Village of Lions Bay

2024 ANNUAL REPORT

For the Wastewater Treatment Plant at
Lot 45 Tidewater Way, Kelvin Grove, Lions Bay on
Wastewater Discharge Permit 5188.

19 June 2025

CONTENTS

GLOSSARY

FOG	Fats, Oils and Greases that affect the operation of the WWTP, and build up in the sewers
SCADA	Supervisory Control And Data Acquisition, the process control system for the municipality's infrastructure
MFR	Multi-family residences
OCP	Official Community Plan
I&I	Inflow and Infiltration (of stormwater and groundwater to the sewer)
RBC	Rotating Biological Contactor
WWTP	Wastewater Treatment Plant

INTRODUCTION

Domestic wastewater produced by 97 residences in Lions Bay's Kelvin Grove neighbourhood is directed through 2,173 meters of 200 mm (8") PVC sanitary-sewer pipe to treatment at the municipality's wastewater treatment plant (WWTP) located at Kelvin Grove Beach & Marine Park.

2024 wastewater operating expenditure was budgeted at $159,250 including amortisation, with $196,457 collected in sewer rates, the difference funding a capital expenditure fund. No capital expenditure was undertaken in 2024, but significant maintenance work included replacing the close-to-failure rotating biological contactor's motor reduction gear drive with the in-stock spare and buying a new spare drive and motor, and adding a SCADA-connected current transducer to the motor power feed to offer a reading of motor health.

A description of the wastewater treatment process is provided in an Appendix.

PERMIT

The municipality's authority to discharge wastewater to the environment is provided under the *Environmental Management Act* by Ministry of Environment and Climate Change Strategy) Permit 5188 (see Appendix), which stipulates the following requirements:

Parameter	Permit value
Effluent volume	340 m^3/day max.
5-day biological oxygen demand (BOD_5)	45 mg/ℓ max.
Total suspended solids (TSS)	60 mg/ℓ max.
Effluent sampling	Daily for total volume, quarterly for BOD, TSS
Reporting	Annually

EFFLUENT ASSAY

All four quarterly effluent samples were within permitted limits:

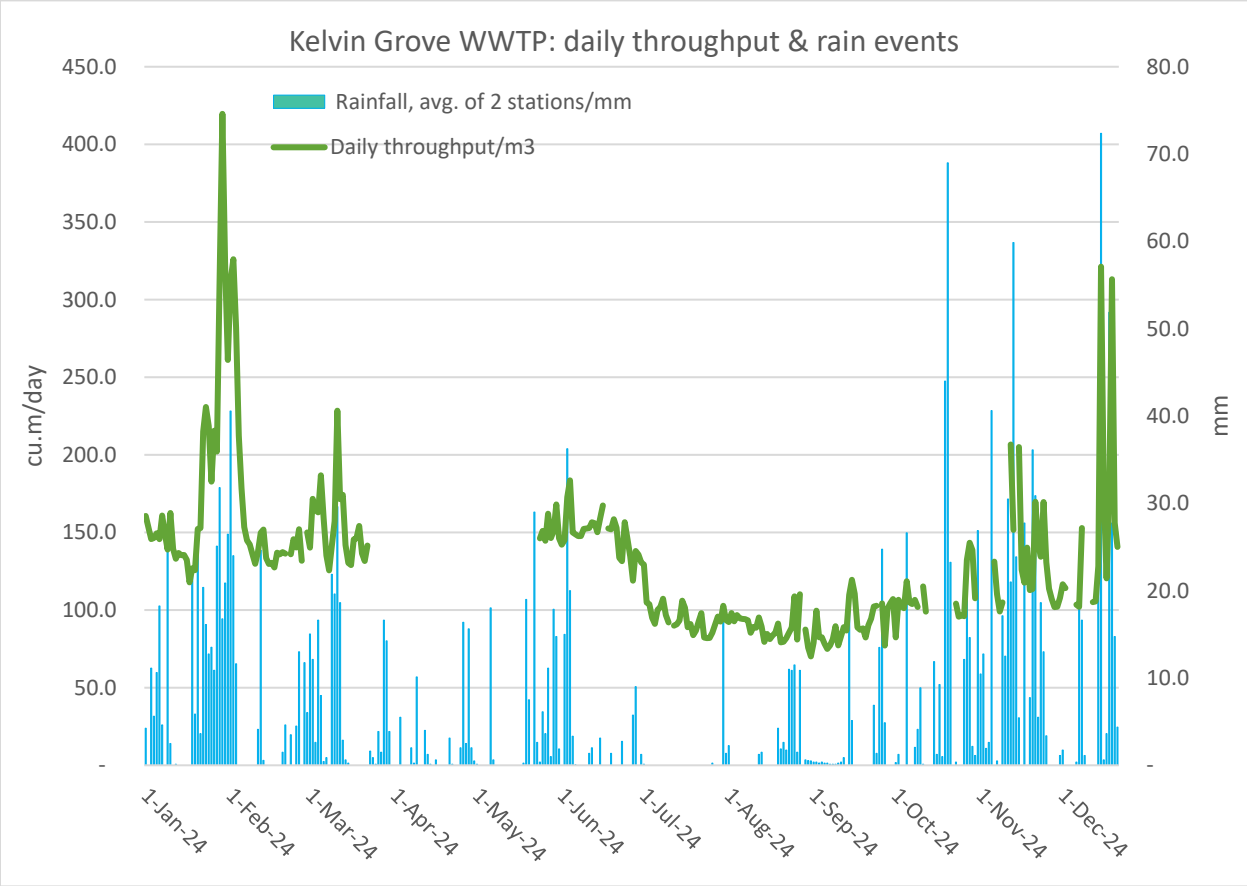
Parameter	21 Mar. 2024	6 Jun. 2024	26 Sep. 2024	10 Dec. 2024
TSS, mg/ℓ (max. 60)	20.7	23.0	30.0	17.7
BOD_5, mg/ℓ (max. 45)	11.8	14.9	25.7	11.3

Laboratory reports are provided in the Appendix.

DISCHARGE VOLUMES

Daily flow data are provided in the Appendix. 2024 saw significant control system data outages from mid-March to mid-May (due to the municipality's new managed IT service provider being unable to correctly configure new routers to the Shaw cable internet service at the plant). Even once that had been addressed, data connectivity was unreliable until the Shaw connection was replaced by Telus fibre

in Dec. 2024. For the data that do exist, there was one exceedance of the permitted 340 cu. m in 2024, namely 420 cu.m on Jan. 29, which saw a total of 187 mm of rain in the 11 preceding days:



No other period of the year saw that amount of rain, and we think it reasonable to infer no volume exceedances therefore occurred in missing data periods. The plant's control system is being upgraded in 2025 to store operating data locally to eliminate the need for a totally reliable data connection.

95 residences have been connected to the system since the neighbourhood was developed in the 1990s. Three further residences commenced construction in 2022, and two were connected in 2024. Despite no appreciable change in the number of sewer connections, flows into the WWTP have increased year-on-year since 2020:

	2017	2018	2019	2020	2021[1]	2022[2]	2023	2024
Average daily flow (m^3/day)	92.4	80.4	72.2	81.3	100.5	116.6	122.2	132.5
Change	-	-13%	-10%	+13%	+24%	+16%	+5%	+8%
Max. daily flow (m^3/day)	269.9	199.8	204.6	203	525	455	443.4	419.7
Exceedances of 340 m^3/day	0	0	0	0	6	1	1	1

[1] The WWTP's RBC renovation was commissioned in Jan. 2021, but data logging was not available until March. Flows were estimated for Jan. and Feb. Atmospheric river events occurred in Oct. and Nov. 2021.

