



**Ontario Clean Water Agency**  
**Agence Ontarienne Des Eaux**

March 31, 2021

Mark Smith  
733 Exeter Road  
London, ON N6E 1L3

Attention: Mr. Smith

**RE: Annual Report 2020**  
**Glencoe Wastewater Treatment Plant**

The Ontario Clean Water Agency is the Operating Authority for the Glencoe Wastewater Treatment Plant on behalf of Municipality of Southwest Middlesex. The system is operated under Environmental Compliance Approval 8720-9NFLAB. Please find attached the 2020 Annual Report for the Glencoe 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,

A handwritten signature in black ink, appearing to read 'TLT'.

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

c.c. Greg Storms, Municipality of Southwest Middlesex  
Dale LeBritton, OCWA's Regional Hub Manager  
Sam Smith, OCWA's Senior Operations Manager  
Cindy Sigurdson, OCWA's Safety, Process and Compliance Manager

**Glencoe Wastewater Treatment Plant**

**2020 ANNUAL REPORT  
January 1 to December 31, 2020**

**MUNICIPALITY OF SOUTHWEST MIDDLESEX**

**Environmental Compliance Approval  
8720-9NFLAB**

**Prepared by:**



**Ontario Clean Water Agency  
Agence Ontarienne Des Eaux**

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## **Section 1: Overview**

The Glencoe Wastewater Treatment Plant (WWTP) operated under several Environmental Compliance Approvals in 2020, see table below.

<b>Environmental Compliance Approval #</b>	<b>Date of Issue</b>	<b>Area which it applies</b>	<b>Status of ECA</b>
<b>8720-9NFLAB</b>	May 26, 2016	WWTP	Current
<b>3-0062-94-006</b>	March 1, 1994	Alum System at Victoria St. PS	Current
<b>3-1154-92-006</b>	September 30, 1992	South St. PS	Current

### **Collection System**

The gravity sewers collect the raw sewage into pump stations located in the Village of Glencoe. The South Street Pumping Station receives sewage and pumps to the Victoria Street Pumping Station. Victoria Street Pumping Station is equipped with a generator to provide backup power. Alum is also dosed at Victoria pump station. The 8" forcemain from Victoria Street Pumping Station leads to the Glencoe Lagoon. Industrial Road Pumping Station pumps to the Victoria Street forcemain to the lagoon. This Pumping Station also has back up power.

### **Wastewater Treatment Plant**

The flow from the 8" forcemain is metered and the raw sewage is then directed to the aerated lagoon. The existing lagoon was converted to a partially mixed aerated lagoon with three aeration zones separated by floating baffles. The three blowers provide air to the fine bubble diffusers in these aeration zones. The effluent from the aerated lagoon enters the Submerged Attached Growth Reactor (SAGR) system.

The SAGR system is designed primarily for nitrification (ammonia removal). It consists of an aerated gravel bed which accepts flow from the aerated lagoon. The gravel bed is covered with a layer of mulch for insulation. The gravel acts as media for the nitrifying bacteria to grow on, these bacteria convert the ammonia to nitrite and ultimately nitrate.

The effluent from the SAGR system flows by gravity to the flocculation tanks. There is an alum injection point and polymer injection point prior to the flocculation tanks. A static mixer is provided prior to the flocculation tanks to aid in the production of floc. The flocculation tanks contain two variable speed mixers. The effluent then flows by gravity to the clarifier where the floc settles. The sludge produced is pumped to the non-aerated lagoon for storage and digestion. This lagoon can be decanted into the aerated lagoon for processing through the plant.

The effluent from the clarifier is discharged to one of two disc filters. These are automatically backwashed. The reject water from the backwash is pumped to the non-aerated lagoon for processing.

From the filters, the effluent travels through the Parshall Flume for flow monitoring and discharged to Newbiggen Creek.

## **Section 2: Monitoring Data**

### **Sampling and Testing**

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

Raw sewage is sampled monthly and tested for BOD<sub>5</sub>, Total Suspended Solids, Total Phosphorus and Total Kjeldahl Nitrogen. The raw samples are collected as a composite sample.

The WWTP effluent is sampled for CBOD<sub>5</sub>, Total Suspended Solids, Total Phosphorus, and Total Ammonia Nitrogen on a weekly basis as a composite sample. A grab sample is also taken on a weekly basis and tested for E. coli, pH and Temperature.

