Annual Report

Akaroa Wastewater Treatment Plant

FY25 - 1 July 2024 to 30 June 2025

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Contents

1. Introduction

1.1 The Treatment Plant

The Akaroa WWTP is located at Takapūneke, at the end of Beach Road south of Akaroa Township, on the Banks Peninsula (BP).

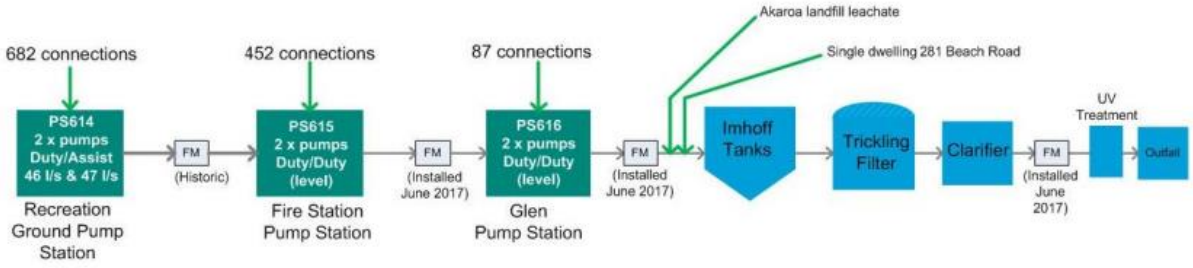
The WWTP is situated at Red House Bay on the east side of Akaroa Harbour as shown in Figure 1. The edge of the bay is defined by rocky outcrops that are exposed at low tide, with the northern rocky outcrop commonly referred to as Green Point (Kingett Mitchell Ltd, 2006). The WWTP outfall extends approximately 100 m offshore, to a depth approximately six to eight metres of water depending on the tidal cycle (MWH New Zealand Limited, 2006).

Figure 1 Akaroa WWTP Location

1.2 Wastewater Treatment Process

Wastewater from Akaroa flows via gravity to three pump stations near the waterfront, located at the Recreation Ground at North Akaroa, the Fire Station at Mid Akaroa and The Glen at South Akaroa.

Wastewater is pumped from the pump station at The Glen via a rising main to the inlet screen located on top of the flow balancing/splitting tank at the top of the WWTP site, see Figure 3.



The screened wastewater is split evenly to the two Imhoff tanks in the flow balancing/splitting tank. Primary solids settle out of the wastewater and are stored and anaerobically digested in the bottom of the Imhoff tanks. Settled wastewater from the Imhoff tanks flows to the trickling filter inlet chamber where it combines with recycled trickling filter wastewater.

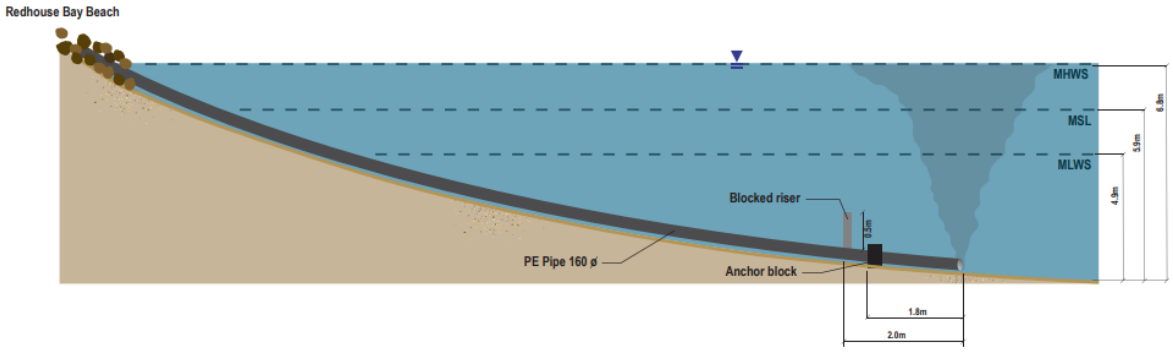
The combined wastewater flows by gravity to the trickling filter distributor arm where it is applied to the trickling filter rock media where the wastewater is treated by biological processes.

Wastewater from the trickling filter drains to the trickling recycle chamber where a submersible pump recycles some of the wastewater back to the trickling filter inlet chamber to maintain the minimum required wetting rate for the media.

Wastewater that is not recycled flows to the secondary clarifier where biological solids from the trickling filter (called humus) settle out. The humus is removed from the bottom of the clarifier and pumped to the flow splitting tank where it settles in the Imhoff tanks with the primary solids.

Clarified wastewater flows from the clarifier to the UV disinfection system, then through a channel beneath UV lamps where it is disinfected.

The disinfected wastewater then normally flows by gravity through the outfall pipe into Akaroa Harbour via an open-ended 160 mm diameter outfall pipe. During periods of high flow and/or high tides, a booster pump located in a wet well downstream of the UV system is automatically activated to push wastewater through to the outfall. The outfall extends 100 m into Red House Bay.



Schematic configuration of outfall

2. Annual report

Condition 19a. Results of all monitoring undertaken in the previous year from 1 July to 30 June.

Parameters Monitored at the Akaroa WWTP

The following parameters are monitored after treatment and before discharge at the plant for this annual report at the frequency specified.

Table showing our level of compliance with the schedule:

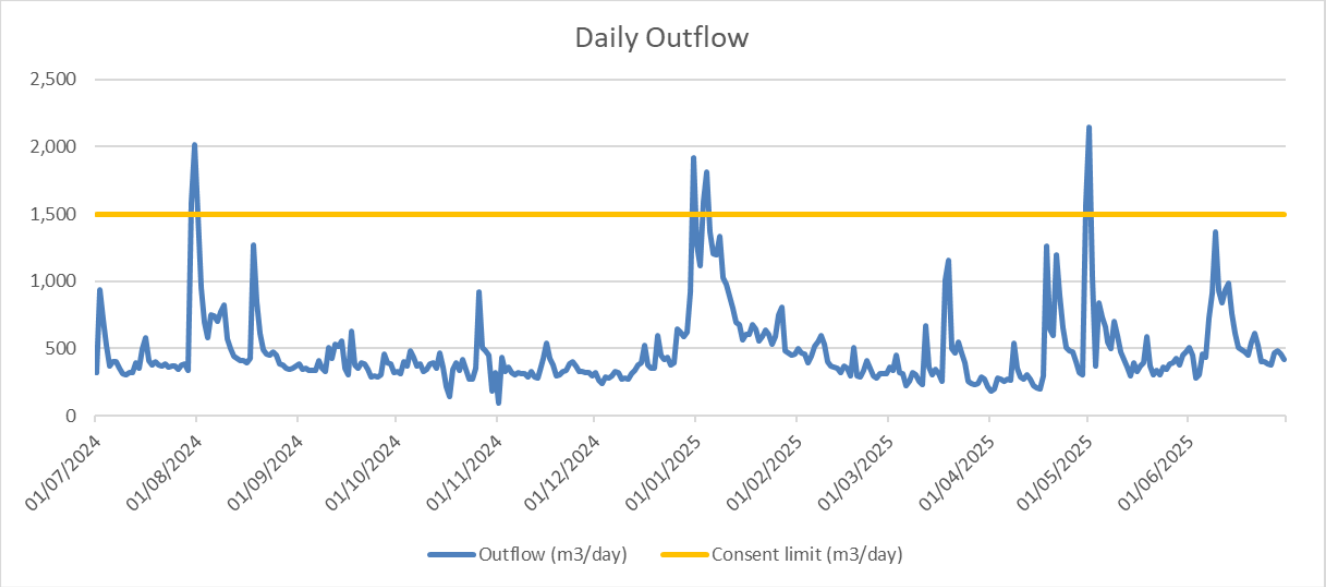
Parameter and (Limit)	3x week (Dec to Feb)	Weekly (Dec to Feb)	Monthly (Mar - Nov)	Annually (Jan)
Faecal Coliforms (1000 CFU /100mL)	☺	☺	😐	☺
Enterococci	☺	☺	☺	☺
Total Suspended Solids (TSS)	☺	☺	☺	
Total five-day biochemical oxygen demand (TBOD5)	☺	☺	☺	☺
Dissolved reactive phosphorus (DRP)	☺	☺	☺	☺
Ammonia	☺	☺	☺	☺
Nitrogen oxides (NOx)	☺	☺	☺	☺
Total phosphorus (TP)	☺	☺	☺	☺
Total nitrogen (TN)	☺	☺	☺	☺
Temperature	☺	☺	😐	😐
Heavy Metals (lead, copper, chromium, cadmium and zinc)	☺	☺	☺	☺

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

See Attached excel workboook for full receiving water sample results.

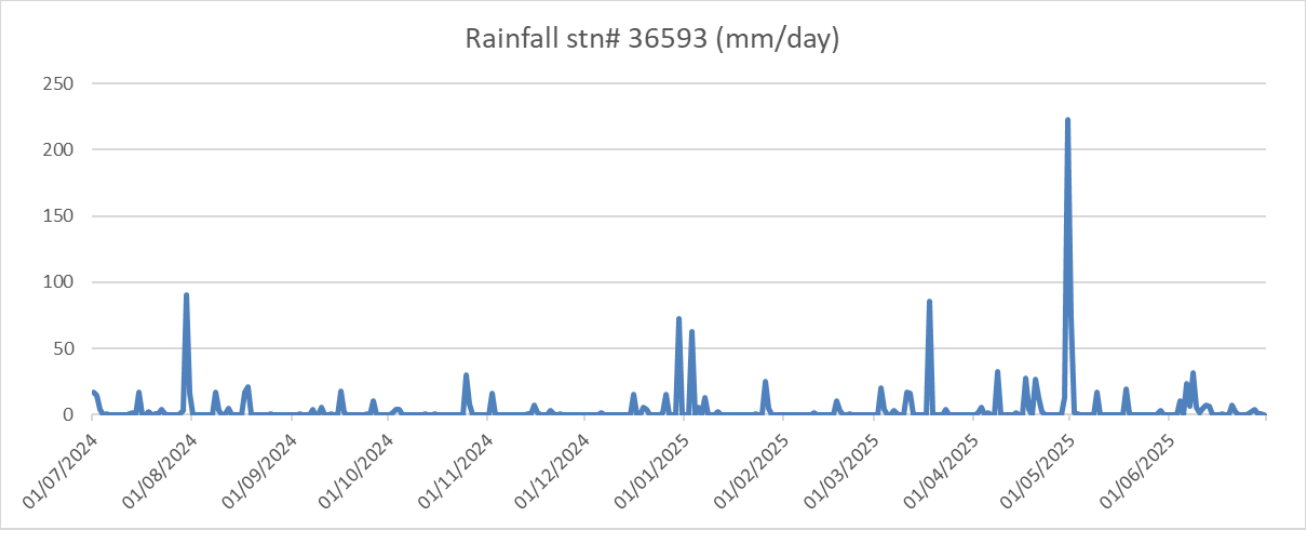
2.1 Flow and Volume

Volume of wastewater discharged recorded continuosly

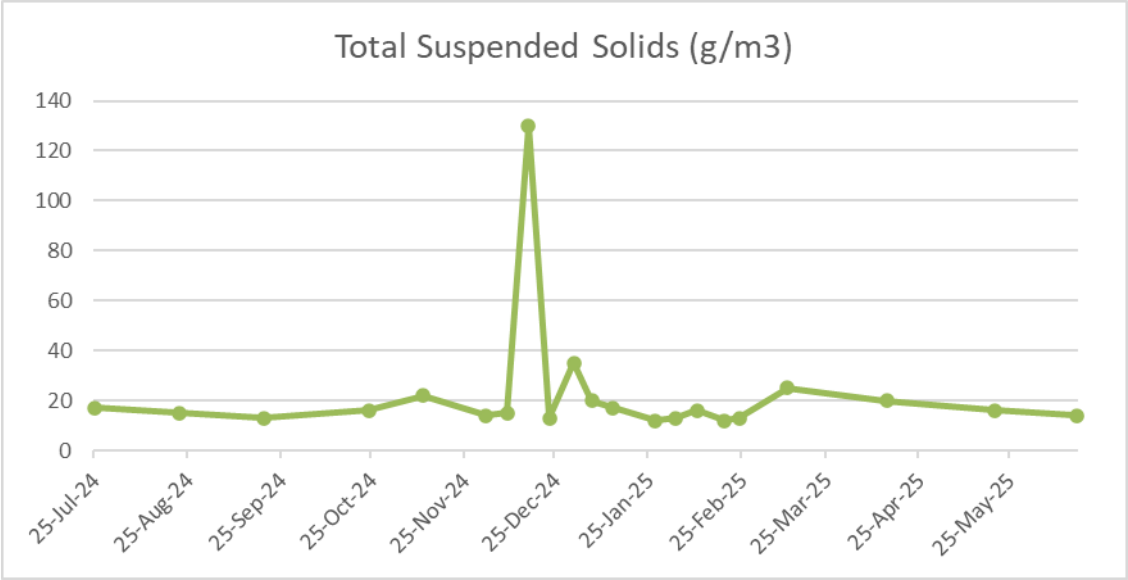


Date	Outflow (m3/day)	Rainfall (mm/day)
30/07/2024	1,588	90.2
31/07/2024	2,015	16
30/12/2024	924	72.4
31/12/2024	1,915	0
03/01/2025	1,594	62.8
04/01/2025	1,810	0
30/04/2025	1,568	223
01/05/2025	2,148	73.6

