L	No
Chlorpyrifos	July 16/18	< 0.02	ug/L	No
Diazinon	July 16/18	< 0.02	ug/L	No
Dicamba	July 16/18	< 0.20	ug/L	No
1,4-Dichlorobenzene	July 16/18	< 0.36	ug/L	No
1,2-Dichlorobenzene	July 16/18	< 0.41	ug/L	No
1,2-Dichloroethane	July 16/18	< 0.35	ug/L	No
1,1-Dichloroethylene (vinylidene chloride)	July 16/18	< 0.33	ug/L	No
Dichloromethane	July 16/18	< 0.35	ug/L	No
2-4 Dichlorophenol	July 16/18	< 0.15	ug/L	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	July 16/18	< 0.19	ug/L	No
Diclofop-methyl	July 16/18	< 0.40	ug/L	No
Dimethoate	July 16/18	< 0.03	ug/L	No
Diquat	July 16/18	< 1	ug/L	No
Diuron	July 16/18	< 0.03	ug/L	No
Glyphosate	July 16/18	< 1	ug/L	No
Malathion	July 16/18	< 0.02	ug/L	No
2 methyl-4-chlorophenoxyacetic acid (MCPA)	July 16/18	<0.00012	mg/L	No
Metolachlor	July 16/18	< 0.01	ug/L	No
Metribuzin	July 16/18	< 0.02	ug/L	No
Monochlorobenzene	July 16/18	< 0.3	ug/L	No
Paraquat	July 16/18	< 1	ug/L	No
Pentachlorophenol	July 16/18	< 0.15	ug/L	No
Phorate	July 16/18	< 0.01	ug/L	No
Picloram	July 16/18	< 1	ug/L	No
Polychlorinated Biphenyls (PCB)	July 16/18	< 0.04	ug/L	No
Prometryne	July 16/18	< 0.03	ug/L	No
Simazine	July 16/18	< 0.01	ug/L	No
Terbufos	July 16/18	< 0.01	ug/L	No
Tetrachloroethylene	July 16/18	< 0.35	ug/L	No
2,3,4,6-Tetrachlorophenol	July 16/18	< 0.20	ug/L	No
Triallate	July 16/18	< 0.01	ug/L	No
Trichloroethylene	July 16/18	< 0.44	ug/L	No
2,4,6-Trichlorophenol	July 16/18	< 0.25	ug/L	No
Trifluralin	July 16/18	< 0.02	ug/L	No
Vinyl Chloride	July 16/18	< 0.17	ug/L	No

