# Akaroa

# Wastewater Treatment Plant

# Annual Monitoring Report

# July 2016 – June 2017

Prepared by: Citycare Water
Kris Kaser

On behalf of:

Christchurch City Council, City Water & Waste Unit

30 August 2017

**Resource Consent Number:** CRC133179 (replaces CRC071865.1)
**File Number:** CO6C/01282
**Client Name:** Christchurch City Council (City Solutions)
**To:** To discharge contaminants into the Coastal Waters.
**Consent Location:** Red House Bay, Beach Road, AKAROA HARBOUR
**State:** Current

**Events:**

8/09/2013 Commencement Date
8/09/2020 Consent Expires
8/09/2020 Lapse Date if not Given Effect To

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| **1** | The discharge shall be only treated wastewater from the Akaroa Wastewater Treatment Plant (WWTP), located at Redhouse Bay, Akaroa Harbour at or about map reference (NZMG) NZMS 260: N37: 0569-0984; (NZTM) Topo 50: BY25:9568-4825, as shown on Plan CRC133179A, which forms part of this consent. |
| | **Compliance** |
| **2** | Treated wastewater from the Akaroa Wastewater Treatment Plant shall be discharged into Akaroa Harbour via an existing 100 metre long submerged outfall at or about map reference (NZMG) NZMS 260: N37: 0558-0991; (NZTM) Topo 50: BY25:9558-4831, as shown on Plan CRC133179A. |
| | **Compliance** |
| **3** | Warning notices, which can be read from a distance of five metres, shall be erected and maintained at the following locations: On the shoreline 400 metres either side of the point on the shoreline nearest the outfall, and Beside Beach Road adjacent to the rocks that lead out to Green Point. The warning notices shall advise the public of the existence of a wastewater outfall and the dangers of swimming in the area or eating shellfish collected in that location. |
| | **Compliance** |
| **4** | a. The volume of wastewater discharged from the Akaroa Wastewater Treatment Plant shall be continuously recorded using a flow meter.<br>b. The readings from the flow meter shall be recorded in litres per second and shall be used to calculate the daily volume of wastewater discharged from the treatment plant. These daily volumes shall be recorded and used to determine compliance with Condition (5). |
| | **Compliance (Attachment 1)** |
| **5** | The volume of treated wastewater discharged shall not exceed 750 cubic metres per day, except during rainfall events of a total of 50 millimetres or more over three consecutive days.<br>Note: For the purposes of this condition, the rainfall shall be that measured at the Akaroa EWS weather station operated by NIWA (Agent number = 36593). |
| | **Compliant (Attachments 1.1, 1.2 and 2.1); >750m³ recorded on the 27 Aug 2016, and 6, 7 & 14 April 2017 when rainfall depth of 50mm.** |
| **6** | Treated wastewater shall be sampled after treatment and prior to discharge into Akaroa Harbour via the outfall. The samples shall be grab samples collected at the frequencies specified, and analysed for the contaminants listed in Table 1: Treated wastewater quality monitoring – contaminants and sampling frequency Weekly (1 Dec-28 Feb) Faecal coliforms, enterococci, total suspended solids (TSS), total five day biochemical, oxygen demand (BOD5), dissolved reactive phorphorous (DRP), ammonia, Nitrogen oxides (NOx), total phosphorus (TP), Total nitrogen (TN), temperature Monthly (between 1 Mar and 30 Nov)<br>Faecal coliforms, enterococci, total suspended solids (TSS), BOD5, DRP, ammonia, NOx, TP, TN, temperature Annually (during Jan) lead, copper, chromium, cadmium, zinc |
| | **Compliance (Attachment 3.1)** |
| **7** | Sampling shall be undertaken in accordance with the sampling schedule in Conditions (6), (12) and (16). The schedule shall seek to incorporate sampling during times with variable environmental parameters listed in Condition (20) (b) to (d) This schedule is to be agreed with the Canterbury Regional Council's RMA Compliance and Enforcement Manager within one month of the commencement of this consent. |
| | **Compliance** |
| **8** | The median concentration of faecal coliforms in the treated wastewater shall not exceed 1,000 per 100 millilitres |
| | **Non-compliant (Attachment 3.1); Three individual exceedances in January 2017 (5,600, 140,000** |

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| | **29,000FC).** |
| **9** | The consent holder shall use the best practicable option to ensure the median concentration of BOD5 and TSS does not exceed 30 grams per cubic metre |
| | **Compliance for $BOD_5$ (Attachment 3.1); maximum medians were 23 mg/l $BOD_5$**<br>**Non compliance for TSS on 13 occasions with max 87 mg/L TSS** |
| **10** | For the purposes of conditions (8) and (9) the median shall be calculated from the results of any five consecutive treated wastewater samples analysed |
| | **Non-Compliance (Attachment 3.1)** |
| **11** | The receiving water shall be sampled and analysed for faecal coliforms and enterococci at the following locations, as shown on Plan CRC133179B, which forms part of this consent:<br>a. At the shoreline nearest the outfall;<br>b. 400 metres along the shoreline in a southerly direction from Site (a); and<br>c. 400 metres along the shoreline in a northerly direction from Site (a). |
| | **Compliance (Attachment 3.2)** |
| **12** | Receiving water sampling and analysis for faecal coliforms and enterococci concentrations shall occur at least weekly between 1 December and 28 February each year and at least monthly for faecal coliforms between 1 March and 3 November each year. Receiving water sampling shall occur within six hours of treated wastewater sampling. |
| | **Compliance (Attachment 3.2)** |
| **13** | In the event that the analysis of receiving water samples collected at each site beyond the 250 metre mixing zone in accordance with Conditions (11) and (12 ) indicates:<br>a. A concentration of faecal coliforms that exceeds a rolling median of 14 faecal coliforms per 100 millilitres from the previous five samples collected in the period 1 December to 28 February each year, the consent holder shall notify the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager, within one month of detecting the exceedence;<br>b. That the concentration of the faecal coliforms in more than ten percent of total samples collected between 1 December and 28 February each year exceeds 43 faecal coliforms per 100 millilitres, the consent holder shall notify the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager, within one month of detecting the exceedance. |
| | **Compliant: ECAN was notified.** |
| **14** | The notification required under Condition (13) shall include the information required to be collected in Condition (20) and shall identify whether the exceedance is likely to have resulted from wastewater discharged from the Akaroa Wastewater Treatment Plant and if so, shall detail what measures the consent holder has implemented or will implement to mitigate any adverse environmental effects as a result of the exceedance, and to prevent a reoccurrence. |
| | **Unable to confirm Compliance** |
| **15** | Grab samples of the receiving water shall be collected and analysed for temperature, Total Nitrogen (TN), Dissolved Inorganic Nitrogen (DIN, calculated as NOx + ammonia), Total Phosphorus (TP), chlorophyll-a and Dissolved Reactive Phosphorus (DRP) at the following locations as shown on Plan Consent detail CRC133179C, which forms part of this consent:<br>a. 250 metres due north of the outfall;<br>b. 250 metres due west of the outfall;<br>c. 250 metres due south of the outfall;<br>d. A control site located at or about map reference (NZMG) NZMS 260: N36:0592-1117; (NZTM) Topo 50: BY25:959-4958, located in French Bay; and<br>e. A control site located at or about map reference (NZMG) NZMS 260: N36:0472-1056; (NZTM) Topo 50: BY25:9471-4897, [potential site of long term outfall]. |
| | **Compliance (Attachment 3.3)** |
| **16** | The receiving water sampling and analysis carried out in accordance with Condition (15) shall occur once every three<br>weeks between 1 December and 28 February each year such that a total of four samples are taken over the summer<br>period. Receiving water sampling shall occur within six hours of treated wastewater sampling. |
| | **Compliance (Attachment 3.3)** |
| **17** | For individual sampling events (as detailed in Condition (16)), if the analysis of receiving water samples collected in accordance with Conditions (15) (a) to (c) indicates trigger values of:<br>a. Dissolved inorganic nitrogen (DIN) (combined total of NOx and ammonia) that exceeds a median of 0.062 milligrams per litre (mg/L);<br>b. Dissolved reactive phosphorus (DRP) that exceeds a median of 0.018 mg/L; and |

