DESBARATS
DRINKING WATER SYSTEM
WATERWORKS # 210001870

ANNUAL & SUMMARY
REPORTS 2020

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 Desbarats Drinking Water System on the system's performance over the past calendar year January 1 to December 31, 2020.

This report encompasses all elements as required by O. Reg. 170/03. Each section explains what is required for the category Small Municipal Residential DWS (as it pertains to the Desbarats 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.

System Description

The Desbarats water treatment plant is rated as a Class 2 Water Treatment subsystem, and for the purposes of O. Reg. 170/03 it is categorized as a Small Municipal Residential system.

The treatment plant includes two (2) low lift centrifugal pumps, each pump rated at 4.24 L/s that deliver surface water from Lake Huron.
The treatment system includes an Ecodyne Monoplant complete with mechanical flocculation, sedimentation and dual media filtration compartments. The filter portion of the package plant involves a dual media of sand and anthracite and provides for filtering to waste after backwashing. Waste from the clarifier is drained at timed intervals to backwash settling tanks from which supernatant travels by gravity to a diffuser in Lake Huron, located downstream from the intake site.

Post chlorination using sodium hypochlorite is injected after filtration before the clearwell to achieve primary and secondary chlorination. There are three (3) cells to the clearwell (reservoir) with a total storage capacity of 142 cubic meters. There is standby power for continued pumping capacity and plant operations. The system also involves six (6) pre-charged pressure tanks for distribution pressure control.

- There are approximately 276 residents using the system with 110 service connections (93 private residences) and a secondary school with a population of about 600 students. Water is provided to the distribution system through a submarine transmission main

Chemicals

Chemicals utilized at the Desbarats Treatment plant during 2020 include:

- Sodium Hypochlorite for primary and secondary disinfection
- Aluminum Sulphate for coagulation
- Polymer (LT20) as a coagulant aid
- Soda Ash for pH and alkalinity adjustment

2020 Expenditures

During the year of 2020, expenses were incurred to maintain treatment and distribution functions:

- ESA services
- 12-month surveillance audit (SAI Global)
- Floc mixer repairs
- Pressure relief valve
- Filter Media (replacement of anthracite and sand)
- Repair of Distribution main

2020 Drinking Water System Changes

Form 1 – Record of Watermains Authorized as a Future Alteration

- n/a

Form 2 – Record of Minor Modification or Replacements

- Filter media (anthracite and sand) replaced
- Highlift pump and starter (#4)

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 Small Municipal Residential Systems.

Table 1: Microbiological sampling requirements

Location	Sample Analysis	# samples	Frequency
Raw	EC / TC	1 sample	monthly
Treated	N/A	-	-
Distribution	EC / TC/ HPC	1 sample	bi-weekly

Desbarats' 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 hamlet: Township Office, Baptist Church, Arena, and Central Algoma Secondary School. Other locations may be sampled as required.

Table 1a: Microbiological Sample Results

Type	# samples	EC (range)	TC (range)	# samples	HPC (range)
Raw	12	0 - 3	2 - 39	-	-
Distribution	26	0	0	26	0

Operational Checks and Testing

Operational testing is completed as per Schedules 6 & 7 of O. Reg. 170/03 for Small Municipal Residential Systems. These checks and testing are completed on site at the water treatment facility by licensed operators. Continuous monitoring analyzers (collecting 5 minute readings) are utilized for measurement of filter turbidity and chlorine residuals.

Table 2: Monthly Filter Turbidity Results

Month	Avg turbidity (NTU)	Range (NTU)	Monthly Filter Efficiency
January	0.10	0.05 - 1.01	99.95
February	0.07	0.05 - 0.20	100
March	0.11	0.06 - 0.23	100.0
April	0.15	0.04 - 0.72	99.93
May	0.15	0.04 - 1.14	91.28
June	0.06	0.04 - 0.17	100
July	0.06	0.04 - 0.19	100
August	0.04	0.03 - 0.27	100
September	0.05	0.04 - 0.09	100
October	0.05	0.04 - 0.16	100
November	0.07	0.04 - 0.90	99.58
December	0.05	0.04 - 0.11	100

Filter Efficiency is monitored by tracking the turbidity readings above and below 0.30 NTU during filter run time. Desbarats maintained filter compliance each month above 95%, the required limit for dual media filtration to achieve necessary filtration credits for primary disinfection.

