

2023 Annual Report

French Creek Pollution Control Centre

February 2024

Submitted to the Ministry of Environment and Climate Change Strategy
envauthorizationsreporting@gov.bc.ca



Executive Summary

The Regional District of Nanaimo (RDN) owns and operates the French Creek Pollution Control Centre (FCPCC) located at 957 Lee Road in Parksville. FCPCC provides secondary treatment. Treated effluent is discharged to the Strait of Georgia.

Operation of FCPCC is regulated by Environmental Management Permit No. PE-4200 issued by the Ministry of Environment and Climate Change Strategy. The authorized treatment works include a septage receiving facility; mechanical screens; grit tanks; primary clarifiers; biological reactors; secondary clarifiers; trickling filter; thermophilic aerobic digesters; biosolids thickening and dewatering facilities; odour control facilities; an outfall extending approximately 2 km from shore to a depth of 61 m below mean low water; an effluent pumping station and pipeline to convey effluent to the storage ponds at the Morningstar Golf Course; standby power; and related appurtenances.

This report was written by RDN staff as a permit requirement. This report summarizes and interprets the FCPCC monitoring data for 2023.

The summary of 2023 monitoring data at FCPCC for the outfall effluent is as follows:

Summary of Compliance	Permit	2023	Permit Exceedances
Maximum Daily Flow (Outfall)	16,000 m ³ /day	14,663.0 m ³ /day	0
Average Daily Flow	-	10,217.9 m ³ /day	
Average Daily cBOD ₅ (Outfall)	45 mg/L	12.3 mg/L	0
Average Daily TSS (Outfall)	60 mg/L	15.8 mg/L	0

The summary of 2023 monitoring data for effluent discharged to Morningstar Golf Course is as follows:

Summary of Compliance	Permit	2023	Permit Exceedances
Maximum Daily Flow	1,370 m ³ /day	1,167 m ³ /day	0
Average Daily cBOD ₅	20 mg/L	8.85 mg/L	0
Average Daily TSS	30 mg/L	10.3 mg/L	0

- **Flow** – The total volume of effluent discharged to the outfall and Morningstar Golf Course from French Creek Pollution Control Centre in 2023 was 3,802,325.6 m³/day, at an average daily flow of 10,417.3 m³/day. The maximum daily flow was 14,663.0 m³/day.

The average daily flow discharged from the outfall in 2023 was 10,217.9 m³/day. The maximum daily flow was 14,663.0 m³/day. In 2023, there were no maximum daily flow exceedances for the outfall effluent.

In 2023, flows were discharged to Morningstar Golf Course between May to September for a total of 79 days. The maximum permitted flow of that can be discharged to the lagoons is 1,370 m³/day. The total volume of effluent discharged to the Morningstar Golf Course in 2023 was 72,915.5 m³. There were no maximum daily flow exceedances to Morningstar.

- **5-day Carbonaceous Biochemical Oxygen Demand** – The influent and effluent average 5-day carbonaceous biochemical oxygen demand (cBOD₅) concentration for 2023 was 231 mg/L and

12.3 mg/L, respectively. The average removal efficiency in 2023 was 94.5%. The average cBOD₅ of the effluent discharged to Morningstar Golf Course was 8.85 mg/L.

There were no cBOD₅ exceedances in 2023 where the maximum permitted cBOD₅ concentration was exceeded.

- **Total Suspended Solids** – The influent and effluent average total suspended solids (TSS) concentration in 2023 was 390 mg/L and 15.8 mg/L, respectively. The average TSS removal efficiency in 2023 was approximately 95.6%. The average TSS of the effluent discharged to Morningstar Golf Course was 10.3 mg/L.

There were no TSS permit exceedances for the outfall effluent or for effluent discharged to Morningstar Golf Course in 2023.

- **General parameters, metals, volatile and semi-volatile compounds** – 2023 results were all consistent with historical data. Only one sample is taken per year so limited conclusions can be made on trending of the parameters.
- **Biosolids** – SYLVIS conducts fecal coliform and full parameter testing as the Qualified Professional for the soil fabrication program. SYLVIS testing results are summarized in the 2023 Management of RDN Biosolids (see Appendix G).

In the RDN sampling program, biosolids met Class A standards for metals and fecal coliforms. Ten fecal coliform samples and two full parameter samples were taken in the RDN sampling.

Table of Contents

1)	<i>Introduction</i>	1
1.1	Environmental Management System.....	1
2)	<i>Site Description and Neighborhood</i>	1
3)	<i>Permit Requirements</i>	2
3.1	Authorized Discharges	2
3.2	Monitoring Requirements.....	2
3.3	Operational Certificate	3
3.4	Outfall Inspection	3
4)	<i>Flow Monitoring</i>	4
4.1	Treatment Plant Flow	4
4.2	Outfall Flow.....	5
4.3	Flows to Morningstar Golf Course	7
4.4	Historical Trends.....	7
5)	<i>Effluent Monitoring</i>	9
5.1	5-Day Carbonaceous Biochemical Oxygen Demand (cBOD ₅)	9
5.1.1	Historical Trends.....	11
5.2	Total Suspended Solids	12
5.2.1	Historical Trends.....	13
5.3	Other General Parameters	14
5.4	Metals.....	16
5.5	Volatile and Semi-Volatile Compounds.....	17
6)	<i>Biosolids</i>	17
6.1	Biosolids Production	17
6.1.1	Historical Trends.....	19
6.2	Biosolids Analysis	19
6.3	Fecal Coliforms	22
6.4	Stabilization and Dewatering	22
6.5	Biosolids Management	23
6.5.1	Forest Fertilization.....	23
6.5.2	Soil Fabrication.....	23

6.5.3	Excellence in Biosolids Award	23
7)	<i>Process Control Monitoring</i>	<i>24</i>
7.1	Ammonia	24
7.2	Nitrate, Nitrite, Alkalinity.....	25
7.3	Temperature	27
7.3.1	Historical Trends.....	27
7.4	pH.....	28
7.4.1	Historical Trends.....	29
7.5	Dissolved Oxygen	30
7.5.1	Historical Trends.....	31
8)	<i>Resource Consumption</i>	<i>31</i>
8.1	Chemical Consumption	31
8.1.2	Historical Trends.....	32
8.2	Electrical Consumption	32
8.3	Water Consumption.....	33
9)	<i>Odour</i>	<i>34</i>
9.1	Operational Procedures	34
9.2	Odour Records.....	34
9.2.1	Historical Trends.....	35
9.3	Odour Episodes	35
9.4	Future Plans	36
10)	<i>Septage Receiving</i>	<i>36</i>
10.1	Historical Trends	36
10.2	Septage Testing.....	37
11)	<i>Contributory Population and Remaining Plant Capacity.....</i>	<i>37</i>
12)	<i>Environmental Incidents.....</i>	<i>38</i>
13)	<i>Conditional Management Plan</i>	<i>38</i>
14)	<i>Facility Upgrades & Major Projects.....</i>	<i>39</i>
14.1	Upgrades and Repairs Completed in 2023	39
14.2	Studies and Projects Completed in 2023.....	39
14.3	Upgrades and Repairs Planned for 2024.....	39
14.4	Studies and Projects Planned for 2024	39
15)	<i>Resource Recovery</i>	<i>39</i>

15.1	Biosolids Reuse	39
15.2	Effluent Reuse.....	40
15.3	Solid Waste Recycling.....	40
16)	<i>Education Programs</i>	40
16.1	Source Control	40
16.2	Water Conservation	40
16.3	Open House	40
16.4	SepticSmart	40
16.5	Liquid Waste Management Plan	41
16.6	Website	41
17)	<i>Conclusions</i>	41
17.1	Flows	42
17.2	Carbonaceous Biochemical Oxygen Demand (cBOD ₅)	42
17.3	Total Suspended Solids (TSS)	42
17.4	General Parameters, Metals, Volatile and Semi-Volatile Compounds.....	42
17.5	Biosolids Quality	43
	<i>Appendix A – Waste Management Permit No. PE-4200 & Amendments</i>	44
	<i>Appendix B – Internal Flow Monitoring and Laboratory Raw Data (Permit Data)</i>	58
	<i>Appendix C – External Laboratory Test Results</i>	73
	<i>Appendix D – Odour Reports</i>	76
	<i>Appendix E – Environmental Incident Reports</i>	82
	<i>Appendix F – Conditional Management Plan 2023 Annual Report</i>	84
	<i>Appendix G – 2023 Management of RDN FCPC Biosolids (SYLVIS)</i>	87

1) Introduction

The Regional District of Nanaimo (RDN) owns and operates the French Creek Pollution Control Centre (FCPCC) located at 957 Lee Rd, Parksville, British Columbia. Treated effluent from FCPCC is discharged to the Strait of Georgia. A small portion of FCPCC treated effluent is pumped in some years to storage lagoons at the Morningstar Golf Course, which is located adjacent to the treatment facility. The treated effluent is used by the golf course to supplement irrigation water.

Operation of the treatment plant is regulated by the Ministry of Environment and Climate Change Strategy under Environmental Management Permit No. PE-4200 (the Permit), issued on January 16, 1976, and amended most recently on July 10, 1990 (see Appendix A).

The authorized works include a septage receiving facility; mechanical screens; grit tanks; primary clarifiers; biological reactors; secondary clarifiers; thermophilic aerobic digesters; biosolids thickening and dewatering facilities; odour control facilities; an outfall extending approximately 2 km from shore to a depth of 61 m below mean low water; an effluent pumping station and pipeline to convey effluent to the storage ponds at the Morningstar Golf Course; standby power; and related appurtenances.

The FCPCC was constructed in 1977 as an activated sludge treatment plant cable of serving a population of 12,000 people. In December 1996, a trickling filter was added to the process and an expansion undertaken to accommodate the increasing population of the area. The expansion, completed in 1997, doubled the plant's capacity and significantly improved the quality of its effluent and biosolids. The plant now uses trickling filter and solid contact tank technology. Further work was done to address odour problems associated with the plant's initial design.

Future upgrades and expansion are planned in the FCPCC Expansion and Odour Upgrade project which the RDN plans to issue to tender in 2025.

This report was written by RDN staff as a permit requirement to summarize and interpret the 2023 FCPCC monitoring data.

1.1 Environmental Management System

The RDN's Wastewater Services department's Environmental Management System (EMS) is certified to the ISO 14001:2015 standard. ISO 14001 is an international EMS standard based on a model of continual improvement. The overall aim of ISO 14001 is to support environmental protection and prevent pollution in balance with socio-economic needs. Visit www.rdn.bc.ca/environmental-management-system for more information.

2) Site Description and Neighborhood

The FCPCC is located at 957 Lee Road between Parksville and Qualicum Beach. The septage receiving area is accessed via a second driveway, located further away from Hwy 19A on Lee Road. The site is approximately 9 acres in size and is surrounded by relatively dense coniferous and deciduous trees.

A single-family residential subdivision is located directly to the south of the plant, condominiums to the southwest, and another single-family subdivision to the west. A campground, marina, pub, and restaurant are located across Hwy 19A to the north.

There were no significant changes to the layout of the neighbourhood in 2023. Phase I of French Creek Estates, to the north of the FCPC, was constructed several years ago. Further phases are proposed in the next fifteen years.

The undeveloped areas around the plant are zoned for high-density residential use, except for the land directly across the highway, which is zoned CMQ6. This zoning allows for the following uses: residential, hotel, resort condominium, neighborhood pub, office, personal service use, public assembly use, recreation facility, restaurant, or retail store.

3) Permit Requirements

3.1 Authorized Discharges

Section 1.1 of the Permit states the maximum daily effluent discharge to the outfall is:

- 16,000 m³/day maximum daily flow.

Section 1.2 of the Permit stipulates that the characteristics of the discharge shall not exceed:

- 5-day carbonaceous biochemical oxygen demand (cBOD₅): 45 mg/L
- Total suspended solids (TSS): 60 mg/L.

Appendix O2 of the Permit states the maximum daily effluent discharge to Morningstar Golf Course is:

- 1,370 m³/day.

And that the discharge shall not exceed:

- 5-day carbonaceous biochemical oxygen demand (cBOD₅): 20 mg/L
- Total suspended solids (TSS): 30 mg/L.

From 2014 to 2018, no treated effluent flows were discharged to Morningstar Golf Course. Discharge to Morningstar Golf Course resumed in 2019.

3.2 Monitoring Requirements

The Permit monitoring requirements are summarized in Table 1. Monthly reports were submitted to the Ministry of Environment and Climate Change Strategy in 2023, reporting all required test results.

Table 1. Monitoring Requirements by Permit Subsection Number

Appendix C-1 A. Sampling and Analyses

A suitable sampling facility shall be installed, and a grab sample of the effluent shall be obtained once a day. The sample shall be analyzed daily for TSS and weekly for cBOD₅.

Once per year a composite sample, over an eight-hour period shall be collected and analyzed for metals, volatile organics, phenolics, organochlorine pesticides, acid extractable herbicides, anions, and inorganics.

Appendix C-1 B. Flow Measurement

A flow measuring device must be provided and maintained to record, once per day, the effluent volume discharged over a 24-hour period.

Appendix B-1 E. Outfall Inspection

An inspection of the outfall line is conducted once every five years, using an underwater camera.

Appendix C-1 C. Sampling and Analytical Procedures

Sampling and flow measurement shall be carried out in accordance with the *British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Sediment and Biological Samples (2013 Edition)*.

Analyses are to be carried out in accordance with the *British Columbia Environmental Laboratory Manual: For the Analysis of Water, Wastewater, Sediment, Biological Materials and Discrete Ambient Air Samples (2020)*, or by suitable alternative procedures as authorized by the Regional Waste Manager.

Appendix C-2 E. Reporting

The Permittee shall maintain records of analyses and flow measurements for inspection and once per month submit the data, suitably tabulated, to the Regional Waste Manager for the previous month's monitoring.

The 2023 monitoring program adhered to all sampling, analytical, flow measurements, and reporting requirements specified in the Permit.

3.3 Operational Certificate

The RDN's approved Liquid Waste Management Plan (LWMP) includes a draft Operational Certificate for FCPC.

3.4 Outfall Inspection

FCPC's outfall was inspected by Remote Operated Vehicle (ROV) in 2017 by SeaVeyors Marine and Environmental. The inspection noted that the outfall pipe was in fair condition. The diffuser section of the outfall was replaced in 2013. No major leaks were identified in the ROV inspection. However, a small leak was identified from the clamp between the old outfall pipe and the replacement diffuser section. A follow up inspection of the diffusers was done in 2019 by ITB Subsea. The RDN retained GreatPacific to

review the ROV videos and provide recommendations in terms of next steps. GreatPacific concluded the small leak from the clamp located approximately 60 m deep and 2 km offshore did not impact the performance of the diffusers. GreatPacific did not recommend a repair due to the expense of addressing the leak and concluded there was no significant risk of the leak to human health or the environment.

The outfall was inspected again in November 2022 by GreatPacific Consulting Ltd. GreatPacific noted the small leak at the diffuser connection did not intensify since 2019. However, another small leak of treated effluent was found at the Flange #3 location. The leak is described as “a diffuse, constant stream of effluent from the west side of the crown. The rate of leakage at this flange was estimated to be much less than that of one of the 25 diffuser ports. GreatPacific noted that it is unlikely that the leak is resulting in imminent risk to environment or human health.

The RDN increased the frequency of inspection and monitoring by underwater Remote Operated Vehicle (ROV) to a 3-year interval to ensure the small leaks of treated effluent at the Flange #3 and diffuser clamp location do not intensify. The next inspection will be scheduled for 2025.

4) Flow Monitoring

4.1 Treatment Plant Flow

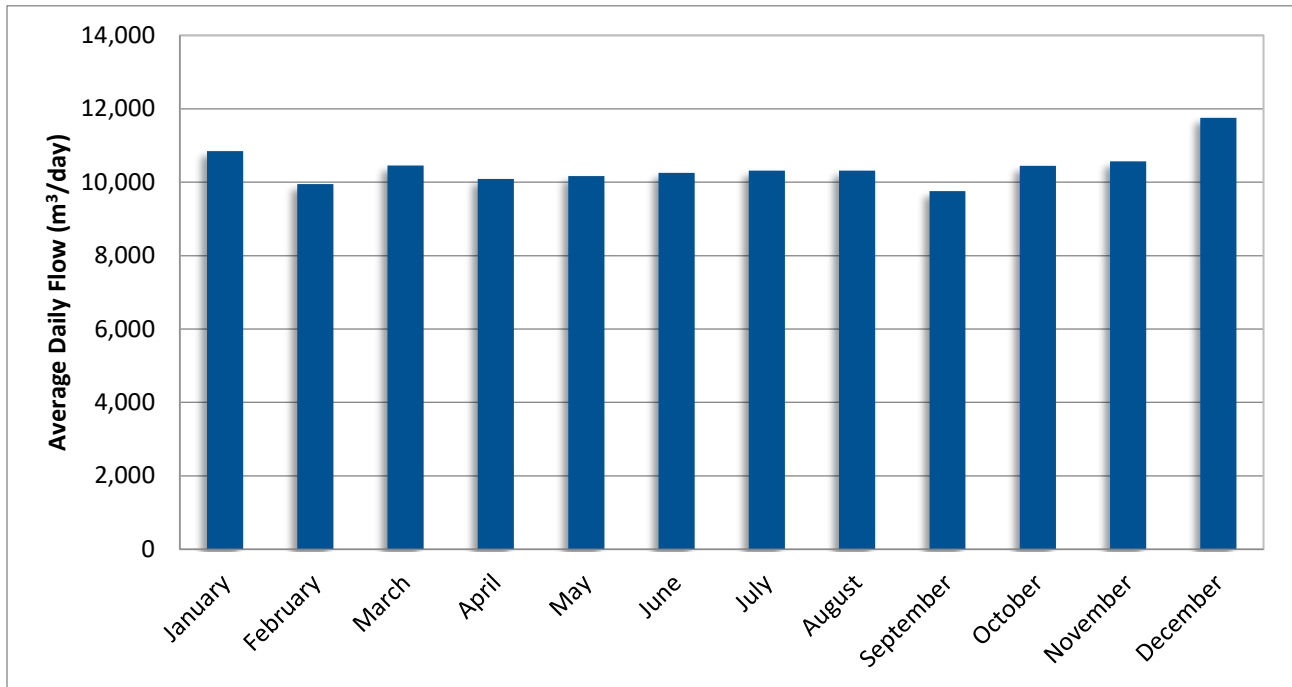
Daily flow monitoring data for FCPC in 2023 are presented in Appendix B. Results are summarised in Table 2 and graphed in Figure 1. The combined flow of effluent discharged from the outfall in 2023 was 3,802,325.6 m³, at an average daily flow of 10,417.3 m³/day.

Table 2. 2023 Treatment Plant Flow

Month	Combined Average Daily Flow (m ³ /day)	Combined Total Flow (m ³)	Combined Maximum Flow (m ³ /day)	Combined Minimum Flow (m ³ /day)	Total Monthly Precipitation (mm)
January	10,843.8	336,158.8	13,259.7	9,738.0	82.9
February	9,949.7	278,591.1	10,259.8	9,436.0	42.9
March	10,455.9	324,134.2	12,690.4	9,572.7	31.6
April	10,093.4	302,802.7	11,006.7	9,608.1	53.6
May	10,171.7	315,323.1	11,043.0	9,777.6	21.7
June	10,252.8	307,583.7	11,019.4	9,843.9	15.9
July	10,315.7	319,786.3	10,669.2	10,015.0	4.1
August	10,315.7	319,787.7	11,275.2	9,603.0	14.3
September	9,757.7	292,731.9	10,214.8	9,486.3	35.1
October	10,449.7	323,939.4	14,663.0	9,427.1	138.6
November	10,565.8	316,972.7	11,988.1	9,649.4	93.1
December	11,758.5	364,514.0	14,462.8	10,670.0	143.7
Average	10,417.3				
Total		3,802,325.6			677.5
Maximum			14,663.0		
Minimum				9,427.1	

* Source: Quaticum Beach Airport weather station (see [Environment Canada](#))

Figure 1. Monthly Average Daily Treatment Plant Flow



4.2 Outfall Flow

Daily flow monitoring data for FCPC in 2023 are presented in Appendix B. The average flow discharged from FCPC in 2023 was 10,217.9 m³/day, and the total annual flow was 3,729,410.1 m³. Table 3 and Figure 2 summarize flow data.

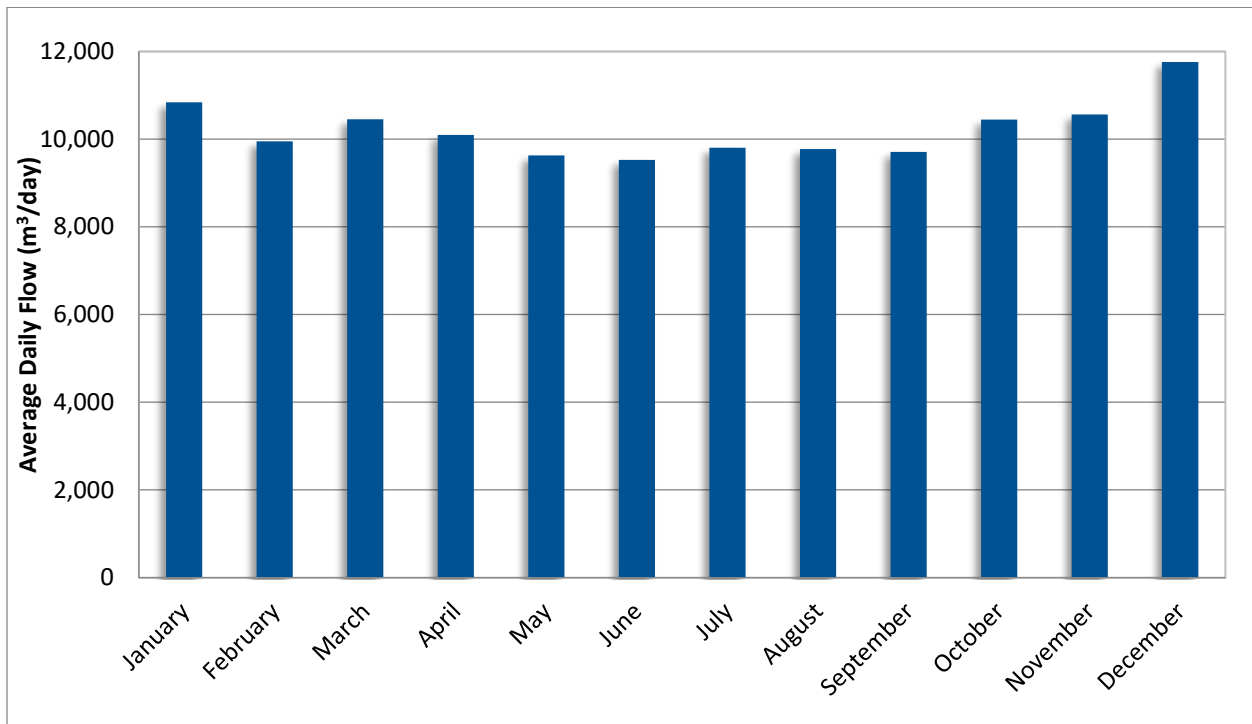
In 2023, there was no maximum daily flow non-compliances.

As part of the LWMP process, the RDN is working collaboratively on I&I reduction with our partners in the City of Parkville and the Town of Qualicum Beach. The RDN has also had Closed Circuit TV (CCTV) condition assessments completed of the interceptor pipes. The RDN also monitors influent quality and conducts a flow monitoring program to investigate sources of infiltration. The RDN also conducts a program to repair sources of infiltration on the Qualicum Beach and Parkville interceptor lines.

Table 3. 2023 Average Daily Flow per Month from the FCPC Outfall

Month	Outfall Average Daily Flow (m ³ /day)	Outfall Total Flow (m ³)	Outfall Maximum Flow (m ³ /day)	Outfall Minimum Flow (m ³ /day)	Outfall Permit Exceedances (Maximum Daily Flow)
January	10,843.8	336,158.8	13,259.7	9,738.0	0
February	9,949.7	278,591.1	10,259.8	9,436.0	0
March	10,455.9	324,134.2	12,690.4	9,572.7	0
April	10,093.4	302,802.7	11,006.7	9,608.1	0
May	9,629.3	298,508.5	10,786.8	8,791.1	0
June	9,526.9	285,806.7	10,712.0	8,790.1	0
July	9,801.4	303,842.4	10,544.9	8,981.0	0
August	9,772.3	302,941.7	10,566.6	8,589.0	0
September	9,706.6	291,197.9	10,214.8	9,078.0	0
October	10,449.7	323,939.4	14,663.0	9,427.1	0
November	10,565.8	316,972.7	11,988.1	9,649.4	0
December	11,758.5	364,514.0	14,462.8	10,670.0	0
Average	10,217.6				
Total		3,729,410.1			0
Maximum			14,663.0		
Minimum				8,589.0	

Figure 2. 2023 Outfall Average Daily Flow by Month



4.3 Flows to Morningstar Golf Course

The Morningstar Golf Course effluent reuse program resumed in 2023. During the summer months effluent can be discharged to lagoons on Morningstar Golf Course for irrigation. The maximum permitted flow of that can be discharged to the lagoons is 1,370 m³/day.

In 2023, flows were discharged from June to September for a total 79 days. Flow monitoring data for the effluent sent to Morningstar Golf Course are summarized in Table 4. The total volume of effluent discharged to the Morningstar Golf Course in 2023 was 72,915.5 m³. There were no maximum flow non-compliances in 2023.

