Ocean Outfall

Christchurch Wastewater Treatment Plant

Annual Monitoring Report for condition 31 of consent CRC051724

1 July 2021 – 30 June 2022

Completed 29 September 2022

Christchurch City Council

Introduction

This report summarises the results of parameters monitored by the Christchurch Wastewater Treatment Plant (CWTP) Ocean Outfall over the period 1 July 2021 – 30 June 2-22, in accordance with consent CRC051724. This consent allows for the discharge of treated wastewater from the CWTP Oxidation Ponds into the Pegasus Bay Coastal Marine Area via an ocean outfall.

The last 12 months have been very challenging out at Bromley. On the 1st day of November 2021, a fire broke out on the roof of the two trickling filters at the CWTP, where it destroyed both roofs and damaged the plastic trickling filter media before it was fully extinguished 24 days later.

The trickling filters were a key component of the secondary treatment process at the CWTP, where they had been in operation since early 1978, responsible for removing around 60% of the organic matter from the sewage inflow. The plastic filter media provided an ideal environment for bacterial slime to grow and as it grew, it consumed the nutrients in the wastewater. As more flow was pumped into the trickling filters, excess slime was washed off as a floating solid and resulted in removal of up to 95% of BOD and ammonia.

Water quality has deteriorated since the catastrophic loss of the fire, compounded by cold winter weather impacting the treatment level provided by the oxidation ponds. We have installed a temporary treatment process to address this and have added an activated sludge plant, which was mechanically operative on 28 July and the biology of the plant achieved maturity on 23 August.

The activated sludge plant recovered most of the secondary treatment efficiency previously provided by the trickling filters. The quality of the wastewater being discharged to the oxidation ponds is now much improved and ensures that going forwards, we can comply with the water standards outlined by the outfall consent.

Christchurch Wastewater Treatment Plant Contents

Annual Monitoring Report

1 July 2021 – 30 June 2022

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1. Discharge rate and maintenance

1.1 Resource Consent Conditions

Table 1.1.1 Pond Discharge Consent Compliance for Monitoring Period 1 July 2021 – 30 June 2022 CRC051724

Consent Condition	Parameter	Condition Detail	Condition Timeframe	Comments	Overall
2	Discharge Content	Discharge is only wastewater from the CWTP ponds	Continuous	Discharge is all and only from the CWTP ponds	☺
3	Discharge Volume	Recorded	Continuous	See figures 1.2.1 and 1.2.2	☺
4	Discharge Rate	Recorded	Continuous	See figures 1.2.1 and 1.2.2	☺
9	Outfall Maintenance	Routine maintenance of the discharge system completed and recorded	Continuous	Discharge system is the pump station, pipeline and diffuser outlets	☺
10	Outfall Condition	Visual inspection of outfall	Five yearly	Completed in March 2021, next due in 2026	☺
12	Pumping Pressure for a given flow	Monitored at the pump station	Continuous	See figures 1.2.1 and 1.2.2	☺

Key: ☺ Full Compliance 😐 Minor, Isolated or Risk of Non-Compliance ☹ Major or Consistent Non-Compliance

1.2 Comments on Resource Consent Conditions

The Ocean Outfall Pumping Station has operated within expected parameters and is comparable with last year's performance. There is a slight build-up of sand in the outfall pipe, but no significant leaks or blockages. An increase in flushing has been recommended to see if this can shift the sand.

