ONTARIO CLEAN WATER AGENCY
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2023 Annual Performance Report for the North Cobalt Sewage Treatment Lagoon & Sewage Collection System

January 1, 2023 to December 31, 2023

PREPARED BY

Ontario Clean Water Agency
on behalf of the City of Temiskaming Shores

Date: March 22, 2024
Rev: 1

Revision History

Rev. No.	Date	Prepared by:	Approved by:	Description
0	March 8, 2024	I. Bruneau, PCT	C. Mongrain, ORO	Revision 0 issued for MECP Inspection
1	March 22, 2024	I. Bruneau, PCT	C. Mongrain, ORO	Corrected issue date of the ECA and included ECA amendment notices in the Executive Summary

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Executive Summary

The North Cobalt Sewage Treatment Lagoon is located at 543083 Proctors Road in the Township of Buck and serves the residence of South Haileybury (North Cobalt). The lagoon is designed to treat a daily average flow of 1200 m^3/day and a peak flow of 2900 m^3/day. It is classified as a Class 2 wastewater treatment system under Ontario Regulation 129/04 and operates under Environmental Compliance Approval (ECA) No. 3-0077-94-006 for Municipal and Private Sewage Works issued on March 8, 1994 and the following amendment notices issued on September 20, 1994, January 30, 1995, February 8, 1995 and December 7, 1995.

The North Cobalt Lagoon Sewage Collection System is a Class II wastewater collection system under Ontario Regulation 129/04 that follows the requirements of ECA No. 218-W601 for Municipal Sewage Collection Systems issued on October 27, 2023.

This report summarizes the requirements of each Approval and describes the operational performance of the system to ensure the production of quality effluent.

The North Cobalt Sewage Treatment Lagoon System operated well in 2023 producing a high quality effluent that met all effluent limits and objectives specified in the system's ECA

The system met the rated capacity limit having an annual average daily flow to the lagoon of 425 m^3, which is 35% of the rated capacity. The total volume of influent flow measured in 2023 was 155,216 m^3 compared to the effluent flow of 188,174 m^3.

There was one (1) spill and six (6) overflow events that occurred during the reporting period which are described in Section 10.

All requirements specified in the system's ECAs and any issues experienced at the facility are further explained throughout the report.

Introduction

Condition 17 of ECA No. 3-0077-94-006 for the North Cobalt Sewage Treatment Lagoon 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 report must be completed in accordance with this approval and contains, but is not limited to the following information outlined in the ECA:

- A summary of all monitoring and compliance reports submitted in the reporting period, including an overview of the success and adequacy of the sewage treatment program;
- A comprehensive interpretation of all monitoring data and analytical data collected relative to the works during the reporting period and a comparison to the effluent quality and quantity criteria described in sections 11 and 12;
- A summary of any effluent quality assurance or control measures undertaken during the reporting period;
- A summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the works;
- A description of any operating problems encountered and corrective actions taken during the reporting period;
- A summary of any proposed alteration, extension or replacement in the process or operation of the works to be completed over the next reporting period which may require approval under the Ontario Water Resources Act;
- A tabulation of the volume of sludge generated in the reporting period and an outline of anticipated volumes to be generated over the next reporting period;
- An outline of the sludge handling methods and disposal areas to be utilized over the next reporting period;
- An evaluation of the calibration and maintenance procedures conducted on all monitoring equipment;
- An evaluation for the need for modifications to the works to improve performance and reliability and to minimize upsets and bypasses.

Condition 4.0(4.6) of ECA No. 218-W601 for the North Cobalt Lagoon Sewage Collection System requires the Owner to prepare and submit an annual performance report to the Ministry of the Environment's Director on or before March 31st of each year and covers a period from January 1st to December 31st of the preceding calendar year. This report must include, but is not limited to the following information;

- 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;

- Includes a summary of any operating problems encountered and corrective actions taken;
- 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;
- Includes a summary of any complaints related to the Sewage Works received during the reporting period and any steps taken to address the complaints.
- 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;
- Includes a summary of all Collection System Overflow(s) and Spill(s) of Sewage, including: dates, volumes and durations. If applicable, loadings for total suspended solids, BOD_5, total phosphorus, and total Kjeldahl nitrogen, and sampling results for *E.coli*, disinfection, if any and any adverse impact(s) and any corrective actions, if applicable;
- Includes a summary of efforts made to reduce Collection System Overflows, Spills, STP Overflows, and/or STP Bypasses, including the following items, as applicable:
    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.
    b) Details of the establishment and maintenance of a PPCP, including a summary of project progresses compared to the PPCP's timelines.
    c) An assessment of the effectiveness of each action taken.
    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.
    e) Public reporting approach including proactive efforts.

The two reports have been merged into one and is presented as the 2023 Annual Performance Report. The report was prepared by the Ontario Clean Water Agency (OCWA) on behalf of the City of Temiskaming Shores and is based on information kept on record by OCWA.

