# Wainui
# Wastewater Treatment Plant
# Annual Monitoring Report
# June 2019 – July 2020

Prepared by: Citycare Water
Kris Kaser

On behalf of

Christchurch City Council, City Water & Waste Unit

28 August 2020

Christchurch City Council

Citycare Water

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| **Resource Consent Number:** | CRC091580 |
| **File Number:** | CO6C/28303 |
| **Client Name:** | Christchurch City Council, Water and Waste Unit |
| **To:** | Discharge treated domestic wastewater onto land from the Wainui Wastewater Treatment Plant |
| **Consent Location:** | Road Reserve, WAINUI |
| **Status:** | Current |
| 21/09/2011 | Consent Commenced |
| 02/05/2013 | Given Effect To |
| 21/09/2021 | Lapse Date |
| 21/09/2046 | Consent Expires |

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| **1** | The discharge shall be only treated domestic wastewater from Wainui. |
| | **Compliance** |
| **2** | Wastewater shall be discharged only onto land within the irrigation areas marked as IA1, IA2, IA3 and IA4, within Pt Lot DP 7501 as shown on the attached Plan CRC091580, centred on map reference NZMS 260 N36:0184-1125. |
| | **Compliance; only IA2 (10,000 $m^2$) utilised during reporting period** |
| **3** | The volume of wastewater discharged shall not exceed 125 cubic metres per day as an annual average. The volume of wastewater discharged shall not exceed 214 cubic metres per day as a weekly average. The volume of wastewater discharged shall not exceed 250 cubic metres per day at any time. |
| | **Compliance; maximum flow was 15.86 $m^3$/d as measured at the treatment plant (27Jun20)** |
| **4** | The consent holder shall measure and record the daily discharge flow from the wastewater treatment system to the irrigation areas in cubic metres using a flow meter that shall record flows to an accuracy of plus or minus 10 percent. |
| | **Compliance** |
| **5** | Prior to discharge, the wastewater shall be treated via the following treatment system:<br>a. Screening of inflow; and then<br>b. Biological secondary treatment; and then<br>c. Disinfection by ultra violet light or another method that provides an equivalent level of treatment. |
| | **Compliance** |
| **6** | Prior to commissioning the wastewater treatment plant, the consent holder shall submit to Environment Canterbury, Attention: RMA Compliance and Enforcement Manager, details of the inlet screening system, the biological treatment method, the disinfection method, and the location of sampling points. |
| | **Compliance** |
| **7** | After exiting the wastewater treatment system, the wastewater shall be discharged via a land application system as follows:<br>a. The land application system shall comprise drip irrigation tubing. The length of tubing installed shall be sufficient to ensure compliance with the hydraulic application rates specified in Condition 8.<br>b. Lines of drip irrigation tubing shall be spaced at intervals not more than one metre apart.<br>c. The drippers on the drip irrigation tubing shall be spaced at intervals not more than one metre apart.<br>d. The wastewater shall be evenly dosed in fixed quantities over the land application system.<br>e. The drip irrigation tubing shall be located on the ground surface or buried up to 150 millimetres below the ground surface. |
| | **Compliance as per design** |
| **8** | The wastewater shall be discharged at an annual average hydraulic application rate not exceeding 3.3 millimetres per day. The maximum weekly average hydraulic application rate shall be 7.2 millimetres per day. The maximum daily hydraulic application rate shall be 12 millimetres per day. |
| | **Compliance; Annual Average hydraulic rate 0.24 mm/d, maximum daily application rate 1.59 mm/d** |
| **9** | a. The land treatment areas shall be vegetated with trees and/or native vegetation.<br>b. At least 75 percent of the area receiving wastewater shall be vegetated with trees and or native vegetation that are at least five years old or otherwise sufficient to avoid erosion and wastewater runoff. |

