Annual Report

For the 2024 Operating Year

Ripley Wastewater Treatment Facility

Resourcing the world VEOLIA

EXECUTIVE SUMMARY:

This report is a summary of the Ripley Wastewater Treatment Facility's performance in accordance with the Ministry of the Environment, Conservation and Parks (MECP) Amended Certificate of Approval (C. of A) No. 3-0724-88-006, Issued: September 18, 2009, and the Federal Wastewater Systems Effluent Regulations (WSER) for the 2023 operating year.

In late 2022, a new Amended Environmental Compliance Approval No. 0667-C8DN2F, Issued : November 29, 2022, was received. This Amended ECA replaces the Amended C. of A.

DESCRIPTION OF FACILITIES: Works Number: 110002773

Component Location

Sewage Pumping Station 59 Park St (Lot 56, Plan 100)
Stabilization Ponds (Lagoons) 76 Park St (Lot 14, Concession 7) Outfall to South Pine River Lot 14, Concession 6
Streamflow Monitoring Station Sideroad No. 10, at South Pine River Crossing Collection System Village of Ripley

SEWAGE PUMPING STATION

- Wet well structure (2.4 m diameter x 10.4 m deep)
- Two (2) raw sewage pumps (11hp each)
- Miltronics level sensor and volume totalizer
- Standby generator (30hp), diesel fuel tank and containment
- Aluminum sulphate storage tank (27,000 L) and containment
- Two (2) chemical feed pumps (30L/h each, max)
- Force Main: 467 m x 150 mm diameter

WASTE STABILIZATION PONDS (CONVENTIONAL FACULTATIVE LAGOON SYSTEM)

- Cell No. 1: 36,500 m^3
- Cell No. 2: 43,200 m^3
- Cell No. 3: 43,200 m^3
  - Three cells sized for a minimum retention time of 200 days at annual average influent design flow of 600 m^3/d
- Aeration Cell 4: 10,400 m^3 (12 hours retention at peak discharge rate of 5,338 m^3/d)
- Blower: Hick Hargreaves HH4063: 540 - 1,080 m^3/h (at 57 kPa)
- Electrically operated knife gate valve (Rotorx)
- Discharge control structure: 90º V-Notch weir and Milltronics level sensor
- Outfall pipe: 550 m x 375 mm diameter
- Stream flow gauge at the South Pine River (maintained by Saugeen Valley CA)