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

### **Raw Sewage Quality**

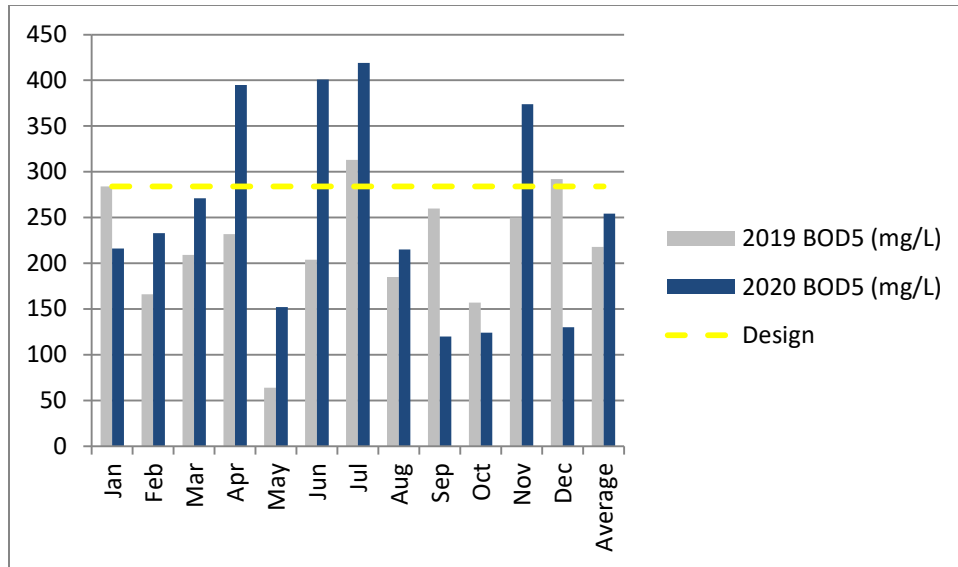
The following table represents the raw sewage (influent) quality, taken on a monthly basis. See Appendix A for more detailed analytical data.

Table 1. Raw sewage annual average concentrations.

<b>Parameter</b>	<b>Annual Average Concentration (mg/L)</b>
<b>BOD<sub>5</sub></b>	254
<b>TSS</b>	214
<b>TP</b>	4.7
<b>TKN</b>	48.3

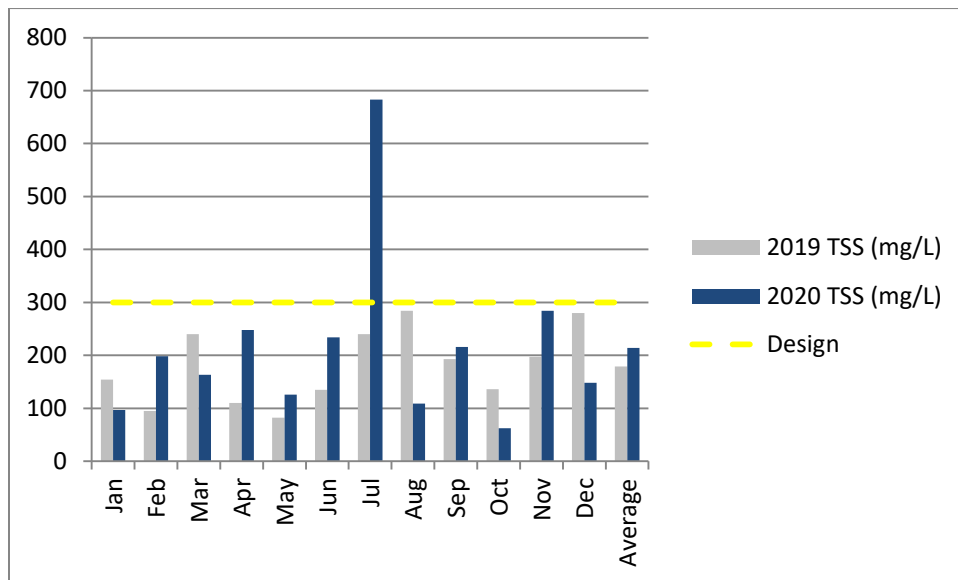
The annual average raw sewage BOD<sub>5</sub> concentration to the plant was 254mg/L, which is a 1.6% increase from 2019 (refer to Chart 1). The average BOD<sub>5</sub> loading to the plant was 161.1kg/d for 2020. There were four months in 2020 where the design criteria were exceeded. Despite these exceedances there were no monthly average effluent limit exceedances as a result.

Chart 1. Monthly average raw BOD<sub>5</sub> concentration for 2020 compared to 2019.



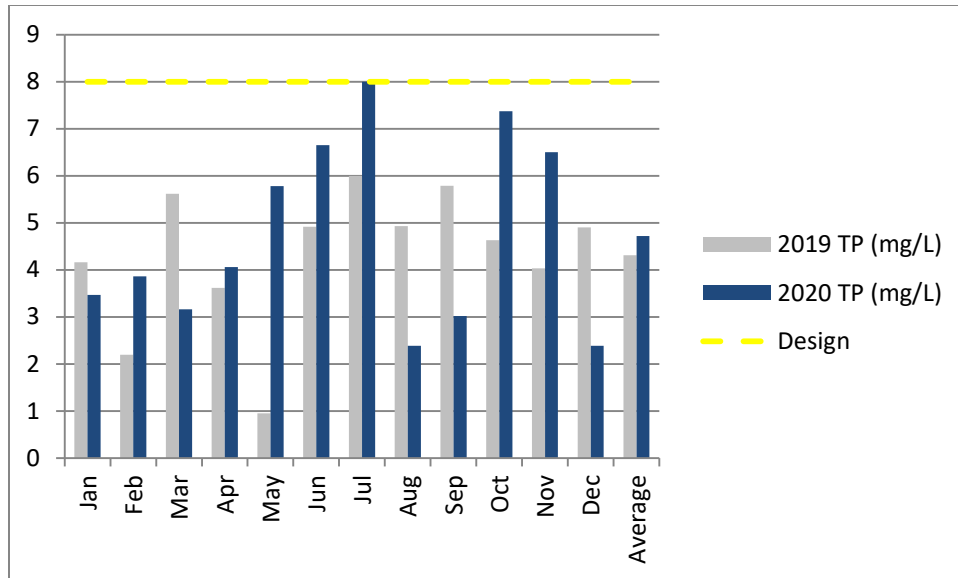
The annual average raw sewage Total Suspended Solids (TSS) concentration to the plant was 214mg/L, which is a 19.7% increase from 2019 (refer to Chart 2). The average TSS loading to the plant was 135.6kg/d for 2020. There was one month where the design criteria was exceeded in 2020.

