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Christchurch Wastewater Treatment Plant

Annual Monitoring Report

July 2012 - June 2013

Summary

This report summarises the results of parameters monitored by the Christchurch Wastewater Treatment Plant (CWTP) over the period July 2012 – June 2013 in accordance with consent CRC051724. Consent CRC051724 allows the discharge of treated wastewater from the CWTP Oxidation Ponds into the Pegasus Bay Coastal Marine Area via an ocean outfall.

Of the comprehensive sampling programme required by the consents, all samples were collected during the monitoring period and most monitored parameters achieved the required standards. CWTP is still in the process of repairing damage from the 2010/2011 earthquakes, which has caused a number of process interruptions to the oxidation ponds throughout the 2012/13 monitoring period. Repairs to the ponds banks were completed early 2013. The other key component of the pond repairs, a replacement outlet structure from the plant to Pond 1, is expected to be completed by late 2013.

A high rainfall in Aug 2012, coupled with earthquake related infiltration and damaged pond banks, endangered to flood neighbouring properties. ECan and affected community groups were notified and an estimated flow of 64,200 m3 was discharged form Pond 6 into the Avon-Heathcote Estuary; the discharge occurred from 14/08/12 16:00 to 15/08/12 13:00. Daily samples where taken from the estuary for a week following the discharge, and sent to ECan.

A visual inspection of the ocean diffuser structure was done in October 2012. The report showed the diffuser was in good condition and cathodic protection was still operational. An increase in marine biota was observed from the 2010 dive survey, although it did not interfere with the diffuser operation.

A single exceedance of the tuatua e.coli limit occurred at the Sumner Surf club sample area in March 2013. ECan was advised as soon as CWTP received the results and warning signs were placed around the sampling area. A follow-up sample taken soon after, showing e.coli readings dropped below the 2.3 MPN/ml limit. Signs on the beach were subsequently removed. There was no records indicating sewer overflows that could have caused it, and an investigation of potential sources shows the likely contamination source was a stormwater outlet near The Esplanade (Sumner).

Heavy rain June 2013 resulted in an overloading of the wider network, and lead to:

- High faecal coliform count for ocean outfall intake
- Exceedances for tuatua samples
- Exceedances on beach samples retests

ECan and the Canterbury Medical Officer of Health was informed 24/06 of high repeat enterococci and f. coliform on the three beach sites. Samples taken 25/06 showed that bacterial levels had dropped within consent limits.

Shellfish were sampled just after the storm event and reported to CWTP 01/07. ECan was notified, and Citycare to instructed to erect signs warning against shellfish harvesting on the same day. Resamples done by EOS Ecology were received 26/07, and showed bacterial levels to be back within consent.

Christchurch Wastewater Treatment Plant Contents

Annual Monitoring Report

Jul 2012 – Jun 2013

1 Outfall Discharge

1.1 Resource Consent Conditions

Table 1.1.1 Pond Discharge Consent Compliance for Monitoring Period July 2011 – June 2012 CRC051724

Consent Condition	Parameter	Compliance Condition	Compliance												
			Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Overall
2	Discharge Content	Discharge is only wastewater from the CWTP ponds	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺
3	Discharge Volume	Recorded	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	😐	☺	😐
4	Discharge Rate	Recorded	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	😐	☺	😐
9	Outfall Maintenance	Routine maintenance completed and recorded	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺
10	Outfall Condition	Visual inspection of outfall	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	☺	☺
12	Pumping Pressure for a given flow	Monitored	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	😐	☺	😐

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

1.2 Comments on Resource Consent Conditions

In general, the Ocean Outfall Pumping Station has operated within expected parameters and is comparable with last year's performance. The discharge flows and pressures were recorded as noted in the quarterly reports, although communication issues prevent the data from being recorded for a 24 hour period in May 2013.

