



Meaford Water Pollution Control Plant Annual Report for the year 2021

Environmental Compliance Approval: 9036-AZFPV6

This 2021 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 2021 Annual Report for the Meaford Waste Water Treatment Plant (WWTP). In 2021 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 2021 was 1,057,485 m³. The 2020 annual average daily flow was 2,919 m³ per day, operating at 74.7% of the design capacity. The Maximum peak daily flow of 236 L/s occurred in August 2020 which was caused by heavy rains.

Table 4: 2021 and 2020 Daily Flow Data

	Average Day 2021 m ³	Average Day 2020 m ³	Peak Day 2021 L/s	Peak Day 2020 L/s	Total Month 2021 m ³	Total Month 2020 m ³
January	2,796	3,462	130	158	86,662	107,320
February	2,180	2,445	138	140	61,026	70,940
March	3714	3,842	152	156	115,134	119,103
April	2,866	2,775	130	154	85,974	83,245
May	2,212	2,421	129	129	68,581	75,046
June	1,849	2,206	161	162	55,475	66,176
July	2,600	2,119	162	145	80,954	65,679
August	1,897	3,108	128	236	58,813	96,344
September	3,182	2,568	162	147	95,450	77,038
October	2,503	2,860	137	149	77,596	88,671
November	2,911	2,986	150	133	87,316	89,569
December	3,523	3,818	162	154	109,211	118,354
Totals					981,832	1,057,485

Plant Performance & Effluent Quality

There were no operating problems encountered or corrective actions required at the Meaford Waste Water 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 2021, all annual loading limits and monthly average concentration limits were met as per the Certificate of Approval.

All lab analysis for the Meaford WPCP 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	125.67	4.24	11.39	96.6
T.S.S	111.17	6.78	18.22	93.9
Total Phosphorus	2.64	2.06	5.54	21.8
Ammonia Nitrogen	19.79	0.53		97.3

Loading Limits

	CBOD Annual Avg. (Limit 78.2kg/d)	TSS Annual Avg. (Limit 78.2kg/d)	Phosphorus Annual Avg. (Limit 15.6kg/d)
January	9.783	9.085	4.004
February	9.807	16.889	3.955
March	19.311	29.709	5.377
April	8.596	10.746	3.367
May	6.083	11.613	3.241
June	10.724	8.505	4.334
July	7.799	11.698	6.544
August	10.244	15.555	6.605
September	15.111	22.269	7.945
October	13.766	27.531	7.327
November	11.641	27.938	6.833
December	12.329	29.942	4.623

The final effluent E-coli maximum monthly geometric mean density was 44.0 per 100ml.

Effluent Objectives and Limits

The effluent from the facility did not meet the monthly Total Phosphorus objective for June, July, August, September, October and November 2021 due to the fact there is no phosphorus removal in the plant. All other effluent objectives and limits were met for 2021.

By-passing, Overflow and Abnormal Conditions

There were no bypass events at the Meaford WPCP during 2021.

There was 1 instance of overflow conditions during 2021 at the WWTP, summarized in table below.

EVENT # (YYYY-##)	LOCATION	RECEIVING WATER	VOLUME (m3)	APPROX. START	APPROX. END	DURATION (HRS)
2021-01	WWTP	Georgian Bay	12,782	Sept 22 @ 15:27	Sept 24 @ 04:00	26.5

Maintenance and Calibration Activities

Plant maintenance, including non-scheduled maintenance is monitored using a manual workorder system. Detailed maintenance reports are available. All routine and preventative maintenance was conducted as scheduled in 2021. All three (3) standby generators were tested on a monthly basis.

3rd Party Calibration reports can be found in Appendix A.