Figure 1.2.1 - Daily Outfall Flow Totals Jul 2021 – Jun 2022

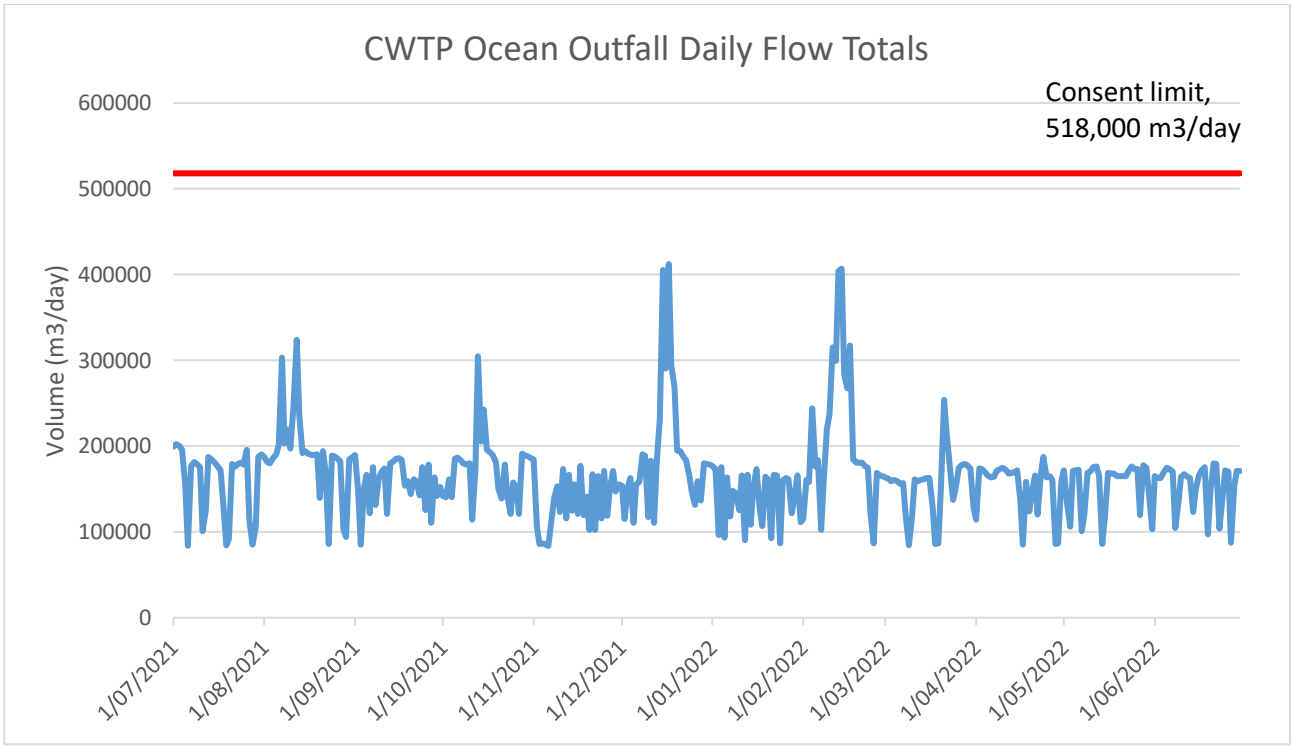
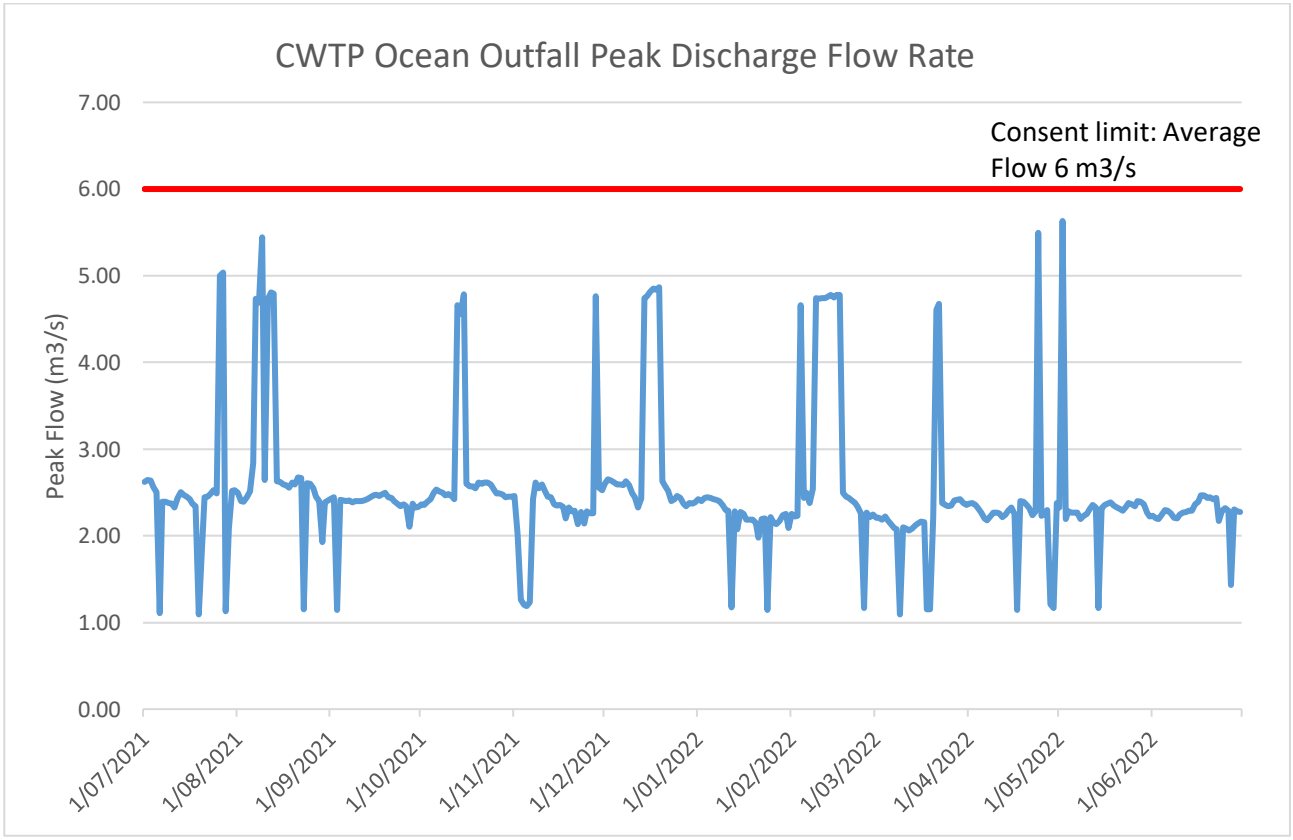


Figure 1.2.2 - Daily Peak Outfall Flows Jul 2021 - Jun 2022



1.3 Resource Consent Standard Conditions

Table 1.3.1 Contaminant Limits Consent Compliance 1 July 2021 – 30 June 2022 CRC051724

Consent Condition	Parameter	Compliance Condition	Compliance												
			Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Overall
15a	Dissolved BOD_5	Concentration does not exceed 20 g/m^3	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	😐	😐	☺
	Total Suspended Solids	Concentration does not exceed 50 g/m^3	☺	☺	☺	☺	☺	☺	😐	😐	😐	😐	😐	☺	😐
	Ammoniacal Nitrogen	Concentration does not exceed 40 g/m^3	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺
16a	Faecal Coliforms	Concentration does not exceed 1,000(standard)/5,000(higher) MPN/100mL	☺	☺	☺	☺	😐	😐	😐	😐	☺	😐	😐	😐	😐
	Enterococci	Concentration does not exceed 1,500 MPN/100mL	☺	☺	☺	☺	☺	😐	☺	😐	☺	☺	😐	😐	😐

Key: ☺ Compliance Achieved with no Exceedance of Standard 😐 Compliance Achieved with Occasional Exceedance of Standard ☹ Exceedance of Standard resulting in Non-Compliance