Ripley Sewage Process Schematic

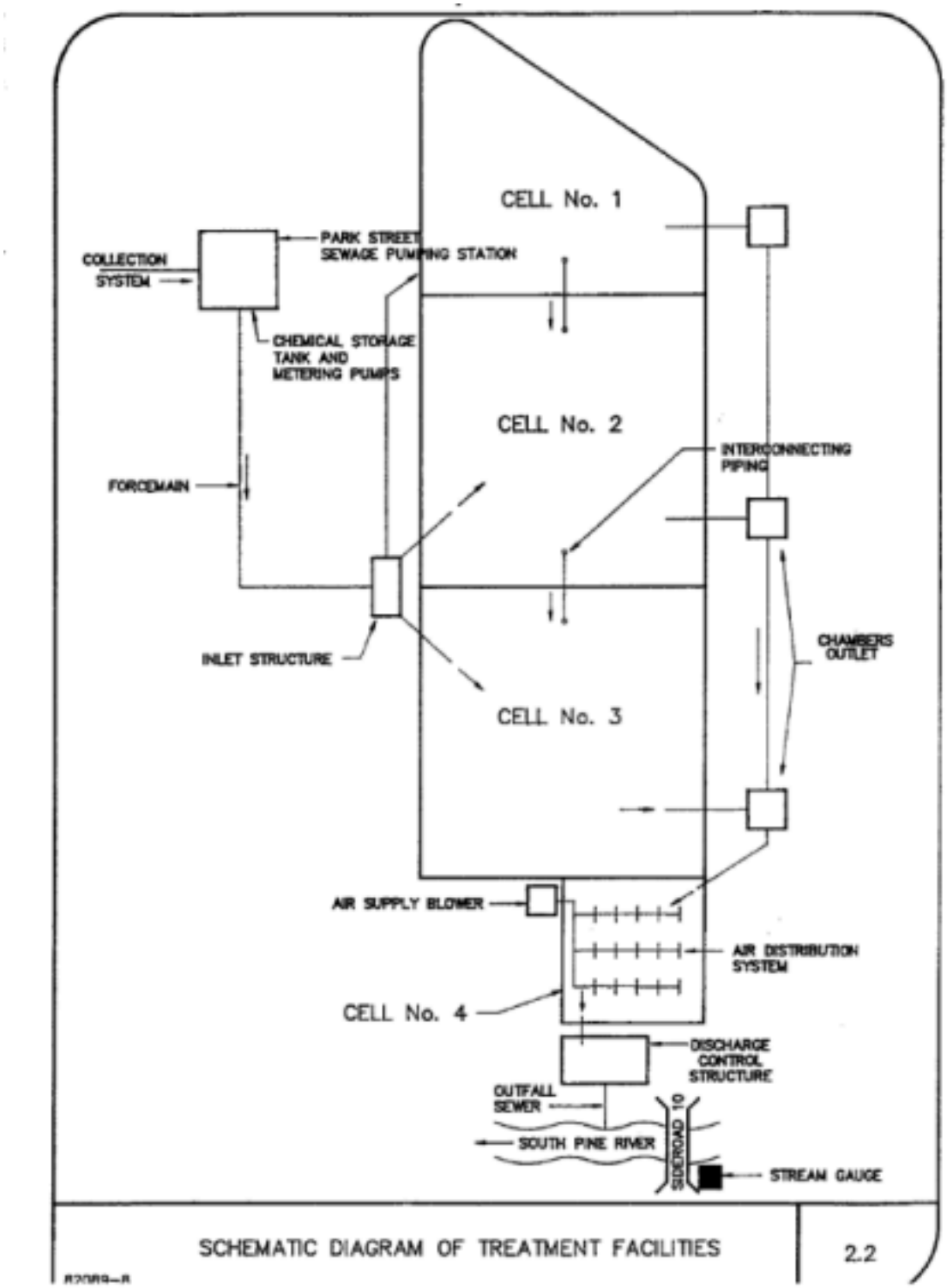

Figure 3

Ripley Sewage Lagoon Aeration Cell Schematic

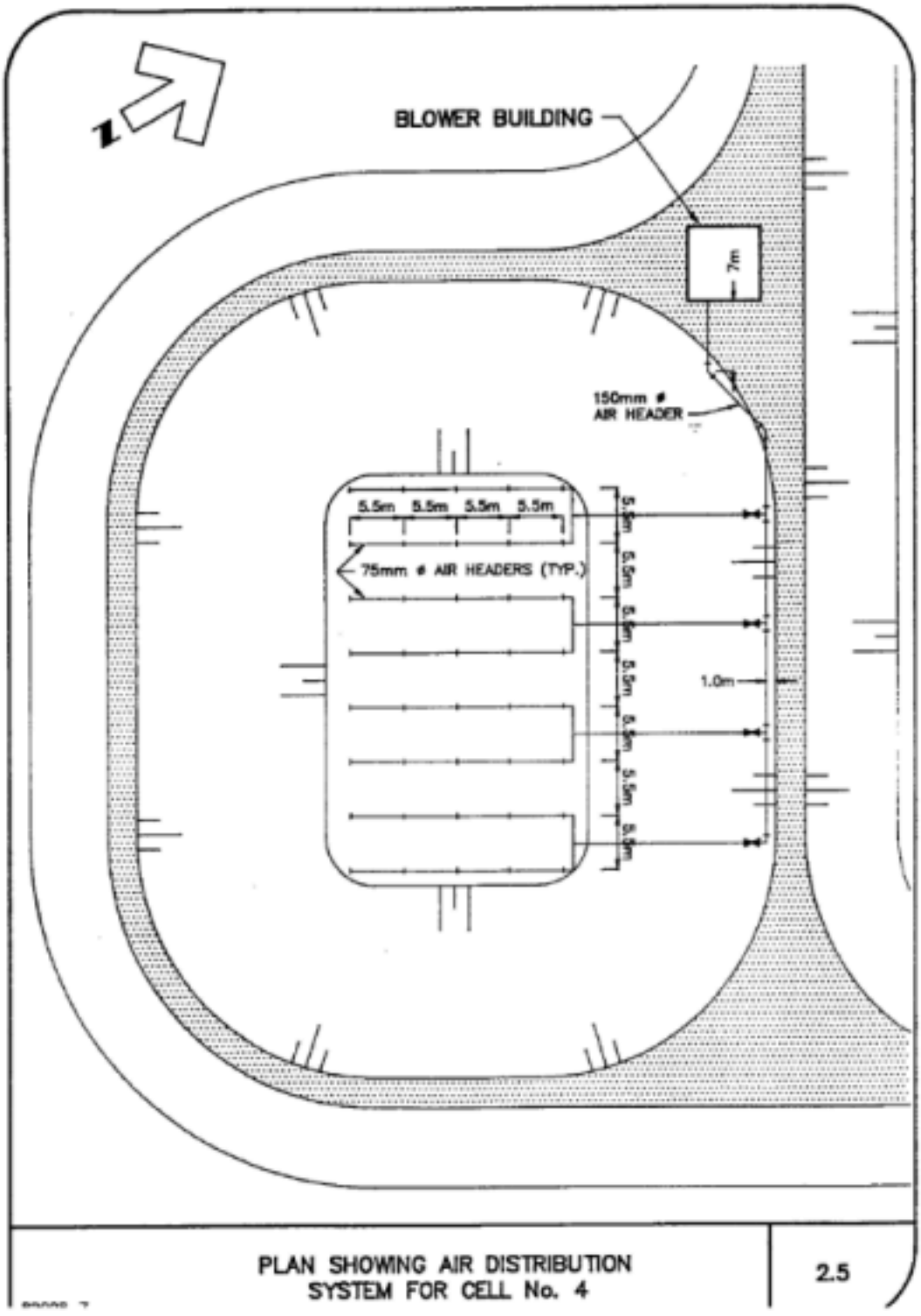

Figure 4

UNIT PROCESS:

In 2024, the Ripley Wastewater Treatment System was operated as follows:

Raw sewage from the collection system flowed to the wet well structure at the Sewage Pumping Station. Aluminum sulphate (alum) was added to promote phosphorus removal before it was pumped to Lagoon Cell No. 1 via the forcemain. The Lagoon Cells worked in series (i.e. Cell 1 --> Cell 2 --> Cell 3), with water depths between 0.3 - 1.8 m..

The Ministry C. of A. and the new Amended ECA allow the treated effluent to be discharged between October 15th to May 1st. When discharge is permitted, the effluent was directed from Cell 3 to Aeration Cell 4, where a blower was used to supply air through a submersible diffuser system. The treated effluent was then directed to the discharge control structure, where the flow was measured prior to entering the outfall pipe to the South Pine River.

REQUIREMENTS - EFFLUENT:

Condition 3. (1) Subject to Subsection (2), the sewage treatment facilities should be designed, constructed and operated such that the concentrations of the materials named below as Effluent Parameters shall not be exceeded in the effluent from the facilities, calculated in accordance with Subsection (3) as shown in Table 1.

Effluent Parameters	Design Objectives	Non-Compliance (Average Over Discharge Period)
BOD-5	15.0 mg/L	25.0 mg/L
Suspended Solids	15.0 mg/L	30.0 mg/L
Total Phosphorus	0.5 mg/L	0.8 mg/L
Free Ammonia	Fall: 3.0 mg/L Spring: 6.0 mg/L	Fall: 6.0 mg/L Spring: 10.0 mg/L
Hydrogen Sulphide	Absent	--

Wastewater Systems Effluent Regulations (WSER)

Prescribed Deleterious Substances	Authorization to Deposit - Conditions (Average Concentration per Section 6 (3))
CBOD	25 mg/L
Suspended Solids	25 mg/L
Total Chlorine Residual	0.02 mg/L max
Un-ionized Ammonia	1.25 mg/L

Note: The laboratory reports Provincial Unionized Ammonia which is calculated from total ammonia, field pH and temperature provided on the Chain of Custody form and is the same as Free Ammonia. The Federal Unionized Ammonia (WSER) is calculated using total ammonia and laboratory pH measured at 15°C.

