



Ontario Clean Water Agency
Agence Ontarienne Des Eaux

March 31, 2021

Lee Orphan
Ministry of the Environment, Conservations and Parks
733 Exeter Road
London, ON N6E 1L3

Attention: Mr. Orphan

RE: Rodney Wastewater Treatment Plant Annual Report 2020

The Ontario Clean Water Agency is the Operating Authority for the Rodney Wastewater Treatment Plant on behalf of the Municipality of West Elgin. The system is operated under Environmental Compliance Approval 3-0871-88-949. Please find attached the 2020 Annual Report for the Rodney Wastewater Treatment Plant.

Feel free to contact me should you require any additional information regarding the report. I can be reached at 519-312-0847.

Sincerely,

Terri-Lynn Thomson
Process and Compliance Technician,
Ontario Clean Water Agency

C.c. Madga Badura, Municipality of West Elgin
Dale LeBritton, OCWA's Regional Hub Manager
Sam Smith, OCWA's Senior Operations Manager
Cindy Sigurdson, OCWA's Safety, Process and Compliance Manager
Angela Stroyberg, Ministry of the Environment, Conservation and Parks

MUNICIPALITY OF WEST ELGIN

RODNEY WASTEWATER TREATMENT PLANT

2020 ANNUAL REPORT
January 1 to December 31, 2020

Environmental Compliance Approval # 3-0871-88-949

Prepared by:



Ontario Clean Water Agency
Agence Ontarienne Des Eaux

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Appendix A: Analytical Data

Section 1: Overview

The wastewater treatment plant was operated under Environmental Compliance Approval 3-0871-88-949 dated April 12, 1994 with amendments September 24, 1998.

Collection System

The collection system contains gravity sewers that lead to the Main Pumping Station located on Furnival Road. It contains a wet well with two submersible pumps that pump to the treatment plant. Backup power is supplied by an onsite generator.

Plant Description

The Rodney Wastewater Treatment Plant is an extended aeration facility which consists of: extended aeration, settling, UV disinfection (seasonal), phosphorus removal, and filtration. The extended aeration process is designed to remove carbonaceous and nitrogenous organic compounds (BOD). Aluminum Sulphate is used for phosphorus removal. After the clarifier the effluent is filtered and seasonally disinfected using ultraviolet light, then discharged to Sixteen Mile Creek. Sludge is directed to the lagoon for storage and settling. Decant liquid off the lagoon is returned to the influent of the plant.

Process Details

- Wastewater is directed into the sewage lift station from the Village of Rodney by gravity. Wastewater is pumped from the sewage lift station located near the junction of Furnival Road and King Street by force main into a reinforced concrete splitter chamber, provided with a mechanical rake bar screen.
- The secondary treatment system consists of two aeration basins, one reinforced concrete clarifier tank and two return activated sludge pumps.
- The phosphorous removal system consists of one 30,000 L fiber reinforced tank with spills containment equipped with 2 diaphragm type metering pumps (1 duty and 1 standby).
- Three mechanical aerators in each aeration tank provide oxygen at a low pressure in the aeration tanks.
- The tertiary treatment system consists of four (4) continuous back wash 2 metre deep bed, granular single media sand filtration units housed in the filter building. Hydrogen peroxide is introduced for filter cleaning when necessary.
- The disinfection system consists of a ultra-violet (UV) unit through which the effluent is discharged seasonally.
- A concrete V-notch weir flow measuring chamber is installed between the clarifier and the filter building.
- Operations are controlled by a programmable logic controller (PLC). A data logging computer system with local monitoring capability is used to monitor, trend, and record select process parameters.
- Laboratory space is also located at the WWTP to allow for basic laboratory analyses to be conducted by the plant operator.
- Process control is monitored by SCADA.

Section 2: Monitoring Data

Sample Collection and Testing

All samples are collected and tested as per the requirements of the Environmental Compliance Approval.

Raw sewage is sampled bi-weekly and tested for BOD₅, total suspended solids, total phosphorus, and total Kjeldahl nitrogen. The raw samples are collected as 24 hour composite samples.

Final effluent is sampled bi-weekly and tested for BOD₅, total suspended solids, total phosphorus, free ammonia nitrogen, total Kjeldahl nitrogen, nitrite, nitrate, pH and alkalinity. Samples are collected using an automatic composite sampler and collected over a twenty-four hour period. Grab samples for dissolved oxygen and temperature are collected bi-weekly. A grab sample for E. coli is sampled bi-weekly during the disinfection period from April 15 to October 15.

In-house tests are conducted on a weekly basis on the final effluent, raw influent and the mixed liquor suspended solids at the plant to check plant performance and to make any operational changes required.