1 System Description

Sewage System Name:	**North Cobalt Sewage Treatment Lagoon**
Sewage System Works Number:	110001382
Sewage System Address:	543083 Proctors Road, Part 13 & 14, Concession 2, Township of Buck, District of Timiskaming, ON
Sewage System Owner:	Corporation of the City of Temiskaming Shores
Sewage Treatment ECA:	3-0077-94-006, issued March 8, 1994
Sewage Collection ECA:	218-W601, issued October 27, 2023
Reporting Period:	January 1, 2023 to December 31, 2023

Capacity of Works:	1200 m^3/day annual average, 2900 m^3/day peak
Service Area:	Temiskaming Shores, subsection North Cobalt
Service Population:	980
Effluent Receiver:	Farr Creek
Major Process:	Three-celled Aerated, Phosphorus Removal Lagoon

The North Cobalt Sewage Treatment Lagoon serves the residents of North Cobalt (South Haileybury) and is designed to treat a daily average flow capacity of 1200 m^3/day and a peak flow of 2900 m^3/day. The system consists of three aerated facultative lagoons each having a capacity of 21,500 m^3. The lagoon continuously discharges to Farr Creek which eventually discharges to Lake Temiskaming.

The North Cobalt Lagoon system is a continuous discharge lagoon comprised of a grit removal facility, three aerated facultative lagoons and two sludge storage transfer lagoons. The control building contains a 27,200 L alum storage tank, air supply system, ultra-violet light disinfection system and Parshall flume for flow measurement. A 100 kW standby diesel generator set is available to supply power in emergency situations

The sewage treatment lagoon consists of the following;

Grit removal facility with manual bar screen consisting of three grit channels each 5m x 0.75m x 0.6m wide two of which are individually equipped with a v-notch weirs;

Aerated lagoon system with three cells in series each having a 0.86 hectare surface area, and a storage capacity of 19,100 m^3 at a nominal depth of 3.5 m. Each of the lagoon cells are equipped with fine bubble diffusers. The system is equipped with interconnecting sewers and chambers including a submersible sewage pump capable of delivering 13 L/s at 6.1 m TDH in Drain Chamber No. 3, and a 300 mm effluent discharge with a submerge outfall structure in Farr Creek. There

are two sludge storage cells with each cell having a capacity of 1500 m^3 at a nominal depth of three metres. Each cell is equipped with air diffusers, mixer and a common submersible sewage pump rated at 12.6 L/s at 8m TDH. In 2014, the lagoon's underdrain system was plugged and a pump was installed, which operates on level, to direct any underdrain wastewater to Cell No. 2.

Control Building housing the following;

- an ultra-violet disinfection system (Trojan UV 3000 B) comprised of two banks totaling 32 lamps with a nominal intensity of 11,000 mW/cm2 and 7.57 s retention time of 38.92 cm/s;
- a 27,200 L alum storage tank;
- an air supply system for the fine bubble diffusers consisting of three rotary positive blowers delivers air through a 150mm air header line to the diffusers in the lagoons cells;
- an air supply system of the sludge storage cells consisting of an air compressor, 1500 L receiver tank, particulate filter, oil filer and 75 mm air header line to the transfers cells;
- a Parshall Flume for measuring effluent flows to Farr Creek;
- a 100 kW diesel generator for back-up power

Alum Building houses two 1100 L alum feed tanks and feed lines for phosphorus removal. The building is located between Cell No. 1 and Cell No. 2 and the system feeds alum into Cell No. 2.

Sludge Storage Transfer Lagoons each have a capacity of 1500 m^3 at a nominal depth of 3 meters. The lagoons are currently not in use as sludge is not removed or managed at this time.

The North Cobalt sewage collection system consists of truck sewers, separate sewers, nominally separate sewers, forcemains and two (2) sewage pumping stations that direct sanitary sewage to the lagoon North Cobalt Sewage Treatment Lagoon. One station is located on Station Street and the other on Groom Drive.

Station Street SPS is located on Lot 10, Con 2 on Station Street in the community of North Cobalt.

The pumping station consists of a poured concrete wet well and two submersible pumps each capable of delivering sewage at a rate of 11.4 L/s at 14.6 meters TDH. It includes an overflow manhole equipped with an overflow pump, piping, valves, instrumentation, and mechanical/electrical equipment for the operation of the pumping station. The station is powered by an MCC (Motor Control Center) and fully controlled by a PLC SCADA system.

The wet well is equipped with a Milltronics level system as well as a back-up float system with a series of alarms. OCWA's remote monitoring system is used to monitor sewage levels and volumes.

The system has a flow meter and chlorine dosing system to measure and treat collection system overflows. The overflow discharge is to an Farr Creek that flows to Lake Temiskaming.

The station is equipped with a 25 kW standby diesel generator which is located inside the pump house building.

Groom Drive SPS is located south of Groom Drive at Queen Street in the community of North Cobalt.

The pumping station consists of a poured concrete wet well and two submersible pumps each capable of delivering sewage at a rate of 3.8 L/s at 7.4 meters TDH. The station is equipped with piping, valves, instrumentation, and mechanical/electrical equipment for the operation of the pumping station, is powered by an MCC and fully controlled by a PLC SCADA system.

The wet well is equipped with a Milltronics level system as well as a back-up float system with a series of alarms. OCWA's remote monitoring system is used to monitor sewage levels and pumping hours.

A 30 kW portable diesel generator is stored off-site at the Temiskaming Shores Public Works Garage to ensure its operation in the winter months.