ENVIRONMENTAL COMPLIANCE APPROVAL # 0667-C8DN2F

Schedule B and C : Final Effluent Concentration Limits (Oct 15 - May 1)

Final Effluent Parameters	Averaging Calculator	Design Objective	Compliance Limit
CBOD5	Seasonal Average	15.0 mg/L	25.0 mg/L
Total Suspended Solids (TSS)	Seasonal Average	15.0 mg/L	30.0 mg/L
Total Phosphorus (TP)	Seasonal Average	0.5 mg/L	0.8 mg/L
Total Ammonia Nitrogen (TAN)	Seasonal Average	Fall : 3.0 mg/L Spring : 6.0 mg/L	Fall : 6.0 mg/L Spring : 10 mg/L
E.Coli	Monthly Geometric Mean	150 cfu/100 mL	200 cfu/100 mL
pH	Single Sample Results	6.5 - 8.5	6.0 - 9.5
Hydrogen Sulphide (H_2S)	Single Sample Results	Not detectable	absent

Condition 6 : Design Objectives

● Exceedance of the Design Objective concentrations for CBOD5, TSS, TP and TAN is deemed to have occurred when the arithmetic mean of analytical results of at least four (4) consecutive grab samples is greater than the corresponding concentration in the table.
● Exceedance of the Design Objective concentrations for H_2S is deemed to have occurred when a positive result from any single sample is greater than the corresponding concentration in the table.

Condition 7 : Compliance Limits

● Exceedance of the Compliance concentrations for CBOD5, TSS, TP and TAN is deemed to have occurred when the arithmetic mean of analytical results of at least four (4) consecutive grab samples is greater than the corresponding concentration in the table.
● Exceedance of the Compliance concentrations for H_2S is deemed to have occurred when a positive result from any single sample is greater than the corresponding concentration in the table.
● The unionized ammonia concentration in the South Pine River after mixing with the lagoons' discharge (downstream) should not exceed 0.02 mg/L in accordance with Provincial Water Quality Objectives (PWQOs).

Effluent (Grab) Sample Results (mg/L) - Weekly during discharge

Date	BOD-5	Total Suspended Solids	Total Phosphorus	Total Ammonia	Calculated Unionized Ammonia (WSER)
Jan 2	4	12	0.03	1.3	0.072
Jan 3	7	**15**	0.03	1.6	0.078
Jan 8	5	**16**	<0.03	2.6	0.164
Jan 11	9	**12**	0.05	3	0.108
Apr 9	8	**10**	0.03	0.6	0.019
Apr 11	8	12	0.04	1.5	0.031
Apr 15	**5**	**20**	0.03	3.4	0.187
Apr 17	6	22	0.06	4.2	0.210
Apr 22	6	26	0.07	6.1	0.202
Apr 25	8	**21**	0.04	6.6	0.168
Min	**4**	**10**	**< 0.03**	**0.6**	**0.031**
Max	**9**	**26**	**0.07**	**6.6**	**0.210**
Annual Avg	**6.6**	**16.6**	**0.04**	**3.1**	**0.124**
# Samples	**10**	**10**	**10**	**10**	**10**
Objectives	**15**	**15**	**0.5**	**Fall: 3 Spring: 6**	--
Non-Compliance[1]	**25**	**30**	**0.8**	**Fall: 6 Spring: 10**	--
WSER[2]	--	**25**	--	--	**1.25**
Compliant	**YES**	**YES**	**YES**	**YES**	**YES**

Four sample results exceeded the C. of A. maximum for Total Suspended Solids (TSS) objectives however, the arithmetic mean for each discharge period (i.e. Spring and Fall) was within compliance :

- Spring Average : 19 mg/L
- Fall Average : 13.75 mg/L

The annual average TSS (16.6 mg/L) was in compliance with the WSER limit.

Notes: [1] For compliance to the Certificate of Approval:

Exceedance of the concentration for BOD-5 and Suspended Solids is deemed to have occurred when the arithmetic mean of analytical results of at least four (4) consecutive grab samples or a single sample is greater than the corresponding concentrations set out in Table 1.