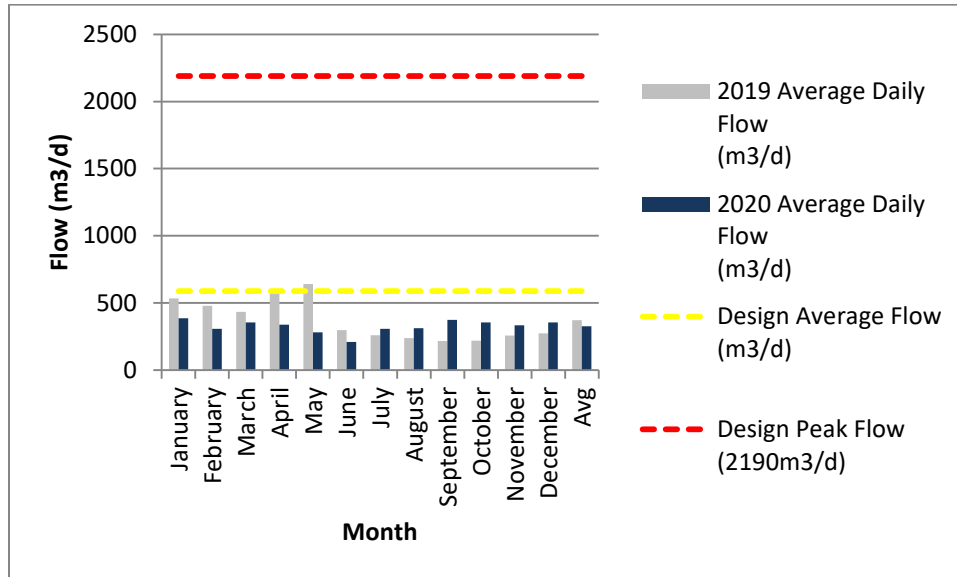
In 2020, all chemical and microbiological sample analyses were conducted by SGS Lakefield Research. Temperature, pH and dissolved oxygen were conducted by staff at the treatment plant.

The receiving stream temperature is performed at Sixteen Mile Creek.

Flows

Detailed monthly flow information is summarized in Appendix A. The total flow treated in 2020 was 119,794m³, which corresponds to a 12% decrease from 2019 raw flows. The annual average daily flow for the reporting period was 327.1m³/day, or 55% of the plant's rated design capacity of 590m³/day (refer to Chart 1).

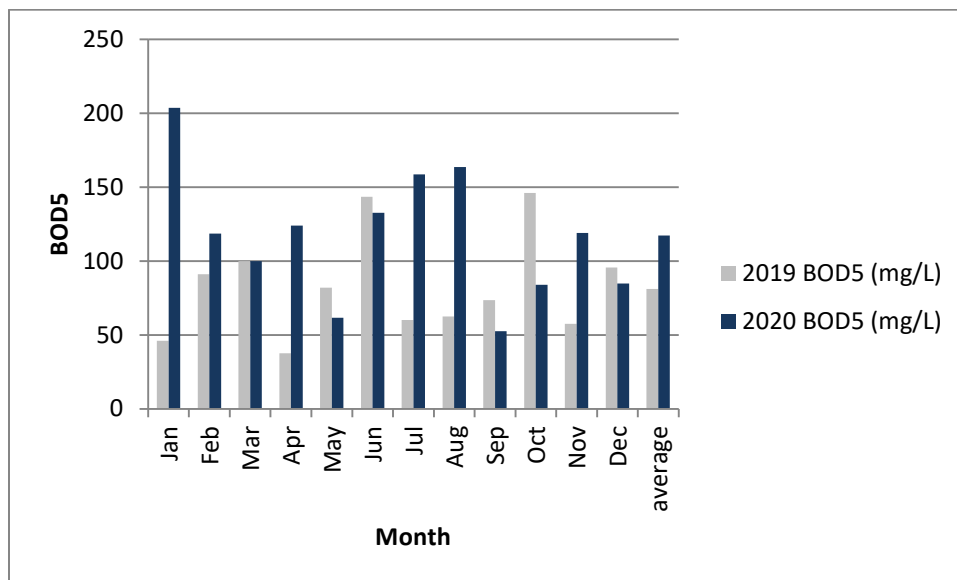
Chart 1. The average daily raw sewage flow to the plant in 2020 compared to 2019.



Raw Sewage Quality

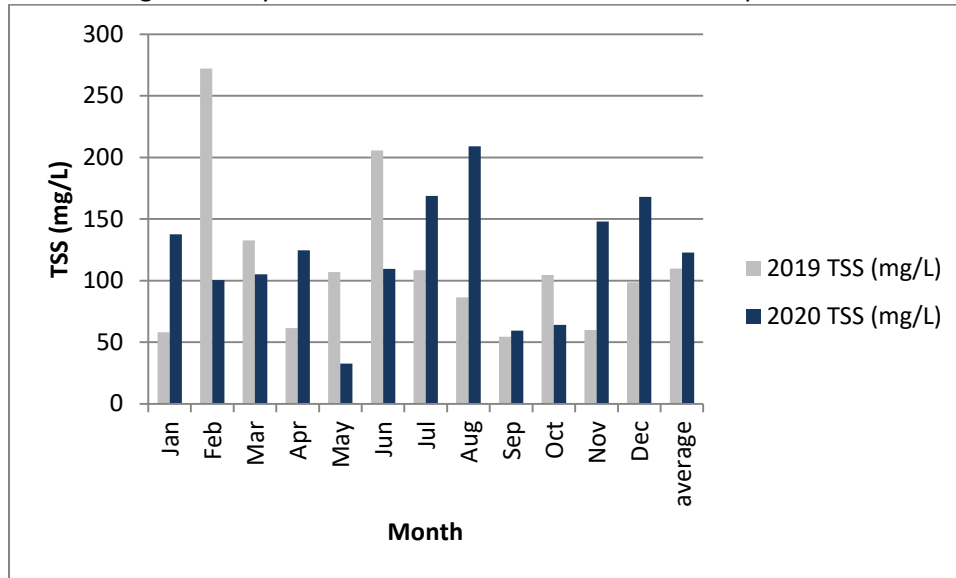
The annual average raw sewage BOD₅ concentration to the plant was 117.2mg/L with a maximum concentration of 289mg/L. The average BOD₅ loading to the plant was 38.4kg/d for 2020. The annual average concentration of BOD₅ has increased 44.4% from 2019, refer to Chart 2.