Briar Hill Well #2

Organic Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor	July 15/19	< 0.02	ug/L	No
Atrazine + N-dealkylated metabolites	July 15/19	< 0.01	ug/L	No
Azinphos-methyl	July 15/19	< 0.05	ug/L	No
Benzene	July 15/19	< 0.32	ug/L	No
Benzo(a)pyrene	July 15/19	< 0.004	ug/L	No
Bromoxynil	July 15/19	< 0.33	ug/L	No
Carbaryl	July 15/19	< 0.05	ug/L	No
Carbofuran	July 15/19	< 0.01	ug/L	No
Carbon Tetrachloride	July 15/19	< 0.17	ug/L	No
Chlorpyrifos	July 15/19	< 0.02	ug/L	No
Diazinon	July 15/19	< 0.02	ug/L	No
Dicamba	July 15/19	< 0.20	ug/L	No
1,2-Dichlorobenzene	July 15/19	< 0.41	ug/L	No
1,4-Dichlorobenzene	July 15/19	< 0.36	ug/L	No
1,2-Dichloroethane	July 15/19	< 0.35	ug/L	No
1,1-Dichloroethylene (vinylidene chloride)	July 15/19	< 0.33	ug/L	No
Dichloromethane	July 15/19	< 0.35	ug/L	No
2-4 Dichlorophenol	July 15/19	< 0.15	ug/L	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	July 15/19	< 0.19	ug/L	No
Diclofop-methyl	July 15/19	< 0.40	ug/L	No
Dimethoate	July 15/19	< 0.06	ug/L	No
Diquat	July 15/19	< 1	ug/L	No
Diuron	July 15/19	< 0.03	ug/L	No
Glyphosate	July 15/19	< 1	ug/L	No
Malathion	July 15/19	< 0.02	ug/L	No
2 methyl-4-chlorophenoxyacetic acid (MCPA)	July 15/19	< 0.00012	mg/L	No
Metolachlor	July 15/19	< 0.01	ug/L	No
Metribuzin	July 15/19	< 0.02	ug/L	No
Monochlorobenzene	July 15/19	< 0.3	ug/L	No
Paraquat	July 15/19	< 1	ug/L	No
Pentachlorophenol	July 15/19	< 0.15	ug/L	No
Phorate	July 15/19	< 0.01	ug/L	No
Picloram	July 15/19	< 1	ug/L	No
Polychlorinated Biphenyls (PCB)	July 15/19	< 0.04	ug/L	No
Prometryne	July 15/19	< 0.03	ug/L	No
Simazine	July 15/19	< 0.01	ug/L	No
Terbufos	July 15/19	< 0.01	ug/L	No
Tetrachloroethylene	July 15/19	< 0.35	ug/L	No
2,3,4,6-Tetrachlorophenol	July 15/19	< 0.20	ug/L	No
Triallate	July 15/19	< 0.01	ug/L	No
Trichloroethylene	July 15/19	< 0.44	ug/L	No
2,4,6-Trichlorophenol	July 15/19	< 0.25	ug/L	No
Trifluralin	July 15/19	< 0.02	ug/L	No
Vinyl Chloride	July 15/19	< 0.17	ug/L	No

Dent Well #2

Organic Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor	July 17/17	< 0.02	ug/L	No
Atrazine + N-dealkylated metabolites	July 17/17	< 0.01	ug/L	No
Azinphos-methyl	July 17/17	< 0.05	ug/L	No
Benzene	July 17/17	< 0.32	ug/L	No
Benzo(a)pyrene	July 17/17	< 0.004	ug/L	No
Bromoxynil	July 17/17	< 0.33	ug/L	No
Carbaryl	July 17/17	< 0.05	ug/L	No
Carbofuran	July 17/17	< 0.01	ug/L	No
Carbon Tetrachloride	July 17/17	< 0.16	ug/L	No
Chlorpyrifos	July 17/17	< 0.02	ug/L	No
Diazinon	July 17/17	< 0.02	ug/L	No
Dicamba	July 17/17	< 0.20	ug/L	No
1,2-Dichlorobenzene	July 17/17	< 0.41	ug/L	No
1,4-Dichlorobenzene	July 17/17	< 0.36	ug/L	No
1,2-Dichloroethane	July 17/17	< 0.35	ug/L	No
1,1-Dichloroethylene (vinylidene chloride)	July 17/17	< 0.33	ug/L	No
Dichloromethane	July 17/17	< 0.35	ug/L	No
2-4 Dichlorophenol	July 17/17	< 0.15	ug/L	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	July 17/17	< 0.19	ug/L	No
Diclofop-methyl	July 17/17	< 0.40	ug/L	No
Dimethoate	July 17/17	< 0.03	ug/L	No
Diquat	July 17/17	< 1	ug/L	No
Diuron	July 17/17	< 0.03	ug/L	No
Glyphosate	July 17/17	< 1	ug/L	No
Malathion	July 17/17	<0.02	ug/L	No
2 methyl-4-chlorophenoxyacetic acid (MCPA)	July 17/17	< 0.00012	mg/L	No
Metolachlor	July 17/17	< 0.01	ug/L	No
Metribuzin	July 17/17	< 0.02	ug/L	No
Monochlorobenzene	July 17/17	< 0.3	ug/L	No
Paraquat	July 17/17	< 1	ug/L	No
Pentachlorophenol	July 17/17	< 0.15	ug/L	No
Phorate	July 17/17	< 0.01	ug/L	No
Picloram	July 17/17	< 1	ug/L	No
Polychlorinated Biphenyls (PCB)	July 17/17	< 0.04	ug/L	No
Prometryne	July 17/17	< 0.03	ug/L	No
Simazine	July 17/17	< 0.01	ug/L	No
Terbufos	July 17/17	< 0.01	ug/L	No
Tetrachloroethylene	July 17/17	< 0.35	ug/L	No
2,3,4,6-Tetrachlorophenol	July 17/17	< 0.20	ug/L	No
Triallate	July 17/17	< 0.01	ug/L	No
Trichloroethylene	July 17/17	< 0.44	ug/L	No
2,4,6-Trichlorophenol	July 17/17	< 0.25	ug/L	No
Trifluralin	July 17/17	< 0.02	ug/L	No
Vinyl Chloride	July 17/17	< 0.17	ug/L	No