[2] For compliance to WSER:

The average concentration of CBOD, and Suspended Solids did not exceed the corresponding concentrations set out in Table 2, and the maximum concentration of un-ionized ammonia in the effluent was less than 1.25 mg/L, expressed as Nitrogen (N), at 15ºC ± 1ºC.

REQUIREMENTS - RAW FLOWS:

Condition 3. (2) The Ripley sewage treatment works are approved to treat sewage at an average flow of 600 m^3 per day. Average flows for the year not to exceed 600 m^3 per day, based on the arithmetic mean of 365 consecutive days flow, and have no negative impact on the receiving stream.

Flows: Raw Sewage Collected at Sewage Pumping Station

Date	Volume, m³	Daily Max, m³	Daily Min, m³	Average, m³
January	18,251	1,415	329	588.74
February	12,687	841	241	437.48
March	12,530	583	239	404.19
April	14,618	1,636	248	487.27
May	9,021	372	222	291.00
June	7,271	350	71	242.37
July	8,204	416	174	264.65
August	7,484	327	149	241.42
September	6,544	288	159	218.13
October	6,453	303	148	208.16
November	6,721	321	166	224.03
December	12,853	1,559	140	446.87
Total	123,637	---	---	---
Maximum	–	1,636	–	–
Minimum	–	–	71	–
Average Month	–	–	–	–
Arithmetic Mean*	---	---	---	338
Compliant	---	---	---	**YES**

Note: * Arithmetic mean of 365 days flow.

Rated Capacity (average): 600 m³/day **Performance (average):** 56.3%

Condition 3. (9)(ii):

The *Owner* shall, when annual average flows reach 500 m³/day (83.3% capacity), further examine the lagoon performance and receiving stream and confirm, in writing to the *District Manager* and the *Director*, that the rated capacity of 600 m³/day will have no negative impact on the receiver.

In 2024, the annual average flow was below 500 m³/d, except in January.

REQUIREMENTS - EFFLUENT FLOWS:

Condition 3. (3) The effluent volume from the Treatment Works shall be adjusted according to the stream flow available in the South Pine River.

Flows: Effluent Discharged to South Pine River

Date	Volume, m^3	Daily Max, m^3	Daily Min, m^3	*Average, m^3
January	50,198	5,374	157	4,183
February	–	–	–	–
March	–	–	–	–
April	94,887	8,467	218	5,272
May	–	–	–	–
June	–	–	–	–
July	–	–	–	–
August	–	–	–	–
September	–	–	–	–
October	–	–	–	–
November	–	–	–	–
December	–	–	–	–
Total	145,085			
Maximum		8,467		
Minimum			157	
Monthly Average				4,727.5
Annual Average				398
Total # days discharged	29			

Notes:

* The monthly average is calculated using the total monthly volume (m^3) divided by the number of days discharged in that same month.

** The annual average is calculated using the annual total volume (m^3) divided by 365 consecutive days flow as per WSER reporting.

Flows: South Pine River Streamflow (m^3), during discharge periods

(Data taken from Sideroad 10 Streamflow Monitoring Station - Saugeen Valley Conservation Authority)

2024	January	April
Min	6.447	6.405
Max	7.223	7.505
Avg	6.626	6.646

CERTIFICATE OF APPROVAL # 3-0724-88-006 REQUIREMENTS - UNIONIZED AMMONIA:

Condition 3. (4) The unionized ammonia concentration in the South Pine River after mixing with the *discharge should not exceed 0.02 mg/L* in accordance with the Ministry's Water Management Goals, Policies and Objectives. In order to comply with this criterion, the effluent discharge rate shall be controlled by the Operating Authority by varying the discharge rate in relation to stream flow in the South Pine River, considering such factors as pH and temperature of the receiving stream.

The discharge samples are sent to the laboratory where they are analyzed for Total Ammonia and Free Ammonia. The Free Ammonia is the same as the Provincial Unionized Ammonia, which is calculated from the Total Ammonia, field temperature and field pH.

