



DAVY DRIVE WATER WORKS

2019 Water Quality Summary
Report



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1 INTRODUCTION

The Davy Drive Water Works (Water Works) supplies water to the Riverleigh Woods Subdivision located on Lot 17, Concession 7. The development, built in 1977, consists of 42 residential lots. A total of 34 lots were connected in 2019, serving an estimated population of 88 residents (based on the Township of Ramara's average population of 2.6 people per dwelling).

This report provides a description of the Water Works and summarizes the monitoring program, water quality, water consumption, chemical usage, system repairs, and maintenance completed in 2019.

This report also summarizes the Water Works compliance status with the Safe Drinking Water Act (SDWA), the Ministry of the Environment, Conservation and Parks (MECP) Drinking Water Works Permit (DWWP) and the MECP Municipal Drinking Water License (MDWL). This annual report summary was prepared for presentation to the Township of Ramara Council as required by Ontario Regulation 170/03 - Drinking Water Systems (O. Reg. 170/03), Schedule 22.

2 APPROVALS

The Water Works is approved under Drinking Water Works Permit (DWWP) No. 147-206, Issue No. 4 and Municipal Drinking Water Licence (MDWL) No. 147-106, Issue No. 3, both dated July 20, 2016.

Table 1 summarizes all approvals issued since 1974.

Table 1: Summary of Approvals

Date Issued	Approval Number	Description
August 30, 2017	7187-AQPS6B	PTTW issued.
July 20, 2016	147-206 Issue No. 4	Drinking Water Works Permit renewal
July 20, 2016	147-106 Issue No. 3	Municipal Drinking Water License renewal
September 18, 2013	147-206 Issue No. 3	DWWP Schedule C Authorization for the addition of a water storage standpipe and two high lift pumps.
February 14, 2013	147-106 Issue No. 2	MDWL – Issue 2
February 14, 2013	147-206 Issue No. 2	DWWP – Issue 2
August 4, 2011	147-106 Issue No. 1	MDWL. Revokes and replaces # 7947-7BURV5
August 3, 2011	147-206 Issue No. 1	DWWP. Revokes and replaces # 7947-7BURV5
June 9, 2008	7947-7BURV5	Revokes and replaces #2533-6EQKRH. Amendment for pre-chlorination system and Well No. 4.
August 11, 2005	2533-6EQKRH	Revokes and replaces # 8483-5W4JBX. Amendment for as-constructed operating conditions.
March 3, 2004	8483-5W4JBX	Approves upgrades and extends upgrades deadline to December 31, 2004. Revokes # 6645-5J2MFY.
January 28, 2003	6645-5J2MFY	Extends deadline for upgrades. Revokes # 6261-53YNT3.
January 9, 2002	6261-53YNT3	Consolidated C of A. Revokes # 7-0181-74-006.
March 29, 1974	7-0181-74-006	Approval for well, Water Works building and water mains.

Permit to Take Water (PTTW) No. 7187-AQPS6B was issued on August 30, 2017 and expires on August 30, 2027. The PTTW allows a maximum daily taking of 75,690 L/d and the following maximum rates and amounts of water taking from each well:

	<u>Maximum Rate</u>	<u>Amount/Day</u>
Well No. 1	25 L/min	15,500 L/d
Well No. 2	20 L/min	11,640 L/d
Well No. 3	60 L/min	49,500 L/d
Well No. 4	75 L/min	49,500 L/d

The permit allows any combination of wells to be utilized to meet system demands, up to the maximum daily taking, while any well is offline for maintenance purposes.

3 DESCRIPTION OF WATER WORKS

The Water Works are described below as they operated in 2019.

3.1 WATER SOURCE

The Davy Drive Water Works system consists of the following four wells:

- Well No. 1, drilled in 1970, is a 152 mm diameter and 75 m deep well located in the Water Works building. A 45 L/min (10 lpm), 1.5 HP Goulds submersible pump is installed in this well, at a depth of 61 m. In 2000, the well was sleeved with a 127 mm diameter steel casing to a depth 6.7 m.
- Well No. 2, drilled in 1995, is a 152 mm diameter and 76 m deep well, located at a distance of 15 m from Well No. 1. A 23 L/min (5 lpm), 1.5 HP Berkeley submersible pump, also set at a depth of 61 m is used in this well. The well is sleeved with a 152 mm diameter steel casing to a depth of 6.7 m.
- Well No. 3, drilled in 2002, is a 152 mm diameter and 60 m deep well, located at a distance of 30 m north of the Water Works building. A 65 L/min (14.4 lpm), 1.0 HP Goulds pump is set at a depth of approximately 60 m. The well is sleeved with a 152 mm diameter steel casing to a depth of 9.1 m.
- Well No. 4, drilled in 2006, is a 152 mm diameter and less than 30.5 m deep well, located at a distance of 80 m north of the Water Works building. A 75 L/min (16.5 lpm), 1.5 HP Goulds submersible deep well pump is set at a depth of 30 m. The well is sleeved with a 152 mm diameter steel casing to a depth of 6.1 m.

3.2 WATER TREATMENT

Raw water is injected with sodium hypochlorite for iron oxidation, and with potassium permanganate for iron and manganese oxidation. Greensand filters are utilized to filter the oxidized iron and manganese. Cartridge filters, down to one micron absolute, and

UV disinfection provide the filtration and primary disinfection required for GUDI wells. Sodium hypochlorite is injected into the filtered water upstream of the standpipe, for secondary disinfection.