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| | c. Ammonia that exceeds a maximum of 0.910 mg/L:<br>the consent holder shall identify whether the Akaroa Wastewater Treatment Plant is operating abnormally and if so, shall record what measures the consent holder has implemented or will implement to return the Akaroa Wastewater Treatment Plant to normal operation, and to prevent a reoccurrence. |
| | **Compliance (Attachment 3.3)** |
| **18** | Within one month of the end of the monitoring period required by Condition (16), the consent holder shall notify the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager if the trigger values specified in Condition (17) were exceeded.<br>This notification shall include the information required to be collected in Condition (20) and shall identify whether the Consent detail exceedence is likely to have resulted from wastewater discharged from the Akaroa Wastewater Treatment Plant and if so, shall detail what measures the consent holder has implemented or will implement to mitigate any adverse environmental effects as a result of the exceedence, and to prevent a reoccurrence. |
| | **Compliance** |
| **19** | All wastewater and receiving environment samples shall:<br>a. be collected by a suitably qualified or experienced person; and<br>b. be analysed at a laboratory accredited for the analyses to ISO guide 25, either by International Accreditation New Zealand (IANZ), or by an organisation with a mutual agreement with IANZ. |
| | **Compliance** |
| **20** | At the time the wastewater and receiving environment samples are collected, the following parameters shall be recorded;<br>a. time and date of sampling and time delay between wastewater and receiving environment samples collection;<br>b. the precipitation over the three consecutive days prior to sampling;<br>c. the tidal state in the receiving environment at the time of sampling in the receiving environment; and<br>d. wind direction and strength. |
| | **Compliance (Attachment 3.3)** |
| **21** | The consent holder shall submit to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager, any sampling results required by this consent during each month by the 10th working day of the following month. |
| | **Compliance via this report** |
| **22** | The consent holder shall submit to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager, an annual report prepared by a suitably qualified person by 31 August each year which includes, but is not limited to the following:<br>a. Results of the monitoring undertaken in the previous year from 1 July to 30 June;<br>b. An analysis of monitoring results against limits and trigger values specified in Conditions (8), (9), (13) and (17) of this consent;<br>c. A comparison of monitoring results for control sites and sites on the edge of the mixing zone for parameters as specified in Conditions (15) to (17).<br>d. An analysis of the extent of correlation between the receiving water monitoring results and treated wastewater monitoring results, as required in Conditions (6), (11), (12), (15) and (16). This shall include an assessment of the information collected for Condition (20), 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;<br>e. Comparison of monitoring results as required in Conditions (6), (11), (12), (15) and (16) with historical data;<br>f. Comparison of the monitoring results required in Conditions (6), (11), (12), (15) and (16). with operation and performance issues from the WWTP; Consent detail<br>g. An interpretation of the results in relation to the effects of the discharge on the environment;<br>h. Identification of any measures taken to remedy any exceedences;<br>i. Details of all changes or upgrades to the treatment plant that may affect the quality or volume of treated wastewater discharged; and<br>j. Summary of any inflow and/or infiltration investigations or works undertaken in the reporting period. |
| | **See below** |
| **23** | Copies of all monitoring results and reports relating to the discharge from the Akaroa Wastewater Treatment Plant shall be made available to the community via the Akaroa Service Centre and the Christchurch City Council website. |
| | **CCC to follow up** |
| **24** | The consent holder shall submit to the Canterbury Regional Council, within six months of the grant of this consent, a management plan that details;<br>a. measures that will be taken to ensure compliance with the consent limits specified in this consent relating to treated wastewater, as specified in Condition (8) and (9) and receiving environment microbiological |

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| | parameters specified in Condition (13); and;<br>b. Contingency measures in response to mechanical or electrical failures. |
| | **Compliance** |
| **25** | The consent shall be exercise in accordance with the management plan. |
| | **Compliance** |
| **26** | The consent holder shall achieve the following milestones within the term of this consent:<br>a. Lodge all applications for the approvals under the Resource Management Act 1991 required to commission the new Akaroa Wastewater Treatment Plant no later than 30 June 2014;<br>b. Award contracts for the construction of the new Wastewater Treatment Plant within eight calendar months of the commencement of the resource consents sought under clause (a) of this condition;<br>c. Require contractors to commence construction on the site of the new Wastewater Treatment Plant within nine months of awarding the contracts under clause (b) of this condition;<br>d. To have a fully operational new Wastewater Treatment Plant within 36 months of awarding the contracts under clause (b) of this condition. |
| | **CCC to follow up** |
| **27** | The discharge from Akaroa WWTP at or about map reference (NZMG) NZMS 260: N37: 0558-0991; (NZTM) Topo 50: BY25:9558-4831, shall cease no more than five years following the commencement of Coastal Permit CRC133179. The consent holder shall submit an annual progress report to the Canterbury Regional Council by the 31 August each year detailing progress made towards meeting the deadline for cessation of the discharge and the clauses of Condition (26). |
| | **CCC to follow up** |
| **28** | The Canterbury Regional Council may, on any of the last five working days of May or November each year, serve notice of its intention to review the conditions of this consent for the purposes of:<br>a. dealing with any adverse effects on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage;<br>b. requiring the adoption of the best practicable option to remove or reduce any adverse effects on the environment; requiring the consent holder to conduct monitoring instead of, or in addition to, that required by the consent; and<br>c. complying with the requirements of a relevant rule in an operative regional plan. |
| | **ECAN to request** |

**Treatment Plant Effluent Monitoring**

Flows into the Akaroa Wastewater Treatment Plant (WWTP) were affected by heavy rain and stormwater on the 27 August 2016 causing a discharge in excess of the 750-$m^3$/d dry weather maximum. For this event, over 50 mm of rainfall was recorded at the Akaroa EWS weather station (Agent number 36593) and on 6/7 April 2017 when 121.8mm and 70.8mm were recorded and 14 April when 66.4mm fell. No exceedance of the 3,000-$m^3$/d wet weather maximum applied and flows were compliant. Flows through the plant were up on previous years with 86,127m3, the previous reporting periods (i.e., 79,046 $m^3$ in 2014-2015 vs 76,973 $m^3$ in 2015-2016) the 95$^{th}$ percentile for flow recorded at 400 $m^3$/d (Attachment 1.3).