Chart 2. Average monthly raw concentration of BOD₅ for 2020 compared to 2019.



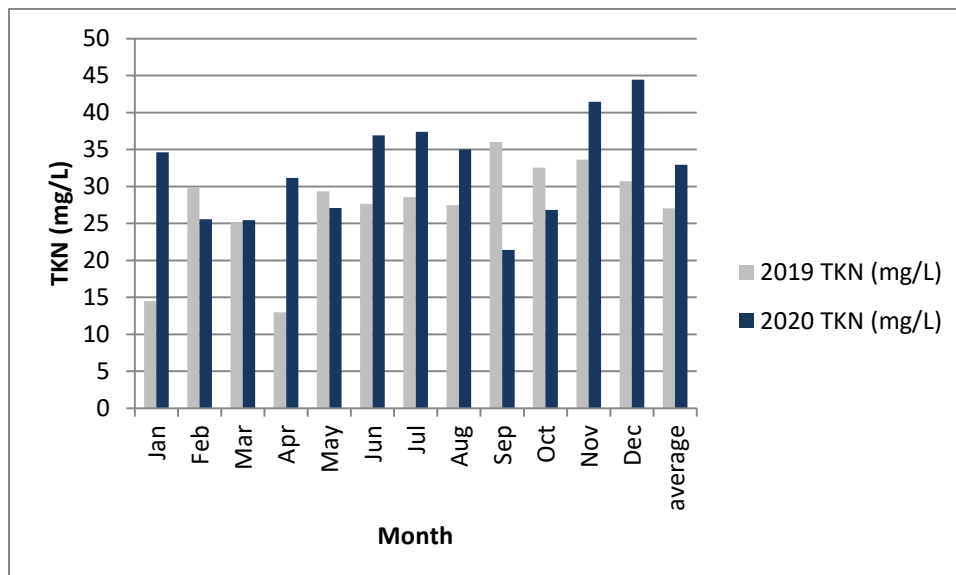
The annual average raw sewage suspended solids (TSS) concentration to the plant was 122.7mg/L, with a maximum of 257mg/L. This corresponds to an average TSS loading to the plant of 40.2kg/day. The average concentration of TSS has increased 11.8% from 2019, refer to Chart 3.

Chart 3. The average monthly raw concentration of TSS for 2020 compared to 2019.



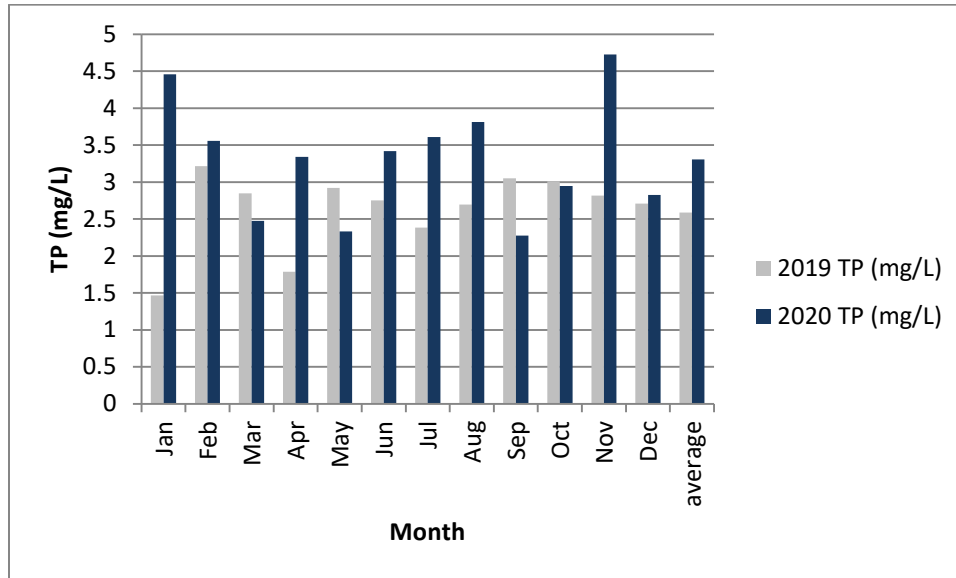
The annual average raw sewage Total Kjeldahl Nitrogen (TKN) concentration to the plant was 32.9mg/L, with a maximum of 82.2mg/L. This corresponds to an average TKN loading to the plant of 10.8kg/day. The average concentration of TKN has increased 21.8% from 2019, refer to Chart 4.

Chart 4. The average monthly raw concentration of TKN for 2020 compared to 2019.



The annual average raw sewage Total Phosphorus (TP) concentration to the plant was 3.31mg/L, with a maximum of 5.9mg/L. This corresponds to an average TP loading to the plant of 1.08kg/day. The average concentration of TP has increased 27.8% from 2019, refer to Chart 5.

Chart 5. The average monthly raw concentration of TP for 2020 compared to 2019.