2 Monitoring Program

2.1 Monitoring Program as Outlined in the Environmental Compliance Approval

Table 1: Analytical Parameters

BOD_5	Five Day Biochemical Oxygen Demand – is measured in an unfiltered sample; includes carbonaceous and nitrogenous oxygen demand. It refers to the amount of oxygen consumed by organic matter in a specific volume of water at a specific temperature over a 5 day period. High BOD_5 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.
TSS	Total Suspended Solids – the dry weight of suspended particles that are not dissolved in water and can be filtered. TSS is composed of settleable solids and non-settleable 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.
TP	Total Phosphorus – a measure of all phosphorus found in a sample, whether it is dissolved or particulate. TP is commonly used to determine the health of water bodies. Excess TP stimulates algae and weed growth that may cause fluctuations in dissolved oxygen in the receiving waters.
TAN	Total Ammonia Nitrogen – the total amount of nitrogen in the forms of Ammonium (NH_4) and Ammonia (NH_3). Ammonia is one of several forms of

Table 1: Analytical Parameters

	nitrogen that exist in aquatic environments and can cause direct toxic effects on aquatic life. High levels of ammonia can corrode and damage critical pieces of infrastructure.
TKN	Total Kjeldahl Nitrogen – measures both total organic nitrogen and ammonium. Excess nitrogen in water bodies can lead to harmful algal blooms and other negative impacts on aquatic ecosystems.
NO_2-N	Nitrogen as Nitrite – can cause excessive algae and plant growth which can deplete oxygen of waterbodies resulting in the death of fish and other aquatic organisms.
NO_3-N	Nitrogen as Nitrate – nitrates are essential plant nutrients, but in excess amounts they can cause significant algae and plant growth and contribute to water quality problems.
E. coli	*Escherichia coli* – Thermally tolerant forms of Escherichia bacteria that can live in the intestines of humans and warm-blooded animals. There are hundreds of *E. coli* strains and most are relatively harmless, however a notorious exception is *E. coli* strain 0157:H7, an emerging pathogen that produces a powerful toxin and can cause severe illness. *E. coli* is used as the most widely adopted indicator of faecal pollution in water and wastewater.
Alkalinity	Alkalinity is an acid neutralizing agent that resists changes in pH. Wastewater systems which include biological processes function best at an optimal pH and alkalinity is needed to ensure pH remains in the optimal range.
pH	pH – expresses the degree or intensity of both acidic and alkaline reactions on a scale from 0 to 14 with 7 being neutral, number less than 7 signify increasingly greater acidic solutions, and numbers greater than 7 signify increasingly basic or alkaline reactions. Very high or very low pH levels can be corrosive to pipes, screening equipment and pumps, can damage biological processes and form undesirable toxic gases or heavy metals.

Table 2: Sampling Requirements for the Raw Sewage (Influent)

Parameter	Type of Sample	Minimum Frequency
BOD_5	24 hour composite	weekly
TSS	24 hour composite	weekly
TP	24 hour composite	weekly
TKN	24 hour composite	weekly
Alkalinity	24 hour composite	weekly

Table 3: Sampling Requirements for the Final Effluent

Parameter	Type of Sample	Minimum Frequency
BOD_5	24 hour composite	weekly
TSS	24 hour composite	weekly
TP	24 hour composite	weekly
TKN	24 hour composite	weekly
TAN (NH_3^- + NH_4 as N)	24 hour composite	weekly
NO_2-N	24 hour composite	weekly
NO_3-N	24 hour composite	weekly
Alkalinity	24 hour composite	weekly
pH	24 hour composite	weekly
Temperature	grab	weekly
E. coli	grab	weekly

3 Interpretation of Monitoring and Analytical Data

3.1 Influent Flow

The influent flow is a measurement based on the total volume of wastewater taken in each day. The system is equipped with flow meters installed on two of three grit channels at the head of the treatment works to measure the raw sewage into the lagoon.

The rated capacity of the North Cobalt Wastewater Lagoon is 1200 m^3/day (average daily flow). The average flow is defined as the total flow to the sewage works during the period of operation upon which the report is based, divided by the number of days in the period.

Compliance is achieved when the average daily influent flow does not exceed 1200 m^3/day or a peak design flow of 2900 m^3/day. The average daily flow for 2023 was 425 m^3/day which is 35% of the average rated capacity. This was the lowest annual average over the last 11 years. A peak flow of 3455 m^3/day was reached on April 11th during heavy rain and snow melt. This was the highest peak flow since 2015 (3752 m^3/day).

The total amount of sewage received by the lagoon in 2023 was 155,216 m^3.

Figure 1 compares the monthly influent flow rates recorded in 2023 to the rated capacity and peak capacity of the plant.

Flow trends are critical to assessing the adequacy of size of the treatment system. Figure 2 shows both the annual average and annual peak values for the last 11 years plotted against the rated capacity and peak flow capacity of the wastewater system.

3.1.1 Monthly Influent Flows

Table 4: Comparison of the Monthly Influent Flows to the Rated Capacity

2023	Total Influent Flow (m^3/d)	Maximum Influent Flow (m^3/d)	Average Daily Influent Flow (m^3/d)	% of the Avg. Day Rated Capacity (1200 m^3/d)
January	8957	679	289	24%
February	5736	474	205	17%
March	5733	225	185	15%
April	33,273	3455	1109	92%
May	17,254	3088	447	37%
June	5917	531	197	16%
July	8761	748	283	24%
August	7691	608	248	21%
September	15,352	3337	512	43%
October	23,437	2305	756	63%
November	14,583	1015	486	41%
December	8525	340	275	23%