Figure 1.2.1 - Daily Outfall Flow Totals Jul 2012 – Jun 2013

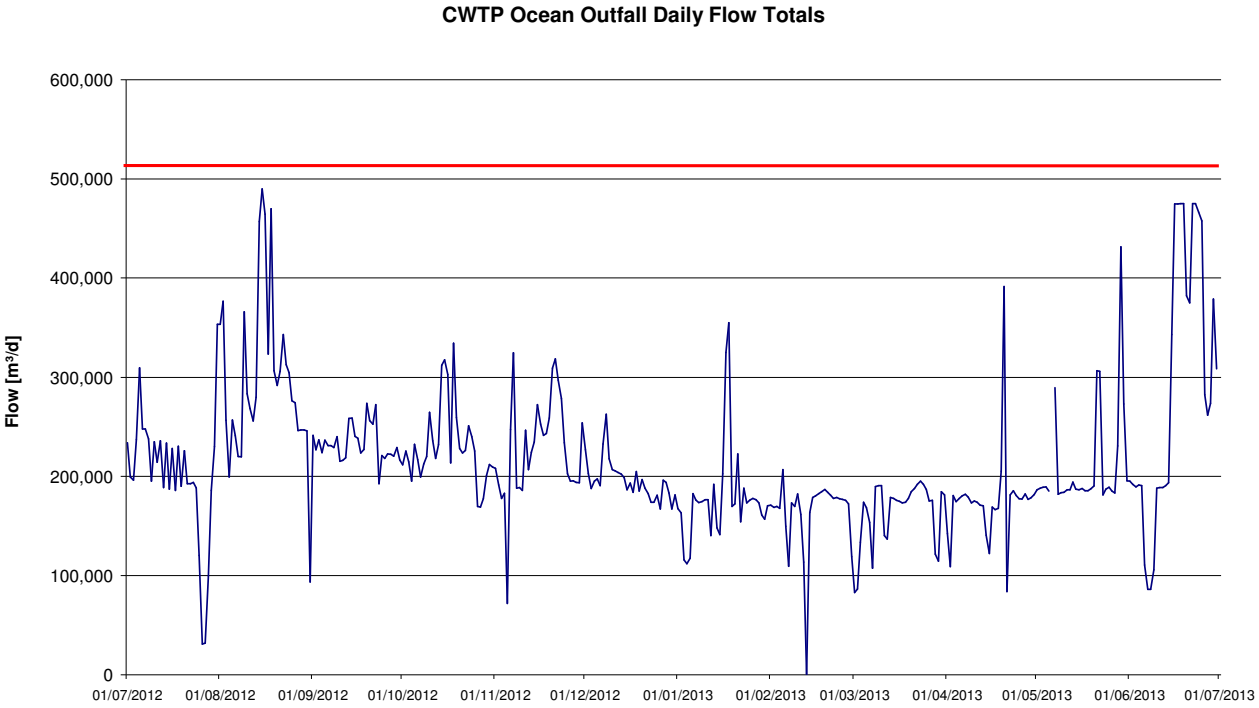
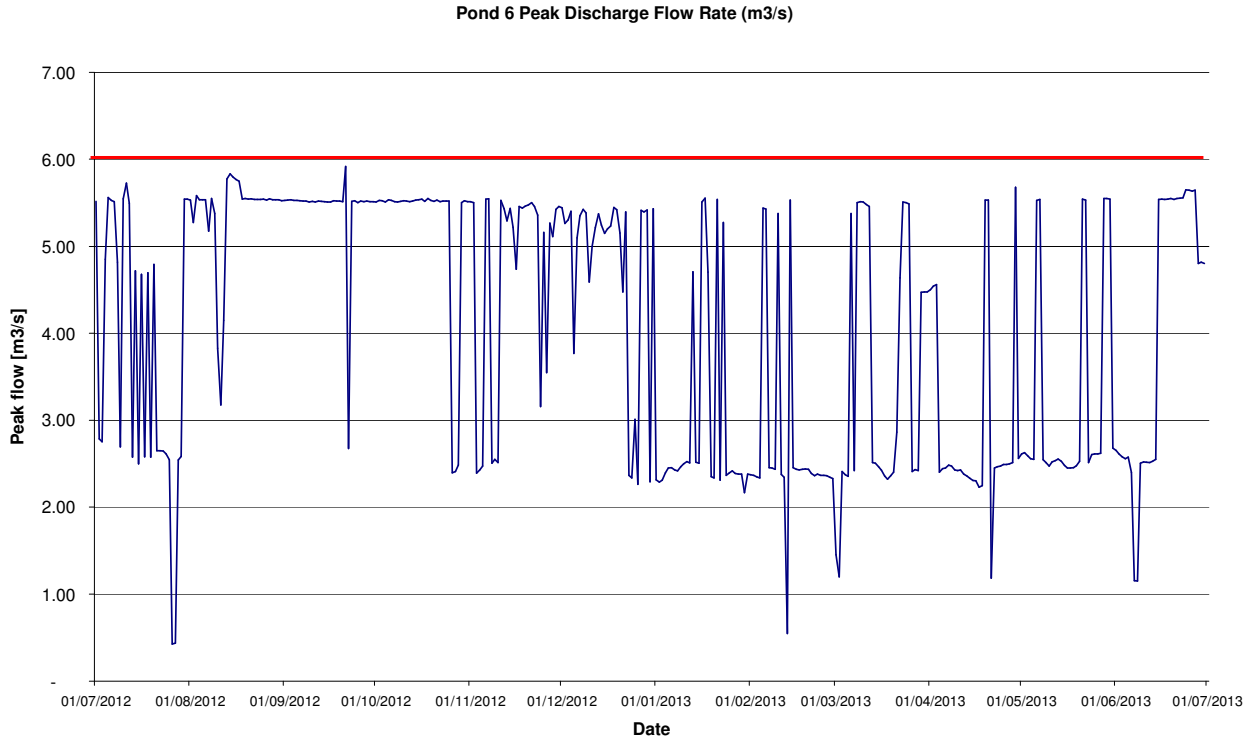


Figure 1.2.2 - Daily Peak Outfall Flows Jul 2012 - Jun 2013



1.3 Resource Consent Standard Conditions

Table 1.3.1 Contaminant Limits Consent Compliance Jul 2012 – Jun 2013 CRC051724

Consent Condition	Parameter	Compliance Condition	Compliance												
			Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	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

There was a number of issues throughout the year that were attributed to high flows from network infiltration and reduced disinfection capacity due to ongoing repairs to the oxidation pond banks.

There were two exceedances of the $50g/m^3$ limit for total suspended solids in Jan & Feb 2013. This is attributed to remediation earthwork on the banks of Pond 6, which disturbed sediment. The sediment disturbance also caused a breech of the enterococci limit in January.

As pond repairs were still continuing throughout the quarter, the shorter residence time has resulted in algae reaching the Ocean Outfall sample point. This unusual growth of algae has resulted in a single BOD exceedance for March and a single suspended solids exceedance for April.