Effluent Limits

Detailed analytical data is attached to this report as Appendix A. The following table provides a summary of the monthly average concentration and loading ranges compared to the limits set in the Environmental Compliance Approval.

Summary and Comparison of Compliance Data

Table 1. Monthly average concentration and loading ranges for 2019.

Parameter	Monthly Average Effluent Limit (mg/L)	Monthly Average Effluent Result Ranges (mg/L)	Monthly Average Loading Limit (kg/d)	Monthly Average Loading Result Ranges (kg/d)
BOD ₅	10(a)	<2 – 4.5	6.9	0.6 – 3.2
	15(b)	<2 – 9		
Suspended Solids	10(a)	<2 – 9	6.9	0.528 – 3.93
	15(b)	3 – 11		
Total Phosphorus	0.5(a)	0.12 - 0.257	0.4	0.01 -0.09
	1.0(b)	0.055 – 0.43		
Total (Ammonia + Ammonium) Nitrogen	3.0(a)	<0.1 – 0.25	2.2	0.02 – 0.57
	5.0(b)	<0.1 –1.6		
E. coli	200	<2 – <2		
Unionized Ammonia*	0.1	0.001– 0.014		

NOTE: (a) limit applies during the non-freezing period

(b) limit applies during the freezing period

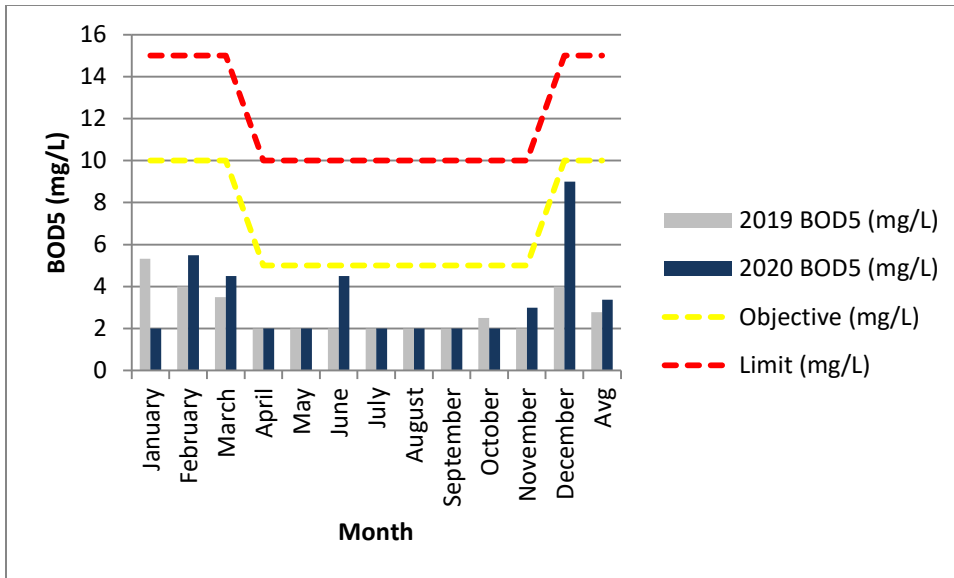
*single sample results

Discussion on Monitoring Data as Compared to the Effluent Limits

There were no non-compliances with Environmental Compliance Approval limits.

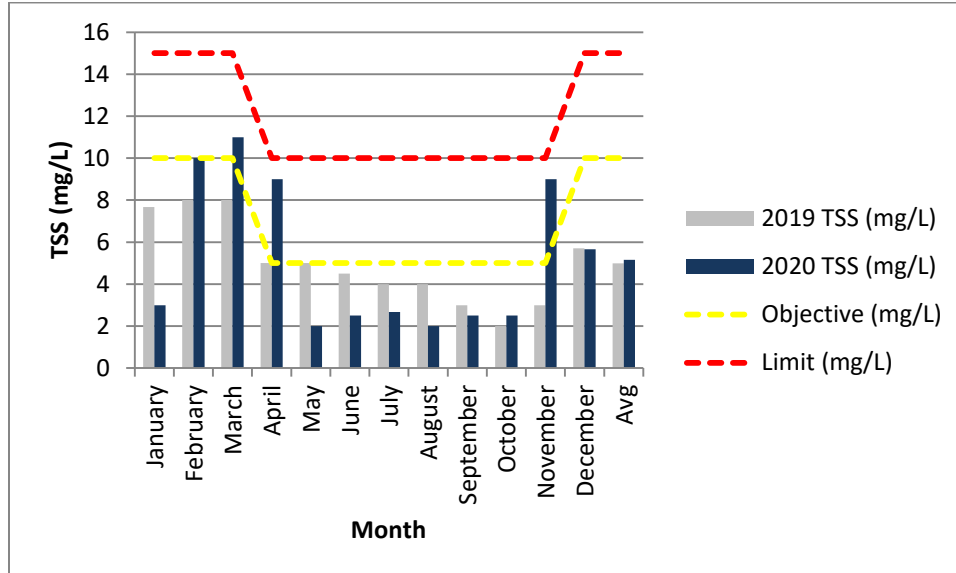
The annual average effluent BOD₅ for 2020 was 3.4mg/L, which is a 21.5% increase from 2019 (refer to Chart 6). The annual loading of BOD₅ at the plant in 2020 was 1.2kg/d. Refer to Table 1 for a list of monthly average effluent limits and loading limits.