The components of the treatment process are described below:

1. Each well line is fitted with a magnetic flow meter to monitor the total daily flow and the peak instantaneous flow taken from each well. A combined raw water magnetic flow meter provides a 4-20 mA signal for both flow pacing the chemical injection and for recording flows on the paperless chart recorder. The paperless chart recorder records the total raw water daily average flow rate, the total daily flow and the peak instantaneous flow rate.
2. The well pump control panel allows the operators to select the duty and stand-by wells. Each well can be run individually or with one another. Each well pump has an hour meter to log the number of hours it operates.
3. Well pump starts and stops are controlled by the water level in the standpipe by an ultrasonic level transducer. Backup pressure switches, set for an operating range of 345 – 450 kPa (50 – 65 psi), are provided to control the well pumps if the standpipe and high lift pumps are off-line. The pressure switches are located on the piping downstream of the greensand filters, upstream of the cartridge filter/UV treatment trains.
4. One 453 L pressure tank is utilized to maintain pressure in the piping when the well pumps are off.
5. A pre-chlorination system is used for iron oxidation and injects sodium hypochlorite into the combined raw water discharge line. The system consists of four chemical feed pumps, one for each well line, and a single calibrated solution tank situated over a common secondary containment system.
6. A potassium permanganate chemical feed system is used to oxidize the raw water iron and manganese. It consists of two injection points on the combined raw water discharge line, two chemical feed pumps, one duty and one stand-by with automatic switchover in case of duty pump failure, and one chemical solution tank complete with mixer and secondary containment.
7. Two greensand filters remove the oxidized (particulate) iron and manganese. Each filter can treat the entire design flow. The second unit is provided to allow treatment to continue while one unit is in backwash mode and/or shut down for maintenance purposes. The backwash cycle consists of a flush cycle that pushes water through the filter from the bottom up, a rest cycle that allows the filter media to settle down, and a rinse cycle that filters water to waste. Each filter has

two diaphragm valves and one solenoid valve to control the water supply to the filter during a backwash cycle.

8. A 5.7 L/s (90 USgpm) backwash pump draws treated water from the standpipe to the filters via the backwash water supply line. The backwash water supply line is fitted with a pressure relief valve to ensure the pump does not dead head during the filters' rest cycle in the backwash process.
9. Two parallel trains of cartridge filters and UV disinfection units provide the filtration and primary disinfection to meet the minimum treatment requirements for a GUDI source. Each train includes: one 25-1 micron nominal cartridge filter; followed by one 1-micron absolute cartridge filter; followed by one Hallet 30-1.5 UV disinfection unit. Each UV unit is equipped with a flow control valve and a powered-open solenoid valve that will automatically close in the event of low UV transmittance, UV system failure or general power failure. However, as each UV unit is connected to a UPS and the emergency power generator, the solenoid valve should not close on a general power failure. All alarms for the UV systems are relayed to the operators through the alarm dialer system.
10. Two motorized valves control the recirculation system that provides cooling to the UV system between treatment cycles (Valve 116 and Valve 121).
11. A sodium hypochlorite chemical feed system is used for secondary disinfection. It consists of two injection points on the common discharge line of the cartridge filter/UV treatment trains, two chemical feed pumps, one duty and one standby with automatic switchover in case of duty pump failure and one chemical solution tank with secondary containment. The chemical pumps alternate as duty and standby after each pump start.
12. One 43 m³ glass-fused-to-steel water storage standpipe, 4.26 m diameter by 3.28 m high. The standpipe is equipped with an ultrasonic level transducer for well pump control and standpipe level monitoring.
13. Two high lift distribution pumps, each rated 0.88 L/s at 49 m TDH, each equipped with variable frequency drive (VFD) motors.
14. Two continuous in-line turbidity analyzers, at the discharge end of the cartridge filter trains, monitor turbidity of the filtered water. Continuous water quality analyzers monitor the free chlorine residual, pH and turbidity of the treated water before it enters the distribution system. The analyzers are logged by the paperless chart recorder and have alarm set points to notify the operators of adverse water quality results.

15. A distribution water magnetic flow meter provides a 4-20 mA signal for recording the daily average flow rate, the total daily flow and the peak instantaneous flow rate entering the distribution system on the paperless chart recorder.

3.3 WASTE WATER TREATMENT AND DISPOSAL

Two wastewater treatment and disposal systems are provided: the filter backwash wastewater system and the grey water from the sample sink disposal system.

3.3.1 Filter Backwash Wastewater System

The components of the filter backwash wastewater system are:

1. A 13,500 L wastewater precast concrete settling tank with float controls and effluent pump. It is located below grade in the yard north of the Water Works building. Backwash wastewater is held for 12 hours to settle out the solids. Then supernatant is pumped to the ditch.
2. A ¼ HP effluent pump is used to pump supernatant from the settling tank. The pump is set at 0.3 m above the tank floor. Solids accumulating at the bottom are removed periodically for disposal.
3. 4m of 100 mm diameter discharge piping outlets to the ditch, east of the Water Works building.

3.3.2 Grey Water Disposal System

Grey water from the sample sink is disposed in an infiltration trench. The system consists of a 900 mm by 900 mm by 900 mm precast concrete tank and 12 m of distribution piping located on the east side of the Water Works building adjacent to the south side of the driveway.

3.4 EMERGENCY GENERATOR

A 20 kW propane powered generator is in a fenced enclosure just west of the Water Works building, to supply power during hydro supply power outages. The generator has sufficient capacity to run the well pumps, chemical feed systems, UV units, analyzer equipment, building lighting and heating in the event of a power outage. There is insufficient power to start a filter backwash process automatically on generator power. A backwash can be started manually on generator power by an operator if power consumption is reduced by turning off other equipment.

The generator can operate for 5 days at maximum capacity when its propane tank is full.

3.5 WATER DISTRIBUTION SYSTEM

The distribution system consists of approximately 1300 m of 50 mm diameter PVC watermain. There is approximately 800 m between the Water Works building and the split in the road, and approximately 500 m total in the two cul-de-sacs. A blow-off and sample station has been installed at the end of each cul-de-sac for flushing and testing purposes.

4 WATER QUALITY MONITORING

4.1 MICROBIOLOGICAL SAMPLING AND RESULTS

The Water Works must be operated in such a manner as to meet the treatment requirements specified in Ontario Regulation 170/03 and Ontario Regulation 169/03.

