

2023 Annual Report

Marathon Wastewater Treatment Plant



Prepared for: The Ministry of the Environment, Conservation and Parks

Prepared by: Northern Waterworks Inc. on behalf of the Town of Marathon

Date: March 27, 2024

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1 Introduction

1.1 Annual Reporting Requirements

The Marathon Wastewater Treatment Plant (WWTP) is regulated by the terms and conditions provided within amended Environmental Compliance Approval No. 4721-AG5JNV (the ECA) issued to the Corporation of the Town of Marathon on September 22, 2017. This Report summarizes the facility's performance over the previous calendar year (January 1 to December 31, 2023) and is intended 1) to provide a performance record for future references, 2) to ensure that the Ministry is made aware of problems as they arise and 3) to provide a compliance record for the terms and conditions outlined in the ECA:

This Annual Report has been prepared in accordance with Condition 11(4) of the ECA and must contain, but shall not be limited to, the following information:

- a summary and interpretation of all monitoring data and a comparison to the effluent compliance limits outlined in Condition 7 of the ECA, including an overview of the success and adequacy of the Works (refer to sections 2.3, 6.1 & 7);
- a description of any operating problems encountered and corrective actions taken (refer to section 6);
- a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the sewage works (refer to section 5.1);
- a summary of any effluent quality assurance or control measures undertaken in the reporting period (refer to section 2.2);
- a summary of the calibration and maintenance carried out on all effluent monitoring equipment (refer to section 5.2);
- a description of efforts made and results achieved in meeting the design objectives of Condition 6 of the ECA (refer to sections 2.3, 3 & 6.1);

- a tabulation of the volume of sludge generated in the reporting period, an outline of anticipated volumes to be generated in the next reporting period and a summary of the locations to where the sludge was disposed (refer to section 4);
- a summary of any complaints received during the reporting period and any steps taken to address the complaints (refer to section 6.3);
- a summary of all bypass, overflow, spill or abnormal discharge events (refer to section 6.4);
- a copy of all *Notice of Modifications* submitted to the Water Supervisor as a result of Schedule B, Section 1, with a status report on the implementation of each modification (refer to section 5.3); and,
- a report summarizing all modifications completed as a result of Schedule B, Section 3 (refer to section 5.4).

1.2 System Description

The Marathon Wastewater Treatment Plant is owned by the Corporation of the Town of Marathon and was operated by Northern Waterworks Inc. for the duration of the reporting period. The facility utilizes an extended aeration wastewater treatment process that relies upon a combination of physical, biological and chemical processes to treat incoming wastewater. The overall goal of the treatment process is to reduce or remove contaminants from influent wastewater to a level that will not adversely impact or impair receiving waters.

The Marathon Wastewater Treatment Plant was originally constructed in 1981 as an extended aeration facility with a hydraulic capacity of 1,987 m³/day. The facility was upgraded to its current state in 1984 by the addition of a second combined treatment unit, which increased the facility's hydraulic rated capacity to 4,400 m³/day (average daily flow). Chlorination at the facility was changed from chlorine gas to sodium hypochlorite in 1994, only to be discontinued by regulatory exemption in 1996. A regulatory exemption was also obtained regarding the chlorination of bypass flows in 1998. Additional modifications and upgrades to the Marathon Wastewater Treatment Plant included the installation of sludge dewatering facilities in 1994, the installation of a turbo blower in 2013, the installation of phosphorus reduction equipment in 2016, and the installation of an emergency diesel generator set and second lower-capacity turbo blower in 2018.