Spring Discharge (Grab) Sample Results (mg/L): Weekly sampling

Date	Upstream Result Unionized Ammonia	Effluent Result Unionized Ammonia	Downstream Result Unionized Ammonia
April 9	<0.0020	0.019	0.0010
April 11	–	0.031	–
April 15	0.0020	0.187	0.006
April 17	–	0.210	–
April 22	<0.003	0.202	0.032
April 25	–	0.168	–
Maximum	<0.003	0.210	0.032
MAC			**<0.02**
Compliant			**NO**

Spring effluent discharging was conducted during the following periods :

- April 9 to April 25.

The Spring discharge total volume was **94,887 m³** in 17 days.

Fall Discharge (Grab) Sample Results (mg/L): Weekly sampling

Date	Upstream Result Unionized Ammonia	Effluent Result Unionized Ammonia	Downstream Result Unionized Ammonia
January 2	0.0020	0.072	0.004
January 4	<0.0010	0.078	0.0030
January 8	0.0020	0.164	0.023
January 11	0.0010	0.108	0.0050
Maximum	**<0.002**	**0.17**	**0.0030**
MAC	**--**	**--**	**< 0.02**
Compliant	**--**	**--**	**YES**

Fall discharge began on January 2 until January 11.

The Fall discharge total volume was **50,198 m³** in 12 days.

GRAND TOTAL DISCHARGE VOLUME: 145,085 m³ in 46 days

ECA # 0667-C8DN2F REQUIREMENTS - EFFLUENT SAMPLING:

Condition 4. Grab samples of the final effluent (discharge) shall be collected twice per week with a minimum of five (5) samples during discharge that captures the beginning of the seasonal discharge, at 25%, 50% and 75% drawdown and at the end of the seasonal discharge and analyzed for at least the following parameter:

CBOD-5
Total Suspended Solids
Total Kjeldhal Nitrogen (TKN)
Nitrite
Nitrate
Total Phosphorus (TP)
Temperature
pH
Hydrogen Sulphide (H2S)
E. coli
Total Ammonia Nitrogen

Exceedance of the concentration of the parameter is deemed to have occurred when the arithmetic mean of analytical results of at least four (4) consecutive grab samples OR a single sample is greater than the corresponding concentrations set out in Subsection (1).

Effluent (Grab) Sample Monitoring Results (mg/L): Weekly sampling during discharge

Date	DO	Temp. (°C)	pH	CBOD5	TSS	Nitrite	Nitrate	TP	H2S	E.Coli	TKN	Total Ammonia
Jan 2	10.53	7.6	8.57	<4	12	0.07	2.13	0.03	<0.02	36	2.5	1.3
Jan 4	13.31	5.2	8.62	<4	15	0.05	2.20	0.03	<0.02	12	3.9	1.6
Jan 8	12.85	7.3	8.66	8	16	0.06	2.11	<0.03	<0.02	10	5.1	2.6
Jan 11	12.28	3.9	8.52	6	12	0.05	2.05	0.05	<0.02	32	3.7	3.0
April 9	10.95	13.9	8.11	4	10	0.04	2.84	0.03	<0.02	2	1.4	0.6
April 11	10.45	12.5	7.98	6	12	0.07	2.45	0.04	<0.02	2	2.8	1.5
April 15	11.26	13.2	8.39	5	20	0.09	1.38	0.03	<0.02	2	4.4	3.4
April 17	10.34	12.6	8.37	6	22	0.13	1.28	0.06	<0.02	2	4.1	4.2
April 22	10.10	12.0	8.20	6	26	0.13	0.94	0.07	<0.02	2	7.6	6.1
April 25	9.60	10.3	8.14	5	21	0.13	0.90	0.01	<0.02	10	7.2	6.6
Minimum	9.6	3.9	7.98	4	10	0.04	0.90	0.01	<0.02	2	2.5	0.6
Maximum	13.31	13.9	8.66	8	26	0.13	2.84	0.07	<0.02	36	7.6	6.6
Average	11.17	9.9	8.36	6	17	0.08	1.82	0.04	<0.02	11	4.3	3.1
# Samples	10	10	10	10	10	10	10	10	10	10	10	10

