



**Mattice**  
Sewage Treatment Lagoon  
Sewage Collection System

**Annual Operating Report**  
January 1, 2023 to December 31, 2023



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Name of Facility:	<b>Mattice Sewage Treatment Lagoon</b>
Address:	<b>Lot 25 Concession 4, Eiber Township, Ontario</b>
MOE Works #:	<b>120001791</b>
Environmental Compliance Approval (ECA):	<b>3-1305-81-826, issued March 10, 1982</b>
Sewage Collection System (CLI-ECA):	<b>291-W601, issued September 5, 2023</b>
Report Period:	<b>January 1, 2023 to December 31, 2023</b>

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### **FACILITY DESCRIPTION:**

Capacity of Works	unknown
Service Area	Community of Mattice
Service Population	542
Effluent Receiver	Missinaibi River via an unnamed creek
Major Process	Single Cell Waste Stabilization Lagoon

The Mattice Sewage Treatment Lagoon is classified as a Class I facility.

As described in the ECA, it consists of:

- Waste stabilization pond with a water surface area of 6.07 ha, providing a volume of 92,000 m<sup>3</sup> at 1.54 m operating depth
- Inlet and outlet chambers
- Approximately 230 metres of 200 mm diameter forcemain

The lagoon is discharged twice a year to the Missinaibi River over 10 days between May 1<sup>st</sup> to May 31<sup>st</sup> and October 15<sup>th</sup> to November 15<sup>th</sup>. When required, phosphorous removal is accomplished by batch dosing the lagoon contents with alum prior to discharge

### **DEFINITIONS**

*BOD<sub>5</sub> - Five-day biochemical oxygen demand measured in an unfiltered sample*

*cBOD<sub>5</sub> - Five-day carbonaceous biochemical oxygen demand measured in an unfiltered sample*

*TSS - Total Suspended Solids*

*TKN – Total Kjeldahl Nitrogen*

*TP - Total Phosphorus*

*E.coli - Escherichia coli*

### **EFFLUENT QUALITY ASSURANCE AND CONTROL MEASURES UNDERTAKEN**

The mechanical elements in the facility are in good repair, and each member of the operational staff possesses a high level of process knowledge and regulatory competence.

Samples are collected as required and analyzed by Testmark Laboratories located in Kirkland Lake, Ontario. Licensed Operators conduct in-house tests for monitoring purposes using procedures as per Standard Methods of Water and Wastewater.

Any bypass or upset events that occur at the pumping stations or plant site are tested, monitored and reported to the Spills Action Center (SAC).

#### **MAINTENANCE PROCEDURES PERFORMED ON THE WORKS**

Lagoon maintenance, including non-scheduled maintenance, is monitored using OCWA's preventative maintenance software programs. All routine and preventative maintenance measures were conducted as scheduled.

#### **OPERATING PROBLEMS AND CORRECTIVE ACTIONS**

There were no major operating issues during the reporting period.

#### **ALTERATIONS, EXTENSIONS OR REPLACEMENTS TO THE WORKS**

There were no alterations, extensions or replacements proposed in the process or operations for the reporting period. There was no need for modifications to improve performance or reliability of the facility.

#### **CALIBRATION AND MAINTENANCE OF ALL MONITORING EQUIPMENT**

The flow-monitoring program, maintained in the Work Management System (WMS), incorporates a calibration of all monitoring devices once a year. This helps ensure their accuracy within plus or minus 15 % of actual rate of flow.

The monitoring equipment is calibrated based on the manufactures recommendations and conducted by a trained person. The volume of raw sewage discharged into the lagoon is measured with a magnetic flow meter.

<u>Instrument</u>	<u>Calibration Date</u>	<u>Accuracy</u>
Lagoon influent flow meter (E&H Promag 50)	June 7, 2023	93.9 %

#### **ABNORMAL DISCHARGE EVENTS, BYPASSES AND SPILLS**

All events are verbally reported to the Ministry of the Environment's Spills Action Center, a courtesy call to the Ministry of Health and a written report is submitted to Environment Canada and OCWA's Compliance Department.