The Marathon Wastewater Treatment Plant consists of the following components:

- influent works which receive raw sewage from the Marathon wastewater collection system and are designed for preliminary treatment. The influent works include grit removal channels, a comminutor with bar screens and a flow splitter chamber;
- an aluminum sulphate chemical feed system for phosphorus reduction consisting of one (1) bulk tank, two (2) chemical day tanks and two (2) chemical metering pumps with injection into the existing influent channel;
- Two (2) combined treatment units which each include one (1) two-celled aeration tank, one (1) clarifier and one (1) sludge holding tank (aerobic digester);
- An effluent contact chamber with flow monitoring equipment and an outfall sewer discharging final effluent to Lake Superior;
- A sludge management system including a polymer chemical feed system and a filter belt press for sludge dewatering housed within a dedicated building;
- A control building housing all air supply equipment (including two turbo blowers), an automation system for the monitoring and control of plant processes, motor control centers, a laboratory/office, washroom and garage; and,
- An emergency diesel generator located in an outdoor enclosure.

2 Water Quality

2.1 Monitoring Programs

The minimum requirements concerning the sampling and testing of raw sewage and final effluent parameters are provided within Condition 9 (Monitoring and Recording) of the ECA. Samples are collected by licenced operators and submitted to an accredited laboratory for analysis on a monthly basis for influent (raw sewage) samples and on a biweekly basis for effluent (treated) samples. Sampling is also conducted in accordance with the Ministry's Procedure F-10-1 (*Procedures for sampling and analysis requirements for municipal and private sewage treatment works – liquid waste streams only*) and with the federal *Wastewater Systems Effluent Regulations* (WSER).

2.2 Quality Assurance & Control

Licensed operators conduct in-house testing to determine the operational performance of the various stages of the treatment process and for quality assurance purposes as it concerns final effluent parameters. **Table 1** summarizes those parameters that were routinely tested for operational control or quality assurance purposes during the reporting period. This table is intended to provide a summary of effluent quality assurance measures undertaken in the reporting period as required by Condition 11(4)(d) of the ECA.

Typical control measures that may be implemented in response to test results include adjusting the rate of return activated sludge flow, altering the volume of solids removed from the treatment process, adjusting applied aluminum sulphate dosages to optimize phosphorus reduction, modifying the operation of air supply equipment, adjusting the relative flow rates to the two treatment units, and conducting plant cleaning and maintenance.

2.3 Monitoring Results & Comparison with Performance Criteria

Raw sewage samples are collected monthly and tested for various parameters in accordance with Condition 9 (Monitoring) of the ECA. Monitoring results are summarized in **Table 2**.

Dewatered sludge samples are collected annually and tested for total solids, total phosphorus and metals in accordance with the Ministry's Procedure F-10-1 (*Procedures for sampling and analysis requirements for municipal and private sewage treatment works – liquid waste streams only*). Annual sludge sample results are provided in **Table 3**.

Table 1: Summary of operational control and quality assurance testing - 2023¹

Parameter	Units	No. of Tests Conducted	Min. Result	Max. Result	Annual Average
Influent Monitoring					
Dissolved Oxygen (DO)	mg/L	75	3.93	10.52	6.30
pH	---	75	8.75	9.97	9.43
Temperature	°C	75	1.0	16.8	11.0
Effluent Monitoring					
Dissolved Oxygen	mg/L	75	2.72	8.63	5.99
pH	---	75	8.12	9.23	8.65
Temperature	°C	75	6.4	16.8	10.8
Total Suspended Solids (TSS)	mg/L	17	2.6	20.4	7.9
Process Monitoring - Treatment Unit 1					
Aeration Tank 1 - DO	mg/L	75	0.40	8.80	4.29
Aeration Tank 1 - pH	---	75	8.21	9.30	8.70
Aeration Tank 1 - TSS	mg/L	16	5806	10176	7829
Aeration Tank 2 - DO	mg/L	75	0.72	9.79	4.12
Aeration Tank 2 - pH	---	75	8.36	9.07	8.66
Aeration Tank 2 - TSS	mg/L	17	4940	10592	7670
Clarifier - Sludge Depth	feet	254	3.2	8.6	5.1
Return Activated Sludge - TSS	mg/L	17	10106	20900	14749
Process Monitoring - Treatment Unit 2					
Aeration Tank 3 - DO	mg/L	65	0.63	15.73	5.58
Aeration Tank 3 - pH	---	65	7.50	9.31	8.68
Aeration Tank 3 - TSS	mg/L	15	160	8684	4942
Aeration Tank 4 - DO	mg/L	65	0.46	15.83	5.19
Aeration Tank 4 - pH	---	65	8.22	9.33	8.65
Aeration Tank 4 - TSS	mg/L	15	98	8874	5088
Clarifier - Sludge Depth	feet	254	0.0	4.6	2.4
Return Activated Sludge - TSS	mg/L	11	464	19348	11845