ECA # 0667-C8DN2F REQUIREMENTS - RAW SEWAGE SAMPLING:

Condition 5. Grab samples of the raw sewage shall be collected at least every two weeks. In addition, 24-hour composite samples of the raw sewage must also be collected every two months. All raw sewage samples must be analyzed for at least the following parameters:

BOD-5
Total Suspended Solids
Total Kjeldhal Nitrogen (TKN)
Total Phosphorus

Raw Sewage (Grab) Sample Results (mg/L): Bi-weekly sampling

Date	BOD-5	CBOD5	TKN	TP	TSS
January	152.00	126.50	31.50	3.09	142.00
February	339.00	302.00	20.70	2.28	168.50
March	163.00	–	24.85	3.00	103.50
April	158.70	104.67	23.93	3.33	317.00
May	121.00	102.00	28.95	3.02	135.00
June	188.00	181.50	50.30	4.38	175.50
July	361.00	–	48.80	5.83	337.50
August	218.00	–	39.70	4.11	253.50
September	273.70	–	43.27	9.43	729.33
October	895.00	–	91.55	14.01	376.50
November	113.50	–	41.50	4.33	238.00
December	182.50	–	26.05	2.85	178.50
Minimum	**113.50**	**102.00**	**20.70**	**2.28**	**103.50**
Maximum	**895.00**	**302.00**	**91.55**	**14.01**	**337.00**
Average	**263.78**	**163.33**	**39.26**	**4.97**	**262.90**
# Samples	**26**	**11**	**26**	**26**	**26**

Raw Sewage (Composite) Sample Results (mg/L): Bi-monthly sampling

Date	CBOD5	BOD5	TSS	TP	TKN
January	44	49	29	1.20	16.40
March	98	141	307	2.47	18.00
May	–	69	49	1.77	26.70
July	–	148	200	2.39	27.20
September	–	110	85	2.36	41.50
November	–	238	106	1.99	39.30
Minimum	**44**	**49**	**29**	**1.20**	**16.40**
Maximum	**98**	**238**	**307**	**2.47**	**41.50**
Average	**71**	**126**	**129**	**2.03**	**28.18**
# Samples	**2**	**6**	**6**	**6**	**6**

Aluminum Sulphate (alum) acts as a coagulant and flocculant that adsorbs and precipitates soluble phosphorus and other compounds such as organic matter, forming clumps that settle to the bottom of the lagoon. Typical alum dosages for the wastewater treatment were between 99 - 286 mg/L.

Month	Total Alum Usage, L	Total Alum Usage, kg	Average Alum Dosage, mg/L
January	3,690	2,389	156
February	1,151	2,660	99
March	2,330	1,509	124
April	4,275	2,768	182
May	2,859	1,851	206
June	2,935	1,900	286
July	3,102	2,009	248
August	2,600	1,683	237
September	2,385	1,544	234
October	2,475	1,603	252
November	2,486	1,610	242
December	4,738	3,067	234
Total	35,652	23,084	–
Average	99	64	209

Environmental Compliance Approval #0667-C8DN2F REQUIREMENTS - Operational

Section 12. Reporting

Operational Problems, Corrective Actions, and Maintenance:

Date	Comments
January 27/28	High Flows/snow melt
March 28	Power outage
April 10	New pump installed by Dale Pump and wired by Marcus (pump #2)
April 11	Spill from Huron Toilets dumping into manhole, Ref #1-5N2EUX
April 12	Pump faulted out, scheduled for repair April 15
April 15	Dale Pump and Pollock Electric onsite to repair pump #2
April 18	Spill from Huron Toilets dumping into manhole, Ref #1-5X8ZAQ
April 25	Power outage
July 11	Backflow testing completed by Ferguson
August 3	Sommers Generators onsite for generator maintenance/Inspection
September 18	Caldecott onsite to repair the air relief
December 30/31	High Flows due to snow melt/rain
January 2	Start discharging
January 12	Discharge complete
April 8	Start discharging
April 25	Discharge complete

2024 Performance Summary

The following is a summary of the overall effectiveness of the treatment of raw sewage from its entry to the Works through the effluent chamber.