Table 3: Chlorine Residuals

Month	Average Chlorine Residual (mg/L)	Chlorine Residual Range (mg/L)
January	1.54	1.20 - 2.18
February	1.62	1.36 - 2.11
March	1.48	0.83 - 2.01
April	1.60	1.06 - 2.33
May	1.63	1.14 - 2.35
June	1.38	0.98 - 2.39
July	1.38	1.09 - 2.08
August	1.48	0.87 - 2.01
September	1.44	0.97 - 2.49
October	1.58	1.14 - 2.61
November	1.59	0.88 - 3.28
December	1.52	1.19 - 1.99

Chlorine residuals are continuously monitored and data is recorded on 5 minute intervals.

Chemical Sampling and Testing

Schedule 13 of O. Reg. 170/03 outlines chemical sampling requirements for Small Municipal Residential systems. Schedules 23 (inorganics) and 24 (organics) are collected every 60 months as well as sodium and fluoride. 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). Desbarats' lead sampling follows the reduced sampling requirements every third year.

Table 4: Schedule 23 - Inorganics

Parameter	Sample Date	Result (µg/L)	Units	ODWS
Antimony	8-Jan-18	<0.60	µg/L	6
Arsenic	8-Jan-18	<1.0	µg/L	25
Barium	8-Jan-18	<10	µg/L	1000
Boron	8-Jan-18	<50	µg/L	5000
Cadmium	8-Jan-18	<0.10	µg/L	5
Chromium	8-Jan-18	<1.0	µg/L	50
Fluoride	8-Jan-18	<0.020	mg/L	1.5
Mercury	8-Jan-18	<0.10	µg/L	1
Selenium	8-Jan-18	<1.0	µg/L	10
Sodium	8-Jan-18	5.05	mg/L	20
Uranium	8-Jan-18	<2.0	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	6-Jan-20	14-Apr-20	6-Jul-20	13-Oct-20
Unit	mg/L	mg/L	mg/L	mg/L	mg/L
Nitrite	1.0	0.323	0.29	0.18	0.28
Nitrate	10	<0.01	<0.05	<0.05	<0.05

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	10	6.8	13	6.4	9.0
HAA	80	2.9	9.0	13	<8	8.0

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

Table 6: Schedule 24 - Organics

Parameter	Date	Result	Unit	ODWS
Alachlor	8-Jan-18	<0.10	µg/L	5
Atrazine + N-dealkylated metobolites	8-Jan-18	<0.20	µg/L	5
Azinphos-methyl	8-Jan-18	<0.10	µg/L	20
Benzene	8-Jan-18	<0.50	µg/L	5
Benzo(a)pyrene	8-Jan-18	<0.010	µg/L	0.01
Bromoxynil	8-Jan-18	<0.20	µg/L	5
Carbaryl	8-Jan-18	<0.20	µg/L	90
Carbofuran	8-Jan-18	<0.20	µg/L	90
Carbon Tetrachloride	8-Jan-18	<0.20	µg/L	5
Chlorpyrifos	8-Jan-18	<0.10	µg/L	90
Diazinon	8-Jan-18	<0.10	µg/L	20
Dicamba	8-Jan-18	<0.20	µg/L	120
1,2-Dichlorobenzene	8-Jan-18	<0.50	µg/L	200
1,4-Dichlorobenzene	8-Jan-18	<0.50	µg/L	5
1,2-Dichloroethane	8-Jan-18	<0.50	µg/L	5
1,1-Dichloroethylene (vinylidene chloride)	8-Jan-18	<0.50	µg/L	14
Dichloromethane	8-Jan-18	<5.0	µg/L	50
2-4 Dichlorophenol	8-Jan-18	<0.30	µg/L	900
2,4-Dichlorophenoxy acetic	8-Jan-18	<0.20	µg/L	100
Diclofop-methyl	8-Jan-18	<0.20	µg/L	9
Dimethoate	8-Jan-18	<0.10	µg/L	20
Diquat	8-Jan-18	<1.0	µg/L	70
Diuron	8-Jan-18	<1.0	µg/L	150
Glyphosate	8-Jan-18	<5.0	µg/L	280
Malathion	8-Jan-18	<0.10	µg/L	190
2-Methyl-4-Chlorophenoxyacetic Acid (MCPA)	8-Jan-18	<0.20	µg/L	100
Metolachlor	8-Jan-18	<0.10	µg/L	50
Metribuzin	8-Jan-18	<0.10	µg/L	80
Monochlorobenzene	8-Jan-18	<0.50	µg/L	80
Paraquat	8-Jan-18	<1.0	µg/L	10
Pentachlorophenol	8-Jan-18	<0.50	µg/L	60
Phorate	8-Jan-18	<0.10	µg/L	2
Picloram	8-Jan-18	<0.20	µg/L	190
Polychlorinated Byphenols	8-Jan-18	<0.035	µg/L	3
Prometryne	8-Jan-18	<0.10	µg/L	1
Simazine	8-Jan-18	<0.10	µg/L	10
Terbufos	8-Jan-18	<0.20	µg/L	1
Tetrachloroethylene	8-Jan-18	<0.50	µg/L	30
2,3,4,6-Tetrachlorophenol	8-Jan-18	<0.50	µg/L	100
Triallate	8-Jan-18	<0.10	µg/L	230
Trichloroethylene	8-Jan-18	<0.50	µg/L	5
2,4,6-Trichlorophenol	8-Jan-18	<0.50	µg/L	5
Trifluralin	8-Jan-18	<0.10	µg/L	45
Vinyl Chloride	8-Jan-18	<0.20	µg/L	2