Pathogen testing, as part for Condition 13e, was completed in March.

Due to the lab making an error in sampling, testing for e. coli for 28/02/13 was missed.

High faecal coliform and enterococci results in August 2012 and June 2013 were due to prolonged heavy rainfall events.

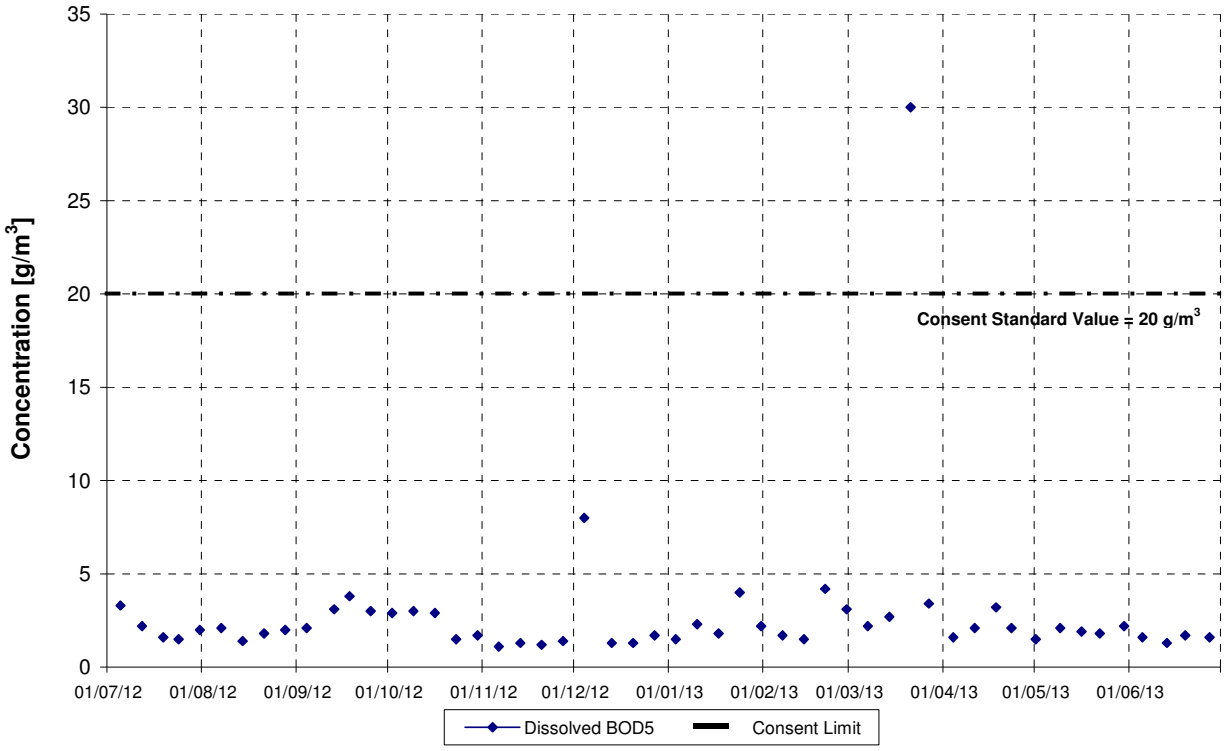
1.5 Dissolved BOD_5 Compliance

Table 1.5.1 Pond Discharge Dissolved BOD_5

Median Value [g/m^3] Current Monitoring Period (July 2012 - June 2013)	2.0	Number of Exceedances Current Monitoring Period (July 2012 - June 2013)	0
Median Value [g/m^3] Previous Monitoring Period (July 2011 - June 2012)	9.3	Number of Exceedances Previous Monitoring Period (July 2011 - June 2012)	0

There was a single non-compliance recorded for the 2012-2013 year. This was due to an unexpected algae growth exacerbated by earthquake repairs to the oxidation ponds. The mean value for the current reporting period was lower than the previous period