1.4 Comments on Resource Consent Standard Conditions

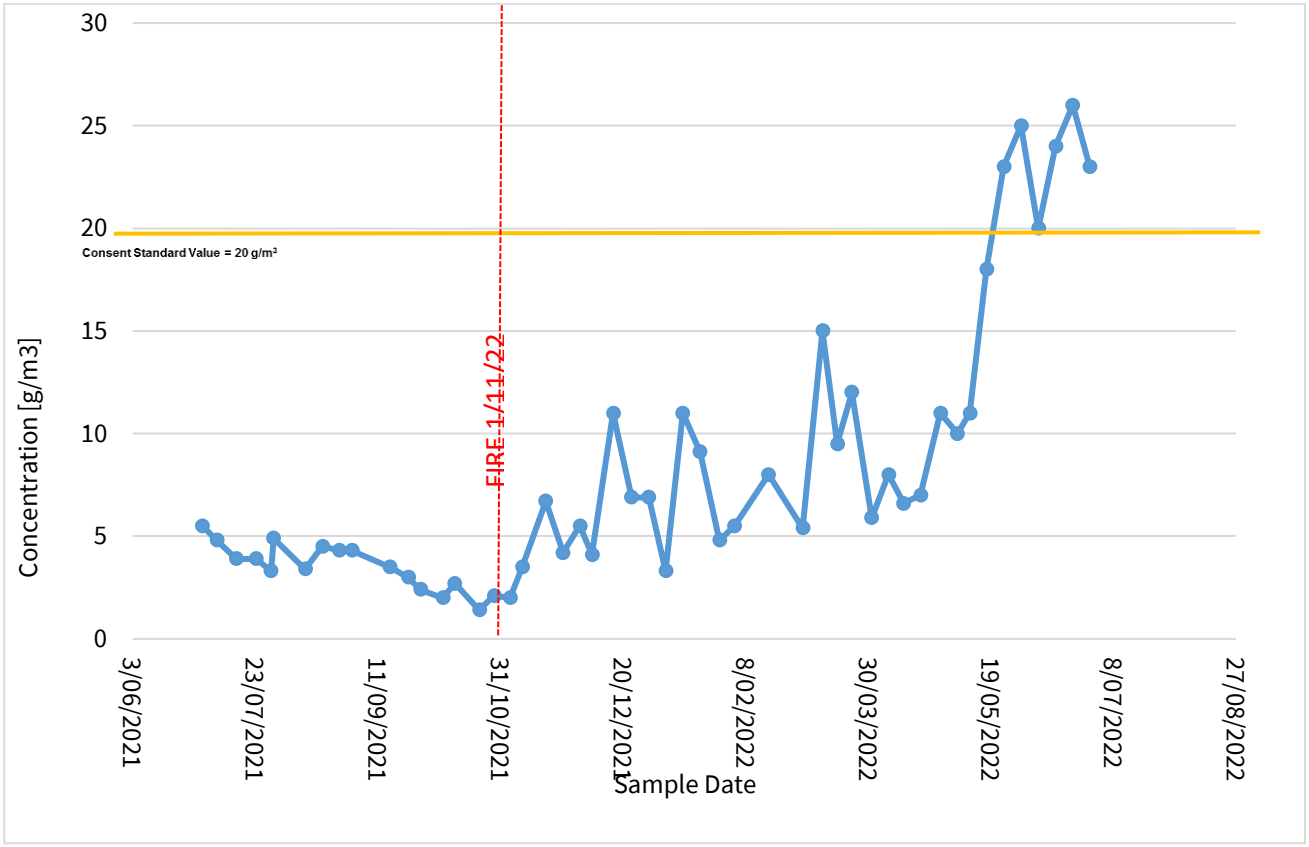
Water quality has deteriorated since the catastrophic loss of the fire in November 2021, compounded by cold winter weather impacting the treatment level provided by the oxidation ponds. This report spans 01 July 2021 to 30 June 2022 and since then we have installed a temporary treatment process to address this and have added an activated sludge plant, which was mechanically operative on 28 July and the biology of the plant achieved maturity on 23 August. The activated sludge plant recovered most of the secondary treatment efficiency previously provided by the trickling filters. The quality of the wastewater being discharged to the oxidation ponds has improved significantly.

1.5 Dissolved BOD_5 Compliance

Table 1.5.1 Ocean Outfall Discharge Dissolved BOD_5

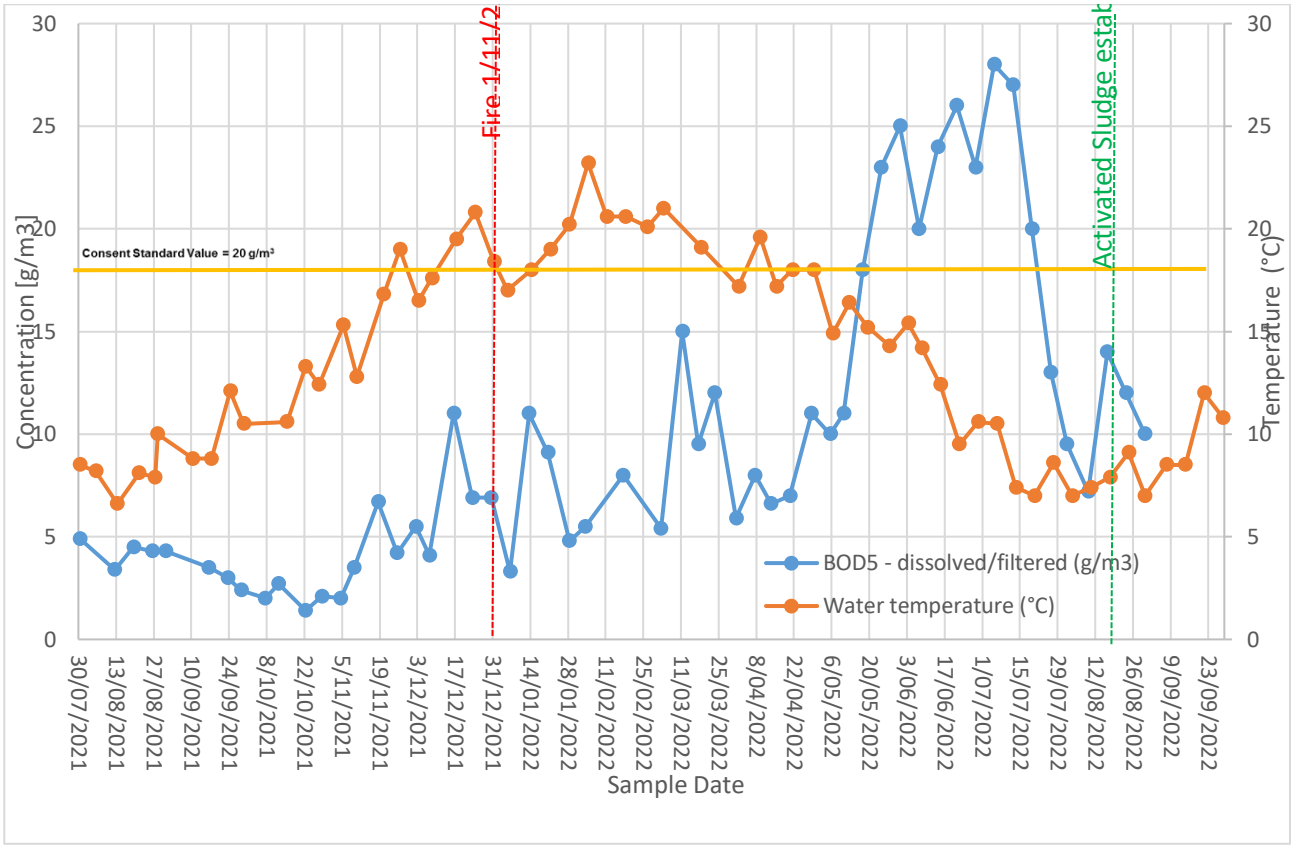
Median Value [g/m^3] Current Monitoring Period (July 2021 - June 2022)	5.5	Number of Exceedances Current Monitoring Period (July 2021 - June 2022)	6
Median Value [g/m^3] Previous Monitoring Period (July 2020 - June 2021)	3.9	Number of Exceedances Previous Monitoring Period (July 2020 - June 2021)	3