1. All samples collected for operational control and quality assurance testing are grab samples.

Sample Date	BOD5 (mg/L)	TSS (mg/L)	Total P (mg/L)	TKN (mg/L)
12-Jan-23	138	67.4	4.63	47.5
8-Feb-23	65.1	42	3.6	34.4
8-Mar-23	97.8	136	3.26	28.6
5-Apr-23	123	134	4.87	39.4
4-May-23	127	137	4.15	28.8
2-Jun-23	120	72.1	4.19	41.2
14-Jul-23	112	73.9	4.76	36.6
10-Aug-23	111	87.7	4.14	47
7-Sep-23	181	162	5.01	46.5
4-Oct-23	141	52.4	4.3	42.4
15-Nov-23	114	65.9	4.33	41.8
13-Dec-23	155	180	4.69	46.1

Solids, total (TS) %	9.62	Mercury, total mg/kg	0.39
Arsenic, total mg/kg	2.14	Molybdenum, total mg/kg	9
Cadmium, total mg/kg	0.754	Nickel, total mg/kg	16
Chromium, total mg/kg	18.4	Phosphorus, total mg/kg	24,400
Cobalt, total mg/kg	2.07	Potassium, total mg/kg	2810
Copper, total mg/kg	392	Selenium, total mg/kg	3.49
Lead, total mg/kg	17	Zinc, total mg/kg	547

In accordance with Condition 11(4)(a) of the ECA, this report must provide a summary and interpretation of all monitoring data and a comparison to the effluent limits outlined in Condition 7 of the ECA. The sewage works must be operated and maintained such that effluent compliance limits are not exceeded. For the purposes of determining compliance, the daily concentration of a parameter shall not exceed the corresponding maximum daily concentration limit for the effluent parameters carbonaceous biochemical oxygen demand (CBOD5), total suspended solids and total phosphorus, where the daily concentration means the concentration of a contaminant in the effluent discharged over any single day, as measured by a composite or grab sample, whichever is required. The limit for effluent pH is expressed as a single sample result range in the ECA.

In addition to comparing monitoring results to the effluent limits and in accordance with Condition 10(4)(f) of the ECA, this report must include a description of efforts made and results achieved in meeting the design objectives. Objectives are summarized in Condition 6 (Design Objectives) of the ECA, and the sewage works must be designed, constructed and operated to achieve these objectives. Design objectives are set at more stringent values than compliance limits and they are expressed in the same manner. Best efforts must also be applied to ensure that the effluent from the facility is essentially free of floating and settleable solids and does not contain oil or any other substances in amounts sufficient to create a visible film or sheen or foam or discolouration on the receiving waters. Design objectives related to flow rates are discussed in section 3.

Table 4 summarizes effluent monitoring results and compares them to the relevant compliance limits and design objectives for all regulated parameters. Effluent total phosphorus exceeded the compliance limit and design objective of 1.0 mg/L in 9 of 27 samples collected during the reporting period, for an exceedance rate of 33%. Effluent total suspended solids exceeded the compliance limit of 15 mg/L on one (1) occasion during the reporting period. Refer to section 6.1 of this report for more information on effluent compliance limit and objective exceedances.

