

2025 Year End Report: Bala Wastewater Treatment Plant (WWTP)



Environmental Compliance Approval: # 5049-B55KXT

Engineering and Public Works Department

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Introduction

The Bala Wastewater Treatment Plant (WWTP), which services the Town of Bala is owned and operated by the District Municipality of Muskoka. The plant is located at 1007 Tower Road and was commissioned in 1996. It currently services 451 customer accounts.

The Plant operates under the MECP Environmental Compliance Approval (Sewage) # 5049-B55KXT, issued October 31, 2018. Under the terms of the Certificate of Approval, the plant is permitted to treat an average daily flow of 550 meters cubed per day, and a peak flow of 2,036 meters cubed per day. Additionally, effluent limit criteria are as follows:

Table 1 Effluent Limit Criteria

Effluent Parameter	Concentration
CBOD	15 mg/L
Total Suspended Solids	15 mg/L
Total Phosphorous	0.30 mg/L
Total Ammonia Nitrogen Summer (May 15 to September 30)	5.0 mg/L
Total Ammonia Nitrogen - Winter (October 01 to May 14)	10.0 mg/L
E. coli	100 CFU/100mL
pH	6.0-9.5 inclusive at all times

The plant is an extended aeration activated sludge treatment process, consisting of grit removal, postsecondary filtration and Ultra-Violet disinfection. The facility is also equipped with aerobic digesters for bio-solids stabilization prior to final disposal.

Waste sludge from the plant process is digested aerobically at the plant and periodically hauled off site for disposal.

General Information

A review of the District of Muskoka infrastructure needs is conducted annually by the Director of Water and Wastewater Services, Area Manager and Chief Operator, and recommendations for maintenance, rehabilitation and renewal programs are considered.

Efforts to eliminate the discharge of untreated or partially treated wastewater to receiving waters are being accomplished by a long-term financial commitment to correct excessive infiltration into the wastewater collection system by means of sewer main rehabilitation replacement, manhole rehabilitation and pumping station rehabilitation programs.

The treatment facility is capable of effective operation during emergencies, maintenance shutdowns, and power failures. This is achieved through such measures as preventive maintenance of duty/standby units, the duplication of major treatment components, the provision of standby power sources and extensive use of the SCADA systems. All pumping stations and treatment control systems use SCADA (Supervisor Control and Data Acquisition),

in combination with Data Highway Plus, and programmable logic controllers. All operators are qualified to operate the systems efficiently and effectively in order to achieve the highest level of treatment at all times. A commitment to provide Operator training and certification is being sustained.

Regulatory sampling is carried out to meet the requirements outlined in the ECA, and additional in-house operational sampling beyond these regulatory requirements is being performed on a routine basis. These efforts have resulted in an effective treatment process which ensures that effluent discharges consistently meet effluent objectives and are environmentally safe. All final effluent sample results for the MBR facilities met their effluent limits.

All data in this report is a compilation of test results received from SGS Canada and their accredited laboratory, Lakefield Research. All in-plant sampling, analysis and recording of results conforms, in order of precedence, to the following 3 standards: Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works", Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" and the American Water Works Association/Water Environment Federation (AWWA/WEF) publication "Standard Methods for the Examination of Water and Wastewater"

Executive Summary

In all respects, test results of the treated effluent for the parameters of CBOD₅, suspended solids, ammonia, total phosphorous, and E. Coli are in compliance with the limits outlined in the ECA regarding monthly allowable concentrations and total effluent loading throughout the entire year.

Overall, the plant treatment processes performed satisfactorily and are deemed to be adequate. Event # 1-PA2UG8 pH exceedance. This event occurred from Aug 1-6 where the pH was less than 6.0 during this time.

Quantity of Flow Summary

The plant has a daily average flow design capacity of 550 meters cubed per day. The actual average daily flow for 2025 was 303 meters cubed per day; however, the 3-year average is 322 meters cubed per day, which represents 59% of the plant capacity. None of the individual system components exceeded the design flow rating.