Chart 2. Monthly average raw TSS concentration for 2020 compared to 2019.



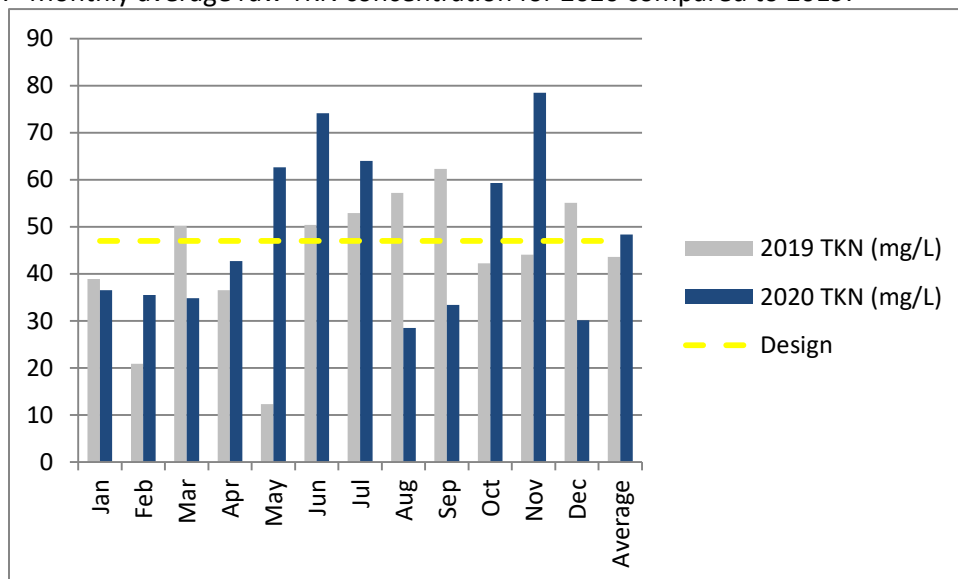
The annual average raw sewage Total Phosphorus (TP) concentration to the plant was 4.7mg/L, which is a 9.5% increase from 2019 (refer to Chart 3). The average TP loading to the plant was 2.99kg/d for 2020. There were no months where the design criteria was exceeded in 2020.

Chart 3. Monthly average raw TP concentration for 2020 compared to 2019.



The annual average raw sewage Total Kjeldahl Nitrogen (TKN) concentration to the plant was 48.3mg/L, which is a 10.9% increase from 2019 (refer to Chart 4). The average TKN loading to the plant was 30.6kg/d for 2020. There were five months where the design criteria was exceeded in 2020. Despite these exceedances there were no monthly average effluent limit exceedances as a result.

Chart 4. Monthly average raw TKN concentration for 2020 compared to 2019.



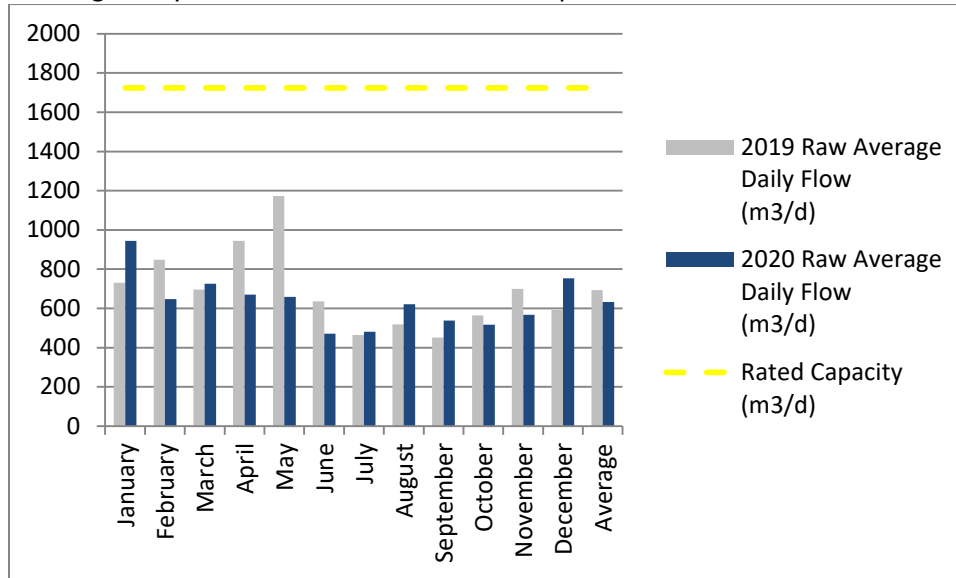
Overall, the plant has operated well with only no non-compliances. These parameters will continue to be monitored to ensure the plant can adequately treat the raw wastewater to the objectives and limits identified in the ECA.

