Teeswater Formosa Sewer System and Wastewater Treatment Plant

120003735

2023 Summary Report
February 16, 2024
Prepared by Veolia Water
For the Municipality of South Bruce

Contents

ECA (#0279-8Q8JD6) Reporting Requirements

Plant Description

The Teeswater Wastewater Treatment Plant is a Sequencing Batch Reactor plant with a Rated Capacity of 1,350 m3/day. Treated water is discharged into the Teeswater River. The facility receives waste from households, businesses and industries in Formosa and Teeswater included, but not limited to dairy waste from Gay Lea Food Co-operatives Limited and brewery waste from the Formosa Brewery

Teeswater Wastewater Treatment Plant

- **Influent Works**
  One (1) 600 mm wide and 1,300 mm deep screen channel equipped with a mechanically cleaned, 3 mm diameter perforated plate debris screen rated at 110 L/s and a bypass channel with an overflow weir and manual bar screen with custom aluminum rake.
  One (1) 2.0 m diameter circular vortex grit removal unit rated with a *peak flow rate* of 110 L/s equipped with a grit removal system.
  One (1) screw conveyor grit classifier serving the grit removal unit.
  One (1) 9,500 L capacity alum solution storage tank, together with two (2) chemical metering pumps (one standby) each rated at 0 to 12 L/h, with an alum solution feed line to the grit tank outlet channel.

- **Secondary Treatment Facilities**
  A 350 mm diameter inflow pipe connected to an influent splitter box designed to distribute the influent sewage evenly between two sequential batch reactors (SBR). The reactors are 29.5 m long x 10.5 m wide x 6.4 m (5.8 m top water level) deep parallel continuous inflow SBRs with a baffle wall at the upstream end of each tank to direct all influent into the bottom of the tank and equipped with a fine bubble aeration system.
  One (1) motorized effluent decanter rated at 196 L/s peak rate for each SBR with, a fixed float scum guard, and discharging into a 26.7 m by 4 m equalization tank.
  Two (2) submersible centrifugal waste activated sludge pumps for each SBR, each rated at 29 m3/h at a TDH of 8.0 m, with discharge line to the sludge digestion facility.

- **Air Blowers**
  Three (3) positive displacement air blowers (one standby) serving as the compressed air supply for the SBR aeration system and sludge digestion system, each rated at 1860 m3/h at 69 kPa.

- **Effluent Filtration Systems**
  Six (6) deep bed, continuous backwash effluent filters with total surface area of 27.87 m2 rated at 3.3 L/m2/s for *Peak Flow Rate* of 92 L/s.
  A 200 mm diameter inlet magmeter to allow supplementary flow-proportional chemical dosing to the filters;
  One (1) 4,100 L chemical storage tank and two dosing pumps (one standby) to the inlet pipe to filters, each with a capacity range of 0 L/h to 12 L/h;
  One (1) 2.4 m3 flocculation (mixing chamber) ahead of filters equipped with a variable speed, 5 hp mixer.
  Two (2) submersible, 7.5 hp well-type pumps each rated at 5 L/s at 73.7 m TDH for effluent water reuse in the headworks.

- **Effluent Disinfection Facilities**
  A 4.41 m long x 406 mm wide x 780 mm deep indoor UV disinfection channel, equipped with a UV disinfection unit with a *peak flow rate* of 152 L/s, complete with a level control serpentine weir.

- **Plant Effluent Outfall Sewer**
  A 525 mm diameter outfall sewer to Teeswater River;

- **Sludge Digestion and Storage Facilities**
  One (1) 550 m3 stage 1 sludge digestion tank and one (1) 245 m3 stage 2 digestion tank, complete with aeration systems and decant assemblies.
  Two (2) submersible centrifugal waste activated sludge pumps rated at 29 m3/h at a TDH of 14.5 m in digester 2, one for truck loading and one for discharge to the sludge storage facilities.
  One (1) 4,461 m3 capacity thickened sludge holding tank with cover.
  One (1) 20 hp sludge mixer and an option for an additional second mixer if required.