Table 4. 2023 Average Daily Flow per Month from the FCPCC Outfall

Month	Morningstar Total Flows (m ³)	Number of Discharge days	Morningstar Maximum Flow (m ³ /day)	Morningstar Permit Exceedances (Maximum Daily Flow)
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	0	0	0	0
May	16,815	17	1,167	0
June	21,777	22	1,075	0
July	15,944	19	1,084	0
August	16,846	18	1,058	0
September	1,534	3	976	0
October	0	0	0	0
November	0	0	0	0
December	0	0	0	0
Total	72,915.5	79		0
Maximum			1,167.0	

4.4 Historical Trends

Historical combined, outfall, and Morningstar flow data reported for previous years are summarised in Tables 3 to 5 and graphed in Figure 3. The discharge to Morningstar Golf Course over the past 10 years has been variable based on demand from the golf course.

In 2015, the RDN repaired a large source of infiltration of sea water on the Qualicum Beach interceptor line. Repairs to manholes to prevent infiltration on the Qualicum Beach interceptor line have also been conducted in 2018, 2019, 2021, and 2022.

Table 5. Historical Trends: Treatment Plant Flow

Year	Combined Average Daily Flow (m ³ /day)	Combined Total Flow (m ³)	Combined Max Daily Flow (m ³ /day)
2014	11,063.9	4,038,338.7	18,983.0
2015	10,713.7	3,910,516.8	15,962.5
2016	10,457.4	3,827,402.4	17,935.2
2017	10,588.5	3,864,816.0	16,275.6
2018	10,356.0	3,779,923.6	19,908.0
2019	9,859.0	3,598,527.4	16,420.3
2020	9,920.3	3,630,815.1	18,439.9
2021	10,511.5	3,836,715.7	25,903.3
2022	10,493.7	3,830,187.6	18,580.1
2023	10,417.3	3,802,325.6	14,663.0

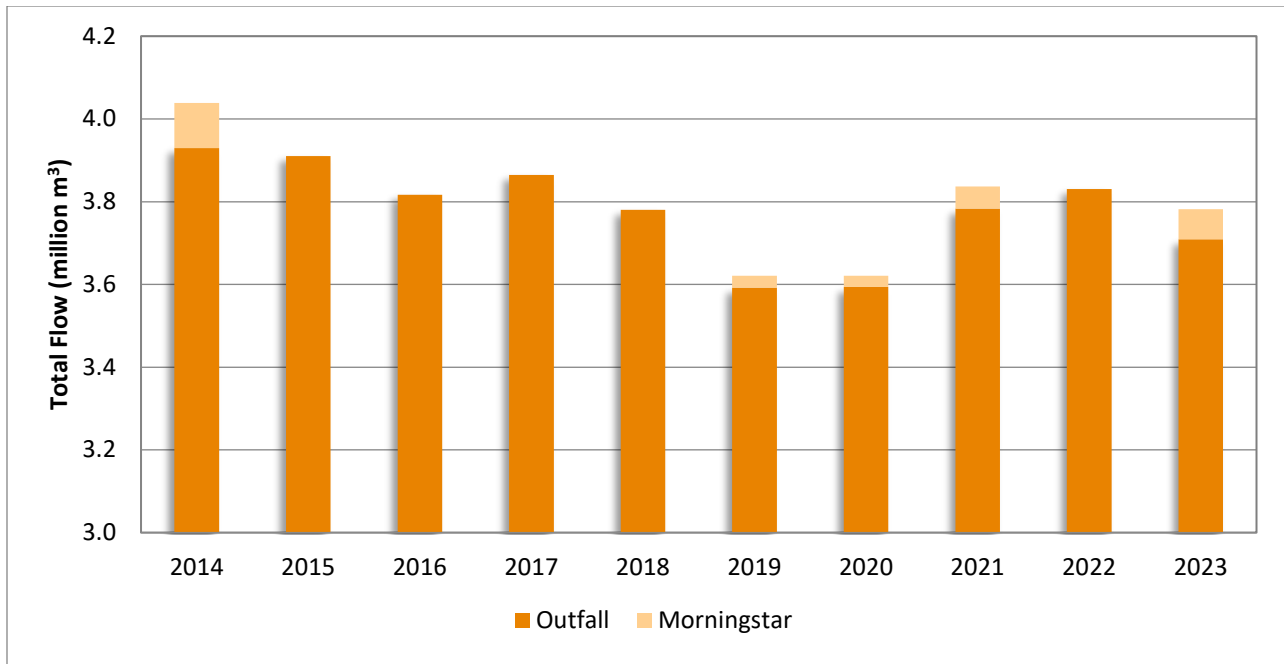
Table 6. Historical Trends: Outfall Discharge

Year	Outfall Average Daily Flow (m ³ /day)	Outfall Total Flow (m ³)	Outfall Permit Exceedances (Maximum Daily Flow)
2014	10,765.4	3,929,361	4
2015	10,713.7	3,910,517	0
2016	10,457.1	3,816,837	2
2017	10,588.5	3,864,816	2
2018	10,356.0	3,779,924	3
2019	9,842.4	3,592,469	1
2020	9,846.1	3,593,821	1
2021	10,364.8	3,783,166	3
2022	10,493.7	3,830,188	2
2023	10,217.9	3,709,111	0

Table 7. Historical Trends: Morningstar Discharge

Year	Morningstar Total Flow (m ³)	Morningstar Permit Exceedances (Maximum Daily Flow)
2014	108,977.6	0
2015	0.0	0
2016	0.0	0
2017	0.0	0
2018	0.0	0
2019	28,623.6	0
2020	27,271.2	0
2021	53,549.8	0
2022	0.0	0
2023	72,915.5	0

Figure 3. Historical Trends: Combined Total Yearly Flow



5) Effluent Monitoring

5.1 5-Day Carbonaceous Biochemical Oxygen Demand (cBOD₅)

Five-day carbonaceous biochemical oxygen demand (cBOD₅) is a measure of the quantity of oxygen consumed by microorganisms to break down organic matter in water in which the contribution from nitrogenous bacteria has been suppressed. A high cBOD₅ means less oxygen is available to support aquatic life. Thus, high cBOD₅ levels result in the contamination of the receiving environment.

The Permit requires testing the effluent for cBOD₅ weekly, with a maximum permitted concentration of 45 mg/L for discharge to the outfall, and 20 mg/L for discharge to Morningstar Golf Course. The average influent and effluent cBOD₅ concentration for 2023 was 231 mg/L and 12.3 mg/L, respectively. The average cBOD₅ removal efficiency was 94.5%. The average effluent cBOD₅ concentration for effluent sent to Morningstar Golf Course was 8.8 mg/L. Results are summarized Table 8 and graphed in Figure 4. Appendix B contains the daily cBOD₅ results.

Effluent was also tested each week for cBOD₅ in a separate sampling program at the ISO17025:2017 certified lab at Greater Nanaimo Pollution Control Centre (GNPCC) to meet the Wastewater Systems Effluent Regulations (WSER) requirements for quarterly average cBOD₅ results.

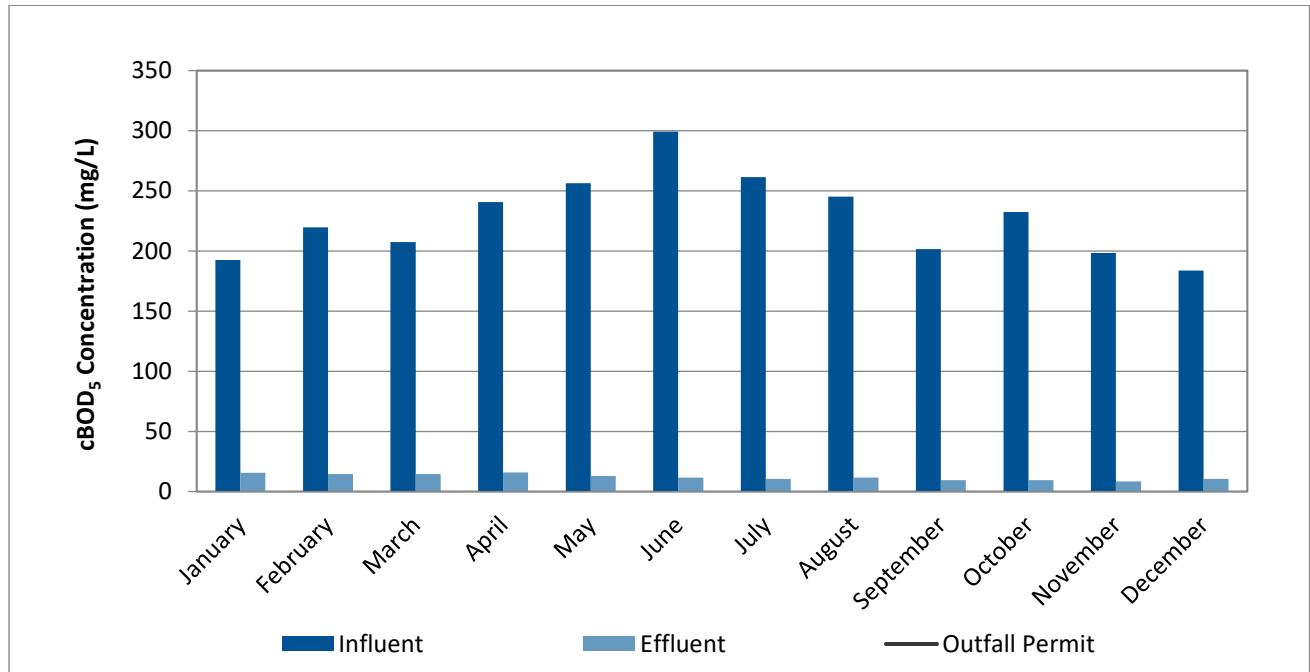
There were no cBOD₅ non-compliances in 2023 for the FCPC effluent, and for the effluent sent to Morningstar Golf Course.

Table 8. 2023 Influent & Effluent cBOD₅ Concentrations

Month	Influent Average cBOD ₅ (mg/L)	Outfall Effluent Average cBOD ₅ (mg/L)	Average % Reduction in cBOD ₅ (%)	Outfall Permit Exceedances (cBOD ₅ >45 mg/L)	Morningstar Average cBOD ₅ (mg/L)	Morningstar Permit Exceedances (cBOD ₅ >20 mg/L)
January	193	15.6	91.5	0		
February	220	14.4	93.6	0		
March	207	14.4	93.0	0		
April	241	15.8	93.5	0		
May	256	13.1	94.8	0	12.8	0
June	299	11.7	96.1	0	9.5	0
July	261	10.4	95.9	0	7.1	0
August	245	11.6	95.3	0	6.0	0
September	202	9.6	95.3	0	7.3	0
October	233	9.4	95.9	0		
November	198	8.3	95.8	0		
December	184	10.6	94.0	0		
Average	231	12.3	94.5		8.8	
Total				0		0

* % Reduction only determined when the influent and effluent cBOD₅ testing was done on the same day

Figure 4. 2023 Influent & Effluent Monthly Average cBOD₅ Concentration



5.1.1 Historical Trends

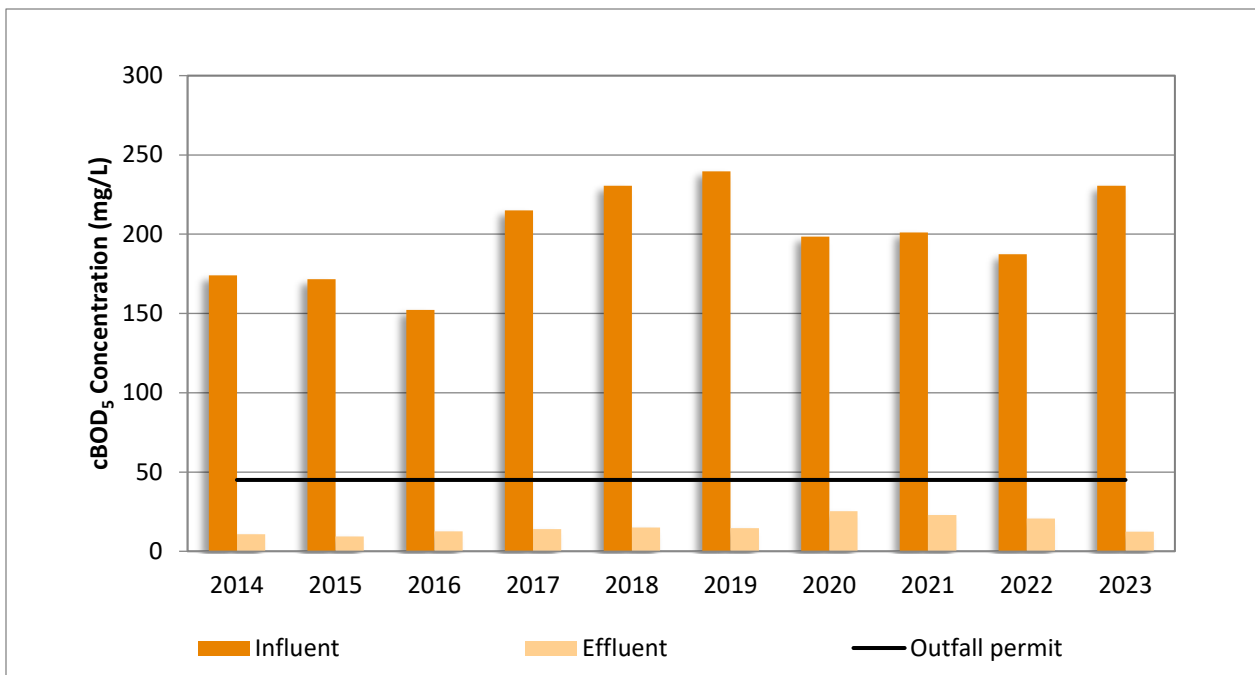
Historical influent and effluent average cBOD₅ concentrations, reduction efficiencies and the number of outfall and Morningstar Golf Course cBOD₅ non-compliances reported over the past 10 years are summarised in the Table 9 and graphed in Figure 5.

The BOD reduction increased in 2023 in comparison to previous years.

Table 9. Historical Trends: Influent & Effluent cBOD₅ Concentrations

Year	Influent Average cBOD ₅ (mg/L)	Outfall Effluent Average cBOD ₅ (mg/L)	Average % Reduction in cBOD ₅	Outfall Permit Exceedances (cBOD ₅ >45 mg/L)	Morningstar Permit Exceedances (cBOD ₅ >20 mg/L)
2014	174	11	93.3	0	0
2015	172	9.3	94.0	0	-
2016	152	12.5	91.4	0	-
2017	215	14.0	93.6	0	-
2018	230	15.1	93.0	2	-
2019	240	14.7	93.7	0	0
2020	198	25.3	88.8	19	0
2021	201	22.8	88.1	1	0
2022	187	20.6	88.8	0	-
2023	231	12.3	94.5	0	0

Figure 5. Historical Trends: Influent & Effluent Yearly Average cBOD₅ Concentration



5.2 Total Suspended Solids

Total suspended solids (TSS) are solids within wastewater that can be captured on a fine filter paper. They are visible in water and decrease water clarity. High concentrations of TSS can cause many problems for aquatic life.

The Permit requires testing of the effluent daily, with a maximum permitted concentration of 60 mg/L for discharge to the outfall, and 30 mg/L for discharge to Morningstar Golf Course (see Appendix B for test data). The pump sending effluent to Morningstar Golf Course is controlled by a TSS probe. The pump turns off the probe hits the 30 mg/L Morningstar TSS permit limit.

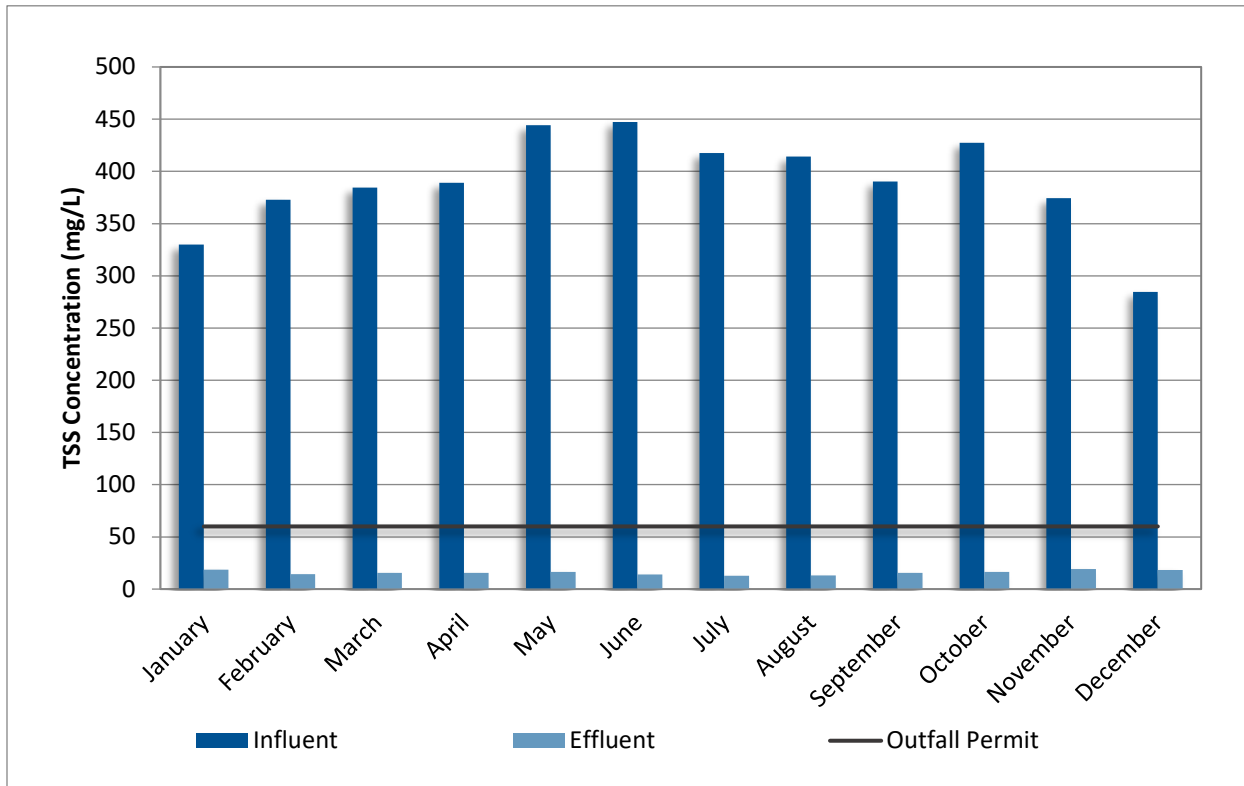
The average TSS concentration for influent and outfall effluent was 390 mg/L and 15.8 mg/L, respectively. The average TSS removal efficiency in 2023 was approximately 95.6%. Table 10 and Figure 6 present the average monthly TSS levels for the influent and effluent in 2023. The average TSS of effluent sent to Morningstar Golf Course was 10.3 mg/L. There were no TSS exceedances for the outfall effluent or for effluent sent to Morningstar Golf Course.

The RDN is undertaking an expansion of FCPC which will allow the wastewater treatment process to treat higher daily flows more efficiently.

Table 10. 2023 Influent & Effluent TSS Concentrations

Month	Influent Average TSS (mg/L)	Outfall Effluent Average TSS (mg/L)	Average % Reduction in TSS	Outfall Permit (mg/L)	Outfall Permit Non-Conformances (cBOD ₅ >60 mg/L)	Morningstar Effluent Average TSS (mg/L)	Morningstar Permit Exceedances (TSS >30 mg/L)
January	330	18.7	93.9	60	0		
February	373	14.2	95.8	60	0		
March	385	15.5	95.8	60	0		
April	389	15.5	95.8	60	0		
May	444	16.3	96.2	60	0	12.3	0
June	447	13.9	96.8	60	0	12.0	0
July	418	12.7	96.8	60	0	9.2	0
August	414	13.1	96.7	60	0	8.2	0
September	390	15.4	95.8	60	0	7.2	0
October	427	16.4	95.9	60	0		
November	374	19.3	94.6	60	0		
December	285	18.4	93.1	60	0		
Average	390	15.8	95.6			10.3	
Total					0		0

Figure 6. 2023 Influent & Effluent Monthly Average TSS Concentration



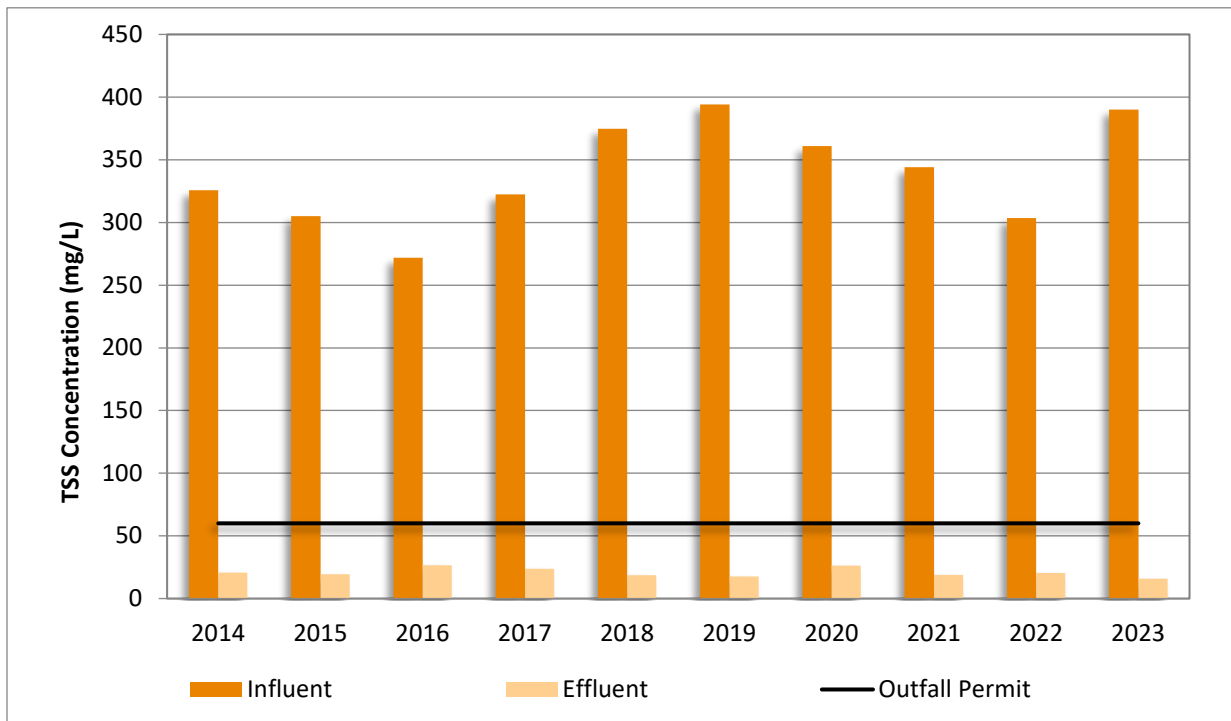
5.2.1 Historical Trends

Historical average TSS concentration in the influent and effluent, reduction efficiencies and the number of outfall and Morningstar Golf Course TSS non-compliances reported over the past 10 years are summarised in Table 9 and graphed in Figure 6. 2023 data are consistent with previous years.

Table 11. Historical Trends: Influent & Effluent TSS Concentration

Year	Influent Average TSS (mg/L)	Effluent Average TSS (mg/L)	Average % Reduction in TSS	Outfall Permit Exceedances (cBOD ₅ >60 mg/L)	Morningstar Permit Exceedances (TSS >30 mg/L)
2014	326	20.7	93.2%	2	1
2015	305	19.3	93.1%	1	-
2016	272	26.6	90.1%	24	-
2017	322	23.8	92.4%	15	-
2018	375	18.8	94.5%	1	-
2019	394	17.6	95.2%	0	0
2020	361	26.2	92.3%	30	1
2021	344	18.9	94.0%	0	0
2022	304	20.5	92.8%	0	-
2023	390	15.8	95.6%	0	0

Figure 7. Historical Trends: Influent & Effluent Yearly Average TSS Concentration



5.3 Other General Parameters

The RDN completes annual testing is completed on the effluent for the following parameters:

Alkalinity	Dissolved Sulphate	pH	Total Phosphorus
Chloride	Dissolved Sulphide	Total Cyanide	Total Organic Carbon
Dissolved Fluoride	Oil and Grease	Total Nitrogen	

A sample of the effluent is tested in September of each year by an external laboratory. In 2023, sample was taken on September 6 (see Appendix C for test results). Results of these general parameters reported over previous years are summarized in Table 12.

Results reported for 2023 for general parameters were consistent with previous years. Only one sample is taken per year so limited conclusions can be made on trending of the parameters.

Dissolved chloride and sulphate in the effluent has progressively increased until 2014 but showed a decrease after 2015.

Dissolved chloride, fluoride, and sulphate results were not requested in 2023 external sampling due to an oversight. These parameters will be requested in future years.

Other parameters remain consistent with historical data.