Plant performance relating to organic parameters $BOD_5$ was good, with no exceedances above the 30-mg/L median limits for effluent quality, however TSS levels exceeded 30 on 13 occasions (max =36) (Table 1).

One faecal coliform (FC) exceedances were recorded over the summer period when an increased loading was received at the plant considered to coincide with the high summer seasonal holiday population.

**Receiving Environment Monitoring**

Some trigger limits were exceeded for human-health related parameters (Attachment 3.2). An average of 8.3% of FC samples were >43 CFU/100mL. All location medians were <14 CFU/100mL FC.

Nutrient data gathered from the receiving environment did not exceed trigger values at any locations for DIN (Attachment 3.3).

**Table 1. Summary of Monitoring Non-Compliances from July 2016-June 2017.**

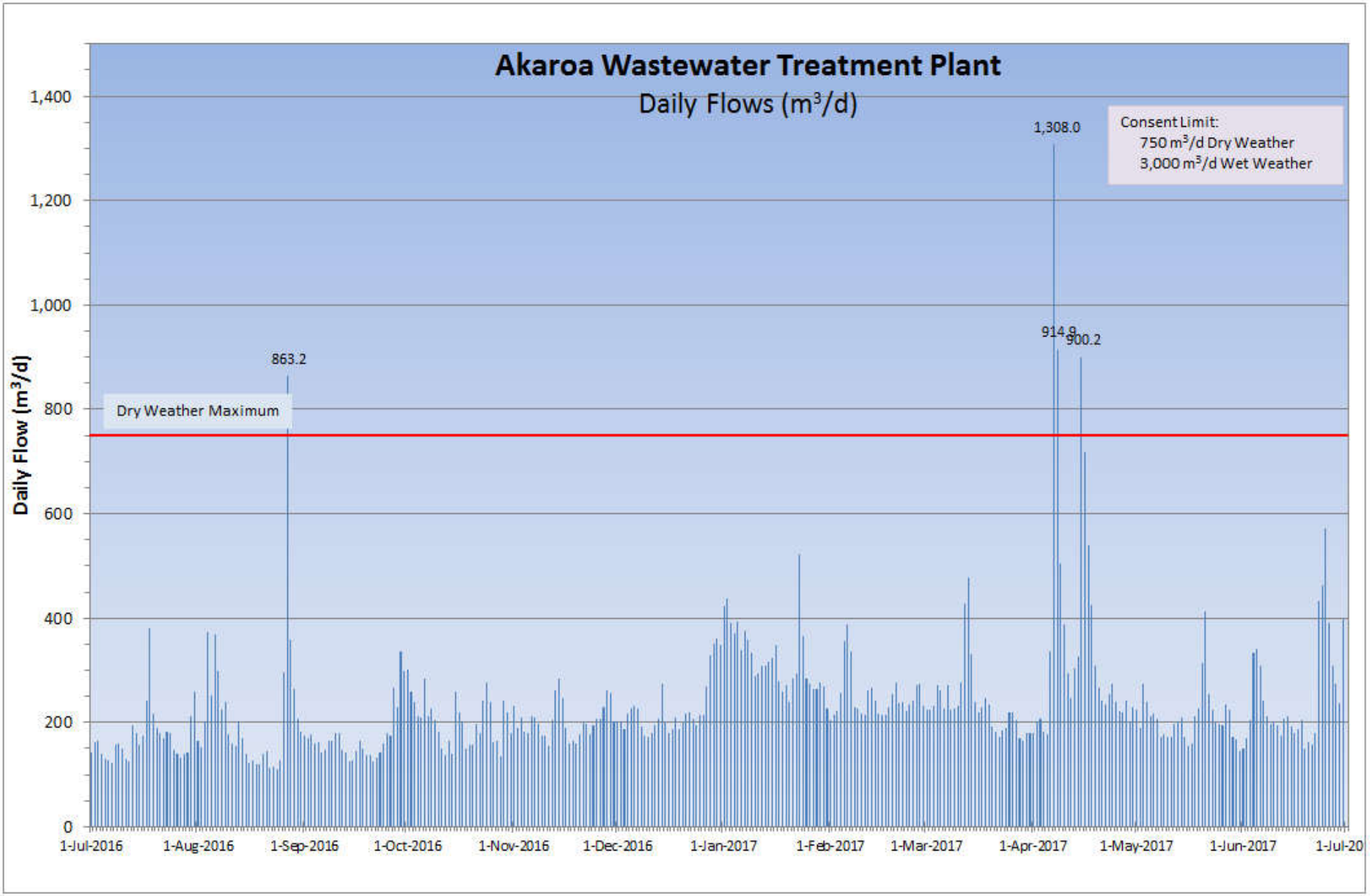
| Treatment Plant Effluent | | | |
|---|---|---|---|
| **Parameter** | **Single Samples Exceeding Limit** | **Median Limit Exceedances** | **Condition Non-Compliances** |
| Dry Weather Flow > 750 m3/d | 0 | - | 0 |
| Wet Weather Flow > 3,000 m3/d | 0 | - | |
| $BOD_5$ > 30 mg/L | 2 | 0 | 13 |
| TSS > 30 mg/L | 14 | 13 | |
| FC > 1,000 CFU/100 mL | 3 | 1 | 1 |
| **Receiving Environment** | | | |
| **Parameter** | **Single Samples Exceeding Limit** | **Median Limit or % Exceedances** | **Condition Non-Compliances** |
| Summer FC > 14 CFU/100 mL | 12 | 3 | 3 |
| <10% Summer FC > 43 CFU/100 mL | 3 | 0 | |
| DIN > 0.062 mg/L (cond 17a) 250m | 1 | | 1 |
| 250 m North | | 0.020 | |
| 250m West | | 0.015 | |
| 250m South | | 0.015 | |
| DRP median > 0.018 mg/L (cond 17b) | 0 | | |
| 250 m North | | 0.009 | |
| 250m West | | 0.007 | |
| 250m South | | 0.008 | |
| NH3 median > 0.910 mg/L (cond 17c) | 0 | | |
| 250 m North | | 0.010 | |
| 250m West | | 0.005 | |
| 250m South | | 0.005 | |