- **Emergency Power Supply System**
  One (1) 360 kW diesel engine standby power generator with integral fuel storage.

- **On-Site Wastewater Pumping Station**
  An on-site wastewater pumping station equipped with two (2) 20 hp solids chopping centrifugal submersible sewage pumps (one standby) for pumping Formosa sewage, septage, filter backwash, domestic sewage and digester decant to the inlet works.
  Includes a septage receiving station with manual bar screen and stainless steel custom rake.

Teeswater Sewage Collection System

- **Teeswater Main Sewage Pumping Station**
  A wet well/dry well style sewage pumping station located at the northwest corner of Mill Street and Hillcrest Street East at 6 Mill Street, Teeswater that is equipped with 2 submersible pumps, a backup generator and inlet manual bar screen complete with custom stainless steel rake.

- **Teeswater Local Sewage Pumping Station A1**
  Located at the intersection of Reid Street and Logan Street, a duplex E-One grinder pump station and a 50 mm diameter forcemain along Logan Street to a maintenance hole east of Wright Street.

- **Teeswater Local Sewage Pumping Station A2**
  Located at the end of Riverview Terrace, a duplex E-One grinder pump station and a 50 mm diameter forcemain along Riverview Terrace to a maintenance hole on Hillcrest Street E

- **Teeswater Local Sewage Pumping Station A3**
  Located at the end of Andrew Street, a duplex pump station with grinder style centrifugal sewage pumps and a 75 mm diameter forcemain along Andrew Street to a maintenance hole on Hillcrest Street W
  This station is equipped with a backup diesel generator.

Formosa Sewage Collection System

- **Formosa Main Sewage Pumping Station**
  A 3.0 m diameter precast concrete wet well sewage pumping station, located on the east side of Bruce Road No. 12 at 1114 Bruce Road 12 and approximately 150 m south of Council Road equipped with two (2) submersible pumps, a backup generator, flow meter, bypass piping and alarms.

- **Formosa Teeswater Sewage Transmission Line** – a 200 mm diameter sanitary forcemain along Bruce Road 12, Concession 10, Sideroad 1B and Concession Road 8 from the pumping station to a grit removal chamber which discharges to a 300 mm/250 mm diameter gravity sewer along Concession Road 8, followed by a 250 mm/200 mm diameter sag sewer along Concession Road 8, with intermediate flush chambers, followed by a 250 mm diameter gravity sewer along Concession Road 8, followed by a second 250 mm/200 mm diameter sag sewer along Concession 8 and Sideroad 10A with intermediate flush chambers, followed by a 250 mm diameter gravity sewer along Sideroad 10A and finally discharges to the on-site sewage pumping station at the wastewater treatment plant;

- **Formosa Low Pressure Sanitary Sewer System –** Low pressure Sewers Serviced with Grinder Pumps at individual service locations.

Teeswater Wastewater Compliance Report 2023

Facility Classification: Class 3 Waste Water Treatment
Rated Capacity: 1350 m3/day
Peak Flow: 7949 m3/day (92 l/s)
Receiving Waters: Teeswater River