A number of repairs or improvements to equipment on the works were made or identified in 2021 as follows:

Plant:

Clarifier #2 all internal components and mechanisms replaced.
 Return Sludge Slip Valves #1 and #2 replaced.
 Total Power - Annual Generator Maintenance.
 ROHES – Cleaning of Aeration Tank #1 and Septage Receiving tank.
 Vaughn Chopper pump replaced in Septage receiving facility.
 Victaulic valves for air supply of Digester and Sludge storage tanks replaced.
 Diffusers replaced on Outfall
 R/S MCC Electrical review
 Sludge Loading arm Retrofit

Pumping Stations:

Caldecott – Station #2 upgrades which included new wet well exhaust fan, wet well entrance retrofit, and addition of crane jibs in dry well and new davit base plates.
 Total Power – Generator Maintenance and Service – Bighead, Station #2 and Station #3
 New 3hp Myers pump and all new floats Station #5

Septage Receiving Works

The Meaford WWTP continued to only accept septage from within its Municipal Boundaries as previously decided by council. In 2021, the Meaford WWTP treated approximately 119,316 gallons of septage/holding tank waste.

Table 6: Septage

Month	Portables		Holding Tanks		Septic		Totals
	Loads	Gallons	Loads	Gallons	Loads	Gallons	Gallons
January	4	680			2	3500	4,180
February	2	375			4	4400	4,775
March	12	2315	1	2300	9	8200	12,815
April	14	3205			24	26900	30,105
May	15	3525			9	10000	13,525
June	26	5770			3	3000	8,770
July	19	4445	2	4400			8,845

August	19	5388					5,388
September	28	6660			2	2600	9,260
October	29	3315			2	2000	5,315
November	20	4020			2	1600	5,620
December	9	1218	1	2500	6	7000	10,718
						Overall Total	119,316

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 2021 sludge sample analyses was carried out by SGS Lakefield Research Limited.

Saugeen Agri is still contracted to haul and spread sludge from the Meaford plant in 2021.

The following sites were certified in 2018:

NASM plan:

- #23398 – Anthony and Darla Penner

A total Volume of 2,689.22 m³ of sludge was applied to the field of NASM plan #23398. Estimated 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	0	October	0
May	1886.2	November	803
June	0	December	0

Discussion

The following is a table summarizing the results received for the period of January 2021 to December 2021 for the following parameters, with the maximum concentrations of the effluent parameters as outlined in the Terms and Conditions for ECA 9036-AZFPV6.

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	65	CBOD5	3	3	3	5		3.5	15.0	20.0mg/l	3	5	
	41	T.S.S	2	3	5	3		3.3	15.0	20mg/l	2	5	
	2.23	Total Phosphorus	1.19	1.39	1.39	1.76		1.4	2.0	4mg/l	1.19	1.76	
	12.4	T.A.N-Freezing	0.2	0.2	0.4	0.6		0.4	3.0	Freezing Period- 5mg/l	0.2	0.6	
		E-Coli	2	2	2	2		2.0	N/A	200 cfu/100mL	2	2	2.0
	12.4	TKN	0.5	1.4	0.8	0.7		0.9			0.5	1.4	
	7.88	pH	7.57	7.48	7.47	7.44		7.49	pH maintained between 6-9.5		7.44	7.57	
February	138	CBOD5	6	4	4	4		4.5	15.0	20.0mg/l	4	6	
	163	T.S.S	14	6	4	7		7.8	15.0	20mg/l	4	14	
	3.48	Total Phosphorus	1.72	1.78	1.76	2		1.8	2.0	4mg/l	1.72	2	
	20.7	T.A.N-Freezing	0.7	0.8	1.2	0.9		0.9	3.0	Freezing Period- 5mg/l	0.7	1.2	
		E-Coli	10	6.0	10	4		7.5	N/A	200 cfu/100mL	4	10	7.0
	25.8	TKN	1	1.5	2.3	1.5		1.6			1	2.3	
	7.81	pH	7.53	7.3	7.3	7.31		7.4	pH maintained between 6-9.5		7.3	7.53	
March	109	CBOD5	5	7	5	7	2	5.2	15.0	20.0mg/l	2	7	
	111	T.S.S	7	9	9	10	5	8.0	15.0	20mg/l	5	10	
	2.25	Total Phosphorus	3.07	1.33	0.77	1.58	0.49	1.4	2.0	4mg/l	0.49	3.07	
	11.5	T.A.N-Freezing	1	1.2	1	1.2	0.7	1.0	3.0	Freezing Period- 5mg/l	0.7	1.2	
		E-Coli	3000	1	18	20	44	616.6	N/A	200 cfu/100mL	1	3000	34.3
	16	TKN	2	1.6	1.8	1.6	0.6	1.5			0.6	2	
	7.63	pH	7.15	7.3	7.4	7.3	7.19	7.3	pH maintained between 6-9.5		7.15	7.4	

