



Meaford Wastewater Treatment Plant Annual Report for the year 2023

Environmental Compliance Approval: 9036-AZFPV6

This 2023 Report for the above-referenced facility summarizes the performance and related activities in accordance with ECA; Condition 11 (4) a through m as follows;

Table 1: Sampling Type and Frequency

Source (Composite)	Parameter	Frequency	Method
Influent	Flow (m3)	Daily	Flow Meter
	CBOD5, TSS, TP, TKN, Ammonia Nitrogen, Nitrite & Nitrate Nitrogen, Alkalinity, pH	Monthly	External Analysis
Effluent	Flow (m3)	Daily	Open Channel Flow Meter
	CBOD5, TSS, TP, TKN, Ammonia Nitrogen, Nitrite & Nitrate Nitrogen	Weekly	External Analysis
	E. Coli	Weekly	External Analysis
	pH	Weekly	In-House & External Analysis
	Temperature	Weekly	In-House & External Analysis

Introduction

The Municipality of Meaford is pleased to provide the Ministry of the Environment, Conservation and Parks (MECP) with the 2023 Annual Report for the Meaford Wastewater Treatment Plant (WWTP). In 2023 the Meaford WWTP operated under the Environmental Compliance Approval Number 9036-AZFPV6 dated October 10, 2018.

The Report is designed to inform the MECP of the quality of effluent being discharged from this plant. The entire treatment process at the Meaford Water Pollution Control Plant can best be described as a “transformation”.

A transformation from a harmful wastewater into two useful end products:

- a) A disinfected treated effluent
- b) An agricultural liquid fertilizer

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System Description

The Meaford WWTP is a high-rate plant consisting of three remote and one onsite sewage pumping stations. The facility is located in a residential area, which is susceptible to noise and odour complaints. The facility has received significant improvements over the past several years, including the addition of a leachate/septic receiving facility during 2005. Also, during this upgrade, the headworks was upgraded with the addition of a fine screen and auger system, the mechanical aeration was replaced with fine air diffusers/blowers, and the chlorine disinfection system was replaced with a UV disinfection system. Past upgrades include the Bighead Pumping station (#1) replacement in 1991, the #3 Station (highway 26 West) was replaced in 1994, and in 1996 the additional biosolids storage facility was completed. In 2014, the existing generator at the main plant was replaced with a new 120kW generator.

- Capacity: 3,910 m³/day
- Classification: Class 3 Wastewater Collection, Class 2 Wastewater Plant
- Service Area: Municipality of Meaford
- Service Population: 4,749
- In Service Date: 1970
- Effluent Receiver: Georgian Bay
- Major Plant Processes: High-Rate Process with Continuous Effluent Discharge
Continuous Ultraviolet Disinfection (new in 2005)
No Phosphorus Removal
Aerobic Digestion with agricultural land disposal of biosolids

Sampling Procedures

Table 2: Raw Sewage Monitoring

Parameters	Sample Type	Frequency
CBOD5	Composite	Monthly
Total Suspended Solids	Composite	Monthly
Total Phosphorus	Composite	Monthly
Total Kjeldahl Nitrogen	Composite	Monthly
Ammonia Nitrogen	Composite	Monthly
Nitrite + Nitrate Nitrogen	Composite	Monthly
Alkalinity, pH	Composite	Monthly

Table 3: Effluent Monitoring

Parameters	Sample Type	Frequency
CBOD5	Composite	Weekly
Total Suspended Solids	Composite	Weekly
Total Phosphorus	Composite	Weekly
Total Kjeldahl Nitrogen	Composite	Weekly
Ammonia Nitrogen	Composite	Weekly
Nitrite + Nitrate Nitrogen	Composite	Weekly
pH	Grab	Weekly
Escherchia Coli	Grab	Weekly
Temperature	Grab	Weekly

Aerobic sludge is collected and tested as per the sampling requirements found in Schedule D in ECA #9036-AZFPV6

All chemical and bacteriological sample analyses are conducted by an accredited lab, SGS Lakefield Research Ltd.

Flows

The total flow treated in 2023 was 823,451 m³, which is down 28,784 m³ from 2022, which is relatively consistent flows for the last two years. The 2023 annual average daily flow was 2,258 m³ per day, operating at approximately 58% of the design capacity. The Maximum peak daily flow of 165 L/s occurred in April 2023 which was caused by heavy rains.