Table 12. Historical Trends: Effluent General Parameters

General Parameter	Units	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
pH	mg/L	7.07	7.45	7.81	8.17	7.81	7.77	7.71	7.94	7.98	7.90
Total Alkalinity *	mg/L	149	188	160	202	217	238	250	220	206	224
Dissolved Chloride	mg/L	3,460	1,830	1,500	1,600	1,400	1,920	1,400	1,700	1,700	-
Total Kjeldahl Nitrogen	mg/L	10	21	22.5	31.4	35.9	36.2	37.2	-	-	-
Total Nitrogen (as N)	mg/L	-	-	-	-	-	-	-	41.2	32.3	45.8
Total Oil and Grease	mg/L	<1.0	1	<1.0	<1.0	<1.0	<2.0	<1.0	12	<1.0	<1.0
Dissolved Sulphate	mg/L	463	266	220	248	172	270	200	250	230	-
Dissolved Sulphide	mg/L	<0.01	0.02	0.0551	0.0568	0.068	0.039	0.040	0.038	0.023	0.043
Total Cyanide	mg/L	0.003	0.002	0.00238	0.00218	<0.0050	0.00440	0.00250	<0.0050	0.00227	0.00223
Dissolved Fluoride	mg/L	0.17	0.04	0.110	0.130	0.130	<1.00	0.13	0.14	0.16	-
Total Organic Carbon	mg/L	12.6	16.2	15.8	18.1	21	19	34	22	33	30
Total Phosphorus	µg/L	2,050	2,650	2,780	2,130	3,740	2,410	4,000	2,100	2,300	4,100

* Total Alkalinity results reflect average annual results from the internal laboratory starting in 2022. Prior to 2022, this parameter was determined by external laboratory testing.

5.4 Metals

The RDN completes annual testing of the effluent for the following metals:

Aluminum (total)	Chromium (total)	Manganese (dissolved)	Selenium (total)
Arsenic (total)	Cobalt (dissolved)	Mercury (total)	Silver (total)
Barium (dissolved)	Copper (dissolved)	Molybdenum (total)	Tin (total)
Boron (dissolved)	Iron (Dissolved)	Nickel (dissolved)	Zinc (total)
Cadmium (dissolved)	Lead (total)		

A composite sample of the effluent is collected over a 24-hour period in September (a low flow month) each year and is tested by an external laboratory. In 2023, metals were sampled on September 6 (see Appendix C). Historic metals results are summarized in Tables 13 and 14. All parameters were consistent with previous years.

Table 13. Historical Trends: Effluent Total Metal Concentrations

Total Metals	Units	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Aluminum	µg/L	35	40	97.6	92	30	42.3	80	41	36	45
Arsenic	µg/L	1	0.6	1.2	0.7	0.67	0.72	0.64	0.72	0.60	0.74
Chromium	µg/L	<0.5	<0.5	9.7	<5.0	<5.0	1.26	<5.0	<5.0	<5.0	<5.0
Lead	µg/L	0.18	0.2	0.36	<1.0	<1.0	0.32	<1.0	<1.0	<1.0	<1.0
Mercury	µg/L	<0.01	<0.0025	<0.010	<0.010	0.0040	<0.010	0.0030	0.068	<0.019	<0.038
Molybdenum	µg/L	2.5	1.4	1.4	<5.0	<5.0	1.98	<5.0	<5.0	<5.0	<5.0
Selenium	µg/L	21.2	<0.5	0.28	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Silver	µg/L	<0.02	0.03	0.027	<0.10	<0.10	<0.050	<0.10	<0.10	<0.10	<0.10
Tin	µg/L	NT*	0.38	<5.0	<25	<25	0.56	<25	<25	<25	<25
Zinc	µg/L	42	29	37.2	<25	<25	24.9	34	<25	31	29

NT – Not Tested

Table 15. Historical Trends: Effluent Dissolved Metal Concentrations

Dissolved Metals	Units	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Barium	µg/L	4.8	3.8	22.7	7.3	<5.0	<5.0	3.3	78.7	<5.0	91.2
Boron	µg/L	647	510	469	570	490	635	470	550	560	650
Cadmium	µg/L	<0.01	0.02	0.024	<0.050	<0.050	0.033	<0.020	<0.050	<0.050	<0.050
Cobalt	µg/L	0.43	0.44	<0.50	<1.0	<1.0	1.67	0.47	<1.0	<1.0	<1.0
Copper	µg/L	2.3	11.6	17.6	14.1	10.8	11.7	17.1	23.0	6.7	10.5
Iron	µg/L	357	523	354	146	286	442	807	169	375	254
Manganese	µg/L	96	100	92.2	96	83.2	123	96	110	117	79.6
Nickel	µg/L	2.5	2.9	2.3	<5.0	<5.0	7.0	3.4	<5.0	<5.0	<5.0

5.5 Volatile and Semi-Volatile Compounds

The RDN completes annual testing of effluent for the following volatile and semi-volatile compounds:

Benzene	Dichloromethane	1,1-1 Trichloroethane
Chloroform	Di-n-butyl phthalate	1,1-2 Trichloroethane
Chloromethane	Ethylbenzene	Trichloroethylene
Di(2-ethylhexyl)phthalate	PCBs	Toluene
Dichlorobromomethane	Tetrachloroethylene	Total Phenols

A composite sample of the effluent is collected over a 24-hour period in September (a low flow month) each year and is tested by an external laboratory. In 2023, volatiles were sampled on September 6 (refer to Appendix C for test results). The historical average concentration of the volatile and semi-volatile compounds is summarised in Table 15. 2023 data are consistent with previous years.

Table 16. Historical Trends: Effluent Semi Volatile and Volatile Compounds

Parameter	Units	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Benzene	µg/L	<0.5	<0.5	<0.40	<0.40	1.0	<0.5	<0.40	<0.40	<0.40	<0.40
Chloroform	µg/L	<1.0	<1	<1.0	1.5	1.2	<1.0	1.4	1.2	1.2	1.1
Chloromethane	µg/L	2	<1	<1.0	<1.0	<1.0	NT	<1.0	<1.0	<1.0	<1.0
Dichlorobromomethane	µg/L	<1.0	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dichloromethane	µg/L	<1	<1	<2.0	<2.0	<2.0	<3.0	<2.0	<1.0	<2.0	<2.0
Ethylbenzene	µg/L	<0.5	<0.5	<1.0	<0.40	<0.40	<1.0	<0.40	<0.40	<0.40	<0.40
Tetrachloroethylene	µg/L	<1	<1	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50
Toluene	µg/L	<0.5	<0.5	<0.40	<0.40	1.7	<1.0	<0.40	<0.40	<0.40	<0.40
Total Phenols	mg/L	0.005	0.010	0.005	0.016	0.025	0.0087	0.0082	0.0033	0.0039	<0.0015
1,1,1-Trichloroethane	µg/L	<1	<1	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	µg/L	<1	<1	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50
Trichloroethylene	µg/L	<1	<1	<0.50	<0.50	<0.50	<1.0	<0.50	<0.50	<0.50	<0.50
Di(2-ethylhexyl)phthalate	µg/L	0.23	<0.20	<2.0	<2.0	<2.0	<1.0	<8.0	<2.0	<2.0	<2.0
Di-N-Butyl Phthalate	µg/L	<0.2	<0.2	<2.0	<2.0	<0.80	<1.0	<8.0	<2.0	<2.0	<2.0
PCBs	µg/L	<0.01	<0.009	<0.050	<0.050	<0.050	<0.050	<0.050	<0.056	<0.056	<2.5

6) Biosolids

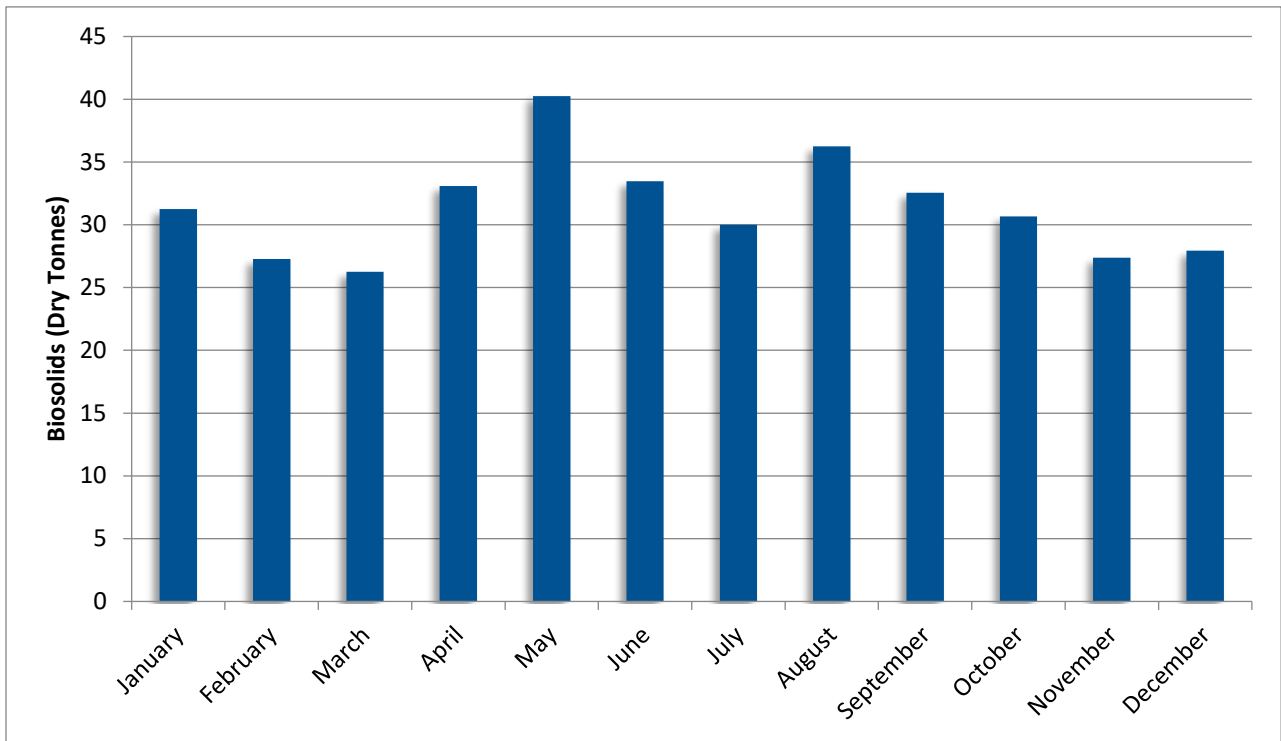
6.1 Biosolids Production

FCPCC produces Class A biosolids. The average monthly production of biosolids in 2023 is summarized in Table 16 and graphed in Figure 8.

Table 17. 2023 Biosolids Production

Month	Trucked Biosolids (Dry Tonnes)	Trucked Biosolids (Wet Tonnes)	% Solids (Dewatered)
January	31.2	98.1	31.9
February	27.3	78.9	34.6
March	26.2	84.4	31.1
April	33.1	97.4	34.0
May	40.3	118.6	33.9
June	33.5	101.0	33.1
July	30.0	87.8	34.2
August	36.2	103.8	34.9
September	32.6	101.4	34.3
October	30.7	88.9	34.5
November	27.4	80.4	34.1
December	27.9	84.0	33.3
Average	31.5	93.7	33.6
Total	378	1,125	

Figure 8. 2023 Monthly Biosolids Production (Trucked Dry Tonnes)



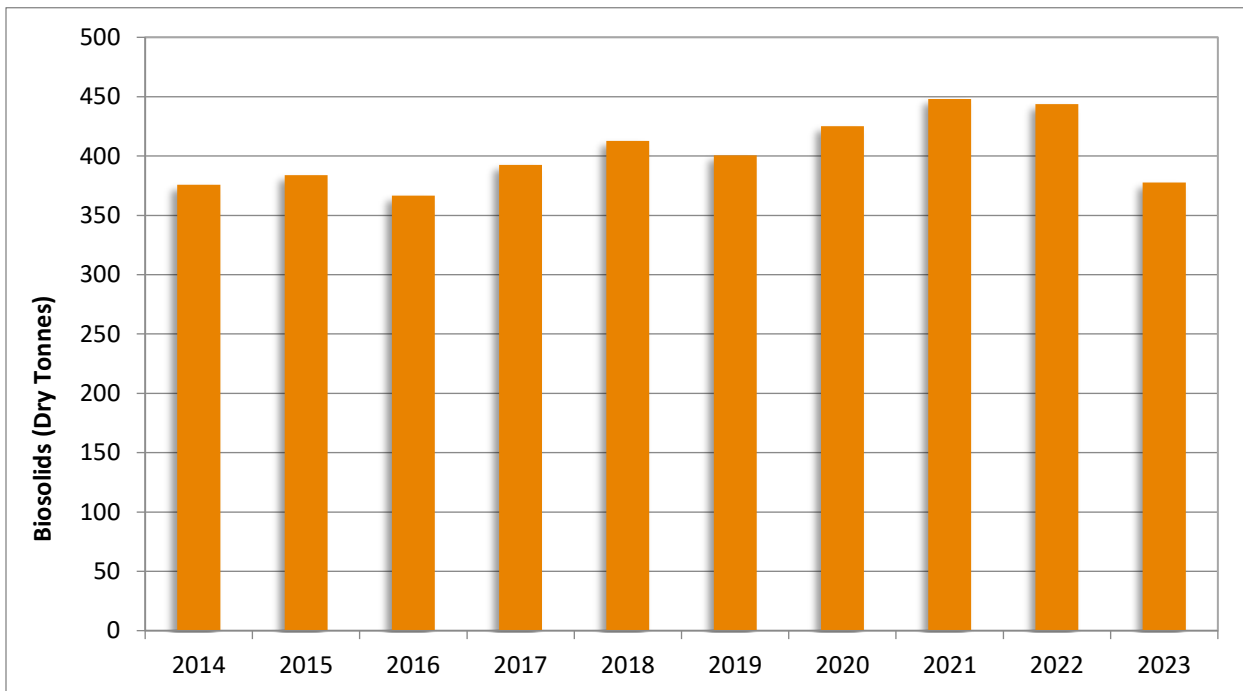
6.1.1 Historical Trends

Historical average polymer usage, total trucked solids (wet tons and dry tons) and yearly average percent solids reported for biosolids are summarized in Table 17 and graphed in Figure 9. Biosolids production decreased in 2023 in comparison to previous years.

Table 17. Historical Trends: Biosolids Production

Year	Polymer Usage (Kg/year)	Trucked Biosolids (Dry Tonnes/year)	Trucked Biosolids (Wet Tonnes/year)	% Solids (Average Pressed Solids)
2014	5,402	376	1,236.15	30.3
2015	6,566	384	1,298.93	29.5
2016	5,867	367	1,188.66	30.8
2017	4,860	392	1,260.32	31.1
2018	5,610	413	1,286.52	32.1
2019	5,481	401	1,255.85	31.9
2020	6,383	425	1,280.71	33.2
2021	4,815	448	1,299.19	34.5
2022	5,108	444	1,291.03	34.4
2023	5,618	378	1,124.71	33.6

Figure 9. Historical Trends: Biosolids Production per Year (Trucked Dry Tonnes)



6.2 Biosolids Analysis

The Organic Matter Recycling Regulation (OMRR) requires that sampling for quality criteria must be taken once per year or from every 1,000 tonnes dry weight, whichever occurs first.

Sampling to meet requirements of the Biosolids Growth Medium fabrication is conducted by SYLVIS. For more information on this sampling, please refer to Appendix G.

The RDN also conducts a program to test FCPC biosolids for quality criteria. Testing for the following parameters is conducted twice a year by an external laboratory.

Total Solids	Chromium*	Molybdenum*
Volatile Suspended Solids	Cobalt*	Nickel*
Moisture	Copper*	Phosphorus
Total Kjeldahl Nitrogen	Iron	Potassium
Arsenic*	Lead*	Selenium*
Cadmium*	Mercury*	Zinc*

*Monitoring required by the Organic Matter Recycling Regulation (OMRR).

Biosolids were tested in January and July 2023 (see Appendix C for test reports). The average concentration of these parameters, reported over previous years, is summarised in Table 16. 2023 metal concentrations were consistent with previous years' data.

All FCPC biosolids samples in 2023 met the OMRR Class A regulatory limits for metals.

Table 18.: Historical Trends: Biosolids General Parameters

Parameter	Units	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Class A	Class B
Total Solids	%	29.0	25.5	26.6	29.8	30.8	31.5	32.4	33.7	35.7	31.0	-	-
Volatile Solids	%	74.4	76.9	75.75	70.2	72.9	71.5	74.35	72.45	76.5	71.8	-	-
Moisture	%	70.9	74.5	69.65	69	69.5	68.5	67.8	66	64.5	69.0	-	-
Total Kjeldahl Nitrogen	% dry weight	2.85	4.875	4.97	5.7	5.7	6.6	3.86	5.5	4.35	4.65	-	-
Arsenic	µg/g	2.8	2.1	2.8	2.8	2.7	3.3	2.1	2.3	2.1	2.2	75	75
Cadmium	µg/g	2.1	1.9	1.9	2.1	1.4	2.1	1.8	1.6	1.3	2.0	20	20
Chromium	µg/g	25.85	19.5	24.5	27.3	27.9	37.9	35.1	37.1	26	27.7	-	1,060
Cobalt	µg/g	2.0	1.6	3.0	4.9	2.9	2.5	2.0	2.5	2.1	2.3	150	150
Copper	µg/g	832	733	702.5	807	637	798	620	602.5	531.5	677	-	2,200
Iron	µg/g	30,950	ND	ND	ND	41,400	48,800	37,900	43,800	37,200	31,500	-	-
Lead	µg/g	21.7	15.4	19.2	18.75	21.8	19.3	14.3	13.1	13.45	14.6	500	500
Mercury	µg/g	1.86	1.50	1.60	0.99	0.66	0.80	1.07	0.82	1.21	0.82	5	15
Molybdenum	µg/g	5.7	5.4	5.4	4.7	3.6	4.6	4.9	6.3	5.1	4.3	20	20
Nickel	µg/g	12.15	10.25	12.5	11.7	10.47	14.15	12.95	13.35	10.485	10.8	180	180
Phosphorus	µg/g	21,800	16,900	17,900	25,750	22,800	28,600	21,300	23,850	20,100	19,800	-	-
Potassium	µg/g	993	ND	ND	ND	727.5	964.5	759.5	986.5	776.5	833	-	-
Selenium	µg/g	5.1	4.0	3.9	4.4	3.1	4.2	3.2	3.0	2.8	3.8	14	14
Zinc	µg/g	1035	880	954.5	1175	890	1,250	1,080	1,110	918	1,270	1,850	1,850

ND – Not determined

6.3 Fecal Coliforms

OMRR requires 7 representative samples for fecal coliforms to be taken every 1,000 tonnes dry weight or once per year, whichever occurs first. The level of fecal coliforms in each Class A sample must be <1000 MPN per gram of total solids (dry weight basis).

SYLVIS conducts fecal coliform testing as the Qualified Professional for the Biosolids Growth Medium (BGM) fabrication program at Harmac. SYLVIS fecal coliform testing is summarized in the 2023 Management of RDN Biosolids (see Appendix G).

The RDN also conducts its own fecal coliform sampling. Sampling was taken of sludge at a sample point immediately downstream of the ATAD digesters. In 2023, the RDN sent ten representative samples of biosolids to an external laboratory for fecal coliform analysis (see test reports in Appendix C). All the laboratory samples met Class A limits. The geometric mean fecal coliform concentration of the biosolids from the RDN sampling in 2023 was <20 MPN/g (dry weight) and is summarized in Table 19.

Table 19. 2023 Biosolids Fecal Coliforms Concentrations

FCPCC Biosolids	
Parameter	Fecal Coliforms
Unit	MPN / g dry
4-Jan-23	<20
7-Feb-23	<20
13-Mar-23	<20
11-Apr-23	<20
15-May-23	<20
18-Jul-23	<20
8-Aug-23	<20
6-Sep-23	<20
16-Oct-23	<20
4-Dec-23	<20
Average	<20

6.4 Stabilization and Dewatering

Biosolids at FCPCC are stabilized using autothermal thermophilic aerobic digesters (ATADs). The ATADs consist of 4 digesters and 3 cooling storage cells which treat sludge collected from the bottom of the sedimentation tanks. Sludge is held in the tanks for 10 to 12 days at 45 to 65°C, during which time it is decomposed and stabilized by biological processes. Once digested, the stabilized sludge is dewatered through a centrifuge, resulting in biosolids with a moist, soil-like consistency. Significant pathogen reduction is achieved in the ATAD tanks, which create Class A biosolids (defined according to OMRR parameters). Stabilization and dewatering process data are presented in Tables 18 and 19.

Volatile Solids Reduction was determined using sampling points from the sludge entering and existing the ATADs. In previous years, Volatile Solids Reduction was determined from samples in ATAD 3 and ATAD 6. Average Volatile Solids Reduction for 2023 is presented below.

Table 20. Stabilization Process Data

Stabilization Process		
Total Mass of Sludge Delivered for Stabilization	101,683	Tons (dry)
% of TSS as VSS in Sludge Feed	84.7	%
Mass of Biosolids Remaining after Stabilization	479.2	Tons (dry)

Table 21. Dewatering Process Data

Dewatering Process		
Volume of Biosolids delivered for dewatering	16,113	m ³
Average Volatile Solids Reduction	52.72	%
% solids in biosolids dewatering feed	2.97	%
% solids in dewatered biosolids	33.6	%
Polymer dosage to aid dewatering	0.349	kg/m ³

6.5 Biosolids Management

In 2023, RDN biosolids were beneficially managed in two programs:

- Forest Fertilization
- Soil Fabrication.

6.5.1 Forest Fertilization

Forest fertilization is the biosolids management option used for GNPCC biosolids. GNPCC biosolids were land applied in a forest fertilization project managed by SYLVIS Environmental.

6.5.2 Soil Fabrication

Soil fabrication is the biosolids management option used for FCPC Biosolids. This program operates in partnership with Harmac Pacific (Harmac) at Harmac’s kraft mill site in Nanaimo. There, RDN biosolids, wood waste, and mineral soil are blended to fabricate soil for cover material for the Harmac landfill during its landfill closure activities as well as a commercial grade biosolids growing medium (BGM).

In 2023, FCPC Class A biosolids were used to fabricate BGM. Details of the soil fabrication program are provided in the 2023 Biosolids Management Summary and Compliance Report, completed by SYLVIS Environmental, and attached in Appendix G.

6.5.3 Excellence in Biosolids Award

In 2019, the Regional District of Nanaimo won the Northwest Biosolids ‘Excellence in Biosolids’ Award for the second time. This award presented by Northwest Biosolids recognizes significant contributions to the development and implementation of cost-effective and environmentally beneficial biosolids management practices. The RDN won this award previously in 2013.

7) Process Control Monitoring

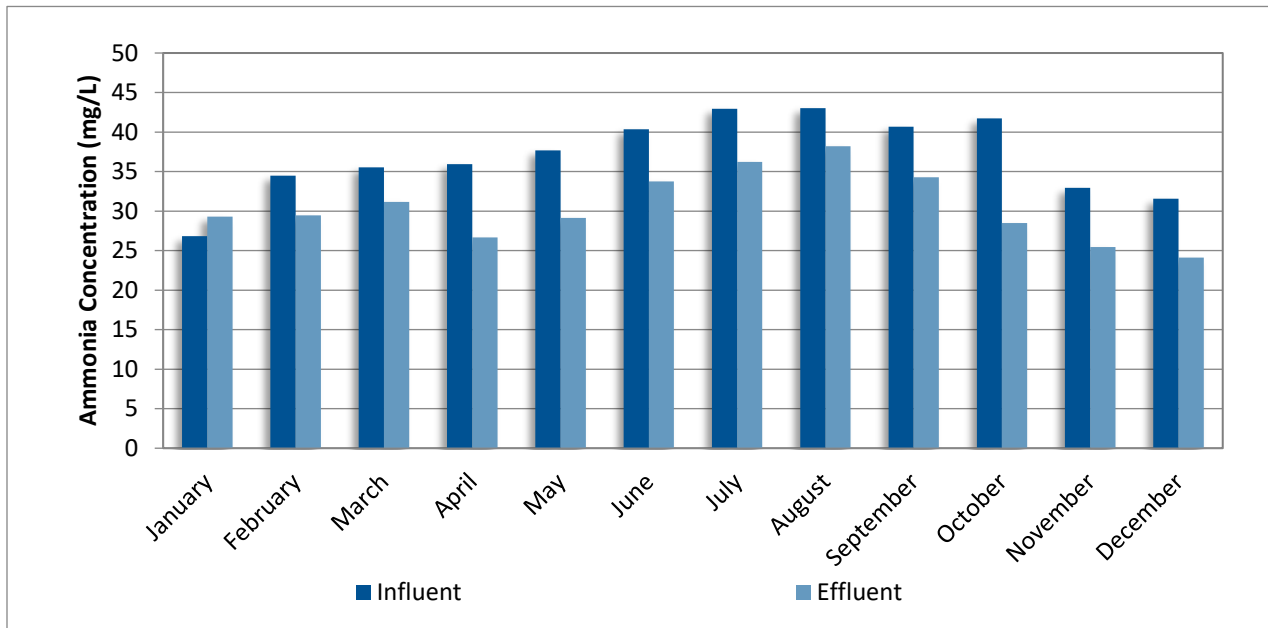
7.1 Ammonia

Ammonia is one of the typical constituents of domestic wastewater. Ammonia can be toxic to fish (freshwater and marine) and is monitored to determine potential impacts to the receiving environment. Ammonia is tested in the influent and effluent weekly. The average ammonia concentration in 2023 in the influent and effluent was 37.4 mg/L and 30.7 mg/L, respectively. Appendix B contains the weekly Ammonia test data for FCPC for 2023. Results are summarized in Table 22 and Figure 10.