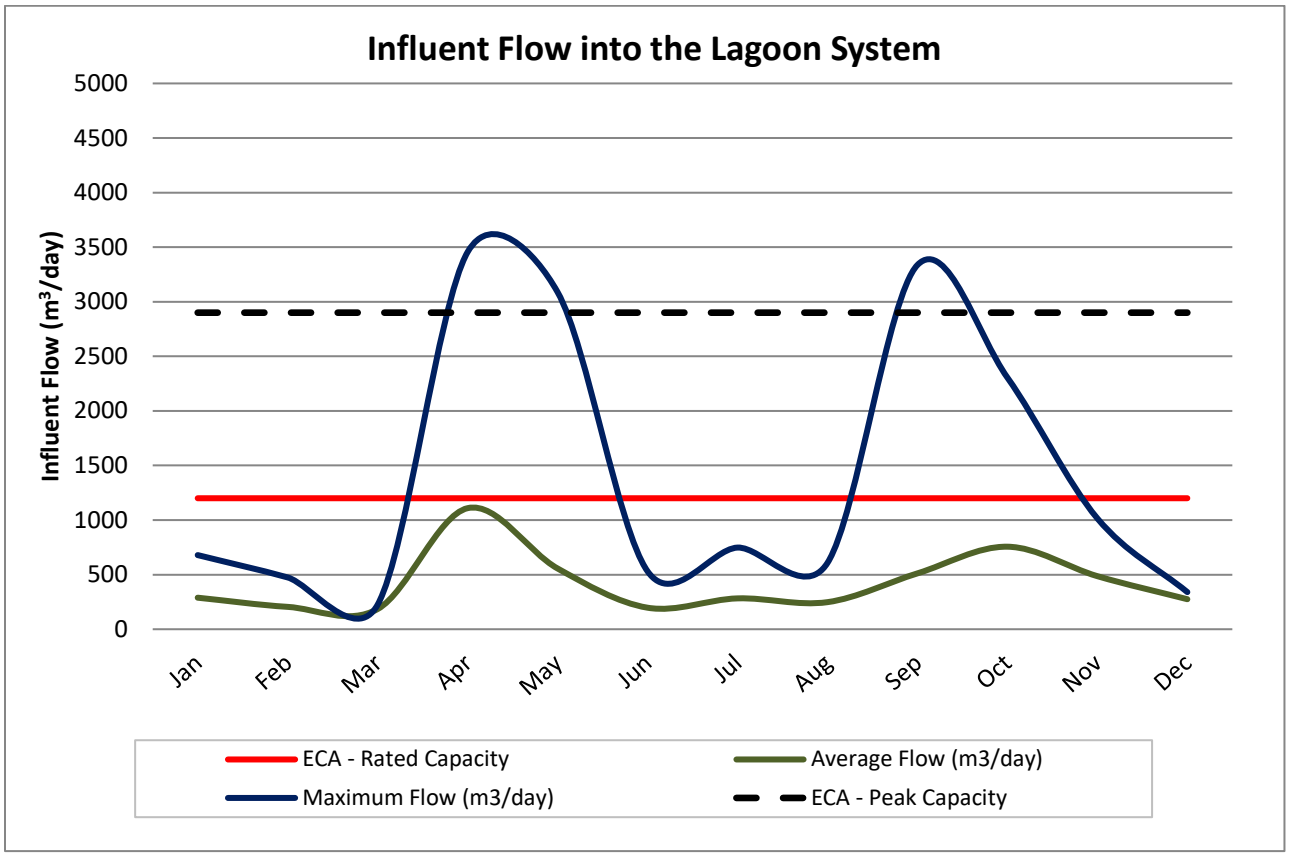

Figure 1 – 2023 Influent Flow into the North Cobalt Lagoon

3.1.2 Annual Influent Flows

Table 5: Comparison of the Annual Influent Flow to the Rated Capacity

Design Capacity (m^3/day)	1200	Maximum Flow Capacity (m^3/day)	2900
2023 Average Flow (m^3/day)	425	2023 Maximum Flow (m^3/day)	3455
Percent of Capacity (%)	35%	Percent of Capacity (%)	119%
Total volume of wastewater treated in 2023		155,216 m^3	

3.1.3 Historical Influent Flows

Table 6: Comparison of Historical Influent Flows (2013 to 2023)

Year	Total Influent Flow (m^3/d)	Maximum Influent Flow (m^3/d)	% Maximum of Peak Capacity (2900 m^3/d)	Average Day Flow (m^3/d)	% Average of Rated Capacity (1200 m^3/d)
2023	155,216	3455	119%	425	35%
2022	174,031	2818	97%	577	40%
2021	169,881	2408	83%	465	39%
2020	201,487	3083	106%	550	46%
2019	210,487	3068	106%	577	48%
2018	175,329	2545	88%	480	40%
2017	213,567	2455	85%	585	49%
2016	187,606	2972	102%	513	43%
2015	193,330	3752	129%	574	48%
2014	172,937	1983	68%	474	40%
2013	162,845	2379	82%	446	37%