Table 4: 2023 and 2022 Daily Flow Data

	Average Day 2023 m ³	Average Day 2022 m ³	Peak Day 2023 L/s	Peak Day 2022 L/s	Total Month 2023 m ³	Total Month 2022 m ³
January	3,061	1,975	150	122	94,883	61,234
February	2,735	2,876	131	160	76,585	80,522
March	2,952	3,853	76	152	91,518	119,432
April	3,235	3,275	165	159	97,055	98,235
May	2,348	2,247	115	138	72,796	69,667
June	1,506	2,543	111	162	45,181	76,285
July	1,563	1,520	96	106	48,462	47,122
August	1,755	1,663	132	141	54,390	51,549
September	1,540	1,746	102	127	46,190	52,373
October	2,123	1,853	119	103	65,798	57,458
November	1,890	1,916	98	110	56,712	57,478
December	2,383	2,609	104	147	73,881	80,880
				Totals	823,451	852,235

Plant Performance & Effluent Quality

There were no operating problems encountered or corrective actions required at the Meaford Wastewater Treatment Plant

Detailed (daily) analytical data is available at the Meaford WWTP office. The annual and monthly averages and loadings are summarized below.

Although the Meaford WWTP is designed as a High Rate Activated Sludge Plant, it continues to perform well, being operated as an activated sludge plant. During 2023, all annual loading limits and monthly average concentration limits were met as per the Certificate of Approval.

All lab analysis for the Meaford WWTP were tested by an accredited lab, SGS Lakefield, and collected as per Guidelines set by the Ministry of Environment, Conservation and Parks.

Table 5: Treatment Efficiency and Loading Limits

	Annual Average Raw	Annual Average Effluent	Annual Average Loading Limits	Efficiency %
CBOD	87.75	3.96	8.94	95.5
T.S.S	57.92	6.25	14.11	89.2
Total Phosphorus	2.59	2.02	4.55	22.1
Ammonia Nitrogen	20.13	0.36		98.2
Loading Limits	CBOD Annual Avg. (Limit 78.2kg/d)	TSS Annual Avg. (Limit 78.2kg/d)	Phosphorus Annual Avg. (Limit 15.6kg/d)	Total Ammonia Nitrogen
January	11.017	26.320	3.091	0.367
February	8.752	19.144	3.903	0.752
March	6.642	17.711	2.029	1.181
April	7.278	22.644	2.499	1.375
May	6.574	9.862	2.860	0.517
June	3.765	7.906	3.648	0.188
July	5.862	11.333	5.760	0.274
August	6.666	11.228	5.586	0.281
September	5.901	10.520	6.694	0.359
October	5.942	8.489	4.533	1.019
November	7.561	13.231	3.601	2.599
December	30.383	13.106	3.354	0.894

The maximum final effluent E-coli monthly geometric mean density was 57.4 per 100ml.

Effluent Objectives and Limits

The effluent from the facility did not meet the monthly Total Phosphorus objective for June, July, August, October and November 2023 due to the fact there is no phosphorus removal in the plant. The Total Phosphorus for the month of September was above the Monthly Average Concentration Limit and notification was provided to the Ministry of Environment, Conservation and Parks (MECP). The Limit is to be under 4mg/l and the monthly average was 4.35mg/l. All other objectives and limits were met for the remaining parameters.

By-passing, Overflow and Abnormal Conditions

There were no bypass events at the Meaford WWTP during 2023. There was 1 instance of overflow conditions during 2023 at the WWTP, summarized in table below.

EVENT # (YYYY-##)	LOCATION	RECEIVING WATER	VOLUME (m3)	APPROX. START	APPROX. END	DURATION (HRS)
2023-01	WWTP	Georgian Bay	2228	13:45	06:47	17

Maintenance and Calibration Activities

Plant maintenance, including non-scheduled maintenance is monitored using a manual workorder system. Completed maintenance reports are available onsite. All routine and preventative maintenance was conducted as scheduled in 2023. All three (3) standby generators were tested monthly.

Several repairs or improvements to equipment on the works were made or identified in 2023 as follows:

Plant

Total Power – Generator Maintenance and Service
Return Sludge Concrete work was completed.
Repairs to the Septage pump were completed.

Pumping Stations

Total Power – Generator Maintenance and Service – Bighead, and Station #3
Bighead Pump Station had repairs completed on one of its pumps.

Septage Receiving Works

The Meaford WWTP continued to only accept septage from within its Municipal Boundaries as previously decided by council. In 2023, the Meaford WWTP treated approximately 24,475 gallons (92.65m³) of septage/holding tank waste.