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	52	CBOD5	2	2	5	3		3.0	15.0	20.0mg/l	2	5	
	31	T.S.S	3	3	2	7		3.8	15.0	20mg/l	2	7	
	1.62	Total Phosphorus	1.02	0.8	1.22	1.66		1.18	2.0	4mg/l	0.8	1.66	
	14.3	T.A.N-Freezing	1.1	0.6	0.8	0.7		0.8	3.0	Freezing Period- 5mg/l	0.6	1.1	
		E-Coli	16	36	2	6		15.0	N/A	200 cfu/100mL	2	36	9.1
	17.4	TKN	1.5	2.1	1.3	2.6		1.9			1.3	2.6	
	7.71	pH	7.99	7.45	7.32	7.38		7.5	pH maintained between 6-9.5		7.32	7.99	
May	122	CBOD5	4	2	2	3		2.8	15.0	20.0mg/l	2	4	
	272	T.S.S	6	6	6	3		5.3	15.0	20mg/l	3	6	
	2.33	Total Phosphorus	1.1	1.23	1.51	2.02		1.47	2.0	4mg/l	1.1	2.02	
	14.1	T.A.N- NON-Freezing	0.4	0.1	0.1	0.1		0.2	3.0	Non-Freezing Period- 3 mg/l	0.1	0.4	
		E-Coli	10	32	2	242		71.5	N/A	200 cfu/100mL	2	242	19.8
	20.4	TKN	1.8	0.5	0.5	0.6		0.9			0.5	1.8	
	7.52	pH	7.39	7.48	7.4	7.33		7.4	pH maintained between 6-9.5		7.33	7.48	
June	125	CBOD5	14	3	2	4	6	5.8	15.0	20.0mg/l	2	14	
	53	T.S.S	5	4	5	4	5	4.6	15.0	20mg/l	4	5	
	4.29	Total Phosphorus	1.72	2.27	3.15	3.64	0.94	2.34	2.0	4mg/l	0.94	3.64	
	36.3	T.A.N-NON-Freezing	0.3	0.1	0.2	0.3	0.1	0.2	3.0	Non-Freezing Period- 3 mg/l	0.1	0.3	
		E-Coli	100	134	2	2	52	58.0	N/A	200 cfu/100mL	2	134	19.5
	41.3	TKN	2.3	1.4	0.6	0.5	0.5	1.1			0.5	2.3	
	7.61	pH	7.16	7.19	7.33	7.25	7.29	7.2	pH maintained between 6-9.5		7.16	7.33	