1.5.2 Ocean Outfall Discharge - Dissolved BOD_5



During the cold and dark winter months, the microorganisms which play a significant part in the wastewater treatment process are not as active. This can be seen on the chart 1.5.3, where exceedances occurred in the May-July period, associated with a drop in temperature.

1.5.3 Outfall Discharge - Dissolved BOD_5 and water temperature



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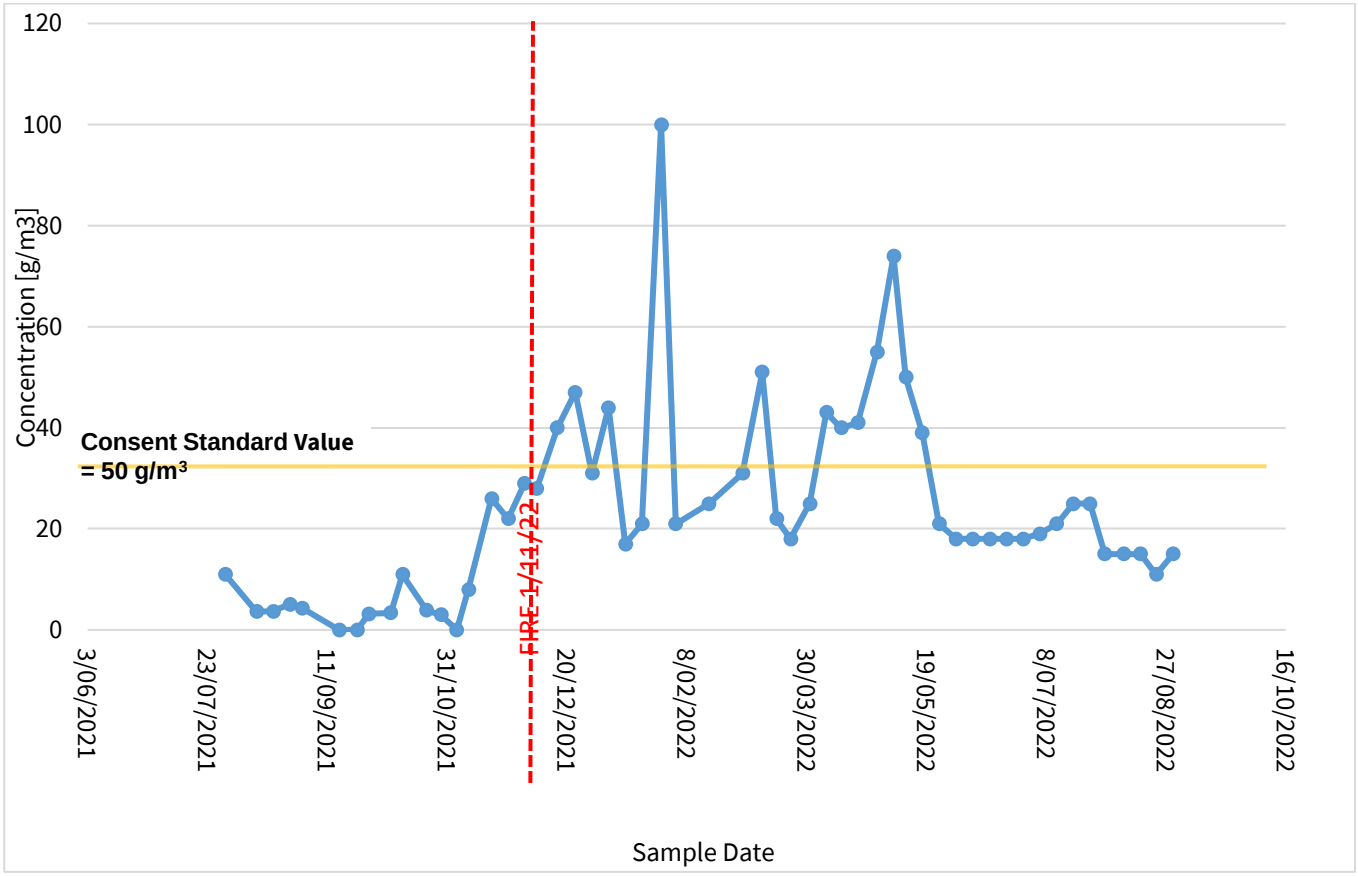
1.6 Total Suspended Solids Compliance

Table 1.6.1 Ocean Outfall Discharge Total Suspended Solids

Median Value [g/m^3] Current Monitoring Period (July 2021 - June 2022)	18	Number of Exceedances Current Monitoring Period (July 2021 - June 2022)	12
Median Value [g/m^3] Previous Monitoring Period (July 2020 - June 2021)	25	Number of Exceedances Previous Monitoring Period (July 2020 - June 2021)	6

There were 18 values exceeding the 50g/m3 limit recorded for the current year. The median value for the current reporting period was lower than the previous period.