Chart 6. The effluent monthly average concentration of BOD₅ in 2020 compared to 2019 concentrations.



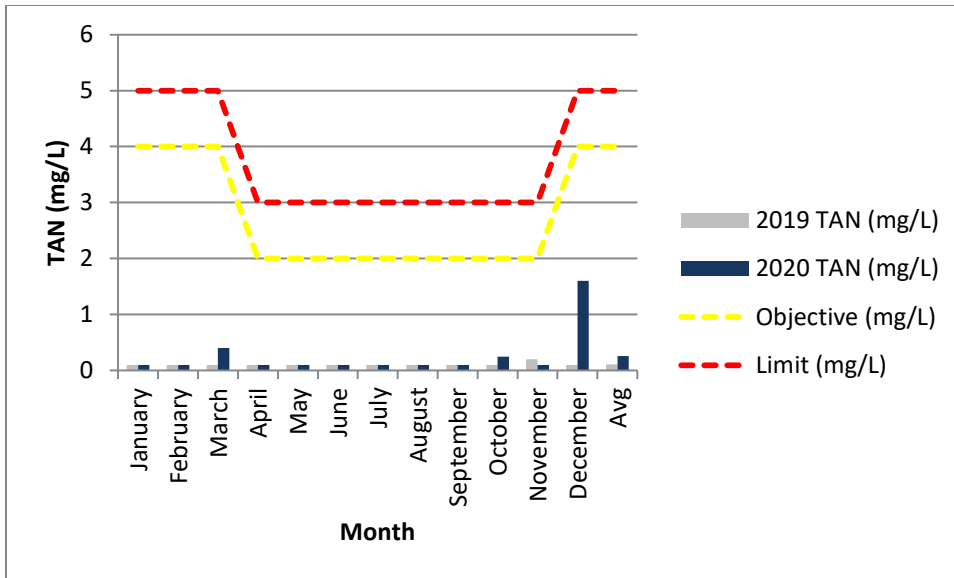
The annual average effluent Total Suspended Solids (TSS) for 2020 was 5.2mg/L, which is an increase from 2019 by 3.3% (refer to Chart 7). The annual loading of TSS at the plant in 2020 was 1.7kg/d. Refer to Table 1 for a list of monthly average effluent limits and loading limits.

Chart 7. The effluent monthly average concentration of TSS in 2020 compared to 2019 concentrations.



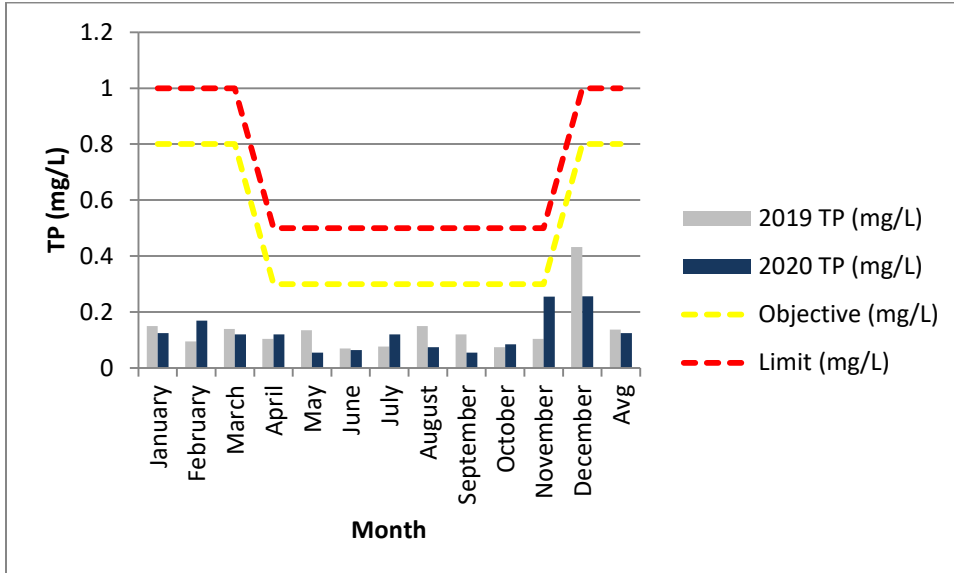
The annual average effluent Total Ammonia + Ammonium Nitrogen (TAN) for 2020 was 0.26mg/L, which is a 142% increase from 2019 (refer to Chart 8). The annual loading of TAN at the plant in 2020 was 0.1kg/d. Refer to Table 1 for a list of monthly average effluent limits and loading limits.

Chart 8. The effluent monthly average concentration of TAN in 2020 compared to 2019 concentrations.