Overall Sewage Renovation Based on Annual Averages

Parameter	Raw Sewage	Effluent	Non-Compliance	% Removal
BOD5	263.78	–	25.0	– %
CBOD	163.33	6	--	96.3%
TKN	39.26	4.3	--	89.1 %
TP	4.97	0.04	0.8	99.2 %
TSS	262.90	17	30.0	93.5 %

SLUDGE ACCUMULATION

Sludge accumulates in the bottom of the lagoon cells. Fortunately, for the Ripley Sewage Treatment Facility, the lagoons have a large surface area, therefore, accumulated sludge is quite low. The amount of sludge accumulated in 2024 was estimated based on the average amount of solids processed through treatment. The following calculation is taken from the *US Army Corps and Engineers Cold Region Research & Engineering Laboratory, Special Report 84-8, Accumulation, Characterization, and Stabilization of Sludges for Cold Region Lagoons, April 1984*. No sludge was removed from Ripley Lagoons in 2024.

The annual average sludge accumulation is approximately 0.87 mm total for all cells. With this information, it was estimated that the running total accumulation since the new Cell (1) was put into service in 2009 is approximately 16.22mm (Cell #1: 12.81 mm, Cell #2: 2.40 mm, Cell #3: 0.79mm).

Other Observations:

- No complaints were reported for the period under review
- No sewage bypass was reported for the period under review
- There were 2 spills reported for 2024 Ref # 1-5N2EUX and Ref # 1-5X8ZAQ
- No modifications to the treatment system were carried out during the period under review

Additional Information:

- **Imported SewageLandfill Leachate Disposal**

ECA #0667-C8DN2F:

Sect. 8.5.c

- The landfill leachate volume eventually disposed of to the Ripley Sewage Lagoons should be kept to not more than approximately 1000 m^3/year. The Ripley Lagoons received 28.20 m3 of Leachate from the Huron Landfill from December 19, 2024

Sect.8.5.d

- The discharge of Leachate to the Ripley Sewage Lagoons (including discharge via the Raw Sewage Pumping Station or its upstream maintenance hole) should only occur during the non-discharge period for the lagoons, and the discharge of Final Effluent to the receiver should not occur within 60 days from the last date of the landfill Leachate disposal to the Ripley Sewage Lagoons…..

- **Municipal Utility Monitoring Program Reports (MUMPs)**

The monthly compilation forms of discharge data are submitted annually to the Ministry. The Ministry uses these forms to publicly report Municipal monitoring data. These forms are populated with appropriate data for submission directly to the Ministry's database.

- **Wastewater Systems Effluent Regulations (WSER) - On-line Reporting**

Since the Ripley Wastewater Treatment Facility discharges to the South Pine River, which is frequented by fish, we are required by WSER to submit a monitoring report through the Effluent Regulatory Reporting Information System (ERRIS) portal on an annual basis. This was submitted in March.

CONCLUSIONS AND RECOMMENDATIONS

The following are the conclusions and recommendations resulting from the analysis of operating and monitoring data for the Ripley Wastewater Treatment Facility during 2024:

1. The annual average sewage influent flow was 377 m^3/day in 2024, as determined by the flow measuring instrumentation in the Ripley Sewage Pumping Station. Given that the approved flow to the works is 600 m^3/day, the works operated at 62.83% of the design capacity.

2. Historically, maximum day flows will typically be greatest during spring months and be lowest during the summer months. During 2024 the maximum day trend was characteristic, with the maximum day flow of 3,513 m^3/day occurring in February. Historical maximum day flows for each month provide some indication that direct inflow from storm water is occurring at times, such as rain events and spring thaw. Action should continue to be taken to identify and remove any illegal connections that exist.

3. Raw sewage average concentrations and loadings for CBOD, TSS, TKN and TP

Parameter	Typical Loadings (mg/L)	2024 Loadings (mg/L)
$CBOD_5$	170	163
TKN	35	39.26
TP	7	4.97
TSS	200	262.9

3. Based on the calculated removal rates of 78.8% to 97.9%, it is concluded that the Ripley Wastewater Treatment Facility provided excellent treatment of sewage in 2024.

4. There were no exceedances of the E.C.A. average monthly concentration limits.