

# **Temagami South Wastewater Treatment Lagoon**

## **2020 Annual Performance Report**

**January 1, 2020 to December 31, 2020**

## INTRODUCTION

Environmental Compliance Approval (ECA) #3-1567-98-006 for Municipal and Private Sewage Works, Condition 4(4.4) requires the Owner to prepare and submit a performance report to the Ministry of the Environment's District Manager on an annual basis, within 90 days of the end of the reporting period, for the preceding calendar year. The 2020 Annual Performance Report was prepared by the Ontario Clean Water Agency (OCWA) on behalf of the Municipality of Temagami and is based on information kept on record by OCWA. The report has been completed in accordance with the approval and contains but is not limited to the following information as per the ECA;

- a summary of all monitoring data including an overview of the success and adequacy of the sewage treatment program;
- a comprehensive interpretation of all monitoring data and analytical data obtained during the reporting period, and a comparison to the effluent quality and quantity criteria described in condition 1;
- a summary of any effluent quality assurance or control measures undertaken during the reporting period;
- a tabulation and description of all bypasses, emergency and upset conditions that took place during the reporting period;
- a summary of the calibration and maintenance procedures conducted on all monitoring equipment;

The Temagami South Lagoon operated well and produced good quality effluent throughout the reporting period meeting all requirements of the ECA with the exception of Total Suspended Solids during the spring discharge.

All requirements specified in the approval are further explained throughout the report.

## ANNUAL PERFORMANCE REPORT

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<b>Sewage System Name:</b>	<b>Temagami South Wastewater Treatment Lagoon</b>
<b>Sewage System Address:</b>	Part of Parcels 19125 and 16810 (22 Jack Guppy Way), Municipality of Temagami, ON
<b>Sewage System Owner:</b>	Corporation of the Municipality of Temagami
<b>Sewage System Number:</b>	110002327
<b>Environmental Compliance Approval:</b>	3-1567-98-006, issued November 8, 1998 and 3-1567-98-006 Notice No. 1, issued December 3, 2008
<b>Reporting Period:</b>	January 1, 2020 to December 31, 2020

### Facility Description

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<b>Capacity of Works:</b>	232 m <sup>3</sup> /day
<b>Service Area:</b>	Temagami, District of Nipissing
<b>Service Population:</b>	350
<b>Effluent Receiver:</b>	Snake Island Lake
<b>Major Process:</b>	Two Cell Phosphorous Removal Lagoon

The Temagami South Wastewater Treatment Lagoon is a Class I facility with a daily average flow capacity of 232 m<sup>3</sup>/day. It consists of a 7.0 acre two-celled waste stabilization lagoon with a combined storage capacity of 45,800 m<sup>3</sup>. The system provides phosphorus removal with the addition of ferric sulphate.

Wastewater from Temagami South is collected by a low pressure/shallow buried sanitary collector sewer system. Each home or business is equipped with a low-pressure grinder pump which pumps wastewater to the collection system.

The system discharges seasonally into Snake Island Lake. The discharge period occurs from May 1 to June 15 and from October 15 to November 30, at a rate that is not to exceed 33.3 L/s or 2877.12 m<sup>3</sup>/day.

## 1.0 Monitoring Data

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### 1.1 Monitoring Program as Outlined in the Environmental Compliance Approval

BOD<sub>5</sub> = Five-day biochemical oxygen demand measured in an unfiltered sample  
 TSS = Total Suspended Solids  
 TP = Total Phosphorus  
 TKN = Total Kjeldahl Nitrogen  
 (NH<sub>3</sub><sup>-</sup> + NH<sub>4</sub>) N = Nitrogen as Ammonium and Ammonia  
 H<sub>2</sub>S = Hydrogen Sulphide

#### 1.1.1 Raw Sewage (Influent)

Parameter	Type of Sample	Minimum Frequency
BOD <sub>5</sub>	grab	quarterly
TSS	grab	quarterly
TP	grab	quarterly
TKN	grab	quarterly

#### 1.1.2 Lagoon Cell Contents

Parameter	Type of Sample	Minimum Frequency
TP	grab	prior to discharge
H <sub>2</sub> S	grab	prior to discharge
<i>E. coli</i>	grab	prior to discharge

#### 1.1.3 Final Effluent

Parameter	Type of Sample	Minimum Frequency
BOD <sub>5</sub>	grab	five per discharge
TSS	grab	five per discharge
TP	grab	five per discharge
(NH <sub>3</sub> <sup>-</sup> + NH <sub>4</sub> ) N	grab	five per discharge

Note: Collected at 0%, 25%, 50%, 75% and 100% drawdown in the lagoon, during the discharge period.