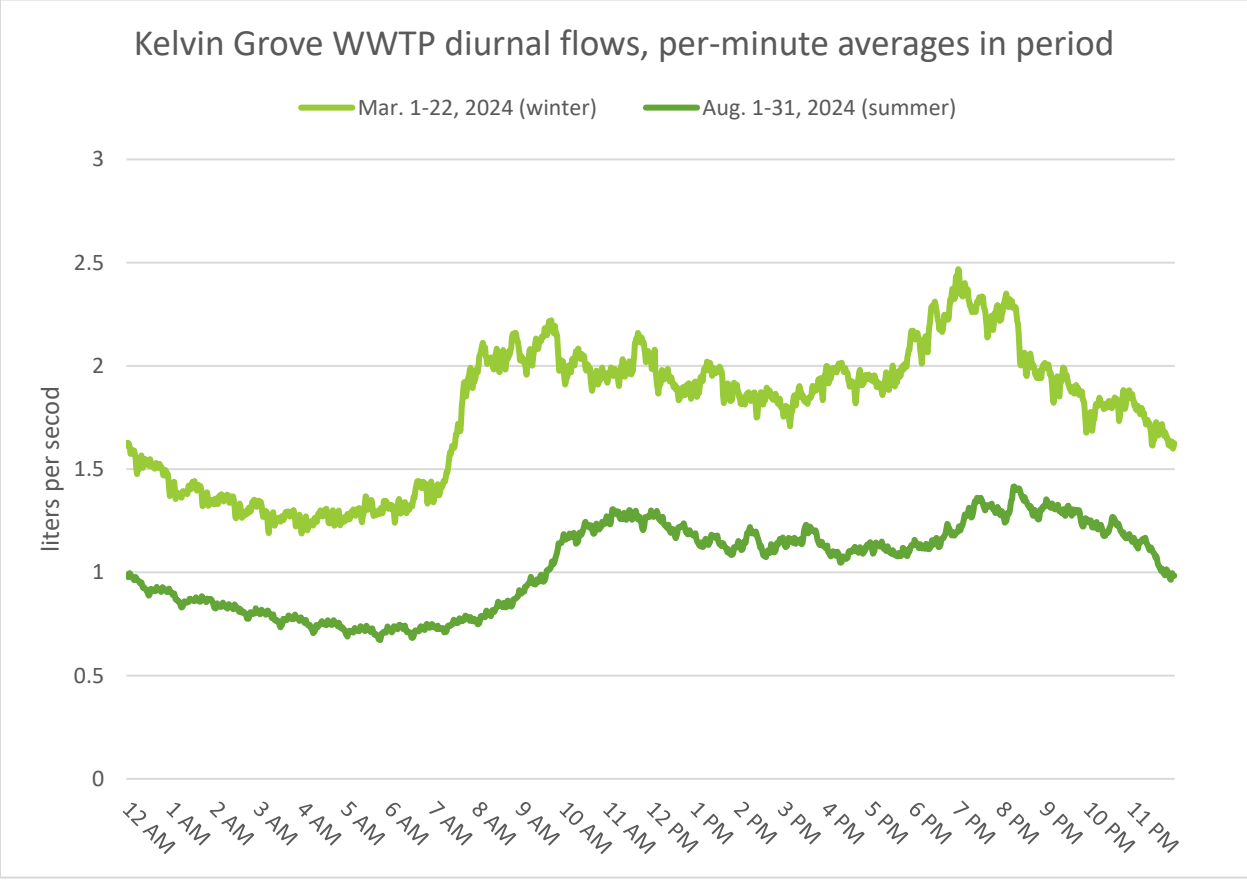
[2] An atmospheric river event occurred in Dec. 2022

This year-on-year increase could be caused by a number of factors:

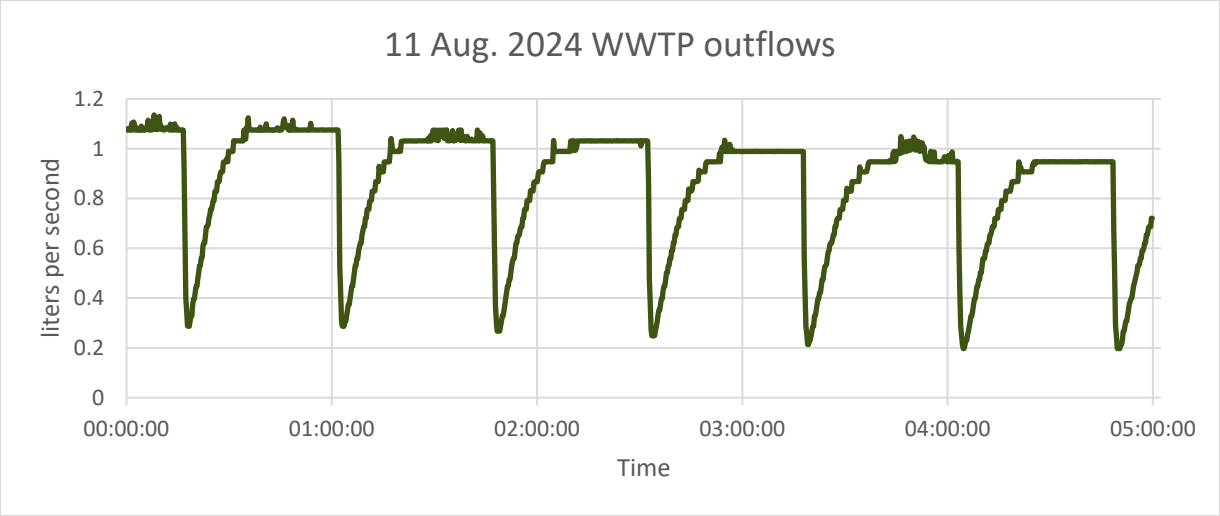
- The plant was rebuilt in 2020 and the effluent flowmeter may have been recalibrated and reporting different absolute values since. Its zero-flow reading was confirmed in 2024, and we believe it is now reporting correctly, if it was not before.
- Qualitatively, residences in the neighbourhood are known to be adding short-term rentals or have secondary suites: an increasing count of occupants will produce more wastewater.
- Lions Bay was exempt from BC's speculation and vacancy tax until the 2023 tax year; its introduction may have increased residents.
- Increased work from home use since COVID-19 means more daytime wastewater production.
- Increasing visitors to the Kelvin Grove Beach Park and use of its washrooms connected to the WWTP.
- Deterioration of private plumbing, discussed further below.
- Shorter winters, leading to more rain than snow, increasing the potential for inflow and infiltration (I&I).

DEMAND

Flows through the plant exhibit a typical residential use pattern over the course of the day: overnight lows build through the morning, peak mid-evening, and drop after 10 pm; summer times are later:



Overnight flows are of note. With only residences connected to the system, flow between 1 and 5 am is expected to be close to zero but instead is significant. On Aug. 11 for example, the 10th day of a period with no rain so less I&I likely, overnight flow out of the plant of a constant 1.0 ℓ/s is seen (excluding 45 min. recirculation cycles):



Expected use at Lions Bay's scales would show spikes on the order of 0.5 ℓ/s for a few seconds as a slug of wastewater flows down the sewer. Cross connection of roof and perimeter drains to the sewer would be expected to produce intermittent flows, somewhat correlated to rainfall. Constant flow through the plant can have only two causes:

- Groundwater I&I into sewers
- Fixtures leaking or deliberately flowing to drain.

Visual and camera inspections in July were conducted to attempt to find the constant flow. One leaking shower, three leaking toilets and one constantly overflowing swimming pool connected to the sewer were found, and repaired by owners, sometimes only after increasingly firm requests. *Average* overnight flow was reduced from March's 1.2 ℓ/s to about 0.7 ℓ/s in August (including the effect of a presumably lower water table and lower resulting groundwater ingress), but even 0.7 ℓ/s was 68 percent of the flow into the plant in the month.