Trihalomethane (THM) distribution sampling is required quarterly and must also be expressed as a running annual average. The limit as set in the Ontario Drinking Water Quality Standards is 100 ug/L. Trihalomethanes are a by-product of the disinfection process.

Date Sampled	THM Result Value (ug/L)	Running Annual Average (ug/L)	Exceedance
January 14/19	44	43.8	No
April 8/19	40	51.5	No
July 8/19	48	51.8	No
October 7/19	46	44.5	No

Sampling and testing for haloacetic acids (HAA) in the distribution system is a new requirement in 2017. The limit as set in the Ontario Drinking Water Quality Standards is 80 ug/L and starting in 2020 must also be expressed as a running annual average. Haloacetic acids are a by-product of the disinfection process.

Date Sampled	HAA Result Value (ug/L)	Running Annual Average (ug/L)	Exceedance
January 14/19	< 5.3	5.3	No
April 8/19	< 5.3	5.3	No
July 8/19	6.1	5.5	No
October 7/19	< 5.3	5.5	No

The Tiverton DWS does not have significant levels of lead and so is currently under a reduced-sampling program. Under this sampling program, O. Reg 170 Schedule 15.1 requires sampling for lead every three years and lead-related parameters (pH and alkalinity) every year. Lead was not required to be sampled in 2019. In 2018, the lead results in the distribution water ranged from <0.01 to 0.53 ug/L.

Parameter	Location Type	Number of Samples	Range of Results
pH	Distribution	4	7.70 – 7.90
Alkalinity (mg/L)	Distribution	4	88 – 125

2.3. Operational Monitoring

Sodium hypochlorite is used for primary and secondary disinfection. The free chlorine residual is monitored continuously on the treated water and seven grab samples are taken each week in the distribution system. In addition, free chlorine levels are monitored continuously at one location in the distribution system. One grab sample was not collected in the distribution system due to inclement weather and closed roads but the chlorine was continuously monitored at the standpipe. The Ministry of the Environment, Conservation and Parks *Procedure for Disinfection of Drinking Water in Ontario* outlines the minimum chlorine residual for adequate treatment.

Free Chlorine Residual	**Number of Grab Samples**	**Range of Results (#-#)**
Briar Hill Well #1 & #2 Treated Water	Continuous Monitoring	0.17 – 8.47
Dent Well #2 Treated Water	Continuous Monitoring	0.24 – 2.00
Distribution Water	364	0.38 – 1.57
Distribution Water	Continuous Monitoring	0.33 – 2.00

O. Reg 170 Schedule 7 requires that turbidity in the raw water is tested at least once every month. Consistent turbidity results greater than 5 NTU could indicate surface water influence on the well.

Raw Water Turbidity	**Number of Grab Samples**	**Range of Results (#-#)**
Briar Hill Well #1	51	0.10 – 0.71
Briar Hill Well #2	51	0.08 – 0.49
Dent Well #2	49	0.10 – 0.84

3. WATER QUANTITY

The following tables list the quantities and flow rates of the water supplied to the distribution system during the reporting period covered by this report, including monthly average and maximum daily flows and a comparison to the rated capacity specified in the system Municipal Drinking Water Licence.