## 1.2 Data

### 1.2.1 Influent Flow

Month	Average Flow (m <sup>3</sup> /day)	Maximum Flow (m <sup>3</sup> /day)	Total Flow (m <sup>3</sup> /day)
January	110	124	3425
February	119	145	3446
March	142	207	4395
April	127	153	3807
May	120	127	3722
June	126	136	3773
July	167	1321	5191
August	135	164	4175
September	117	141	3510
October	126	141	3899
November	113	124	3394
December	112	130.3	3486
Total	-	-	46223

### 1.2.2 Summary of Influent Flow

Maximum Flow (m <sup>3</sup> /day)	Average Flow (m <sup>3</sup> /day)	Rated Capacity (m <sup>3</sup> /day)	% Capacity	Exceedance
1,321	126	232	54	No

### 1.2.3 Raw Sewage (Influent)

Parameter	Average	Maximum
BOD <sub>5</sub> (mg/L)	145.4	364
TSS (mg/L)	151	267
TP (mg/L)	4.9	10.4
TKN (mg/L)	52.2	129

### 1.2.4 Lagoon Cell Contents

Parameter	Spring	Fall
TP (mg/L)	0.31	0.104
H <sub>2</sub> S (mg/L)	0.04	0.03
<i>E. coli</i> (cfu/100 mL)	955	45

Note: cfu = colony forming units

### 1.2.5 Effluent Flow Summary

Discharge Period	Volume (m <sup>3</sup> )	Avg Flow (m <sup>3</sup> /day)	Flow Rate (L/sec)	Compliance	
Spring: May 13 - June 4	40,278	2877	33.3	May 1 to June 15	2877.1 m <sup>3</sup> /day Or 33.3 L/sec
Fall: Oct 29 to Nov 12	34,525	2,466	28.5	Oct 15 to Nov 30	

Avg = Average

Spring Dates: May 13 - 19 and May 28 - June 4 (14 days)

Fall Dates: Oct 29 - Nov 6 & Nov 8 - 12 (14 days)

### 1.2.6 Effluent - Spring

Parameter (mg/L)	Seasonal Average	Compliance Limit	Compliance Period	Exceedance
BOD <sub>5</sub>	5.8	25	seasonal average	No
TSS	27.6*	25	seasonal average	Yes
TP	0.25	1.0	seasonal average	No
TAN (NH <sub>3</sub> <sup>-</sup> + NH <sub>4</sub> ) N	13.3	N/A	N/A	N/A

\*TSS exceeded the seasonal average concentration limit of 25 mg/L and loadings limit of 71.9 kg/day.

### 1.2.7 Effluent - Fall

Parameter (mg/L)	Seasonal Average	Compliance Limit	Compliance Period	Exceedance
BOD <sub>5</sub>	4.1	25	seasonal average	No
TSS	20.3	25	seasonal average	No
TP	0.47	1.0	seasonal average	No
TAN (NH <sub>3</sub> <sup>-</sup> + NH <sub>4</sub> ) N	15.3	N/A	N/A	N/A

### 1.2.8 Effluent - Spring Loadings

Parameter (kg/day)	Average	Compliance Limit	Compliance Period	Exceedance
BOD <sub>5</sub>	16.7	71.9	seasonal average	No
TSS	79.4*	71.9	seasonal average	Yes
TP	0.7	2.9	seasonal average	No

\*TSS exceeded the seasonal average concentration limit of 25 mg/L and loadings limit of 71.9 kg/day.

### 1.2.9 Effluent - Fall Loadings

Parameter (kg/day)	Average	Compliance Limit	Compliance Period	Exceedance
BOD <sub>5</sub>	10.5	71.9	seasonal average	No
TSS	52.2	71.9	seasonal average	No
TP	1.2	2.9	seasonal average	No

## 1.3 Sewage Treatment Program Success and Adequacy

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

### 1.3.1 Performance Summary - Spring

Parameter	Influent	Effluent	% Removal
BOD <sub>5</sub> (mg/L)	145.4	5.8	96
TSS (mg/L)	151	27.6	82
TP (mg/L)	4.9	0.25	95

### 1.3.2 Performance Summary - Fall

Parameter	Influent	Effluent	% Removal
BOD <sub>5</sub> (mg/L)	145.4	4.1	97
TSS (mg/L)	151	20.3	87
TP (mg/L)	4.9	0.47	90