Not only is constant flow an inefficient use of the plant's hydraulic capacity, but it also reduces retention time and hence BOD removal. The increased dilution does reduce the total suspended solids concentration, so sample frequency will be increased as part of fixes undertaken in 2025.

MAINTENANCE

ROUTINE

In accordance with the operating permit, regular inspection and maintenance activities are conducted to keep the facility in good working order:

- Weekday inspection for vandalism, damage to RBC disks, shaft misalignment or deflection, motor and reduction gear noise, sludge levels, smell, blockage of weirs and orifices.
- Monthly inspection of RBC reduction gear oil, and lubrication of fittings and bearings.
- Pump out based on sludge level in the primary and secondary clarifiers. In 2024, the plant was pumped in November, removing about 30 m^3 of sludge.
- Diver inspection of the outfall every six years, with the last inspection in 2019, and the next due in 2025.

NON-ROUTINE, 2024

- In August 2022, the sewer network had been smoke tested, revealing several small leaks in sewer laterals and manholes. Letters were sent to property owners advising of private-side leaks and requiring their repair. Staff are still addressing identified public-side defects.
- As noted previously, by visually inspecting manholes three sections of sewer with continuous flow seemingly independent of recent precipitation were found. An in-house CCTV unit identified three residences producing continuous flow.
- In July a contractor was brought in to inspect areas that our owned camera could not reach, identifying a further leaking toilet and continuous flow from a swimming pool overflow. A sewer branch for properties on Sweetwater and Tidewater were found to be carrying constant flow, for further investigation in late summer 2025.
- The May inspection found the RBC reduction gear close to failure, with water and metal filings in the oil. The in-stock spare was installed, with a desiccant pack added to the breather port to reduce moisture contamination, and a drain valve added to ease future inspections and oil changes. The old drive was sent for inspection—as expected a failed shaft seal had allowed water ingress—but found to be too damaged to rebuild, so a new spare gearbox and motor were ordered and delivered.
- A current transducer was installed on the motor power feed and added to the SCADA process control system to offer a reading of motor health.

LOOKING FORWARD: 2025

- Install conductivity sensor for motor gear reduction drive oil.
- Video inspect select property service laterals using a slave rover from the main camera.
- PR campaign to reduce constant flow and FOG (Fat, Oil, Grease) entering sewers.
- Grout select manhole barrels to reduce groundwater I&I
- Seek cross-connections of stormwater ditches and culverts, and of roof and perimeter drains to the sewer, by video scoping during heavy rain periods in late 2025
- Diver-inspect outfall pipe 185 meters beyond and 60 metres beneath the low water mark.
- Add SCADA control system historian to store data locally to eliminate reliance on constantly up data connectivity back to the central server.
- Replace two seized manholes, raise eight manhole rings to or above street level to reduce I&I, recontour street catchbasins to direct stormwater into ditches (completed May).

STRATEGIC ISSUES

Emergency RBC repair in 2020/1 utilised a like-for-like design to not trigger a new permit requirement. That choice unfortunately pushed back an Infrastructure Master Plan concept to expand the plant by adding modules to bring further sections of the Village onto central sewer. A foreseen need is a 390 m force main from Lions Bay Beach Park to replace its overused onsite wastewater system, past Lions Bay Marina and the Public Works Yard (considered a future MFR property in the OCP), and connecting to the sewer at Periwinkle:

FACILITY CLASSIFICATION

The Environmental Operators Certification Program classifies the plant as a Small Wastewater System, valid until Feb. 28, 2026:


EOCP

CERTIFICATE of CLASSIFICATION

Environmental Operators Certification Program

This is to certify that:

Village of Lions Bay Wastewater System

Facility No. 795

has been classified as a

Small Wastewater System

CHAIR, BOARD of DIRECTORS

PRESIDENT and CEO

Dated: February 28, 2021
At: Burnaby, BC
Valid until: February 28, 2026

A society incorporated under the Society Act, S.B.C. S-28724

OPERATOR CERTIFICATIONS

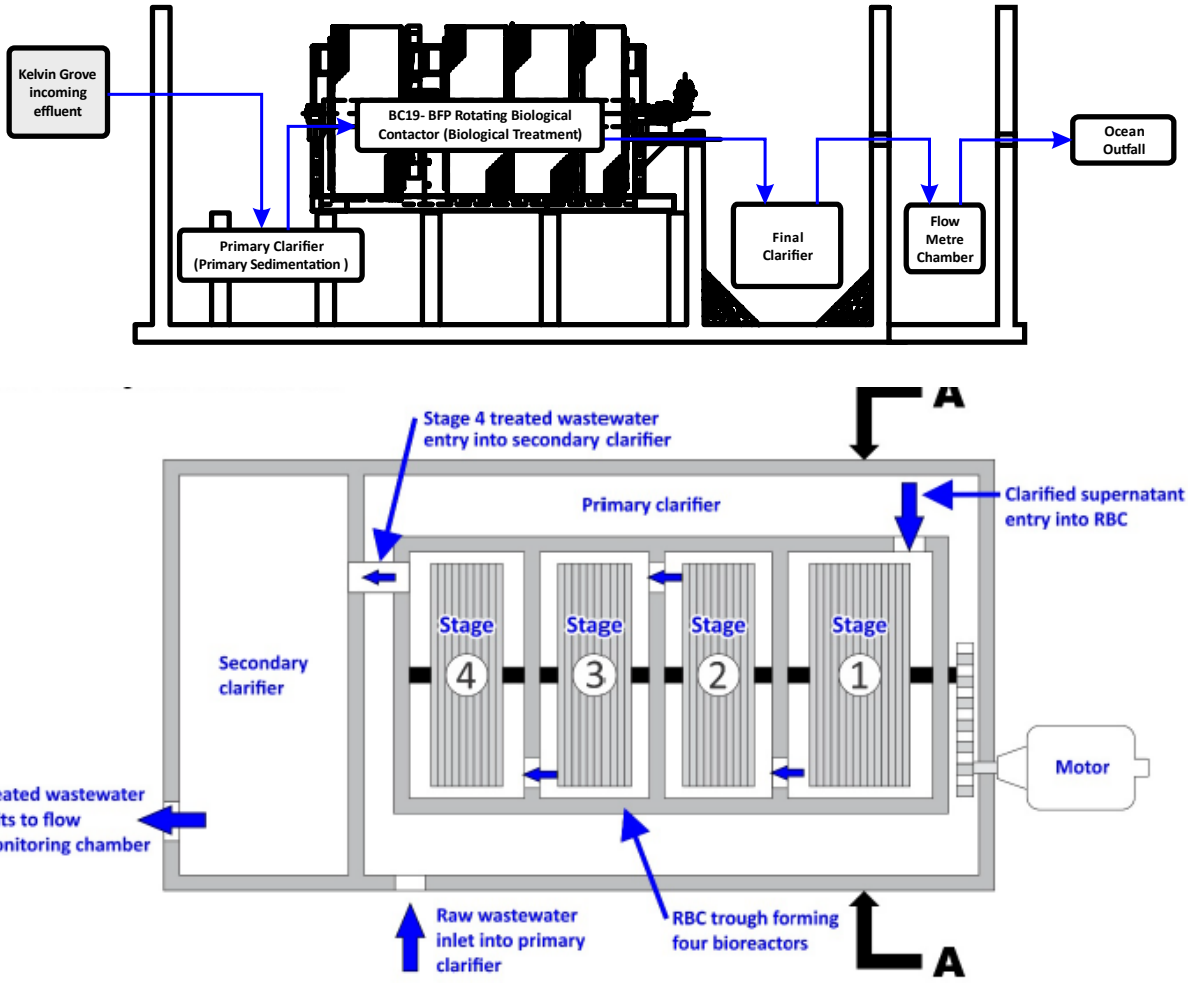
The municipality fielded two mandatory EOCP-certified operators in 2024:

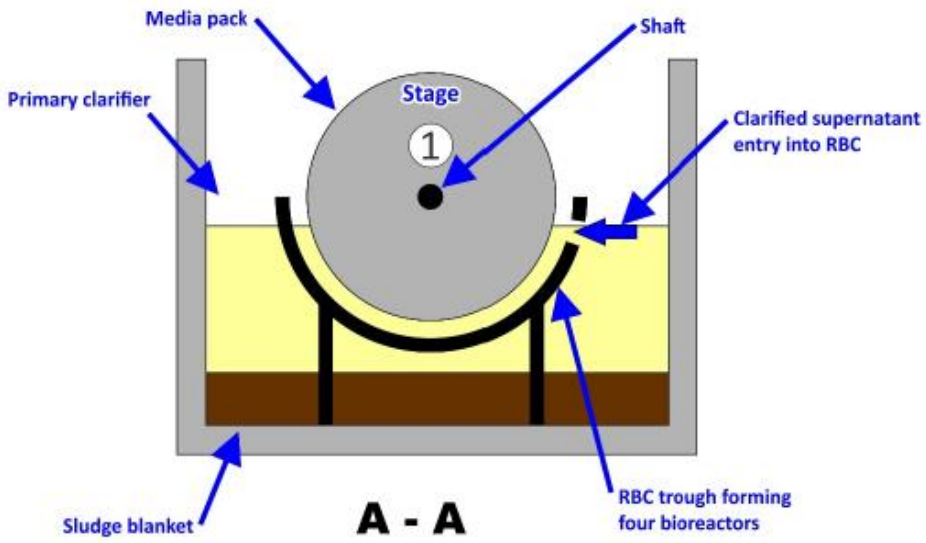
OPERATOR	EOCP CERTIFICATIONS
Foreman 1 AY (Operations Supervisor in 2025)	Small Wastewater Systems (one required), Wastewater Collection 2 (one required)
Technician 1 GS (Operator 2 in 2025)	Small Wastewater Systems (Wastewater Collection 1 in 2025)

APPENDIX 1 – WASTEWATER TREATMENT PROCESS

The Kelvin Grove WWTP utilises a rotating biological contactor (RBC) process to treat wastewater in three stages: primary clarification, biological treatment and secondary clarification.

Figure 1 - Treatment Process





1 PRIMARY CLARIFICATION

Wastewater flows through Lions Bay's sewer network by gravity. Entering the WWTP, solids, fats, oils and greases partially settle and form a sludge blanket at the bottom of the plant. Sludge depths over about 30 cm decrease treatment efficiency due to exclusion of oxygen available for biological activity, so is periodically removed by pumper truck to Metro Vancouver's Iona Island, Richmond wastewater facility.

2 BIOLOGICAL TREATMENT

Biological treatment relies on naturally occurring bacteria and protozoa consuming organic matter for food.

Exiting primary clarification, wastewater containing suspended and dissolved organic matter passes to the RBC chamber. RBCs are large plastic disks, approx. 3 m in diameter in Lions Bay's case, dipping into the pool of wastewater in the chamber. The disks rotate about 1.5 times a minute, to alternately expose them to air. The disk surface is corrugated to provide extra surface area for a film of microorganisms to grow on.

The first disks in the train see the highest organic loadings and are where the highest biological activity occurs. Microorganism species in this zone are simple ciliates and filamentous and non-filamentous bacteria.

As wastewater progresses down the chamber, decreasing organic loading gives preference to higher life forms including protozoa and rotifers. Disk rotation provides oxygen to the process, plus keeps material in suspension rather than allowing it to settle to the floor of the chamber.

In a well-functioning unit with appropriate wastewater feed rate, nutrient loading and micro- organism population, the RBC will produce an earthy, humus-like musty smell; sour or sewage smell indicates

suboptimal conditions. Recirculation pumps run every 45 minutes to return some effluent to the front of the plant, akin to the return activated sludge process found in much larger regional plants.

3 SECONDARY CLARIFICATION

Past the RBC, the wastewater stream enters a second clarifying chamber where dense biomass settles out, leaving a liquid effluent relatively clear of suspended material to be discharged to the environment, in Lions Bay's case via an outfall pipe into Howe Sound. Settled sludge is periodically removed. In a tertiary system, secondary sludge is sent to closed tanks for anaerobic digestion for days to weeks, but Lions Bay is not yet required to use tertiary treatment.

APPENDIX 2 – SEWER LAYOUT

APPENDIX 3 – DAILY LOG

Date (exceedances in orange)	Daily throughput/m³	Max. flow/ℓ/s	Avg. effluent temp/°C	Rainfall, avg. of 2 stations/mm
	Blanks indicate missing data due to SCADA outages			
1 Jan 24	160.6	3.4	12.9	4.3
2 Jan 24	153.1	3.1	13.0	0
3 Jan 24	145.7	3.0	12.9	11.1
4 Jan 24	146.4	2.7	12.7	5.6
5 Jan 24	149.4	3.2	12.7	10.6
6 Jan 24	145.7	2.7	12.6	18.3
7 Jan 24	160.9	3.0	12.4	4.6
8 Jan 24	149.2	3.0	12.4	0
9 Jan 24	139.0	3.1	12.2	24.6
10 Jan 24	162.5	3.6	12.0	2.5
11 Jan 24	139.4	3.4	11.7	0
12 Jan 24	133.1	2.9	11.7	0.1
13 Jan 24	136.8	3.0	11.4	0
14 Jan 24	135.4	3.0	10.5	0
15 Jan 24	135.5	3.1	10.3	0
16 Jan 24	132.4	3.0	10.4	0
17 Jan 24	117.8	2.3	10.4	0
18 Jan 24	126.9	2.9	10.4	21.8
19 Jan 24	125.7	3.3	10.3	5.9
20 Jan 24	152.3	3.2	10.5	25.0
21 Jan 24	152.8	3.0	10.5	3.6
22 Jan 24	215.1	4.5	10.5	20.4
23 Jan 24	230.8	4.2	10.3	16.1
24 Jan 24	218.6	3.7	9.9	12.8
25 Jan 24	182.7	3.6	9.9	13.5
26 Jan 24	215.5	4.0	9.9	10.9
27 Jan 24	202.1	3.8	10.0	25.1
28 Jan 24	312.4	6.0	10.0	31.8
29 Jan 24	419.7	7.2	9.8	16.8
30 Jan 24	322.8	5.2	9.7	20.9
31 Jan 24	261.1	7.0	10.0	26.5
1 Feb 24	312.0	6.0	10.2	40.6
2 Feb 24	326.0	5.6	10.3	24.0
3 Feb 24	282.0	5.1	10.3	11.6
4 Feb 24	212.4	3.8	10.6	0
5 Feb 24	178.5	3.2	10.9	0
6 Feb 24	153.4	3.3	11.0	0
7 Feb 24	144.9	2.9	11.0	0
8 Feb 24	142.2	3.0	11.1	0
9 Feb 24	136.0	3.0	11.2	0
10 Feb 24	129.8	3.5	11.3	0
11 Feb 24	137.3	3.1	11.3	4.1
12 Feb 24	149.7	2.9	11.4	24.6
13 Feb 24	151.8	2.9	11.4	0.6
14 Feb 24	133.5	2.7	11.4	0
15 Feb 24	129.7	2.6	11.3	0
16 Feb 24	130.4	2.9	11.1	0
17 Feb 24	127.5	2.6	11.0	0
18 Feb 24	136.9	2.6	11.2	0
19 Feb 24	135.9	2.8	11.5	0