Table 4: Effluent monitoring results summary and comparison with performance criteria - 2023

Effluent Parameter ¹	Units	Objective ² (MDC or Range)	Limit ² (MDC or Range)	No. of Samples	Min. Result	Max. Result	Annual Average ³	Annual % Removal	No. of Exceedances ⁵	
									Objective	Limit
CBOD5	mg/L	10	15	27	<2.0	408	23.0	n/a	2	4
TSS	mg/L	10	15	27	<3.0	2450	104.5	86% ⁶	3	6
Total P	mg/L	1.0	1.0	27	0.20	48.7	2.84	75% ⁷	0	9
pH ⁴	---	6.5 – 9.0	6.0 – 9.5	75	8.12	9.23	8.65	n/a	0	0

1. CBOD5 = carbonaceous biochemical oxygen demand; TSS = total suspended solids; Total P = total phosphorus; TAN = total ammonia nitrogen.
2. MDC = Maximum Daily Concentration, where the daily concentration means the concentration of a contaminant in the effluent discharged over any single day, as measured by a composite or grab sample, whichever is required.
3. Values less than the analytical lower detection limit are assigned a value equal to the detection limit for the determination of the annual average concentration.
4. Results from the in-house testing program are used to determine performance against the objective and compliance limit for the effluent parameter pH.
5. WWTP was on continuous bypass from July 9, 2023 14:00 until Dec 7, 2023 10:00. This was due to a clarifier rake arm failure. Exceedances occurred leading up to and during this time period.
6. The TSS result (2450 mg/L) from July 9, 2023 is excluded from this calculation but included in the total number of exceedances.
7. The Total P sample result of 48.7 mg/L from July 9, 2023, is excluded. This outlier result was associated with process upset that interfered with the extended aeration treatment process.

3 Flow Monitoring

Condition 6(2) of the ECA states that the Owner shall use best efforts to operate the facility within its rated capacity. The rated capacity of the Marathon Wastewater Treatment Plant refers to the average daily flow for which the sewage works are approved to handle, where average daily flow is defined as the cumulative total effluent flow from the facility during a calendar year divided by the number of days during which effluent was discharged in that year. Specifically, the Owner shall ensure that the average daily flow of effluent from the treatment plant does not exceed 4,400 m³/day over the course of a calendar year. In accordance with Condition 6(3), the Owner shall also assess the issues and provide recommendations to the Water Supervisor if the annual average daily flow reaches 80% of the facility's rated capacity. Table 5 summarizes flow monitoring results for the current reporting period.

Month	Effluent Flow Monitoring Results				Solids Management Results	
	Total Volume (m ³)	Average Daily Flow (m ³ /day)	Capacity Assessment (%)	Maximum Daily Flow (m ³ /day)	Dewatered Sludge Volume Removed (Filter Press) (m ³)	Sludge Volume Removed from Digester (Vacuum Truck) (m ³)
Jan	31,084	1,003	23%	1,123	0	0
Feb	30,141	1,076	24%	1,703	88	0
Mar	35,986	1,161	26%	1,495	32	100
Apr	38,695	1,290	29%	1,631	48	0
May	32,937	1,062	24%	1,276	32	0
Jun	27,003	900	20%	1,425	8	0
Jul	22,680	732	17%	891	24	0
Aug	24,565	792	18%	1,081	40	0
Sep	23,845	795	18%	1,041	16	0
Oct	30,875	996	23%	1,454	16	0
Nov	25,364	845	19%	1,046	0	307
Dec	27,482	887	20%	1,097	0	0
Total	350,657	---	---	---	304	407
Average	29,221	961	22%	---	34	34

Throughout the reporting period approximately 350,657 m³ of effluent was deposited by the facility. On an average day in 2023, 961 m³ of effluent was discharged to the natural environment, which represents 22% of the rated capacity of the facility (4,400 m³/day). The maximum amount of effluent deposited on a given day in 2023 was 1,703 m³, representing approximately 39% of the rated capacity. Approximately 196,992 m³ (56% of the total) was discharged by combined treatment unit no. 1, while the remaining 153,665 m³ (44%) was discharged by combined treatment unit no. 2.

Table 6 summarizes recent historical flow monitoring results for the Marathon Wastewater Treatment Plant. Average daily flows over the previous ten (10) reporting periods have been stable and the facility has operated at between 22% and 25% of its rated capacity. The system is expected to operate within its rated capacity over the next reporting period.