1.5.2 Pond Discharge Dissolved BOD_5



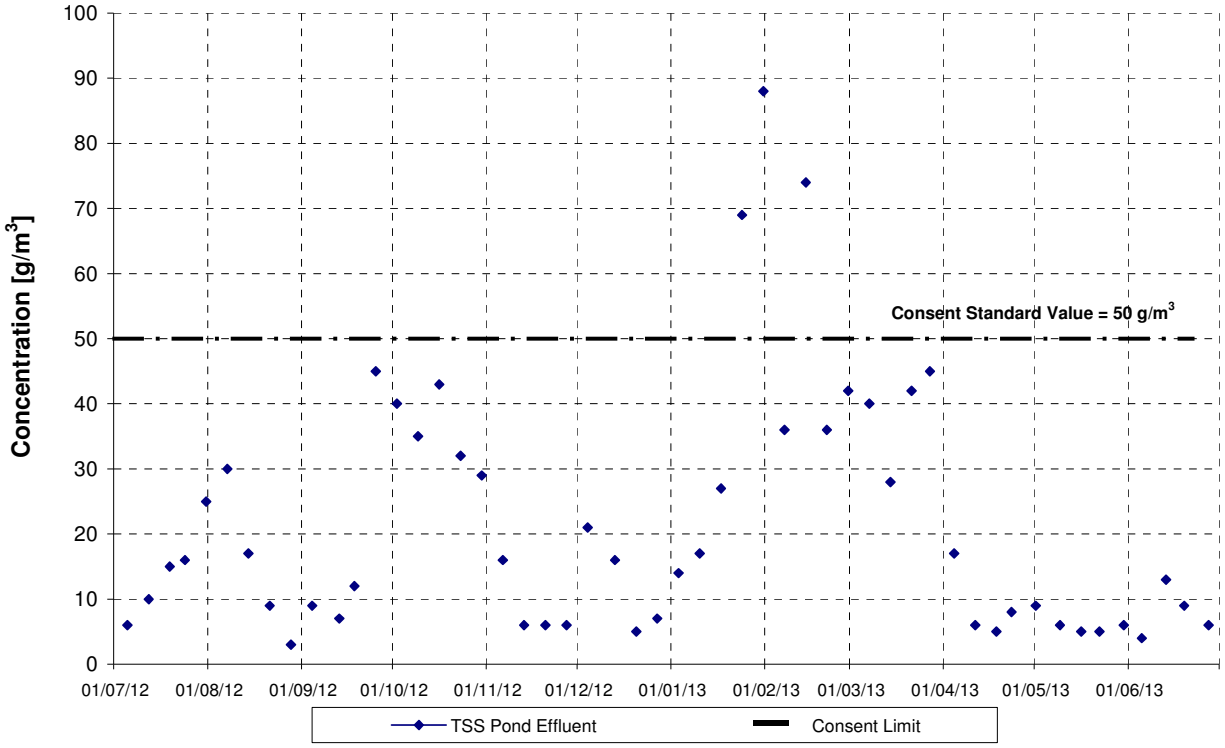
1.6 Total Suspended Solids Compliance

Table 1.6.1 Pond Discharge Total Suspended Solids

Median Value [g/m^3] Current Monitoring Period (July 2012 - June 2013)	16	Number of Exceedances in Current Monitoring Period (July 2012 - June 2013)	3
Median Value [g/m^3] Previous Monitoring Period (July 2011 - June 2012)	16	Number of Exceedances in Previous Monitoring Period (July 2011 - June 2012)	0

There were three non-compliances recorded for the 2012-2013 year, the other values being within the consent standard value. The non-compliances are due to algae growth combined with oxidation pond repairs reducing the hydraulic residence time. The mean value for the current period was similar to the 2011/2012 reporting period.

1.6.2 Pond Discharge Total Suspended Solids



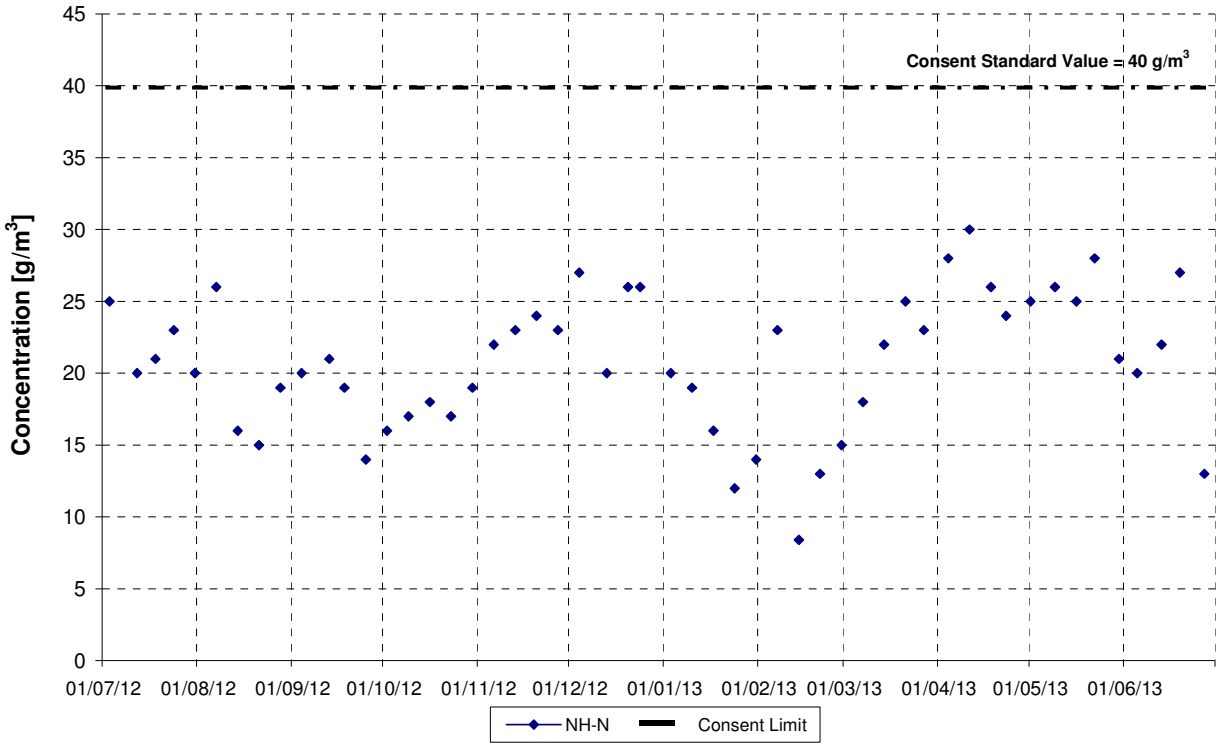
1.7 Ammonia Nitrogen Compliance

Table 1.7.1 Pond Discharge Ammoniacal Nitrogen

Median Value [g/m^3] Current Monitoring Quarter (July 2012 - June 2013)	21	Number of Exceedances Current Monitoring Quarter (July 2012 - June 2013)	0
Median Value [g/m^3] Previous Monitoring Quarter (July 2011 - June 2012)	18	Number of Exceedances Previous Monitoring Quarter (July 2011 - June 2012)	0

There were no exceedances recorded for 2012-2013. The mean value for the current period was higher than the 2011-2012 reporting period.