## Flows

Detailed monthly flow information is summarized in Appendix A.

The raw flow total to the plant was 231,910m<sup>3</sup>, which corresponds to an 8.2% decrease from the 2019 raw flow volume. The daily average raw flow was 633m<sup>3</sup>/day, which is 36.7% of the rated capacity of the facility. Refer to Chart 5 for the average daily flow per month.

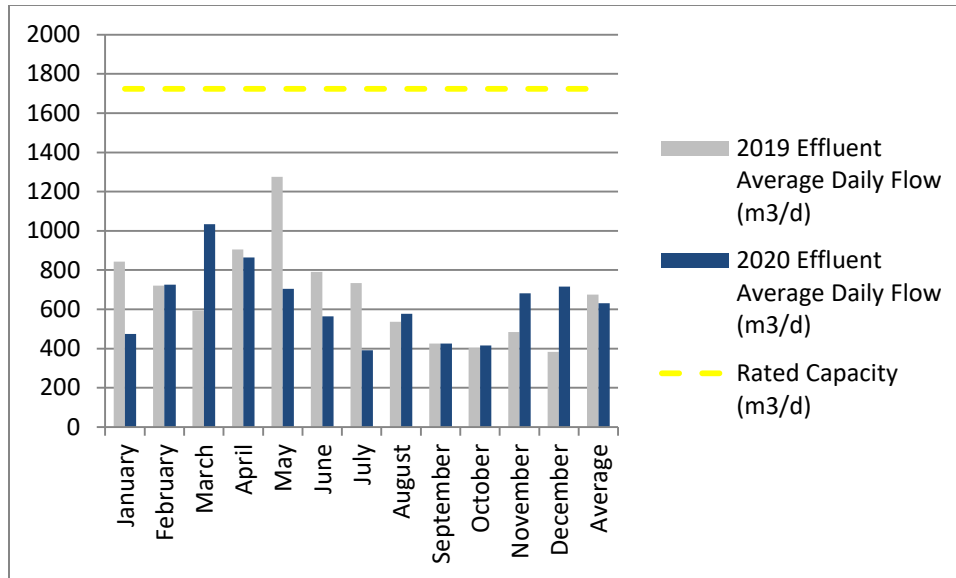
Chart 5. Average Daily flow each month for 2020 compared to 2019.



The effluent flow total discharged from the plant was 230,882m<sup>3</sup> in 2020. The daily average effluent flow was 631.37m<sup>3</sup>/day, this corresponds to a 6.4% decrease from 2019. Refer to Chart 6 for the average daily flow per month. The effluent flow is controlled by the operator based on effluent quality and level in the lagoon.

Chart 6. Average Daily flow each month for 2020 compared to 2019.





### Effluent Limits

Detailed analytical data is provided in Appendix A for the WWTP effluent. The following table summarizes the monthly average concentrations and annual average loadings compared to the Environmental Compliance Approval Limits.

Table 2. Monthly average effluent results and the annual average loadings compared to the effluent limits prescribed in the Environmental Compliance Approval.

Parameter	Monthly Average Effluent Limit (mg/L)	Monthly Average Effluent Result Ranges (mg/L)	Annual Average Loading Limit (kg/d)	Annual Average Loading Results (kg/d)
<b>CBOD<sub>5</sub></b>	13.7	<2 - 2.25	23.6	1.3
<b>TSS</b>	13.7	<2 – 10.6	23.6	4.6
<b>TP</b>	0.55	0.055 - 0.466	0.95	0.1
<b>TAN</b>	3.0	<0.1 – 1.65	5.17	0.2
<b>E. coli</b>	200cfu/100mL	1.5 – 3.6		
<b>pH</b>	6-9.5	6.92 – 8.88		

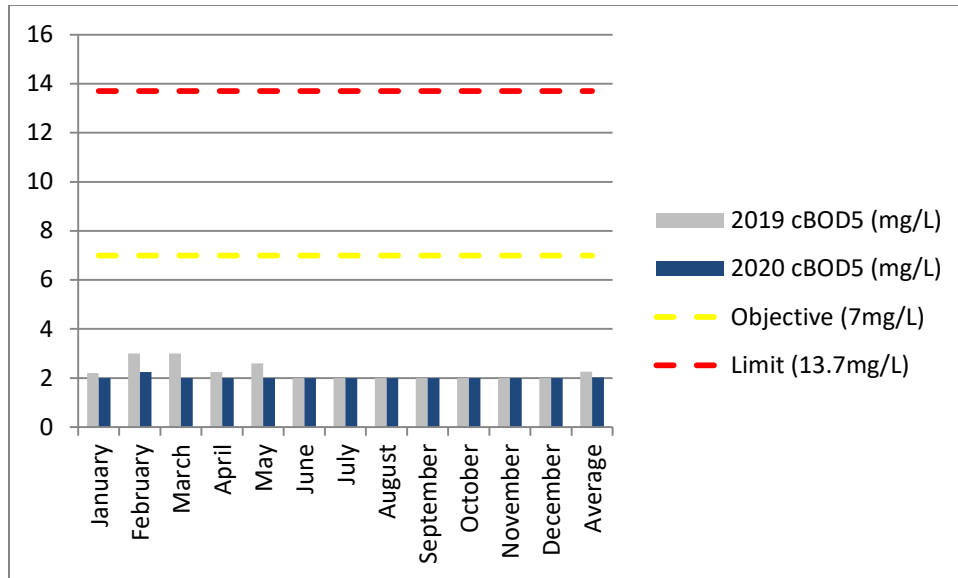
Note: pH range is minimum and maximum readings for the year.