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Minimum	Average	Maximum	Limit
Flow																	
Total Raw Flow (m3/mth)	30,332	28,031	30,899	31,365	31,307	31,541	31,451	30,441	28,492	30,707	27,647	29,172	361,385		30,115		
Raw Average Day Flow (m3/d)	978	1,001	997	1,046	1,010	1,051	1,015	982	950	991	922	941			990		1350
Raw Max Day Flow (m3/d)	1,187	1,309	1,268	1,303	1,306	1,295	1,286	1,189	1,177	1,209	1,228	1,301				1,309	
Biochemical O2 Demand																	
Influent Average BOD (mg/L)	485	509	344	372	571	590	716	400	426	360	482	521		148.0	477.6	1,900.0	
Effluent Average CBOD (mg/L)	3	3	2	2	2	2	3	3	2	2	7	2			2.7	11.0	10
Percent Removal	99.5	99.5	99.4	99.5	99.6	99.7	99.6	99.3	99.5	99.3	98.6	99.6			99.4 %		
Suspended Solids																	
Influent Average TSS (mg/L)	173	216	213	181	190	219	252	179	160	201	427	227			224.1	3,000.0	
Effluent Average TSS (mg/L)	10	10	2	7	8	6	7	3	6	7	14	7			7.2	37.0	10
Percent Removal	94.4	95.4	98.9	96.1	95.9	97.4	97.1	98.1	96.1	96.6	96.7	96.9			96.6 %		
Phosphorus																	
Influent Average TP (mg/L)	5.04	13.99	4.98	4.94	9.07	19.40	5.37	4.52	4.78	4.83	5.30	4.95			7.42	68.20	
Effluent Average TP (mg/L)	0.08	0.13	0.12	0.12	0.15	0.10	0.14	0.09	0.13	0.18	0.20	0.13			0.14	0.34	0.15
Percent Removal	98.4	99.1	97.5	97.5	98.3	99.5	97.3	98.0	97.3	96.3	96.3	97.3			97.7 %		
Nitrogen Series																	
Influent Average NH3+4 (mg/l)	27.80	32.18	22.30	27.25	26.80	25.10	36.73	38.15	37.70	28.66	30.86	32.51			30.58	47.40	
Influent Average TKN (mg/L)	49.24	47.20	46.00	48.77	44.86	40.25	51.43	53.32	55.66	48.50	55.69	49.55			49.00	72.70	
Effluent Average NH3+NH4 (mg/L)	0.10	0.15	0.14	0.10	0.10	0.18	0.65	0.10	0.10	0.12	0.13	0.10			0.16	2.30	2
Effluent Average Nitrate (mg/L)	5.11	7.93	13.28	6.63	5.09	3.28	4.07	6.53	11.79	8.73	7.23	3.19			7.02	50.80	
Effluent Average Nitrite (mg/L)	0.03	0.10	0.30	0.05	0.03	0.04	0.08	0.31	0.03	0.03	0.04	0.03			0.09	1.42	
Effluent TKN (mg/L)	1.63	1.28	1.28	1.23	0.84	1.43	1.98	1.14	0.78	0.90	2.35	1.43			1.33	4.10	
pH																	
Influent Average pH	7.40	7.02	7.47	7.39	7.56	7.25	7.26	7.31	7.54	7.45	7.36	7.20		5.70	7.33	7.97	
Effluent Average pH	8.16	8.32	8.22	8.29	8.31	8.14	8.22	8.19	8.26	8.29	8.04	8.12		7.77	8.22	8.64	
UV Disinfection																	
Average UV Intensity	26.07	25.68	24.03	16.70	15.65	48.66	47.96	38.65	30.14	17.40	6.99	15.16			26.1	74.2	
Disinfection															Geo. Mean		
E.Coli Geo.Mean per 100mL	1	2	3	3	2	2	9	2	2	2	2	2			3	880	100

*** Note: The Effluent Ammonia limit from December 1st to April 30th is 4 mg/l**
Values exceeding Monthly Effluent limits have been highlighted red
Values exceeding Monthly Effluent Objectives have been highlighted yellow

Effluent Objectives

In 2023 there were 8 months (February to May, July and September to November) that the Total Phosphorus (0.10 mg/l) objective was not met.
The objective for Total Suspended Solids (5mg/l) was not met for the months of January, February, April, May, June, July, September, October, November and December.
The objective for Effluent CBOD (5 mg/l) was not met in November.
See the Teeswater Compliance Report (Page 5) for more details.

Operating Problems

During 2023 there were several operating issues which impacted the effluent quality. In October the Effluent limit of 10 mg/l Total Suspended Solids was exceeded. In October and November the Effluent Limit of 0.15 mg/l Total Phosphorus was exceeded. The main cause of these exceedances were algae build-up in the filter system, and seasonal biological changes that occurred in the SBR basins.