Appendix A summarizes the sampling and testing requirements in accordance with Schedule 11 of O. Reg. 170/03.

The sampling locations are as follows:

- Raw water: from each well as it enters the Water Works building
- Treated water: after treatment, just before the water leaves the water works building
- Distribution: at a point in the distribution system that is the furthest from the treatment system. THMs, HAAs and lead are to be sampled at a location that is likely to have an elevated concentration.

Seven (7) water samples are taken on a weekly basis for microbiological testing: one sample from each well (raw), one sample of the treated water at the Water Works building (treated), and two samples at various locations in the distribution system.

Raw water samples are tested for Total Coliforms, Escherichia coli (E. coli) and background colonies.

Treated and distribution water samples are tested for Total Coliforms, E. coli, Heterotrophic Plate Count (HPC), and background colonies.

All bacteriological testing was performed by the accredited laboratory SGS Lakefield Research Limited (SGS) in Lakefield, Ontario.

The results of the bacteriological analyses are reviewed by the overall responsible operator and kept electronically at the Township office. If a treated or distribution water sample contains Total Coliforms or E.coli, the MECP Spills Action Centre and the Simcoe Muskoka District Health Unit are notified immediately, verbally and in writing. The site is also re-sampled.

All treated water bacteriological test results met the Ontario Drinking - Water Quality Standards of Ontario Regulation 169/03 (O. Reg. 169/03) Schedule 1 microbiological requirements.

A summary of microbiological testing can be found in Appendix C.

4.2 FREE CHLORINE RESIDUAL MONITORING AND RESULTS

Primary disinfection is achieved by UV disinfection. Sodium hypochlorite is used for secondary disinfection and operators monitor the chlorine residuals in treated and distribution water.

Free chlorine residuals at the Water Works building are monitored using a continuous analyzer. In 2019, free chlorine residuals ranged between 0.0 mg/L and 2.89 mg/L. When the continuous analyzer measured a free chlorine residual outside of the operation limits, the on-duty operators compared the results with those of a hand-held analyzer, and confirmed all Water Works equipment was operating normally. All measurements recorded outside the operating range were attributed to testing of alarm set-points, a short-term power failure, regular maintenance or cleaning. The continuous analyzer was re-calibrated as required. Hand-held measurements of free chlorine ranged between 0.73 mg/L and 2.19 mg/L.

Free chlorine residuals in the distribution system are monitored daily, in accordance with Ontario Regulation 170/03, Schedule 7. The operator used a portable Hach Chlorine Residual Meter to verify that the free chlorine residuals were maintained within the operation limits of 0.2 mg/L to 4.0 mg/L. Free chlorine residuals in the daily water distribution samples ranged between 0.58 mg/L and 1.86 mg/L.

Free chlorine residuals are summarized in Table 2.

Table 2: Davy Drive - 2019 Free Chlorine Residuals

Free Chlorine Residuals (ppm)						
Month	Water Works				Distribution System	
	Continuous Analyser		Hand-held Instrument (Daily)			
	Min*	Max	Min	Max	Min	Max
January	0.00	1.95	1.07	1.72	0.84	1.52
February	0.00	1.90	1.04	1.59	0.66	1.11
March	0.40	1.94	1.14	1.65	0.92	1.38
April	0.15	1.81	1.24	1.59	0.92	1.43
May	0.00	1.96	1.10	1.80	0.74	1.55
June	0.20	2.50	1.24	2.19	0.88	1.62
July	0.21	2.01	1.07	1.82	0.76	1.52
August	0.01	1.97	0.73	1.61	0.62	1.29
September	0.02	1.55	0.77	1.19	0.58	1.03
October	0.55	1.82	1.04	1.61	0.92	1.37
November	0.06	2.51	1.18	1.70	1.12	1.62
December	0.00	2.89	1.52	2.30	1.20	1.86

*Low chlorine alarm test or non-reportable event

4.3 PHYSICAL/CHEMICAL TESTING RESULTS

4.3.1 Raw Water

A quarterly raw water sampling program was initiated in 2006 to test for major ions, nitrite and nitrate from each well. The intent of the program is to permit trend analysis of the results by a hydrogeologist for future studies pertaining to source water protection for the municipal water supply wells.

The quality of raw water from the Davy Drive wells is tested in February, May, August and November annually by SGS Laboratories. A full characterization of the physical/chemical quality of the raw water from the Davy Drive wells was last completed in 2001 and 2002. Raw water quality laboratory results for 2019 are summarized in Appendix B.

Raw water quality observed in 2019 is consistent with results from previous years. Hardness (CaCO₃) and manganese in all wells exceeded the aesthetic objectives for treated water as specified in Table 4 of the Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (June 2003) (ODWS). Colour was equal to or exceeded the aesthetic objective in all samples except for the May sample from Well 3 and the August sample from Well 4. Iron content generally exceeds the aesthetic objective from all wells.

Sodium concentration exceeded 20 mg/L from Well 2 in February and May.

Nitrate concentrations ranged from 0.006 mg/L to 0.007 mg/L.

Hand-held measurements of turbidity were in the following ranges:

- 0.36 NTU – 5.79 NTU in Well No. 1;
- 0.31 NTU – 1.88 NTU in Well No. 2;
- 0.48 NTU – 1.68 NTU in Well No. 3; and
- 0.50 NTU – 3.08 NTU in Well No. 4.

4.3.2 Treated Water

Treated water quality was tested by SGS in February, May, August, and November 2019. Treated water was tested for Colour, Iron, Manganese, Nitrate and Nitrite. Water in the distribution system was tested for Trihalomethanes (THMs), Haloacetic Acids (HAAs) and Lead.

Treated water quality laboratory results for 2019 are summarized in Table 3.

Treated water quality met the specifications in O. Reg. 169/03, Schedule 2, and the AO/OG of the ODWS. The filters effectively reduced iron and manganese concentrations in the raw water by $\geq 98\%$.