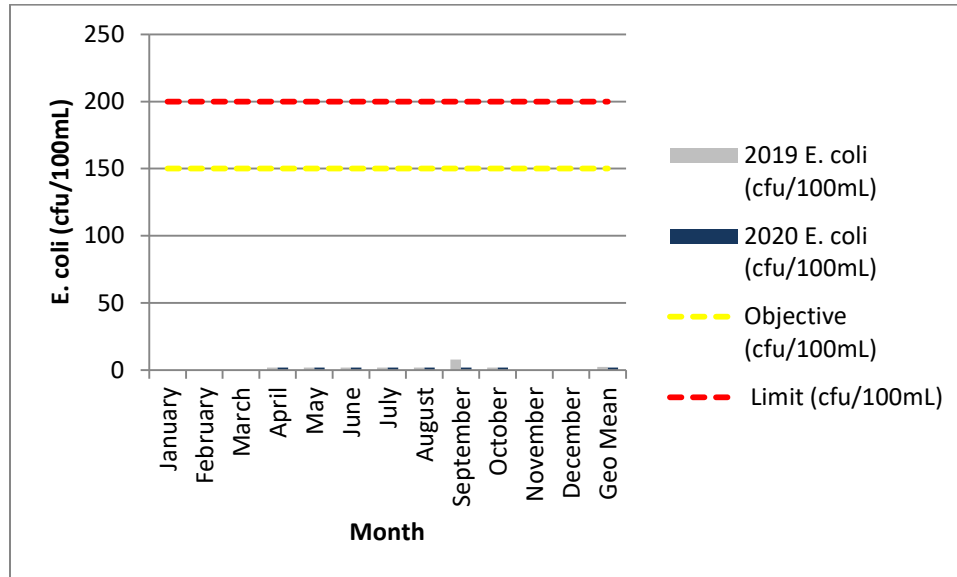
The annual average effluent Total Phosphorus (TP) for 2020 was 0.13mg/L, which is a 9.2% decrease from 2019 (refer to Chart 9). The annual loading of TP at the plant in 2020 was 0.04kg/d. Refer to Table 1 for a list of monthly average effluent limits and loading limits.

Chart 9. The effluent monthly average concentration of TP in 2020 compared to 2019 concentrations.



The annual geometric mean effluent E. coli for 2020 was 2.0cfu/100mL, which is a 20% decrease from 2019 (refer to Chart 10). Refer to Table 1 for a list of monthly geometric mean effluent limits.

Chart 10. The effluent monthly geometric mean concentration of E. coli in 2020 compared to 2019 concentrations.



Section 3: Operating Problems and Corrective Actions

The SCADA system was upgraded in 2019 and commissioned in 2020 to help with communication issues and overall use of the system.

Cold temperatures can affect the treatment of the sewage. The mechanical surface aerators in the aeration tanks lowers the temperature of the contents further. Usually, adjustments to the mixed liquor suspended solids at the plant is enough to remain in compliance during these cold periods, however in extreme winters this is not enough. A replacement of the mechanical aerators is proposed in the future. Not only should this improve treatment but will be more energy efficient.

The collection system on Third Street has required frequent monitoring due to backing up of sewage in the area. This area is inspected and flushed routinely.

Section 4: Maintenance

Regular scheduled monthly preventative maintenance is assigned and monitored using the Workplace Management System (WMS) program. The following is a summary of maintenance performed other than WMS work orders:

- Repairs to pump station power supply
- Bar Screen float and scraper repairs
- Repairs to scum pump
- Replaced auto samplers
- Sand filter media replaced
- Air compressor repairs

Section 5: Effluent Quality Assurance

Effluent quality assurance is evaluated by monitoring parameters and changes throughout the plant processes. The operators monitor the aeration tank by performing weekly tests on the mixed liquor. These tests include dissolved oxygen, pH, temperature, settling tests, Mixed Liquor Suspended Solids (MLSS), and Mixed Liquor Volatile Suspended Solids (MLVSS). As well, monitoring of the alum dosages, wasting volumes and Return Activated Sludge Suspended Solids is completed. Data collected from these tests provide information to the operator to make the appropriate adjustments in the treatment process and take corrective actions before the plant reaches its effluent limits.

Section 6: Calibration and Maintenance

Annual maintenance on the generator was completed by Albert's Generator Services. Flowmetrix Technical Services Inc. performed the annual calibration on the flow meter in March. In house meters for pH and dissolved oxygen are calibrated by OCWA operators as per manufacturer's instructions.

Section 7: Effluent Quality

Effluent Objectives

The following table shows the monthly average effluent concentrations ranges and loadings to the effluent objectives outlined in the Environmental Compliance Approval.

Table 3. Monthly average effluent concentration and loadings compared to objectives.

Parameter	Average Monthly Effluent Objective (mg/L)	Average Monthly Effluent Result Ranges (mg/L)	Average Monthly Loading Objectives (kg/day)	Average Monthly Loading Result Ranges (kg/day)
BOD ₅	5(a)	<2 – 4.5	3.9	0.6 – 3.2
	10(b)	<2 – 9		
Suspended Solids	5(a)	<2 – 9	3.9	0.528 – 3.9
	10(b)	3 – 11		
Total Phosphorus	0.3(a)	0.12 - 0.257	0.28	0.01 -0.09
	0.8(b)	0.055 – 0.43		
Total (Ammonia + Ammonium) Nitrogen	2.0(a)	<0.1 – 0.25	1.57	0.02 – 0.57
	4.0(b)	<0.1 –1.6		
E. coli	150	<2 – <2		
Dissolved Oxygen	5 (minimum)	5.96 – 10.15		

Discussion of Effluent Objectives

The Rodney WWTP met all the monthly averaging loading objectives and monthly average concentration objectives in 2020 set out in the Environmental Compliance Approval with a few exceptions.

TSS was exceeded in March, April and November. High suspended solids were experienced in March and April due to a malfunction in the new SCADA controller causing the system to waste too much. In November it was due to RAS/WAS pump issues. The operator responded and took corrective action to slowly return the mixed liquor to normal levels.