All results for the required 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	<1	42.0	7.00
Distribution-Summer	<1	32.0	7.37

Desbarats water system is eligible for plumbing exemption, however Alkalinity and pH are required for analysis in the distribution every winter and summer collection periods and Lead in distribution every 3 years for the winter and summer periods. The two prescribed winter/summer collection periods are Dec 15 – Mar15 and June 15- Oct 15., respectively.

Table 8: TSS – C of A requirement for plant process waste water

Month	Result Value	Unit
January	11	mg/L
February	9	mg/L
March	14	mg/L
April	12	mg/L
May	19	mg/L
June	9	mg/L
July	15	mg/L
August	17	mg/L
September	25	mg/L
October	8	mg/L
November	12	mg/L
December	23	mg/L

The 2020 annual average suspended solids concentration is 14.5 mg/L for plant service water (BW, instrumentation flows) released back to the environment, and is under the C of A limit of 25 mg/L.

Compliance

Adverse Water Quality Incidents

During 2020, the Desbarats DWS reported two incidents of adverse water quality.

Table 9: Adverse Water Quality Incidents

Date	Incident Reported
June 2	Monthly filter compliance not met (May)
December 18	Loss of pressure in distribution system due to main break.

Annual Drinking Water System Inspection

The annual DWS inspection took place on Dec 10, 2020 by MECP Drinking Water inspector Shelley Baggio. 1 non-compliance and 3 additional recommendations and best practice were identified.
The DWS received a final inspection rating of 95.67%.

The following table identifies any non-compliance with requirement of the Act, the regulations, the system's approval, drinking water works permit, municipal drinking water license and any orders applicable to the system that were not met at any time during the period covered by the report.

Table 10: Non-compliances identified during Annual DWS Inspection

Non-compliance	The filter efficiency for May 2020 was only 91.28%. It was reported that the elevated treated water turbidity was due to a period of elevated raw water turbidity at the beginning of the month.
Action	The operating authority must continue to closely monitor the filtrate turbidity during periods of elevated raw water turbidity; however, no additional actions are required at this time.
Corrective Actions	Filter media has been replaced.

Flows

The Permit to Take Water authorizes the municipality to draw water from Lake Huron at a rate not to exceed 547.2 m3/d.
The maximum daily volume taken was 166 m^3/d, 30.3 % of the permit limit.

Municipal Drinking Water Licence: 275-201 specifies a maximum intake capacity of 366 m^3/d.
The max flow rate reported was 143m^3/d, 39.1% of the rated capacity.

The Desbarats WTP treated and distributed a total of 35 887 m^3 during the year of 2020. The average day treated flow demand was 98.0 m^3/d, and maximum day flow was 143 m^3/d on December 18, 2020.