Year	Total Volume (m ³)	Average Daily Flow (m ³ /day)	Capacity Assessment (Average Daily Flows)	Maximum Daily Flow (m ³ /day)
2014	395,232	1,083	25%	2,224
2015	382,367	1,048	24%	2,342
2016	369,975	1,011	23%	1,891
2017	371,576	1,018	23%	2,004
2018	351,099	962	22%	1,802
2019	371,992	1,019	23%	2,803
2020	363,884	994	23%	1,697
2021	368,923	1,011	23%	1,936
2022	360,957	989	22%	1,559
2023	350,657	961	22%	1,703

4 Solids Management

In accordance with Condition 11(4)(g) of the ECA, this report must provide a tabulation of the volume of sludge generated in the reporting period, an outline of anticipated volumes to be generated over the next reporting period and a summary of the locations to where the sludge was disposed. The concentration of solids in the treatment process is controlled by directing activated sludge (i.e., waste activated sludge) to the aerobic digesters (sludge holding tanks) of the respective combined treatment units. Sludge is then stabilized and transferred to a dewatering system for further processing, such that solids are concentrated and much of the water present is removed and returned to the influent works. Dewatered sludge is hauled by trailer as processed organic waste by Northern Waterworks Inc. under amended ECA no. 5924-5NPKL7. During the reporting period, dewatered sludge was hauled exclusively to the drying beds at the Marathon waste disposal site (ECA no. A591806). Solids management methods and disposal areas to be utilized over the next reporting period are not expected to change. In certain situations, stabilized activated sludge may be removed directly from the aerobic digesters using a vacuum truck. During the reporting period, sludge was removed from the digester on multiple occasions by Phil's Septic Pumping Service Inc. (hauled as processed organic waste under amended ECA no. A900484).

A tabulation of the amount of sludge generated and removed during the reporting period is provided in **Table 5**, and recent historical sludge volumes are provided in **Table 7**. In 2023, 304 m³ of dewatered sludge was generated and removed. Additionally, approximately 407 m³ of sludge was removed from the digesters during the reporting period.

Year	Dewatered Sludge Volume Removed (Filter Press) (m ³)	Sludge Volume Removed from Digester (Vacuum Truck) (m ³)
2014	568	0
2015	648	0
2016	656	0
2017	536	0
2018	752	0
2019	568	0
2020	840	250
2021	712	425
2022	540	194
2023	304	407

5 Maintenance and Modifications

5.1 Planned Maintenance, Repairs & Minor Modifications

In accordance with Condition 11(4)(c) of the ECA, this report must include a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the sewage works. A planned maintenance program is employed at the facility that ensures that the sewage works and related equipment that are installed or used to achieve compliance are properly operated and maintained. Licenced Operators perform routine maintenance on all equipment including pumps, air supply equipment, monitoring equipment, alarm systems, safety equipment and other treatment components.

Additional significant maintenance activities and minor repairs and modifications that occurred during the reporting period are summarized in **Table 8**.

Date	Task
1-Jun-2023 to 2-Jun-2023	Using a vacuum truck provided and operated by Phil's Septic Pumping Service Inc., the chlorine contact chambers were cleaned and inspected.
6-Apr-2023 to 19-May-2023	RAS pumps rebuilt by Mahons
13-Jul-2023 to 27 July 2023	Operators entered aerations for cleaning assisting removal of rags, sludge etc., repairs were made to "boot strapping" replaced all straps.
1-Aug-2023	Sling Choker performed on-site hoist inspections

Table 8: Summary of maintenance activities and minor repairs and modifications - 2023

Date	Task
9-Aug-2023	Rite Price Electrical replaced lighting in clarifiers 1 & 2
14-Sep-2023	The two (2) backflow prevention devices at the treatment facility were tested and inspected by a qualified professional from Robert's Plumbing & Sheet Metal Co. Both devices passed the testing protocol.
4-Oct-2023	Calibration verification for the two (2) effluent flow measuring devices was conducted by a representative from Synergy Controls Corporation. Both flow measuring devices passed calibration verification.
21- Dec-2023	Using a vacuum truck provided and operated by Phil's Septic Pumping Service Inc., the chlorine contact chamber was cleaned and inspected.