### Discussion on Monitoring Data as Compared to the Effluent Limits

All compliance monthly average limits and annual loadings were met in 2020.

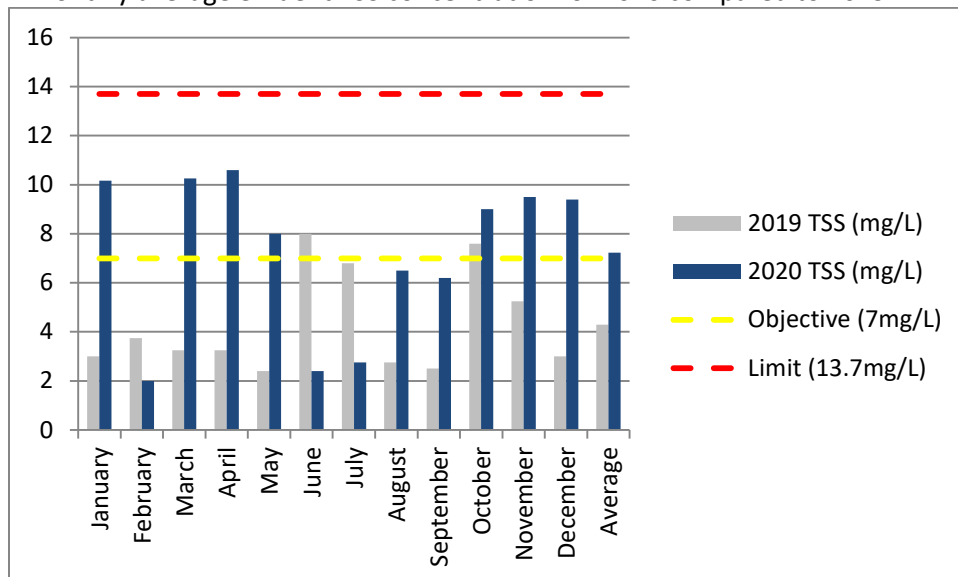
The annual average effluent CBOD<sub>5</sub> concentration was 2.0mg/L, which is a 10.4% decrease from 2019 (refer to Chart 7). The average cBOD<sub>5</sub> loading was 1.3kg/d for 2020. There were no objective or limit exceedances for cBOD in 2020.

Chart 7. Monthly average effluent cBOD5 concentration for 2020 compared to 2019.



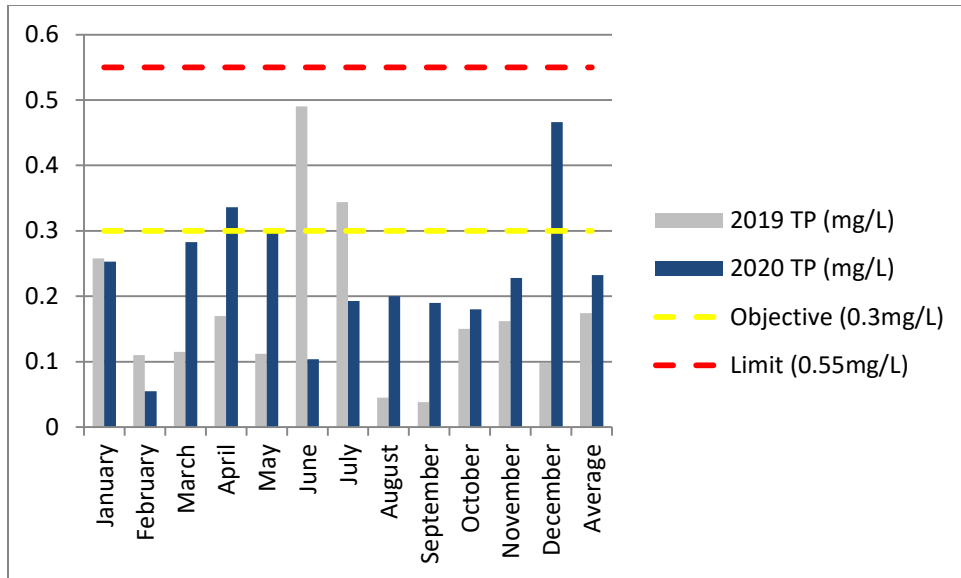
The annual average effluent Total Suspended Solids (TSS) concentration was 7.3mg/L, which is a 68.3% increase from 2019 (refer to Chart 8). There were seven objective exceedances and no limit exceedances in 2020, refer to Section 7. The average TSS loading was 4.6kg/d for 2020.

Chart 8. Monthly average effluent TSS concentration for 2020 compared to 2019.