Date (exceedances in orange)	Daily throughput/m³	Max. flow/ℓ/s	Avg. effluent temp/°C	Rainfall, avg. of 2 stations/mm
	Blanks indicate missing data due to SCADA outages			
20 Feb 24	137.3	3.1	11.5	1.5
21 Feb 24	136.4	2.7	11.7	4.6
22 Feb 24				0
23 Feb 24	135.9	2.7	11.8	3.5
24 Feb 24	145.6	5.6	11.8	0
25 Feb 24	140.3	2.9	12.1	4.5
26 Feb 24	152.1	3.3	12.2	13.0
27 Feb 24	131.8	2.6	11.9	0
28 Feb 24				11.8
29 Feb 24	150.0	3.1	11.3	6.0
1 Mar 24	140.2	2.9	11.0	15.0
2 Mar 24	171.7	3.7	10.8	12.1
3 Mar 24	164.3	3.2	10.6	2.6
4 Mar 24	162.9	3.1	10.6	16.6
5 Mar 24	186.8	3.6	10.6	8.0
6 Mar 24	158.7	3.5	10.3	0.4
7 Mar 24	135.2	3.2	10.3	0.9
8 Mar 24	125.6	2.9	10.3	0
9 Mar 24	141.4	3.4	10.3	21.9
10 Mar 24	157.2	3.2	10.4	19.6
11 Mar 24	228.4	4.5	10.6	29.6
12 Mar 24	171.5	3.7	10.3	18.6
13 Mar 24	174.2	3.4	10.4	2.9
14 Mar 24	141.8	2.9	10.5	0.6
15 Mar 24	130.4	2.6	10.7	0.3
16 Mar 24	129.0	3.0	10.9	0
17 Mar 24	145.5	3.3	11.2	0
18 Mar 24	146.3	3.1	11.6	0
19 Mar 24	154.2	3.4	11.6	0
20 Mar 24	136.5	3.0	11.6	0
21 Mar 24	131.6	2.8	11.6	0
22 Mar 24	141.6	3.4	11.7	0
23 Mar 24				1.6
24 Mar 24				0.9
25 Mar 24				0.1
26 Mar 24				3.9
27 Mar 24				1.5
28 Mar 24				16.6
29 Mar 24				14.3
30 Mar 24				3.9
31 Mar 24				0
1 Apr 24				0
2 Apr 24				0
3 Apr 24				5.5
4 Apr 24				0
5 Apr 24				0
6 Apr 24				0
7 Apr 24				2.0
8 Apr 24				0.3
9 Apr 24				10.1
10 Apr 24				0
11 Apr 24				0
12 Apr 24				4.0

Date (exceedances in orange)	Daily throughput/m³	Max. flow/ℓ/s	Avg. effluent temp/°C	Rainfall, avg. of 2 stations/mm
	Blanks indicate missing data due to SCADA outages			
13 Apr 24				1.3
14 Apr 24				0.1
15 Apr 24				0
16 Apr 24				0.6
17 Apr 24				0
18 Apr 24				0
19 Apr 24				0
20 Apr 24				0
21 Apr 24				3.1
22 Apr 24				0.1
23 Apr 24				0
24 Apr 24				0
25 Apr 24				2.0
26 Apr 24				16.4
27 Apr 24				2.5
28 Apr 24				15.6
29 Apr 24				2.0
30 Apr 24				0.5
1 May 24				0.1
2 May 24				0
3 May 24				0
4 May 24				0
5 May 24				0
6 May 24				18.0
7 May 24				0.6
8 May 24				0
9 May 24				0
10 May 24				0
11 May 24				0
12 May 24				0
13 May 24				0
14 May 24				0
15 May 24				0
16 May 24				0
17 May 24				0
18 May 24				0.3
19 May 24				19.0
20 May 24				7.5
21 May 24				0
22 May 24				29.0
23 May 24				2.6
24 May 24	146.2	2.7	15.2	0.4
25 May 24	151.0	2.9	15.5	6.1
26 May 24	144.7	2.9	15.5	3.6
27 May 24	162.1	3.8	15.5	11.1
28 May 24	146.4	3.5	15.6	1.0
29 May 24	150.8	2.9	15.6	17.9
30 May 24	168.1	3.8	15.4	14.8
31 May 24	146.2	3.4	15.4	1.9
1 Jun24	142.1	3.4	15.4	0
2 Jun24	145.0	3.1	15.7	15.0
3 Jun24	172.7	4.2	15.7	36.3
4 Jun24	183.6	3.6	15.5	20.0

Date (exceedances in orange)	Daily throughput/m³	Max. flow/ℓ/s	Avg. effluent temp/°C	Rainfall, avg. of 2 stations/mm
	Blanks indicate missing data due to SCADA outages			
5 Jun24	150.0	3.0	14.9	3.3
6 Jun24	148.8	3.3	15.1	0.1
7 Jun24	147.6	2.9	15.4	0
8 Jun24	147.7	3.3	15.6	0
9 Jun24	152.3	3.5	15.9	0
10 Jun24	152.5	3.0	16.1	0
11 Jun24	152.8	3.2	16.3	1.4
12 Jun24	156.5	3.9	16.3	2.0
13 Jun24	156.0	3.2	16.2	0
14 Jun24	150.2	3.4	16.3	0
15 Jun24	158.9	4.2	16.4	3.1
16 Jun24	167.4	3.2	16.4	0
17 Jun24				0
18 Jun24	152.6	3.3	16.3	0
19 Jun24	152.0	3.0	16.4	1.4
20 Jun24	158.5	3.1	16.7	0
21 Jun24	153.0	3.3	16.8	0
22 Jun24	133.7	2.7	16.9	0
23 Jun24	131.5	2.9	17.1	2.8
24 Jun24	156.6	3.3	17.2	0
25 Jun24	145.6	3.4	17.2	0
26 Jun24	134.5	3.5	17.3	0
27 Jun24	118.9	3.5	17.5	5.8
28 Jun24	138.0	2.8	17.5	9.0
29 Jun24	135.7	3.5	17.6	0
30 Jun24	130.7	3.2	17.7	1.3
1 Jul 24	129.3	3.2	17.9	0.1
2 Jul 24	104.8	2.7	18.3	0
3 Jul 24	103.7	1.9	18.4	0
4 Jul 24	95.0	2.6	18.4	0
5 Jul 24	91.1	2.7	18.5	0
6 Jul 24	100.2	2.7	18.7	0
7 Jul 24	101.9	2.7	18.9	0
8 Jul 24	107.3	2.8	19.0	0
9 Jul 24	96.8	2.5	19.3	0
10 Jul 24	92.0	2.8	19.4	0
11 Jul 24				0
12 Jul 24	90.0	1.9	19.6	0
13 Jul 24	90.8	2.2	19.7	0
14 Jul 24	93.3	2.2	19.7	0
15 Jul 24	106.1	2.4	19.8	0
16 Jul 24	101.5	2.1	19.7	0
17 Jul 24	88.9	2.5	19.7	0
18 Jul 24	91.0	2.3	19.9	0
19 Jul 24	83.8	2.0	20.1	0
20 Jul 24	86.7	1.7	20.2	0
21 Jul 24	92.6	2.5	20.3	0
22 Jul 24	98.0	2.2	20.4	0
23 Jul 24	82.3	1.7	20.2	0
24 Jul 24	81.9	1.5	20.2	0
25 Jul 24	82.1	1.7	20.2	0
26 Jul 24	85.4	1.9	20.2	0.3
27 Jul 24	90.7	2.0	20.2	0