There was one abnormal discharge event that occurred in 2023. A record of the time, location, duration, quantity, and details are summarized below:

May 3 Lagoon Overflow – Overflow at Discharge Point  
 Type of incident: Overflow  
 SAC Ref No.: 1-3FXQEF  
 Date & Time: May 3, 2023 @ 1225 hrs  
 Termination: May 13, 2023 @ 1510 hrs  
 Duration: 242.5 hrs  
 Approximate volume: 5051 m3  
 Details: Lagoon reached capacity and began to overflow at the discharge point  
 Receiver: Missinaibi River  
 Actions: Sampled, reported, and monitor  
 Reporting: Verbal report to SAC, emails to MOH, EC, and SAC.

**SLUDGE REMOVAL**

There was no sludge removed during the reporting period

**COMPLAINTS**

There were no complaints received during the reporting period

**PROPOSED ALTERATIONS**

There are no major proposed alterations

**MONITORING PROGRAM – RAW SEWAGE (INFLUENT)**

A monthly grab sample is taken on the raw sewage and analyzed for:

- BOD<sub>5</sub>
- Total Suspended Solids
- Total Phosphorous

Below is a summary of the raw influent sampling for the calendar year

<b>Parameter (mg/L)</b>	<b>Number of Samples</b>	<b>Average</b>	<b>Maximum</b>
BOD <sub>5</sub>	12	103.5	333
Total Phosphorous	12	1.84	3.69
Total Suspended Solids	12	118.4	326

Refer to *APPENDIX A: Monthly Summary of Raw Influent Sampling and Monitoring Data*, which summarizes the monitoring and sampling analysis conducted at the facility

### **MONITORING PROGRAM – COLLECTION SYSTEM OVERFLOWS (CLI-ECA)**

A weekly grab sample is taken on any collection system overflow and analyzed for:

- BOD<sub>5</sub>
- Total Suspended Solids
- Total Phosphorous
- Total Kjeldahl Nitrogen
- E.coli

The Mattice sewage collection system consists of one pumping station. There were no overflow events at the Melrose Pumping Station during this reporting period.

### **MONITORING PROGRAM – FINAL EFFLUENT**

A grab sample is taken at the start, middle, and end of the discharge periods. Samples are analyzed for:

- BOD<sub>5</sub>
- cBOD<sub>5</sub>
- Total Suspended Solids
- Total Phosphorous
- *E. coli* (*Escherichia coli*)

### **EFFLUENT (SPRING DISCHARGE)**

The approved spring discharge period is May 1<sup>st</sup> to May 31<sup>st</sup>. The spring discharge for 2023 consisted of two parts:

- An uncontrolled/unapproved discharge (Overflow) from May 3<sup>rd</sup> to May 13<sup>th</sup> and
- A controlled/approved discharge from May 13<sup>th</sup> to May 23<sup>rd</sup>.

The following data is the average concentration values from both the uncontrolled and controlled discharges. Non-compliance occurs when the compliance limit is exceeded.

<b>Parameter (mg/L)</b>	<b>May 3 to May 13</b>	<b>May 13 to May 23</b>	<b>Compliance</b>
<i>E. coli</i> (cfu/100mL)	16,435	67	<i>None</i>
BOD <sub>5</sub>	10.0	5.3	<i>Maximum 30 mg/L</i>
cBOD <sub>5</sub>	8.0	4.0	<i>Maximum 25 mg/L</i>
Total Suspended Solids	7.3	5.8	<i>Maximum 40 mg/L</i>
Total Phosphorous (TP)	0.301	0.092	<i>Maximum 1.8 mg/L</i>

### EFFLUENT (FALL DISCHARGE)

The approved fall discharge period is October 15<sup>th</sup> to November 15<sup>th</sup>. The fall discharge was from November 5<sup>th</sup> to November 14<sup>th</sup>.

The following data is the average concentration values from the controlled discharge. Non-compliance occurs when the compliance limit is exceeded.

Parameter (mg/L)	November 5 <sup>th</sup> to November 14 <sup>th</sup>	Compliance
<i>E. coli</i> (cfu/100mL)	390	None
BOD <sub>5</sub>	3.6	Maximum 30 mg/L
cBOD <sub>5</sub>	2.1	Maximum 25 mg/L
Total Suspended Solids	3.2	Maximum 40 mg/L
Total Phosphorous (TP)	0.066	Maximum 1.8 mg/L
TP Loadings (kg/d)	0.28	17 kg/d

Refer to *APPENDIX B: Summary of Final Effluent Sampling and Monitoring Data*, which summarizes the monitoring and sampling analysis conducted.