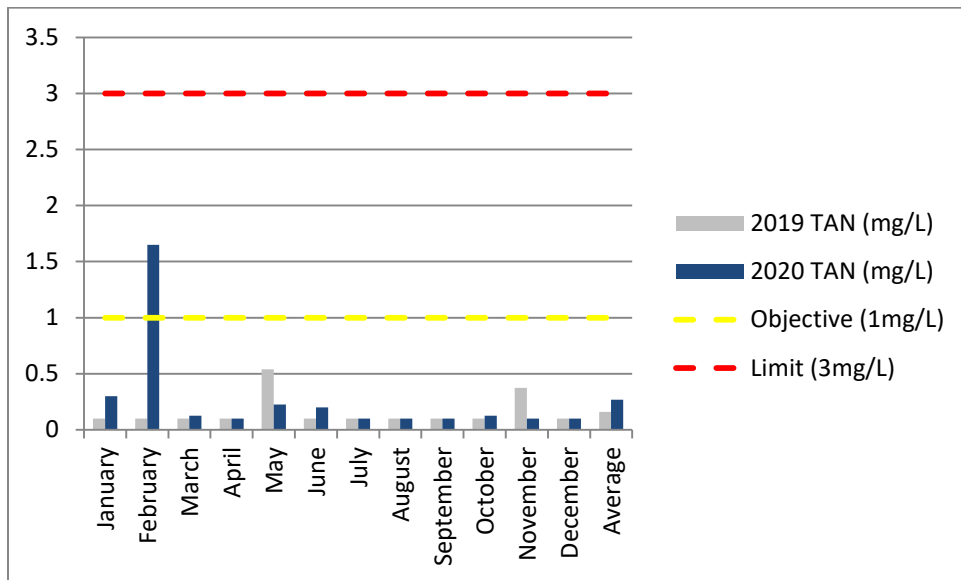
The annual average effluent Total Phosphorus (TP) concentration was 0.23mg/L, which is a 33% increase from 2019 (refer to Chart 9). The average TP loading was 0.1kg/d for 2020. There were two objective exceedances in 2020, refer to Section 7. There were no limit exceedances for TP in 2020.

Chart 9. Monthly average effluent TP concentration for 2020 compared to 2019.



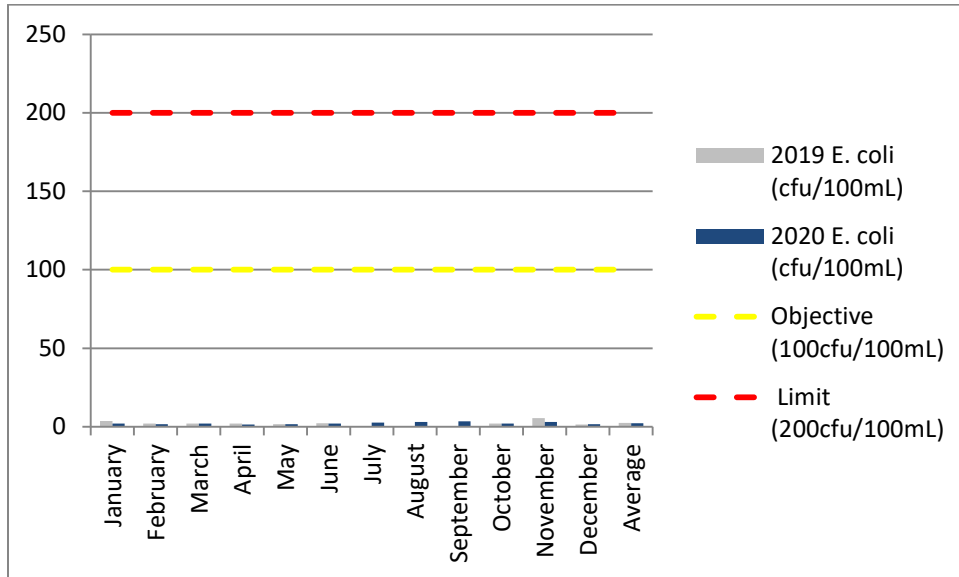
The annual average effluent Total Ammonia Nitrogen (TAN) concentration was 0.27mg/L, which is a 68% increase from 2019 (refer to Chart 10). The average TAN loading was 0.2kg/d for 2020. There were one objective exceedance but no limit exceedances for TAN in 2020.

Chart 10. Monthly average effluent TAN concentration for 2020 compared to 2019.



The annual geometric mean effluent E. coli concentration was 2.2cfu/100mL, which is a decrease of 11.7% from 2019 (refer to Chart 11). There were no objective or limit exceedances for E. coli in 2020.

Chart 11. Monthly geometric mean effluent E. coli concentration for 2020 compared to 2019.



**Section 3: Operating Problems and Corrective Actions, including Schedule B Modifications.**

Typically inflow and infiltration issues have been noted in the collection system, which causes excessive flow at the pump stations during wet weather conditions. In 2020 there was a need for vacuum trucks in January and the station needed to be monitored during high flow times.

Due to high flows and damage to the filter screens there was an increase in suspended solids which did not meet the ECA Objectives in January. This also caused the objective exceedance for TAN in February. Suspended solids exceeded the objective also in March, April, May, October, November and December and the Total Phosphorus in April and December due high flows and inadequate alum/polymer dosages. Adjustments were made to the polymer and alum dose to alleviate the issue.