Date (exceedances in orange)	Daily throughput/m³	Max. flow/ℓ/s	Avg. effluent temp/°C	Rainfall, avg. of 2 stations/mm
	Blanks indicate missing data due to SCADA outages			
28 Jul 24	95.8	2.1	20.3	0
29 Jul 24	92.6	2.1	20.4	0
30 Jul 24	102.7	2.5	20.5	17.1
31 Jul 24	93.6	2.1	20.5	1.4
1 Aug 24	92.3	2.3	20.5	2.3
2 Aug 24	98.1	3.2	20.6	0
3 Aug 24	92.7	2.3	20.8	0
4 Aug 24	96.8	2.5	20.9	0
5 Aug 24	94.6	2.3	20.9	0
6 Aug 24	94.3	2.8	21.1	0
7 Aug 24	94.1	2.0	21.1	0
8 Aug 24	93.4	2.2	21.1	0
9 Aug 24	85.4	1.4	21.1	0
10 Aug 24	89.1	1.8	21.1	0
11 Aug 24	88.7	2.3	21.3	0
12 Aug 24	95.2	2.5	21.3	1.3
13 Aug 24	89.4	1.7	21.3	1.5
14 Aug 24	79.5	1.3	21.1	0
15 Aug 24	84.6	1.8	21.1	0
16 Aug 24	81.3	2.0	21.1	0
17 Aug 24	83.6	2.1	21.2	0
18 Aug 24	85.3	2.4	21.2	0
19 Aug 24	91.3	4.7	21.3	4.3
20 Aug 24	79.2	3.0	21.3	1.9
21 Aug 24	79.5	1.9	21.2	2.6
22 Aug 24	81.9	4.9	21.1	1.8
23 Aug 24	85.3	2.2	21.0	11.0
24 Aug 24	88.8	2.0	20.9	10.9
25 Aug 24	108.8	2.7	20.7	11.5
26 Aug 24	81.0	2.0	20.6	1.5
27 Aug 24	110.2	3.1	20.7	10.9
28 Aug 24				0
29 Aug 24	87.4	1.9	20.2	0.6
30 Aug 24	75.8	1.5	20.4	0.5
31 Aug 24	70.2	1.6	20.6	0.5
1 Sep 24	78.9	2.3	20.6	0.4
2 Sep 24	99.6	3.0	20.5	0.4
3 Sep 24	82.5	1.8	20.5	0.3
4 Sep 24	82.5	2.4	20.6	0.4
5 Sep 24	78.3	2.1	20.6	0.3
6 Sep 24	75.0	1.7	20.8	0.3
7 Sep 24	77.3	2.2	20.9	0.1
8 Sep 24	81.2	2.0	21.0	0.1
9 Sep 24	89.6	2.7	21.0	0.1
10 Sep 24	77.2	2.1	21.1	0.3
11 Sep 24	83.2	2.5	21.1	0.4
12 Sep 24	89.0	1.9	21.0	0.9
13 Sep 24	86.8	1.7	20.8	0
14 Sep 24	109.8	3.3	20.7	19.5
15 Sep 24	119.5	2.9	20.7	5.1
16 Sep 24	110.5	3.0	20.4	0
17 Sep 24	88.8	2.7	20.4	0
18 Sep 24	87.3	2.5	20.4	0

Date (exceedances in orange)	Daily throughput/m^3	Max. flow/ℓ/s	Avg. effluent temp/°C	Rainfall, avg. of 2 stations/mm
	Blanks indicate missing data due to SCADA outages			
19 Sep 24	88.2	2.0	20.5	0
20 Sep 24	82.4	1.5	20.5	0
21 Sep 24	90.2	1.8	20.6	0
22 Sep 24	94.4	2.0	20.4	0
23 Sep 24	102.3	2.3	20.3	6.9
24 Sep 24	102.8	2.4	20.2	1.4
25 Sep 24				13.5
26 Sep 24	104.3	2.6	20.4	24.8
27 Sep 24	77.1	1.6	20.1	4.9
28 Sep 24	101.0	1.5	19.8	0
29 Sep 24	104.4	1.7	19.8	0
30 Sep 24	107.1	1.9	19.6	0
1 Oct 24	82.4	2.3	14.6	0.3
2 Oct 24	106.6	1.6	19.2	1.3
3 Oct 24	102.7	1.8	19.1	0
4 Oct 24	101.2	1.5	19.0	0
5 Oct 24	118.6	2.1	18.7	26.6
6 Oct 24	105.0	1.7	18.7	0
7 Oct 24	103.9	1.7	18.8	0
8 Oct 24	106.6	1.7	18.9	2.1
9 Oct 24	102.0	1.6	19.0	4.1
10 Oct 24				8.9
11 Oct 24	115.2	1.8	18.9	0.1
12 Oct 24	99.0	1.6	18.5	0
13 Oct 24				0
14 Oct 24	108.6	1.8	18.7	0
15 Oct 24				11.9
16 Oct 24				1.3
17 Oct 24				9.3
18 Oct 24				1.0
19 Oct 24				44.0
20 Oct 24				69.0
21 Oct 24				23.3
22 Oct 24				0
23 Oct 24	104.1	1.7	16.2	0.4
24 Oct 24	95.7	22.7	25.7	0
25 Oct 24	96.7	1.5	16.6	0
26 Oct 24	96.0	1.5	16.6	12.1
27 Oct 24	132.3	2.0	16.6	21.5
28 Oct 24	143.4	2.6	16.7	14.6
29 Oct 24	138.6	2.0	16.5	2.2
30 Oct 24	107.6	1.7	16.3	1.1
31 Oct 24				26.9
1 Nov 24				10.5
2 Nov 24				12.8
3 Nov 24				1.9
4 Nov 24				2.6
5 Nov 24				40.6
6 Nov 24	131.2	2.5	15.3	0
7 Nov 24	110.1	1.7	15.2	0.5
8 Nov 24	99.1	1.6	15.4	0
9 Nov 24	104.9	1.7	15.8	17.1
10 Nov 24				12.5

Date (exceedances in orange)	Daily throughput/m³	Max. flow/ℓ/s	Avg. effluent temp/°C	Rainfall, avg. of 2 stations/mm
	Blanks indicate missing data due to SCADA outages			
11 Nov 24				30.5
12 Nov 24	206.6	3.9	15.5	21.0
13 Nov 24	151.7	3.7	14.8	59.9
14 Nov 24				23.9
15 Nov 24	205.0	4.0	13.6	5.4
16 Nov 24	126.0	2.0	13.8	0
17 Nov 24	117.6	2.6	14.0	27.8
18 Nov 24	140.2	2.7	14.3	0
19 Nov 24	112.8	1.7	14.3	7.8
20 Nov 24	113.6	2.5	14.1	36.1
21 Nov 24	169.7	3.9	13.8	30.9
22 Nov 24	143.2	3.2	13.3	5.5
23 Nov 24	134.3	3.1	13.5	18.6
24 Nov 24	169.6	3.2	13.6	13.0
25 Nov 24	130.7	3.1	13.8	3.4
26 Nov 24	113.8	1.8	14.0	0
27 Nov 24	107.1	1.7	14.0	0
28 Nov 24	101.9	1.5	13.8	0
29 Nov 24	102.1	1.6	13.9	0
30 Nov 24	107.9	22.7	25.7	1.1
1 Dec 24	116.6	1.9	13.8	1.8
2 Dec 24	114.1	1.8	13.9	0
3 Dec 24				0
4 Dec 24				0
5 Dec 24				0
6 Dec 24	103.5	1.6	13.8	0.4
7 Dec 24	102.1	1.7	13.9	23.1
8 Dec 24	152.8	3.8	14.0	16.6
9 Dec 24				1.1
10 Dec 24				0
11 Dec 24				0
12 Dec 24	105.1	1.9	13.6	0
13 Dec 24	105.6	2.0	13.6	0
14 Dec 24	128.3	2.9	13.6	41.1
15 Dec 24	321.2	8.5	13.5	72.4
16 Dec 24	176.8	3.5	11.9	0.6
17 Dec 24	120.4	2.4	12.3	3.6
18 Dec 24	175.7	9.2	12.6	51.9
19 Dec 24	313.1	6.3	12.3	27.8
20 Dec 24	156.1	3.9	11.9	14.8
21 Dec 24	140.7	2.8	12.3	4.4
22 Dec 24	154.3	3.6	12.7	22.9
23 Dec 24	164.9	3.5	12.8	24.9
24 Dec 24	161.0	3.2	12.8	8.3
25 Dec 24	169.3	3.4	12.8	6.1
26 Dec 24	164.5	3.4	12.9	42.4
27 Dec 24	303.5	6.1	12.9	41.5
28 Dec 24	175.0	3.5	11.8	6.0
29 Dec 24	153.5	3.4	12.3	15.9
30 Dec 24	152.1	3.1	12.4	14.3
31 Dec 24	146.4	2.8	12.6	4.6