1.7.1 Pond Discharge Ammoniacal Nitrogen



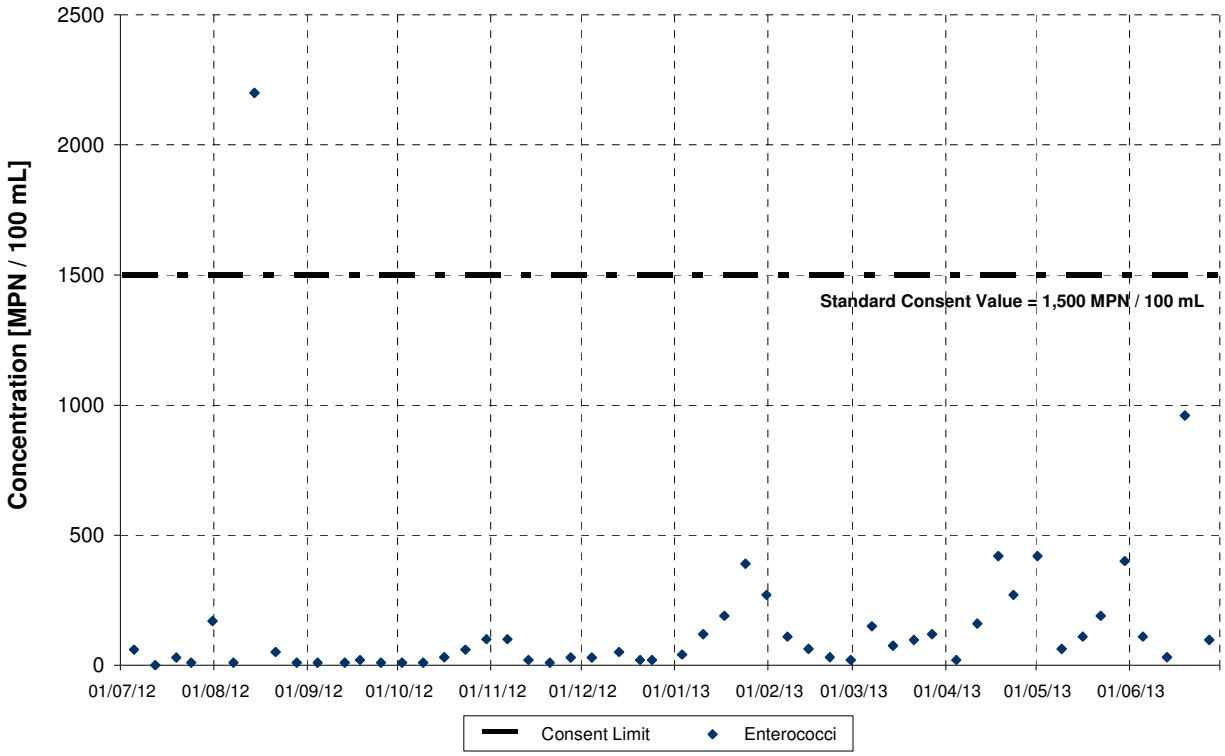
1.8 *Enterococci Monitoring*

Table 1.8.1 Pond Discharge Enterococci

Median Value [MPN/100ml] Current Monitoring Quarter (July 2012 - June 2013)	60	Number of Exceedances Current Monitoring Quarter ((July 2012 - June 2013)	1
Median Value [MPN/100ml] Previous Monitoring Quarter (July 2011 - June 2012)	41	Number of Exceedances Previous Monitoring Quarter ((July 2011 - June 2012)	2

There were a single exceedances of the consented value due to a high rainfall event. The mean value was higher than the 2011-2012 period.