Table 6: Septage

Month	Portables Loads	Portables Gallons	Holding Tank Loads	Holding Tank Gallons	Septic Loads	Septic Gallons	Total Gallons
January	6	945					945
February	4	750	1	950			1,700
March	5	1,095					1,095
April	Pump out	for repair					0
May	Pump out	for repair					0
June	Pump out	for repair					0
July	Pump out	for repair					0
August	Pump out	for repair					0
September	8	1,655					1,655
October	14	3,210					3,210
November	26	4,150					4,150
December	19	3,120	2	4,800	3	3,800	11,720
					Overall	Total	24,475

Biosolids Facility

Digested sludge produced at the Meaford WWTP was land-applied in accordance with the Nutrient Management Act 2002 and Ontario Regulation 267/03.

Grab samples of digested (aerobic) sludge are collected as the sludge truck is being filled. In 2023 sludge sample analyses was carried out by SGS Lakefield Research Limited.

Region of Huronia Environmental Services Ltd (ROHES) was contracted to haul and spread sludge from the Meaford plant in 2023.

A total Volume of 1,689 m³ of sludge was applied to the field of NASM plan #6030. Estimated allowable hauled sludge amounts have been estimated at approximately 2,600 m³ annually.

The plant is achieving greater storage capacity than the 6-month storage capacity that is presently required by the Ministry of Environment, Conservation and Parks.

Monthly Haulage volumes from the plant were as follows:

Month	Cubic Metres	Month	Cubic Metres
January	0	July	0
February	0	August	0
March	0	September	0
April	643	October	0
May	0	November	1046
June	0	December	0

Inspections

There were no regulatory inspections during the 2023 review period.

Alarm Response

The Environmental Services staff responded without interruption or loss of service to all plant and pumping station alarms.

Complaint Summary

There were no complaints received during this reporting period with regard to the Meaford WWTP.

Operational Objectives

The Meaford Water Pollution Control Plant continues to provide excellent wastewater treatment. Meaford and its operators will continue to strive through expertise and knowledge to meet all objectives and to continually improve and optimize the efficiency of the facility.

Discussion

The following are tables summarizing the results received for the period of January 2023 to December 2023 for the following parameters, with the maximum concentrations of the effluent parameters as outlined in the Terms and Conditions for ECA 9036-AZFPV6.

2023 Sewage Lab Results Monthly Averages

Month	Raw	Parameters	Effluent Sample Sets					Monthly Average Concentration	Monthly Average Concentration Objective	Monthly Average Concentration Limits	MIN	MAX	Monthly Geometric Mean
			1	2	3	4	5						
January	53	CBOD5	3	5	4	4	2	3.6	15.0	20.0mg/l	2	5	
	35	T.S.S	9	3	7	12	12	8.6	15.0	20mg/l	3	12	
	1.61	Total Phosphorus	0.39	0.88	1.22	1.22	1.34	1.0	2.0	4mg/l	0.39	1.34	
	10.8	T.A.N-Freezing	0.1	0.2	0.1	0.1	0.1	0.1	3.0	Freezing Period-5mg/l	0.1	0.2	
		E-Coli	2	2	4	31	38	15.4	N/A	200 cfu/100mL	2	38	7.2
	11.9	TKN	0.5	1.9	1.4	1.4	0.5	1.1			0.5	1.9	
	7.92	pH	7.81	7.75	7.71	7.44	7.35	7.62	pH maintained between 6-9.5		7.35	7.81	
February	54	CBOD5	4	2	7	3		3.2	15.0	20.0mg/l	2	7	
	46	T.S.S	6	8	3	11		7.0	15.0	20mg/l	3	11	
	1.93	Total Phosphorus	1.45	2.17	0.77	1.32		1.4	2.0	4mg/l	0.77	2.17	
	17.6	T.A.N-Freezing	0.2	0.2	0.4	0.3		0.3	3.0	Non-Freezing Period- 3 mg/l	0.2	0.4	
		E-Coli	4	2	2	130		34.5	N/A	200 cfu/100mL	2	130	6.8
	23.2	TKN	0.7	0.9	1.6	1.4		1.2			0.7	1.6	
	7.76	pH	7.15	7.56	7.76	7.98		7.6	pH maintained between 6-9.5		7.15	7.98	
March	55	CBOD5	2	3	2	2		2.3	15.0	20.0mg/l	2	3	
	27	T.S.S	9	7	4	4		6.0	15.0	20mg/l	4	9	
	1.84	Total Phosphorus	0.68	1	0.6	0.47		0.7	2.0	4mg/l	0.47	1	
	15.9	T.A.N-Freezing	0.3	0.3	0.5	0.5		0.4	3.0	Non-Freezing Period- 3 mg/l	0.3	0.5	
		E-Coli	10	2	2	34		12.0	N/A	200 cfu/100mL	2	34	6.1
	17.7	TKN	1.6	1.5	1.4	0.5		1.3			0.5	1.6	
	7.75	pH	7.44	7.41	8.15	7.69		7.7	pH maintained between 6-9.5		7.41	8.15	