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	*CAS Number*	*Method/Lab*	*LOR*	*Unit*	*Client sample ID*	**Sewer Treatment Plant (Treated Sewer)**	----	----	----	----
					Client sampling date / time	21-Mar-2024 11:30	----	----	----	----
						VA24A6059-001	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
Solids, total suspended [TSS]	----	E160/VA	3.0	mg/L		20.7	----	----	----	----
Aggregate Organics										
Biochemical oxygen demand [BOD]	----	E550/VA	2.0	mg/L		11.8	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

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Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

				Client sample ID	**Sewer Treatment Plant (Treated Sewer)**	-----	-----	-----	-----
				Client sampling date / time	06-Jun-2024 00:00	----	----	----	----
Analyte	*CAS Number*	*Method/Lab*	*LOR*	*Unit*	**VA24B3192-001**	--------	--------	--------	--------
					Result	----	----	----	----
Physical Tests									
Solids, total suspended [TSS]	-----	E160/VA	3.0	mg/L	23.0	----	----	----	----
Aggregate Organics									
Biochemical oxygen demand [BOD]	-----	E550/VA	2.0	mg/L	14.9	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

				Client sample ID	Sewer Treatment Plant (Treated Sewer)	----	----	----	----
				Client sampling date / time	26-Sep-2024 11:45	----	----	----	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	VA24C5571-001	----	----	----	----
					Result	----	----	----	----
Physical Tests									
Solids, total suspended [TSS]	----	E160/VA	3.0	mg/L	30.0	----	----	----	----
Aggregate Organics									
Biochemical oxygen demand [BOD]	----	E550/VA	2.0	mg/L	25.7	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.
Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	Sewer Treatment Plant (Treated Sewer)	----	----	----	----
					Client sampling date / time	10-Dec-2024 11:45	----	----	----	----
					VA24D3169-001	----	----	----	----	----
					Result	----	----	----	----	----
Physical Tests										
Solids, total suspended [TSS]	----	E160/VA	3.0	mg/L		17.7	----	----	----	----
Aggregate Organics										
Biochemical oxygen demand [BOD]	----	E550/VA	2.0	mg/L		11.3	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

APPENDIX 5 – OPERATING PERMIT

BRITISH COLUMBIA

MINISTRY OF ENVIRONMENT

PERMIT

5188

Under the Provisions of the Environmental Management Act

THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

Lot 45 Tidewater Way
Lion's Bay, British Columbia

is authorized to discharge effluent to Howe Sound from a residential development located on Tidewater Way, Lion's Bay, British Columbia, subject to the requirements listed below. Contravention of any of these requirements is a violation of the *Environmental Management Act* and may lead to prosecution.

This Permit supersedes and amends all previous versions of Permit 5188 issued under Section 14 of the *Environmental Management Act*.

Capitalized terms referred to in this authorization are defined in the attached Glossary. Other terms used in this authorization have the same meaning as those defined in the *Environmental Management Act* and applicable regulations.

Where this authorization provides that the Director may require an action to be carried out, the Permittee must carry out the action in accordance with the requirements of the Director.

1. **AUTHORIZED DISCHARGE**

1.1 This section applies to the discharge of effluent from a **residential development**. The site reference number for this discharge is E100978.

1.1.1 The maximum rate of discharge is 340 cubic metres per day.

Date issued: November 20, 1978
Date amended: May 31, 2017
(most recent)

Daniel P. Bings
for Director, *Environmental Management Act*
Authorizations - South

1.1.2 The characteristics of the discharge must not exceed the following parameters:

5-day biochemical oxygen demand	45 mg/L;
Total suspended solids (non-filterable residue)	60 mg/L.

1.1.3 The discharge is authorized from Authorized Works which are a rotating biological contactor secondary treatment plant, and an outfall extending 180 metres seaward of low water mark and 60 metres below low water level, and related appurtenances approximately located as shown on the attached Site Plan.

1.1.4 The Permittee must not discharge under this authorization unless the Authorized Works are complete and fully operational.

1.1.5 The location of the facilities from which the discharge is authorized to originate and the point where the discharge is authorized to occur is Block B, District Lot 1575, Group 1, New Westminster District.

2. GENERAL REQUIREMENTS

2.1 Maintenance of Works and Emergency Procedures

The Permittee must regularly inspect the authorized works and maintain them in good working order.

In the event of an emergency or condition beyond the control of the Permittee which prevents effective operation of the Authorized Works or leads to an unauthorized discharge, the Permittee must take remedial action to restore the effective operation of the Authorized Works and to prevent any unauthorized discharges. The Permittee must immediately report the emergency or condition and the remedial action that has and will be taken to the RAPP line (1-877-952-7277, #7272 from mobile phone) or electronically at this link: http://www.env.gov.bc.ca/cos/rapp/form.htm.

The Director may require the Permittee to reduce or suspend operations until the Authorized Works have been restored, and/or corrective steps have been taken to prevent unauthorized discharges.

2.2 **Bypasses**

The Permittee must not permit any discharge authorized by this authorization to bypass the authorized works, except with the prior written approval of the Director.

2.3 **Posting of Outfall**

The Permittee must erect and maintain a sign along the alignment of the outfall above the high water mark. The sign must identify the nature of the works. The Permittee must confirm whether the wording and size of the sign is acceptable to the Director prior to installing the sign.

2.4 **Treatment Plant Sludge Wasting and Disposal**

The Permittee must dispose of sludge wasted from the treatment plant at a site and in a manner approved by the Director, or as authorized by regulation under the *Environmental Management Act.*

2.5 **Facility Classification and Operator Certification**

The Permittee in a manner and on timelines specified by the Director must have the authorized works classified (and the classification must be maintained) by the Environmental Operators Certification Program Society (Society). The Permittee must cause the authorized works to be operated and maintained by:

a) persons certified within and according to the program provided by the Society to the satisfaction of the Director, or

b) persons who are qualified in the safe and proper operation of the facility for the protection of the environment, as demonstrated to the satisfaction of the Director.

The Permittee must notify the Director of the classification level of the facility and certification levels of the operators, and changes of operators and/or operator certification levels within 30 days of any change.

3. MONITORING REQUIREMENTS

3.1 Sampling Procedures

The Permittee is required to carry out sampling in accordance with the procedures described in the "British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, 2013 Edition (Permittee)" or most recent edition, or by alternative procedures as authorized by the Director.

A copy of the above manual is available on the Ministry web page at www.env.gov.bc.ca/epd/wamr/labsys/lab_meth_manual.html.