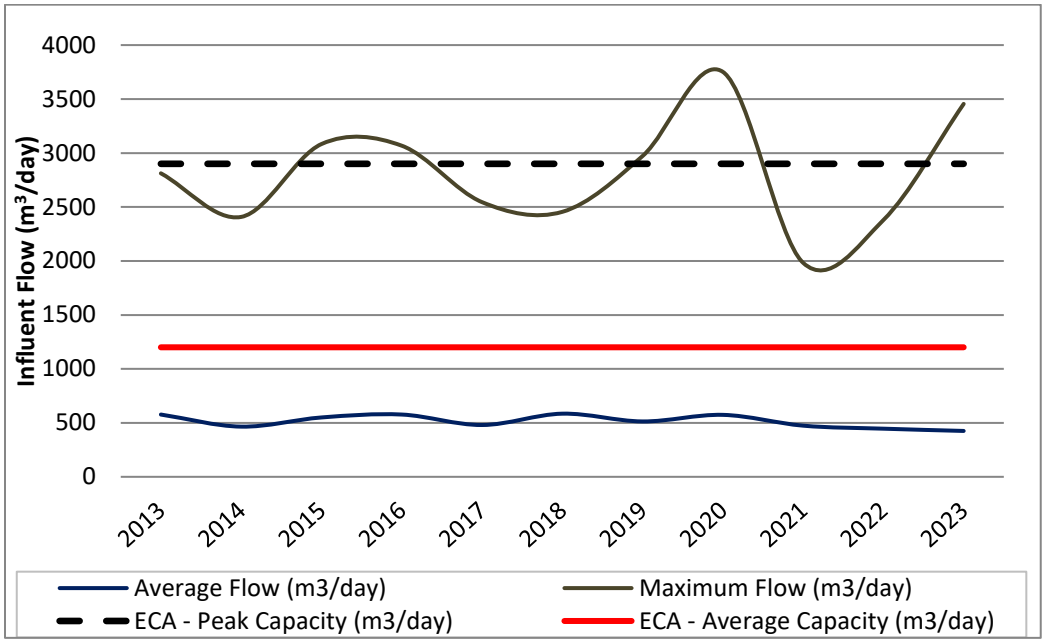

Figure 2 – Historical Influent Flow Trends (2013 to 2023)

3.2 Effluent Flows

The effluent flow is measured using a Parshall Flume located on the effluent discharge pipe to measure flows into Farr Creek.

3.3 Influent Verses Effluent Flows

The total volume of influent flow measured in 2023 was 155,216 compared to the effluent flow of 188,174 m^3 which is 18% higher than influent flow.

Table 7 and Figure 3 compare the 2023 influent flows to the effluent flows.

Table 7: Influent and Effluent Flow Comparison for 2023

2023	Influent Flow (m^3/month)	Effluent Flow (m^3/month)	Flow Difference (Effluent – Influent)	% Percent Difference
January	8957	9580	623	7.0%
February	5736	6172	436	7.6%
March	5733	5866	133	2.3%
April	33,273	43,161	9888	30%
May	17,254	24,552	7298	42%
June	5917	6223	306	5.2%
July	8761	11,790	3029	35%
August	7691	8248	557	7.2%
September	15,352	17,537	2185	4%
October	23,437	29,626	6189	26%
November	14,583	16,603	2020	14%
December	8525	8814	289	3.4%
TOTAL	**155,216**	**188,174**	**32,958**	**18%**

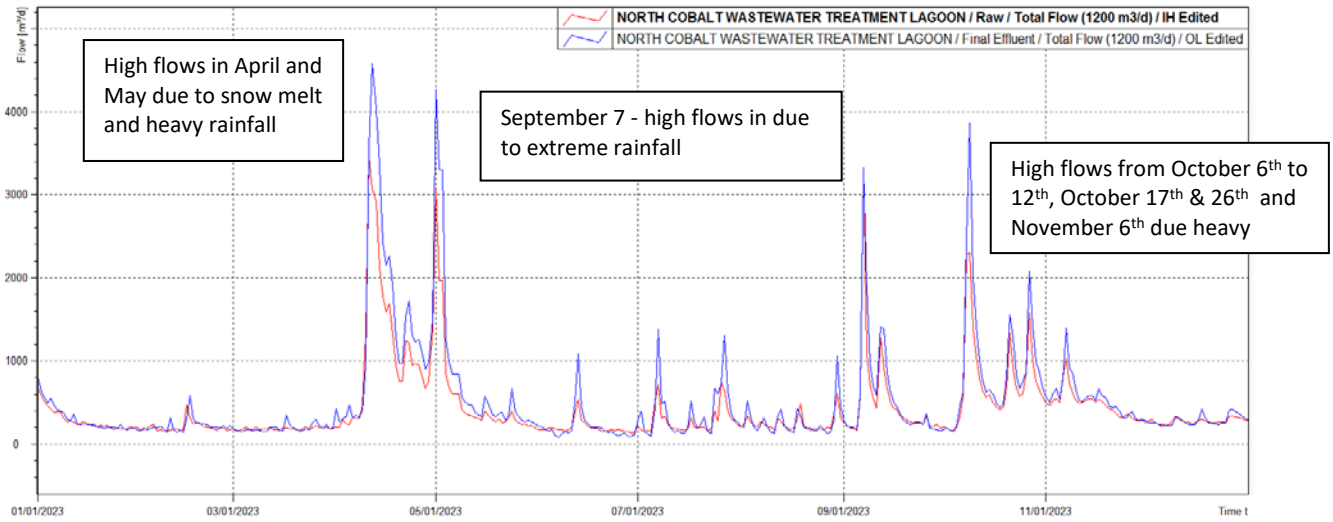

Figure 3 – Comparison of Influent and Effluent Flows (2023)

3.4 Influent (Raw Sewage) Quality

Influent samples are required to be collected on a weekly basis. This section summaries the annual average and annual maximum concentrations of analytical parameters for 2023. A summary of the monthly monitoring data is available in Appendix A.