The annual average flow for 2020 was $327.3\text{m}^3/\text{d}$, which is below the design flow of $590\text{m}^3/\text{d}$. The design average daily flow for the plant was exceeded 6 days in 2020. The hydraulic peak flow of $2,190\text{m}^3/\text{day}$ for the plant was not exceeded 2020.

Section 8: Biosolids

The lagoon is used for sludge digestion and storage as per the Environmental Compliance Approval. The waste activated sludge (WAS) process transfers to the lagoon. The sludge is allowed to settle at the bottom of the lagoon and the liquid is pumped back to the head of the plant for treatment. There is sludge build up at the discharge pipe from the plant to the lagoon, this is being considered for removal in 2021. In 2020, the amount of WAS transferred to the lagoon was approximately $1,460\text{m}^3$. It is anticipated that a similar amount will be transferred in 2021.

Section 9: Community Complaints

No community complaints were received in 2020.

Section 10: Bypasses, Spills, and Abnormal Discharges

There were no by-pass events for the Rodney WWTP during 2020.

The Rodney Wastewater Treatment Plant can direct raw sewage from the pump station to the lagoon when there is a power failure of long duration or if there is high flow to the plant.

Section 11: Alterations, Extensions or Replacement of the Works

The SCADA system was upgraded in 2019 with commissioning in 2020. In July, the sand filter media was replaced.

Recommended capital upgrades to the system for 2021 include: clarifier overhaul, alum tank replacement (including building work), lagoon decant upgrade, dissolved oxygen analyzer, lagoon dredging, facility Lighting, valve Replacement, collection system flushing/inspection and pump station clean out. A substantial funding application was submitted by OCWA on behalf of the municipality to help fund the above upgrades.

Section 12: Summary

Overall the Rodney Wastewater Treatment Plant provided effective treatment in 2020, with no non-compliances and very few objective exceedances. Capital improvements to the system will ensure continued success in the operation of the plant and to improve the effluent quality.