3.2 Analytical Procedures

The Permittee must carry out analyses in accordance with procedures described in the "British Columbia Laboratory Manual (2015 Permittee Edition)", or the most recent edition or by alternative procedures as authorized by the Director. A copy of the above manual is available on the Ministry web page at www.env.gov.bc.ca/epd/wamr/labsys/lab_meth_manual.html.

3.3 Grab Sampling

The Permittee must install and maintain a sampling facility and obtain a grab sample of the effluent authorized by Section 1.1 once every three months. The Permittee must take due care in sampling, storing and transporting the samples to control temperature and avoid contamination, breakage, and any other factor or influence that may compromise the integrity of the samples.

3.4 Analysis

The Permittee must collect sample (s) on a quarterly basis and obtain analysis of the sample (s) for the following parameters:

a) total suspended solids (non-filterable residue), mg/L;
b) 5-day biochemical oxygen demand, mg/L.

3.5 Flow Measurement

The Permittee must install and maintain a suitable to the Director, flow measuring device, and record once per month the effluent volume discharged over a 24-hour period. The Permittee must retain the records for inspection by Ministry staff.

4. REPORTING REQUIREMENTS

4.1 Annual Report

The Permittee must collect and maintain data of analyses and flow measurements required under this authorization for inspection when requested by Ministry staff and submit the data for the previous year to the Director in a form satisfactory to the Director. The Permittee must make data submissions in respect of each subsequent year within 30 days of the end of the applicable year.

The Permittee must submit all data required to be submitted under this section by email to the Ministry's Routine Environmental Reporting Submission Mailbox (RERSM) at EnvAuthorizationsReporting@gov.bc.ca. For guidelines on how to properly name the files and email subject lines or for more information visit the Ministry website:

http://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions/routine-environmental-reporting-submission-mailbox

4.2 Non-compliance Notification

The Permittee must immediately notify the Director or designate by email at EnvironmentalCompliance@gov.bc.ca of any non-compliance with the requirements of this authorization by the Permittee and take remedial action to remedy any effects of such non-compliance. The Permittee must provide the Director with written confirmation of all such non-compliance events, including available test results, within 24 hours of the original notification, unless otherwise directed by the Director.

4.3 Non-compliance Reporting

If the Permittee fails to comply with any of the requirements of this authorization, the Permittee must, within 30 days of such non-compliance,

submit to the Director a written report that is satisfactory to the Director and includes, but is not necessarily limited to, the following:

a. all relevant test results obtained by the Permittee related to the noncompliance,
b. an explanation of the most probable cause(s) of the noncompliance, and
c. a description of remedial action planned and/or taken by the Permittee to prevent similar noncompliance(s) in the future.

The Permittee must submit all non-compliance reporting required to be submitted under this section by email to the Ministry's Compliance Reporting Submission Mailbox (CRSM) at EnvironmentalCompliance@gov.bc.ca. For guidelines on how to report a non-compliance or for more information visit the Ministry website:

http://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions/non-compliance-reporting-mailbox.

4.4 **Non-compliance Reporting and Exceedances**

The Permittee must cause each data submission required by this authorization to include a statement outlining the number of exceedances of permitted discharges that occurred during the reporting period, the dates of each such exceedance, an explanation as to the cause of the exceedances, and a description of the measures taken by the Permittee to rectify the cause of each such exceedance. If no exceedances occurred over the reporting period, the required statement may instead indicate that no exceedance of permitted discharges occurred during the reporting period.

4.5 **Spill Reporting**

The Permittee must immediately report all spills to the environment (as defined in the Spill Reporting Regulation) in accordance with the Spill Reporting Regulation, which among other things, requires notification to the Provincial Emergency Program at 1-800-663-3456.

4.6 **Licence to Publish Documents**

a. Subject to paragraph b, the Permittee authorizes the Province to publish on the Ministry of Environment website the entirety of any Regulatory

Document.

b. The Province will not publish any information that could not, if it were subject to a request under section 5 of the Freedom of Information and Protection of Privacy Act, be disclosed under that Act.

c. The Permittee will indemnify and save harmless the Province and the Province's employees and agents from any claim for infringement of copyright or other intellectual property rights that the Province or any of the Province's employees or agents may sustain, incur, suffer or be put to at any time that arise from the publication of a Regulatory Document.

GLOSSARY

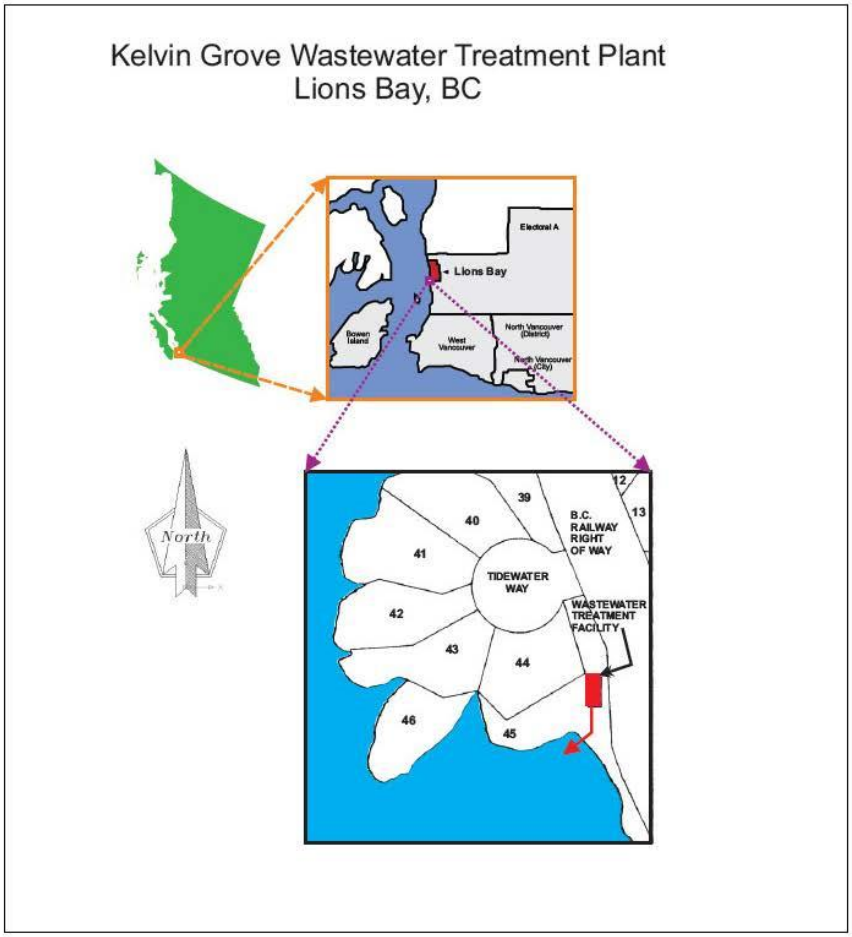
"Authorized Works" means a rotating biological contactor secondary treatment plant, chlorination facilities, related appurtenances, and an outfall extending 180 metres seaward of low water mark and 60 metres below low water level, and related appurtenances approximately located as shown on Site Plan A as stated in Section 1.1.3.

"Facility" means a residential development located 0.4 km south of Lion's Bay, British Columbia.

"Province" means Her Majesty the Queen in right of British Columbia;

"Regulatory Document" means any document that the Permittee is required to provide to the Director or the Province pursuant to: (i) this authorization; (ii) any regulation made under the Environmental Management Act that regulates the facility described in this authorization or the discharge of waste from that facility; or (iii) any order issued under the Environmental Management Act directed against the Permittee that is related to the facility described in this authorization or the discharge of waste from that facility;

SITE PLAN



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(most recent)

Daniel P. Bings
for Director, *Environmental Management Act*
Authorizations - South

Permit Number: 5188