Table 8: Influent Concentrations

Parameter	Annual Average	Annual Maximum
BOD_5 (mg/L)	< 151	670
TSS (mg/L)	192	1300
TP (mg/L)	3.97	17.0
TKN (mg/L)	29.9	71.3
Alkalinity (mg/L $CaCO_3$)	233	309

"<" means values include results that were less than the laboratory's method detection limit

3.4.1 Historical Trends of Influent Characteristics

The characteristics of the raw wastewater influence the design and efficacy of the wastewater treatment process. Influent data and trends for BOD_5, TSS, TP, TKN and Alkalinity for the last 11 years data is provided in Appendix B.

The trends show that the average BOD_5 concentration varied from 64 to 213 mg/L over the past 11 years with a maximum level of 2200 mg/L in 2018.

The average TSS concentration ranged from 58 to 328 with a maximum concentration of 3640 mg/L in 2021.

The average TP concentration varied slightly from 2.1 to 5.0 with a maximum concentration of 45 mg/L in 2018.

The average TKN concentration fluctuated from 18 to 532 with a maximum concentration of 191 mg/L in 2021.

The average alkalinity concentrations remained fairly consistent over the past 10 years.

3.5 Effluent Quality

The North Cobalt sewage effluent quality is based on the carbonaceous biochemical oxygen demand ($cBOD_5$), total suspended solids (TSS), total phosphorus (TP) and *E. coli* levels. In 2023, the lagoon produced a high quality effluent which met the compliance limits specified in the system's ECA. Summaries of the minimum and maximum monthly averages for the final effluent concentrations are shown in Table 9 along with the annual minimum and maximum pH and temperature results. The effluent loadings are shown in Table 10.

Table 9: Effluent Concentrations

Parameter	Monthly Average (minimum)	Monthly Average (maximum)	Compliance Limit (monthly average)	Exceedance
BOD_5 (mg/L)	< 1.1	4.8	25	No
TSS (mg/L)	< 1.6	12	25	No
TP (mg/L)	< 0.004	0.228	1.5	No
E.coli (cfu/100mL)	< 5	9	200 (*geomean)*	No
TKN (mg/L)	0.9	19	N/A	No
TAN (mg/L)	0.21	10	N/A	No
NO_3-N (mg/L)	0.90	2.63	N/A	No
NO_2-N (mg/L)	< 0.02	0.23	N/A	No
Alkalinity (mg/L)	24	139	N/A	No
Parameter	**Annual Minimum**	**Annual Maximum**	**Operation Guideline**	**Exceedance**
pH	7.48	8.53	6.0 to 9.5 (inclusive)	No
Temperature (°C)	0.5	25	N/A	No

"<" means values include results that were less than the laboratory's method detection limit

Table 10: Effluent Loadings

Parameter	Monthly Average (minimum)	Monthly Average (maximum)	Compliance Limit (monthly average)	Exceedance
BOD_5 (kg/d)	< 1.45	6.11	30	No
TSS (kg/d)	< 2.6	11	30	No
TP (kg/d)	< 0.030	0.330	1.8	No

Appendix A includes a Monthly Process Data Report which summarizes the effluent monitoring and analysis conducted at the facility during the reporting period.

3.6 Sewage Treatment Program Success and Adequacy

The Performance Summary shows the efficiency of the lagoon performance through pollutant removal rates from raw sewage through to the final effluent.

Table 11 demonstrates that the lagoon treatment process was very successful in decreasing the levels of BOD_5, TSS and TP and quite effective in reducing TKN from the influent, producing a high quality effluent.

Table 11: Performance Summary

Parameter	Influent (annual average)	Effluent (annual average)	% Removal
BOD_5 (mg/L)	< 151	< 2.8	98%
TSS (mg/L)	192	< 5.1	97%
TP (mg/L)	3.97	< 0.068	98%
TKN (mg/L)	29.9	7.0	77%

4 Effluent Quality Assurance and Control Measures Undertaken

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

- Operational staff have current and appropriate level of certification for the operation of the facility and continue to learn and achieve knowledge of the process and equipment Experienced staff has a high level of regulatory competence. New staff receives on-going training to achieve operational knowledge and regulatory competence.
- The pumping stations and lagoon site are inspected by a certified OCWA operator regularly during the work week.
- Certified operators conduct daily reviews of selected data from continuous monitoring equipment which is captured by a remote monitoring system.
- In-house tests; pH and temperature, are conducted by licensed operators for monitoring purposes using standard methods for Water and Wastewater.
- Samples are collected as required and analyzed by Testmark Laboratories located in Kirkland Lake, Ontario. Analysis of the samples is 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.
- A sampling system which includes an excel sample calendar, which is updated at the beginning of each year, and a chain of custody binder are used to ensure all samples are collected as per the requirements identified in the system's ECA.
- Operations and Compliance staff review facility round sheets and laboratory reports to monitor the routine operation of the treatment system and ensure compliance with the ECA.
- All process and laboratory data is logged in a process data management system.
- Routine maintenance is scheduled and tracked to completion using OCWA's Workplace Maintenance System (WMS). Instrumentation equipment is tested and maintained as per manufacturer's recommendations.
- Certified operators monitor chemical usage and make adjustments as required.
- Alum Sulphate is added to the lagoon to reduce total phosphorus levels and help settle solids.
- Any bypass, overflow 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.
- All flow and effluent quality data is reviewed by the Overall Responsible Operator and Compliance staff to identify any changes in concentrations and/or emerging trends. All non-compliances are reported to Ministry's Spills Action Center (SAC) and the local MECP inspector.