APPENDIX A

Analytical Data

						January 2020 Stream < 5°C		February 2020 Stream < 5°C		March 2020 Stream <5°C		April 2020 Stream >5oC		May 2020 Stream < 5oC		June 2020 Stream >5oC		July 2020 Stream >5oC		August 2020 Stream >5oC		September 2020 Stream >5oC		October 2020 Stream >5oC		November 2020 Stream >5oC		December 2020 Stream <5oC		Summary	Annual Loading
		Objective Concentration	Objective Loading	Limits	Loading Limits	Results	Loading	Results	Loading	Results	Loading	Results	Loading	Results	Loading	Results	Loading	Results	Loading	Results	Loading	Results	Loading	Results	Loading	Results	Loading	Results	Loading		
Raw Flow (m3/d)	Avg	590		590 (ann)		387.19		308.54		357.02		338.2		280.87		211.06		307.88		312.56		375.55		354.96		335.29		355.75		327.31	
	Max			2190		619		391		727		439.1		347.7		267.1		618.3		613		555.2		517.9		396.6		467		727	
	Min					177		265.4		0		277.7		226.1		151.5		170.9		175.3		274.2		0		262.4		221.5		0	
	Sum					12002.88		8947.7		11067.6		10146		8706.9		6331.8		9544.3		9689.51		11266.5		11003.9		10058.7		11028.2		119793.99	
Effluent Flow (m3/d)	Avg					387.19		308.54		357.02		338.2		280.87		211.06		307.88		312.56		375.55		354.96		335.29		355.75		327.31	
	Max					619		391		727		439.1		347.7		267.1		618.3		613		555.2		517.9		396.6		467		727	
	Min					177		265.4		0		277.7		226.1		151.5		170.9		175.3		274.2		0		262.4		221.5		0	
	Sum					12002.88		8947.7		11067.6		10146		8706.9		6331.8		9544.3		9689.51		11266.5		11003.9		10058.7		11028.2		119793.99	
Raw BOD5 (mg/L)	Avg					203.5	78.79	118.5	36.6	100	35.7	124	41.9	61.5	17.3	132.5	28.0	158.667	48.9	163.5	51.1	52.5	19.7	84	29.8	119	39.9	84.667	30.1	117.231	38.4
	Max					289		187		117		158		71		177		191		203		63		103		151		103		289	
	Min					118		50		83		90		52		88		131		124		42		65		87		51		42	
Raw SS (mg/L)	Avg					137.5	53.24	100.5	31.0	105	37.5	124.5	42.1	32.5	9.1	109.5	23.1	168.667	51.9	209	65.3	59.5	22.3	64	22.7	148	49.6	168	59.8	122.692	40.2
	Max					158		144		156		127		43		166		182		257		72		89		219		253		257	
	Min					117		57		54		122		22		53		152		161		47		39		77		74		22	
Raw TKN (mg/L)	Avg					34.6	13.40	25.55	7.9	25.45	9.1	31.15	10.5	27.1	7.6	36.9	7.8	37.4	11.5	35	10.9	21.4	8.0	26.8	9.5	41.45	13.9	44.433	15.8	32.935	10.8
	Max					38.1		34.9		31.5		32.1		31.9		42.6		42.5		40.7		23.2		33.8		50.5		82.2		82.2	
	Min					31.1		16.2		19.4		30.2		22.3		31.2		28.8		29.3		19.6		19.8		32.4		21.3		16.2	
Raw TP (mg/L)	Avg					4.455	1.72	3.555	1.10	2.475	0.88	3.34	1.13	2.33	0.65	3.42	0.72	3.61	1.11	3.81	1.19	2.275	0.85	2.945	1.05	4.725	1.58	2.827	1.01	3.307	1.08
	Max					5.49		3.6		3.09		3.36		2.54		4.02		4.34		3.98		2.4		3.33		5.9		3.71		5.9	
	Min					3.42		3.51		1.86		3.32		2.12		2.82		2.78		3.64		2.15		2.56		3.55		1.95		1.86	
Effluent BOD5 (mg/L)	Avg	5 (10)	3.9	10 (15)	6.9	< 2	0.77	5.5	1.7	< 4.5	1.6	< 2	0.7	< 2	0.6	< 4.5	0.9	< 2	0.6	< 2	0.6	< 2	0.8	< 2	0.7	< 3	1.0	< 9	3.2	< 3.538	1.2
	Max					< 2		7		< 7		< 2		< 2		< 7		< 2		< 2		< 2		< 2		< 4		< 22		< 22	
	Min					< 2		4		< 2		< 2		< 2		< 2		< 2		< 2		< 2		< 2		< 2		< 2		< 2	
Effluent SS (mg/L)	Avg	5 (10)	3.9	10 (15)	6.9	3	1.16	10	3.09	11	3.92722	9	3.044	< 2	0.562	< 2.5	0.528	< 2.667	0.821	2	0.625	< 2.5	0.939	< 2.5	0.887	9	3.018	< 5.667	2.016	< 5.077	1.662
	Max					4		11		12		10		< 2		3		4		2		3		3		9		8		12	
	Min					2		9		10		8		< 2		< 2		2		2		< 2		< 2		9		< 2		< 2	
Effluent TAN (mg/L)	Avg	2 (4)	1.57	3.0 (5.0)	2.2	< 0.1	0.04	< 0.1	0.03	0.4	0.14	< 0.1	0.03	< 0.1	0.03	< 0.1	0.02	< 0.1	0.03	< 0.1	0.03	< 0.1	0.04	< 0.25	0.09	< 0.1	0.03	< 1.6	0.57	< 0.308	0.10
	Max					< 0.1		< 0.1		0.7		< 0.1		< 0.1		< 0.1		< 0.1		< 0.1		< 0.1		< 0.4		< 0.1		< 4.6		< 4.6	
	Min					< 0.1		< 0.1		0.1		< 0.1		< 0.1		< 0.1		< 0.1		< 0.1		< 0.1		< 0.1		< 0.1		< 0.1		< 0.1	
Effluent TKN (mg/L)	Avg					< 0.55	0.21	< 0.55	0.17	0.9	0.32	< 0.5	0.17	1.55	0.44	< 0.95	0.20	< 1.067	0.33	< 0.5	0.16	< 1.5	0.56	< 1.4	0.50	< 2.6	0.87	< 2.3	0.82	< 1.235	0.40
	Max					< 0.6		< 0.6		1.2		< 0.5		1.7		1.4		< 2.2		< 0.5		< 2.3		< 3.2		< 5.4		< 5.4		< 5.4	
	Min					< 0.5		< 0.5		0.6		< 0.5		1.4		0.5		< 0.5		< 0.5		< 0.7		< 0.8		< 2		< 0.5		< 0.5	
Effluent NO2 (mg/L)	Avg					< 0.03	0.01	< 0.03	0.01	0.585	0.21	< 0.03	0.01	0.04	0.01	0.04	0.01	0.113	0.03	0.105	0.03	0.05	0.02	0.72	0.26	< 0.03	0.01	0.593	0.21	< 0.209	0.07
	Max					< 0.03		< 0.03		1.14		< 0.03		0.04		0.04		0.14		0.13		0.06		1.4		< 0.03		0.97		< 1.4	
	Min					< 0.03		< 0.03		0.03		< 0.03		0.04		0.04		0.06		0.08		0.04		0.04		< 0.03		0.03		< 0.03	
Effluent NO3 (mg/L)	Avg					20.95	8.11	22.5	6.9	17.45	6.2	22.4	7.6	29.25	8.2	33.2	7.0	36.7	11.3	30.25	9.5	27.85	10.5	29.05	10.3	29.2	9.8	23.067	8.2	27.058	8.9
	Max					25.9		24.4		18.7		23.6		29.9		34.5		38.6		31.3		29		29.1		30.8		29.8		38.6	
	Min					16		20.6		16.2		21.2		28.6		31.9		33.8		29.2		26.7		29		27.6		16.5		16	
Effluent TP (mg/L)	Avg	0.3 (0.8)	0.28	0.5 (1.0)	0.4	0.125	0.05	0.17	0.05	0.12	0.04	0.12	0.04	0.055	0.02	0.065	0.01	0.12	0.04	0.075	0.02	< 0.055	0.02	0.085	0.03	0.255	0.09	0.257	0.09	< 0.13	0.04
	Max					0.14		0.18		0.18		0.13		0.06		0.07		0.17		0.08		< 0.08		0.11		0.36		0.57		0.57	
	Min					0.11		0.16		0.06		0.11		0.05		0.06		0.09		0.07											