## Attachment 1.1: Flows, Akaroa, Data

| Plant | Akaroa Wastewater Treatment, Banks Peninsula: Daily Flows | | | | | | |
|---|---|---|---|---|---|---|---|
| Date | Flow ($m^3$/d) | Date | Flow ($m^3$/d) | Date | Flow ($m^3$/d) | Date | Flow ($m^3$/d) |
| 1-Jul-2016 | 143.6 | 1-Oct-2016 | 300.6 | 1-Jan-2017 | 423.7 | 1-Apr-2017 | 179.6 |
| 2-Jul-2016 | 163.0 | 2-Oct-2016 | 258.6 | 2-Jan-2017 | 438.1 | 2-Apr-2017 | 202.8 |
| 3-Jul-2016 | 164.7 | 3-Oct-2016 | 240.0 | 3-Jan-2017 | 390.3 | 3-Apr-2017 | 206.0 |
| 4-Jul-2016 | 140.3 | 4-Oct-2016 | 210.7 | 4-Jan-2017 | 369.7 | 4-Apr-2017 | 182.7 |
| 5-Jul-2016 | 131.3 | 5-Oct-2016 | 210.1 | 5-Jan-2017 | 394.2 | 5-Apr-2017 | 177.7 |
| 6-Jul-2016 | 126.6 | 6-Oct-2016 | 284.2 | 6-Jan-2017 | 337.4 | 6-Apr-2017 | 335.3 |
| 7-Jul-2016 | 123.1 | 7-Oct-2016 | 211.6 | 7-Jan-2017 | 375.9 | 7-Apr-2017 | **1,308.0** |
| 8-Jul-2016 | 156.8 | 8-Oct-2016 | 227.5 | 8-Jan-2017 | 359.3 | 8-Apr-2017 | **914.9** |
| 9-Jul-2016 | 160.9 | 9-Oct-2016 | 205.3 | 9-Jan-2017 | 333.0 | 9-Apr-2017 | 503.8 |
| 10-Jul-2016 | 148.9 | 10-Oct-2016 | 182.7 | 10-Jan-2017 | 288.7 | 10-Apr-2017 | 389.0 |
| 11-Jul-2016 | 129.1 | 11-Oct-2016 | 150.6 | 11-Jan-2017 | 293.4 | 11-Apr-2017 | 293.8 |
| 12-Jul-2016 | 125.9 | 12-Oct-2016 | 137.4 | 12-Jan-2017 | 307.7 | 12-Apr-2017 | 246.0 |
| 13-Jul-2016 | 195.5 | 13-Oct-2016 | 164.9 | 13-Jan-2017 | 309.6 | 13-Apr-2017 | 303.6 |
| 14-Jul-2016 | 180.8 | 14-Oct-2016 | 140.1 | 14-Jan-2017 | 316.8 | 14-Apr-2017 | 326.6 |
| 15-Jul-2016 | 156.7 | 15-Oct-2016 | 258.6 | 15-Jan-2017 | 324.0 | 15-Apr-2017 | **900.2** |
| 16-Jul-2016 | 175.1 | 16-Oct-2016 | 218.6 | 16-Jan-2017 | 349.1 | 16-Apr-2017 | 717.7 |
| 17-Jul-2016 | 241.4 | 17-Oct-2016 | 202.6 | 17-Jan-2017 | 280.1 | 17-Apr-2017 | 539.5 |
| 18-Jul-2016 | 381.4 | 18-Oct-2016 | 150.9 | 18-Jan-2017 | 259.0 | 18-Apr-2017 | 426.4 |
| 19-Jul-2016 | 217.7 | 19-Oct-2016 | 158.1 | 19-Jan-2017 | 271.7 | 19-Apr-2017 | 307.6 |
| 20-Jul-2016 | 188.7 | 20-Oct-2016 | 158.6 | 20-Jan-2017 | 240.4 | 20-Apr-2017 | 266.4 |
| 21-Jul-2016 | 179.8 | 21-Oct-2016 | 196.3 | 21-Jan-2017 | 283.6 | 21-Apr-2017 | 242.1 |
| 22-Jul-2016 | 169.2 | 22-Oct-2016 | 179.0 | 22-Jan-2017 | 294.9 | 22-Apr-2017 | 234.5 |
| 23-Jul-2016 | 183.1 | 23-Oct-2016 | 242.8 | 23-Jan-2017 | 522.0 | 23-Apr-2017 | 254.3 |
| 24-Jul-2016 | 178.8 | 24-Oct-2016 | 275.4 | 24-Jan-2017 | 365.1 | 24-Apr-2017 | 274.1 |
| 25-Jul-2016 | 148.5 | 25-Oct-2016 | 240.0 | 25-Jan-2017 | 285.1 | 25-Apr-2017 | 240.1 |
| 26-Jul-2016 | 139.2 | 26-Oct-2016 | 162.5 | 26-Jan-2017 | 274.2 | 26-Apr-2017 | 222.0 |
| 27-Jul-2016 | 131.8 | 27-Oct-2016 | 163.7 | 27-Jan-2017 | 263.2 | 27-Apr-2017 | 219.7 |
| 28-Jul-2016 | 138.9 | 28-Oct-2016 | 135.2 | 28-Jan-2017 | 264.1 | 28-Apr-2017 | 240.7 |
| 29-Jul-2016 | 143.2 | 29-Oct-2016 | 242.6 | 29-Jan-2017 | 276.5 | 29-Apr-2017 | 203.1 |
| 30-Jul-2016 | 211.0 | 30-Oct-2016 | 219.4 | 30-Jan-2017 | 269.1 | 30-Apr-2017 | 228.8 |
| 31-Jul-2016 | 259.2 | 31-Oct-2016 | 180.1 | 31-Jan-2017 | 227.5 | 1-May-2017 | 224.3 |
| 1-Aug-2016 | 164.2 | 1-Nov-2016 | 230.7 | 1-Feb-2017 | 205.2 | 2-May-2017 | 189.5 |
| 2-Aug-2016 | 151.6 | 2-Nov-2016 | 190.6 | 2-Feb-2017 | 214.7 | 3-May-2017 | 273.4 |
| 3-Aug-2016 | 202.6 | 3-Nov-2016 | 209.2 | 3-Feb-2017 | 222.1 | 4-May-2017 | 240.4 |
| 4-Aug-2016 | 372.3 | 4-Nov-2016 | 181.2 | 4-Feb-2017 | 255.8 | 5-May-2017 | 211.5 |
| 5-Aug-2016 | 251.1 | 5-Nov-2016 | 180.4 | 5-Feb-2017 | 356.0 | 6-May-2017 | 217.9 |
| 6-Aug-2016 | 369.2 | 6-Nov-2016 | 212.2 | 6-Feb-2017 | 387.3 | 7-May-2017 | 206.1 |
| 7-Aug-2016 | 298.3 | 7-Nov-2016 | 209.7 | 7-Feb-2017 | 335.2 | 8-May-2017 | 172.6 |
| 8-Aug-2016 | 223.9 | 8-Nov-2016 | 196.6 | 8-Feb-2017 | 229.9 | 9-May-2017 | 177.7 |
| 9-Aug-2016 | 238.2 | 9-Nov-2016 | 176.0 | 9-Feb-2017 | 228.0 | 10-May-2017 | 171.3 |
| 10-Aug-2016 | 178.4 | 10-Nov-2016 | 174.5 | 10-Feb-2017 | 217.3 | 11-May-2017 | 173.2 |
| 11-Aug-2016 | 160.6 | 11-Nov-2016 | 154.6 | 11-Feb-2017 | 215.2 | 12-May-2017 | 195.9 |
| 12-Aug-2016 | 155.8 | 12-Nov-2016 | 203.9 | 12-Feb-2017 | 262.1 | 13-May-2017 | 202.3 |
| 13-Aug-2016 | 201.2 | 13-Nov-2016 | 262.0 | 13-Feb-2017 | 266.2 | 14-May-2017 | 209.7 |
| 14-Aug-2016 | 168.8 | 14-Nov-2016 | 283.0 | 14-Feb-2017 | 241.6 | 15-May-2017 | 172.2 |
| 15-Aug-2016 | 140.9 | 15-Nov-2016 | 247.7 | 15-Feb-2017 | 217.6 | 16-May-2017 | 155.3 |
| 16-Aug-2016 | 123.3 | 16-Nov-2016 | 190.6 | 16-Feb-2017 | 213.5 | 17-May-2017 | 158.7 |
| 17-Aug-2016 | 127.0 | 17-Nov-2016 | 160.2 | 17-Feb-2017 | 215.2 | 18-May-2017 | 210.9 |
| 18-Aug-2016 | 120.8 | 18-Nov-2016 | 163.7 | 18-Feb-2017 | 230.3 | 19-May-2017 | 227.6 |