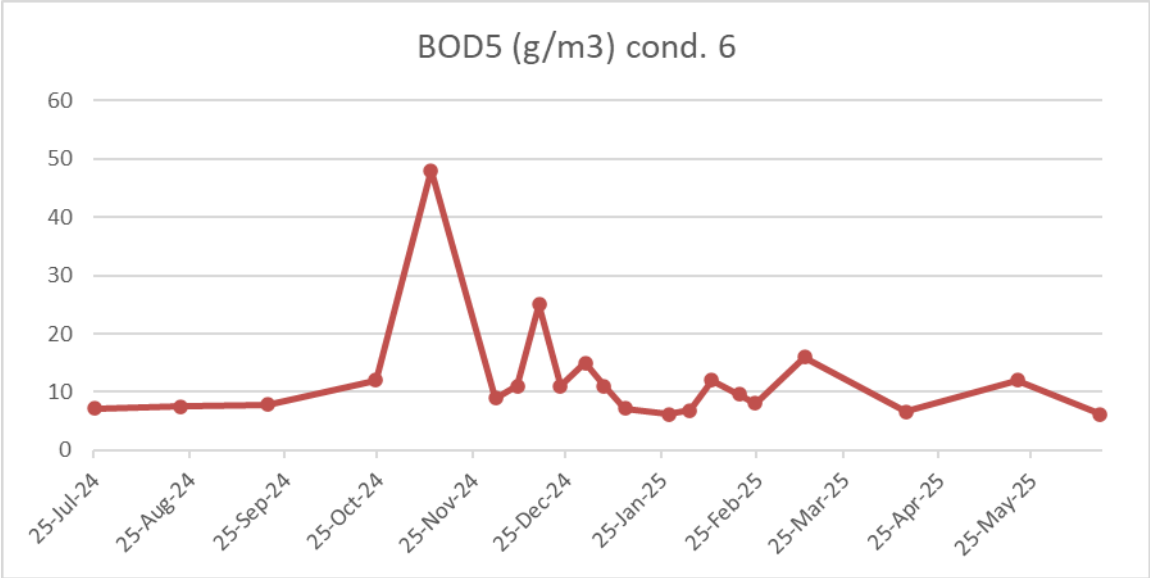
2.1.1 Table showing rainfall events totalling over 30mm over 3 consecutive days



2.2 Total suspended solids (TSS)

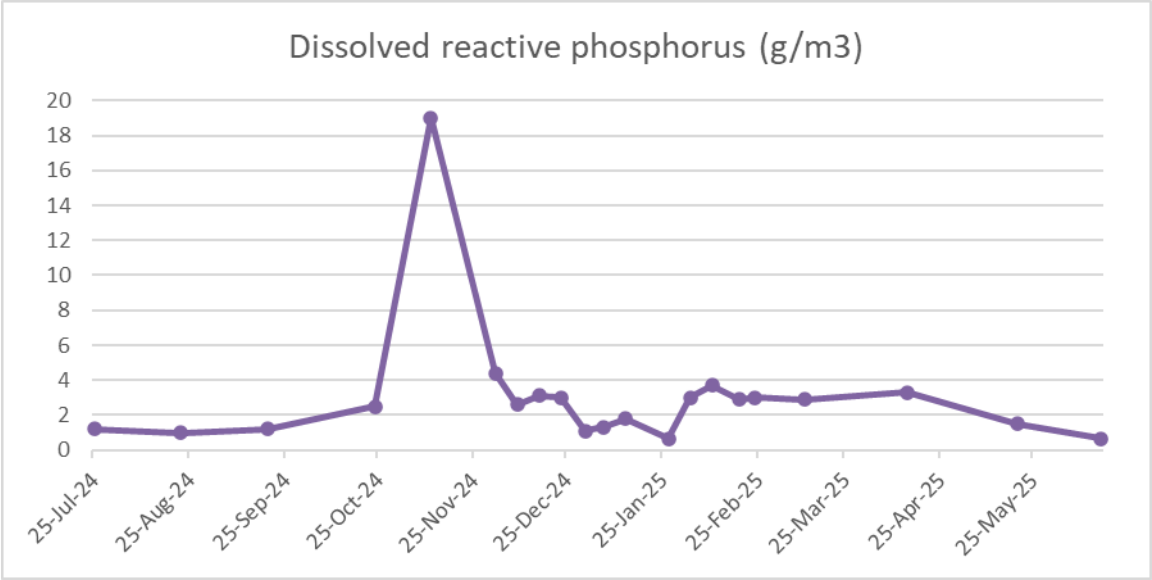


2.3 Total five-day biochemical oxygen demand (TBOD5)

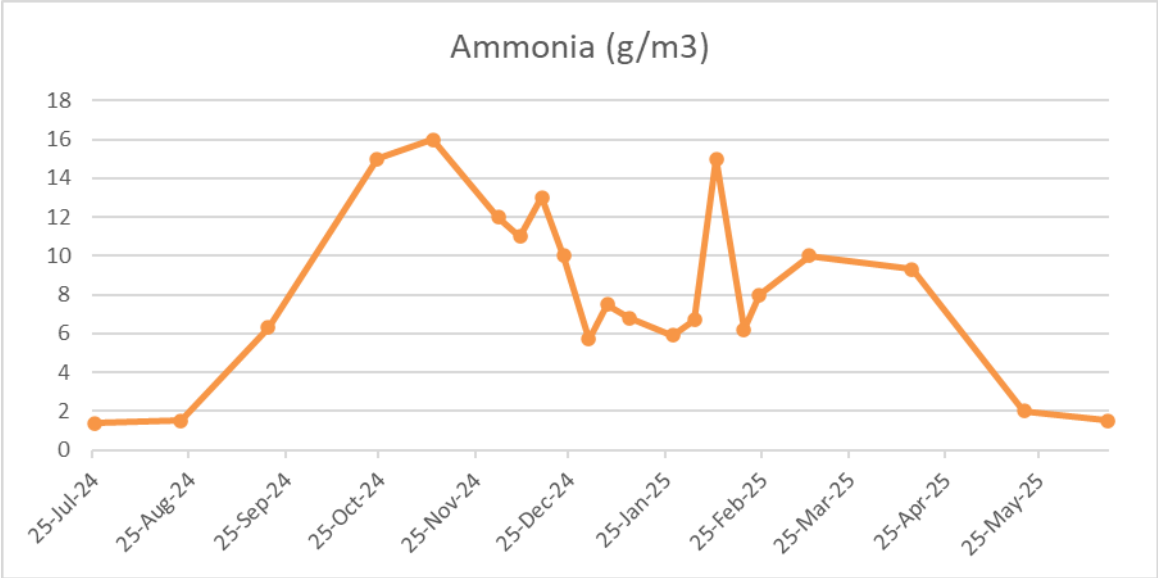


Lab ID 2417537: Due to a low QC for BOD analysis done on 13/11/2024, BOD was not reported, and a calculated BOD was reported. This result was 48 g/m3 and could explain the single high result on the chart.