Table 10. 2023 Influent & Effluent Ammonia Concentration

Month	Influent Average Ammonia (mg/L)	Effluent Average Ammonia (mg/L)	% Reduction
January	26.8	29.3	-9.2%
February	34.5	29.5	14.5%
March	35.5	31.2	12.3%
April	35.9	26.7	25.8%
May	37.7	29.1	22.7%
June	40.4	33.7	16.4%
July	43.0	36.2	15.7%
August	43.0	38.2	11.2%
September	40.7	34.3	15.7%
October	41.7	28.5	31.7%
November	32.9	25.5	22.7%
December	31.6	24.1	23.7%
Average	37.4	30.7	16.9%

Figure 10. 2023 Influent & Effluent Monthly Average Ammonia Concentration



7.2 Nitrate, Nitrite, Alkalinity

Wastewater Services' staff conduct weekly testing of the effluent for nitrate, nitrite, and alkalinity. The average monthly concentration is summarized in Table 23 and graphed in Figures 11 and 12.

Table 23. Effluent Nitrate, Nitrite, and Alkalinity

Month	Effluent Average Nitrate (NO ₃) (mg/L)	Effluent Average Nitrite (NO ₂) (mg/L)	Effluent Average Alkalinity (mg/L)
January	1.65	1.047	223
February	1.980	1.003	214
March	2.238	0.833	231
April	2.39	0.674	205
May	2.38	1.016	236
June	2.51	1.363	202
July	1.86	1.070	243
August	0.93	0.693	256
September	1.39	1.267	259
October	2.02	1.210	205
November	2.76	1.081	231
December	2.66	1.127	186
Average*	2.09	1.051	224

Figure 11. 2023 Effluent Nitrate and Nitrite Monthly Average Concentration

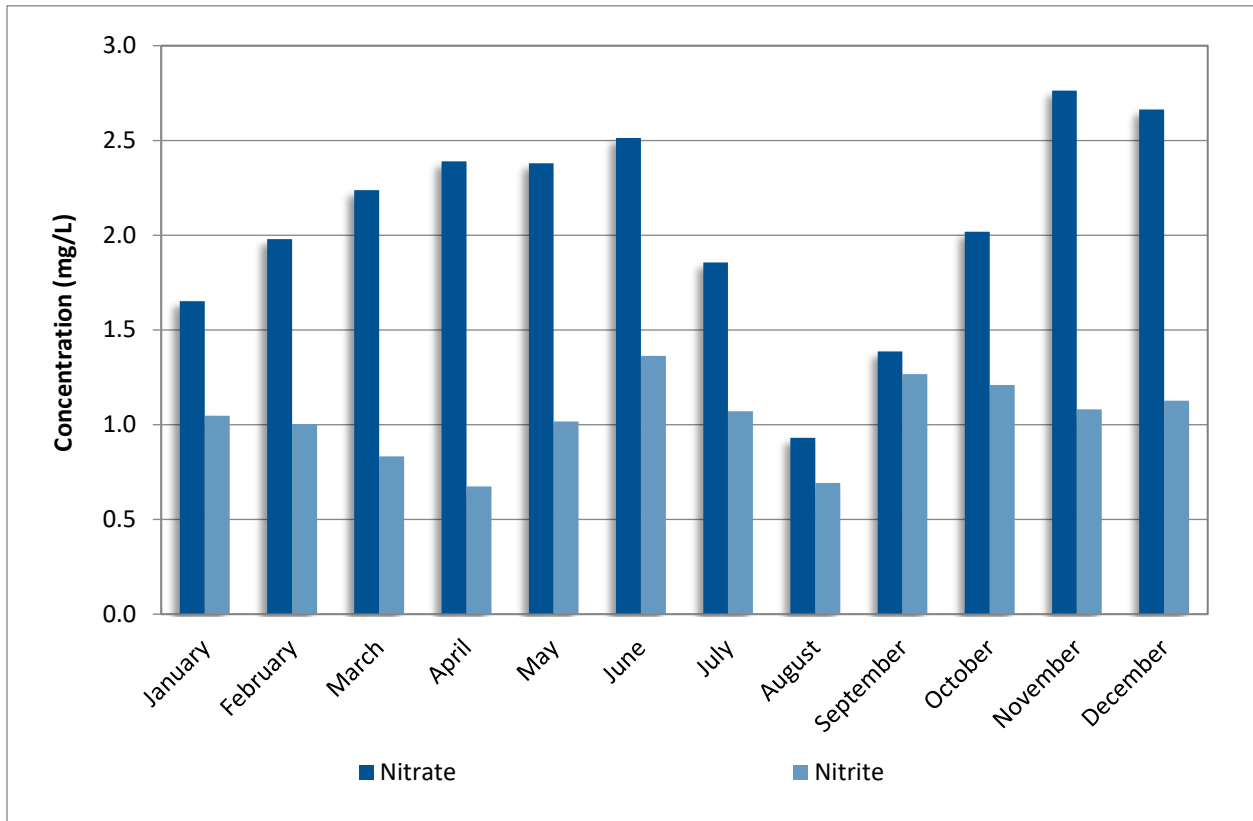
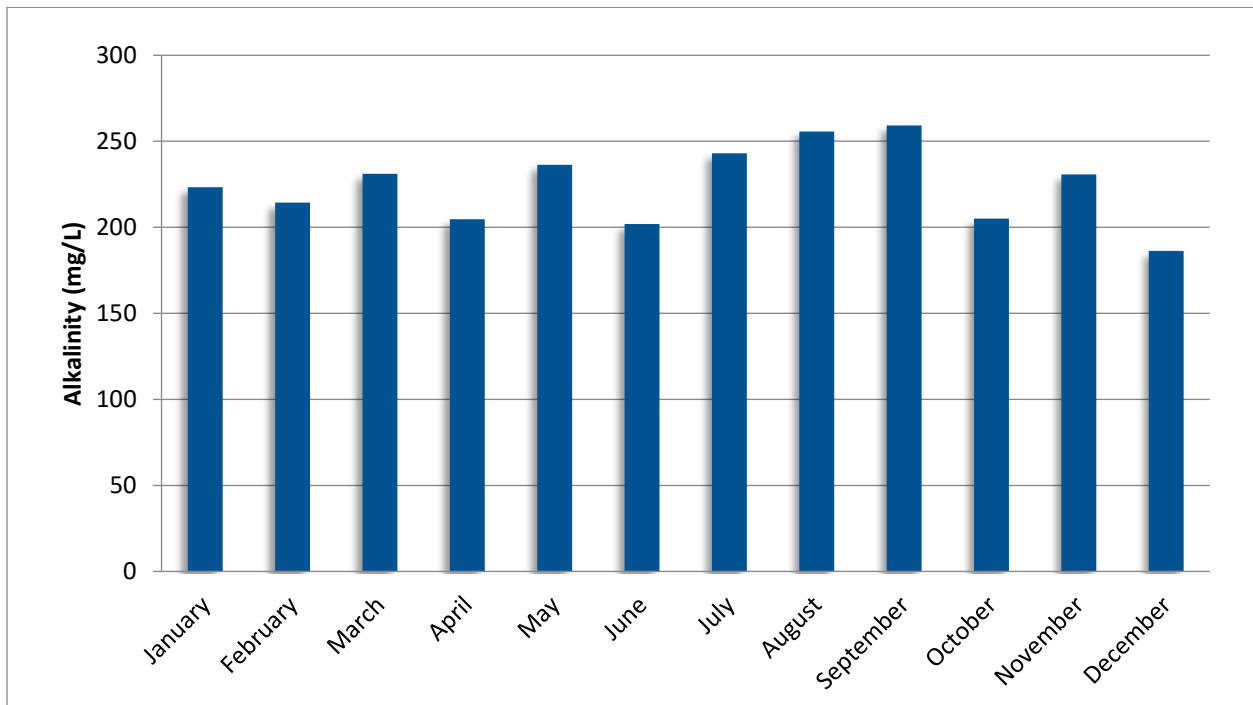


Figure 12. 2023 Effluent Alkalinity Monthly Average



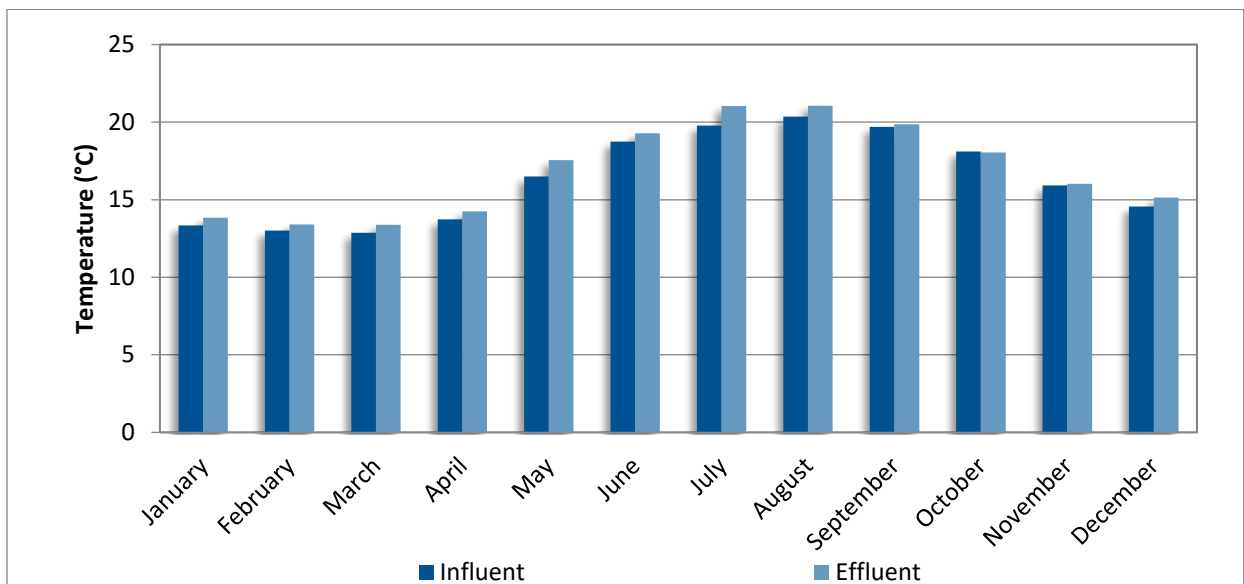
7.3 Temperature

Wastewater Services’ staff monitor the temperature of the influent and effluent daily. Temperature data for 2022 is presented in Appendix B. The average temperature for each month is summarized in Table 24 and graphed in Figure 13.

Table 24. 2023 Influent & Effluent Temperatures

Month	Average Temperature (°C)	
	Influent	Effluent
January	13.3	13.8
February	13.0	13.4
March	12.9	13.4
April	13.7	14.3
May	16.5	17.6
June	18.7	19.3
July	19.8	21.0
August	20.4	21.1
September	19.7	19.9
October	18.1	18.1
November	15.9	16.0
December	14.5	15.1
Average	16.4	16.9

Figure 13. 2023 Influent & Effluent Monthly Average Temperature



7.3.1 Historical Trends

Historical influent and effluent average temperatures reported over previous years are summarized in Table 25. 2023 data are consistent with historical data.

Table 25. Historical Trends: Influent & Effluent Average Temperature

Year	Average Temperature (°C)	
	Influent	Effluent
2014	16.6	17.2
2015	16.9	17.4
2016	16.7	17.2
2017	16.1	16.6
2018	16.3	16.9
2019	16.1	16.6
2020	16.0	16.5
2021	16.7	16.9
2022	16.1	16.8
2023	16.4	16.9

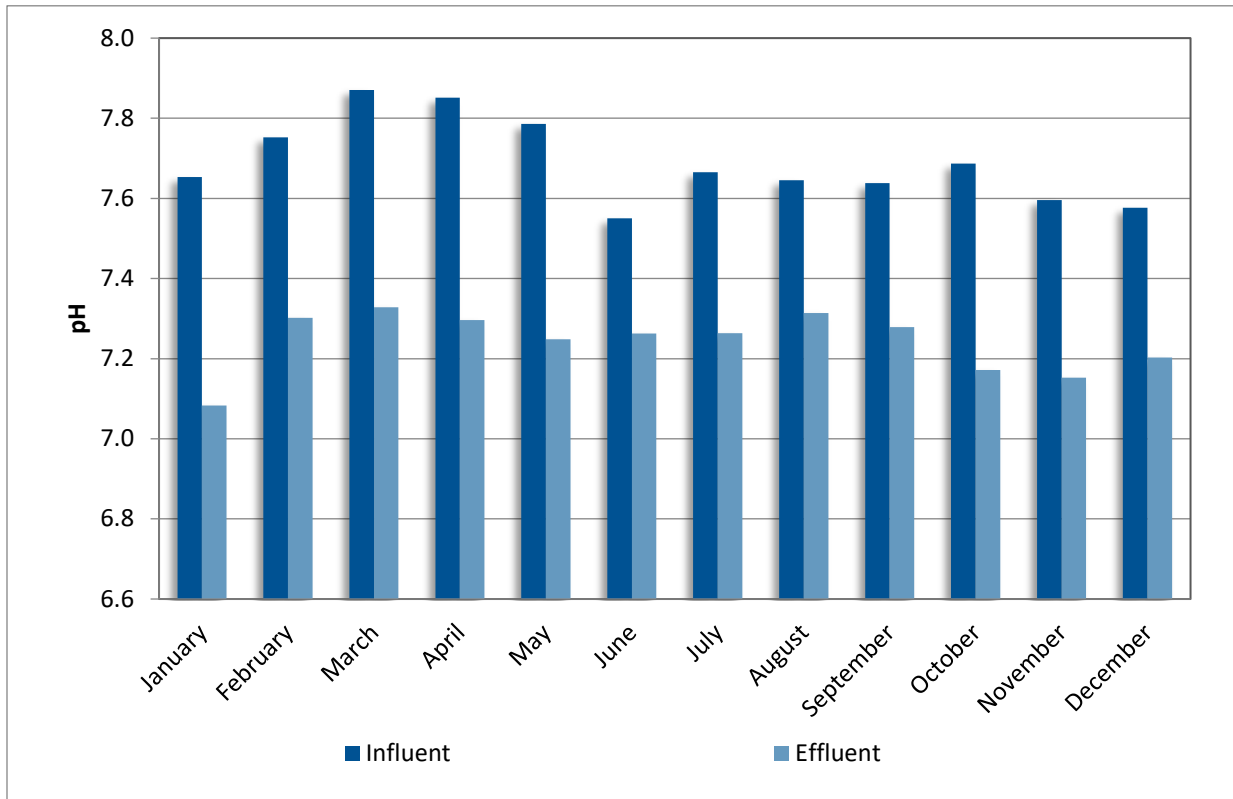
7.4 pH

Wastewater Services’ staff monitor the pH of grab samples of the influent and effluent daily. The pH data for FCPCC for 2023 is presented in Appendix B, the average monthly pH data are summarized in Table 26 and Figure 14.

Table 26. 2023 Influent & Effluent Average pH

Month	Average pH	
	Influent	Effluent
January	7.65	7.08
February	7.75	7.30
March	7.87	7.33
April	7.85	7.30
May	7.79	7.25
June	7.55	7.26
July	7.67	7.26
August	7.65	7.31
September	7.64	7.28
October	7.69	7.17
November	7.60	7.15
December	7.58	7.20
Average	7.69	7.24

Figure 14. 2023 Influent & Effluent Monthly Average pH



7.4.1 Historical Trends

Historical average influent and effluent pH values reported previous years are summarized in Table 27. 2023 data are consistent with historical data.

Table 27. Historical Trends: Influent & Effluent pH

Year	Average pH	
	Influent	Effluent
2014	7.52	6.90
2015	7.79	7.07
2016	7.84	7.22
2017	7.68	7.35
2018	7.67	7.35
2019	7.72	7.34
2020	7.59	7.30
2021	7.61	7.31
2022	7.62	7.24
2023	7.69	7.24

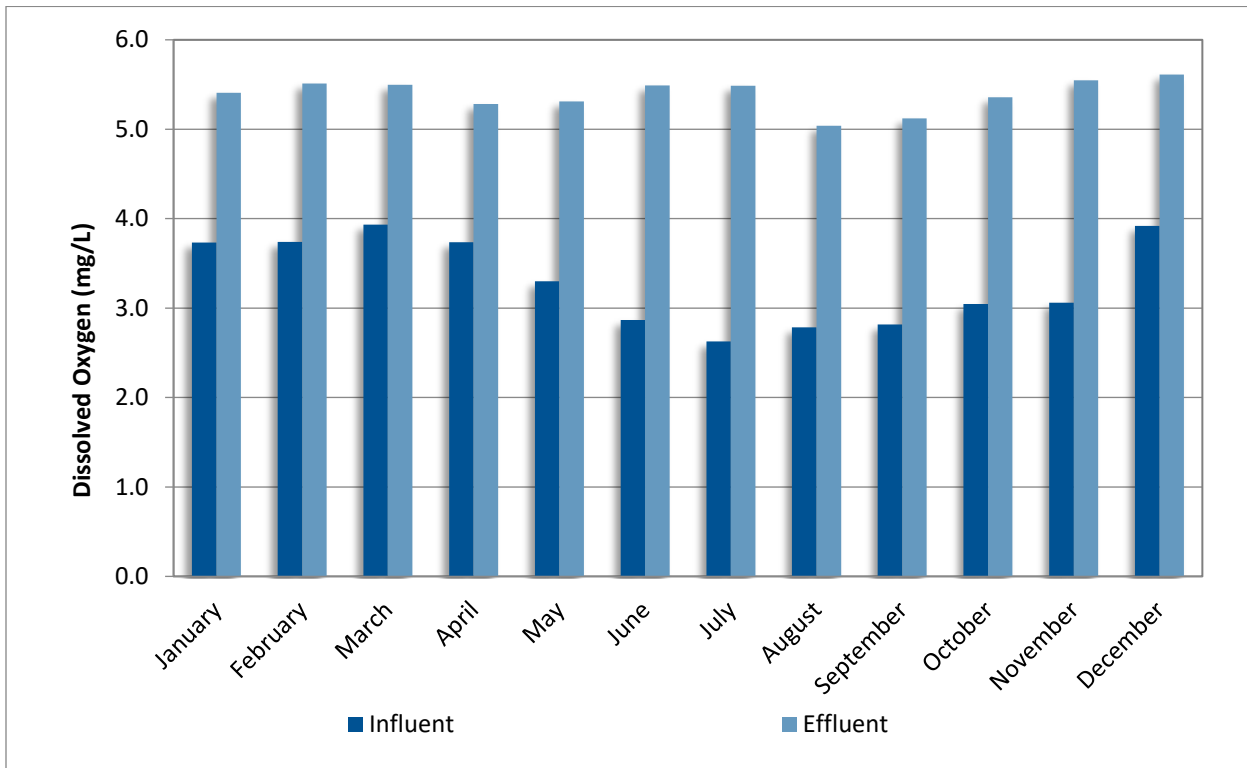
7.5 Dissolved Oxygen

The dissolved oxygen (DO) of the influent and effluent is measured daily. The average monthly DO concentrations are summarized in Table 28 and graphed in Figure 15.

Table 28. 2023 Influent & Effluent Dissolved Oxygen Concentration

Month	Average Dissolved Oxygen (mg/L)	
	Influent	Effluent
January	3.73	5.41
February	3.74	5.51
March	3.93	5.50
April	3.74	5.28
May	3.30	5.31
June	2.87	5.49
July	2.63	5.49
August	2.78	5.04
September	2.82	5.12
October	3.04	5.36
November	3.06	5.55
December	3.92	5.61
Average	3.30	5.39

Figure 15. 2023 Influent & Effluent Average Dissolved Oxygen Concentration



7.5.1 Historical Trends

Historical influent and effluent average DO concentration are summarized in Table 29. 2023 data are consistent with historical data.

Table 29. Historical Trends: Influent & Effluent Dissolved Oxygen Concentration

Year	Average Dissolved Oxygen (mg/L)	
	Influent	Effluent
2014	3.04	4.71
2015	3.26	5.11
2016	2.62	4.25
2017	3.44	4.91
2018	3.45	5.01
2019	3.08	5.20
2020	3.36	5.51
2021	2.99	5.32
2022	3.05	5.92
2023	3.30	5.39

8) Resource Consumption

8.1 Chemical Consumption

Table 30 summarizes the cost of chemicals used in the treatment process in 2023.

Table 30. 2023 Chemical Consumption

Chemical	Consumption	Units	Cost (\$)*	Use
Dry Polymer (W-Hydrofloc 1622)	5,618	Kg	\$53,648	Dewatering
Liquid Polymer (ClearFloc CE405)	4,398	Kg	\$35,620	Thickening
Caustic Soda	1,579	Kg	\$1,601	Odour Control
Ferrous Chloride	143,223	kg	\$80,921	Odour Control
Sodium Hypochloride	29,082	L	\$27,919	Odour Control
Actizyme			\$4,463	Secondary Treatment (Microbiological Growth)
Other			\$7,475	Various chemicals
Total			\$211,647	

8.1.2 Historical Trends

Annual costs of chemicals consumed in over the last ten years are summarised in Table 31. Pricing has increased since 2020 due the market trends and supply chain issues.

Table 31. Historical Trends: Chemical Costs

Year	Dewatering Polymer	Thickening Polymer	Secondary Treatment Polymer	Caustic Soda	Ferrous Chloride	Sodium Hypochlorite	De-Odorizer	De-Foamer	Hydrogen Peroxide	Actizyme	Other	Total
2014	\$41,760	\$17,785	\$6,034	\$9,630	\$8,606	\$11,190	\$1,935	\$2,410	-			\$99,350
2015	\$42,680	\$14,978	\$3,375	\$7,241	\$9,021	\$12,348	\$1,820	\$5,146	-			\$96,608
2016	\$38,137	\$13,627	\$9,563	\$7,260	\$13,015	\$10,149	\$0	\$0	-			\$91,752
2017	\$31,592	\$16,288	\$15,754	\$393	\$15,976	\$11,673	\$2,018	\$2,759	-			\$96,453
2018	\$36,467	\$21,980	\$133	\$1,726	\$20,798	\$15,899	\$1,995	\$1,576	-			\$100,574
2019	\$35,628	\$28,071	-	\$2,060	\$19,974	\$34,576	-	-	\$1,862			\$122,172
2020	\$41,488	\$27,510	-	\$879	\$20,696	\$24,608	-	-	\$3,724			\$118,905
2021	\$32,982	\$25,279	-	\$7,469	\$23,765	\$32,923	-	\$3,991	-			\$126,409
2022	\$45,050	\$25,824	-	\$8,091	\$52,306	\$42,408	-	\$4,026	-	\$4,463		\$182,168
2023	\$53,648	\$35,620	-	\$1,601	\$80,921	\$27,919	-	-	-	\$4,463	\$7,475	\$211,647

Note:

1. In 2014, use of ferrous chloride was discontinued at Hall Road pump station. Due to a corrosion of the ferrous chloride tank at Bay Avenue pump station, ferrous was only used at FCPC prior to 2017. It is now only added to the process at FCPC.

8.2 Electrical Consumption

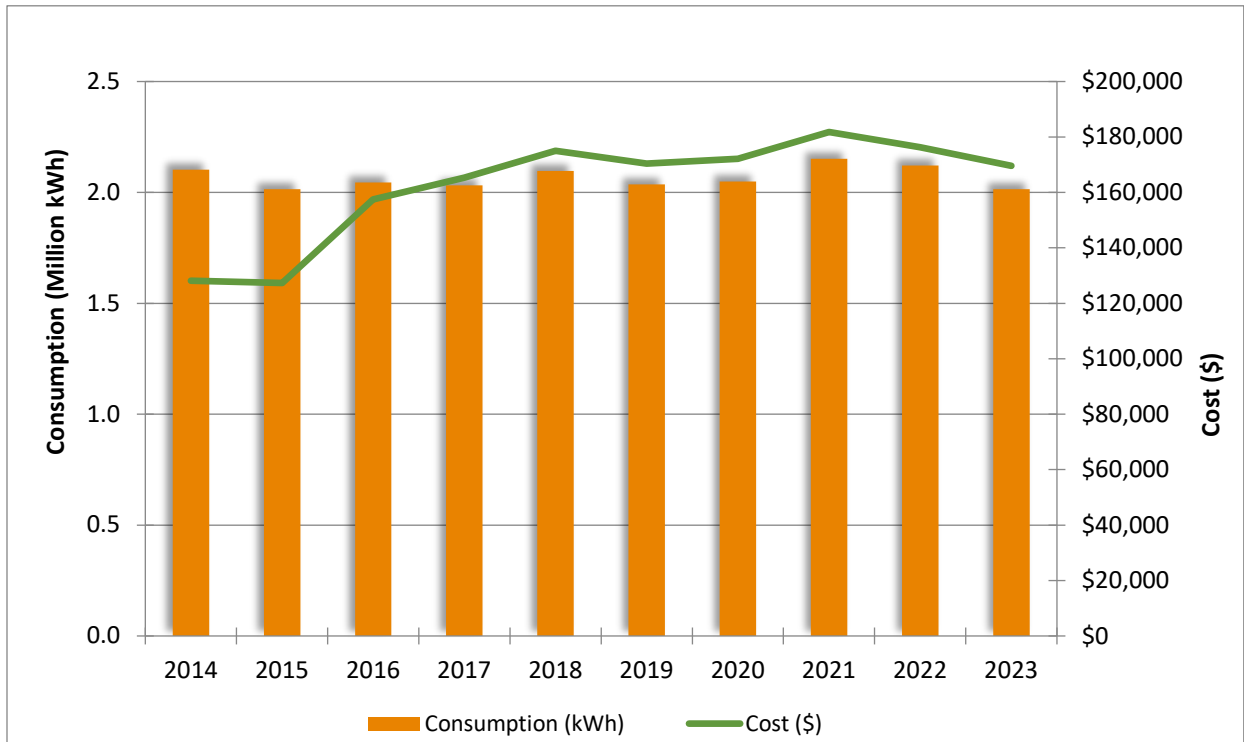
Historical annual electrical consumption and costs are summarised in Table 32 and graphed in Figure 16. Note: this section reports electrical consumption at the treatment plant only (pump stations are excluded). The cost of electricity excludes federal and provincial taxes.