1.6.2 Ocean Outfall Discharge Total Suspended Solids



Immediately following the fire, high TSS levels were reported. This was due to partially untreated wastewater (primary treated only) being discharged rapidly through the oxidation ponds, which didn't provide sufficient settlement time. With the implementation of the temporary process, the settlement time has now been increased, which has returned the TSS levels to below the consent standard level.

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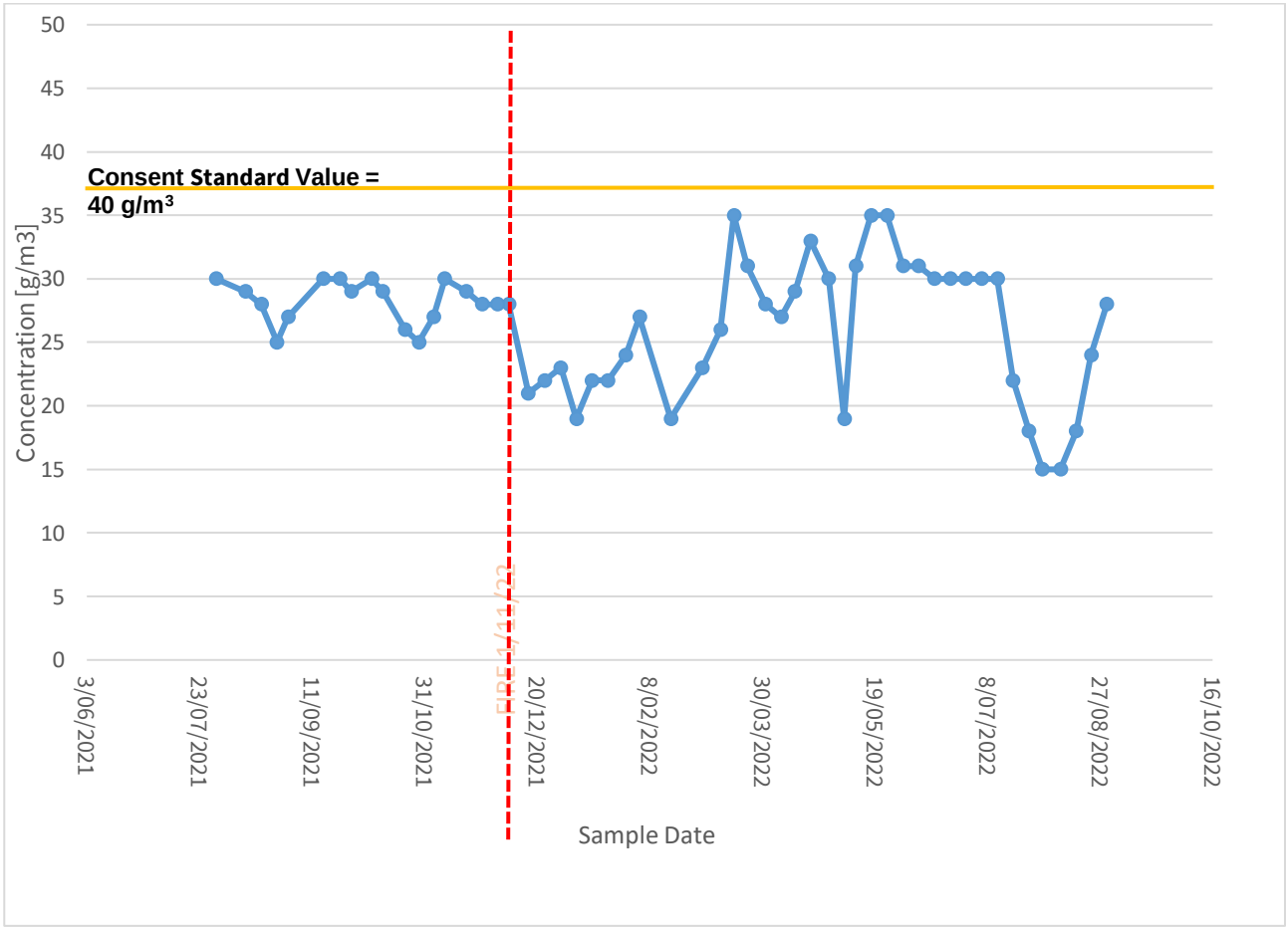
1.7 Ammonia Nitrogen Compliance

Table 1.7.1 Ocean Outfall Discharge Ammoniacal Nitrogen

Median Value [g/m^3] Current Monitoring Period (July 2021 - June 2022)	28	Number of Exceedances Current Monitoring Period (July 2021 - June 2022)	0
Median Value [g/m^3] Previous Monitoring Period (July 2020 - June 2021)	26	Number of Exceedances Previous Monitoring Period (July 2020 - June 2021)	0

There was zero values exceeding 40g/m3 recorded for current year. The median value for the current period was slightly higher than the previous reporting period.