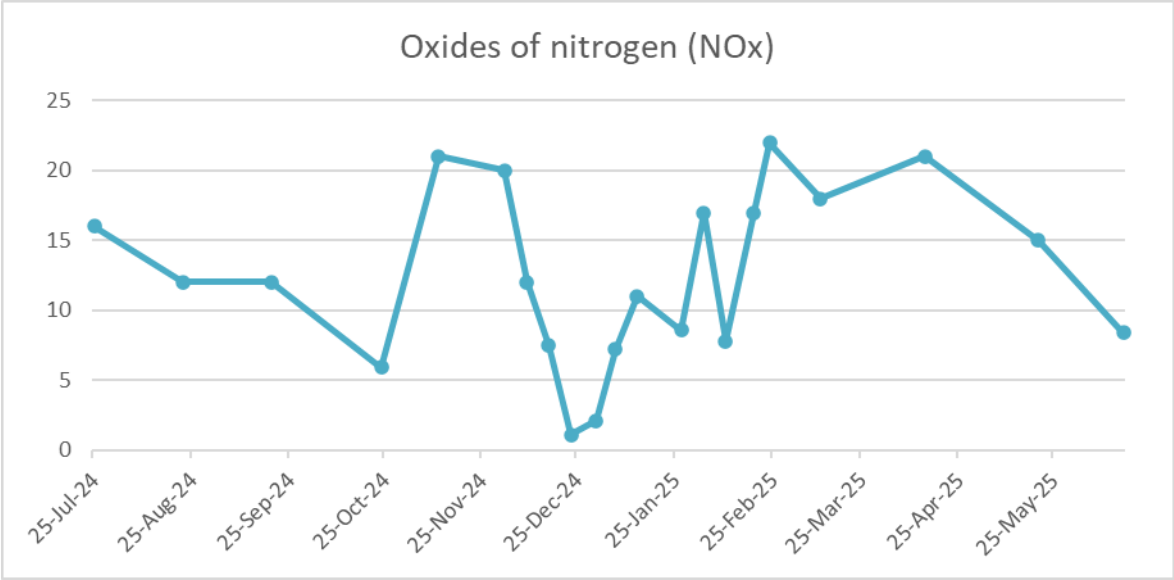
2.4 Dissolved reactive phosphorus (DRP)



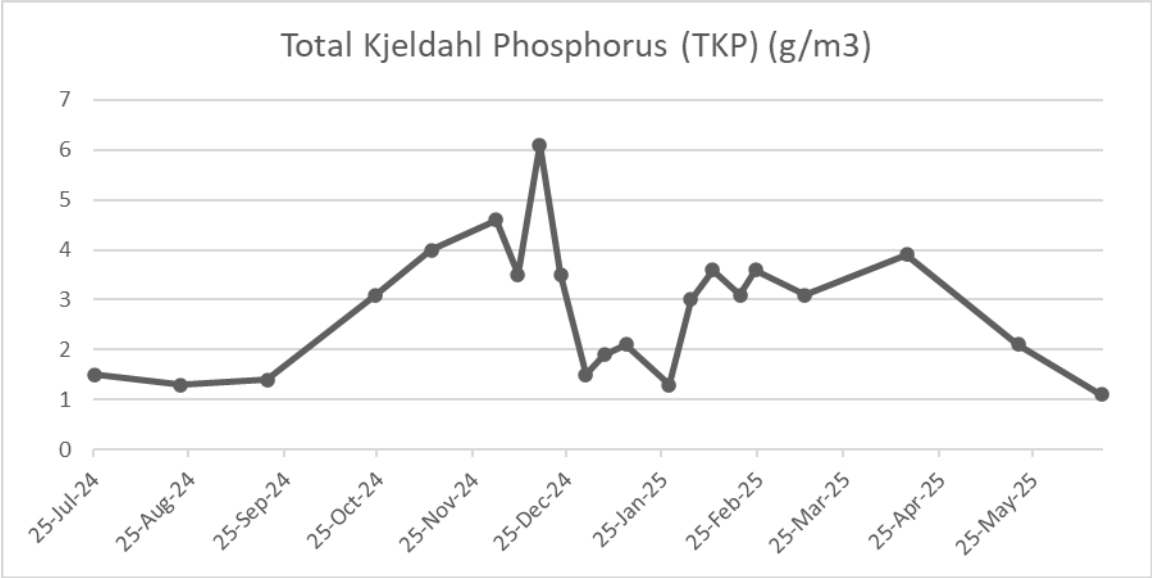
2.5 Ammonia



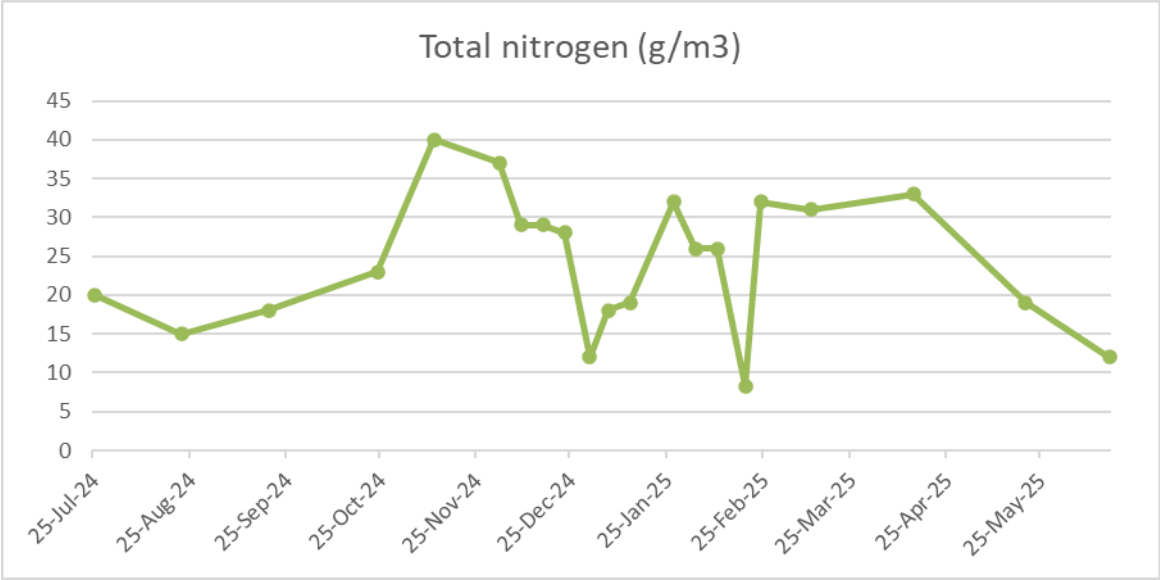
2.6 Nitrogen oxides (NOx)