Table 3: Davy Drive - 2019 Treated Water Quality Results

Parameter	Feb	May	Aug	Nov	MAC	AO/OG
Colour (TCU)	<3	<3	<3	<3		5
Iron ($\mu\text{g/L}$)	<7	12	<7	<7		300
Manganese ($\mu\text{g/L}$)	1.35	2.82	0.49	0.86		50
Nitrite (mg/L)	<0.003	<0.003	<0.003	<0.003	1	
Nitrate (mg/L)	0.053	0.058	0.026	0.056	10	
Nitrate + Nitrite (mg/L)	0.053	0.058	0.026	0.056		
Lead (Distribution) ($\mu\text{g/L}$)			0.21		10	
THM Total (Distribution) ($\mu\text{g/L}$)	52.3	70.3	73.6	74.58		
THM (Distribution) * ($\mu\text{g/L}$)	75	76.5	68	67.7	100*	
HAA Total (Distribution) ($\mu\text{g/L}$)	57.8	71.7	48.7	81		
HAA (Distribution) * ($\mu\text{g/L}$)	72.7	72.9	63.5	64.8	80*	

*Four Quarter Running Average

AO/OG – Aesthetic Objective/Operational Guideline

MAC – Maximum Acceptable Concentration

4.3.2.1 Lead

In accordance with the lead testing requirements of O. Reg. 170, Schedule 15.1-5 (10), treated water in the distribution system was tested for lead, alkalinity and pH in March and August 2019. All parameters were within the AO/OG and MAC of the ODWS. The laboratory results are summarized in Table 4.

Table 4: Davy Drive - 2019 Lead Testing Results

Date	Location	pH	Alkalinity (mg/L)	Lead (ug/L)
March 11, 2019	Sample Station 7449	6.63	131	0.37
August 21, 2019	Sample Station 1	6.94	155	0.21

Maximum Acceptable Concentration for Lead: 10 ug/L

Operational Guideline for Alkalinity: 30-500 mg/L

Operational Guideline for pH: 6.5-8.5

4.3.2.2 Turbidity

Treated water turbidity and filter effluent turbidity were monitored by continuous analyzers. Treated water turbidity ranged between 0.0 NTU and 4.15 NTU. Turbidity readings outside the operating range of 0.0 NTU to 1.0 NTU occurred during routine maintenance (continuous analyzer cleaning and calibration) or were caused by air bubbles in the treated water, or failure of the turbidity meter wiper.

As required by the MECP's Procedure for Disinfection for Drinking Water in Ontario, June 2006, in order for the treatment system to claim the 2.0 log *Cryptosporidium* removal credit, the filter turbidity results must be less than or equal to 0.2 NTU in 95% of the measurements taken each month. This was achieved for all months in 2019.

4.4 WASTE WATER SAMPLING

The MDWL specifies the filter backwash waste water must be sampled and analyzed quarterly for iron and total suspended solids (TSS). The annual average concentration in the effluent discharged from the backwash waste water facilities must not exceed 15 mg/L for TSS and 1 mg/L for iron. The 2019 annual average concentration of TSS was 5.5 mg/L and iron was 0.90 mg/L, respectively. Backwash is also tested for manganese to evaluate the effectiveness of manganese removal by the filters. The annual average concentration of manganese was 0.35 mg/L.

4.5 WELL LEVEL MONITORING

The static water levels in Wells No. 1, 2, 3, and 4 were monitored monthly as required by the PTTW, with the exception of August. The operator missed recording the static water levels in August. The recorded water levels, measured from the top of the well casing, are summarized in Table 5. These results will be reviewed by a hydrogeologist to evaluate the condition of the wells and the aquifer prior to any future PTTW applications.

Table 5: Davy Drive - 2019 Supply Wells Static Water Levels

Depth of Water Below Top of Well Casing (m)				
Date	Well No. 1	Well No. 2	Well No. 3	Well No. 4
January 30, 2019	4.18	4.36	4.40	4.43
February 21, 2019	3.77	3.94	4.08	4.11
March 29, 2019	3.61	3.94	4.28	4.15
April 26, 2019	4.16	6.81	2.99	2.90
May 23, 2019	4.26	7.49	3.05	2.90
June 27, 2019	4.01	10.41	3.95	3.79
July 30, 2019	3.88	6.39	3.95	4.01
August				
September 26, 2019	3.91	7.01	4.16	3.90
October 29, 2019*	13.33	10.60	8.26	7.98
November 28, 2019	5.27	8.43	3.78	3.64
December 27, 2019	9.79	10.87	6.81	9.91
Average				
Minimum				
Maximum				

*Raw water pumps ran 20 minutes before measurements were taken.

A measurement of static water levels was not recorded for the month of August.

5 WATER USAGE

5.1 WATER CONSUMPTION AND CHEMICAL USAGE

The average water consumption in Davy Drive during 2019 was 14.5 m³/day, as shown in Table 6. This corresponds to an estimated per capita average water consumption of 165 L/p/day. The maximum daily flow of 32 m³/day corresponds to 42% of the system's rated capacity of 76 m³/day.

Sodium hypochlorite usage for pre- and post- chlorination and potassium permanganate usage in 2019 are also summarized in Table 6.

Total annual water consumption in 2019 was 1.22% higher than in 2018. A summary of the average daily demand (ADD), maximum daily demand (MDD) and the three year (2017 to 2019) historical averages and maximums are presented in Table 7.