## 2.0 Interpretation of Monitoring and Analytical Data

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The Temagami South Sewage Treatment Lagoon operated well within its required capacity. The raw sewage (influent) flow is a measurement based on the total volume of sewer water taken each day. Table 1.2.1 *Influent Flow Data* summarizes the flow data for 2020. The average and maximum flows are presented for each month. Compliance is achieved when the average annual influent flow does not exceed 232 m<sup>3</sup>/day and when the seasonal average effluent does not exceed 2877.1 m<sup>3</sup>/day or 33.3 L/s. In 2020, the average annual flow was 126 m<sup>3</sup>/day, which represents 54% of the rated capacity and the maximum seasonal average effluent flow 2,616 m<sup>3</sup>/day, which represents 91% of the compliance limit. In 2020, the total amount of sewage received by the lagoon was 46,223 m<sup>3</sup> and the total discharged was 73,367 m<sup>3</sup>.

The effluent quality is based on the seasonal average of the biochemical oxygen demand, total suspended solids, and total phosphorus levels. The annual averages for all parameters are listed in table 1.2.6.1 and 1.2.6.2 *Effluent*.

Biochemical 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. In 2020, the average BOD<sub>5</sub> was 5.8 mg/L for the spring discharge and 4.1 mg/L for the fall discharge complying with the limit of 25 mg/L.

Suspended Solids (TSS) in effluent are composed of settle able solids and non-settle able 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. In 2020 the average TSS for the spring discharge was 27.6 mg/L which exceeds the compliance limit of 25 mg/L. The average TSS for the fall discharge was 20.3 mg/L complying with the limit. The elevated TSS results in the spring are presumably due to the late thaw, the lagoon turning over more frequently and decreased chemical addition. These issues will be taken into account for the 2021 spring discharge.

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. In 2020, the average TP for both seasons complied with the limit of 1 mg/L. In the spring it was 0.25 mg/L and in the fall it was 0.47 mg/L.

Refer to Appendix A for the Monthly Process Data Report, which summarizes the monitoring and sampling analysis conducted at the facility.

## 3.0 Effluent Quality Assurance and Control Measures Undertaken

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The following activities are included in regular operator and supervisory activities to assure the quality of the sewage treatment operations including effluent quality and flow monitoring data:

- The lagoon system is inspected by a certified OCWA operator regularly during the work week.
- Certified operators monitor chemical usage and make adjustments as required
- Operations and Compliance staff review daily round sheets and laboratory reports to keep track of routine operation of the treatment plant and ensure compliance with the ECA.

- All process and laboratory data is logged in a process data management system.
- All effluent quality data is reviewed by the Overall Responsible Operator and Compliance staff to identify any changes in concentrations and/or emerging trends.
- All instrumentation is tested and maintained as per manufacturer’s recommendations.
- All routine maintenance scheduled in OCWA’s Workplace Maintenance System (WMS), was completed in 2020.

Quality Control elements of the monitoring program include the following:

- Samples are collected as required and analyzed by Testmark Laboratories located in Kirkland Lake, Ontario. Analyses are conducted in accordance with the Standard Council of Canada (SCC), in cooperation with the Canadian Association for Laboratory Accreditation Inc. (CALA).
- Quality control procedures are method specific and include laboratory duplicate samples, spiked blanks and spiked duplicates.
- Any bypass or upset events that occur in the system are tested, monitored and reported to the local Health Unit and Spills Action Center (SAC) and local Health Unit.

#### **4.0 Bypasses, Sewer Main Breaks, Emergency, and Upset Events**

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There were no bypasses, breaks, emergencies or upsets at the Temagami South Lagoon in 2020.

The TSS concentration and loading limits were exceeded during the spring discharge, as mentioned in section 2.0, due to the lagoon turning over and timing of samples, as well as decreased chemical addition. Chemical addition will be increased in spring 2021 and the lagoon will be given more time to settle after recirculating. The discharge will be monitored and stopped if the solids are high.

#### **5.0 Calibration and Maintenance of all Monitoring Equipment**

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Plant maintenance, including non-scheduled maintenance, is monitored using the OCWA’s Preventative Maintenance software program. Monitoring equipment is calibrated based on the manufactures recommendations. All routine and preventative maintenance measures were conducted as scheduled in 2020. Refer to Table 5.1 for a summary of calibrations conducted in 2020.