### FLOWS SUMMARY AND COMPARISON

#### RAW INFLUENT FLOW

Month	Total Flow (m <sup>3</sup> )	Average Flow (m <sup>3</sup> /day)	Maximum Flow (m <sup>3</sup> /day)
January	6,538	211	238
February	5,155	184	226
March	5,092	164	199
April	22,812	760	2,169
May	17,504	565	2,073
June	6,264	209	245
July	7,044	227	419
August	8,542	276	381
September	6,848	228	277
October	8,603	278	459
November	11,061	369	636
December	10,367	334	408

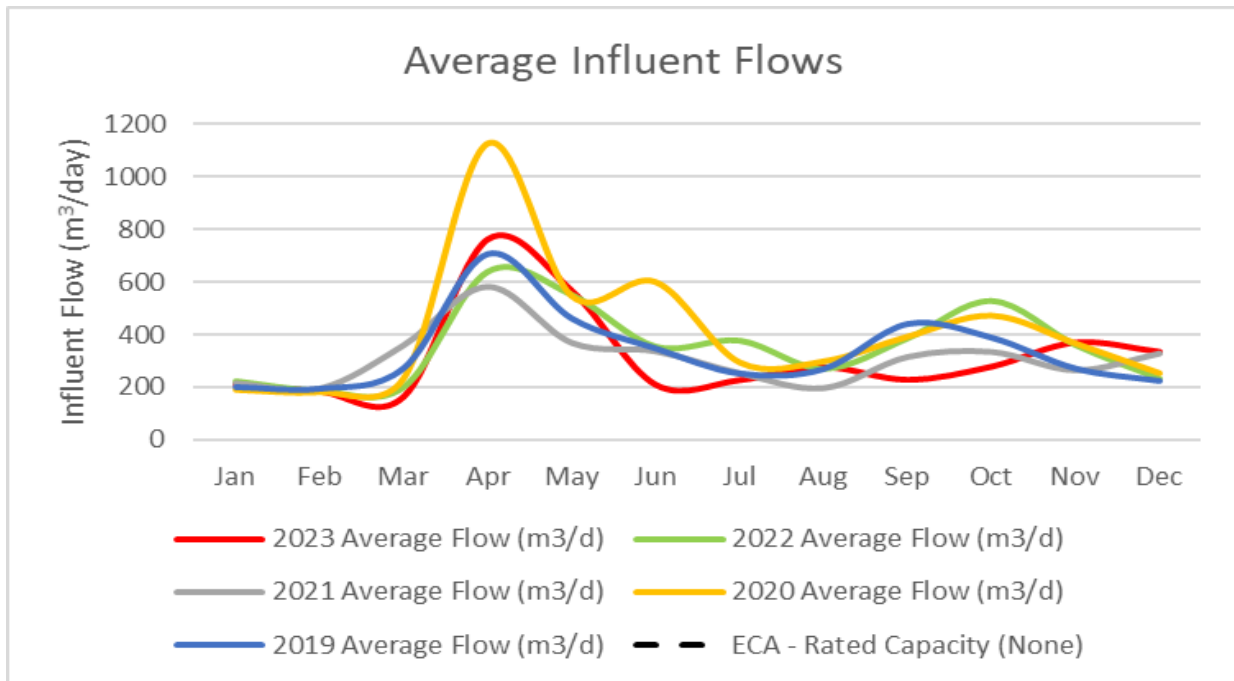


**SUMMARY OF INFLUENT FLOW**

Total Volume of Influent (m <sup>3</sup> )	115,830
Maximum Annual Flow (m <sup>3</sup> /day)	2,169
Average Annual Flow (m <sup>3</sup> /day)	317
Rated Capacity (m <sup>3</sup> /day)	N/A
Percent of Capacity (%)	N/A
Exceedance? (Yes/No)	No

**HISTORICAL AVERAGE INFLUENT FLOW**

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>
2023	211	184	164	760	565	209	227	276	228	278	369	334
2022	223	186	200	638	550	354	376	270	385	527	359	232
2021	216	195	360	582	369	337	254	197	316	334	265	328
2020	192	184	237	1129	549	602	296	301	395	474	368	256
2019	198	192	270	704	459	345	249	267	438	386	268	221



### SUMMARY OF EFFLUENT FLOW

Discharge Period	Average Flow (m <sup>3</sup> /d)	Maximum Flow (m <sup>3</sup> /d)	Total Flow (m <sup>3</sup> )
Spring Overflow	459	500	5,051
Spring	6,859	7,617	75,849
Fall	4,251	4,680	42,511

Refer to APPENDIX C: Summary of Raw Influent and Final Effluent Flow Monitoring Data which summarizes the raw influent and treated effluent flows during the reporting period.