5.2 Flow Monitoring Equipment Calibration and Maintenance

Condition 9(6) of the ECA requires the Owner to install and maintain continuous flow measuring devices to measure the effluent from the treatment facility with an accuracy to within plus or minus 15 percent of the actual flowrate for the entire design range of the flow measuring devices. Flow measurement equipment described in the ECA includes a flow metering system consisting of two (2) ultrasonic flow meters, one (1) for each effluent contact chamber associated with the respective combined treatment units.

Flow measurement devices are inspected daily and calibration is verified annually. Calibration or replacement is indicated if devices fail the calibration verification protocol. Calibration verification for the two (2) flow meters was conducted by a representative from Synergy Controls Corporation on October 4, 2023. Both flow measuring devices passed calibration verification.

5.3 Summary of Schedule B, Section 1 Modifications

In accordance with Condition 11(4)(j) of the ECA, this report must include copies of all *Notice of Modifications* submitted to the Water Supervisor as a result of Schedule B, Section 1, with a status report on the implementation of each modification. Such modifications must adhere to the criteria for limited operational flexibility and may affect sewage pumping stations, sewage treatment processes, the sewage treatment plant outfall, or sanitary sewers.

No Schedule B, Section 1 modifications were completed during the reporting period.

5.4 Summary of Schedule B, Section 3 Modifications

In accordance with Condition 11(4)(k) of the ECA, this report must summarize all modifications completed as a result of Schedule B, Section 3. Such modifications refer to normal or emergency operational modifications, such as repairs, reconstructions or other improvements that are part of maintenance activities, including cleaning or renovations to existing approved equipment, provided that the modification is made with equivalent equipment. Such modifications are not required to follow the Limited Operational Flexibility notification protocols, provided that the number of pieces and description of the equipment as described in the ECA does not change.

No Schedule B, Section 3 modifications were completed during the reporting period.

6 Operating Problems

In accordance with Condition 11(4)(b) of the ECA, this report must provide a description of any operating problems encountered and corrective actions taken during the reporting period. For the purposes of this report, operating problems may be indicated by 1) effluent compliance limit and design objective exceedances, 2) bypasses, overflows, spills and abnormal discharge events, 3) complaints and 4) significant equipment, infrastructure and process failures.

6.1 Effluent Compliance Limit and Design Objective Exceedances

Compliance limit and design objective exceedances in 2023 can be attributed to process upset. The WWTP was on continuous bypass from July 9, 2023 14:00 until Dec 7, 2023 10:00 due to a clarifier rake arm failure. Exceedances were during or immediately preceding this bypass.

6.1.1 Total Phosphorus

Best efforts to achieve the effluent compliance limits and design objectives for total phosphorous focused on modifying aluminum sulphate dosages along with reducing the concentration of solids in the treatment process by using a vacuum truck to remove activated sludge from the digesters. In a continued effort to improve biological phosphorous reduction an anaerobic zone has been maintained in the inlet of all four basins while still maintaining adequate mixing. Due to the configuration of the respective treatment units, approximately 33% of the total aeration tank volume in treatment unit #1 (aeration tanks 1 and 2) is dedicated to this anoxic zone, while approximately 50% of the aeration tank volume in treatment unit #2 (aeration tanks 3 and 4) is dedicated to this anoxic zone. Results have shown these changes to facility operations have been effective in reducing total phosphorous concentrations, the effectiveness of the anoxic zones in the aeration tanks will continue to be closely monitored and evaluated throughout 2024. Along with adjustments being made with respect to the alum dosing coupled with effective waste management strategies total phosphorous concentrations are expected to remain within limits.

Table 9 summarizes recent historical effluent total phosphorus results. The table also summarizes the 2022 results following the establishment of the aeration tank anoxic zones. There was no improvement in performance in 2023 with respect to effluent total phosphorus reduction, and the stated goals of the sewage treatment program were not achieved but the number of exceedances did not increase.