The Cobalt Lagoon has produced high quality effluent with no effluent or objective exceedances.

5 Efforts Made to Meet Effluent Objectives

The Effluent Design Objectives are those levels of performance which can be achieved by treatment processes treating normal strength municipal sewage under optimum conditions. A sewage treatment facility should be able to produce annual average effluent quality approximately equal to the Effluent Design Objectives, but should not exceed the Effluent Compliance Limits. The objectives are used to promote continuous improvement in the operations of the works and to trigger corrective action before environmental impairment occurs.

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

- Certified operational staff have a high level of process knowledge and regulatory proficiency.
- 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. OCWA reviews these results on a regular basis to confirm compliance with ECA objective and limits.
- In-house sampling and testing for selected operational parameters provides real-time results which are used to enhance process and operational performance.
- 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.
- A five year rolling recommended capital and major maintenance report is used to assist the Owner and OCWA with planning infrastructure needs for the short and long terms. A letter summarizing capital work recommendations a provided to the Owner each year for their approval.

The North Cobalt Lagoon met the monthly effluent objectives for BOD_5, TSS, and TP. A summary of results are provided in the tables below.

Table 12: Effluent Concentration Objectives

Parameter	Monthly Average (min to max)	Objective (monthly average)	Exceedance
BOD_5 (mg/L)	< 1.1 to 4.8	15	No
TSS (mg/L)	< 1.6 to 12	15	No
TP (mg/L)	< 0.004 to 0.228	1.0	No

Table 13: Effluent Loading Objectives

Parameter	Monthly Average (min to max)	Objective (monthly average)	Exceedance
BOD_5 (kg/d)	< 1.45 to 6.11	18	No
TSS (kg/d)	< 2.6 to 11	18	No
TP (kg/d)	< 0.030 to 0.330	1.2	No

6 Operating Problems & Corrective Actions

Operating problems encountered during 2023 are summarized below.

- The lagoon experienced algae growth in the warmer months which resulted in elevated TSS concentrations. Alum was injected into Cell No. 3, as well as Cell No. 2 to help reduce the growth and lower TSS levels.
- Station Street Sewage Pumping Station (SPS) – A spill occurred at the pumping station due to a faulty level transmitter which was replaced.
- Station Street SPS - Sodium hypochlorite pump was non-operational while the overflow pump was running. The outlet for the pump was broken and was replaced.
- Station Street SPS - Six (6) overflow events occurred during heavy rainfall and spring snow melt. Refer to Section 10 for further details.

7 Maintenance Procedures Performed on the Works

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 was conducted in 2023.

Significant maintenance that took place during 2023:

<u>North Cobalt Lagoon</u>

- Cleaned grit channels and manholes
- Removed No. 3 blower when bearings failed
- Repaired No. 2 blower outlet coupler and replaced filter intake
- Replaced on-line effluent pH probe,

- Replaced UV bulbs
- Replaced alum transfer pump

Station Street Sewage Pumping Station

- Replaced faulty level transmitter (LIT) with an upgraded unit.

Refer to Appendix C for a maintenance summary which includes preventative work, capital projects and emergency repairs.

8 Calibration & Maintenance of all Monitoring Equipment

Influent and effluent monitoring equipment is calibrated based on requirements of the system's ECA or manufactures recommendations. Flow meters are calibrated annually to ensure a required accuracy of +/- 5%. pH meters are calibrated to ensure an acceptable tolerance and accuracy as specified by the manufacturer.

Routine maintenance was conducted as scheduled by qualified Instrumentation Technicians during the reporting period. Refer to Table 12 for a summary of calibrations conducted in 2023.

Table 14: Calibration Summary

Instrument	Calibration Date	% Accuracy
Raw Flow Meter – Channel No. 1	August 23, 2023	98.8%
Raw Flow Meter – Channel No. 2	August 23, 2023	98.5%
Effluent Flow Meter	August 22, 2023	99.1%
Station St. SPS Overflow Meter	August 22, 2023	100%
pH Analyzer	July 12 & October 6, 2023	99 to 100 %
Portable pH Analyzer	Jan. 17, Apr. 12, Jul. 6 and Oct. 6, 2023	95 to 100%

9 Sludge Generation and Disposal

The systems ECA requires sludge volumes to be tabulated each year and anticipated volumes to be generated over the next reporting period.

No sludge was disposed of during this reporting period and it's anticipated that no sludge will be disposed of in 2024.

Sludge and water depths were measured in 2020, 2021 and during this reporting period on June 29, 2023. Sludge depths are trended and were estimated for year 2022. There is a decrease in the sludge volume compared to the previous years as shown in the following tables. The average sludge volume in 2023 was determined by using twelve sampling points in Cell 1 and Cell 2 and 10 sampling points in Cell 3. Measurements are taken regularly to ensure no excess sludge accumulation is taking place. It is anticipated that the sludge volume will remain approximately the same during future years.