Plant Operational Upsets or Process Failures

Event # 1-J2L1HE – March 16, 2025 - Plant surcharged from heavy precipitation/infiltration

Event # 1-PA2UG8 –August 1 to 6, 2025 - Plant exceeded minimum pH of 6.0 due to upset process

Summary of Maintenance

All equipment information at this plant is entered into a computer database. From this information, a scheduled preventive maintenance program has been established. The maintenance program includes (and not limited to):

- Monthly trials of emergency testing (under load) of the standby generators.
- Monthly calibration verification of analytical equipment
- Annual service of emergency standby generators.
- Annual calibration of flow metering devices
- Annual calibration verification of analytical equipment by third party
- Annual cleaning of sewage pumping stations.
- Marine inspection of effluent outfall and diffuser was last completed in 2022 and is planned for 2027.

All flow meter and analytical calibration verifications indicated all equipment was within calibration tolerances as required in the ECA.

Evaluation of the Need for Improvement Works

The treatment facility is operating at a plant capacity of 59% and has been relatively stable and within compliance specific to effluent parameter criteria, with the exception of the pH exceedance from August 1 to 6, 2025.

Evaluation Summary of Proposed Work Requiring Approval under OWRA

No works performed in 2025.

Interpretation of Analytical Results

All sample results for Raw Sewage and Final Effluent are reported in this section. Other tables in this report include Chemical Usage, Biosolids Quality, and Biosolids Quantity.

Raw Sewage

The information reported in the Raw Sewage sample results summary table consists of test results of analysis conducted on composite samples of the plant influent flow as required by the plant ECA. Samples are sent for analysis to Lakefield Research, as well as analysis conducted on site using Standard Methods or equivalent. Weekly analysis has been performed and reported as specified under the terms outline in the ECA.

Influent Analysis

Table 2 Influent Analysis

Influent Parameter	Minimum	4 Week Average Maximum	Annual Average	Average Loading kg/Day
BOD5 (mg/L)	17	268	117.44	28.66
Suspended Solids (mg/L)	28	292	121.96	30.42
Total Phosphorus (mg/L)	0.39	3.63	1.97	0.46
TKN (mg/L)	3.9	44.4	21.3	5.21
pH	6.72	8.64	7.23	N/A

Effluent Analysis

The information reported in the Final Effluent sample results summary Table 3 consists of test results of analysis conducted on final effluent composite samples. Bacteriological samples, however, consisted of grab samples. Weekly analysis has been performed and reported as specified under the terms outlined in the ECA.

Effluent Objective Analysis

pH exceedance in relation to Event # 1-PA2UG8 August 1 to 6, 2025. Objective pH was not met from August 7 to the 15, 2025, of a pH less than 6.5.

Final Effluent Analysis Summary

All final effluent samples tested for CBOD5, suspended solids, E. Coli, and total phosphorous were below non-compliance limits outlined in the ECA.

Table 3 Final Effluent Analysis Summary

Parameter	Minimum	4 Week Average Maximum	Annual Average	Average Loading kg/day
COBD5 (mg/L)	2.0	5.25	2.28	0.75
Suspended Solids (mg/L)	2.0	3.75	2.35	0.75
Ammonia (mg/L)	0.10	0.45	0.14	0.07
E. Coli (#/100 mL)	0	13.9	1.07	N/A
Total Phosphorus (mg/L)	0.03	0.05	0.04	0.02
pH	5.61	7.57 (max)	7.09	N/A

Average daily flow comparisons by day of week ensure ECA requirements for scheduled sampling are taken at a time, and in a location characteristic of the quality and quantity of the

sewage stream over the time period being monitored. Average daily flow rates by day of the week compare the flow to the average daily flow for the entire year. This data is used to determine if a particular day of the week is best to ensure samples are taken to meet the requirements of scheduled monitoring sections of the ECA's. Sampling plans are reviewed and updated yearly, based on the previous yearly flow data.