Year/ Time Period	Total No. of Samples	Average Concentration (mg/L)	% Removal	Total No. of Compliance Limit Exceedances	Compliance Limit Exceedance Rate
2014	26	2.67	37%	26	100%
2015	26	2.50	44%	26	100%
2016	26	2.70	39%	26	100%
2017	26	2.47	56%	24	92%
2018	26	1.09	76%	15	58%
2019	26	1.40	72%	21	81%
2020	27	0.95	86%	11	41%
2021	26	1.02	87%	11	43%
2021- outlier excluded ¹	25	0.82	89%	10	40%
2022	26	0.86	83%	9	35%
2023- outlier excluded ²	27	2.84	75%	9	33%

1. The sample result of 6.08 mg/L from May 5, 2021, is excluded. This outlier result was associated with an equipment failure that interfered with the extended aeration treatment process.
2. The sample result of 48.7 mg/L from July 9, 2023, is excluded. This outlier result was associated with process upset that interfered with the extended aeration treatment process.

6.1.2 Total Suspended Solids

During the reporting period, effluent total suspended solids exceeded the design objective of 10 mg/L on three (3) occasions and the compliance limit on six (6) occasions. The exceedances can all be attributed to process upset and the subsequent lengthy bypass.

Table 10 summarizes recent historical effluent total suspended solids (TSS) results. Despite the compliance limit exceedance, effluent TSS annual average concentrations have been below the design objective for the previous eleven (11) reporting periods. Percent removals have consistently been between 96 and 98%, with the exception of 2023. These results suggest that the facility is providing effective secondary treatment for an extended aeration facility with total

phosphorus removal, as per Ministry Guideline F-5-1. Specifically, the facility achieved the effluent TSS design objective of 15 mg/L and the compliance limit of 25 mg/L for the entire reporting period, insofar as these limits are normally expressed either as a monthly or annual average concentration.

Table 10: Recent historical effluent total suspended solids results summary

Year	Total No. of Regulatory Effluent Samples	Annual Average Conc. (mg/L)	Annual % Removal	Design Objective		Compliance Limit	
				Total No. of Exceedances	Exceedance Rate	Total No. of Exceedances	Exceedance Rate
2014	26	5.4	96%	2	8%	0	0%
2015	26	5.3	97%	1	4%	1	4%
2016	26	4.8	97%	1	4%	0	0%
2017	26	5.7	97%	2	8%	0	0%
2018	26	5.7	97%	2	8%	2	8%
2019	26	6.5	96%	4	15%	3	12%
2020	27	6.2	96%	6	22%	3	11%
2021	26	5.2	98%	2	8%	1	4%
2022	25	5.2	96%	1	4%	1	4%
2023	27	14.3 ¹	86% ¹	3	11%	6	22%

¹July 9, 2023 TSS result (2450 mg/L) excluded from this calculation, but included in the total number of exceedances. WWTP was on continuous bypass from July 9, 2023 14:00 until Dec 7, 2023 10:00 due to a clarifier rake arm failure.

Notably, the design objective and compliance limit in the ECA are expressed as a maximum daily concentration and are more stringent than the requirements in Guideline F-5-1. If the facility were regulated in a manner consistent with other secondary treatment plants, it is likely that there would be little to no effluent TSS design objective or compliance limits exceedances. That is, the operational performance of the Marathon Wastewater Treatment Plant is consistent with other secondary treatment facilities with respect to effluent TSS concentrations. A goal of the sewage treatment program in 2024 and beyond is to maintain historical performance with respect to effluent TSS results, including achieving an annual average concentration less than 10 mg/L and an annual percent removal greater than 95%. Operational performance with respect to effluent total suspended solids concentrations is considered adequate and no significant operational changes are required.

6.2 Bypasses, Overflows, Spills and Abnormal Discharge Events

In accordance with Condition 11(4)(i) of the ECA, this report must provide a summary of all bypasses, plant overflows, spills or abnormal discharge events.