Maintenance and Events

Additional maintenance other than routine maintenance included:

January 26 - Installed a new fan for Blower #3
February 1 - Hays onsite to repair explosion-proof heaters in headworks building
June 5 - Replaced headworks manual alum pump diaphragm
October 20 - A new compressor was installed for the Filters

QA/QC Measures

1. Dissolved Phosphorus tests were used to indicate the required Alum dosage.
2. pH measurements were taken to ensure levels were between 6.0 and 9.0 and water quality.
3. Dissolved oxygen was measured to ensure that adequate aeration is being carried out.
4. Mixed liquor suspended solids and 30 minute settling tests are used to determine adequate microbiological populations and to set the sludge wasting rates.

All required regulatory and ECA analyses were performed by SGS Labs. In addition, routine in house laboratory sampling was undertaken to ensure compliance. These tests include: 30 minute Settling, Suspended Solids, Final Effluent Total Phosphorus, pH, and temperature.
Filamentous Bacteria analysis was completed by GAP Labs.

Monitoring Equipment

The following is a list of the monitoring equipment at the Teeswater WWTP:

- Hach DR 2800 – Total Phosphorus, Dissolved Phosphorus, Ammonia, Total Solids (Effluent)
- Hach HQ 40d– pH, Dissolved Oxygen, Temperature (Effluent, and SBR Tanks)
- Endress Hauser online Analyzer - Dissolved Oxygen, Temperature (SBR Tanks)
- Digital Scale for MLSS and TSS (Effluent, SBR Tanks)
- Lab Oven for MLSS and TSS (Effluent, SBR Tanks)

Calibration and Service of Equipment

- July 12, 2023 – Annual inspection of lifting equipment.
- April 10, 2023 - Calibration of flow monitoring equipment at the Wastewater Treatment Plant and Teeswater Collection System
- May 2, 2023 - Calibration of gas detectors by Hetek
- November 21, 2023 – Calibration of gas detectors by Hetek

Bio Solids Volume

In 2023 approximately 4,134 m3 of Biosolids were hauled and land applied. Based on the volume of Sludge that was in the holding tank compared to the prior year the total volume generated was approximately 4,098 m3. The hauled Bio-Solids were applied to the following sites: Batte (NASM #24928), Batte (NASM#23697), Batte (NASM #24161).
Overall the Biosolids production decreased by 2630 m3 in 2023 compared to 2022. This amount was less due to pretreatment that was undertaken by Gay Lea Foods, which is reducing plant loading and allowing for more efficient operation of the Digesters
Based on plant operations and biosolids production so far in 2024 we expect the total volume to be similar to 2023.

Customer Complaints

2023 (Throughout) – Odor complaints continued to be received from Formosa residents, however the number of residents with complaints appears to have been reduced. Veolia and South Bruce will continue to take additional measures to further reduce odor complaints. Several sewer deodorizing units have been installed into suspect man holes. Additionally, more frequent sewer main flushing has been implemented. In May of 2020 smoke testing was conducted to help identify odor sources from the sewer system. This also helped identify issues with some of the property owner's plumbing.
For 2024 South Bruce Council has approved additional monitoring and plans to implement improvements based on the results of the monitoring.

Information for the District Manager

No additional information was known to have been requested from the District Manager.

Recommendations

No significant recommendations at this time.

By-Passes

There were no by-passes or spills to report for 2023.

Table 2 BYPASS AND OVERFLOW SUMMARY FOR 2023

	Primary Bypass			Secondary Bypass			Plant Overflows			Collection System Overflows		
MONTH	No. of Events (events)	Duration (hours)	Volume (1000m3)	No. of Events (events)	Duration (hours)	Volume (1000m3)	No. of Events (events)	Duration (hours)	Volume (1000m3)	No. of Events (events)	Duration (hours)	Volume (m3)
January	0			0			0			0		
February	0			0			0			0		
March	0			0			0			0		
April	0			0			0			0		
May	0			0			0			0		
June	0			0			0			0		
July	0			0			0			0		
August	0			0			0			0		
September	0			0			0			0		
October	0			0			0			0		
November	0			0			0			0		
December	0			0			0			0		
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0

Note: An 'Event' means an occurrence or occurrences of a bypass or overflow separated by a period of more than 12 hours between the occurrence(s) or the event(s) and the previous event, at each location.