1.7.1 Ocean Outfall Discharge Ammoniacal Nitrogen



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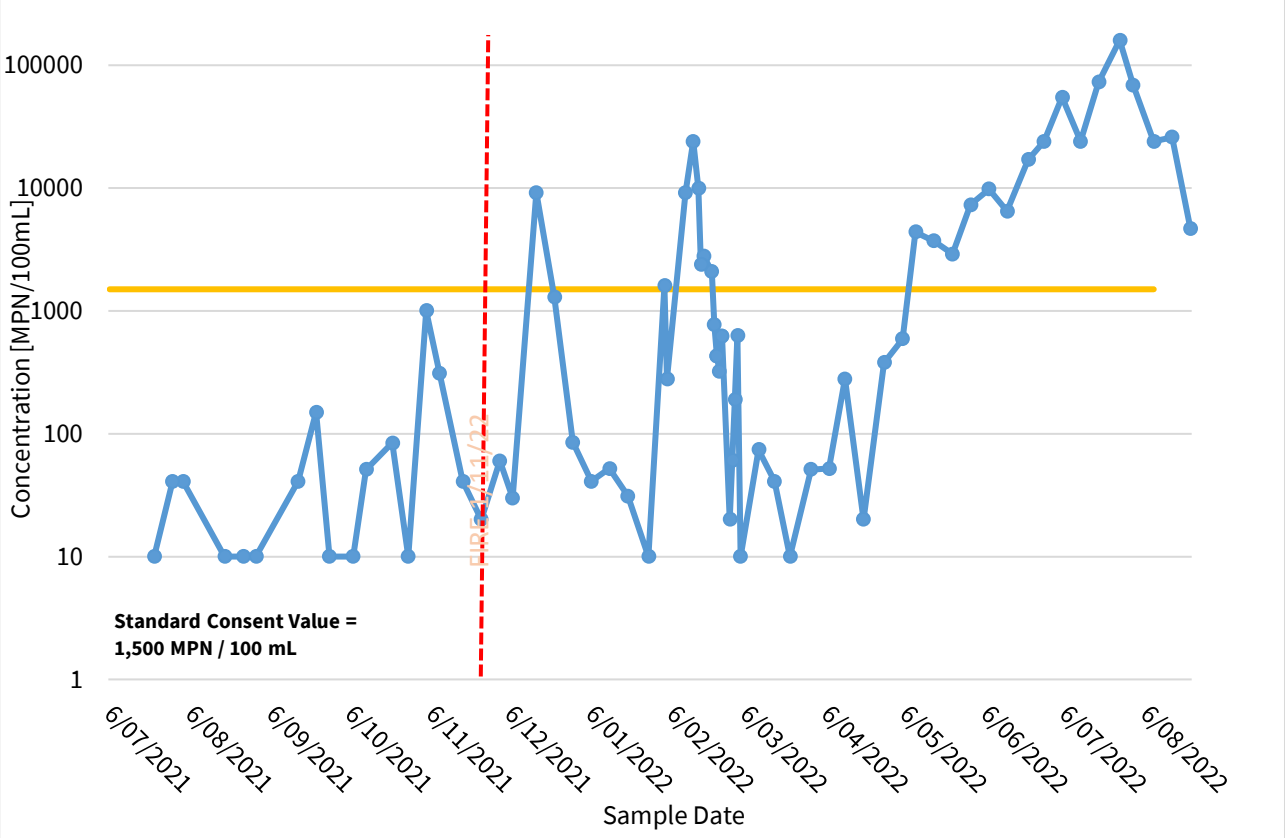
1.8 Enterococci Monitoring

Table 1.8.1 Ocean Outfall Discharge Enterococci

Median Value [MPN/100ml] Current Monitoring Period (July 2021 - June 2022)	117.5	Number of Exceedances Current Monitoring Period (July 2021 - June 2022)	22
Median Value [MPN/100ml] Previous Monitoring Period (July 2020 - June 2021)	26	Number of Exceedances Previous Monitoring Period (July 2020 - June 2021)	0

There was zero exceedances of the standard consent value (1,500 MPN/100mL) in the current year. The median value was lower than the previous period.

1.8.1 Ocean Outfall Discharge Enterococci



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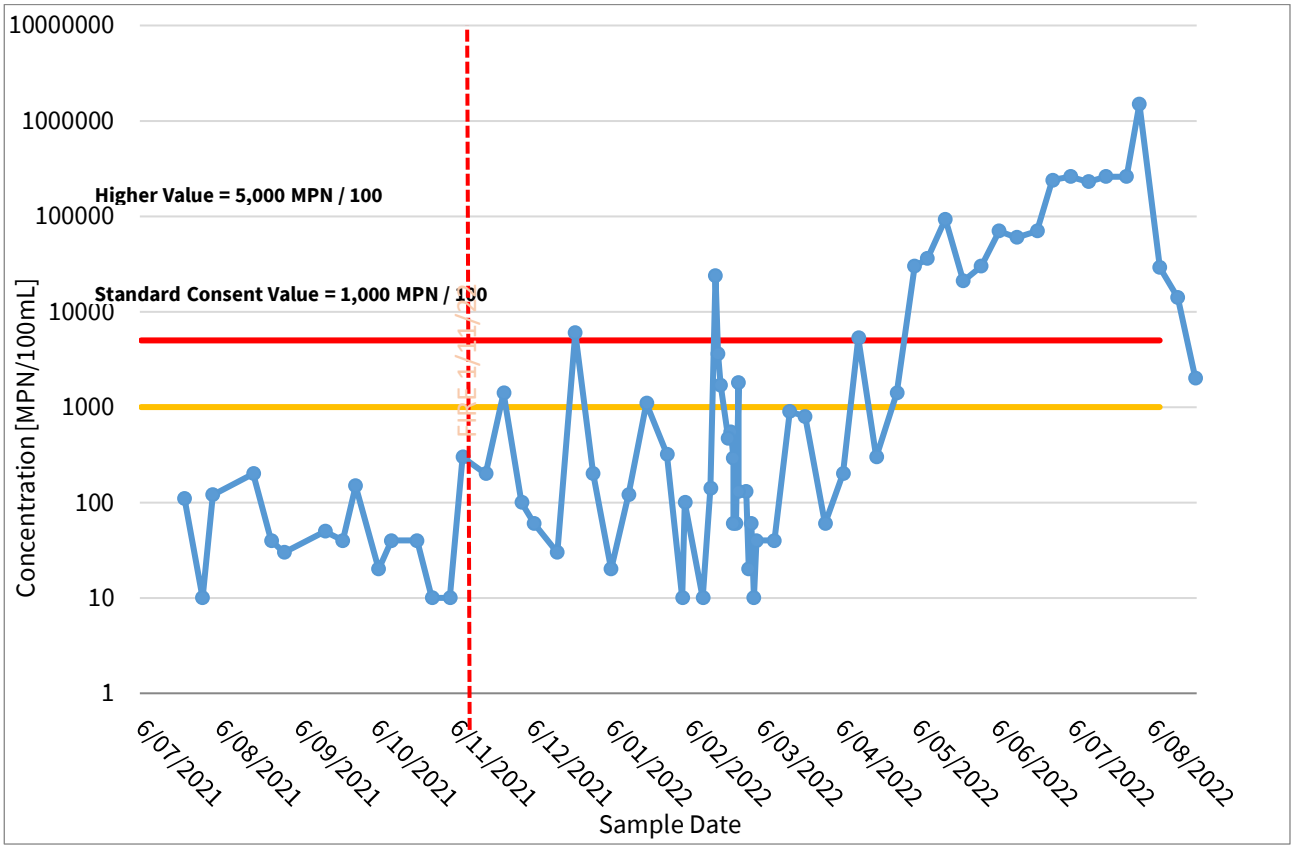
1.9 Faecal Coliform Compliance

Table 1.9.1 Ocean Outfall Discharge Faecal Coliforms

Median Value [MPN/100ml] Current Monitoring Period (July 2021 - June 2022)	150	Number of Exceedances Current Monitoring Period (July 2021 - June 2022)	24
Median Value [MPN/100ml] Previous Monitoring Period (July 2020 - June 2021)	70	Number of Exceedances Previous Monitoring Period (July 2020 - June 2021)	2

There were four sample results above the standard consent limit, with zero of those above the higher consent limit. The median for this year is higher than the previous period.