##### **5.1 Calibration Summary**

<b>Date</b>	<b>Instrument</b>	<b>% Accuracy</b>
May 26, 2020	Influent Flow Meter	99.9

\*Calibration was scheduled to be completed in March but it wasn’t completed until May 26, 2020 due to COVID.

## 6.0 Maintenance Procedures Performed on the Works

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Routine maintenance schedules are entered in OCWA's computerized Workplace Management System (WMS). This is a comprehensive maintenance program that is based on a pro-active and preventive approach. This program includes but is not limited to running weekly, monthly, and annually checks as required or as recommended by manufacturer's instructions. All routine and preventative maintenance measures were conducted as scheduled in 2020.

There was not any major maintenance performed on the system in 2020.

## 7.0 Efforts Made to Meet Effluent Objectives

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OCWA uses a number of best efforts to achieve the *Effluent Objectives*;

- Operational staff has current and appropriate level of certification for the operation of the facility and continue to learn and achieve knowledge of the process and equipment. Staff also has a high level of regulatory competence.
- The mechanical elements in the facility are regularly inspected, well maintained and kept in good repair. OCWA uses a computerized maintenance management program which generates works orders to ensure maintenance of equipment is proactively performed.
- Raw wastewater and effluent samples are collected as required and analyzed by Testmark Laboratories, an accredited laboratory in Kirkland Lake. OCWA reviews these results on a regular basis to ensure compliance with ECA objectives and limits.
- Operations, maintenance and emergency procedures are available to ensure facilities are operated in compliance with applicable legal instruments. Facility staff has access to a network of operational compliance and support experts at the region and corporate levels.
- OCWA provides quarterly reports to the Owner which discusses operational data, maintenance activities and capital improvements.
- The pH was maintained within the objective range of 6.5 to 9.0 inclusive
- The works were operated according to the capacity of the plant.
- During this reporting period the facility met all objectives for seasonal effluent concentrations and loadings, with the exception of TSS in the spring. Results are provided in the tables below for a comparison of the seasonal results to the system's objectives.

### 7.1 Effluent Concentration Objectives - Spring

Parameter	Seasonal Average	Objective (Seasonal Average)	Exceedance
BOD <sub>5</sub> (mg/L)	5.8	15	No
TSS (mg/L)	27.6	20	Yes
TP (mg/L)	0.25	1	No

### 7.2 Effluent Concentration Objectives - Fall

Parameter	Seasonal Average	Objective (Seasonal Average)	Exceedance
BOD <sub>5</sub> (mg/L)	4.1	15	No
TSS (mg/L)	20.3	20	Yes, by 0.3 mg/L
TP (mg/L)	0.47	1	No

### 7.3 Spring Effluent Loading Objectives

Parameter	Average	Objective (Seasonal Average)	Exceedance
BOD <sub>5</sub> (mg/L)	16.7	43.1	No
TSS (mg/L)	79.4*	57.5	Yes
TP (mg/L)	0.7	2.9	No

### 7.4 Fall Effluent Loading Objectives

Parameter	Average	Objective (Seasonal Average)	Exceedance
BOD <sub>5</sub> (mg/L)	10.5	43.1	No
TSS (mg/L)	52.2	57.5	No
TP (mg/L)	1.2	2.9	No

## Appendix A: Monthly Process Data Report

Raw Data (mg/L)	Count	Jan	April	Jul	Oct	Avg
BOD5	4	68	72.3	364	77.2	145
Suspended Solids	4	86	144	267	108	151
TKN	4	23.2	31.6	129	24.9	52
Total Phosphorus	4	2.52	3.45	10.4	3.26	4.9

Spring Effluent (mg/L)	Count	0%	25%	50%	75%	100%	Avg
BOD5	5	5.3	5.9	6.8	2.6	8.4	5.8
Suspended Solids	5	43	25	13	23	34	27.6
Total Phosphorus	5	0.35	0.17	0.2	0.35	0.19	0.25
NH3 + NH4 as N	5	17.1	14.9	15.1	14.7	4.68	13.3

Fall Effluent (mg/L)	Count	0%	25%	50%	75%	100%	Avg
BOD5	5	3.3	3	4.1	4.4	5.7	4.1
Suspended Solids	5	15	15.2	13.5	17.4	15.4	15.3
Total Phosphorus	5	0.561	0.237	0.253	0.949	0.355	0.47
NH3 + NH4 as N	5	20	19	6	37	19.5	20.3