There have been ongoing issues with reaching capacity at the WWTP while maintaining compliance with the effluent limits. An additional alum feed point was re-instated on the raw flow at Victoria Street Pump Station (ECA 3-0062-94-006). This has been proven as effective at reducing the phosphorus concentrations of the effluent at higher flow rates.

There have been no modifications under Schedule B, Section 3 in 2020.

**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:

- New Electrical panel at South Street Pump Station
- Filter gearbox repairs
- Service water pump repairs
- Pump repairs – Main pump station
- Lagoon diffuser repairs
- Waste pump repairs

## **Section 5: Effluent Quality Assurance**

Effluent quality assurance is evaluated by monitoring parameters within the lagoon cells, SAGR influent, SAGR effluent and the effluent discharge. In house tests include: dissolved oxygen, pH, temperature, total phosphorus, total ammonia nitrogen, alkalinity, and total suspended solids.

## **Section 6: Calibration and Maintenance**

Annual maintenance on the generators at the Pump Stations was completed in June by Albert’s Generator Service. Flow Metrix 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**

Detailed analytical data is provided in the excel spreadsheet in Appendix A. The following table summarizes the monthly average concentration ranges.

Table 3. Monthly effluent ranges compared to the objectives set out in the Environmental Compliance Approval.

Parameter	Effluent Objective (mg/L)	Effluent Monthly Average Ranges (mg/L)
CBOD <sub>5</sub>	7	<2 - 2.25
TSS	7	<2 – 10.6
TP	0.3	0.055 - 0.466
TAN	1.0	<0.1 – 1.65
E. coli	100cfu/100mL	1.5 – 3.6
pH	6.5-8.5	6.92 – 8.88

In 2020, there were objectives exceeded in the effluent of the WWTP. Refer to Table 4 for a list of objectives and possible cause.

Table 4. Objectives that were exceeded in 2020.

Date	Parameter	Results	Comment/Cause
January 2020	TSS	10.2	Increase in flows, filter screen malfunction, repaired filter, adjusting alum and Polymer dosage
February 2020	TAN	1.65	January filter and flow issues, decreased flows
March 2020	TSS	10.25	Increase in flows, adjusting alum dosage
April 2020	TSS	10.6	Increase in flows, adjusting alum dosage
April 2020	TP	0.34	Increase in flows, adjusting alum dosage
May 2020	TSS	8	Increase in flows, adjusting alum dosage
October 2020	TSS	9	Increase in flows, adjusting alum dosage
November 2020	TSS	9.5	Increase in flows, adjusting alum dosage
December 2020	TSS	9.4	Increase in flows, adjusting alum dosage
December 2020	TP	0.47	Increase in flows, adjusting alum dosage

### Discussion on Effluent Objectives

There have been 10 objectives that have been exceeded with the operation of the WWTP in 2020, compared to 4 in 2019. The plant is mostly having issues with meeting suspended solids and total phosphorus objective. As mentioned in Section 3, a pilot study was initiated to determine whether a change in alum dosing point will provide more effective treatment, in 2019 the permanent dosing point at Victoria pump station was re-instated.

### **Section 8: Biosolids Management**

The sludge from the clarifier is directed to the east lagoon where it is allowed to settle at the bottom of the lagoon. The amount of sludge is currently manageable, and will not require dredging at this time. The estimated quantity of sludge transferred back to the lagoon in 2020 was 21,750m<sup>3</sup>. It is estimated that a similar amount, 22,000m<sup>3</sup>, will be transferred in 2021.

### **Section 9: Community Complaints**

There were two complaints in the collection system in 2020. The first was a a backup in the collection system during high flow conditions in January. The issue was alleviated by vac trucks were removing wastewater at the pump station and transferring directly to the lagoon. The second complaint was for a blockage, this was also received in January. The blockage was located and removed from the collection system.

No community complaints received were for the Glencoe Wastewater Treatment Plant in 2020.

### **Section 10: Bypass, Spills, and Abnormal Discharges**

There was no bypass, spills or abnormal discharge events for the Glencoe Wastewater Treatment Plant for the reporting period.

## **Section 11: Summary**

The Glencoe Wastewater Treatment Plant provided effective treatment meeting compliance limit criteria's. A secondary alum dosing point have shown to have a greater effect on effluent results while maintaining higher flows that were unable to be reached the previous year. There are ongoing issues with meeting regulatory objectives for total suspended solids at high flows, which are being addressed and will continue to be addressed in to 2021.

