# DESBARATS
# DRINKING WATER SYSTEM
# WATERWORKS # 210001870

# ANNUAL & SUMMARY
# REPORTS 2023

# 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, 2023.

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 definitions 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 an elementary/secondary school with a total 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 2023 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

## 2023 Expenditures

During the year of 2023, expenses were incurred to maintain treatment and distribution functions:

- ESA services
- 12-month surveillance audit (SAI Global)
- Air compressor
- Floc mixer motor an coupling
- Chemical shed construction
- Transmission line repairs

## 2023 Drinking Water System Changes

Form 1 – Record of Watermains Authorized as a Future Alteration

- n/a

Form 2 – Record of Minor Modification or Replacements

- n/a

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 2: Microbiological Sample Results**

| Type | # samples | EC (range) | TC (range) | # samples | HPC (range) |
|---|---|---|---|---|---|
| **Raw** | 12 | 0 - 5 | 6 - 146 | 0 | - |
| **Distribution** | 27 | 0 | 0 | 27 | 0 |

## Operational Checks and Testing

Operational testing is completed as per Schedules 6 & 7 of O. Reg. 170/03 for Small Municipal Residential Systems. 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 3: Monthly Filter Turbidity Results**

| Month | Avg turbidity (NTU) | Range (NTU) | Monthly Filter Efficiency |
|---|---|---|---|
| **January** | 0.04 | 0.03 - 1.18 | 99.9 |
| **February** | 0.04 | 0.02 - 0.26 | 100 |
| **March** | 0.04 | 0.03 - 0.68 | 99.9 |
| **April** | 0.04 | 0.03 - 0.47 | 99.9 |
| **May** | 0.03 | 0.02 - 4.99 | 99.6 |
| **June** | 0.03 | 0.03 - 0.74 | 99.9 |
| **July** | 0.03 | 0.02 - 0.19 | 100 |
| **August** | 0.03 | 0.02 - 0.09 | 100 |
| **September** | 0.03 | 0.02 - 0.06 | 100 |
| **October** | 0.05 | 0.02 - 0.86 | 99.2 |
| **November** | 0.05 | 0.02 - 0.67 | 99.5 |
| **December** | 0.03 | 0.02 - 0.59 | 99.9 |

***Desbarats maintained filter compliance each month above 95%, (required limit) to achieve necessary filtration credits for primary disinfection.***

**Table 4: Chlorine Residuals**

| Month | Average Chlorine Residual (mg/L) | Chlorine Residual Range (mg/L) |
|---|---|---|
| **January** | 1.49 | 1.29 - 1.84 |
| **February** | 1.43 | 1.29 - 1.72 |
| **March** | 1.54 | 1.25 - 1.97 |
| **April** | 1.41 | 1.18 - 1.64 |
| **May** | 1.44 | 1.18 - 1.69 |
| **June** | 1.38 | 1.04 - 1.76 |
| **July** | 1.56 | 1.32 - 1.81 |
| **August** | 1.57 | 1.32 - 1.94 |
| **September** | 1.51 | 0.96 - 1.99 |
| **October** | 1.63 | 0.87 - 2.31 |
| **November** | 1.50 | 1.26 - 2.16 |
| **December** | 1.49 | 0.93 - 1.85 |

***Chlorine residuals are continuously monitored, and data is recorded at 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 regulation's plumbing exemption but monitors the distribution system water quality for changes that may impact lead corrosion.

**Table 5: Schedule 23 - Inorganics**

| Parameter | Sample Date | Result (µg/L) | Units | ODWS |
|---|---|---|---|---|
| Antimony | 23-Jan-23 | <0.5 | µg/L | 6 |
| Arsenic | 23-Jan-23 | <1 | µg/L | 10 |
| Barium | 23-Jan-23 | 9 | µg/L | 1000 |
| Boron | 23-Jan-23 | <2 | µg/L | 5000 |
| Cadmium | 23-Jan-23 | <0.1 | µg/L | 5 |
| Chromium | 23-Jan-23 | <1 | µg/L | 50 |
| Fluoride | 23-Jan-23 | <0.05 | mg/L | 1.5 |
| Mercury | 23-Jan-23 | <0.1 | µg/L | 1 |
| Selenium | 23-Jan-23 | 0.2 | µg/L | 50 |
| Sodium | 23-Jan-23 | 4.35 | mg/L | 20 |
| Uranium | 23-Jan-23 | <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 and would require notifications if exceeded.***