Final Effluent Sampling Summary

All samples were collected following the frequency and methods required by the facility approval. For the coming 2026 year, 24-hour composite samples will be collected on Wednesday rather than Tuesday of each week as was done in 2025.

Biosolids Generation

The quality and volume of biosolids hauled from the facility for disposal are outlined in the table provided. Dewatered biosolids from the plant were hauled by a contractor for disposal in 2025 and this will continue in 2026. It is not anticipated that there will be a significant increase in the total volume of bio solids produced in 2026.

Summary of Complaints received throughout the reporting period.

There were no complaints received in the reporting period.

Bala Wastewater Collection Summary 2025

New or Replaced Sewer Mains

No new sewer mains were installed in Bala 2025.

New Sewer Services:

1 new customer connected to existing municipal services.

Sewer Lateral Blockages:

There were no sewer lateral blockages in 2025.

Sewer Pump Stations:

All stations were cleaned by high velocity water pressure. All debris was vacuumed out and hauled to the appropriate landfill site. ARV's in River and Musquash were inspected.

Main Line Sewer Blockages:

There were no main line sewer blockages in 2025.

Sewer Force Mains:

All the low-pressure sewage force mains within the collection system were flushed by field staff through our annual preventive maintenance program in 2025.

Air Release Valves:

All eleven (11) of the air release vacuum valves connected to the sewage force mains in our collection system had a maintenance inspection 2025.

Sewer Flushing and Video Inspections:

2271m of flushing or video inspections completed in 2025.

Sewer Rehabilitation:

There was no MH rehab in Bala in 2025.

Locates:

Field staff addressed 109 locates for Bala One Call in 2025.

Table 4 Effluent Flow Summary – 2025

Month	Plant Total Monthly (m ³)	Average Day Flow (m ³ /d)	Maximum Day Flow (m ³ /d)	Minimum Day Flow (m ³ /d)
January	9,319	301	641	187
February	5,711	206	228	171
March	17,681	570	1,411	199
April	19,395	646	1,246	434
May	12,983	419	590	284
June	9,532	318	449	223
July	7,581	245	382	166
August	6,514	210	298	151
September	4,527	151	236	107
October	5,156	166	243	117
November	5,999	200	471	152
December	6,049	195	278	142

Total Flow: 110,509 m³

Average Day: 303 m³

Maximum Day: 1,411 m³

Minimum Day: 107 m³

Table 5 Influent Quarterly Analysis Summary – Weekly 24-Hour Composite Sample

Sample Date	Sample Identification Number	BOD5 mg/L	Suspended Solids mg/L	Total Kjeldahl Nitrogen mg/L	Total Phosphorus mg/L
Feb-11-25	CA12239	130	64	17.2	1.32
May-06-25	CA13325	52	55	10.2	0.81
Aug-12-25	CA13452	260	158	44.4	4.06
Nov-25-25	CA12847	116	164	22.3	1.71
Yearly Average		117.4	121.96	21.3	1.97
Maximum		268	292	44.4	5.61
Minimum		17	28	3.9	0.39

Table 7 Chemical Usage Summary: Alum

Month	Average Dosage mg/L	Total kg (dry)
January	104.9	791.5
February	111.5	487.4
March	115.6	1,459.9
April	111.3	1,659.7
May	104.6	972.4
June	103.2	810.0
July	110.8	635.4
August	207.8	739.6
September	127.3	417.1
October	122.1	480.2
November	118.5	501.5
December	96.9	421.5
Average	119.6	781.3

Total Yearly Kilograms: 9,376 kg

Table 8 Chemical Usage Summary: Soda Ash

Month	Average Dosage mg/L	Total kg (dry)
January	33.9	312.5
February	32.8	193.1
March	30.2	483.1
April	28.5	551.9
May	30.6	355.6
June	33.1	304.4
July	36.8	292.5
August	65.4	397.5
September	91.6	291.3
October	70.1	320.0
November	90.7	376.3
December	75.0	376.3
Average	51.6	354.54