Table 6: Davy Drive - 2019 Water Consumption and Chemical Usage

Month	Water Consumption				Sodium Hypochlorite Usage (L)	Potassium Permanganate Usage (kg)
	Total (m ³)	Average (m ³ /d)	Maximum (m ³ /d)	Minimum (m ³ /d)		
January	379	12.2	16	6	30.27	0.16
February	339	12.1	15	10	23.84	0.11
March	404	13.0	16	10	27.93	0.12
April	414	13.8	17	11	29.94	0.11
May	459	14.8	26	12	33.12	0.14
June	537	17.9	32	13	38.13	0.21
July	561	18.1	30	14	39.10	0.21
August	522	16.8	31	13	37.23	0.19
September	405	13.5	22	11	31.48	0.13
October	428	13.8	17	11	34.79	0.12
November	406	13.5	18	11	33.55	0.13
December	458	14.8	17	13	36.40	0.18
Total	5,312				395.8	1.80
Average		14.5			-	-
Min./Max.			32	6	-	-

Table 7: Davy Drive Water Works Historical Treated Water Demand

Year	No. of Connections	ADD (m ³ /day)	MDD (m ³ /day)	Rated Capacity (m ³ /day)	Per Capita Consumption (L/p/day)	
					Average	Maximum
2006	33	17	41	76	200	478
2007	32	16	29	76	191	349
2008	32	17	29	76	207	347
2009	32	15	28	76	183	336
2010	32	15	32	76	179	389
2011	32	15	24	76	177	288
2012	34	14	29	76	158	322
2013	34	16	31	76	180	352
2014	34	17	44	76	192	498
2015	34	13	26	76	149	294
2016	34	13	35	76	152	396
2017	34	12.3	21	76	140	239
2018	34	14.3	23	76	163	261
2019	34	14.5	32	76	165	363
3 Yr Avg / Max		13.7	32		156	363

5.2 LAWN WATERING BAN

No owner of occupant within Davy Drive is permitted to use water from the Water Works for the purpose of watering lawns or gardens or for any other non-domestic use, as per municipal Bylaw No. 2005.72.

5.3 SYSTEM RESERVE CAPACITY

In accordance with MECP Procedure D-5-1, the reserve capacity is calculated by the following formula:

$$\text{Reserve Capacity} = \text{Design Flow} - \text{Committed Flow}$$

Design flow is the maximum permissible flow approved by the MDWL and/or PTTW. Davy Drive Water Works' maximum day rated capacity is 76 m³/day.

The committed flow is the total expected water demand from the existing and proposed connections based on the previous three years of data. The committed number of service connections is 42. The three-year (2017-2019) maximum day per capita water consumption is 363 L/p/day. At this water consumption rate, the committed flow is 39.5 m³/day.

Therefore, the calculated reserve capacity is 36.5 m³/day.

6 OPERATION AND MAINTENANCE

6.1 SYSTEM INSPECTION

The water system is inspected annually by the Ministry of Environment, Conservation and Parks (MECP) to confirm compliance with MECP legislation and authorizing documents (the DWWP and MDWL), as well as evaluating conformance with Ministry drinking water-related policies and guidelines. The physical inspection took place on November 21, 2019 with the inspection review period of November 1, 2018 – November 1, 2019.

There was an issue of non-compliance with regulatory requirements identified during the inspection review period. Details of the inspection is in [Section 8: Compliance Status](#).

6.2 SUMMARY OF MAINTENANCE AND REPAIRS

Throughout the year, regular maintenance was completed at the Water Works such as cleaning and calibrating the chlorine and turbidity analyzers, cleaning the chlorine pumps, injectors and lines, flushing mains, operating main valves and responding to power failures.

All flow meters were recalibrated by a qualified technician in January, 2019.

Repairs and regular maintenance completed in 2019 were as follows:

- Replace U.V bulbs UV #2
- Replace uninterrupted power source on UV units
- Replace UV #2 turbidity optical sensor
- Replace filter seats in filter #1 and #2
- Replace generator starter relay
- Replace Well #2 starter solenoid
- Replace backwash timers
- Replace generator bloc heater

6.3 SUMMARY OF UPGRADES AND IMPROVEMENTS

No new equipment was added.

6.4 PUBLIC COMPLAINTS

No complaints were received in 2019.

7 WATER WORKS AND OPERATOR LICENSES

The MECP Water Works number is 220007141. The Water Works is categorized as a Small Municipal Residential system.

A summary of the facility operators in 2019 and their level of certification are listed in Table 8.

Table 8: Certified Operators

Operator	Water Treatment Class	Licence No./ Expiry Date	Water Dist. Class	Licence No./ Expiry Date
Dave Readman	Class II	12460 July 31.21	Class II	13530 July 31.21
Donald O'Connell	Class II	53308 Feb 28.23	N/A	N/A
Rob Smith	Class III	53310 Feb 28.23	Class III	96079 Feb 28.23
Nicholas Leroux	Class III	68579 July 31.21	Class III	83999 Mar 31.20
Joe Foley	Class II	87270 Aug 31.21	N/A	N/A
Kyle Readman	Class I	102761 Oct. 31.21	N/A	N/A

The Operators attended workshops, seminars and training throughout the year to ensure they maintain and enhance their knowledge pertaining to the operation of drinking water systems and remain knowledgeable on current trends in the industry.

Each operator is mandated by Ontario Regulation 128/04 under the Safe Drinking Water Act, 2002 to complete the applicable number of required training hours over a 3-year period in order to renew their licence.

8 COMPLIANCE STATUS

The drinking water system is subject to the legislative requirements of the Safe Drinking Water Act and regulations made therein, including Ontario Regulation 170/03 “Drinking Water Systems”.

The MECP conducted an inspection of the Davy Drive Water Works on November 21, 2019. The primary focus of the inspection is to confirm compliance with Ministry of Environment, Conservation and Parks legislation and authorizing documents, as well as evaluating conformance with Ministry drinking water-related policies and guidelines during the inspection review period.

There was an issue of non-compliance with regulatory requirements identified during the inspection review period. All UV sensors were not checked and calibrated as required under Schedule E of the Municipal Drinking Water Licence (MDWL).