1.8.1 Pond Discharge Enterococci



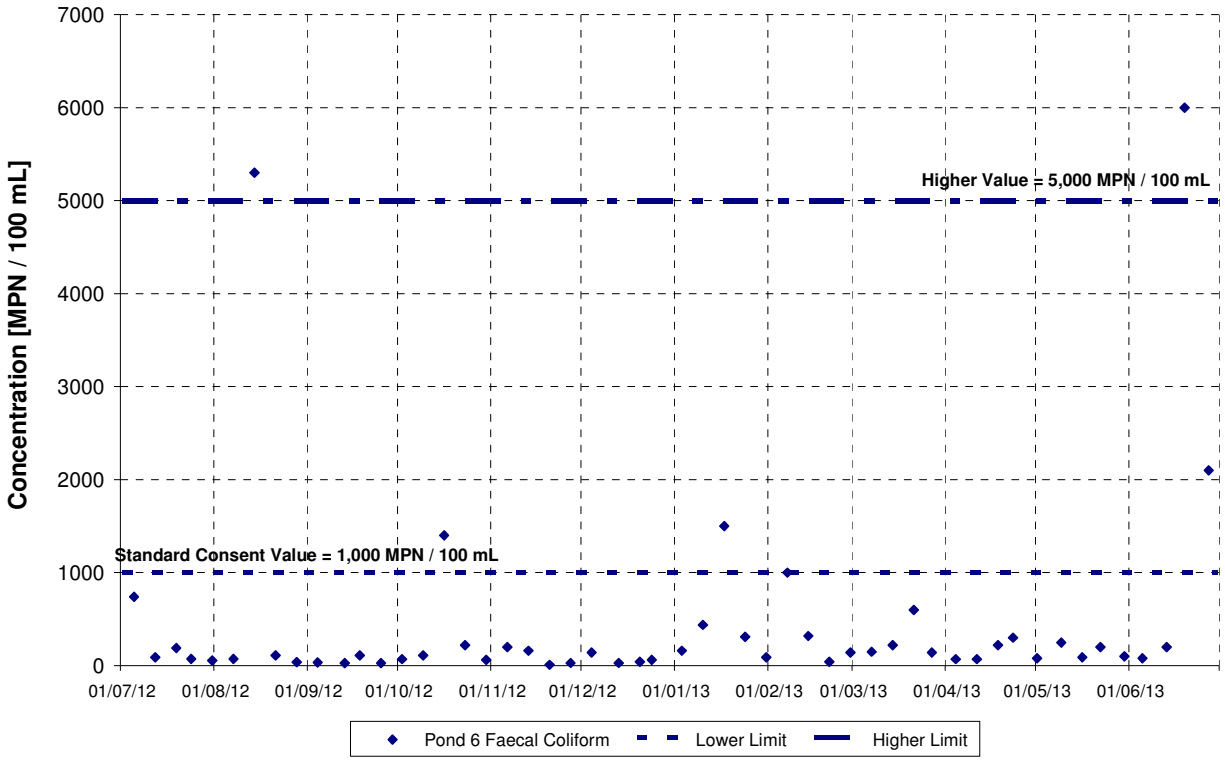
1.9 *Faecal Coliform Compliance*

Table 1.9.1 Pond Discharge Faecal Coliforms

Median Value [MPN/100ml] Current Monitoring Quarter (July 2012 - June 2013)	105	Number of Exceedances of Lower Limit for Current Monitoring Period (July 2012 - June 2013)	5
Median Value [MPN/100ml] Previous Monitoring Quarter (July 2011 - June 2012)	380	Number of Exceedances of Lower Limit for Previous Monitoring Period (July 2011 - June 2012)	13

The two non-compliance samples over the higher value were due to high rainfall events in August 2012 and June 2013. Similarly the three exceedances of the standard value was also due to rainfall. The median for this year is lower than the previous period.

1.9.1 Pond Discharge Faecal Coliforms



1.10 Other Pathogenic, and Other Contaminants

Condition 13e

Giardia cysts, cryptosporidium, salmonella, enterovirus, adenovirus and campylobacter levels have been measured and reported in March 2013.

Condition 13f

Heavy metals (copper, chromium, nickel, zinc, cadmium, lead, arsenic, and mercury) were measured and reported July 2012 and January 2013.

Condition 13g

Organochlorine pesticides, organophosphate pesticides, PCBs, and polycyclic aromatic hydrocarbons were measured and reported in July 2012.

Condition 17

No scums, foams or other floatable material was observed at the edge of the diffuser mixing zone.

2 Receiving Environment Monitoring in Pegasus Bay

2.1 *Water Quality Resource Consent Conditions*

Table 2.1.1 Receiving Environment Water Quality Consent Compliance Aug 2012 – Jul 2013

Consent Condition	Parameter	Compliance Condition	Compliance				
			Jul - Oct 12	Nov –Jan 13	Feb – Apr 13	May - Jun 13	Overall
18	Faecal Coliforms	Sampled and Analysed	☺	☺	☺	😐	😐
	Enterococci	Sampled and Analysed	☺	☺	☺	😐	😐
22a[1]	Temperature	Two yearly	n/a	n/a	☺	n/a	n/a
	DO	Two yearly	n/a	n/a	☺	n/a	n/a
	Salinity	Two yearly	n/a	n/a	☺	n/a	n/a
	Total Suspended Solids	Two yearly	n/a	n/a	☺	n/a	n/a
	Nitrogen Oxides	Two yearly	n/a	n/a	☺	n/a	n/a
	Ammoniacal Nitrogen	Two yearly	n/a	n/a	☺	n/a	n/a
	Dissolved Reactive Phosphorus	Two yearly	n/a	n/a	☺	n/a	n/a
	Chlorophyll-a	Two yearly	n/a	n/a	☺	n/a	n/a
	Trace Metals (arsenic, cadmium, copper, chromium, lead, nickel and zinc)	Two yearly	n/a	n/a	☺	n/a	n/a
	Faecal Coliforms	Two yearly	n/a	n/a	☺	n/a	n/a
	Enterococci	Two yearly	n/a	n/a	☺	n/a	n/a
	Phytoplankton Species	Two yearly	n/a	n/a	☺	n/a	n/a

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

[1] Sampling is scheduled for 2013.