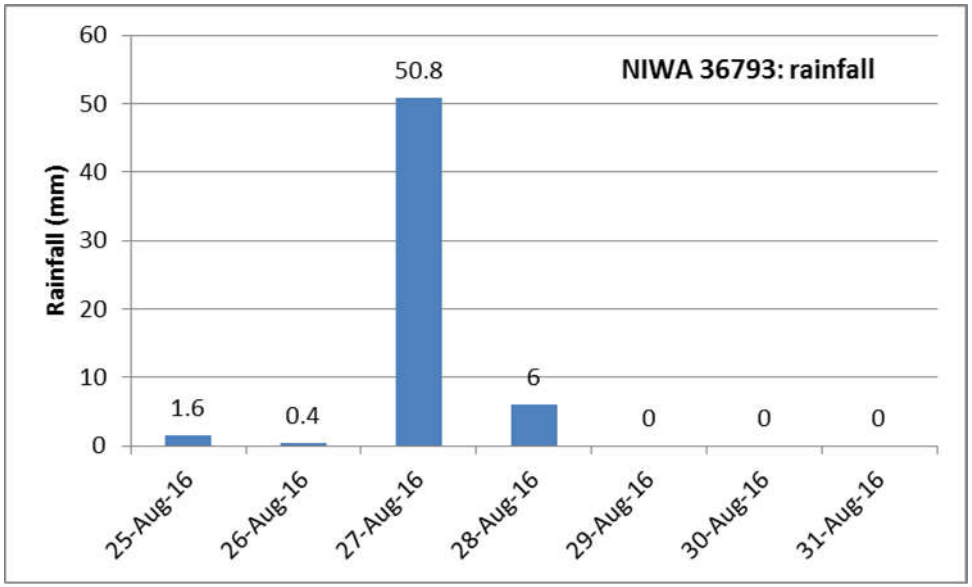
| Date | Flow ($m^3$/d) | Date | Flow ($m^3$/d) | Date | Flow ($m^3$/d) | Date | Flow ($m^3$/d) |
|---|---|---|---|---|---|---|---|
| 19-Aug-2016 | 121.3 | 19-Nov-2016 | 160.4 | 19-Feb-2017 | 253.2 | 20-May-2017 | 312.5 |
| 20-Aug-2016 | 140.3 | 20-Nov-2016 | 177.2 | 20-Feb-2017 | 277.4 | 21-May-2017 | 413.9 |
| 21-Aug-2016 | 144.1 | 21-Nov-2016 | 200.1 | 21-Feb-2017 | 235.6 | 22-May-2017 | 253.5 |
| 22-Aug-2016 | 113.9 | 22-Nov-2016 | 196.7 | 22-Feb-2017 | 239.5 | 23-May-2017 | 223.3 |
| 23-Aug-2016 | 116.3 | 23-Nov-2016 | 176.9 | 23-Feb-2017 | 221.6 | 24-May-2017 | 199.0 |
| 24-Aug-2016 | 110.4 | 24-Nov-2016 | 195.6 | 24-Feb-2017 | 234.2 | 25-May-2017 | 196.2 |
| 25-Aug-2016 | 127.5 | 25-Nov-2016 | 207.0 | 25-Feb-2017 | 242.0 | 26-May-2017 | 194.3 |
| 26-Aug-2016 | 296.6 | 26-Nov-2016 | 206.8 | 26-Feb-2017 | 271.1 | 27-May-2017 | 233.8 |
| 27-Aug-2016 | **863.2** | 27-Nov-2016 | 228.6 | 27-Feb-2017 | 273.2 | 28-May-2017 | 224.9 |
| 28-Aug-2016 | 359.1 | 28-Nov-2016 | 261.0 | 28-Feb-2017 | 232.0 | 29-May-2017 | 171.9 |
| 29-Aug-2016 | 264.0 | 29-Nov-2016 | 256.2 | 1-Mar-2017 | 223.8 | 30-May-2017 | 167.0 |
| 30-Aug-2016 | 207.8 | 30-Nov-2016 | 202.9 | 2-Mar-2017 | 223.8 | 31-May-2017 | 144.6 |
| 31-Aug-2016 | 182.7 | 1-Dec-2016 | 202.9 | 3-Mar-2017 | 233.0 | 1-Jun-2017 | 149.9 |
| 1-Sep-2016 | 174.2 | 2-Dec-2016 | 203.1 | 4-Mar-2017 | 271.6 | 2-Jun-2017 | 170.1 |
| 2-Sep-2016 | 170.9 | 3-Dec-2016 | 187.3 | 5-Mar-2017 | 260.5 | 3-Jun-2017 | 204.2 |
| 3-Sep-2016 | 178.2 | 4-Dec-2016 | 216.7 | 6-Mar-2017 | 227.3 | 4-Jun-2017 | 334.6 |
| 4-Sep-2016 | 159.3 | 5-Dec-2016 | 226.1 | 7-Mar-2017 | 270.6 | 5-Jun-2017 | 339.7 |
| 5-Sep-2016 | 162.2 | 6-Dec-2016 | 232.7 | 8-Mar-2017 | 224.1 | 6-Jun-2017 | 308.7 |
| 6-Sep-2016 | 141.7 | 7-Dec-2016 | 228.0 | 9-Mar-2017 | 225.8 | 7-Jun-2017 | 242.7 |
| 7-Sep-2016 | 148.5 | 8-Dec-2016 | 191.0 | 10-Mar-2017 | 232.5 | 8-Jun-2017 | 212.6 |
| 8-Sep-2016 | 164.2 | 9-Dec-2016 | 174.8 | 11-Mar-2017 | 277.6 | 9-Jun-2017 | 196.3 |
| 9-Sep-2016 | 164.5 | 10-Dec-2016 | 172.3 | 12-Mar-2017 | 427.1 | 10-Jun-2017 | 202.0 |
| 10-Sep-2016 | 180.6 | 11-Dec-2016 | 179.0 | 13-Mar-2017 | 477.4 | 11-Jun-2017 | 193.6 |
| 11-Sep-2016 | 179.6 | 12-Dec-2016 | 195.6 | 14-Mar-2017 | 332.1 | 12-Jun-2017 | 174.4 |
| 12-Sep-2016 | 147.1 | 13-Dec-2016 | 207.0 | 15-Mar-2017 | 239.4 | 13-Jun-2017 | 206.5 |
| 13-Sep-2016 | 143.1 | 14-Dec-2016 | 274.4 | 16-Mar-2017 | 219.9 | 14-Jun-2017 | 212.6 |
| 14-Sep-2016 | 126.1 | 15-Dec-2016 | 199.5 | 17-Mar-2017 | 229.9 | 15-Jun-2017 | 191.2 |
| 15-Sep-2016 | 126.5 | 16-Dec-2016 | 179.0 | 18-Mar-2017 | 247.8 | 16-Jun-2017 | 180.2 |
| 16-Sep-2016 | 144.0 | 17-Dec-2016 | 186.9 | 19-Mar-2017 | 233.5 | 17-Jun-2017 | 188.3 |
| 17-Sep-2016 | 165.6 | 18-Dec-2016 | 210.4 | 20-Mar-2017 | 193.1 | 18-Jun-2017 | 204.4 |
| 18-Sep-2016 | 148.9 | 19-Dec-2016 | 186.4 | 21-Mar-2017 | 181.3 | 19-Jun-2017 | 151.0 |
| 19-Sep-2016 | 136.4 | 20-Dec-2016 | 199.9 | 22-Mar-2017 | 172.1 | 20-Jun-2017 | 161.1 |
| 20-Sep-2016 | 137.1 | 21-Dec-2016 | 216.2 | 23-Mar-2017 | 183.7 | 21-Jun-2017 | 158.5 |
| 21-Sep-2016 | 125.6 | 22-Dec-2016 | 218.8 | 24-Mar-2017 | 190.1 | 22-Jun-2017 | 180.3 |
| 22-Sep-2016 | 132.4 | 23-Dec-2016 | 205.9 | 25-Mar-2017 | 218.4 | 23-Jun-2017 | 433.8 |
| 23-Sep-2016 | 142.9 | 24-Dec-2016 | 195.8 | 26-Mar-2017 | 219.0 | 24-Jun-2017 | 463.2 |
| 24-Sep-2016 | 160.6 | 25-Dec-2016 | 215.1 | 27-Mar-2017 | 205.4 | 25-Jun-2017 | 571.6 |
| 25-Sep-2016 | 180.9 | 26-Dec-2016 | 213.8 | 28-Mar-2017 | 169.7 | 26-Jun-2017 | 391.1 |
| 26-Sep-2016 | 174.2 | 27-Dec-2016 | 269.9 | 29-Mar-2017 | 165.9 | 27-Jun-2017 | 307.6 |
| 27-Sep-2016 | 267.0 | 28-Dec-2016 | 329.5 | 30-Mar-2017 | 180.4 | 28-Jun-2017 | 275.1 |
| 28-Sep-2016 | 228.3 | 29-Dec-2016 | 351.4 | 31-Mar-2017 | 179.6 | 29-Jun-2017 | 237.1 |
| 29-Sep-2016 | 334.8 | 30-Dec-2016 | 361.4 | 1-Apr-2017 | 179.6 | 30-Jun-2017 | 398.2 |
| 30-Sep-2016 | 299.4 | 31-Dec-2016 | 347.3 | | | | |