The MDWL states that the sensors are to be checked monthly or as per the recommendations of the equipment manufacturer. The manufacturer of the UV units provided documentation which recommends an annual sensor check. During the inspection review period, on January 19, 2019, the UV sensors were checked against the calibration unit. Current UV sensors were replaced with new ones on January 17, 2020, with existing sensors sent out to be calibrated by manufacturer.

No Provincial Orders were issued in conjunction with this inspection.

The Water Works adhered to the sampling and testing requirements of the Safe Drinking Water Act and the Municipal Drinking Water Licence. A summary of the minimum sampling and testing frequencies is included in the corresponding water works’ Operations and Maintenance Manual.

In summary, the Davy Drive Water Works operated in accordance with the DWWP and MDWL during 2019, with the exception of the above noted issue, a corrective action was issued and is complete. Static water levels were recorded monthly as required by the PTTW, with the exception of August, where the measurement was missed.

Based on 2019 treated water quality test results, at no time were the residents of Davy Drive at any health risk. All treated water samples tested below the maximum acceptable concentrations for all microbiological and chemical parameters, as specified in Ontario Regulation 169/03, Schedules 1 and 2.

The annual report required by Ontario Regulation 170/03, Schedule 11 was made available to the public on the Township of Ramara website on February 28, 2020. A copy of the report is included in Appendix C.

APPENDIX A:
Schedule for required sampling

Schedule for required sampling

Frequency	Location		
	Raw Water (for each well)	Treated water	Distribution
Continuous		Free Chlorine Residual Turbidity (filtered water) Turbidity (treated water)	
Every Week	Total Coliforms E.Coli	Total Coliforms E. Coli HPC or Background	Free Chlorine Residual (2/week)
Every 2 weeks			Total Coliforms E. Coli HPC or Background
Monthly	Total Coliforms E. Coli		
Every Calendar Quarter			THMs HAAs
Every 3 Months	Nitrite Nitrate Major Ions Colour	Nitrite Nitrate Colour Iron Manganese	
Twice per year			Alkalinity and pH (in both spring and summer periods)
Every 36 Months (2 periods)			Lead (Schedule 15.1, Reduced Sampling of distribution system)(in both spring and summer periods)
Every 60 Months		Inorganics (Schedule 23) Organics (Schedule 24) Sodium Fluoride	

Notes:

1. **Bold** text items are O. Reg. 170/03 testing requirements.
2. Normal text items are recommended to monitor system performance.
3. Major Ions: Alkalinity (as CaCO₃), Calcium Chloride, Conductivity, Fluoride, Hardness (as CaCO₃), Iron, Magnesium, Manganese, pH, Potassium, Sodium, and Sulphate.

APPENDIX B:
Raw water quality summary

Davy Drive Wells No.1,2,3,4
Raw Water Quality - 2019
Laboratory Results

Parameter	Treated Water		27-Feb-19				28-May-19				21-Aug-19				27-Nov-19			
	MAC	AO/OG	Well				Well				Well				Well			
			No. 1	No. 2	No. 3	No. 4	No. 1	No. 2	No. 3	No. 4	No. 1	No. 2	No. 3	No. 4	No. 1	No. 2	No. 3	No. 4
Alkalinity (as CaCO ₃), mg/L		30 - 500	152	163	136	108	144	159	125	106	150	164	157	161	133	162	139	123
Calcium, mg/L			82.3	119	45.6	36	62	103	33.6	25.5	86.6	114	70.6	68.8	76.4	125	46.8	64
Chloride, mg/L		250	2.3	4.3	6.7	3.4	3.5	2.5	2.2	2.3	2.2	15	38	37	6.2	10	14	6.9
Colour, TCU		5	14	10	10	5	14	10	4	6	11	9	5	<3	8	9	9	10
Conductivity, uS/cm			474	689	367	325	414	675	301	259	464	702	539	556	378	623	402	330
Fluoride, mg/L	1.5		0.29	0.39	0.22	0.21	0.27	0.44	0.21	0.22	0.35	0.38	0.24	0.27	0.28	0.40	0.26	0.26
Hardness (as CaCO ₃), mg/L		80 - 100	235	337	156	136	183	292	118	102	246	329	241	248	229	363	167	214
Iron, ug/L		300	796	483	977	88	362	325	756	100	511	668	1360	58	478	916	212	1230
Magnesium, mg/L			7.07	9.6	10.3	11.1	6.79	8.36	8.32	9.18	7.35	10.6	15.7	18.4	9.19	12.1	12.3	13.3
Manganese, ug/L		50	245	306	379	86.5	219	239	288	56.4	182	419	646	415	160	442	129	538
Nitrate, mg/L	10		0.081	<0.006	<0.006	0.057	0.105	0.006	<0.006	0.028	0.075	0.008	<0.006	<0.006	0.284	<0.006	<0.006	0.048
Nitrite, mg/L	1.0		0.006	0.007	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Nitrate + Nitrite, mg/L			0.087	0.007	<0.006	0.057	0.105	0.006	<0.006	0.028	0.075	0.008	<0.006	<0.006	0.284	<0.006	<0.006	0.048
pH		6.5 - 8.5	8.18	8.25	8.01	8.08	7.91	8.01	7.75	7.61	8.19	8.14	8.11	8.13	7.27	7.64	7.26	7.23
Potassium, mg/L			1.06	1.36	1.46	1.46	0.919	1.09	1.14	1.07	0.967	1.24	1.56	1.62	1.42	1.56	1.55	1.66
Sodium, mg/L	20	200	12.5	26.6	13	11.6	11.5	25.3	9.6	8.75	10.4	22	18.9	19.4	13.4	12.1	14.9	20.3
Sulphate, mg/L		500	83	180	42	50	68	180	27	29	83	170	58	67	58	150	57	53

MAC - Maximum Acceptable Concentration in Treated Water
AO - Aesthetic Objective
OG - Operational Guideline

APPENDIX C:
2019 Annual Report

Part III Form 2
Section 11. ANNUAL REPORT.