**Table 6: Nitrate/ Nitrite Results**

| Date | ODWS | 4-Jan | 4 Apr | 4-Jul | 7-Oct |
|---|---|---|---|---|---|
| Unit | mg/L | mg/L | mg/L | mg/L | mg/L |
| Nitrate | 10 | 0.29 | 0.34 | 0.34 | 0.30 |
| Nitrite | 1.0 | <0.05 | <0.05 | <0.05 | <0.05 |

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

**Table 7: Disinfection By-products Results (THM/HAA)**

| Date | ODWS | Q1 | Q2 | Q3 | Q4 | RAA |
|---|---|---|---|---|---|---|
| Unit | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L |
| THM | 100 | 19 | 15.9 | 22.6 | 21.8 | 17.6 |
| HAA | 80 | 10.1 | 8 | 18 | 13 | 14.5 |

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

**Table 8: Community Lead Sampling Results**

| Location Type | Alkalinity, mg/L | pH |
|---|---|---|
| Distribution monitoring | 53 | 7.5 |

***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.***

***Table 9: TSS – C of A requirement for plant process wastewater***

| Quarter | Result Value | Unit |
|---|---|---|
| **Q1** | 5.0 | mg/L |
| **Q2** | 3.7 | mg/L |
| **Q3** | 18.6 | mg/L |
| **Q4** | 5.7 | mg/L |

***The 2023 annual average suspended solids concentration is 8.1 mg/L for plant service water (backwash and instrumentation flows) released back to the environment.***

**Table 10: Schedule 24 - Organics**

| Parameter | Date | Result | Unit | ODWS |
|---|---|---|---|---|
| Alachlor | 23-Jan-23 | <0.238 | µg/L | 5 |
| Atrazine + N-dealkylated metobolites | 23-Jan-23 | <0.5 | µg/L | 5 |
| Azinphos-methyl | 23-Jan-23 | <0.179 | µg/L | 20 |
| Benzene | 23-Jan-23 | <0.1 | µg/L | 1 |
| Benzo(a)pyrene | 23-Jan-23 | <0.01 | µg/L | 0.01 |
| Bromoxynil | 23-Jan-23 | <0.0939 | µg/L | 5 |
| Carbaryl | 23-Jan-23 | <3 | µg/L | 90 |
| Carbofuran | 23-Jan-23 | <4 | µg/L | 90 |
| Carbon Tetrachloride | 23-Jan-23 | <0.2 | µg/L | 5 |
| Chlorpyrifos | 23-Jan-23 | <0.2 | µg/L | 90 |
| Diazinon | 23-Jan-23 | <0.179 | µg/L | 20 |
| Dicamba | 23-Jan-23 | <0.0822 | µg/L | 120 |
| 1,2-Dichlorobenzene | 23-Jan-23 | <0.2 | µg/L | 200 |
| 1,4-Dichlorobenzene | 23-Jan-23 | <0.3 | µg/L | 5 |
| 1,2-Dichloroethane | 23-Jan-23 | <0.2 | µg/L | 5 |
| 1,1-Dichloroethylene (vinylidene chloride) | 23-Jan-23 | <0.3 | µg/L | 14 |
| Dichloromethane | 23-Jan-23 | <1 | µg/L | 50 |
| 2-4 Dichlorophenol | 23-Jan-23 | <0.3 | µg/L | 900 |
| 2,4-Dichlorophenoxy acetic acid | 23-Jan-23 | <0.352 | µg/L | 100 |
| Diclofop-methyl | 23-Jan-23 | <0.117 | µg/L | 9 |
| Dimethoate | 23-Jan-23 | <0.179 | µg/L | 20 |
| Diquat | 23-Jan-23 | <0.7 | µg/L | 70 |
| Diuron | 23-Jan-23 | <10 | µg/L | 150 |
| Glyphosate | 23-Jan-23 | <20 | µg/L | 280 |
| Malathion | 23-Jan-23 | <0.179 | µg/L | 190 |
| 2-Methyl-4-Chlorophenoxyacetic Acid (MCPA) | 23-Jan-23 | <5.87 | µg/L | 100 |
| Metolachlor | 23 Jan-23 | <0.119 | µg/L | 50 |
| Metribuzin | 23-Jan-23 | <0.119 | µg/L | 80 |
| Monochlorobenzene | 23-Jan-23 | <0.5 | µg/L | 80 |
| Paraquat | 23-Jan-23 | <0.3 | µg/L | 10 |
| Pentachlorophenol | 23-Jan-23 | <0.3 | µg/L | 60 |
| Phorate | 23-Jan-23 | <0.119 | µg/L | 2 |
| Picloram | 23-Jan-23 | <0.0822 | µg/L | 190 |
| Polychlorinated Byphenols (PCB) | 23-Jan-23 | <0.06 | µg/L | 3 |
| Prometryne | 23-Jan-23 | <0.0596 | µg/L | 1 |
| Simazine | 23-Jan-23 | <0.179 | µg/L | 10 |
| Terbufos | 23-Jan-23 | <0.119 | µg/L | 1 |
| Tetrachloroethylene | 23-Jan-23 | <0.3 | µg/L | 10 |
| 2,3,4,6-Tetrachlorophenol | 23-Jan-23 | <0.2 | µg/L | 100 |
| Triallate | 23-Jan-23 | <0.119 | µg/L | 230 |
| Trichloroethylene | 23-Jan-23 | <0.2 | µg/L | 5 |
| 2,4,6-Trichlorophenol | 23-Jan-23 | <0.2 | µg/L | 5 |
| Trifluralin | 23-Jan-23 | <0.119 | µg/L | 45 |
| Vinyl Chloride | 23-Jan-23 | <0.1 | µg/L | 1 |