Chart 1: 5 year Flow Comparison

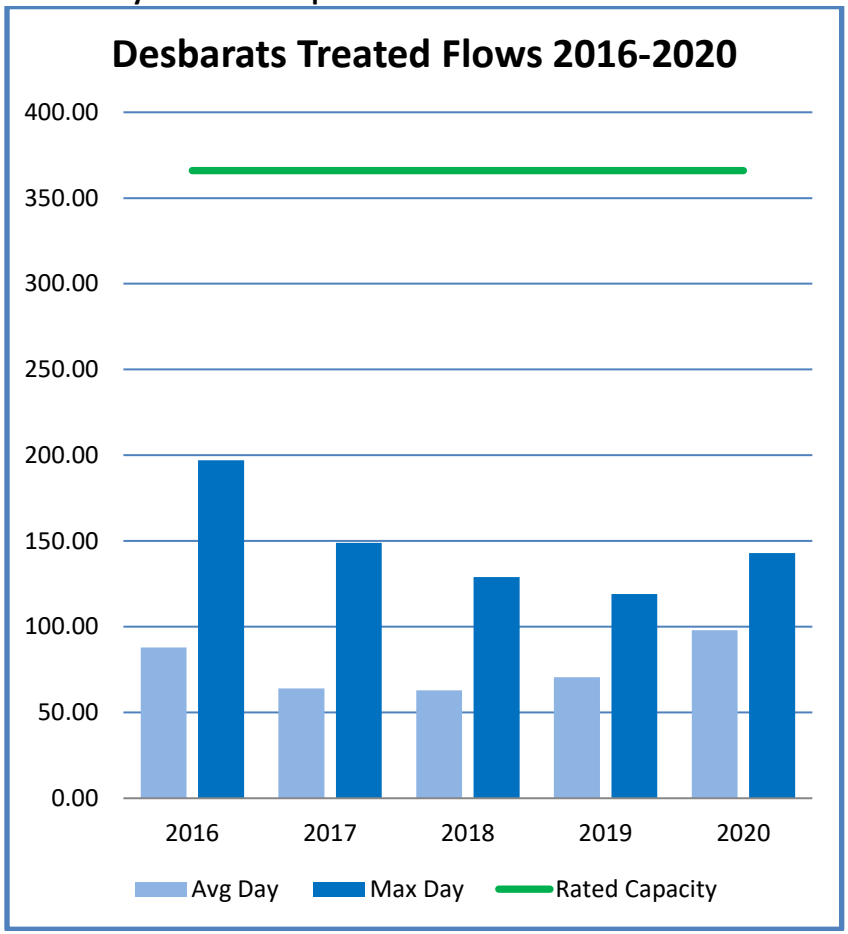
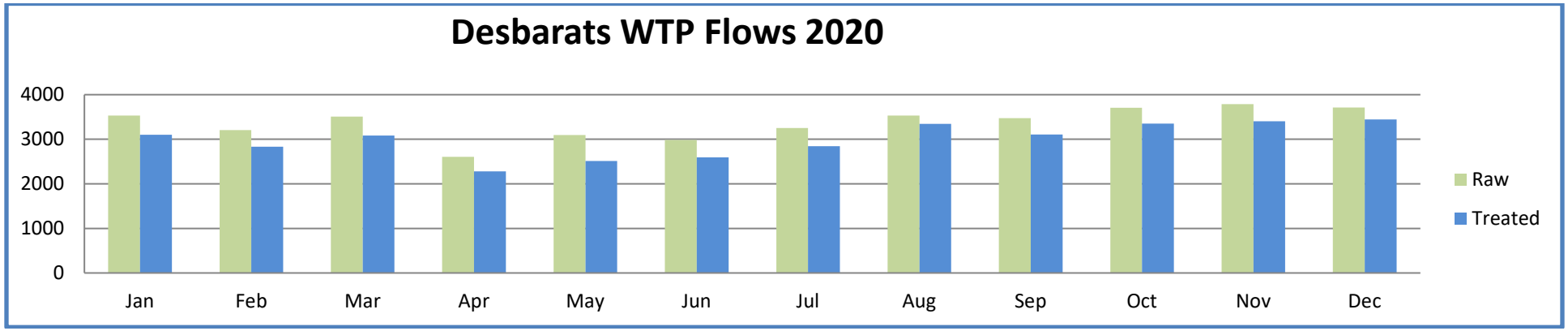


Table 11: Raw and Treated water Flows 2020

2020	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 PTTW	Treated Water (m^3)	Minimum Day (m^3/d)	Maximum Day (m^3/d)	Average Day (m^3/d)
January	3,530	96	141	113.9	20.8	3,101	83	121	110.5
February	3,204	92	134	110.5	20.2	2,832	86	117	97.7
March	3,509	92	139	113.2	20.7	3,082	89	123	99.4
April	2,604	79	99	86.8	15.9	2,277	70	84	75.9
May	3,094	88	124	99.8	18.2	2,514	72	102	81.1
June	2,985	80	133	99.5	18.2	2,591	73	122	86.4
July	3,252	82	145	104.9	19.2	2,844	77	122	91.7
August	3,520	88	143	113.9	20.8	3,347	84	132	108.0
September	3,471	100	135	115.7	21.1	3,105	92	123	103.5
October	3,706	108	135	119.5	21.8	3,350	96	119	108.1
November	3,788	112	136	126.3	23.1	3,401	108	119	113.4
December	3,710	74	166	119.7	30.3	3,443	69	143	111.1

Chart 2: Desbarats WTP Flows 2020



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 Johnson
1 Johnson Drive
Desbarats, ON
P0R 1E0

Summary Report

This Summary report for The Desbarats Drinking Water System for the period of January 1st to December 31st, 2020 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 Johnson.

Tables, Definition of Terms

Appendix A: List of Tables/ Charts

Appendix B: Definition of Terms

Acronym	Definition
AWQI	Adverse water quality incident
BWA	Boil Water Advisory
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