1.9.1 Ocean Outfall Discharge Faecal Coliforms



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1.10 Other Pathogenic and Other Contaminants

These results have been attached to this annual report and have also been included in the monitoring reports sent quarterly.

Condition 13e - Annually

Giardia cysts, cryptosporidium, salmonella, enterovirus, adenovirus and campylobacter levels.

- Sampled on 29/03/2022

Condition 13f – Six Monthly

Heavy metals (copper, chromium, nickel, zinc, cadmium, lead, arsenic, and mercury)

- Sampled 20/01/2022 and 05/07/2022

Condition 13g - Annually

Organochlorine pesticides, organophosphate pesticides, PCBs, and polycyclic aromatic hydrocarbons

- Sampled on 28/09/2021

2. Receiving Environment Monitoring in Pegasus Bay

2.1 Water Quality Resource Consent Conditions

Consent conditions 18, 21 and 22 call for monitoring of the marine environment around the outfall at various frequencies and were identified in the AEE. These requirements are summarised in Table 2.4.1. The results are attached to the quarterly reports covering the same period. Going forward from July 2022 these sample results will now be sent the following mont

Table 2.1.1 Weekly Sampling Beach Water Quality Compliance July 2021 – June 2022

Consent Condition	Location	Parameter	Compliance				
			Jul - Oct 21	Nov –Jan 22	Feb – Apr 22	May - Jun 22	Overall
18	South New Brighton Beach	Faecal Coliforms	☺	☺	☺	😐	☺
	South New Brighton Beach	Enterococci	☺	☺	☺	☺	☺
	Sumner Beach Surf Club	Faecal Coliforms	☺	☺	😐	😐	😐
	Sumner Beach Surf Club	Enterococci	☺	😐	☺	☺	☺
	New Brighton Beach Surf Club	Faecal Coliforms	☺	☺	😐	😐	😐
	New Brighton Beach Surf Club	Enterococci	☺	☺	☺	☺	☺

Key: ☺ Full Compliance 😐 Minor, Isolated or Risk of Non-Compliance ☹ Major or Consistent Non-Compliance

Table 2.1.2 Receiving Environment Ocean Water Quality Compliance July 2021 – June 2022

Consent Condition	Parameter	Condition Timeframe	200m from the diffuser pipe				
			North of the centre	South of the centre	West of inshore end	East of inshore end	Overall
22a[1]	Temperature	Two yearly	☺	☺	☺	☺	☺
	DO	Two yearly	☺	☺	☺	☺	☺
	Salinity	Two yearly	☺	☺	☺	☺	☺
	Total Suspended Solids	Two yearly	☺	☺	☺	☺	☺
	Nitrogen Oxides	Two yearly	☺	☺	☺	☺	☺
	Ammoniacal Nitrogen	Two yearly	☺	☺	☺	☺	☺
	Dissolved Reactive Phosphorus	Two yearly	☺	☺	☺	☺	☺
	Chlorophyll-a	Two yearly	☺	☺	☺	☺	☺
	Trace Metals (arsenic, cadmium, copper, chromium, lead, nickel and zinc)	Two yearly	☺	☺	☺	☺	☺
	Faecal Coliforms	Two yearly	☺	☺	☺	☺	☺
	Enterococci	Two yearly	☺	☺	☺	☺	☺
	Phytoplankton Species	Two yearly	☺	☺	☺	☺	☺

Key: ☺ Full Compliance 😐 Minor, Isolated or Risk of Non-Compliance ☹ Major or Consistent Non-Compliance

1. Last sampled 26/02/2021, next due in February or March 2023.

2.2 Comments on Compliance

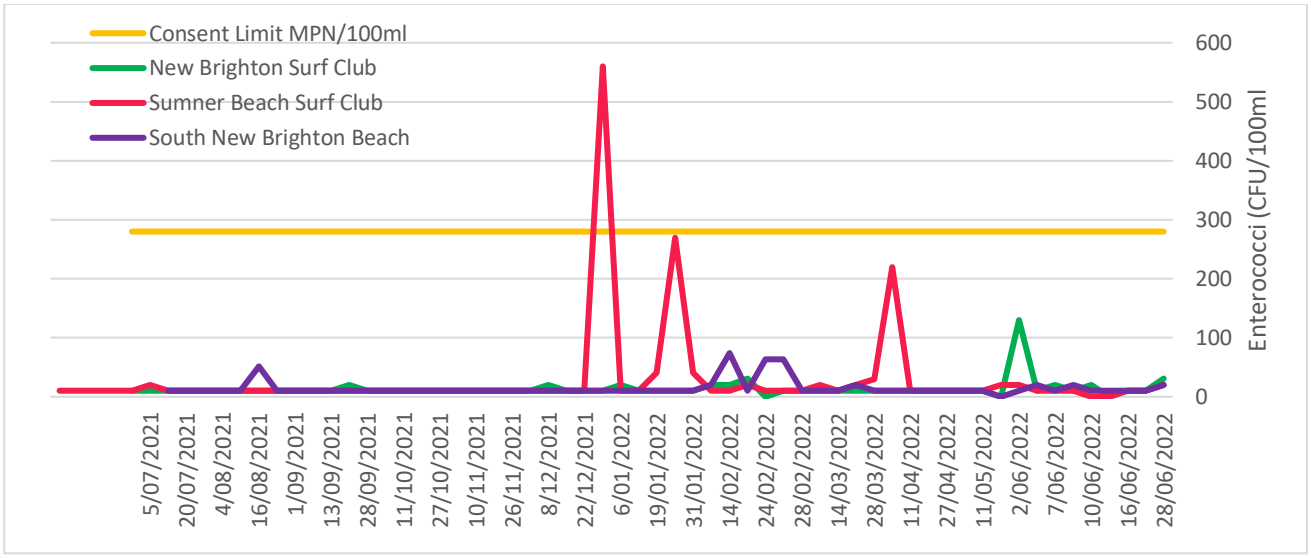
There have been a few exceedances recorded in the last 12 months. Environment Canterbury and the District Health Board have been notified when appropriate

Testing for condition 22a was last sampled 26/02/2021, next due in February or March 2023.