Table 32. Historical Trends: FCPC Electrical Consumption

Year	Consumption (kWh)	Cost (\$)
2014	2,103,120	\$128,146
2015	2,014,928	\$127,321
2016	2,044,800	\$157,473
2017	2,031,840	\$165,277
2018	2,097,360	\$174,964
2019	2,035,440	\$170,450
2020	2,048,974	\$172,096
2021	2,152,216	\$181,784
2022	2,120,888	\$176,288
2023	2,015,041	\$169,614

Note: Electrical consumption at the treatment plant only (pump stations are excluded).

Figure 16. Historical Trends: FCPC Electrical Consumption and Costs (Treatment Plant Only)



8.3 Water Consumption

Water consumption at FCPC for 2023 was estimated at 1,937 m³ using water invoices. Table 33 contains the water consumption records over the last eight years. There have been considerable decreases in water consumption due to proactive water monitoring and increased use of reclaimed water in treatment processes. Water use has declined to a new technology to pressurize the seals on pumps using air pressure and water as opposed to constant water flow. Note: this is water consumption at the treatment plant only (pump stations are excluded).

Table 33. Historical Trends: FCPC Water Consumption

Year	Consumption (m ³)
2014	8,539*
2015	5,109
2016	4,575
2017	2,013
2018	4,894
2019	6,160
2020	4,815
2021	4,356
2022	2,324
2023	1,937

Notes *2014 Water Consumption obtained from WaterTrax records. All other years were from invoices.

9) Odour

Odours at the FCPC were a significant concern prior to 2000, and considerable progress has been made in reducing odours at the FCPC facility. The odour control system at FCPC now includes two bioscrubbers, one chemical scrubber, and one biofilter.

RDN staff will continue to monitor the effectiveness of odour control initiatives to ensure the impacts to neighborhoods adjacent to the plant are minimized. The RDN acknowledges the assistance and input from residents in addressing air quality issues around the FCPC.

9.1 Operational Procedures

Wastewater that enters FCPC comes mainly from domestic sources. Tourism in the summer months substantially increases the flows to the treatment plant, as well as results in more solids. Winter flows are higher, but the solids concentration is lower during this time. TSS and cBOD₅ are measured in the influent and effluent to determine the strength of the wastewater. A higher strength of wastewater in the summer appears to correlate to a higher level of odours throughout the treatment plant.

Influent and effluent temperatures increase during the summer months, thereby also increasing odours. Increased temperature releases additional gas and vapour into the atmosphere causing odours. As a result, odour reports increase in the summer.

The FCPC staff have a schedule of routine duties that have an impact on odours. In 2013, the air flow through the trickling filters was reversed to avoid stripping odorous compounds and improve odour conditions at the plant. In 2020, the media for the bio-filters was replaced. In 2022, repairs were made to the trickling filter piping which have significantly reduced the number of odour concerns. In 2023, repairs were also completed to the chemical scrubber and replaced the dewatering biofilter media.

9.2 Odour Records

The most common sources of odours at wastewater treatment plants are ammonia and hydrogen sulfide gases. At FCPC, more odour reports are typically received in the summer months due to septage dumping (septic trucks) and higher temperatures resulting in increased biological activity. The concentration of hydrogen sulfide gas in the influent also increases in the summer months.

Odour reports received at FCPC are routinely recorded on a form and entered into the department's Environmental Management System. The location of the odour, time of day, weather conditions, and current activities at the plant are noted along with the report. Through this system, the Chief Operator and Senior Operator are notified of all reports within 24 hours.

In previous years, many of the odour reports were mistaken as odours from FCPC but were due to odours from herring roe. Herring spawn along the beaches near FCPC in the spring and the rotting of these eggs later in the season produces strong odours near the treatment plant. There were no issues with roe in 2022.

The number of odour reports decreased after 2021 to previous years. This is likely related to replacement of the media in the biofilters at FCPC in 2020 and the trickling filter piping repair in 2022.

Appendix D contains further information on the 15 odour reports received in 2023.

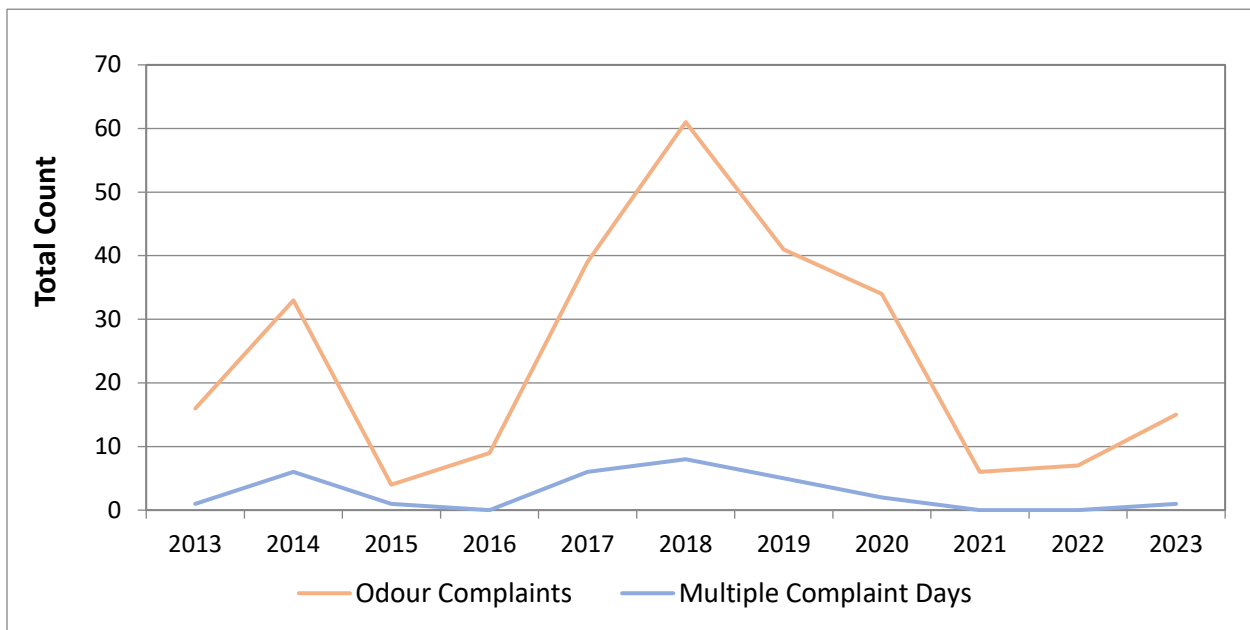
9.2.1 Historical Trends

The odour reports over the last 10 years are summarized in Table 34 and graphed in Figure 17.

Table 34. Historical Trends: FCPCC - Number of Odour Reports

Year	Odour Reports	Multiple Complaint Days
2014	33	6
2015	4	1
2016	9	0
2017	39	6
2018	61	8
2019	41	5
2020	34	2
2021	6	0
2022	7	0
2023	15	1

Figure 17. Historical Trends: FCPCC Odour Reports



9.3 Odour Episodes

An odour episode is any disruption in the regular operation of the treatment plant that may cause odour.

- An odour concern in May was related to the cleaning out of the ATAD digesters at FCPCC.
- An odour concern in October was attributed to replacement of the biofilter media in the dewatering building.

9.4 Future Plans

RDN staff will continue to monitor the effectiveness of odour control initiatives to ensure that the impacts on adjacent neighborhoods are minimized.

The RDN has been working in partnership with Vancouver Island University (VIU) researchers to identify, locate, and monitor sources of odours near FCPC. Monitoring at FCPC was ongoing in 2023 and identified several odour control systems at FCPC which could be made more efficient. The design of the expansion project will incorporate the monitoring results. The RDN also established a long-term agreement with VIU for an odour monitoring program.

The RDN is also finalizing Detailed Design of the FCPC Expansion and Odour Control Upgrade. The project will include significant odour control upgrades at the existing plant and the expansion site.

10) Septage Receiving

The total combined volume of Septage and Pump & Haul discharged in 2023 was 2,352,171 Imperial gallons (10,693 m³). This volume does not include discharge of NBPC sludge to FCPC. These volumes are tabulated in the 2023 NBPC Annual Report.

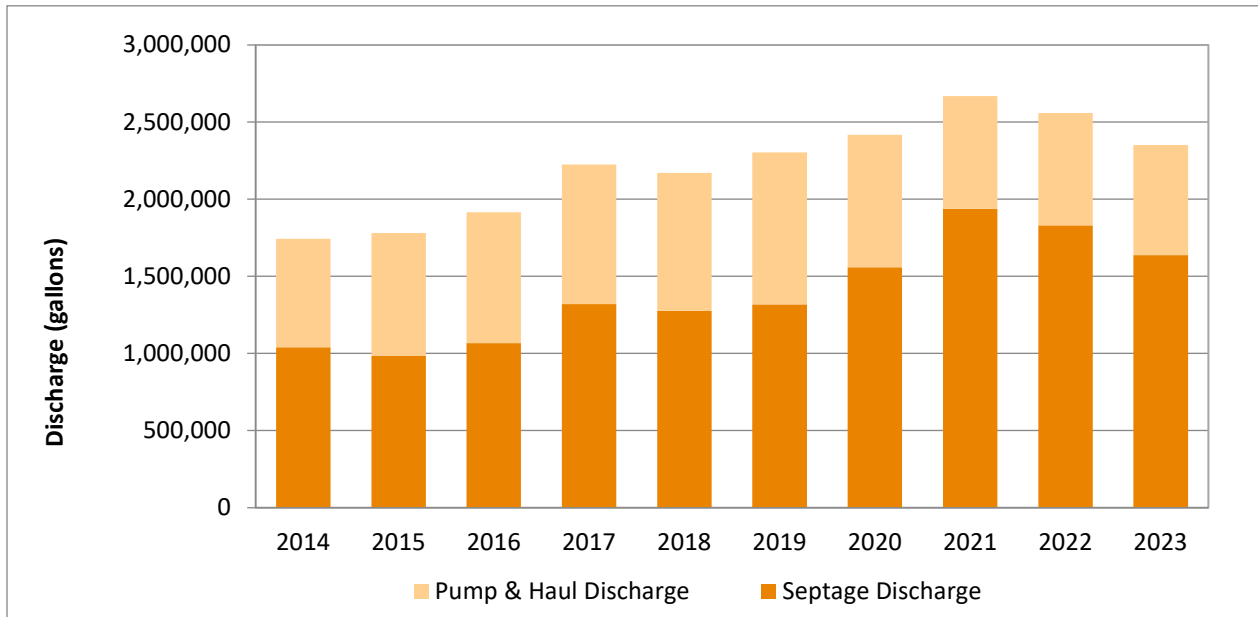
10.1 Historical Trends

The volumes of Septage and Pump & Haul waste discharged over the past ten years are summarised in Table 35 and graphed in Figure 18. The volume received has shown an increasing trend. The volume peaked in 2021 and has been gradually decreasing since then. This is likely related to better tracking of volumes discharged due to the installation of a septage meter.

Table 35. Historical Trends: Septage and Pump & Haul Discharged at FCPC

Year	Total Septage (Imperial Gallons)	Total Pump & Haul (Imperial Gallons)	Combined Total (Imperial Gallons)	Combined Total (m ³ /year)
2014	1,039,564	703,950	1,743,514	7,926
2015	986,594	795,197	1,781,791	8,100
2016	1,067,458	847,500	1,914,958	8,706
2017	1,320,987	903,700	2,224,687	10,114
2018	1,277,508	893,594	2,171,102	9,870
2019	1,318,518	984,713	2,303,231	10,471
2020	1,559,241	859,025	2,418,266	10,994
2021	1,938,308	729,999	2,668,307	12,130
2022	1,831,525	726,302	2,557,827	11,628
2023	1,638,123	714,048	2,352,171	10,693

Figure 18. Historical Trends: Annual Septage and Pump & Haul Waste Discharged at FCPC



10.2 Septage Testing

Septage used to be tested quarterly for a series of parameters. In December 2013, the monitoring program discontinued because:

- Sampling of septage is not required for any regulatory authorities as it enters the main waste stream where the final effluent is tested before being discharged to the receiving environment.
- Sufficient historical data created a reference and determined that septage had a negligible impact on overall effluent quality.
- A random sampling program that targets haulers directly may better detect the discharge of unauthorized waste.

In 2019, the RDN implemented a new sampling protocol for testing of septage discharged by haulers at FCPC. One hauler per quarter was randomly selected, their discharge was tested for a variety of parameters, and results were compared to the Trucked Liquid Waste Rates and Regulations Bylaw No. 1732.

The random septage sampling program has not occurred since 2020, however. Sampling safety issues and bylaw limit review will need to be resolved before this program is resumed.

11) Contributory Population and Remaining Plant Capacity

The current FCPC plant operating capacity is designed for an average daily flow of 12,000 m³/day, with a maximum daily flow capacity of 18,360 m³/day. Wastewater Services continues to install new

equipment and upgrade existing technology to ensure the future carrying capacity of the treatment plant is adequate and permit levels are not exceeded.

In 2023, the combined average daily flow from FCPC was 10,417.3 m³/day with a maximum daily discharge of 14,663.0 m³/day. The estimated population serviced in 2023 was 29,329 with a projected annual growth rate of approximately 1.39 %.

The LWMP states that FCPC will likely need to be expanded between 2018 and 2025. In 2017, the RDN commissioned a preliminary design study to evaluate expansion options for FCPC. The detailed design study for the FCPC Stage 4 expansion and Odour Control Upgrades was ongoing in 2023. The RDN is planning to issue the project to tender in early 2025.

12) Environmental Incidents

As part of the RDN's ISO 14001 Environmental Management System certification, records are maintained regarding any environmental incidents that are associated with the RDN's wastewater infrastructure and treatment facilities including spills, leaks, and fires. Environmental incidents may be related to spills, leaks, or fires from the treatment plant, gravity sewer interceptor and force mains conveying wastewater to FCPC.

- On September 20, 2023, there was an environmental incident related to spill from the digested sludge feed line pipe. The leak occurred when the centrifuge was shut down for the day. Operators were near the pipe and immediately identified the leak. Sludge spilled on the parking lot and on the grass near the Morningstar Creek. It is believed that sludge did not enter the creek. Operations exposed and repaired the pipe, cleaned up the spill, and submitted an end of spill report to regulatory agencies.

More information on this Environmental Incident can be found in Appendix E.

13) Conditional Management Plan

On May 1, 2012, a Conditional Management Plan (CMP) for FCPC came into effect. A CMP is an agreement between Canadian Food Inspection Agency, Environment Canada, Fisheries and Oceans Canada, the British Columbia Ministry of Environment, and the RDN.

The original CMP was renewed several times. The current agreement expires January 31, 2025.

The key objectives of the agreement are as follows:

- Provides enhanced management of shellfish harvesting in the Conditionally Classified Harvest Areas adjacent to the FCPC.
- Outlines the roles and responsibilities of the signatories in the event of a discharge of wastewater into the marine environment from the collection system pump stations that carry wastewater to FCPC.

No closures or re-openings occurred in 2023. Please refer to Appendix F for the 2023 CMP Annual Report.

14) Facility Upgrades & Major Projects

14.1 Upgrades and Repairs Completed in 2023

- ATAD Cleaning
- Lee Road and Hall Road Operator Platform Replacement
- Lee Road Genset Installation
- Odour Control repairs to chemical scrubber.

14.2 Studies and Projects Completed in 2023

- FCPC Stage 4 Expansion and Odour Control Upgrade Detailed Design (ongoing)
- Bay Ave Pump Station Upgrade Construction
- Reclaimed water study
- VIU Odour Monitoring Study.
- Contaminants of Emerging Concern Study.

14.3 Upgrades and Repairs Planned for 2024

- Centrifuge #1 Rotating Assembly
- Bay Avenue Pump Station Replacement (Completion of Project)
- Qualicum Beach manhole repairs.

14.4 Studies and Projects Planned for 2024

- FCPC Stage 4 Expansion and Odour Control Upgrade Detailed Design (ongoing). The tendering of this project is planned for 2025
- Bay Ave Pump Station Upgrade Construction (to be completed)
- ISO 14001:2015 Surveillance Audit.
- FCPC Biosolids PFAS project.

15) Resource Recovery

15.1 Biosolids Reuse

Since 1999, RDN biosolids have been beneficially used in agriculture, landfill closures, mine reclamation, and forest fertilization. Biosolids management in 2023 is discussed in Section 6.5.

15.2 Effluent Reuse

The reuse of effluent in operational processes at FCPCC has decreased the plant's demand for potable water from the community's supply. Effluent was reused to irrigate Morningstar Golf Course in 2023.

15.3 Solid Waste Recycling

Wastewater Services has a general recycling program at the treatment plant, initiated as part of the department's Environmental Management System, and continues to recycle waste oils, cardboard, metals, paints and paint thinners.

16) Education Programs

16.1 Source Control

In November 2015, the Board approved the new Source Control Bylaw No. 1730 which replaces the old Bylaw No. 1225. This bylaw regulates the discharge of waste into any sewer or drain connected to a sewage facility operated by the RDN. The new bylaw provides a process for issuing Waste Discharge Permits and a new fee structure based on waste strength and volume. The bylaw applies to discharges in municipal collection systems. The Bylaw also contains new prohibited waste items and new provisions for fees and enforcement.

In January 2017, the RDN Board adopted the new Trucked Liquid Waste Rates and Regulations Bylaw No. 1732 which replaces Bylaw Nos. 988, 1218, and 1224. Bylaw No. 1732 introduced more source control provisions including an expanded schedule of prohibited wastes and a new a schedule of restricted wastes. It also introduced more enforcement tools.

16.2 Water Conservation

The RDN has a water conservation and outreach program called Team WaterSmart for municipalities in the region and electoral areas.

The RDN's Board also recently approved a new Water Conservation Plan in 2020. This plan was completed in collaboration with water conservation planning work done by the City of Parksville, Town of Qualicum Beach, and other member municipalities.

16.3 Open House

Open houses give the public an opportunity to tour the facilities, learn about recent upgrades, browse information, and ask questions. There was an Open House at FCPCC on June 3, 2023.

16.4 SepticSmart

SepticSmart is an RDN educational program that provides information on septic system operation and maintenance. It aims to prolong the life of functioning systems in the region. The SepticSmart program includes an information package, annual workshops and a rebate program. More information on the SepticSmart Program is available at: <https://www.rdn.bc.ca/septicsmart>.

Two SepticSmart workshops were held in 2023.

In 2014, the RDN launched the SepticSmart Rebate program to: 1) make it easier for residents to manage septic system maintenance, 2) promote long-term maintenance habits, and 3) maximize the longevity of existing onsite systems. The SepticSmart Rebate program was offered in 2023. To date, more than \$365,000 in rebates have been issued to homeowners towards septic tank repairs and maintenance as part of this program.

16.5 Liquid Waste Management Plan

The RDN Liquid Waste Management Plan (LWMP) is a 20-year plan to support sustainable wastewater management in the region. This plan authorizes the RDN to find community-driven and cost-effective solutions to protect public health and achieve a standard level of wastewater treatment over a reasonable timeframe. The BC Minister of the Environment approved the RDN's LWMP in October 2014. An annual report on LWMP implementation will be submitted under separate cover in June.

In December 2023, the RDN submitted a request to the Province of BC for an LWMP Amendment.

16.6 Website

The RDN's Wastewater Services department website www.rdn.bc.ca/wastewater-services is regularly updated and provides education material related to wastewater treatment, environmental management, pollution prevention and septic system maintenance (the SepticSmart program).

The [Get Involved](#) portion of the RDN website is an online public engagement space that hosts outreach information specific to the regional projects. In 2023, the following FCPC projects were highlighted on the Get Involved page:

- [FCPC Expansion and Odour Control Upgrade Project](#)
- [Bay Avenue Pump Station Replacement](#).

17) Conclusions

Table 36 and 37 summarize the 2023 permit monitoring data for FCPC and Morningstar Golf Course respectively:

Table 36. FCPC Summary of Compliance

Summary of Compliance	Permit	2023	Permit Exceedances
Maximum Daily Flow (Outfall)	16,000 m ³ /day	14,663.0 m ³ /day	0
Average Daily Flow	-	10,217.9 m ³ /day	
Average Daily cBOD ₅ (Outfall)	45 mg/L	12.3 mg/L	0
Average Daily TSS (Outfall)	60 mg/L	15.8 mg/L	0

Table 37. FCPC Discharge to Morningstar Golf Course Summary of Compliance

Summary of Compliance	Permit	2023	Permit Exceedances
Maximum Daily Flow	1,370 m ³ /day	1,167 m ³ /day	0
Average Daily cBOD ₅	20 mg/L	8.85 mg/L	0
Average Daily TSS	30 mg/L	10.3 mg/L	0

17.1 Flows

The average daily flow discharged from the treatment plant and outfall in 2023 was 10,417.3 m³/day. The total annual flow was 3,802,325.6 m³. The highest daily outfall flow was 14,663.0 m³/day. There were no flow maximum day exceedances in 2023.

The average daily flow to the outfall in 2023 was 10,217.6 m³/day. The total annual flow was 3,729,410 m³. The highest daily outfall flow was 14,663.0 m³/day. There were no flow maximum day exceedances in 2023.

From May to September, effluent was discharged to lagoons on Morningstar Golf Course for irrigation for a total of 79 days. The Morningstar Golf Course effluent reuse program resumed in 2023. The maximum permitted flow of that can be discharged to the lagoons is 1,370 m³/day. The total volume of effluent discharged the Morningstar Golf Course effluent reuse program in 2023 was 72,915.5 m³.

17.2 Carbonaceous Biochemical Oxygen Demand (cBOD₅)

The average cBOD₅ concentration for influent and outfall effluent was 231 mg/L and 12.3 mg/L, respectively. The average cBOD₅ removal efficiency in 2023 was approximately 94.5%. The average cBOD₅ concentration for effluent discharged to Morningstar Golf Course was 8.85 mg/L.

There were no cBOD₅ exceedances for the FCPC effluent, or for discharge to the Morningstar Golf Course effluent reuse program.

17.3 Total Suspended Solids (TSS)

The average TSS concentration for influent and outfall effluent was 390 mg/L and 15.8 mg/L, respectively. The average TSS removal efficiency in 2023 was approximately 95.6%. The average cBOD₅ concentration for effluent discharged to Morningstar Golf Course was 10.3 mg/L.

There were no TSS permit exceedances in 2023 of the effluent to the outfall or for discharge to Morningstar Golf Course.

17.4 General Parameters, Metals, Volatile and Semi-Volatile Compounds

Results reported for 2023 for all general parameters, metals, volatile and semi-volatile compounds were consistent with previous years. Note, only one sample is taken per year so limited conclusions can be made on trending of the parameters.

17.5 Biosolids Quality

SYLVIS conducts fecal coliform and full parameter testing as the Qualified Professional for the biosolids soil fabrication program at Harmac. SYLVIS test results are summarized in the 2023 Management of RDN Biosolids (see Appendix G).

In the RDN sampling program, FCPC biosolids met Class A standards for metals and fecal coliforms. Ten fecal coliform samples and two full parameter samples were taken.

Appendix A – Waste Management Permit No. PE-4200 & Amendments



Province of
British Columbia

Ministry of
Environment

Vancouver Island Region :
Regional Headquarters
2569 Kenworth Road
Nanaimo
British Columbia
V9T 4P7
Telephone: (604) 758-3951

JUL 10 1990

REGISTERED MAIL

File: PE-4200

Regional District of Nanaimo
6300 Hammond Bay Road
Lantzville, British Columbia
V0R 2H0

Gentlemen:

LETTER OF TRANSMITTAL

Enclosed is a copy of amended Permit No. PE-4200, issued under the provisions of the Waste Management Act, in the name of Regional District of Nanaimo. Your attention is respectfully directed to the terms and conditions outlined in the Permit. An annual fee for Permit No. PE-4200 will be determined on the basis of your industrial code and capacity in accordance with the Waste Management Fees Regulation.

The administration of this Permit will be carried out by staff from our Regional Office located at 2569 Kenworth Road, Nanaimo, British Columbia, V9T 4P7 (telephone 758-3951). Plans, data and reports pertinent to the Permit are to be submitted to the Regional Waste Manager at this address.

You will note that values have been expressed in the International System of Units (SI). These units are to be used in submitting monitoring results and any other information in connection with this Permit.