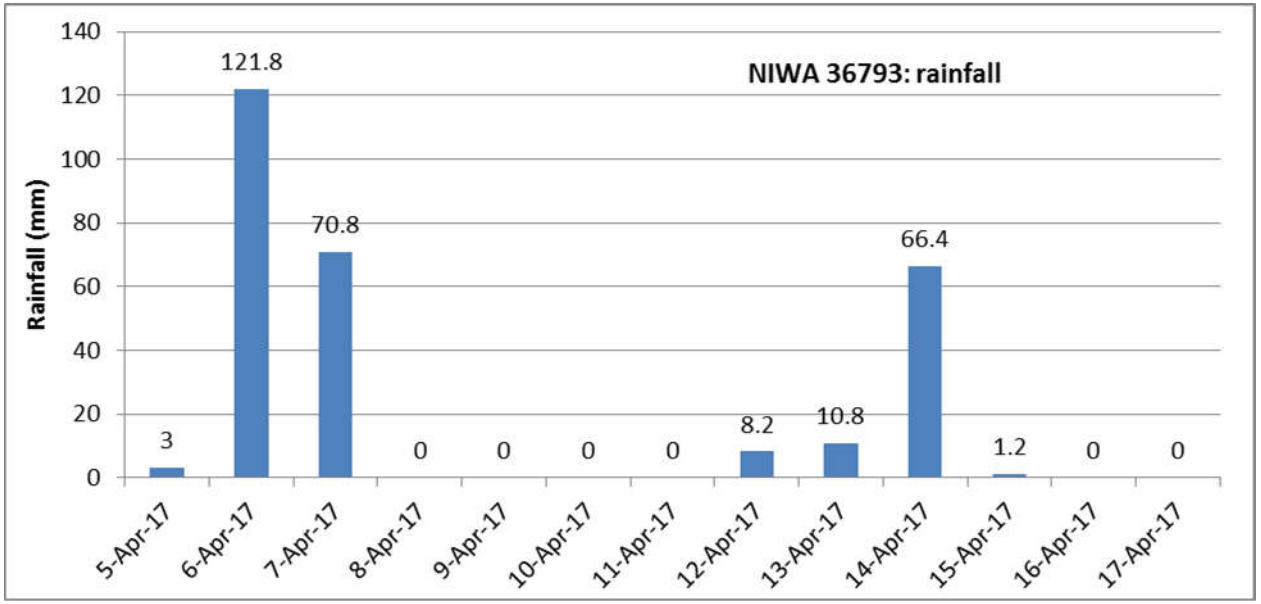
**Attachment 1.2: Flows, Akaroa, Chart**