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

# Compliance

## Adverse Water Quality Incidents

During 2023, the Desbarats DWS reported one incident of adverse water quality.

**Table 11: Adverse Water Quality Incidents**

| Date | Incident Reported |
|---|---|
| **23 Oct** | Loss of distribution pressure (repair of transmission line) |

## Annual Drinking Water System Inspection

The annual DWS inspection took place on May 25, 2023, by MECP Drinking Water inspector Shelley Baggio. Zero non-compliance and four additional recommendations and best practice were identified.

**The DWS received a final inspection rating of 100.0%.**

# 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 239 $m^3$/d, 43.7 % 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 175 $m^3$/d, 47.8% of the rated capacity.**

The Desbarats WTP treated and distributed a total of 43,087 $m^3$ during the year of 2023. The average day treated flow demand was 91.5 $m^3$/d, and maximum day flow was 175 $m^3$/d on October 3, 2023.

**Chart 1: 5-year Flow Comparison**

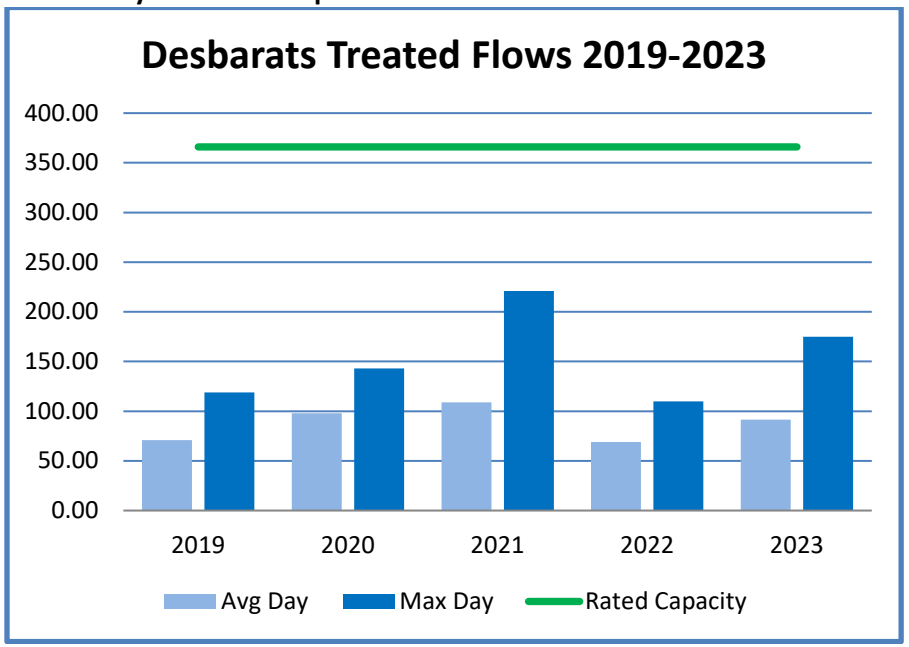
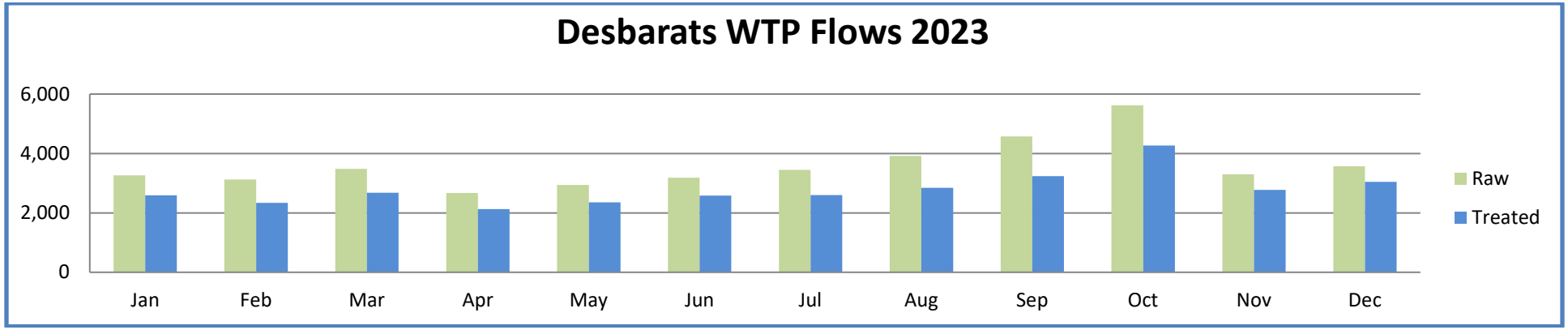


**Table 12: Raw and Treated water Flows 2023**

| 2024 | 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 ($m^3/d$) | % Max Flow Day of Rated Capacity |