This Permit does not authorize entry upon, crossing over, or use for any purpose of private or Crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority shall rest with the Permittee.

Yours very truly,

G. E. Oldham, P. Eng.
Regional Waste Manager

SM 28.05.90 Enclosure
F 28.5.90
RAB 09/06/90





MINISTRY OF ENVIRONMENT

PERMIT

Under the Provisions of the Waste Management Act

REGIONAL DISTRICT OF NANAIMO
6300 Hammond Bay Road
Lantzville, British Columbia
VOR 2H0

is hereby authorized to discharge effluent from a municipal
sewage system located within the Regional District of Nanaimo
to the Strait of Georgia and to storage lagoons at the
Morningstar Golf Course near Parksville, British Columbia

This permit has been issued under the terms and
conditions prescribed in the attached Appendices

01, 02, A-1, A-2, B-1, B-2, C-1 and C-2

Regional Waste Manager

Permit No. PE-4200

Date issued: January 16, 1976

Date amended: JUL 10 1990

SM 28.05.70

F 20.5.90

RAB 09/04/90

ENV 2093



MINISTRY OF ENVIRONMENT
WASTE MANAGEMENT BRANCH

APPENDIX 01

to Permit No. PE-4200


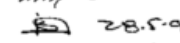
(Effluent)

- (a) The discharge of effluent to which this appendix is applicable is from a municipal sewage system servicing the Parksville and Qualicum Beach area as shown on the attached Appendix A-1.
- (b) The maximum rate at which effluent may be discharged is 16 000 m³/d.
- (c) The characteristics of the effluent shall be equivalent to or better than:
5-day Biochemical Oxygen Demand - 45 mg/L
Total Suspended Solids - 60 mg/L.
- (d) The works authorized are screening, degritting and ancilliary facilities, a secondary treatment plant, sludge digestion and dewatering facilities and an outfall with diffuser extending 2440 m from mean low water to a depth of 61 m below mean low water and related appurtenances approximately located as shown on the attached Appendix A-1.
- (e) The location of the facilities from which the effluent originates and to which this appendix is appurtenant is Lot 2, Plan 2570, District Lot 28, Nanoose District.
- (f) The location of the point of discharge and to which this appendix is appurtenant is the Strait of Georgia off the mouth of French Creek.
- (g) Those works authorized must be completed and in operation on and from the date of this appendix.

Date issued: January 16, 1976

Date amended: JUL 10 1990


Regional Waste Manager

 28.05.90
 28.5.90
PMB 02/04/90



MINISTRY OF ENVIRONMENT
WASTE MANAGEMENT BRANCH

APPENDIX 02

to Permit No. PE-4200

(Effluent)

- (a) The discharge of effluent to which this appendix is applicable is from a municipal sewage treatment facility as shown on the attached Appendix A-2.
- (b) The maximum rate at which effluent may be discharged is 1 370 m³/d.
- (c) The characteristics of the effluent shall be equivalent to or better than:
5-day Biochemical Oxygen Demand - 20 mg/L;
Total Suspended Solids - 30 mg/L.
- (d) The works authorized are a secondary sewage treatment plant, a pump station and pipeline, and related appurtenances approximately located as shown on the attached Appendix A-2.
- (e) The location of the facilities from which the effluent originates and to which this appendix is appurtenant is Lot 2, Plan 2570, District Lot 28, Nanoose District.
- (f) The location of the point of discharge and to which this appendix is appurtenant is a pipeline to storage lagoons (authorized works under Waste Management Permit No. PE-8195) situated on the northern half of District Lot 83, Nanoose Land District.
- (g) Those works authorized must be completed and in operation on and from the date of this appendix.

Date issued: JUL 10 1990

Regional Waste Manager

Date amended: _____

JMM 20.05.90 _____
PA 28.5.90 _____
RAB 09/04/90 _____



MINISTRY OF ENVIRONMENT
WASTE MANAGEMENT BRANCH

APPENDIX B-1
to Permit No. PE-4200

A. MAINTENANCE OF WORKS

The Permittee shall inspect the pollution control works regularly and maintain them in good working order. Notify the Regional Waste Manager of any malfunction of these works.

B. EMERGENCY PROCEDURES

In the event of an emergency or condition beyond the control of the Permittee which prevents continuing operation of the approved method of pollution control, the Permittee shall immediately notify the Regional Waste Manager and take appropriate remedial action.

C. BYPASSES

The discharge of effluent which has bypassed the authorized works is prohibited unless the approval of the Director or the Regional Waste Manager is obtained and confirmed in writing.

D. PROCESS MODIFICATIONS

The Permittee shall notify the Regional Waste Manager prior to implementing changes to any process that may affect the quality and/or quantity of the discharge.

E. OUTFALL INSPECTION

The Permittee shall conduct a dye test on the outfall line authorized in Appendix 01 (or inspect by another method approved by the Regional Waste Manager) once every five years or as may otherwise be required by the Regional Waste Manager.

F. DISINFECTION

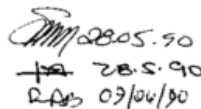
Although disinfection of the effluent discharge authorized by Appendix 01 is not required at this time, suitable provisions should be made to include disinfection facilities in the future. If disinfection is by chlorination, dechlorination facilities may also be required.

Date issued: JUL 10 1990



Date amended: _____

Regional Waste Manager


2805.90
28.5.90
RAS 09/04/90



MINISTRY OF ENVIRONMENT
WASTE MANAGEMENT BRANCH

APPENDIX B-2
to Permit No. PE-4200

G. SLUDGE WASTING AND DISPOSAL

Sludge wasted from the treatment plant shall be disposed of to a site and in a manner approved by the Regional Waste Manager.

H. EFFLUENT UPGRADING

Based on receiving environment monitoring data and/or other information obtained in connection with this discharge, the Permittee may be required to provide additional treatment facilities.

Date issued: JUL 10 1990

Date amended: _____

MM 28.05.90
RAB 28.5.90
RAB 09/06/90



Regional Waste Manager



MINISTRY OF ENVIRONMENT
WASTE MANAGEMENT BRANCH

APPENDIX C-1
to Permit No. PE-4200

A. SAMPLING AND ANALYSIS

The Permittee shall install a suitable sampling facility and obtain a grab sample of the effluent once every day. The sample shall be analyzed on a daily basis for Total Suspended Solids and on a weekly basis for 5-day Biochemical Oxygen Demand.

Once per year a composite sample, over an eight-hour period, shall be taken during a low flow period in July or August and analyzed for parameters such as metals, volatile organics, phenolics, organochlorine pesticides, acid extractable herbicides, anions, and inorganics. The Regional Waste Manager shall advise the Permittee in writing of the specific parameters to be analyzed.

B. FLOW MEASUREMENT

For the discharge authorized by Appendix 01, provide and maintain a suitable flow measuring device and record once per day the effluent volume discharged over a 24-hour period.

C. SAMPLING AND ANALYTICAL PROCEDURES

Sampling and flow measurement shall be carried out in accordance with the procedures described in "Field Criteria for Sampling Effluents and Receiving Waters", April 1989.

Analyses are to be carried out in accordance with procedures described in "A Laboratory Manual for the Chemical Analysis of Waters, Wastewaters, Sediments and Biological Materials, (1976 edition including updates)", April 1989.

Copies of the above manuals are available from the Data Standards Group, Ministry of Environment, 3800 Westbrook Mall, Vancouver, British Columbia, V6S 2L9, at a cost of \$20.00 and \$70.00, respectively, and are also available for inspection at all Waste Management offices.

Date issued: JUL 10 1990

Date amended: _____

[Signature]
Regional Waste Manager

V. 2096 w877
2/11/90
4.7.90
04.07.90



MINISTRY OF ENVIRONMENT
WASTE MANAGEMENT BRANCH

APPENDIX C-2
to Permit No. PE-4200

D. RECEIVING ENVIRONMENT MONITORING

At the discretion of the Regional Waste Manager, the Permittee may be required to conduct a receiving environment monitoring program for the discharge authorized by Appendix 01. The program shall be established in consultation with the Regional Waste Manager, who will advise the Permittee in writing of the program requirements.

E. REPORTING

Maintain data of analyses and flow measurements for inspection and once per month submit the data, suitably tabulated, to the Regional Waste Manager for the previous month's monitoring. The first report is to be submitted by September 30, 1990.

Date issued: JUL 10 1990

Date amended: _____

Regional Waste Manager

ENV. 2096 w817
Fm 05/07/90
4-7-90
DM 01.07.90



Province of
British Columbia
Ministry of
Environment,
Lands and Parks

BC
Environment

Environmental Protection Division
777 Broughton Street
Victoria
British Columbia
V8V 1X5

COPY

Telephone: (604) 387-9974

Facsimile: (604) 356-9836

File: PE-4200

June 17, 1993

Regional District of Nanaimo
6300 Hammond Bay Road
Lantzville, British Columbia
V0R 2H0

Dear Permittee:

Re: Notification of Amendment to Permit No. PE-4200

Please note that Permit No. PE-4200, issued under the provisions of the Waste Management Act, in the name of Regional District of Nanaimo is amended by adding to Appendix B-2 the following clauses:

(h) FACILITY CLASSIFICATION

The Permittee shall classify the wastewater treatment facility authorized in part (d) of Appendix No. 01 (the facility) and the classification shall be maintained with the "British Columbia Water and Wastewater Operators Certification Program Society" (BCWWOCPS). The Permittee shall submit an application to classify the facility to BCWWOCPS by **August 1, 1993**. Although the facility may have already been voluntarily classified previously, an application for classification must be submitted by the above date.

(i) OPERATOR CERTIFICATION

If the facility is classified by the BCWWOCPS (the Program) at Level II or higher, the Permittee shall ensure that all operators of the facility shall be certified by the Program to a Class I level, at a minimum, by **December 1, 1994**.

Operators in Training:

The Permittee shall ensure that all operators in training (OIT) working at the facility classified by the BCWWOCPS at Level II or higher shall be required to successfully pass an OIT examination within three (3)

.. /2

months of commencement of employment at the facility. The OIT certificate shall be valid for fifteen (15) months from the date of issue. Prior to the expiry date of the OIT certificate, but not sooner than twelve (12) months from the date when the OIT commenced facility operation, the OIT shall successfully complete a Class I certification examination in order to continue to operate at the facility.

Chief Operator: Level II or higher

If the facility is classified by the BCWWOCPS at Level II or higher, the Permittee shall designate at least one operator to be the "Chief Operator" of the facility by **December 1, 1996**. The "Chief Operator" shall be certified at a Class II level, at a minimum.

After **December 1, 1996**, no person shall have "Direct Responsible Charge", as defined by the BCWWOCPS, of a municipal wastewater treatment facility classified at Level II or higher unless they possess a valid operator's certificate not more than one level below the classification level of the facility.

Chief Operator: Level III and IV

If the facility is classified by the BCWWOCPS at Level III, the Permittee shall designate a "Chief Operator", certified at a Class III level by **December 1, 1998**.

If the facility is classified by the BCWWOCPS at Level IV, the Permittee shall designate a "Chief Operator", certified at a Class IV level by **December 1, 1998**.

All other terms and conditions of Permit No. PE-4200 remain in full force and effect. If you have any questions regarding this amendment please contact John Finnie at 751-3183.

Yours truly,

R.J. Driedger,
Deputy Director of Waste Management

cc: Ted Oldham
BCWWOCPS

DB
ACL
Bmm

August 24, 1994

File: PE-4200

Regional District of Nanaimo
6300 Hammond Bay Rd
PO Box 40
Lantzville BC V0R 2H0

ATTENTION: Mike Donnelly
Manager of Operations

Dear Mike Donnelly:

Re: Monitoring of French Creek
Pollution Control Centre Effluent

As outlined in Appendix C-1 to Permit PE-4200, the Regional District of Nanaimo is required to obtain a composite sample of the effluent once per year during July or August and have the sample analyzed for several parameters. The exact parameters were listed in our letter to you dated July 17, 1990 (copy enclosed). Our records indicate that the Regional District last sampled for these specific parameters on July 16, 1992.

Environmental Protection staff have reviewed the results of your July, 1992 sampling. Since the analysis shows that the levels meet the ministry's 1994 Approved and Working Criteria for Water Quality, we advise you that repeating this sampling procedure is not necessary at this time, although it may be required in the future.

If you have any questions or concerns, please contact Al Leuschen, P. Eng., or Bernie MacKay of this office at 751-3100.

Yours truly,



J. O. Finnie, P.Eng.
Head, Municipal & Environmental
Safety Sections
Environmental Protection
DB/dpc
monitor.db
Enclosure

9410815

Appendix B – Internal Flow Monitoring and Laboratory Raw Data (Permit Data)

2023 Combined Flows to Outfall and Morningstar Golf Course (Cubic Metres)

Day	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1	10,547.0	9,814	10,400	9,705	10,036	10,060	10,410	10,567	10,211	9,708	11,146	11,189
2	10,890.2	9,747	11,059	9,763	9,778	10,199	10,489	10,337	10,054	10,292	11,111	10,834
3	10,429.8	10,107	10,848	9,654	9,891	10,201	10,669	10,614	9,707	9,709	10,703	10,741
4	10,392.2	10,189	12,690	9,608	10,180	10,281	10,484	10,537	9,934	9,570	11,230	14,463
5	10,609.1	10,095	12,233	9,678	11,043	10,355	10,298	10,472	9,773	9,488	11,004	12,410
6	10,626.4	10,142	12,414	10,252	10,397	10,075	10,378	10,206	9,719	9,670	11,296	11,662
7	11,370.1	9,998	11,341	10,123	10,374	10,155	10,545	10,467	9,820	9,781	10,772	11,019
8	11,581.9	9,669	11,033	10,451	10,203	10,236	10,269	10,674	9,801	9,816	10,411	10,670
9	11,740.5	9,857	10,667	11,007	10,127	11,019	10,034	10,632	9,736	9,794	10,287	12,189
10	11,027.9	9,807	10,602	10,571	10,188	10,407	10,453	10,196	10,059	9,981	11,988	11,461
11	10,902.6	9,813	10,417	10,197	9,986	10,359	10,030	10,409	9,853	9,705	11,977	11,068
12	12,914.2	10,009	10,489	10,004	9,906	10,199	10,304	10,239	9,554	9,442	11,541	10,970
13	13,259.7	9,887	10,456	10,171	10,104	10,100	10,333	10,108	9,642	9,469	11,171	11,578
14	12,278.2	9,733	10,402	9,987	9,863	10,359	10,202	10,330	9,694	9,427	10,683	12,137
15	11,640.6	9,645	10,201	10,009	9,947	10,148	10,155	10,296	9,614	9,732	10,684	11,814
16	11,344.3	9,731	10,014	10,086	10,058	9,844	10,296	10,429	9,556	10,875	10,607	11,354
17	11,092.7	9,954	10,080	10,232	9,932	10,444	10,270	10,385	9,587	11,524	10,386	11,226
18	11,306.3	10,260	10,142	10,397	9,942	10,393	10,315	10,363	9,486	14,663	10,576	11,433
19	10,822.8	10,035	10,170	10,167	10,340	10,712	10,469	10,157	9,580	11,656	10,285	11,935
20	10,586.7	10,260	10,395	10,199	10,316	10,229	10,221	10,373	9,576	9,952	10,168	11,614
21	10,640.6	10,148	9,966	10,201	10,234	10,187	10,413	11,275	9,583	10,692	10,280	11,176
22	10,449.9	9,797	9,909	10,409	10,787	10,067	10,297	10,224	9,509	10,273	9,918	11,620
23	10,311.0	9,436	10,256	10,424	10,322	10,122	10,050	10,120	9,667	10,209	9,649	11,373
24	10,144.3	9,907	9,855	10,498	10,322	10,037	10,297	10,051	9,786	13,960	9,677	11,371
25	9,913.1	10,017	9,883	9,651	10,249	10,060	10,015	9,603	10,021	12,498	9,775	12,861
26	9,893.6	10,193	9,796	9,804	10,236	10,435	10,238	10,145	9,981	11,040	9,828	12,899
27	9,969.5	10,206	9,755	9,926	10,128	10,101	10,330	10,023	10,215	10,442	9,898	12,878
28	10,068.4	10,137	9,585	9,896	10,087	10,233	10,358	10,189	9,679	10,337	9,824	13,093
29	9,746.5		9,823	9,884	10,192	9,989	10,344	10,193	9,838	10,210	9,904	12,173
30	9,738.0		9,573	9,851	10,186	10,578	10,394	10,027	9,498	10,226	10,196	11,864
31	9,920.7		9,679		9,972		10,430	10,147		9,796		11,442
Total:	336,159	278,591	324,134	302,803	315,323	307,584	319,786	319,788	292,732	323,939	316,973	364,514
Average:	10,844	9,950	10,456	10,093	10,172	10,253	10,316	10,316	9,758	10,450	10,566	11,759
Minimum:	9,738	9,436	9,573	9,608	9,778	9,844	10,015	9,603	9,486	9,427	9,649	10,670
Maximum:	13,260	10,260	12,690	11,007	11,043	11,019	10,669	11,275	10,215	14,663	11,988	14,463

2023 Morningstar Flows (Cubic Metres)												
Day	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1	0	0	0	0	0	1,057	0	0	460	0	0	0
2	0	0	0	0	0	1,067	0	0	976	0	0	0
3	0	0	0	0	111	1,033	349	675	0	0	0	0
4	0	0	0	0	931	0	6	766	0	0	0	0
5	0	0	0	0	974	1,040	0	893	0	0	0	0
6	0	0	0	0	987	782	0	0	98	0	0	0
7	0	0	0	0	992	778	0	0	0	0	0	0
8	0	0	0	0	1,012	876	817	1,058	0	0	0	0
9	0	0	0	0	1,033	1,075	1,017	1,036	0	0	0	0
10	0	0	0	0	1,053	0	432	1,036	0	0	0	0
11	0	0	0	0	1,052	0	1,031	0	0	0	0	0
12	0	0	0	0	1,077	0	1,027	1,031	0	0	0	0
13	0	0	0	0	1,069	0	762	0	0	0	0	0
14	0	0	0	0	1,072	1,057	0	1,023	0	0	0	0
15	0	0	0	0	0	1,043	525	0	0	0	0	0
16	0	0	0	0	0	1,054	0	1,005	0	0	0	0
17	0	0	0	0	0	925	802	0	0	0	0	0
18	0	0	0	0	0	0	894	0	0	0	0	0
19	0	0	0	0	0	0	974	0	0	0	0	0
20	0	0	0	0	0	905	1,011	0	0	0	0	0
21	0	0	0	0	0	974	1,012	970	0	0	0	0
22	0	0	0	0	0	1,009	0	962	0	0	0	0
23	0	0	0	0	0	1,027	0	985	0	0	0	0
24	0	0	0	0	0	993	1,035	996	0	0	0	0
25	0	0	0	0	0	1,050	1,034	1,014	0	0	0	0
26	0	0	0	0	1,074	1,052	1,070	336	0	0	0	0
27	0	0	0	0	1,051	979	0	0	0	0	0	0
28	0	0	0	0	0	1,019	1,062	0	0	0	0	0
29	0	0	0	0	1,052	982	1,084	1,035	0	0	0	0
30	0	0	0	0	1,108	0	0	1,015	0	0	0	0
31	0	0	0	0	1,167	0	0	1,010	0	0	0	0
Total:	0	0	0	0	16,815	21,777	15,944	16,846	1,534	0	0	0
Average:	0	0	0	0	542	726	514	543	49	0	0	0
Minimum:	0	0	0	0	0	0	0	0	0	0	0	0
Maximum:	0	0	0	0	1,167	1,075	1,084	1,058	976	0	0	0
Non compliance (max flow)	0	0	0	0	0	0	0	0	0	0	0	0
No. Discharge Days	0	0	0	0	17	22	19	18	3	0	0	0

Maximum permitted daily flow: 1,370 cubic metres/day

Flows were sent to Morningstar Golf Course for 79 days between May to September.

2023 Outfall Flows (Cubic Metres)

Day	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1	10,547.0	9,814.4	10,400.2	9,705.0	10,035.7	9,002.6	10,409.7	10,566.6	9,750.6	9,708.2	11,145.6	11,189.2
2	10,890.2	9,746.6	11,058.7	9,762.5	9,777.6	9,131.6	10,488.8	10,336.9	9,078.0	10,292.0	11,110.8	10,833.6
3	10,429.8	10,106.6	10,848.0	9,654.2	9,780.1	9,168.3	10,319.8	9,939.3	9,707.3	9,708.8	10,702.9	10,741.1
4	10,392.2	10,189.1	12,690.4	9,608.1	9,249.0	10,281.0	10,477.5	9,771.4	9,933.8	9,569.8	11,230.1	14,462.8
5	10,609.1	10,095.0	12,233.0	9,678.2	10,068.9	9,314.5	10,298.3	9,578.9	9,773.4	9,488.3	11,003.5	12,409.6
6	10,626.4	10,142.0	12,414.0	10,251.9	9,410.0	9,292.7	10,377.6	10,206.4	9,621.0	9,670.4	11,295.8	11,662.2
7	11,370.1	9,997.5	11,341.0	10,123.0	9,382.1	9,376.7	10,544.9	10,467.2	9,819.9	9,781.4	10,771.6	11,018.8
8	11,581.9	9,669.0	11,032.8	10,451.2	9,191.1	9,360.2	9,452.1	9,616.1	9,800.6	9,816.2	10,410.6	10,670.0
9	11,740.5	9,857.4	10,666.5	11,006.7	9,093.5	9,944.4	9,016.8	9,596.1	9,735.8	9,793.9	10,286.9	12,189.2
10	11,027.9	9,807.2	10,601.8	10,571.1	9,135.1	10,406.8	10,021.5	9,159.9	10,058.8	9,981.0	11,988.1	11,461.1
11	10,902.6	9,813.0	10,417.3	10,196.8	8,933.8	10,359.1	8,998.6	10,409.2	9,852.8	9,704.9	11,977.0	11,067.7
12	12,914.2	10,009.3	10,489.2	10,003.9	8,829.2	10,199.0	9,276.6	9,207.5	9,554.2	9,441.6	11,540.5	10,969.6
13	13,259.7	9,886.9	10,456.4	10,170.7	9,035.2	10,100.0	9,570.7	10,108.1	9,642.1	9,469.4	11,170.7	11,577.5
14	12,278.2	9,733.2	10,402.2	9,987.3	8,791.1	9,302.1	10,201.7	9,307.0	9,694.1	9,427.1	10,683.4	12,136.5
15	11,640.6	9,644.5	10,201.4	10,009.2	9,947.4	9,105.4	9,629.9	10,296.4	9,614.4	9,732.3	10,684.4	11,813.5
16	11,344.3	9,731.0	10,013.7	10,086.1	10,058.0	8,790.1	10,295.8	9,423.6	9,555.8	10,875.3	10,607.3	11,354.1
17	11,092.7	9,954.2	10,080.3	10,231.7	9,931.9	9,519.1	9,468.4	10,385.0	9,587.1	11,524.4	10,385.6	11,225.8
18	11,306.3	10,259.8	10,142.3	10,397.3	9,942.0	10,393.2	9,420.8	10,362.8	9,486.3	14,663.0	10,575.8	11,433.2
19	10,822.8	10,035.4	10,169.9	10,166.6	10,340.0	10,712.0	9,495.4	10,156.5	9,579.5	11,656.4	10,284.8	11,935.1
20	10,586.7	10,259.7	10,394.9	10,199.0	10,315.8	9,324.0	9,210.2	10,372.8	9,575.5	9,951.7	10,168.0	11,614.2
21	10,640.6	10,147.9	9,966.1	10,200.8	10,233.6	9,212.5	9,400.8	10,305.2	9,583.1	10,691.6	10,280.1	11,175.5
22	10,449.9	9,796.5	9,909.0	10,408.6	10,786.8	9,058.0	10,296.8	9,262.2	9,509.0	10,273.0	9,917.7	11,619.5
23	10,311.0	9,436.0	10,256.1	10,423.7	10,322.0	9,094.9	10,049.7	9,135.4	9,667.1	10,209.2	9,649.4	11,372.8
24	10,144.3	9,906.8	9,855.4	10,497.5	10,322.0	9,043.9	9,261.5	9,054.7	9,785.9	13,959.8	9,677.3	11,371.0
25	9,913.1	10,016.7	9,882.5	9,650.7	10,248.5	9,010.3	8,981.0	8,589.0	10,021.4	12,498.4	9,774.8	12,861.2
26	9,893.6	10,192.6	9,795.8	9,804.4	9,162.3	9,382.8	9,167.7	9,809.1	9,980.6	11,040.4	9,828.0	12,898.8
27	9,969.5	10,205.8	9,755.3	9,925.6	9,076.7	9,121.8	10,330.2	10,022.9	10,214.8	10,442.2	9,898.1	12,878.3
28	10,068.4	10,137.0	9,584.9	9,896.1	10,086.7	9,214.1	9,296.0	10,188.9	9,678.9	10,336.7	9,824.1	13,093.2
29	9,746.5		9,823.4	9,884.3	9,139.9	9,007.8	9,260.1	9,158.2	9,837.9	10,209.9	9,903.6	12,173.2
30	9,738.0		9,572.7	9,850.5	9,077.5	10,577.8	10,393.9	9,011.7	9,498.2	10,225.8	10,196.2	11,864.1
31	9,920.7		9,679.0		8,805.0		10,429.6	9,136.7		9,796.3		11,441.6
Total:	336,159	278,591	324,134	302,803	298,508	285,807	303,842	302,942	291,198	323,939	316,973	364,514
Average:	10,844	9,950	10,456	10,093	9,629	9,527	9,801	9,772	9,707	10,450	10,566	11,759
Minimum:	9,738	9,436	9,573	9,608	8,791	8,790	8,981	8,589	9,078	9,427	9,649	10,670
Maximum:	13,260	10,260	12,690	11,007	10,787	10,712	10,545	10,567	10,215	14,663	11,988	14,463
Non compliance (max flow)	0	0	0	0	0	0	0	0	0	0	0	0