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						
July	166	CBOD5	3	2	3	4		3.0	15.0	20.0mg/l	2	4	
	51	T.S.S	6	4	3	5		4.5	15.0	20mg/l	3	6	
	2.99	Total Phosphorus	3.01	2.34	2.72	2		2.52	2.0	4mg/l	2	3.01	
	29.2	T.A.N-NON-Freezing	1.1	0.2	0.6	0.2		0.53	3.0	Non-Freezing Period- 3mg/l	0.2	1.1	
		E-Coli	26	6	2	10		11.0	N/A	200 cfu/100mL	2	26	7.5
	36.1	TKN	1.2	1.2	1.6	1.3		1.33			1.2	1.6	
	7.61	pH	7.22	7.19	7.77	7.44		7.4	pH maintained between 6-9.5		7.19	7.77	
August	254	CBOD5	6	2	8	6	5	5.4	15.0	20.0mg/l	2	8	
	238	T.S.S	7	3	10	10	11	8.2	15.0	20mg/l	3	11	
	2.98	Total Phosphorus	2.6	3.73	3.79	3.85	3.44	3.48	2.0	4mg/l	2.6	3.85	
	17.7	T.A.N- NON-Freezing	0.5	0.2	0.4	0.2	0.3	0.32	3.0	Freezing Period- 3 mg/l	0.2	0.5	
		E-Coli	10	24	2	10	2	9.6	N/A	200 cfu/100mL	2	24	6.3
	23.2	TKN	2.1	1.5	1.9	2	0.5	1.60			0.5	2.1	
	7.73	pH	7.38	7.18	7.14	7.88	7.34	7.4	pH maintained between 6-9.5		7.14	7.88	
September	184	CBOD5	6	3	6	4		4.8	15.0	20.0mg/l	3	6	
	76	T.S.S	5	8	12	3		7.0	15.0	20mg/l	3	12	
	3.7	Total Phosphorus	3.23	2.97	2.72	1.07		2.50	2.0	4mg/l	1.07	3.23	
	33.5	T.A.N-NON-Freezing	0.6	0.1	0.4	0.1		0.30	3.0	Freezing Period- 3 mg/l	0.1	0.6	
		E-Coli	2	2	48	6		14.5	N/A	200 cfu/100mL	2	48	5.8
	36.2	TKN	1.6	1.2	2.3	0.5		1.40			0.5	2.3	
	7.56	pH	7.24	7.29	7.22	7.52		7.3	pH maintained between 6-9.5		7.22	7.52	

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						
October	124	CBOD5	4	8	4	6		5.5	15.0	20.0mg/l	4	8	
	97	T.S.S	6	14	8	16		11.0	15.0	20mg/l	6	16	
	3.08	Total Phosphorus	1.97	2.51	4.96	2.27		2.9	2.0	4mg/l	1.97	4.96	
	25.5	T.A.N-Freezing	0.1	0.8	0.1	0.2		0.3	3.0	Freezing Period-5mg/l	0.1	0.8	
		E-Coli	20	104	10	180		78.5	N/A	200 cfu/100mL	10	180	44.0
	26.2	TKN	0.5	1.2	0.5	1.2		0.9			0.5	1.2	
	7.31	pH	7.41	7.32	7.34	7.43		7.4	pH maintained between 6-9.5		7.32	7.43	
November	102	CBOD5	4	3	6	4	3	4.0	15.0	20.0mg/l	3	6	
	106	T.S.S	12	8	7	11	10	9.6	15.0	20mg/l	7	12	
	1.6	Total Phosphorus	2.3	2.44	3.94	1.8	1.26	2.3	2.0	4mg/l	1.26	3.94	
	12.3	T.A.N-Freezing	0.1	0.2	0.2	1.8	0.2	0.5	3.0	Freezing Period-5mg/l	0.1	1.8	
		E-Coli	32	64	120	32	4		N/A	200 cfu/100mL	4	120	31.6
	13.9	TKN	1.4	0.9	0.5	3	0.9	1.3			0.5	3	
	7.65	pH	7.38	7.33	7.3	7.37	7.48	7.4	pH maintained between 6-9.5		7.3	7.48	
December	67	CBOD5	4	3	4	3		3.5	15.0	20.0mg/l	3	4	
	95	T.S.S	12	8	8	6		8.5	15.0	20mg/l	6	12	
	1.1	Total Phosphorus	1.27	0.77	1.67	1.54		1.3	2.0	4mg/l	0.77	1.67	
	10	T.A.N-Freezing	0.1	1.6	0.2	2		1.0	3.0	Freezing Period-5mg/l	0.1	2	
		E-Coli	18	16	2	8			N/A	200 cfu/100mL	2	18	8.2
	11.9	TKN	0.7	2.1	0.8	0.9		1.1			0.7	2.1	
	7.9	pH	7.54	7.66	7.44	7.3		7.5	pH maintained between 6-9.5		7.3	7.66	

In-house tests were conducted by licensed operators for monitoring purposes using Standard Methods. The data generated from these tests is used to determine the treatment efficiency while maintaining process control. All in-house monitoring equipment is calibrated based on the manufacturer's recommendations.

Inspections

There were no regulatory inspections during the 2021 review period.

Alarm Response

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

Complaint Summary

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

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.