2.2 *Comments on Compliance*

Ocean samples for Condition 22 were taken in March 2013 and the overall condition of the samples was good with ammonia below detectible limits, no scums or foams, and no bacterial contamination. The Feb – Apr 2013 quarterly report contained a report showing the presence of Pseudo nitzschia algae in the ocean water samples taken around the diffuser mixing zone. At the request of Environment Canterbury, CWTP took several algae population surveys (June 2013) around the outfall diffuser, a nearby on-shore location, and at the outfall pump station inlet. All repeat samples had low or negligible levels of P. nitzschia algae.

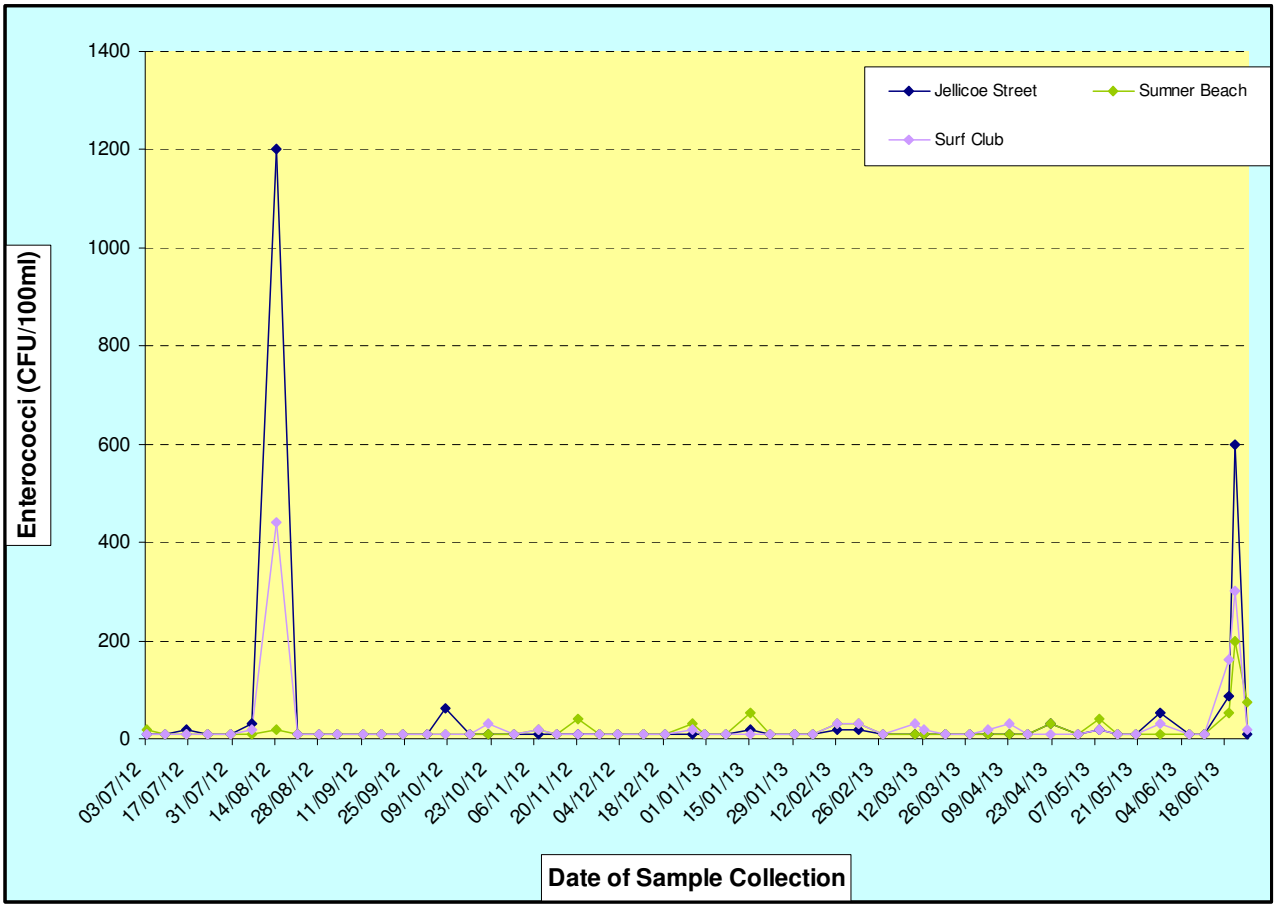
2.3 *Beach Water Quality Analysis Results*