**Attachment 1.3: Flows, Akaroa, '% less than'**

**Attachment 2.1: Rainfall data**



**Attachment 3.1: Lab Data, Akaroa Wastewater Treatment Plant (Conditions 6-10)**

| | |
|---|---|
| Plant: | Akaroa Wastewater Treatment, Banks Peninsula |
| Asset Owner: | Christchurch City Council |
| Laboratory | Christchurch City Council Laboratory, City Water & Waste Unit |

| Date | $NH_4$-N [mg/l] | $BOD_5$ [mg/l] | ENT MPN/100ml | FC CFU/100ml | Temp [deg C] | NOx [mg/l] | DRP [mg/l] | TP [mg/l] | TSS [mg/l] | TN [mg/l] | 5-Sample Median $BOD_5$ [mg/l] | 5-Sample Median TSS [mg/l] | 5-Sample Median FC CFU/100ml | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 Oct 2016 | 6.7 | 8.2 | 20 | 10 | 15.2 | 19.0 | 2.7 | 3.3 | 19.0 | 26.7 | 5.0 | 22 | 10 | |
| 2 Nov 2016 | 6.0 | 7.7 | 10 | 280 | 16.8 | 20.0 | 2.7 | 3.3 | 26.0 | 27.1 | 6.7 | 26 | 10 | |
| 6 Dec 2016 | 17.0 | 11.0 | 30 | 70 | 18.7 | 5.8 | 2.9 | 3.0 | 25.0 | 22.8 | 7.7 | 25 | 10 | |
| 14 Dec 2016 | 11.0 | 7.5 | 10 | 30 | 17.6 | 7.7 | 1.6 | 2.4 | 30.0 | 18.7 | 7.7 | 26 | 30 | |
| 21 Dec 2016 | 12.0 | 18.0 | 290 | 5,600 | 19.0 | 8.9 | 2.7 | 4.3 | 49.0 | 19.9 | 8.2 | 26 | 70 | |
| 28 Dec 2016 | 34.0 | 19.0 | 10 | 50 | NA | 5.5 | 4.6 | 6.1 | 49.0 | 46.5 | 11.0 | 30 | 70 | |
| 4 Jan 2017 | 41.0 | 32.0 | 750 | 600 | 20.0 | 5.8 | 4.4 | 7.4 | 110.0 | 62.8 | 18.0 | 49 | 70 | |
| 10 Jan 2017 | 43.0 | 130.0 | 24,000 | 140,000 | 19.4 | 1.0 | 4.9 | 8.2 | 130.0 | 79.0 | 19.0 | 49 | 600 | |
| 18 Jan 2017 | 37.0 | 18.0 | 6,500 | 29,000 | 21.0 | 1.2 | 2.4 | 5.1 | 87.0 | 40.2 | 19.0 | 87 | 5,600 | |
| 25 Jan 2017 | 21.0 | 23.0 | 10 | 10 | 20.4 | 8.2 | 1.8 | 4.1 | 84.0 | 33.2 | 23.0 | 87 | 600 | |
| 1 Feb 2017 | 20.0 | 16.0 | 0 | 0 | 20.5 | 6.8 | 2.2 | 4.1 | 66.0 | 27.8 | 23.0 | 87 | 600 | FAC = 3.8 |
| 8 Feb 2017 | 22.0 | 16.0 | 10 | 10 | 19.9 | 8.4 | 2.5 | 5.2 | 81.0 | 33.4 | 18.0 | 84 | 10 | |
| 14 Feb 2017 | 27.0 | 9.3 | 10 | 10 | 21.2 | 10.0 | 2.5 | 4.1 | 55.0 | 38 | 16.0 | 81 | 10 | |
| 21 Feb 2017 | 14.0 | 9.3 | 10 | 10 | 24.2 | 1.1 | 2.3 | 4.2 | 56.0 | 16.1 | 16.0 | 66 | 10 | |
| 28 Feb 2017 | 16.0 | 5.2 | 10 | 10 | 20.7 | 14.0 | 2.4 | 4.2 | 67.0 | 18.7 | 9.3 | 66 | 10 | |
| 19 Apr 2017 | 9.7 | 7.2 | 10 | 40 | 16.5 | 1.1 | 2.5 | 3.1 | 37.0 | 12.1 | 9.3 | 56 | 10 | |
| 23 May 2017 | 1.3 | 6.3 | 10 | 10 | NA | 15.0 | 0.9 | 3.4 | 22.0 | 16 | 7.2 | 55 | 10 | |
| 14 Jun 2017 | 5.7 | 13.0 | 20 | 10 | NA | 16.0 | 1.6 | 2.5 | 29.0 | 25.2 | 7.2 | 37 | 10 | |
| | | | | | | | | | | Limit | 30 | 30 | 1,000 | |
| | | | | | | | | | | Exceedances | 0 | 13 | 1 | |
| | | | | | | | | | | Max | 23.0 | 87.0 | 5,600 | |

| | As [mg/l] | Cd [mg/l] | Cr [mg/l] | Cu [mg/l] | Pb [mg/l] | Ni [mg/l] | Zn [mg/l] |
|---|---|---|---|---|---|---|---|
| 6 Jan 2016 | | <0.00020 | <0.001 | 0.013 | <0.0015 | | 0.045 |
| 4 Jan 2017 | | 0.019 | 0.0024 | 0.032 | 0.0033 | | 0.095 |