Briar Hill Wells #1 and #2
The rated capacity from the Briar Hill Pumphouse is 717.12 m^3/day. There is no maximum flow rate specified for water supplied to the distribution system.

Month	Average Daily Flow (m^3/day)	% Average Day Flow/ Rated Capacity	Maximum Daily Flow (m^3/day)	% Maximum Day Flow/ Rated Capacity
January	178	25%	257	36%
February	199	28%	267	37%
March	184	26%	205	29%
April	184	26%	440	61%
May	197	27%	405	56%
June	164	23%	286	40%
July	184	26%	231	32%
August	189	26%	260	36%
September	172	24%	200	28%
October	151	21%	260	36%
November	223	31%	248	35%
December	197	28%	238	33%
Annual	185.1	26%	440	61%

Month	Average Daily Flow Rate (L/s)	Maximum Daily Flow Rate (L/s)
January	2.06	10.10
February	2.30	10.26
March	2.13	5.66
April	2.12	10.03
May	2.28	5.86
June	1.90	10.26
July	2.13	10.22
August	2.19	5.84
September	1.99	5.91
October	1.74	5.90
November	2.58	5.66
December	2.28	5.65
Annual	2.14	10.26

Dent Well #2
The rated capacity from the Dent Pumphouse is 397.44 m^3/day. There is no maximum flow rate specified for water supplied to the distribution system. (It should be noted that the Permit to Take Water limit for water taking from the Dent Well is 250.5 m^3/d.)

Month	Average Daily Flow (m^3/day)	% Average Day Flow/ Rated Capacity	Maximum Daily Flow (m^3/day)	% Maximum Day Flow/ Rated Capacity
January	47.7	12%	123.7	31%
February	36.1	9%	88.3	22%
March	38.1	10%	62.6	16%
April	51.4	13%	175.5	44%
May	42.0	11%	162.3	41%
June	39.7	10%	109.6	28%
July	46.2	12%	90.3	23%
August	50.5	13%	98.3	25%
September	41.1	10%	60.6	15%
October	58.6	15%	177.8	45%
November	54.3	14%	77.0	19%
December	54.3	14%	139.0	35%
Annual	46.7	12%	177.8	45%

Month	Average Daily Flow Rate (L/s)	Maximum Daily Flow Rate (L/s)
January	0.55	10.30
February	0.42	10.30
March	0.44	4.94
April	0.59	10.21
May	0.49	9.14
June	0.47	9.95
July	0.54	10.13
August	0.58	5.18
September	0.47	5.19
October	0.68	5.20
November	0.63	5.18
December	0.63	5.41
Annual	0.54	10.30

4. ADVERSE WATER QUALITY INCIDENTS AND NON-COMPLIANCE FINDINGS

Any adverse results from microbiological samples, chemical samples or observations of operational conditions that indicate adverse water quality are reported to the Spills Action Centre (SAC) of the Ministry of the Environment, Conservation and Parks and the Medical Officer of Health (MOH). All adverse conditions are responded to immediately and corrective actions taken.

Incident Date	Parameter	Result	Corrective Action	Corrective Action Date
December 19, 2019 AWQI #149302	Total Coliform E. coli	16 cfu/100mL 14 cfu/100 mL	Resample	December 19, 2019

The annual Ministry of the Environment, Conservation and Parks Inspection took place on May 7, 2019. The inspection report did not identify any non-compliance issues and the system received a final inspection rating of 100%.

O. Reg 170 Schedule 22 requires the municipality to identify any requirements of the Safe Drinking Water Act, Regulations, Drinking Water Works Permit, Municipal Drinking Water Licence and any Order that the system failed to meet during the reporting period. All requirements were met in 2019.