## **APPENDIX A**

### **Analytical Data**



		Objectives	Compliance Limits	Loading Limit	Jan	Feb	March	April	May	June	July	August	September	October	November	December	Summary	Loading
Raw Flow	Avg				944.11	646.86	725.29	670.97	658.68	470.7	480.52	621	538.9	516.45	567.9	753.87	633.64	
	Max	1723			2896	770	2062	951	1352	593	1020	2553	1067	681	1130	1669	2896	
	Min				562	525	546	521	201	404	406	438	436	453	442	429	201	
	Sum				29267.42	18759	22484	20129	20419	14121	14896	19251	16167	16010	17037	23370	231910.42	
Raw Samples	BOD5 (mg/L)	284			216	233	271	395	152	401	419	215	120	124	374	130	254.2	161.1
	TSS (mg/L)	300			97	198	163	248	126	234	683	109	216	62	284	148	214.0	135.6
	TP (mg/L)	8			3.47	3.86	3.16	4.06	5.78	6.65	8	2.39	3.02	7.37	6.5	2.39	4.72	2.99
	TKN (mg/L)	47			36.5	35.5	34.8	42.7	62.6	74.1	64	28.5	33.4	59.3	78.5	30.1	48.3	30.6
Effluent Flow	Avg		1723		474.84	725.59	1034.23	864.13	703.87	565.1	391.71	576.71	425.93	416.03	682.5	715.84	630.82	
	Max	1723			881	1246	1546	1080	903.18	906	666	928	506	856	792	862	1546	
	Min				376	260	366	595	547.56	418	228	392	233	309	604	638	228	
	Sum				14720	21042	32061	25924	21819.93	16953	12143	17878	12778	12897	20475	22191	230881.93	
Effluent CBOD5 (mg/L)	Avg	7	13.7	23.6	< 2	< 2.25	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2.02	1.3
	Max				< 2	< 3	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 3	
	Min				< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	
Effluent TSS (mg/L)	Avg	7	13.7	23.6	< 10.167	< 2	< 10.25	< 10.6	< 8	< 2.4	< 2.75	< 6.5	< 6.2	< 9	< 9.5	< 9.4	< 7.333	4.6
	Max				< 27	< 2	< 20	< 21	< 15	< 3	< 4	< 9	< 13	< 17	< 14	< 14	< 27	
	Min				< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 4	< 2	< 3	< 5	< 5	< 2	
Effluent TP (mg/L)	Avg	0.3	0.55	0.95	< 0.253	< 0.055	< 0.283	< 0.336	< 0.3	< 0.104	< 0.193	< 0.2	< 0.19	< 0.18	< 0.228	< 0.466	< 0.236	0.1
	Max				< 0.7	< 0.13	< 0.48	< 0.45	< 0.61	< 0.13	< 0.24	< 0.25	< 0.52	< 0.37	< 0.32	< 1.51	< 1.51	
	Min				< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.07	< 0.07	< 0.14	< 0.04	< 0.05	< 0.14	< 0.1	< 0.03	
Effluent TAN (mg/L)	Avg	1	3	5.17	< 0.3	< 1.65	< 0.125	< 0.1	< 0.225	< 0.2	< 0.1	< 0.1	< 0.1	< 0.125	< 0.1	< 0.1	< 0.309	0.2
	Max				< 0.9	< 4.2	< 0.2	< 0.1	< 0.6	< 0.4	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 4.2	
	Min				< 0.1	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Eff. E. Coli (cfu/100mL)	Geo Mean	100	200		< 2	< 1.682	< 2	< 1.516	< 1.587	< 2	< 2.632	< 2.991	< 3.565	< 2	< 3.162	< 1.741	< 2.24	
	Max				< 2	< 2	< 2	< 2	< 2	< 2	< 6	< 10	< 18	< 2	< 5	< 2	< 18	
	Min				< 2	< 1	< 2	< 0	< 0	< 2	< 2	< 2	< 2	< 2	< 2	< 0	< 0	
Effluent DO (mg/L)	Avg				10.575	9.782	11.848	10.029	8.679	7.782	7.825	7.789	7.854	8.848	10.079	9.032	9.182	
	Max				11.35	12.68	13.15	11.13	9.6	8.22	8.43	8.12	9.16	9.3	10.57	11.04	13.15	
	Min				9.43	6.86	10.68	9.35	7.64	7.12	7.46	7.47	6.09	8.15	9.65	7.28	6.09	
Effluent pH	Avg				7.528	7.421	7.871	7.535	7.789	7.807	7.665	7.64	7.608	7.45	7.503	7.419	7.603	
	Max	8.5	9.5		7.9	7.85	8.88	7.97	8.41	8.04	8.04	7.9	7.86	7.85	7.95	8.22	8.88	
	Min	6.5	6		6.92	7.07	7.03	6.95	7.5	7.31	7.27	7.28	7.27	6.96	6.9	7.03	6.9	
Effluent Temp. (oC)	Avg				4.069	2.718	5.408	9.367	13.009	20.042	24.969	24.8	21.267	16.315	10.475	7.369	13.411	
	Max				6.8	4.3	8.7	11.6	16.7	22.1	26.7	26.8	24.1	18.7	14.3	11.3	26.8	
	Min				2.4	1.7	2.3	7.7	10.5	18.1	22.4	23.6	18.5	13.9	7.8	2.3	2.3	
Eff. Unionized Amm. (mg/L)	Avg				0.001	0.004	0.001	0.001	0.004	0.006	0.004	0.002	0.002	0.002	0.001	0.001	0.002	
	Max				0.001	0.005	0.002	0.002	0.011	0.009	0.006	0.003	0.003	0.004	0.002	0.002	0.011	
	Min				0.000	0	0.000	0	0.001	0.002	0.002	0.001	0.001	0	0.000	0	0.000	