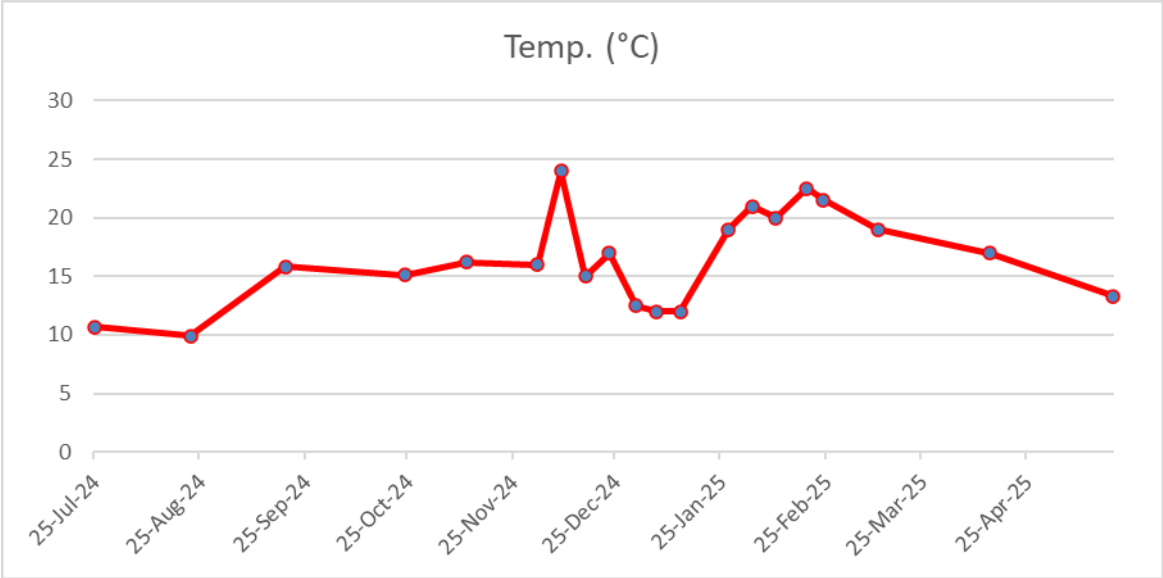
2.7 Total phosphorus (TP)



2.8 Total nitrogen (TN)

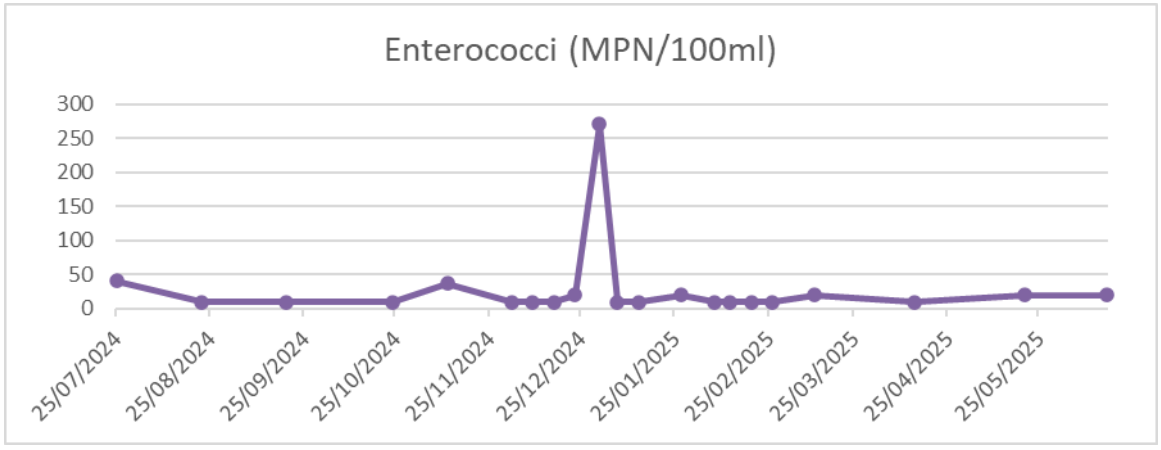


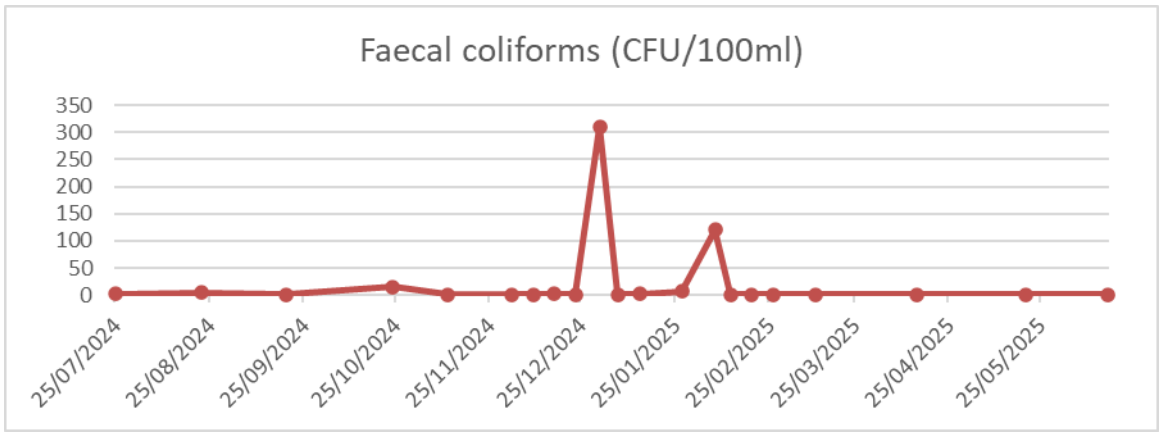
2.9 Temperature



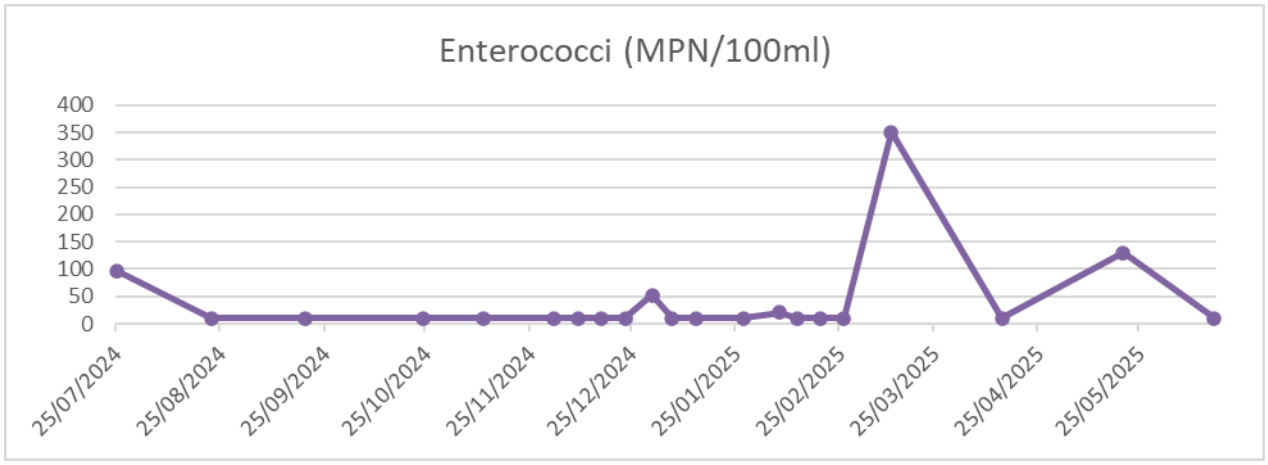
Parameters Monitored in the Receiving Water