Total Yearly Kilograms: 4,254 kg

Table 9 Effluent Quarterly Analysis Summary – Weekly 24-Hour Composite Sample Part 1

Sample Date	Sample Identification Number	CBOD5 mg/L	Alkalinity (Total as CaCO3) mg/L	pH	Phosphate	Total Phosphorus mg/L	Suspended Solids mg/L
Feb-11-25	CA12239	2	38	7.18	0.03	0.04	2
May-06-25	CA13325	2	61	7.30	0.03	0.03	4
Aug-12-25	CA13452	2	53	7.12	0.03	0.10	6
Nov-25-25	CA12847	2	77	7.10	0.03	0.03	2
Yearly Average		2	54	7.09	0.03	0.04	2.35
Maximum		2	110	7.57	0.03	0.11	6
Minimum		2	6	5.61	0.03	0.03	2

Table 10 Effluent Quarterly Analysis Summary – Weekly 24-Hour Composite Sample Part 2

Sample Date	Sample Identification Number	Conductivity mg/L	Total Kjeldahl Nitrogen mg/L	Nitrate Nitrogen mg/L	Nitrite Nitrogen mg/L	Total Ammonia Nitrogen mg/L	Chloride mg/L
Feb-11-25	CA12239	418	0.5	16.8	0.03	0.1	72
May-06-25	CA13325	467	0.5	12.2	0.03	0.1	91
Aug-12-25	CA13452	827	0.8	46.4	0.26	0.5	58
Nov-25-25	CA12847	579	2.5	24.0	0.03	0.1	72
Yearly Average		572.8	0.7	23.4	1.37	0.14	82.2
Maximum		827	2.6	49.2	40.44	1.0	220
Minimum		418	0.5	4.6	0.03	0.1	49

Table 11 Effluent Loading and Concentration Summary 2025 CBOD5

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.0	0.60	1.28
February	2.0	0.41	0.46
March	4.6	2.62	6.49
April	2.0	1.29	2.49
May	2.5	1.05	1.47
June	2.0	0.64	0.90
July	2.0	0.49	0.76
August	2.0	0.42	0.60
September	2.0	0.30	0.47
October	2.0	0.33	0.49
November	2.2	0.40	0.94
December	2.0	0.39	0.56
Average Monthly	2.26	0.75	1.41
Effluent Objective	10		
Non-Compliance	15	8.25	8.25

Table 12 Effluent Loading and Concentration Summary 2025 Suspended Solids

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	2.00	0.60	1.28
February	2.00	0.41	0.46
March	3.29	1.88	4.64
April	2.00	1.29	2.49
May	3.25	1.36	1.92
June	2.00	0.64	0.90
July	2.00	0.49	0.76
August	3.75	0.79	1.12
September	3.00	0.45	0.71
October	2.00	0.33	0.49
November	2.00	0.40	0.94
December	2.00	0.39	0.56
Average Monthly	2.44	0.75	1.35
Effluent Objective	10.00		
Non-Compliance	15.00	8.25	8.25

Table 13 Effluent Loading and Concentration Summary 2025: Total Ammonia Nitrogen Summer

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
May	0.15	0.06	0.09
June	0.10	0.03	0.04
July	0.16	0.03	0.06
August	0.45	0.09	0.13
September	0.10	0.02	0.02
October	0.10	0.02	0.02
Average Monthly	0.18	0.04	0.06
Effluent Objective	0.5	0.28	0.28
Non-Compliance	5	2.75	2.75

Table 14 Effluent Loading and Concentration Summary 2025: Total Ammonia Nitrogen Winter

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	0.10	0.03	0.06
February	0.10	0.02	0.02
March	0.10	0.06	0.14
April	0.10	0.06	0.12
November	0.10	0.02	0.05
December	0.10	0.02	0.03
Average Monthly	0.10	0.04	0.07
Effluent Objective	2.00		
Non-Compliance	10.00	5.5	5.5