### SEWAGE TREATMENT PROGRAM SUCCESS AND ADEQUACY

The table below details results and efficiency of the lagoon's performance demonstrating pollutant removal rates from raw sewage concentrations through to final effluent for BOD<sub>5</sub>, suspended solids and total phosphorus.

Parameter (Avg)	Influent	Effluent	% Removal
TP (mg/L)	1.84	0.134	92.7
BOD <sub>5</sub> (mg/L)	103.5	5.8	94.4
TSS (mg/L)	118.4	5.2	95.6

*Notes: Percent removal calculations are based on the annual average values*

### INTERPRETATION OF MONITORING AND ANALYTICAL DATA

The Mattice sewage treatment Lagoon's effluent monitoring parameters fell below the compliance limits specified in the facility's ECA.

The effluent quality is based on the biochemical oxygen demand, total suspended solids and total phosphorous levels.

The Biological Oxygen Demand (BOD<sub>5</sub>) is the amount of oxygen used by micro-organisms as they decompose organic matter in the effluent sample for five days. High BOD<sub>5</sub> in effluent means a large quantity of oxygen was needed to break down the organic matter and identifies a large amount of organic matter in the effluent indicating inadequate treatment. The BOD<sub>5</sub> limit of 30 mg/L was not exceeded.

Suspended Solids (TSS) in effluent are composed of settleable solids and nonsettleable solids depending on the size, shape and weight of the solid particles. Settable solids are large sized particles that tend to settle more rapidly in a given period of time. The compliance limit of 40.0 mg/L was not exceeded.

Total Phosphorus (TP) refers to the amount of phosphorus in a sample. Excess TP stimulates algae and weed growth that may cause fluctuations in dissolved oxygen in the receiving waters. The compliance limit of 1.8 mg/L was not exceeded.

**SUMMARY**

The Melrose pumping station had new pumps installed in 2019. Since the installation of the new pumps, there has been only one collections system overflow. This occurred in 2020, during a rapid snowmelt event when it briefly overflowed for 2 hours with an approximate 7m<sup>3</sup> volume. The pumping station and collection system do not have any immediate concerns.

In 2023, the effluent during both the unauthorized and authorized periods was of good quality and well below the compliance limits established in the ECA.

**APPENDIX A: Monthly Summary of Raw Influent Sampling and Monitoring Data**

<b>Influent</b>	11-Jan-23	7-Feb-23	7-Mar-23	12-Apr-23	9-May-23	6-Jun-23	5-Jul-23	15-Aug-23	12-Sep-23	4-Oct-23	14-Nov-23	6-Dec-23
BOD5	300	75.1	110	14	36	60	333	11	32	120	41	110
TSS	38	89	79	26	66	326	196	198	54	76.7	39.5	233
TP	2.34	2.2	3.62	0.139	1.88	1.58	3.15	0.785	0.403	3.69	0.716	1.58

**APPENDIX B: Summary of Final Effluent Sampling and Monitoring Data**

<b>Overflow Effluent</b>	03-May	09-May
BOD (5-day)	12	7.9
Carbonaceous BOD	9.2	6.7
Escherichia coli	37000	7300
Field pH	7.46	7.14
Field Temperature	4	5
Total Phosphorus (as P)	0.213	0.389
Total Suspended Solids	6.5	8

<b>Spring Discharge Effluent</b>	13-May	16-May	23-May
BOD (5-day)	5.8	5.9	4.3
Carbonaceous BOD	4	5.1	2.9
Escherichia coli	185	110	15
Field pH	7.17	6.93	7.3
Field Temperature	16.5	10	15
Total Phosphorus (as P)	0.125	0.092	0.058
Total Suspended Solids	8	2.5	7

<b>Fall Discharge Effluent</b>	05-Nov	07-Nov	14-Nov
BOD (5-day)	2.5	1	7.2
Carbonaceous BOD	1.9	0.5	3.8
<i>Escherichia coli</i>	5	70	170000
Field pH	7.36	7.45	7.47
Field Temp	5	3	4
Total Phosphorus (as P)	0.036	0.03	0.131
Total Suspended Solids	1.5	4.5	3.5