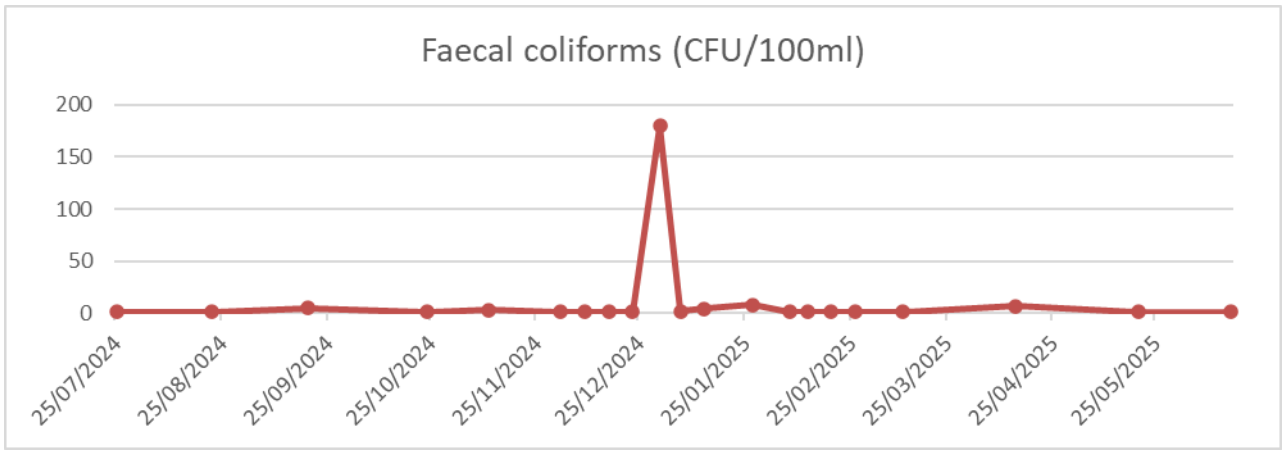
2.10 RW shoreline 400m Nth



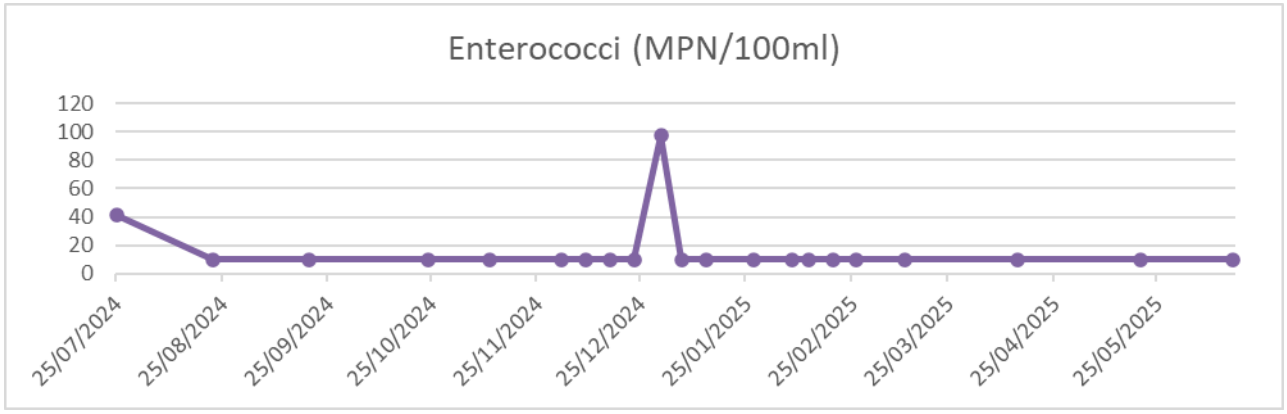


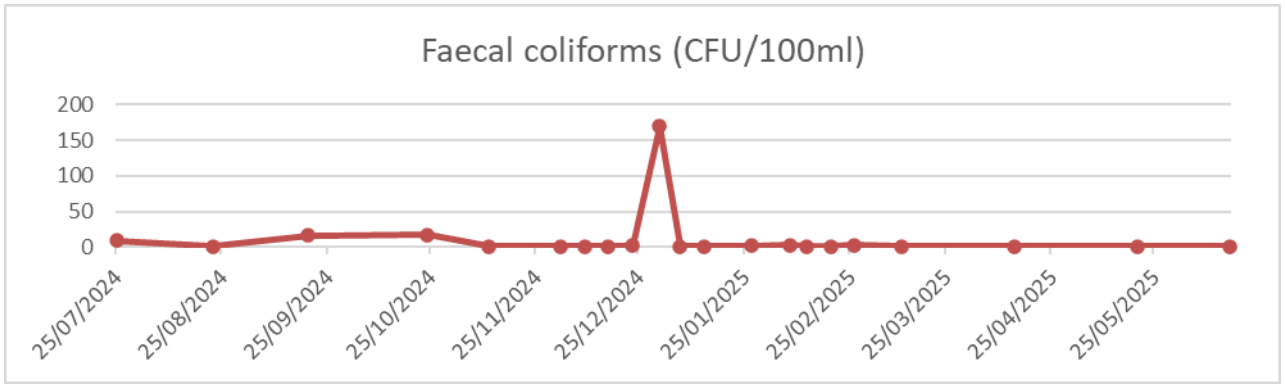
2.11 RW shoreline 400m Sth





2.12 RW Outfall





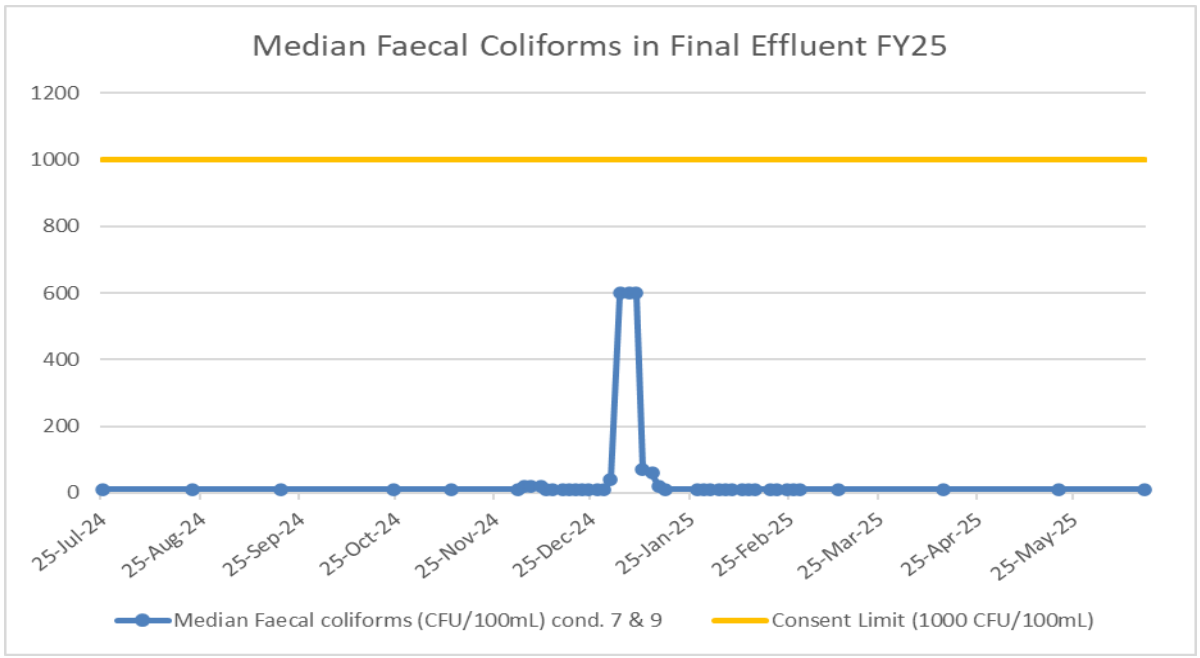
Median Limits

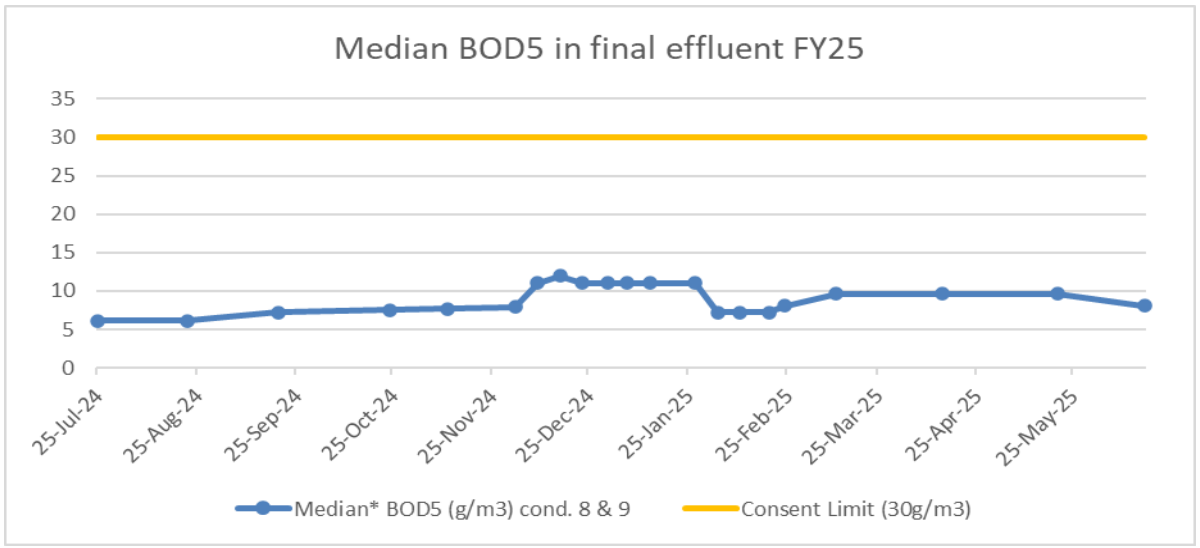
Condition 19b. *an analysis of monitoring results against limits and trigger values specified in Conditions 9, 10, 11 and 14 of this resource consent. (medians)*