| January | 3,260 | 81 | 124 | 105.0 | 22.7 | 2,587 | 64 | 101 | 83.5 | 27.6 |
| February | 3,127 | 90 | 150 | 111.7 | 27.4 | 2,336 | 64 | 120 | 83.4 | 32.8 |
| March | 3,482 | 92 | 156 | 112.3 | 28.5 | 2,681 | 64 | 114 | 86.5 | 31.1 |
| April | 2,673 | 76 | 104 | 89.1 | 19.0 | 2,127 | 59 | 78 | 70.9 | 21.3 |
| May | 2,938 | 65 | 133 | 94.8 | 24.3 | 2,357 | 61 | 104 | 76.0 | 28.4 |
| June | 3,186 | 89 | 155 | 106.2 | 28.3 | 2,582 | 81 | 131 | 86.1 | 35.8 |
| July | 3,444 | 94 | 125 | 111.1 | 22.8 | 2,600 | 75 | 93 | 83.9 | 25.4 |
| August | 3,914 | 107 | 149 | 126.3 | 27.2 | 2,847 | 75 | 107 | 91.8 | 29.2 |
| September | 4,577 | 121 | 206 | 152.6 | 37.6 | 3,233 | 75 | 157 | 107.8 | 42.9 |
| October | 5,623 | 89 | 239 | 181.4 | 43.7 | 4,270 | 75 | 175 | 137.7 | 47.8 |
| November | 3,296 | 85 | 127 | 109.9 | 23.2 | 2,778 | 75 | 112 | 92.6 | 30.6 |
| December | 3,567 | 91 | 145 | 115.1 | 26.5 | 3,044 | 75 | 122 | 98.2 | 33.3 |

**Chart 2: Desbarats WTP Flows 2023**



# 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 at the Township 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, 2023, 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 |
| **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 |