Drinking-Water System Number:	220007141
Drinking-Water System Name:	Davy Drive Well Supply
Drinking-Water System Owner:	The Corporation of the Township of Ramara
Drinking-Water System Category:	Small Municipal Residential
Period being reported:	January 1, 2019 to December 31, 2019

<p><u>Complete if your Category is Large Municipal Residential or Small Municipal Residential</u></p> <p>Does your Drinking-Water System serve more than 10,000 people? Yes [] No [X]</p> <p>Is your annual report available to the public at no charge on a web site on the Internet? Yes [X] No []</p> <p>Location where Summary Report required under O. Reg. 170/03 Schedule 22 will be available for inspection.</p> <div style="border: 1px solid black; padding: 5px;"> Township of Ramara Municipal Office 2297 Highway 12 Brechin, ON L0K 1B0 </div>	<p><u>Complete for all other Categories.</u></p> <p>Number of Designated Facilities served: <div style="border: 1px solid black; padding: 2px; width: 100px; text-align: center;">N/A</div> </p> <p>Did you provide a copy of your annual report to all Designated Facilities you serve? Yes [] No []</p> <p>Number of Interested Authorities you report to: <div style="border: 1px solid black; padding: 2px; width: 100px; text-align: center;">N/A</div> </p> <p>Did you provide a copy of your annual report to all Interested Authorities you report to for each Designated Facility? Yes [] No []</p>
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Note: For the following tables below, additional rows or columns may be added or an appendix may be attached to the report

List all Drinking-Water Systems (if any), which receive all of their drinking water from your system:

Drinking Water System Name	Drinking Water System Number

Did you provide a copy of your annual report to all Drinking-Water System owners that are connected to you and to whom you provide all of its drinking water?

Yes [] No []
 *Not applicable

Indicate how you notified system users that your annual report is available, and is free of charge.

- Public access/notice via the web
- Public access/notice via Government Office
- Public access/notice via a newspaper
- Public access/notice via Public Request
- Public access/notice via a Public Library
- Public access/notice via other method

Describe your Drinking-Water System

The Davy Drive Subdivision Drinking Water System services Riverleigh Woods Subdivision and consists of four (4) groundwater wells, one drinking water treatment plant, and approximately 900 m of 50 mm diameter watermains.

The raw water source for this drinking water system is groundwater, which is drawn through Wells No. 1, 2, 3, and 4. Water is pumped from the wells to the water works building. Raw water is pre-chlorinated and treated with potassium permanganate for iron and manganese oxidation. Two greensand filters are utilized to filter oxidized iron and manganese. Two parallel trains of cartridge filters and ultraviolet disinfection units are used to meet treatment requirements for a GUDI well source. The filter effluent is injected with sodium hypochlorite for secondary disinfection. Treated water is stored in a 43 m³ standpipe. Two high lift pumps pump water into the distribution system.

Continuous water quality on-line analyzers monitor the free chlorine residual, pH and turbidity of the treated water before it enters the distribution system. The analyzers are logged continuously by the paperless chart recorder and have alarm set points to notify the operators of adverse water quality results.

The water works is equipped with a 20 kW propane emergency generator. The generator has sufficient capacity to run the entire Water Works. The generator can operate for 5 days at maximum capacity when its propane tank is full.

List all water treatment chemicals used over this reporting period

Sodium Hypochlorite
Potassium Permanganate

Were any significant expenses incurred to?

- Install required equipment
- Repair required equipment
- Replace required equipment

Please provide a brief description and a breakdown of monetary expenses incurred

- Replace U.V bulbs UV #2 (\$500)
- Replace uninterrupted power source on UV units (\$ 500)
- Replace UV #2 turbidity optical sensor. (\$ 1000)
- Replace filter seats in filter #1 and #2. (\$1000)
- Replace generator starter relay (\$500)
- Replace Well #2 starter solenoid (\$700)
- Replace backwash timers (\$500)
- Replace generator bloc heater (\$700)

Provide details on the notices submitted in accordance with subsection 18(1) of the Safe Drinking-Water Act or section 16-4 of Schedule 16 of O.Reg.170/03 and reported to Spills Action Centre

Incident Date	Parameter	Result	Unit of Measure	Corrective Action	Corrective Action Date

Microbiological testing done under the Schedule 10, 11 or 12 of Regulation 170/03, during this reporting period.

	Number of Samples	Range of E.Coli Or Fecal Results (min #)-(max #)	Range of Total Coliform Results (min #)-(max #)	Number of HPC Samples	Range of HPC Results (min #)-(max #)
Raw	208	0 - 9	0 - 67	0	0
Treated	52	0	0	52	0 - 1
Distribution	108	0	0	104	0 - 4

Operational testing done under Schedule 7, 8 or 9 of Regulation 170/03 during the period covered by this Annual Report.

	Number of Grab Samples	Range of Results (min #)-(max #)
Turbidity	8760	0 – 2.04 NTU
Chlorine	8760	0 – 3.20 mg/L
Fluoride (If the DWS provides fluoridation)		N/A

NOTE: For continuous monitors use 8760 as the number of samples.

NOTE:
 When free chlorine residual was measured to be outside of the operating range of **0.4 mg/L to 4.0 mg/L**, the results were confirmed by operators as non-reportable events by use of a hand held analyzer. All results obtained outside the operating range were attributed to testing of alarm set-points, short term power failure, regular maintenance or cleaning.

When a turbidity value was recorded to exceed the limit of 1.0 NTU, the results were checked by operators by use of a hand held analyzer. All results obtained outside the objective range were attributed to testing of alarm set-points, short term power failure, regular maintenance or cleaning.

Summary of additional testing and sampling carried out in accordance with the requirement of an approval, order or other legal instrument.