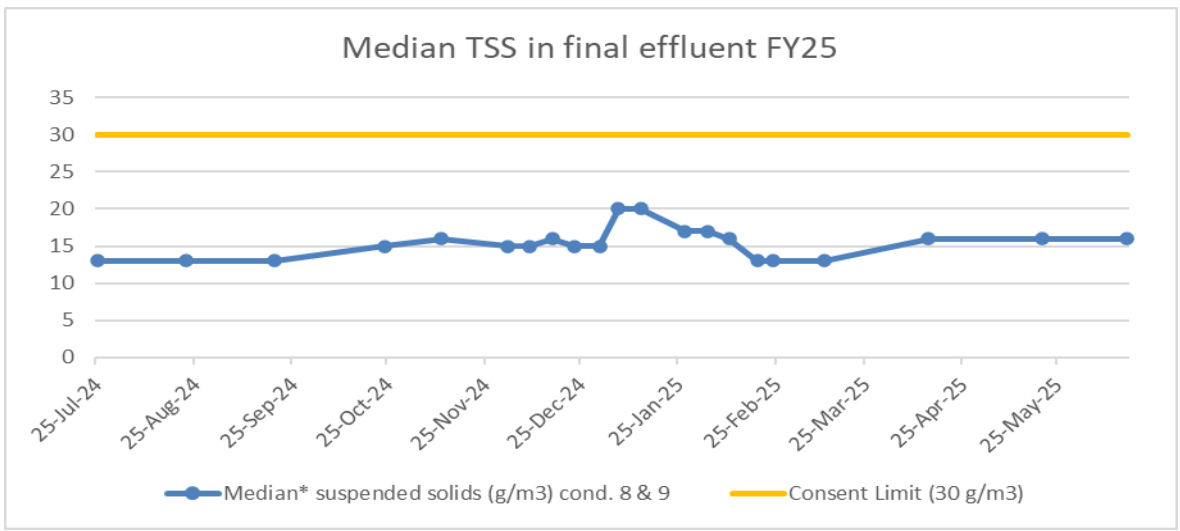
Condition	Location	Parameter and (Limit)	July – Sep 24	Oct – Dec 24	Jan – Mar 25	Apr – June 25
9	Treated Wastewater	Median Faecal Coliforms (1000 CFU /100mL)	☺	☺	☺	☺
10	Treated Wastewater	Median BOD5 (30g /m3)	☺	☺	☺	☺
11	Treated Wastewater	Median TSS (30g /m3)	☺	☺	☺	☺
14	Receiving Water	Median Faecal Coliforms (14 CFU /100mL)	☺	☺	☺	☺