2023 Sewage Lab Results Monthly Averages

Month	Raw	Parameters	Effluent Sample Sets					Monthly Average Concentration	Monthly Average Concentration Objective	Monthly Average Concentration Limits	MIN	MAX	Monthly Geometric Mean
			1	2	3	4	5						
April	25	CBOD5	2	3	2	2		2.3	15.0	20.0mg/l	2	3	
	37	T.S.S	7	6	4	11		7.0	15.0	20mg/l	4	11	
	1.17	Total Phosphorus	0.79	0.38	1.1	0.82		0.77	2.0	4mg/l	0.38	1.1	
	9.2	T.A.N-Freezing	0.1	0.8	0.5	0.3		0.4	3.0	Freezing Period-5mg/l	0.1	0.8	
		E-Coli	154	2	2	126		71.0	N/A	200 cfu/100mL	2	154	16.7
	12	TKN	0.9	1.4	1.1	0.5		1.0			0.5	1.4	
	7.79	pH	8.41	7.61	7.63	7.34		7.7	pH maintained between 6-9.5		7.34	8.41	
May	51	CBOD5	2	3	2	3	4	2.8	15.0	20.0mg/l	2	4	
	48	T.S.S	3	5	3	5	5	4.2	15.0	20mg/l	3	5	
	1.38	Total Phosphorus	0.5	1.8	0.86	0.94	1.99	1.22	2.0	4mg/l	0.5	1.99	
	9.5	T.A.N- NON-Freezing	0.2	0.2	0.2	0.4	0.1	0.2	3.0	Non-Freezing Period- 3 mg/l	0.1	0.4	
		E-Coli	2	82	20	2	2	21.6	N/A	200 cfu/100mL	2	82	6.7
	12.9	TKN	1	0.7	1.3	1.1	0.5	0.9			0.5	1.3	
	7.79	pH	7.94	7.57	7.55	7.4	7.4	7.6	pH maintained between 6-9.5		7.4	7.94	
June	114	CBOD5	3	2	2	3		2.5	15.0	20.0mg/l	2	3	
	67	T.S.S	10	4	4	3		5.3	15.0	20mg/l	3	10	
	2.93	Total Phosphorus	2.09	1.98	2.81	2.81		2.42	2.0	4mg/l	1.98	2.81	
	20.2	T.A.N-NON-Freezing	0.2	0.1	0.1	0.1		0.1	3.0	Non-Freezing Period- 3 mg/l	0.1	0.2	
		E-Coli	2	2	2	10		4.0	N/A	200 cfu/100mL	2	10	3.0
	28.8	TKN	1.5	1.7	0.5	0.8		1.1			0.5	1.7	
	7.56	pH	7.28	7.85	7.3	7.32		7.4	pH maintained between 6-9.5		7.28	7.85	