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

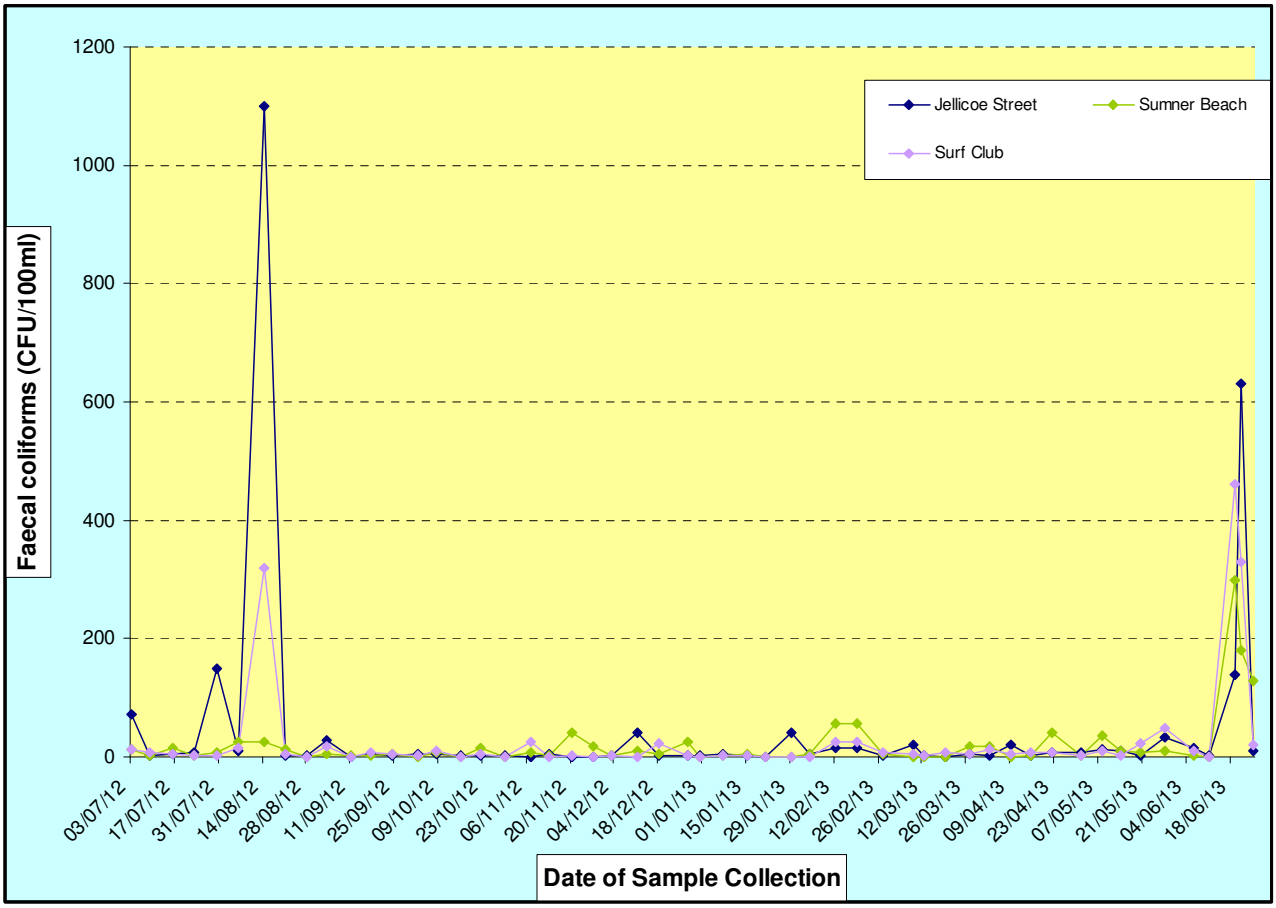
High initial results in August 2012 were due to a high rainfall event, although retests were within the limits.

The high rainfall event in June 2013 resulted in high repeat samples for all three beaches. ECan and the Canterbury Medical Officer of Health was informed 24/06 of high enterococci and f. coliform on all three beach sites. Samples taken 25/06 showed that bacterial levels had dropped within consent limits. The high samples were due to pumping station overflows.

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 covering the same period.

Table 2.4.1 Receiving Environment Monitoring Consent Compliance Jul 2012 - Jun 2013

Consent Condition	Parameter	Frequency	Compliance Condition	Compliance				
				Jul - Oct 12	Nov –Jan 13	Feb – Apr 13	May - Jun 13	Overall
23	Marine Sediments	5-yearly	Reported	n/a	n/a	n/a	n/a	n/a
25	Benthic Invertebrates	5-yearly	Reported	n/a	n/a	n/a	n/a	n/a
26	Epibenthic Fauna	5-yearly	Reported	n/a	n/a	n/a	n/a	n/a
27	Shellfish/Tuatua	Quarterly	Sampled and Analysed	☺	☺	😐	😐	😐
29	Complaints	As required	Recorded and Reported	☺	☺	☺	☺	☺
31	Report	Annually	Report and information lodged with ECan	☺	n/a	n/a	n/a	☺
32	Report	Quarterly	Report and information lodged with ECan	☺	☺	☺	☺	☺
34	Management Plan	4 Years post commissioning	Report and information lodged with ECan	n/a	n/a	n/a	n/a	n/a

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 is due in 2016.

Condition 27

Shellfish were sampled and analysed. A single exceedance of the tuatua e.coli limit occurred at the Sumner Surf club in April 2013. ECan was advised immediately and signs, warning members of the public to avoid shellfish collection, were placed around the sampling area. A follow-up sample was taken by EOS Ecology a week later showed e.coli readings were below the 2.3 MPN/ml limit. Signs on the beach were subsequently removed. Records did not show any sewer overflows that could have caused the exceedance, but it is possible the contamination source was a stormwater outlet located near The Esplanade (Sumner). All other samples did not exceed the 2.3 MPN/ml e.coli limit.

Shellfish were sampled just after the heavy and prolonged rainfall event in June 2013 and the high bacterial results reported to CWTP 01/07. ECan was notified, and Citycare to instructed to erect signs warning against shellfish harvesting on the same day. Resamples done by EOS Ecology were received 26/07, and showed bacterial levels to be back within consent. The higher shellfish bacterial count was due to the network overflows that occurred during the heavy rainfall event in June.

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 ECan.

Condition 33

A report on the diffuser field testing is not due until 2016.

Condition 34

The validation of the AEE management plan is due 2014.