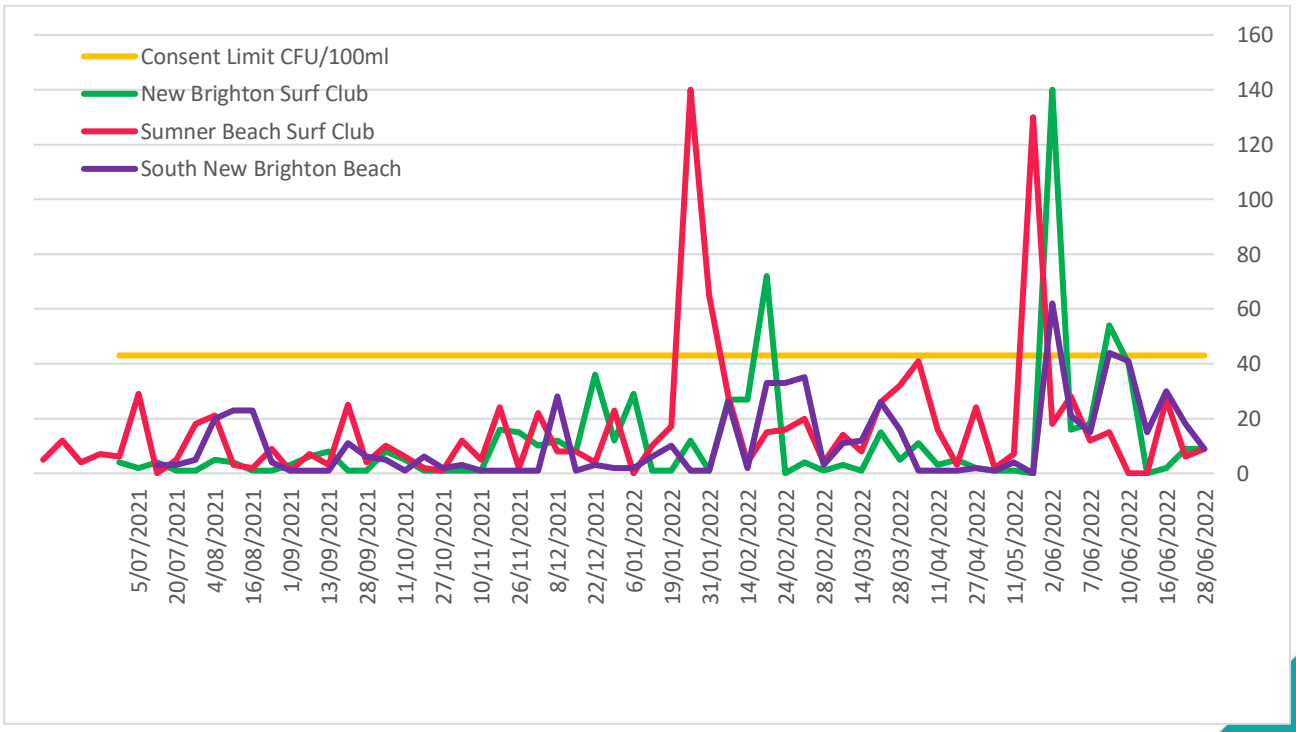
2.3 Beach Water Quality Analysis Results

Samples for condition 18 were taken at weekly intervals from the prescribed onshore locations. The results are presented in Figures 2.3.1 and 2.3.2.

2.3.1 Enterococci Levels at beaches adjacent to the Outfall



2.3.2 Faecal Coliform Levels at beaches adjacent to the Outfall



2.4 Other Receiving Environment Analysis

Consent conditions 23, 25, 26 and 27 call for monitoring of the marine environment around the outfall at various frequencies and were identified in the AEE. These requirements are summarised in Table 2.4.1. The results are attached to the quarterly reports as required.

Table 2.4.1 Receiving Environment Monitoring Consent Compliance Jul 2021- Jun 2022

Consent Condition	Parameter	Frequency	Compliance Condition	
23	Marine Sediments	5-yearly	Reported	☺
25	Benthic Invertebrates	5-yearly	Reported	☺
26	Epibenthic Fauna	5-yearly	Reported	☺
27	Shellfish/Tuatua	Quarterly	Sampled and Analysed	☺
29	Complaints	As required	Recorded and Reported	☺
31	Annual Report	Annually	Report and information lodged with ECan	☺
32	Quarterly Report	Quarterly	Report and information lodged with ECan	☺
34	Management Plan	4 Years post commissioning	Report and information lodged with ECan – done March 2012 - 12/140121	☺
36	Community Liaison Group	Annually	Not requested in 2022 (as per ECAN agreement)	☺

Key: ☺ Full Compliance 😐 Minor, Isolated or Risk of Non-Compliance ☹ Major or Consistent Non-Compliance

2.5 Comments on Other Receiving Environment

Conditions 23 - 26

Sediment, benthic and epibenthic testing was carried out in July 2022

Condition 27

Shellfish were sampled and analysed in June 2022

Condition 29

There were no complaints from the public regarding the ocean outfall during the reporting period.

Condition 31 and 32

Annual and quarterly reports have been submitted to Environment Canterbury

Condition 36

Environment Canterbury agreed that due to negligible interest in our community meeting that we could forgo holding it unless requested by the community. There was no request in 2022. The annual report is still to be circulated to the parties which would have been invited to the community meeting.