Maximum permitted daily flow: 16,000 cubic metres/day

2023 Influent 5-day Biochemical Oxygen Demand (BOD₅) (mg/L)

Day	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1						407				213		
2		230	195	231	255						236	
3	227							276				
4				264	179	244	214					
5	192		180						204	230		
6						320	253					
7			212		201				210		212	
8	152					338		285				
9		212	219		254		225				204	
10	116							236	186	245		171
11				236	296	329	211					
12	127	205	203						202	248	158	186
13				243		324	230	247				
14		247	200		265				156			182
15	121					220		279		220		
16		194	199	232	391		218				224	
17	217							230	192	320		174
18				268	240	250	372					
19	175	244	196						202	186	196	
20				250		330	340	247				
21		246	208						234		186	190
22	181					320		231		198		
23		208	234	218	278		251				194	
24	221							236		188		
25				241	250	246	280					
26	259	194	191						228		168	
27				255		262	256					
28		217	234		233			199			205	200
29	255									194		
30			224	211	234		287				200	
31	261							232		316		
Average	193	220	207	241	256	299	261	245	202	233	198	184

2023 Effluent 5-day Biochemical Oxygen Demand (BOD₅) (mg/L)

Day	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov
1	19.4					15.2				7.6	
2		19.8	12.8	13.7	14.7						6.0
3	23.7							10.4			
4				17.8	8.6	10.8	11.7				
5	20.9	17.7	13.7						8.9	8.1	
6						14.8	12.1				
7		14.4	13.2		11.1				10.2		9.7
8	17.0					14.1		12.6			
9		14.0	11.4		17.1		10.5				10.0
10	14.5							9.2	9.8	9.0	
11				15.3	18.2	11.2	10.6				
12	17.6	11.1	13.8						10.5	7.8	7.2
13				20.2		9.8	9.6	14.5			
14		14.5	14.8		11.2				6.9		
15	11.0					8.0		18.6		7.2	
16		12.1	18.1	15.1	12.3		8.5				8.4
17	13.2							10.8	7.7	14.8	
18				16.7	14.1	9.6	13.5				
19	11.3	13.8	15.8						8.1	8.0	7.8
20				16.3		13.1	9.7	8.7			
21		14.6	15.8						8.5		8.4
22	11.1					11.6		8.1		8.5	
23		13.6	17.5	14.5	14.3		11.5				7.9
24	14.4							9.1		12.1	
25				16.5	13.2	9.8	9.5				
26	13.1	14.2	12.6						15.5		8.6
27				14.9		12.5	8.9				
28		13.3	14.1		10.2			11.0			9.2
29	13.8									8.7	
30			13.6	12.4	11.6		9.3				8.2
31	18.0							14.5		11.4	
Average	15.6	14.4	14.4	15.8	13.1	11.7	10.4	11.6	9.6	9.4	8.3
Non-compliance	0	0	0	0	0	0	0	0	0	0	0

FCPCC Outfall Maximum cBOD₅: 45 mg/L

2023 Morningstar 5-day Biochemical Oxygen Demand (BOD₅) (mg/L)

Day	May	June	July	Aug	Sept
1		14.6			7.3
2		11.5			
3	12.8			6.9	
4	12.7			6.9	
5					
6					
7					
8		8.1			
9		9.1			
10				6.0	
11	14.7				
12	12.6				
13			6.8		
14		7.3			
15		7.4			
16					
17					
18					
19					
20			7.0		
21			8.3		
22		10.2			
23		9.0			
24				5.3	
25				6.1	
26	11.2				
27					
28			6.4		
29		8.4			
30					
31				4.6	
Count	5	9	4	6	1
Average:	12.8	9.5	7.1	6.0	7.3
Non-compliances	0	0	0	0	0
Minimum:	11.2	7.3	6.4	4.6	7.3

FCPCC Morningstar Discharge Maximum cBOD₅: 20 mg/L

2023 Influent Total Suspended Solids (TSS) (mg/L)

Day	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1	254	381	377	289	545	647	386	503	485	448	469	307
2	296	379	391	316	382	496	295	367	322	708	345	271
3	260	348	393	338	550	325	274	298	297	605	303	308
4	392	111	256	393	414	403	374	483	398	657	427	220
5	325	NR	265	613	325	477	457	292	380	253	291	215
6	274	NR	353	374	281	405	391	335	553	454	308	315
7	258	NR	311	409	317	479	570	376	424	422	545	
8	245	553	548	212	397	461	368	358	442	424	450	302
9	287	352	347	285	492	504	433	381	358	519	366	259
10	213	549	334	320	478	384	286	373	302	500	376	219
11	382	373	325	550	401	381	468	561	366	651	284	296
12	282	299	325	566	517	481	432	608	365	423	253	291
13	265	506	343	345	382	350	656	305	395	409	300	114
14	220	426	346	473	326	462	318	467	164	404	296	285
15	219	415	517	295	460	561	304	382	336	329	273	273
16	242	370	331	366	620	532	351	532	361	421	325	274
17	352	402	398	423	538	331	419	405	307	457	681	246
18	344	402	396	437	498	371	492	473	419	359	382	527
19	329	290	328	429	360	651	520	303	409	311	266	317
20	280	328	514	389	334	359	504	361	551	350	360	360
21	281	523	305	363	346	460	730	385	527	550	431	301
22	338	334	415	296	588	469	430	338	373	312	401	327
23	414	312	370	296	527	389	392	470	384	304	494	281
24	393	332	426	549	605	477	575	416	380	330	341	257
25	401	305	377	354	487	355	373	390	434	296	393	253
26	657	280	330	363	462	328	358	388	431	545	297	251
27	365	400	472	453	356	482	324	372	427	302	432	289
28	321	349	489	526	315	537	464	419	383	385	313	389
29	334		559	255	550	318	356	507	410	286	429	295
30	516		409	393	401	542	322	488	327	381	400	270
31	493		371		516		322	500		453		229
Average:	330	373	385	389	444	447	418	414	390	427	374	285

2023 Effluent Total Suspended Solids (TSS) (mg/L)

Day	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1	24.8	14.4	13.8	15.4	18.0	16.4	13.0	11.6	12.4	15.4	20.6	21.4
2	28.0	12.8	16.2	14.6	19.8	13.8	14.4	11.4	11.2	15	11.2	22.0
3	23.6	19.8	17.6	16.4	13.0	14.0	17.4	11.8	14.8	12	15.8	19.4
4	24.6	14.5	17.6	18.0	11.2	11.8	17.0	11.2	12.0	14.6	14.4	21.4
5	21.4	15.4	14.6	16.4	18.0	15.6	11.0	10.6	11.6	13	18.6	17.8
6	29.0	16.6	16.4	10.6	14.5	13.2	15.8	11.2	15.0	15.4	25.4	11.2
7	29.6	13.8	15.4	14.8	12.2	13.0	13.0	11.2	15.8	17.0	15.6	13.0
8	14.4	17.0	15.8	12.4	17.2	11.8	12.6	15.2	20.0	14.4	17.2	16.8
9	25.4	19.8	15.6	14.0	17.8	14.8	12.6	13.4	20.8	17.2	17.0	19.4
10	15.0	18.0	18.4	19.8	14.2	12.2	15.0	10.8	17.6	20.0	19.4	16.2
11	20.4	12.6	19.2	16.8	18.0	12.2	13.4	12.0	16.8	15.0	22.8	20.6
12	24.4	11.2	15.0	15.0	17.2	15.4	15.0	7.0	20.2	15.8	16.0	21.0
13	17.0	9.4	13.0	14.2	18.8	14.2	13.2	9.4	15.6	16.4	16.6	11.6
14	19.6	14.4	12.2	16.4	14.4	15.4	12.6	9.8	15.8	16.8	22.8	18.0
15	12.0	14.2	16.6	14.0	20.4	11.8	10.4	20.6	15.6	17	15.6	19.2
16	17.2	13.4	14.2	12.2	17.7	14.8	11.6	13.4	17.4	19	17.0	14.4
17	16.0	11.8	15.6	16.6	15.6	12.6	13.2	12.6	15.6	26	14.6	16.6
18	18.8	13.0	16.4	22.2	19.0	11.8	14.2	14.0	16.0	15.2	14.8	13.6
19	14.0	13.2	13.8	15.6	18.8	17.0	10.4	12.4	18.6	14.6	18.2	18.4
20	16.0	12.6	18.0	17.0	17.0	16.4	10.2	12.0	18.6	13.6	18.4	13.2
21	17.8	15.4	16.0	14.0	15.0	13.0	23.0	15.6	16.4	16.8	23.2	15.2
22	15.2	17.2	15.4	16.4	17.6	15.0	8.8	11.6	16.8	15.4	26.0	17.0
23	16.0	13.8	15.6	12.8	17.0	13.6	8.8	13.8	16.2	17.6	21.2	23.6
24	16.2	11.2	16.0	26.8	13.6	15.2	11.6	13.4	19.8	19.6	20.4	20.6
25	14.0	12.4	16.6	18.2	16.6	12.6	11.8	14.4	11.8	13.8	24.8	23.6
26	16.6	14.6	12.8	12.6	14.6	13.4	10.0	16.4	13.6	17.4	19.4	20.0
27	15.6	13.8	16.4	13.0	16.4	14.2	10.6	16.4	11.0	15.6	24.6	19.6
28	12.8	12.0	13.4	15.8	13.1	13.8	9.8	20.4	11.0	15.4	21.8	20.8
29	14.0		15.2	13.0	17.8	16.4	10.4	18.8	15	15.8	24.0	17.2
30	14.2		12.8	11.2	16.2	12.0	9.6	14.2	10.2	20.6	21.2	18.8
31	15.8		15.0		15.4		13.8	11.0		15.3		28.4
Average:	18.7	14.2	15.5	15.5	16.3	13.9	12.7	13.1	15.4	16.4	19.3	18.4
Non-compliances (Morningstar)	0	0	0	0	0	0	0	0	0	0	0	0
Non-Compliance (Outfall)	0	0	0	0	0	0	0	0	0	0	0	0
Total Non-Compliances	0	0	0	0	0	0	0	0	0	0	0	0

FCPCC Outfall Maximum TSS: 60 mg/L

Days highlighted in yellow were days in which TSS exceed levels in the outfall permit.

2023 Morningstar Total Suspended Solids (TSS) (mg/L)

Day	May	June	July	Aug	September
1		16.0			6.8
2		10.4			7.6
3	18.4	19.6	19.2	5.6	
4	11.6		12.4	9.6	
5	12.4	9.6		6.8	
6	14.4	12.0			7.2
7	11.6	18.0			
8	14.8	10.0	10.0	7.2	
9	12.8	11.6		8.8	
10	13.2		11.2	10.8	
11	18.8		6.8		
12	12.8		9.6	8.4	
13	7.2		8.8		
14	10.4	10.4		6.0	
15		11.6	6.8		
16		13.6		10.0	
17		15.2	10.8		
18			8.8		
19			6.4		
20		10.8	8.8		
21		9.6	5.6	9.2	
22		10.4		8.4	
23		10.8		6.4	
24		10.8	8.0	8.0	
25			9.2	8.4	
26	10.4	12.0	10.4	8.8	
27	12.0	9.2			
28		10.8	7.6		
29	7.6	8.8	6.0	9.6	
30	12.4			9.2	
31	8.0			6.4	
Count	17	21	18	18	3
Average:	12.3	12.0	9.2	8.2	7.2
Non-compliances	0	0	0	0	0
Minimum:	7.2	8.8	5.6	5.6	6.8
Maximum:	18.8	19.6	19.2	10.8	7.6

FCPCC Morningstar Discharge Maximum TSS: 30 mg/L

2023 Influent Ammonia (NH₃) (mg/L)

Day	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Sample 1	26.3	36.0	30.5	37.5	34.2	40.8	44.9	42.7	43.3	47.0	32.6	31.8
Sample 2	20.8	35.0	31.6	34.3	NR	38.4	41.3	42.5	41.3	43.1	32.8	30.9
Sample 3	22.5	32.4	37.4	36.0	42.8	41.6	41.0	43.9	41.9	43.3	33.4	32.0
Sample 4	37.7		41.1		36.0	41.5	43.4		36.2	31.0		
Sample 5			37.1			39.5	44.2			44.3		
Average	26.8	34.5	35.5	35.9	37.7	40.4	43.0	43.0	40.7	41.7	32.9	31.6

2023 Effluent Ammonia (NH₃) (mg/L)

Day	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec
Sample 1	31.8	31.9	26.5	30.5	29.6	31.4	40.0	37.7	37.2	30.1	26.5	21.0
Sample 2	27.3	29.7	26.3	23.1	NR	27.6	34.1	37.6	39.2	32.8	27.3	23.8
Sample 3	26.4	26.8	33.6	26.4	26.7	37.9	31.8	39.3	31.0	30.8	22.6	24.7
Sample 4	31.7		38.8		31.1	37.8	40.1		29.7	19.7		26.9
Sample 5			30.6			34.0	35.1			29.1		
Average	29.3	29.5	31.2	26.7	29.1	33.7	36.2	38.2	34.3	28.5	25.5	24.1
% Reduction	-9.2%	14.5%	12.3%	25.8%	22.7%	16.4%	15.7%	11.2%	15.7%	31.7%	22.7%	23.7%

Regular Ammonia testing is not required for permit, regular testing is completed internally and has historically been reported in this section of the Annual Report.

2023 Influent Temperature

Day	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1	12.6	13.6	12.6	12.5	14.7	18.8	19.6	20.5	20.9	17.5	15.2	15.2
2	13.2	13.7	12.5	12.4	14.6	18.2	19.5	20.4	20.4	17.6	16.4	13.4
3	13.3	13.0	12.8	13.6	15.3	17.9	19.7	21.2	19.9	18.8	16.8	13.5
4	13.4	12.5	12.9	14.1	15.2	18.3	19.9	19.9	19.3	18.6	16.2	14.7
5	13.1	12.8	10.8	14.4	14.9	18.3	2.0	21.3	21.0	18.9	18.2	14.6
6	13.5	14.7	12.5	13.4	15.3	17.8	21.6	20.7	20.1	19.2	16.4	14.6
7	12.8	13.4	12.4	13.3	14.6	18.9	19.8	20.0	20.9	19.6	17.2	16.6
8	13.0	13.6	13.8	13.2	15.2	18.7	19.6	20.3	20.4	18.8	16.1	14.6
9	13.5	13.2	12.8	12.6	15.0	19.2	20.1	20.2	20.6	19.5	16.2	16.0
10	13.2	13.4	12.1	12.7	15.2	18.6	19.9	20.2	20.1	18.7	17.1	15.5
11	13.3	13.6	12.1	14.1	16.0	18.2	20.1	20.1	20.2	18.9	15.1	15.3
12	13.4	13.2	11.7	13.5	16.5	18.6	20.4	20.8	18.8	18.7	15.3	14.8
13	13.6	13.1	13.4	13.5	15.6	18.5	20.6	21.6	20.6	18.5	16.6	15.4
14	13.2	13.0	12.5	13.2	15.6	18.7	20.8	20.4	19.0	19.1	15.5	14.5
15	13.3	13.1	12.2	14.8	17.1	18.9	20.3	20.6	20.8	19.0	17.2	14.3
16	14.0	13.3	13.6	14.4	16.7	19.1	20.8	19.8	18.7	17.7	14.1	14.8
17	13.6	13.8	12.7	13.7	17.1	17.8	20.7	20.3	19.6	19.4	15.3	13.5
18	13.5	12.2	12.9	14.4	16.8	18.4	20.3	20.2	19.7	18.3	15.0	15.2
19	13.1	12.2	11.3	14.7	18.7	19.6	20.4	21.2	19.8	18.2	16.0	14.6
20	13.3	12.7	13.1	13.7	17.9	18.4	20.4	20.7	20.3	18.1	15.3	15.3
21	13.9	12.7	13.4	13.3	17.4	18.3	20.6	20.4	19.9	18.3	16.6	14.3
22	13.3	12.9	13.5	12.9	17.4	19.1	21.0	19.4	19.6	18.5	15.6	14.1
23	14.4	10.8	13.0	12.9	17.2	18.8	21.0	19.9	19.5	17.1	15.7	14.7
24	13.5	12.9	12.7	14.4	17.6	18.7	20.8	20.0	19.3	18.4	15.9	14.5
25	13.5	13.4	14.8	14.7	17.7	19.9	20.9	19.8	20.0	16.1	15.0	14.8
26	13.2	12.1	13.7	15.1	17.9	19.5	20.3	20.6	18.5	18.0	16.0	13.7
27	13.8	12.9	13.0	13.9	17.0	19.0	20.4	20.1	18.6	16.8	14.8	14.2
28	13.4	12.5	13.1	14.3	17.1	19.3	20.4	20.4	18.5	15.8	15.2	14.0
29	11.6		14.2	14.2	18.2	19.3	20.3	20.4	18.5	15.0	14.8	13.7
30	13.0		13.6	13.8	17.8	19.4	20.4	19.9	17.6	17.2	16.7	13.5
31	13.9		13.3		17.9		20.6	19.8		17.2		13.1
Average:	13.3	13.0	12.9	13.7	16.5	18.7	19.8	20.4	19.7	18.1	15.9	14.5
Minimum:	11.6	10.8	10.8	12.4	14.6	17.8	2.0	19.4	17.6	15.0	14.1	13.1
Maximum:	14.4	14.7	14.8	15.1	18.7	19.9	21.6	21.6	21.0	19.6	18.2	16.6

2023 Effluent Temperature

Day	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1	13.7	12.9	12.5	14.1	15.7	18.7	20.9	21.1	20.6	18.5	15.8	15.6
2	13.4	13.4	12.9	13.9	15.6	18.8	20.7	21.4	20.9	18.3	17.2	15.0
3	13.4	13.3	12.8	13.9	16.2	18.7	20.8	21.2	21.0	18.7	16.9	15.1
4	13.9	13.7	13.1	13.7	16.5	18.7	19.9	20.7	20.2	18.5	17.5	15.1
5	13.8	14.3	12.5	NT	16.3	18.5	20.8	22.1	20.2	19.3	17.9	15.2
6	13.9	14.2	12.9	13.8	15.8	18.8	20.8	22.0	19.2	18.8	16.9	15.0
7	14.1	14.0	12.4	15.3	16.0	19.2	20.9	21.2	20.7	19.3	17.1	16.4
8	14.1	13.3	12.9	14.8	15.6	18.2	20.5	19.5	19.7	19.1	16.4	14.0
9	14.1	13.3	13.4	14.4	16.1	19.6	21.2	20.9	20.4	19.5	16.5	14.7
10	13.2	13.6	13.3	14.2	16.3	19.7	20.5	21.0	20.7	19.4	16.9	14.8
11	14.0	14.0	13.1	13.8	16.5	19.5	20.8	20.6	20.7	19.2	16.7	15.4
12	NT	14.0	13.2	13.8	16.9	19.6	20.7	21.8	19.6	18.6	16.4	16.3
13	14.1	13.7	13.1	14.1	17.3	19.8	20.7	22.1	20.6	18.2	16.2	14.9
14	14.1	13.6	12.8	13.5	18.0	18.4	20.9	21.5	20.2	18.3	15.7	14.9
15	14.1	13.0	13.3	14.6	18.0	18.7	21.3	21.7	19.9	19.2	15.7	14.9
16	13.9	13.3	13.3	14.4	18.6	18.2	21.4	20.8	19.7	19.2	15.6	15.2
17	14.1	13.6	13.1	14.3	18.3	19.0	21.4	20.9	20.3	18.6	15.2	15.3
18	14.6	13.9	13.5	14.3	18.4	19.5	20.5	21.1	20.2	18.1	15.5	14.9
19	13.4	13.8	13.6	14.1	18.3	19.0	21.1	21.7	19.9	18.5	16.4	15.3
20	14.1	13.9	14.0	12.9	18.6	18.7	21.3	21.6	19.5	18.9	15.4	15.1
21	14.0	13.9	14.1	13.9	18.9	18.9	21.2	21.1	19.3	18.2	15.6	15.2
22	13.7	13.0	14.2	13.4	18.8	19.5	21.8	20.6	18.8	18.2	15.6	15.3
23	13.7	13.0	14.1	14.3	18.2	19.2	21.9	20.8	20.2	18.0	15.3	15.8
24	13.7	12.3	15.2	14.1	18.5	19.8	20.9	19.8	19.7	17.4	14.3	14.7
25	13.9	12.2	13.8	14.3	18.3	19.9	20.9	19.6	19.5	16.1	15.2	14.6
26	13.8	13.0	13.8	14.8	18.6	20.5	21.3	21.3	19.6	16.4	15.6	14.0
27	14.2	12.6	13.6	14.8	19.0	20.4	21.4	21.3	18.8	15.9	15.3	15.0
28	14.5	12.7	13.4	14.8	18.9	20.5	21.3	20.4	18.9	15.7	15.2	14.9
29	13.3		13.6	15.3	19.2	20.2	21.8	21.7	18.3	15.9	15.4	15.9
30	12.7		13.3	15.7	18.6	20.5	21.5	20.6	18.7	15.7	15.3	15.6
31	13.3		13.8		18.3		21.0	20.7		15.9		15.1
Average:	13.8	13.4	13.4	14.3	17.6	19.3	21.0	21.1	19.9	18.1	16.0	15.1
Minimum:	12.7	12.2	12.4	12.9	15.6	18.2	19.9	19.5	18.3	15.7	14.3	14.0
Maximum:	14.6	14.3	15.2	15.7	19.2	20.5	21.9	22.1	21.0	19.5	17.9	16.4

2023 Influent pH

Day	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1	7.24	7.61	8.15	7.63	8.11	8.29	7.38	7.62	7.90	7.54	6.85	7.31
2	7.63	7.67	8.07	7.61	8.04	7.95	7.54	7.44	7.67	7.54	6.58	7.19
3	7.59	7.81	7.98	8.17	8.13	7.49	7.78	7.86	7.46	7.80	7.38	7.42
4	7.81	7.39	7.85	7.49	8.10	7.74	7.65	7.78	7.60	7.65	6.85	7.47
5	7.70	7.28	7.72	7.63	7.90	7.59	7.43	7.89	7.80	7.68	7.84	7.49
6	7.73	7.72	7.80	8.08	7.66	7.65	7.44	7.43	7.82	7.75	7.55	7.22
7	7.57	7.79	8.00	7.82	7.57	7.92	7.58	7.48	7.83	7.88	7.96	7.84
8	7.59	7.80	7.30	7.70	7.95	7.68	7.61	7.84	8.08	7.34	7.38	7.54
9	7.60	7.82	8.06	7.48	7.74	8.02	7.78	7.84	7.78	7.79	7.69	7.76
10	7.74	7.83	7.66	7.69	7.63	7.63	7.49	7.77	7.64	7.60	7.28	7.67
11	7.71	7.71	7.78	8.06	8.07	6.61	7.50	7.91	7.47	7.60	7.44	7.62
12	7.79	7.58	7.50	8.06	7.55	7.58	7.85	7.79	7.59	7.70	7.49	7.67
13	7.54	7.77	8.15	7.84	7.56	7.68	7.65	7.56	7.90	7.81	7.72	7.95
14	7.55	7.88	7.70	7.72	7.60	8.08	7.24	7.69	7.02	7.84	7.60	7.48
15	7.58	8.09	7.74	8.01	7.87	7.08	7.80	7.77	7.64	8.11	7.72	7.51
16	7.73	8.08	7.90	7.72	7.74	7.28	7.69	7.74	7.41	7.61	7.71	7.78
17	7.74	7.91	7.95	7.63	7.86	7.65	7.88	7.59	7.59	7.85	7.61	7.38
18	7.46	7.14	8.13	8.02	7.56	7.64	7.91	7.91	7.52	7.71	7.36	7.50
19	7.84	7.61	7.48	8.00	7.57	7.36	7.80	7.51	7.79	7.57	7.77	7.52
20	7.36	7.76	7.76	8.00	7.85	7.52	7.92	7.41	7.20	7.60	7.74	7.55
21	7.76	7.81	8.06	7.75	7.49	7.53	7.72	7.92	7.20	7.19	8.25	7.40
22	7.86	8.17	8.16	7.80	7.41	6.63	7.90	7.59	7.89	7.72	7.55	7.62
23	7.67	7.65	7.73	7.66	7.91	7.13	7.90	7.63	7.46	7.51	7.95	7.69
24	7.98	8.08	7.63	8.14	7.83	7.77	7.59	7.62	7.66	7.57	7.85	7.74
25	7.74	7.97	7.79	7.96	7.93	7.31	7.77	7.37	7.77	7.66	7.78	7.80
26	7.88	7.57	8.03	7.99	8.12	7.70	7.61	7.57	7.66	8.16	7.97	7.99
27	7.85	7.55	8.06	8.02	7.65	7.61	7.38	7.40	7.55	7.83	7.62	7.57
28	7.87	8.02	8.03	8.16	7.29	7.86	7.58	7.64	7.59	7.62	7.65	7.65
29	7.34		7.51	8.09	7.79	7.79	7.58	7.45	7.95	7.21	7.63	7.51
30	7.60		8.22	7.61	7.87	6.73	7.54	7.55	7.70	7.89	8.11	7.54
31	7.21		8.09		8.02		7.85	7.43		7.96		7.49
Average:	7.65	7.75	7.87	7.85	7.79	7.55	7.67	7.65	7.64	7.69	7.60	7.58
Minimum:	7.21	7.14	7.30	7.48	7.29	6.61	7.24	7.37	7.02	7.19	6.58	7.19
Maximum:	7.98	8.17	8.22	8.17	8.13	8.29	7.92	7.92	8.08	8.16	8.25	7.99