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

- There have been 0 exceedances of any of the consent limit medians in FY25


Median Faecal Coliforms in Final Effluent FY25
1200
1000
800
600
400
200
0
25-Jul-24
25-Aug-24
25-Sep-24
25-Oct-24
25-Nov-24
25-Dec-24
25-Jan-25
25-Feb-25
25-Mar-25
25-Apr-25
25-May-25
Median Faecal coliforms (CFU/100mL) cond. 7 & 9
Consent Limit (1000 CFU/100mL)


Median BOD5 in final effluent FY25
35
30
25
20
15
10
5
0
25-Jul-24
25-Aug-24
25-Sep-24
25-Oct-24
25-Nov-24
25-Dec-24
25-Jan-25
25-Feb-25
25-Mar-25
25-Apr-25
25-May-25
Median* BOD5 (g/m3) cond. 8 & 9
Consent Limit (30g/m3)


Median TSS in final effluent FY25
35
30
25
20
15
10
5
0
25-Jul-24
25-Aug-24
25-Sep-24
25-Oct-24
25-Nov-24
25-Dec-24
25-Jan-25
25-Feb-25
25-Mar-25
25-Apr-25
25-May-25
Median* suspended solids (g/m3) cond. 8 & 9
Consent Limit (30 g/m3)

Condition 19c. *An analysis of the extent of correlation between the receiving water monitoring results and treated wastewater monitoring results, as required in Conditions 7 (treated wastewater contaminants), 12(receiving environment bacterial samples), and 13 (RW sampling schedule). This shall include an assessment of the information collected for Condition 17 (environment parameters), its impact on the results and any changes to the sampling regime as a result of this analysis that have been agreed with Canterbury Regional Council.*

In past years there has been no links between the sample results at the plant, and what was returned for receiving water. When high receiving environment bacterial samples were returned, the samples taken at the plant outfall showed low levels of bacteria. In FY25 low median levels of bacterial samples were returned at the plant itself as well as at the receiving water. This would have been circumstantial, as there is no pattern where bacteria sampled at the plant results in a high receiving environment number.

Condition 19d. *Comparison of monitoring results as required in Conditions 7 (treated wastewater contaminants), 12(receiving environment bacterial samples), and 13 (RW sampling schedule) with historical data.*

There have been singular high sample results returned from treated wastewater, primarily during the summer months in most years back to 2012. These results show a one-off annual spike, when the population reaches the summer peak. These results aren't seen during the regular sampling schedule over the year.

There has also been the odd instance of an elevated median value in the receiving environment samples, but at the same time, the treated wastewater samples have been under the guideline values.

Condition 19e. *Comparison of the monitoring results required in Conditions 7 (treated wastewater contaminants), 12(receiving environment bacterial samples), and 13 (RW sampling schedule) with operation and performance issues from the WWTP.*

When the CCC took responsibility for the Banks Peninsula treatment plants in 2021, there was a large amount of maintenance that had been deferred at each of the 4 treatment plants on the Peninsula. We have been slowly catching up on this maintenance and making upgrades where we can. You can see the positive effect this work is having with the low sample levels and medians seen across the WWTP

Condition 19f. An interpretation of the results in relation to the effects of the discharge on the environment.

The parameters sampled of the treated wastewater are all below consent levels, except for occasional elevated levels caused by elevated faecal coliform levels over holiday and summer periods. These high levels of faecal coliforms could impact the environment through aerobic decomposition of these coliforms, causing a reduction of dissolved oxygen levels.

The samples taken of the receiving environment are generally not affected by the treated wastewater discharged. There are no obvious links between samples taken of the different areas.

Condition 19g and 19h. *Identification of any measures taken to remedy any exceedances and details of all changes or upgrades to the treatment plant that may affect the quality or volume of treated wastewater discharged.*

On August 1, a water recirculation system was implemented to reduce the use of potable water for cleaning purposes at the treatment plant. It is currently used for internal cleaning of the inlet auger and a drip system for the wastewater treatment plants PST's, saving the use of approximately 10 m^3 of potable water per day.

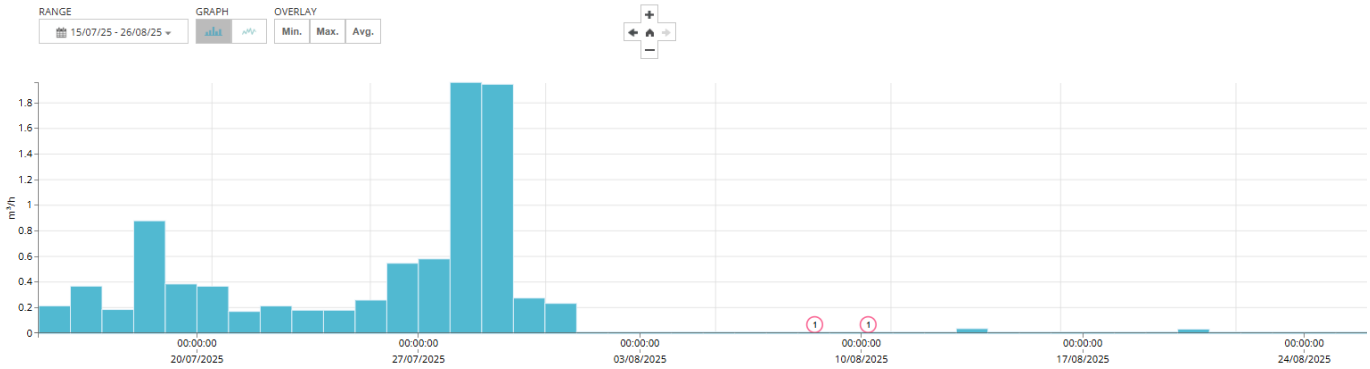


Figure 1 Akaroa WWTP, potable water usage. Temetra, flow meter I24WF902179.

Condition 19i. *Summary of any inflow and/or infiltration investigations or works undertaken in the reporting period.*

- When this consent was initially granted in May 2022, there were no water meters and Residential Flow was calculated as the permanent Akaroa population (refer to Statistics New Zealand for the most recent census data) multiplied by a factor of 240 litres per person per day, to get an assumed value.
- New meters have been rolled out in the last 6 months to all our customers, so now we have an accurate picture of water use in the township.

Inflow and Infiltration Estimate Table

Item	Units	Period using assumed residential flow	Period using new customer meters	Total
Start	Date	1/07/2024	1/01/2025	-
Finish	Date	31/12/2024	30/06/2025	-
Days	Days	184	181	**365**
Residential Population	People	645	645	**645**
Residential Assumed Flow	Litres/Person per day	240	-	**-**
Residential flow	m^3	28,483	-	**28,483**
Commercial Meter Daily Average	m^3/day	147	-	
Commercial flow	m^3	27,135	-	**27,135**
Combined commercial and residential consumption based on new metering	m^3	-	85,306	**85,306**
L'aube Hill WTP Flow	m^3	6,551	6,689	**13,240**
Legitimate Flow	m^3/year	62,169	91,995	**154,164**
Total WW Flow	m^3/year	92,497	108,200	**200,697**