Date of legal instrument issued	Parameter	Date Sampled	Result	Unit of Measure	Compliance Requirement	Exceedance
July 20, 2016 MDWL No. 147-106, Issue No. 3	Iron in backwash effluent	February, May, August, November	0.90	mg/L (annual average)	1.0 mg/L (annual average)	No
July 20, 2016 MDWL No. 147-106, Issue No. 3	Suspended solids in backwash effluent	February, May, August, November	5.5	mg/L (annual average)	15.0 mg/L (annual average)	No

Summary of Inorganic parameters tested during this reporting period or the most recent sample results

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony	21-Aug-19	<0.09	µg/L	
Arsenic	21-Aug-19	<0.2	µg/L	
Barium	21-Aug-19	134	µg/L	
Boron	21-Aug-19	87	µg/L	
Cadmium	21-Aug-19	0.004	µg/L	
Chromium	21-Aug-19	0.19	µg/L	
Lead (Distribution)	11-Mar-19	0.37	µg/L	
Lead (Distribution)	21-Aug-19	0.21	µg/L	
Mercury	21-Aug-19	<0.01	µg/L	
Selenium	21-Aug-19	0.10	µg/L	
Sodium	02-Sep-15	24.1	mg/L	
Uranium	21-Aug-19	1.19	µg/L	
Fluoride	15-Aug-17	0.23	mg/L	
Nitrite	27-Feb-19	<0.003	mg/L	
Nitrite	28-May-19	<0.003	mg/L	
Nitrite	21-Aug-19	<0.003	mg/L	
Nitrite	27-Nov-19	<0.003	mg/L	
Nitrate	27-Feb-19	0.053	mg/L	
Nitrate	28-May-19	0.058	mg/L	
Nitrate	21-Aug-19	0.026	mg/L	
Nitrate	27-Nov-19	0.056	mg/L	

Summary of lead testing under Schedule 15.1 during this reporting period

(applicable to the following drinking water systems; large municipal residential systems, small municipal residential systems, and non-municipal year-round residential systems)

Location Type	Number of Samples	Range of Lead Results (min#) – (max #)	Unit of Measure	Number of Exceedances
Plumbing				
Distribution	2	0.21-0.37	µg/L	0

Summary of Organic parameters sampled during this reporting period or the most recent sample results

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor	21-Aug-19	<0.02	µg/L	
Atrazine + N-dealkylated metabolites	21-Aug-19	<0.01	µg/L	
Azinphos-methyl	21-Aug-19	<0.02	µg/L	
Benzene	21-Aug-19	<0.32	µg/L	
Benzo(a)pyrene	21-Aug-19	<0.004	µg/L	
Bromoxynil	21-Aug-19	<0.33	µg/L	
Carbaryl	21-Aug-19	<0.01	µg/L	
Carbofuran	21-Aug-19	<0.01	µg/L	
Carbon Tetrachloride	21-Aug-19	<0.16	µg/L	
Chlorpyrifos	21-Aug-19	<0.02	µg/L	
Diazinon	21-Aug-19	<0.02	µg/L	
Dicamba	21-Aug-19	<0.20	µg/L	
1,2-Dichlorobenzene	21-Aug-19	<0.41	µg/L	
1,4-Dichlorobenzene	21-Aug-19	<0.36	µg/L	
1,2-Dichloroethane	21-Aug-19	<0.35	µg/L	
1,1-Dichloroethylene (vinylidene chloride)	21-Aug-19	<0.33	µg/L	
Dichloromethane	21-Aug-19	<0.35	µg/L	
2-4 Dichlorophenol	21-Aug-19	<0.15	µg/L	
2,4-Dichlorophenoxy acetic acid (2,4-D)	21-Aug-19	<0.19	µg/L	
Diclofop-methyl	21-Aug-19	<0.40	µg/L	
Dimethoate	21-Aug-19	<0.03	µg/L	
Diquat	21-Aug-19	<1.0	µg/L	
Diuron	21-Aug-19	<0.03	µg/L	
Glyphosate	21-Aug-19	<1.0	µg/L	
Malathion	21-Aug-19	<0.02	µg/L	
Metolachlor	21-Aug-19	<0.01	µg/L	
Metribuzin	21-Aug-19	<0.02	µg/L	
Monochlorobenzene	21-Aug-19	<0.30	µg/L	
Paraquat	21-Aug-19	<1.0	µg/L	
Pentachlorophenol	21-Aug-19	<0.15	µg/L	
Phorate	21-Aug-19	<0.01	µg/L	
Picloram	21-Aug-19	<1.0	µg/L	
Polychlorinated Biphenyls(PCB)	21-Aug-19	<0.04	µg/L	

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Prometryne	21-Aug-19	<0.03	µg/L	
Simazine	21-Aug-19	<0.01	µg/L	
THM - Quarterly Average <i>(NOTE: Latest annual average)</i>	27-Feb-19 to 27-Nov-19	67.7	µg/L	
Terbufos	21-Aug-19	<0.01	µg/L	
Tetrachloroethylene	21-Aug-19	<0.35	µg/L	
2,3,4,6-Tetrachlorophenol	21-Aug-19	<0.14	µg/L	
Triallate	21-Aug-19	<0.01	µg/L	
Trichloroethylene	21-Aug-19	<0.44	µg/L	
2,4,6-Trichlorophenol	21-Aug-19	<0.25	µg/L	
4-Chloro-2-methylphenoxy acetic acid	21-Aug-19	<0.00012	µg/L	
Trifluralin	21-Aug-19	<0.02	µg/L	
Vinyl Chloride	21-Aug-19	<0.17	µg/L	

List any Inorganic or Organic parameter(s) that exceeded half the standard prescribed in Schedule 2 of Ontario Drinking Water Quality Standards.

Parameter	Result Value	Unit of Measure	Date of Sample
THM - Quarterly Average	67.7	µg/L	Quarterly Average (27-Feb-19 to 27-Nov-19)

(Only if DWS category is large municipal residential, small municipal residential, large municipal non residential, non municipal year round residential, large non municipal non residential)

Notes on Additional Sampling

None.