2023 Effluent pH

Day	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1	7.21	7.33	7.39	7.34	7.31	7.31	7.32	7.28	7.32	7.33	7.14	7.24
2	7.09	7.14	7.39	7.26	7.29	7.21	7.24	7.31	7.24	7.28	7.19	7.23
3	7.06	7.27	7.46	7.36	7.27	7.20	7.22	7.29	7.15	7.31	7.11	7.09
4	7.06	7.28	7.32	7.26	7.33	7.25	7.24	7.39	7.31	7.25	7.19	7.17
5	7.10	7.20	7.23	NT	7.22	7.30	7.26	7.30	7.24	7.05	7.26	7.07
6	7.18	6.99	7.35	7.28	7.13	7.32	7.13	7.29	7.30	7.08	7.12	7.11
7	7.16	7.29	7.35	7.28	7.35	7.33	7.19	7.34	7.31	7.01	7.09	7.16
8	7.24	7.35	7.33	7.37	7.34	7.32	7.18	7.39	7.34	7.03	7.19	7.13
9	7.07	7.24	7.39	7.29	7.32	7.36	7.22	7.40	7.25	7.10	7.06	7.21
10	7.05	7.15	7.40	7.19	7.36	7.13	7.17	7.36	7.27	7.25	7.18	7.23
11	7.00	7.09	7.32	7.32	7.31	7.21	7.28	7.30	7.30	7.27	7.18	7.13
12	NT	7.27	7.32	7.36	7.33	7.31	7.27	7.23	7.33	7.28	7.22	7.31
13	7.02	7.35	7.21	7.22	7.22	7.26	7.20	7.27	7.32	7.30	7.00	7.23
14	6.93	7.25	7.34	7.33	7.21	7.30	7.20	7.34	7.18	7.14	7.19	7.14
15	7.15	7.31	7.26	7.25	7.19	7.27	7.18	7.35	7.17	7.18	7.21	7.15
16	7.03	7.39	7.33	7.24	7.28	7.26	7.07	7.26	7.29	7.21	7.08	7.08
17	7.07	7.35	7.28	7.33	7.26	7.24	7.18	7.38	7.26	7.13	7.25	7.14
18	7.19	7.35	7.31	7.30	7.29	7.28	7.23	7.32	7.29	7.17	7.10	7.15
19	7.08	7.34	7.25	7.34	7.13	7.29	7.37	7.31	7.28	7.15	7.09	7.25
20	7.22	7.29	7.08	7.34	7.16	7.29	7.34	7.30	7.27	7.20	7.19	7.08
21	7.14	7.36	7.29	7.27	7.15	7.24	7.32	7.28	7.30	7.20	7.12	7.16
22	7.19	7.40	7.30	7.25	7.23	7.29	7.28	7.31	7.31	7.25	7.14	7.34
23	7.04	7.39	7.32	7.30	7.18	7.32	7.34	7.33	7.15	7.12	7.17	7.11
24	6.89	7.32	7.38	7.28	7.25	7.19	7.34	7.32	7.20	7.23	7.18	7.35
25	6.89	7.45	7.29	7.30	7.30	7.31	7.33	7.35	7.37	7.14	7.20	7.19
26	7.04	7.46	7.29	7.30	7.32	7.24	7.42	7.24	7.44	6.99	7.13	7.36
27	7.10	7.42	7.40	7.35	7.20	7.24	7.43	7.27	7.28	7.12	7.16	7.26
28	7.24	7.43	7.38	7.31	7.20	7.23	7.34	7.28	7.26	7.23	7.22	7.34
29	7.05		7.49	7.29	7.18	7.17	7.33	7.28	7.30	7.15	7.07	7.28
30	7.02		7.38	7.29	7.07	7.21	7.25	7.33	7.32	7.14	7.14	7.30
31	6.99		7.34		7.33		7.29	7.32		7.03		7.29
Average:	7.08	7.30	7.33	7.30	7.25	7.26	7.26	7.31	7.28	7.17	7.15	7.20
Minimum:	6.89	6.99	7.08	7.19	7.07	7.13	7.07	7.23	7.15	6.99	7.00	7.07
Maximum:	7.24	7.46	7.49	7.37	7.36	7.36	7.43	7.40	7.44	7.33	7.26	7.36

Appendix C – External Laboratory Test Results

FCPCC INFLUENT & EFFLUENT (ANNUAL) –September 6, 2023

Parameter	Unit	Influent	Effluent
AMMONIA NITROGEN	mg/L	48	42
pH	pH Units	7.51	7.9
ALKALINITY	mg/L	-	-
DISSOLVED CHLORIDE	mg/L	-	-
TOTAL KJELDAHL NITROGEN	mg/L	-	-
TOTAL NITROGEN	mg/L	81.6	45.8
OIL AND GREASE	mg/L	28	<1.0
SULPHATE (D)	mg/L	-	-
SULPHIDE (T)	mg/L	0.17	0.043
CYANIDE (T)	mg/L	0.00173	0.00223
FLUORIDE (D)	mg/L	-	-
TOTAL PHENOLS	mg/L	0.044	<0.0015
TOTAL ORGANIC CARBON	mg/L	130	30
PHOSPHOROUS (T)	µg/L	7.8	4.1
METALS			
Parameter	Unit	Influent	Effluent
ALUMINUM (T)	µg/L	0.775	0.045
ARSENIC (T)	µg/L	2.53	0.74
BARIUM (D)	µg/L	117	91.2
BORON (D)	µg/L	670	650
CADMIUM (D)	µg/L	<0.050	<0.050
CHROMIUM (T)	µg/L	<5.0	<5.0
COBALT (D)	µg/L	<1.0	<1.0
COPPER (D)	µg/L	12.5	10.5
IRON (D)	µg/L	444	254
LEAD (T)	µg/L	4.2	<1.0
MANGANESE (D)	µg/L	47.6	79.6
MERCURY (T)	µg/L	<0.038	<0.038
MOLYBDENUM (T)	µg/L	<5.0	<5.0
NICKEL (D)	µg/L	<5.0	<5.0
SELENIUM (T)	µg/L	0.75	<0.50
SILVER (T)	µg/L	0.51	<0.10
TIN (T)	µg/L	<25	<25
ZINC (T)	µg/L	372	29
VOLATILE ORGANIC COMPOUNDS, PCBs, and PHTHALATES			
Parameter	Unit	Influent	Effluent
BENZENE	µg/L	<0.40	<0.40
CHLOROFORM	µg/L	1.9	1.1
CHLOROMETHANE	µg/L	<1.0	<1.0
DICHLOROBROMOMETHANE	µg/L	<1.0	<1.0
DICHLOROMETHANE	µg/L	<2.0	<2.0
ETHYLBENZENE	µg/L	<0.40	<0.40
TETRACHLOROETHYLENE	µg/L	<0.50	<0.50
TOLUENE	µg/L	6.7	<0.40
1,1,1-TRICHLOROETHANE	µg/L	<0.50	<0.50
1,1,2-TRICHLOROETHANE	µg/L	<0.50	<0.50
TRICHLOROETHYLENE	µg/L	<0.50	<0.50
DI(2-ETHYLHEXYL)PHTHALATE	µg/L	<100	<2.0
DI-N-BUTYLPHTHALATE	µg/L	<100	<2.0
NAPHTHALENE	µg/L	-	-
PCBS	µg/L	<0.050	<2.5

NT - Not Tested

FCPCC Biosolids				
Parameter	Unit	04-Jan-23	18-Jul-23	Average
TOTAL SOLIDS	%	31.6	30.4	31.0
VOLATILE SOLIDS	%	77.7	65.9	71.8
MOISTURE	%	68	70	69
TOTAL KJELDAHL NITROGEN	% dry wt.	4.2	5.1	4.7
ARSENIC (T)	µg/g	1.89	2.60	2.25
CADMIUM (T)	µg/g	1.57	2.37	1.97
CHROMIUM (T)	µg/g	19.6	35.8	27.7
COBALT (T)	µg/g	1.83	2.80	2.32
COPPER (T)	µg/g	523	830	677
IRON (T)	µg/g	20,500	42,400	31,500
LEAD (T)	µg/g	11.3	17.9	14.6
MERCURY (T)	µg/g	0.571	1.06	0.816
MOLYBDENUM (T)	µg/g	4.52	4.06	4.29
NICKEL (T)	µg/g	9.04	12.5	10.8
PHOSPHOROUS (T)	µg/g	13,700	25,800	19,800
POTASSIUM (T)	µg/g	742	924	833
SELENIUM (T)	µg/g	2.99	4.63	3.81
ZINC (T)	µg/g	932	1,610	1,270

FCPCC Biosolids	
Parameter	Fecal Coliforms
Unit	MPN / g dry
4-Jan-23	<20
7-Feb-23	<20
13-Mar-23	<20
11-Apr-23	<20
15-May-23	<20
18-Jul-23	<20
8-Aug-23	<20
6-Sep-23	<20
16-Oct-23	<20
4-Dec-23	<20
Average	<20

Note: Fecal coliform samples for FCPCC biosolids were taken from the ATAD Out Sample Point

Appendix D – Odour Reports

Odour Concerns

Date of Occurrence	Location	Incident Description	Extent of damage (if applicable)	Preventative Measures Identified	Conclusion for this Environmental Incident
FCPCC - Odour (x14)					
26-Jan-23	██████████ Dickenson Way Parksville BC	██████████ called to say that she has noticed odours have been worse the last few days. Odours seem to get worse later in the day.			Action taken is adequate and item can be closed.
2-May-23	██████████ Mulholland Dr.	██████████ emailed in the RDN's odour communication form indicating that there has been some bad odours coming from the French Creek treatment plant over the last few days. The weather condition at time of call was sunny, 23c, wind westerly at 10km/h. I gave ██████████ a call and explained to her the work that was happening on site. (WALCO cleaning of ATAD's #3 & 6 and the investigation that was happening into the chemical scrubber). I explained that there had been notices sent out to the neighbors explaining about the extra noise and odours that may be experienced over this week. ██████████ thanked me for the phone call and the update.			██████████'s actions regarding this incident were sufficient, and the reasons associated are clear...no further action is required, as the chemical scrubber is being addressed by RDN Engineering, Operations, and Maintenance.
5-Sep-23	Dalmation Drive	Resident called to say that she has noticed that it has been odorous over the past week. The night of September 5th was especially bad. The caller also indicated that the emergency number did not send her to the correct department to file a complaint (1-800-862-3429)			Chief Operator handled the odor concern properly and agreed to follow up with caller.

Date of Occurrence	Location	Incident Description	Extent of damage (if applicable)	Preventative Measures Identified	Conclusion for this Environmental Incident
5-Dec-23	FCPCC	Complainant opened window at her residence and noticed a strong sewage smell, subsided after about 15 minutes	Septage haulers spilling residual sewage from connection hose after transaction is complete.	Checked all odour control systems were operating properly, chemical scrubber had just had product change done, septage area had been hosed down	Temporary odor issue from septage system when offloading, which can be normal for these septage sites. Appropriate response taken to communicate with caller.
7-Aug-23	Lee Road	[REDACTED] called into the after hours odour complaint line to say that it has been odorous for the last few number of nights and what ever we are doing is not working and that he will start calling in every night now. [REDACTED] lives a couple blocks South East of the plant. The last few days have been overcast with not much wind and temperatures hovering close to 20C in the mornings.			The weather has been calm, muggy, warm, and overcast which contributes to odors around our facilities. The chemical scrubber commissioning should help mitigate odors in the area.
3-Oct-23	Dalmatian Drive	[REDACTED] from [REDACTED] Dalmatian Drive called in to say that she is frequently experiencing odours in her neighborhood. The odours seem to be frequently noticeable in the after hours of the treatment plant. The last time she noticed odours was this last Sunday but decided to call in this morning.			In discussion with [REDACTED]: The dewatering biofilter has been replaced with an adequate amount of media on it. OPS will continue to monitor it, but they believe that there is enough for now. The new media does have a different odor to it then the other media when it was new. OPs is still working with Arjun to figure out our chemical scrubber. VIU came to site on Friday Sept 29 to do there air monitoring so am looking forward to there report as to what they found on site and in the neighboring area.

Date of Occurrence	Location	Incident Description	Extent of damage (if applicable)	Preventative Measures Identified	Conclusion for this Environmental Incident
14-Dec-23	Area around FCPC	Caller says that she is fed up with the constant bad odours in the area over the past 5 months. She indicates that children on the school buses are closing the windows on the buses and have disgusted faces because of the smell.			During the 5 months mentioned, there were projects at FCPC that could have added to odor. This has now ceased and all operations is normal.
17-May-23	Mulholand and Lee Road	██████████ called to say that he was walking and noticed a foul smell when at the corner of Mulholand and Lee Road this morning. He said that he attended an open house where he was told to call in anytime he detected foul odours in the area of the plant.		It is believed that this odour complaint was due to the fact that MH#1 (Influent manhole / bypass chamber) was open for the Influent Bypass pumping RFP contractor site visit.	The reasoning behind the odor source is accurate, and as the event is completed the odor no longer exists. No further action is required.
5-Sep-23	██████████ Rosemount Close	██████████ called to complain about the odour around the Morningstar golf course south pond. He stated the pond looks black and seems to be going anaerobic. He stated that there was an event like this about 6 years ago and that this would not happen if the treatment plant didn't send its effluent there.			MGC pond is not an RDN asset, and any concern from the pond is not the RDN's responsibility. This should not be a Incident but more of a communication.
19-Dec-23	██████████ Lee Rd, Parksville, BC	Caller noticed a terrible smell when going outside between 14:15 and 14:30		Checked plant odour control systems and operations - everything normal. Checked septage delivery slips - nothing showing	Nothing apparent that would have contributed to any unusual odor.

Date of Occurrence	Location	Incident Description	Extent of damage (if applicable)	Preventative Measures Identified	Conclusion for this Environmental Incident
16-Aug-23	FCPCC	Noticed odor around plant gate and want to inform us.		Checked all odor control systems are functioning. Nothing abnormal in plant	█ received call from █ around 4:15pm on Aug 16/23. █ is new to the area, and noticed an odor when driving by the front FCPCC gate. █ had been told by another resident to call the FCPCC every time she noticed any odor. Temp was 18C, wind NW 13k/h, RH 52%, clear skies.
18-Aug-23	FCPCC	Wanting to let us know of odors at this time.		Checked all odor control systems are functioning. Nothing abnormal in plant	█ received call from █ around 11:30am on Aug 18/23. █ had been told by another resident to call the FCPCC every time she noticed any odor. Temp was 16C, wind NW 24k/h, RH 70%, clear skies. All odor systems were checked and operating as intended.
5-Oct-23	█ Dalmatian Drive Parksville	█ called in to report that she could detect an odour at her residence that she believes is coming from the Wastewater treatment plant. She said that she will continue to call when she detects odours.			Note are sufficient for this incident.
18-Nov-23	█ Dalmatian Drive	Homeowner states that it smells horrible today.		It was found that the new biofilter media for De-watering is not performing very well. It was also found that during an inspection of the plant that more water was needed to the bio-towers.	The reclaimed water lines were looked into, and a contractor worked on the RSW system Dec 5/23 which resulted in better RSW flow.

Parksville & Qualicum Interceptor-Odour (1)

Date of Occurrence	Location	Incident Description	Extent of damage (if applicable)	Preventative Measures Identified	Conclusion for this Environmental Incident
1-Aug-23	Judges Row	<p>██████████ from the city of Qualicum Beach called to say that he had received a call from a lady that had been swimming at the beach along Judges Row in Qualicum last night and believes there is a sewage leak there. He had sent two staff members out to investigate but nothing was found but wanted to ensure the RDN was aware of the concern. ██████████ and ██████████ went out to sight and walked the beach area from Judges row to Hall Road Lift station. It was low tide and nothing was found and all lids were well secured and sealed. ██████████ called the lady that called in the concern. (██████████)</p> <p>She was out swimming last night at high tide and at one point said that she noticed a very strong smell of sewage when next to a submerged manhole and then left the area.</p>	Nothing was found.		Investigation and assessment is accurate to indicate this was not from our system, and likely another source (ie. bilge pump, off shore dumping).

Appendix E – Environmental Incident Reports

Environmental Incidents:

Date of Occurrence	Incident Title	Quantity of Material Spilled	Accident Location	Incident Description	Extent of damage (if applicable)	Preventative Measures Identified	Notes	Conclusion for this Environmental Incident
FCPCC Spill (x1)								
September 20, 2023	Sludge feed line spill	200 Litres	De-Watering Building	Digested sludge feed line to Centrifuge sprung a leak just outside the De-Watering Building just after the Centrifuge had been shut down for the day. Operations were only a few feet away from the pipe when it began to leak. Digested sludge flowed down the driveway and onto the parking lot. Some diluted sludge spilled onto the grass areas next to the parking lot and next to the bridge over Morningstar creek. It is believed that the spill did not enter the creek. Operations exposed the broken pipe and isolated the pumps and valves to this line in preparation of repairing the pipe tomorrow morning.				The spill has been cleaned up, and the broken pipe repaired and back in service. End of Spill report was completed oct 10/23 and is being sent to the Ministry and Feds.

Appendix F – Conditional Management Plan 2023 Annual Report

January 4, 2024

File: 2240-20-CMP

Erin Milligan
Canadian Shellfish Sanitation Program Coordinator
Fisheries and Oceans Canada
VIA EMAIL: erin.milligan@dfo-mpo.gc.ca

Dear Erin,

**Re: 2023 Annual Report
French Creek Pollution Control Centre – Conditional Management Plan**

The Regional District of Nanaimo (RDN) has a Conditional Management Plan (CMP) for two pump stations associated with the French Creek Pollution Control Centre (FCPCC) near Parksville, BC:

- Hall Road Pump Station, 300 Hall Road
- Bay Avenue Pump Station, 385 Bay Avenue.

The original CMP was established in 2012 and has been renewed several times. The current agreement expires on January 31, 2025.

According to the agreement, the RDN shall report CMP activities annually. This letter summarizes CMP activities from January 1, 2023, to December 31, 2023. It also lists notable upgrades and activities at FCPCC and suggests proposed changes, if any, to future versions of the CMP.

CMP Activities

There were no trigger events from January 1, 2023, to December 31, 2023.

FCPCC Upgrades and Activities

The 2023, the work most relevant to the CMP was the Bay Avenue Pump Station Upgrade Project. Once complete (expected in February 2024), this project will increase pumping capacity and meet the current standards for Flood Construction Levels. During the upgrade, the overflow, to which this CMP relates, was removed. It will not be reinstated.

Other upgrades and activities at FCPCC in 2023 include:

- Initiated an Integrated Project Delivery (IPD) method for the FCPCC Expansion and Odour Control Upgrade Project. Completed the Validation stage and started the final Detailed Design.
- Replaced media in the dewatering biofilter.
- Monitored air quality in an ongoing partnership with VIU.
- Cleaned the media in the chemical air scrubber and replaced the chemical with a safer enzyme.

Proposed CMP Changes

The RDN recommends removing the Bay Avenue Pump Station from the CMP as the overflow no longer exists at this location.

Recommended changes to the RDN contacts in Appendix D are listed below.

- Contact 1: Ian Lundman, FCPC Chief Operator
Tel: 250-248-5794 ext. 6315
Cell: 250-751-5580
ilundman@rdn.bc.ca
- Contact 2: Rob Skwarczynski, Operations Superintendent
Tel: 250-758-1157
Cell: 250-816-2767
Rskwarczynski@rdn.bc.ca
- Contact 3: Belinda Woods, Manager, Wastewater Services
Tel: 250-390-6234
Cell: 250-268-9290
bwoods@rdn.bc.ca

If you have any questions regarding this report, please do not hesitate to contact me at 250-390-6575 or snorum@rdn.bc.ca.

Sincerely,



Shelley Norum
Wastewater Program Coordinator
T: 250-390-6575 | Email: snroum@rdn.bc.ca

Appendix G – 2023 Management of RDN FCPCC Biosolids (SYLVIS)

ANNUAL SUMMARY

2023 Management of Regional District of Nanaimo French Creek Pollution Control Centre Biosolids

Presented to: Shelley Norum, RDN

Presented by: Christian Evans, SYLVIS Environmental

Presentation date: February 7, 2024

BACKGROUND

Regional District of Nanaimo (RDN) Class A biosolids from the French Creek Pollution Control Centre (FCPCC) are delivered to the Nanaimo Forest Products Harmac Pacific pulp and paper mill (Harmac) in Nanaimo, BC where they are blended with hog fuel and sand to produce a biosolids growing medium (BGM), a retail-grade product regulated under the BC *Organic Matter Recycling Regulation* (OMRR). BGM is sold to local property developers or used in on-site landfill closure. BGM from FCPCC biosolids has been produced at Harmac since 2020.

SYLVIS Environmental provides qualified professional oversight of the BGM program and certifies annual or semi-annual batches of BGM as per the BGM criteria in the OMRR. To date all batches of BGM produced using FCPCC biosolids at Harmac have met regulatory quality criteria.

2023 MANAGEMENT SUMMARY

Row #	Material	Category	2020	2021	2022	2023
1	FCPCC Biosolids (wt)	Carry over from previous year	0	730	1,031	1,682
2		Tonnage delivered to BGM project	1,007	1,299	1,291	1,124
3		Tonnage exported from site	277	998	640	605
4		Tonnage used in landfill cover	0	0	0	648
5		Carry over to next year (1+2)-(3+4)	730	1,031	1,682	1,554
6	BGM (m ³)	Carry over from previous year	0	3,300	4,700	7,700
7		Volume mixed	4,700	6,000	6,000	5,200
8		Volume exported from site	1,400	4,600	3,000	2,800
9		Volume used in landfill cover	0	0	0	3,000
10		Carry over to next year (6+7)-(8+9)	3,300	4,700	7,700	7,100

Note: Biosolids are mixed at a ratio of 2 biosolids : 4 hog fuel : 5 sand to produce BGM.

BIOSOLIDS QUALITY SUMMARY

In 2023, three composite samples were collected by SYLVIS and analyzed for physical parameters, nutrients, and trace elements. In 2023 FCPCC biosolids met the OMRR Class A criteria for trace elements concentrations. Eight samples for fecal coliform analysis were collected by SYLVIS in 2023. Six of these samples had fecal coliforms below the Class A criterion of 1,000 MPN/g. Two samples collected late in 2023 exceeded this criterion, but it was determined that they were spurious results, likely related to sample collection or storage issues. Unfortunately

there was insufficient time in 2023 to re-sample following these results. The RDN's FCPCC sampling results were used to confirm that the biosolids continue to meet the OMRR Class A criterion of < 1,000 MPN/g fecal coliforms.


Table 1: French Creek Pollution Control Centre biosolids quality summary - 2023.

WWTP	FCPCC	OMRR Class A Biosolids Criteria ^a	Units
# of samples	3		
Available Nutrients			
Ammonia + Ammonium - N (available)	2,697	-	µg/g
Nitrate - N (available)	4	-	µg/g
Phosphorus (total)	23,333	-	µg/g
Potassium (available)	691	-	µg/g
Classification			
Organic Matter	62.7	-	%
Total Nitrogen	4.48	-	%
C:N Ratio	7.9	-	-
OMRR Trace Elements			
Arsenic	2.2	75	µg/g
Cadmium	1.60	20	µg/g
Chromium	53.3	1,060 ^b	µg/g
Cobalt	2.47	150	µg/g
Copper	713	2,200 ^b	µg/g
Lead	17.0	500	µg/g
Mercury	0.593	5	µg/g
Molybdenum	3.43	20	µg/g
Nickel	13.3	180	µg/g
Selenium	1.5	14	µg/g
Zinc	1,140	1,850	µg/g
Physical Properties			
Total Solids	32.1	-	%
Electrical Conductivity (Sat Paste)	7.78	-	dS/m
pH (1:2 Soil:Water)	7.2	-	pH
Foreign Matter	< 0.1	1	%
Foreign Matter (sharps)	< 0.1	0	%
Microbiology			
Fecal coliforms	10 ^c	1,000	MPN/g Dry

Note: All analyses based on dry weight.

- a Class A trace element criteria specified in Trade Memorandum T-4-93, Standards for Metals in Fertilizers and Supplements as of August 2017, and microbiological criteria specified in Schedule 3 of the BC *Organic Matter Recycling Regulation*.
- b For context, OMRR Class B trace element criteria are specified where no Class A criteria exist.
- c Value is the maximum of six samples collected by SYLVIS throughout 2023.



 250-390-6560 | 250-954-3792 | 1-877-607-4111

 rcu@rdn.bc.ca

www.rdn.bc.ca