**Attachment 3.2: Lab Data, Receiving Environment (Condition 11-14 and 20)**

| Akaroa STP | STP | 400m Shoreline North | 400m Shoreline South | Shoreline nearest OF | 400m Shoreline North | 400m Shoreline South | Shoreline nearest OF | 400m Shoreline North | 400m Shoreline North | 400m Shoreline South | 400m Shoreline South | Shoreline nearest Outfall | Shoreline nearest Outfall |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample Time | ENT MPN/100ml | ENT MPN/100ml | ENT MPN/100ml | FC CFU/100ml | FC CFU/100ml | FC CFU/100ml | Sample Time | Time between samples taken from | Sample Time | Time between samples taken from | Sample Time | Time between samples taken from |
| 26 Jul 2016 | 8:15 | | | | 24 | 1 | 10 | 8:05 | 0:10 | 7:45 | 0:30 | 7:55 | 0:20 |
| 2 Aug 2016 | 8:55 | | | | 1 | 1 | 1 | 9:20 | 0:25 | 9:10 | 0:15 | 9:00 | 0:05 |
| 7 Sep 2016 | 7:40 | | | | 1 | 1 | 1 | 8:10 | 0:30 | 7:50 | 0:10 | 8:00 | 0:20 |
| 3 Oct 2016 | 9:50 | | | | 6 | 2 | 1 | 9:40 | 0:10 | 9:20 | 0:30 | 9:30 | 0:20 |
| 2 Nov 2016 | 7:30 | | | | 8 | 7 | 2 | 8:00 | 0:30 | 7:40 | 0:10 | 7:50 | 0:20 |
| 6 Dec 2016 | 7:30 | 10 | 10 | 10 | 1 | 1 | 2 | 7:15 | 0:15 | 7:00 | 0:30 | 7:08 | 0:22 |
| 14 Dec 2016 | 7:45 | 10 | 10 | 10 | 22 | 20 | 17 | 8:00 | 0:15 | 8:10 | 0:25 | 8:10 | 0:25 |
| 21 Dec 2016 | 10:50 | 10 | 10 | 10 | 2 | 1 | 10 | 10:40 | 0:10 | 11:00 | 0:10 | 10:30 | 0:20 |
| 28 Dec 2016 | 7:15 | 10 | 10 | 10 | 3 | 4 | 6 | 7:40 | 0:25 | 7:40 | 0:25 | 7:40 | 0:25 |
| 4 Jan 2017 | 7:05 | 10 | 10 | 10 | 19 | 22 | 18 | 7:25 | 0:20 | 7:15 | 0:10 | 7:20 | 0:15 |
| 10 Jan 2017 | 6:40 | 41 | 41 | 10 | 110 | 80 | 55 | 6:15 | 0:25 | 7:00 | 0:20 | 6:50 | 0:10 |
| 18 Jan 2017 | 6:45 | 10 | 10 | 10 | 1 | 1 | 4 | 6:50 | 0:05 | 7:00 | 0:15 | 6:55 | 0:10 |
| 25 Jan 2017 | 6:50 | 10 | 10 | 10 | 22 | 15 | 20 | 6:35 | 0:15 | 6:45 | 0:05 | 6:40 | 0:10 |
| 1 Feb 2017 | 7:00 | 10 | 10 | 10 | 12 | 11 | 11 | 7:20 | 0:20 | 7:10 | 0:10 | 7:15 | 0:15 |
| 8 Feb 2017 | 7:45 | 10 | 10 | 10 | 3 | 2 | 1 | 7:55 | 0:10 | 8:15 | 0:30 | 8:05 | 0:20 |
| 14 Feb 2017 | 12:15 | 10 | 10 | 10 | 1 | 1 | 1 | 12:45 | 0:30 | 12:25 | 0:10 | 12:35 | 0:20 |
| 21 Feb 2017 | 13:00 | 10 | 10 | 10 | 6 | 2 | 3 | 12:20 | 0:40 | 12:30 | 0:30 | 12:25 | 0:35 |
| 28 Feb 2017 | 8:00 | | | | 11 | 8 | 8 | 8:20 | 0:20 | 8:10 | 0:10 | 8:15 | 0:15 |
| 19 Apr 2017 | 8:15 | | | | 20 | 18 | 24 | 8:45 | 0:30 | 8:25 | 0:10 | 8:35 | 0:20 |
| 23 May 2017 | 12:30 | | | | 1 | 2 | 1 | 12:30 | 0:00 | 12:47 | 0:17 | 12:50 | 0:20 |
| 14 Jun 2017 | 13:00 | | | | 1 | 1 | 1 | 13:30 | 0:30 | 13:30 | 0:30 | 13:30 | 0:30 |
| | | | summer FC singles > 14 | | 4 | 4 | 4 | | | | | | |
| 5 sample median of Summer samples >14 (Condition 13a) | | | | | 3 | 3 | 3 | | | | | | |
| # summer samples > 43 (cond 13b) | | | | | 1 | 1 | 1 | | | | | | |
| % summer samples > 43 | | | | | 8.3% | 8.3% | 8.3% | | | | | | |
| # total samples > 43 (Cond 13b) | | 0 | 0 | 0 | 1 | 1 | 1 | | | | | | |
| % total samples > 43 | | 0.0% | 0.0% | 0.0% | 4.8% | 4.8% | 4.8% | | | | | | |
| # all summer samples > 43 (cond 13b) | | | | | | | 3 | | | | | | |
| % all summer samples > 43 | | | | | | | 8.3 | | | | | | |

**Attachment 3.3: Lab Data, Receiving Environment (Conditions 15-18)**

| Date | 250 metres due North | | | | | | | 250 metres due West | | | | | | | 250 metres due South | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temp °C | TN mg/L | NOx mg/L | NH3 mg/L | DIN mg/L | TP mg/L | DRP mg/L | Temp °C | TN mg/L | NOx mg/L | NH3 mg/L | DIN mg/L | TP mg/L | DRP mg/L | Temp °C | TN mg/L | NOx mg/L | NH3 mg/L | DIN mg/L | TP mg/L | DRP mg/L |
| TRIGGER | | | | 0.910 | 0.062 | | 0.018 | | | | 0.910 | 0.062 | | 0.018 | | | | 0.910 | 0.062 | | 0.018 |
| | | | | | | | | | | | | | | | | | | | | | |
| 6-Dec-16 | | 0.150 | 0.010 | 0.072 | 0.082 | 0.027 | 0.007 | | 0.130 | 0.010 | 0.005 | 0.015 | 0.022 | 0.006 | | 0.150 | 0.010 | 0.005 | 0.015 | 0.021 | 0.005 |
| 28-Dec-16 | | 0.170 | 0.010 | 0.014 | 0.024 | 0.017 | 0.011 | | 0.150 | 0.010 | 0.011 | 0.021 | 0.012 | 0.007 | | 0.140 | 0.010 | 0.006 | 0.016 | 0.010 | 0.012 |
| 18-Jan-17 | | 0.150 | 0.010 | 0.005 | 0.015 | 0.029 | 0.010 | | 0.094 | 0.010 | 0.005 | 0.015 | 0.030 | 0.009 | | 0.130 | 0.010 | 0.005 | 0.015 | 0.029 | 0.009 |
| 8-Feb-17 | | 0.160 | 0.010 | 0.005 | 0.015 | 0.030 | 0.007 | | 0.190 | 0.01 | 0.005 | 0.015 | 0.024 | 0.007 | | 0.14 | 0.010 | 0.005 | 0.015 | 0.028 | 0.007 |
| | | | | | | | | | | | | | | | | | | | | | |
| 2016/2017 4-Sample M | | 0.155 | 0.010 | 0.010 | 0.020 | 0.028 | 0.009 | | 0.140 | 0.010 | 0.005 | 0.015 | 0.023 | 0.007 | | 0.140 | 0.010 | 0.005 | 0.015 | 0.025 | 0.008 |

| | Plant Effluent | | | | |
|---|---|---|---|---|---|
| | TN mg/L | NOx mg/L | NH3 mg/L | TP mg/L | DRP mg/L |
| 6-Dec-16 | 22.8 | 5.8 | 17.0 | 3.0 | 2.9 |
| 28-Dec-16 | 46.5 | 5.5 | 34.0 | 6.1 | 4.6 |
| 18-Jan-17 | 40.2 | 1.2 | 37.0 | 5.1 | 2.4 |
| 8-Feb-17 | 33.4 | 8.4 | 22.0 | 5.2 | 2.5 |