**APPENDIX C: Summary of Raw Influent and Final Effluent Flow Monitoring Data**

Raw Flows	January	February	March	April	May	June	July	August	September	October	November	December
Maximum Flow (m3/d)	238	226	199	2,169	2,073	245	419	381	277	459	636	408
Average Flow (m3/d)	211	184	164	760	565	209	227	276	228	278	369	334
Total	6,538	5,155	5,092	22,812	17,504	6,264	7,044	8,542	6,848	8,603	11,061	10,367

Discharge Effluent Flows	January	February	March	April	May	June	July	August	September	October	November	December	
Maximum Flow (m3/d)	<b>May 13 - 23</b>				7,617	<b>Nov 5 - Nov 14</b>						4,680	
Average Flow (m3/d)					6,859							4,251	
Total					75,849							42,511	

Note: The above effluent flow data section does not include the overflow volume, however, the chart below does includes the overflow.

	01/2023	02/2023	03/2023	04/2023	05/2023	06/2023	07/2023	08/2023	09/2023	10/2023	11/2023	12/2023
Effluent Discharge / Flow - m <sup>3</sup> /d												
Count IH	0	0	0	0	21	0	0	0	0	0	10	0
Max IH					7616.6						4680	
Mean IH					3852.4						4251.1	
Min IH					240						2243	
Total IH					80900.4						42511	

**APPENDIX D: CLI-ECA Reporting Sections**

Collection ECA # 291-W601 Schedule E	(Page #) Section in Report
4.6.3 If applicable, includes a summary of all required monitoring data along with an interpretation of the data and any conclusion drawn from the data evaluation about the need for future modifications to the Authorized System or system operations.	(6) HISTORICAL AVERAGE INFLUENT FLOW (4) MONITORING PROGRAM – COLLECTION SYSTEM OVERFLOWS (CLI-ECA) (2) ABNORMAL DISCHARGE EVENTS, BYPASSES AND SPILLS (3) PROPOSED ALTERATIONS (8) SUMMARY
4.6.4 Includes a summary of any operating problems encountered and corrective actions taken.	(2) ABNORMAL DISCHARGE EVENTS, BYPASSES AND SPILLS (2) OPERATING PROBLEMS AND CORRECTIVE ACTIONS
4.6.5 Includes a summary of all calibration, maintenance, and repairs carried out on any major structure, Equipment, apparatus, mechanism, or thing forming part of the Municipal Sewage Collection System.	(2) CALIBRATION AND MAINTENANCE OF ALL MONITORING EQUIPMENT (2) MAINTENANCE PROCEDURES PERFORMED ON THE WORKS
4.6.6 Includes a summary of any complaints related to the Sewage Works received during the reporting period and any steps taken to address the complaints.	(3) COMPLAINTS
4.6.7 Includes a summary of all Alterations to the Authorized System within the reporting period that are authorized by this Approval including a list of Alterations that pose a Significant Drinking Water Threat.	(2) ALTERATIONS, EXTENSIONS OR REPLACEMENTS TO THE WORKS
4.6.8 Includes a summary of all Collection System Overflow(s) and Spill(s) of Sewage, including: a) Dates; b) Volumes and durations; c) If applicable, loadings for total suspended solids, BOD, total phosphorus, and total Kjeldahl nitrogen, and sampling results for E.coli; d) Disinfection, if any; and e) Any adverse impact(s) and any corrective actions, if applicable.	(2) ABNORMAL DISCHARGE EVENTS, BYPASSES AND SPILLS

<p>4.6.9 Includes a summary of efforts made to reduce Collection System Overflows, Spills, STP Overflows, and/or STP Bypasses, including the following items, as applicable:</p> <ul style="list-style-type: none"> <li>a) A description of projects undertaken and completed in the Authorized System that result in overall overflow reduction or elimination including expenditures and proposed projects to eliminate overflows with estimated budget forecast for the year following that for which the report is submitted.</li> <li>b) Details of the establishment and maintenance of a PPCP, including a summary of project progresses compared to the PPCP's timelines.</li> <li>c) An assessment of the effectiveness of each action taken.</li> <li>d) An assessment of the ability to meet Procedure F-5-1 or Procedure F-5-5 objectives (as applicable) and if able to meet the objectives, an overview of next steps and estimated timelines to meet the objectives.</li> <li>e) Public reporting approach including proactive efforts.</li> </ul>	<p>(8) SUMMARY</p>
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