Table 15: Sludge Volume Cell 1

Date	Sample Points	Average Depths (m)		Sludge Volume (m^3)	% Capacity
		Water	Sludge		
Oct. 8, 2020	6	3.2	0.37	3182	17%
Aug. 19, 2021	16	3.2	0.70	6020	32%
2022 (estimate)	-	-	0.49	4214	22%
Jun. 29, 2023	12	2.3	0.18	1548	8%

As per the Operations Manual: Operating depth = 3.5 m, Area = 8600 m2, Operating Capacity = 19,100 m3

Table 16: Sludge Volume Cell 2

Date	Sample Points	Average Depths (m)		Sludge Volume (m^3)	% Capacity
		Water	Sludge		
Oct. 8, 2020	9	3.5	0.31	2666	14%
Aug. 19, 2021	16	3.4	0.43	3698	19%
2022 (estimate)	-	-	0.37	3182	17%
Jun. 29, 2023	12	2.5	0.21	1806	9%

As per the Operations Manual: Operating depth = 3.5 m, Area = 8600 m2, Operating Capacity = 19,100 m3

Table 17: Sludge Volume Cell 3

Date	Sample Points	Average Depths (m)		Sludge Volume (m^3)	% Capacity
		Water	Sludge		
Oct. 6, 2020	9	3.5	0.11	946	5%
Aug. 19, 2021	16	3.4	0.44	3784	20%
2022 (estimate)	-	-	0.37	3182	17%

Date	Sample Points	Average Depths (m)		Sludge Volume (m^3)	% Capacity
		Water	Sludge		
Jun. 29, 2023	10	2.3	0.13	1118	6%

As per the Operations Manual: Operating depth = 3.5 m, Area = 8600 m2, Operating Capacity = 19,100 m3

10 Abnormal Discharge Events

10.1 Overflow, Bypass and Spill Events

Six (6) overflow events occurred at the Station Street (No. 2) sewage pumping station during the reporting period. The overflow events occurred during Spring snow melt or heavy periods of rainfall which caused the flow to exceed the station's capacity. The untreated wastewater was chlorinated and tested for BOD_5, TSS, TP, TKN and *E. coli* as required under condition 3.0(3.4)(3.4.1b) of the ECA.

One (1) spill occurred on February 17th at the Station Street sewage pumping station due to a level transmitter (LIT) fault caused by frost on the sensor. A review of the flow trend showed the spill lasted for a short duration (4 minutes). The LIT was replaced with a unit that performs better in colder weather.

The events were reported to the Ministry's Spills Action Center (SAC) and local Health Unit as per the collection system's ECA and to Environment Canada as required under the Federal Fisheries Act.

The table below presents a summary of the abnormal discharge events in 2023 and Appendix D provides details of the events and sample results.

Table 18: Summary of Abnormal Discharge Events in 2023

Date	Duration	Type	Cause	Adverse Impacts	Estimate Volume (m^3)
February 17	4 minutes	Spill	LIT fault/frost	None	2.5
April 11	7.2 hours	Overflow	Heavy snow melt	None	161
April 12	2.1 hours	Overflow	Rapid snow melt	None	13
April 13	7.1 hours	Overflow	Heavy snow melt	None	108
May 1	10.7 hours	Overflow	Heavy rainfall	None	253
September 7	7.8 hours	Overflow	Extreme rainfall	None	416
October 8	10 minutes	Overflow	Heavy rainfall	None	8.6

10.2 Efforts Made to Reduce System Overflows and Bypasses

The annual average daily influent flow into the lagoon is well below the rated capacity and overflows/bypasses/spills are very rare.

A review of historical data over the last 10 years (2013 to 2023) indicates that all abnormal discharge events occurred at the Station Street Sewage Pumping Station and discharged to a ditch next to the station, aka Mill Creek. Forty-two (42) overflow events occurred from 2013 to 2023 during heavy rains and snow melt.

In an effort to reduce and/or eliminate overflow, bypass and spill events and to confirm with Procedure F-5-1, the following are in place.

- Emergency backup generators are installed at the lagoon site and sewage pumping station.
- A SCADA system is used to accurately monitor the sewage network and an alarm system is in place at key points in the process and at the sewage pumping station to alert operators of any issues; power failures, high levels, equipment failures, loss of communication and intrusion.
- Regular routine maintenance is performed to help reduce overflows/bypasses/spills events. For example: monthly generator tests to ensure the generators will start during a power failure and equipment will continue to operate normally, monthly alarm testing and equipment maintenance as outlined in the Maintenance Summary found in Appendix C.
- Repairs to the collection system are done promptly as issues occur.
- A program is in place to prevent roof leaders and sump pumps from being connected with sanitary new builds.
- To more accurately measure and monitor overflow volumes, the Station Street pump station is equipped with a flow meter to measure flow during overflow events.

10.3 Summary of Alterations to the System to Reduce Overflows

There have been no projects done in 2023 to reduce overflows/bypasses/spills.

10.4 Public Notification

The system has a Public Notification Procedure to notify the public and downstream users that may be adversely affected in the event of an overflow, bypass or spill at the lagoon. Signage will be posted at publicly accessible points located near all collection system overflow outfall locations before May 21, 2025 as required under the ECA .

11 Complaints

No complaints were received during the reporting period.

12 Proposed Alterations to the Works

No major alterations to the system are planned for 2024.

APPENDIX A
Monthly Process Data Report

APPENDIX B
Historical Trends of Influent Characteristics

APPENDIX C
Maintenance Summary

APPENDIX D

Summary of Abnormal Discharge Events