Table 15 Effluent Loading and Concentration Summary 2025: Fecal Coliform

Month	Geomean (#/100mL)	Maximum Daily (#/100mL)
January	0.00	0.00
February	0.00	0.00
March	2.23	55.59
April	0.00	0.00
May	0.00	0.00
June	0.00	0.00
July	0.00	0.00
August	0.00	0.00
September	0.00	0.00
October	0.00	0.00
November	1.00	1.00
December	0.00	0.00
Average Monthly	0.27	4.72
Effluent Objective	80.00	
Non-Compliance	100.00	

Table 16 Effluent Loading and Concentration Summary 2025: Total Phosphorus

Month	Average mg/L	Average kg/day	Maximum Daily kg/day
January	0.03	0.01	0.02
February	0.04	0.01	0.01
March	0.05	0.03	0.07
April	0.03	0.02	0.04
May	0.03	0.01	0.02
June	0.03	0.01	0.01
July	0.03	0.01	0.01
August	0.06	0.01	0.02
September	0.05	0.01	0.01
October	0.03	0.01	0.01
November	0.03	0.01	0.01
December	0.03	0.01	0.01
Average Monthly	0.04	0.01	0.02
Effluent Objective	0.30	0.165	0.165
Non-Compliance	0.30	0.165	0.165

Table 17 Final Effluent Summary pH 2025

Month	Minimum	Maximum	Average
January	6.56	7.24	6.82
February	6.64	7.00	6.80
March	6.60	7.05	6.84
April	6.62	7.42	6.93
May	6.59	7.29	6.95
June	6.53	6.97	6.75
July	6.50	6.81	6.59
August	5.60	6.99	6.54
September	6.40	7.23	6.89
October	6.50	7.62	6.78
November	6.52	7.37	6.73
December	6.50	7.70	6.88
Average Monthly	6.46	7.23	6.79
Effluent Objective	6.5	8.5	
Effluent Limit Minimum	6.0	9.5	

Table 18 Liquid Sludge Production Summary2025

Month	Hauler	Liquid Volume m ³	Destination
January			
February	ROHES	72.8	ROHES - Lagoon
March	ROHES	109.2	ROHES - Lagoon
April			
May	ROHES	145.6	ROHES - Lagoon
June			
July	ROHES	109.2	ROHES - Lagoon
August			
September	ROHES	109.2	ROHES - Lagoon
October			
November	ROHES	72.8	ROHES - Lagoon
December	ROHES	72.8	ROHES - Lagoon

Yearly Total Volume: 692 m³
Yearly Average Volume: 99 m³
Maximum Volume: 146 m³

Table 19 Sludge Quality Analysis 2025

Parameter Sampled (mg/L)	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Date	Feb-11-25	May-06-25	Aug-13-25	Nov-25-25
Sample ID	CA12232	CA13328	CA12514	CA12844
Nitrate	14	3	170	65
Mercury	0.011	0.008	0.011	0.030
Chromium	0.09	0.09	0.23	0.29
Cobalt	0.01	0.01	0.03	0.04
Copper	2.3	2.4	5.3	6.8
Lead	0.1	0.1	0.2	0.3
Molybdenum	0.05	0.05	0.08	0.10
Nickel	0.09	0.09	0.19	0.23
Selenium	0.1	0.1	0.1	0.1
Arsenic	0.1	0.1	0.1	0.1
Zinc	2	2	6	7
Cadmium	0.005	0.005	0.007	0.014
Ammonia+ Ammonium	2.9	6.9	47	4
Total Kjeldahl Nitrogen	451	605	1010	1010
Total Phosphorus	164	163	456	617
Total Solids	9730	12500	25400	24100
TSS	7970	12200	23400	25400
Nitrite	3	3	13	3
PO4(sol)(Dissolved Reactive Phosphorous)	0.75	0.75	0.75	0.75
COD	6700	7100	12000	12500
BOD	1810	666	748	4320

Certification of Reports

I certify that the information in this document and all attachments is correct, accurate, and complete to the best of my knowledge

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