A bypass means a diversion of sewage around one or more unit processes within the treatment facility, excluding preliminary treatment processes, whereby diverted sewage flows are returned to the treatment facility upstream of the effluent sampling location and are discharged to the environment through the approved effluent disposal facilities. Bypasses are prohibited except in emergency situations or in situations where the event is planned and is a direct and unavoidable result of a planned repair or maintenance procedure. Due to the configuration of the Marathon WWTP, all diverted sewage flows to the bypass line at the facility are classified as bypasses.

One (1) continuous bypass event occurred during the reporting period. From July 9, 2023 14:00 until Dec 7, 2023 10:00 secondary treatment was provided due to a clarifier rake arm failure. Altogether the bypass totaled approximately 122,664 m³ (807 m³/day) over 152 days and represented 35% of the total annual volume of wastewater effluent from the sewage works.

An overflow means a discharge to the environment from the Works at designed locations other than the approved effluent disposal facilities or via the effluent disposal facilities downstream of the final effluent sampling points. Overflows are also prohibited except in emergency situations or in situations where the event is planned and is a direct and unavoidable result of a planned repair or maintenance procedure. Overflows generally occur in the wastewater collection system.

Spills are releases of pollutants into the natural environment from or out of a structure, vehicle or other container that is abnormal in quality or quantity in light of all the circumstances of the discharge. Spills include the releases of all pollutants other than raw sewage or partially treated sewage, which are otherwise classified as Class I spills and are exempt from Part X of the EPA. Specifically, spills of raw or partially treated sewage are discharges (bypasses and overflows) that are authorized by and are conducted in accordance with an environmental compliance approval.

Abnormal discharge events include any other abnormal events not otherwise classified as a bypass, overflow, or spill.

No overflows, spills or abnormal discharges occurred during the reporting period.

6.3 Complaints

In accordance with Condition 11(4)(h) of the ECA, this report must provide a summary of any complaints received during the reporting period and any steps taken to address the complaints.

There were no customer complaints received for the Marathon WWTP during the reporting period.

6.4 Equipment, Infrastructure and Process Failures

Operating problems associated with significant equipment, infrastructure and process failures that occurred during the reporting period are summarized in **Table 9**. These failures exclude minor equipment faults or power supply interruptions that otherwise do not significantly impact the treatment process.

Table 9: Summary of significant equipment, infrastructure, and process failures - 2023	
Event Date	Event Description
Jan 1 2022 – Dec 31 2022 (ongoing)	Due to aging infrastructure several areas have been flagged as “not safe for personnel to walk on” these areas are the digester covers (aged wood covers have broken inwards leaving small spaces into digester with no protection from falling in) also flagged were the contact chamber covers (due to aged wood covers) for all aging worn out wood covers they are being addressed through capital projects projected for replacement in 2023 and 2024.
July 9 – Dec 10, 2023	The WWTP was on continuous bypass from July 9, 2023 14:00 until Dec 7, 2023 10:00 due to a clarifier rake arm failure. Compliance limit and design objective exceedances in 2023 can be attributed to process upset. Exceedances were during or immediately preceding this bypass. Repair was completed in 2023.

7 Conclusion

In accordance with Condition 10(4)(a) of the ECA, this report must include an overview of the success and adequacy of the sewage works. Water quality and flow monitoring results suggest a successful and adequate sewage treatment program, with the exception of effluent total phosphorus and suspended solids concentrations during the bypass due to mechanical failure. Under normal operations, the Marathon Wastewater Treatment Plant was capable of consistently meeting all other design objectives and compliance limits for all final effluent parameters. Additionally, all flows from the sewage works were below the rated capacity for the facility.

A goal of the sewage treatment program in 2024 is to continue to reduce the magnitude and frequency of effluent total phosphorus limit exceedances by optimizing treatment processes and maximizing biological and chemical phosphorus reduction. Specifically, best efforts will be applied to operate and maintain the facility to achieve a) an effluent total phosphorus annual average concentration below 1.0 mg/L, b) an annual percent removal greater than 90% and c) a compliance limit exceedance rate below 15%.