2023 Sewage Lab Results Monthly Averages

Month	Raw	Parameters	Effluent Sample Sets						Monthly Average Concentration	Monthly Average Concentration Objective	Monthly Average Concentration Limits	MIN	MAX	Monthly Geometric Mean
			1	2	3	4	5	6						
July	134	CBOD5	3	4	4	4		3.8	15.0	20.0mg/l	3	4		
	65	T.S.S	5	6	7	11		7.3	15.0	20mg/l	5	11		
	3.4	Total Phosphorus	2.69	3.79	3.94	4.32		3.69	2.0	4mg/l	2.69	4.32		
	26.7	T.A.N-NON-Freezing	0.2	0.1	0.2	0.2		0.18	3.0	Non-Freezing Period- 3mg/l	0.1	0.2		
		E-Coli	2	98	2	112		53.5	N/A	200 cfu/100mL	2	112	14.5	
	33.5	TKN	1.4	0.7	0.5	1.4		1.00			0.5	1.4		
	7.7	pH	7.24	7.39	7.32	7.23		7.3	pH maintained between 6-9.5		7.23	7.39		
August	60	CBOD5	4	5	3	3	4	3.8	15.0	20.0mg/l	3	5		
	49	T.S.S	6	8	9	6	3	6.4	15.0	20mg/l	3	9		
	3.81	Total Phosphorus	4.16	2.99	2.45	2.92	3.4	3.18	2.0	4mg/l	2.45	4.16		
	28.6	T.A.N- NON-Freezing	0.2	0.2	0.1	0.1	0.2	0.16	3.0	Freezing Period- 3 mg/l	0.1	0.2		
		E-Coli	2	10	46	2	2	12.4	N/A	200 cfu/100mL	2	46	5.2	
	33.3	TKN	1.6	1	1	0.8	0.5	0.98			0.5	1.6		
	7.75	pH	7.3	7.59	7.45	7.43	7.32	7.4	pH maintained between 6-9.5		7.3	7.59		
September	134	CBOD5	5	4	3	4	3	4	3.8	15.0	20.0mg/l	3	5	
	58	T.S.S	6	6	8	7	7	7	6.8	15.0	20mg/l	6	8	
	3.2	Total Phosphorus	3.46	10.5	2.69	2.8	3.09	3.55	4.35	2.0	4mg/l	2.69	10.5	
	29.2	T.A.N-NON-Freezing	0.4	0.2	0.2	0.1	0.2	0.3	0.23	3.0	Freezing Period- 3 mg/l	0.1	0.4	
		E-Coli	4	2	2	2	2	2	2.3	N/A	200 cfu/100mL	2	4	2.2
	36.2	TKN	1.4	1.2	0.7	0.6	0.9	0.9	0.95			0.6	1.4	
	7.75	pH	7.31	7.18	7.33	7.36	7.28	7.23	7.3	pH maintained between 6-9.5		7.18	7.36	

2023 Sewage Lab Results Monthly Averages

Month	Raw	Parameters	Effluent Sample Sets						Monthly Average Concentration	Monthly Average Concentration Objective	Monthly Average Concentration Limits	MIN	MAX	Monthly Geometric Mean
			1	2	3	4	5	6						
October	128	CBOD5	2	4	2	2	4	2.8	15.0	20.0mg/l	2	4		
	52	T.S.S	4	6	5	2	3	4.0	15.0	20mg/l	2	6		
	4.18	Total Phosphorus	3.23	0.91	2.85	1.71	1.98	2.1	2.0	4mg/l	0.91	3.23		
	33.1	T.A.N-Freezing	0.2	0.4	1.1	0.2	0.5	0.5	3.0	Freezing Period-5mg/l	0.2	1.1		
		E-Coli	2	8	2	2	2	3.2	N/A	200 cfu/100mL	2	8	3.6	
	37.3	TKN	0.9	0.5	1.8	1.6	1.5	1.3			0.5	1.8		
	7.64	pH	7.27	7.48	7.42	7.8	7.36	7.5	pH maintained between 6-9.5		7.27	7.8		
November	241	CBOD5	8	2	2	4		4.0	15.0	20.0mg/l	2	8		
	185	T.S.S	8	7	4	9		7.0	15.0	20mg/l	4	9		
	4.1	Total Phosphorus	2.61	1.47	1.84	1.7		1.9	2.0	4mg/l	1.47	2.61		
	26	T.A.N-Freezing	1.3	1.3	1.3	1.6		1.4	3.0	Freezing Period-5mg/l	1.3	1.6		
		E-Coli	132	2	2			7.5	N/A	200 cfu/100mL	2	132	8.1	
	29.8	TKN	1.8	2	4.4	2.5		2.7			1.8	4.4		
	7.41	pH	7.61	7.68	7.32	7.37		7.5	pH maintained between 6-9.5		7.32	7.68		
December	4	CBOD5	38	4	4	5		12.8	15.0	20.0mg/l	4	38		
	26	T.S.S	5	5	5	7		5.5	15.0	20mg/l	5	7		
	1.6	Total Phosphorus	0.96	1.81	1.37	1.49		1.4	2.0	4mg/l	0.96	1.81		
	14.8	T.A.N-Freezing	0.2	0.6	0.2	0.5		0.4	3.0	Freezing Period-5mg/l	0.2	0.6		
		E-Coli	14	2	10	100		16.0	N/A	200 cfu/100mL	2	100	12.9	
	17.3	TKN	3.1	0.6	3.3	1.4		2.1			0.6	3.3		
	7.8	pH	7.31	7.41	7.48	7.36		7.4	pH maintained between 6-9.5		7.31	7.48		