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| | c. All trees shall be maintained in a healthy state until they reach an age where harvesting is appropriate. |
| | **Compliance** |
| **10** | The wastewater shall not be discharged onto land closer than 20 metres from any surface water body, including ephemeral waterways, and shall not be discharged onto land closer than 10 metres from the irrigation area property boundary. |
| | **Compliance as per design** |
| **11** | Wastewater shall be sampled in accordance with standard AS/NZS 5667.1.1998 after treatment and prior to discharge onto land at least once every month. The sampling frequency may be reduced to at least once every three months provided:<br>a. At least ten years have elapsed since commissioning of the wastewater treatment system; and<br>b. None of the contaminant triggers values specified in condition (14) have been exceeded during the previous ten years. |
| | **Compliance** |
| **12** | Samples of treated wastewater taken in compliance with condition (11) shall be analysed for the following contaminants:<br>a. total suspended solids<br>b. five-day biochemical oxygen demand<br>c. total nitrogen<br>d. faecal coliforms. |
| | **Compliance (Attachment 2)** |
| **13** | Detailed records shall be kept of the specific irrigation areas used for wastewater irrigation. |
| | **Compliance; only IA2 (10,000 m$^2$) utilised during reporting period as per design** |
| **14** | The median concentration of contaminants shall be compared to the following trigger values:<br>a. total suspended solids 20 grams per cubic metre<br>b. faecal coliforms 10,000 colony forming units/100 millilitres.<br>For the purposes of this condition, the median shall be calculated from the results of any five consecutive treated wastewater samples analysed. |
| | **Compliance: FC's were over on 3 occasions – Median FC=345 (Attachment 2)**<br>**Non-Compliance: TSS were over on 2 occasions (attachment 2)** |
| **15** | The consent holder shall notify the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager, within 20 working days of the identification of any exceedance of any trigger value specified in Condition (14). The notification shall detail what measures the consent holder has implemented or will implement to mitigate any adverse environmental effects and to prevent a reoccurrence of a trigger value exceedance. Such measures may include:<br>a. Additional sampling and analysis of the treated wastewater.<br>b. Investigation of whether the exceedance has adversely affected soil quality or water quality in waterways adjacent to the irrigation areas.<br>c. Further treatment of the wastewater discharge.<br>i. The consent holder shall use their best endeavours to ensure that the trigger values specified in Condition (14) are not exceeded. |
| | **Compliance** |
| **16** | The discharge shall not result in any wastewater flowing off the irrigation areas IA1, IA2, IA3 and IA4 shown on Plan CRC091580. |
| | **Compliance as per design (eg irrigation inhibited based on rainfall)** |
| **17** | Wastewater shall not be discharged onto land with an average slope greater than 20 degrees. |
| | **Compliance as per design** |
| **18** | All samples required to be taken under this consent shall be:<br>a. Taken by a suitably qualified person.<br>b. Stored and transferred in accordance with AS/NZS 5667.1:1998 (Water quality - Sampling - Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples), and details of all that methodology shall be maintained and made available on request by the Canterbury Regional Council.<br>c. Analysed using generally accepted methods and analysed by a laboratory that is accredited for each method of analysis by International Accreditation New Zealand or an equivalent accreditation body. |
| | **Compliance** |
| **19** | The discharge onto land shall not exceed a rate of 200 kilograms of nitrogen per hectare per year. |
| | **Compliance; TN load estimated at 32.8 kg/ha** |
| **20** | Fencing shall be established and maintained around the wastewater treatment system and irrigation areas to prevent livestock access and to deter public entry. |
| | **Compliance** |

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| **21** | The consent holder shall erect warning notices at the entrance gates to the wastewater treatment plant and irrigation areas. The notices shall be readable at a distance of five metres and shall state "Treated wastewater is irrigated onto land in this area. Public access is prohibited. For contact details, phone Christchurch City Council on 03-941-8999". |
| | **Compliance** |
| **22** | The wastewater treatment and land application systems shall be operated by trained and competent staff. |
| | **Compliance** |
| **23** | a. Within one month of commissioning of the wastewater treatment and land irrigation systems, a Wastewater Management Plan that includes the detailed inspection, maintenance and contingency programmes to be undertaken to ensure compliance with conditions of this consent including conditions (3), (7d), (8), (9), (14), (16) and (19), shall be prepared and provided to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager.<br>b. The consent holder may, at any time, submit to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager, an amended Wastewater Management Plan provided it is for the purpose of avoiding or mitigating an adverse environmental effect, or maintaining or improving the overall effectiveness of the original Wastewater Management Plan.<br>c. This consent shall be exercised in accordance with the current version of the Wastewater Management Plan. |
| | **Compliance per Wainui Wastewater Scheme Management Plan (Spire 2013)** |
| **24** | The consent holder shall keep written records of all inspections, maintenance and upgrades of the wastewater treatment and land application systems. For upgrades and non-routine maintenance the records shall include the reason for the work, a description of the work, the expected outcome of the work and the date the work was completed. The consent holder shall forward a copy of the records to the Canterbury Regional Council upon request. |
| | **Compliance (Attachment 3)** |
| **25** | An annual report on the performance of the wastewater treatment and land application systems shall be submitted to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager, by 30 August each year. The report shall include as a minimum:<br>a. Daily discharge flow records.<br>b. Wastewater sampling results.<br>c. Median and 90 percentile wastewater quality concentrations.<br>d. Records of the irrigation areas used.<br>e. Daily wastewater application rates.<br>f. Estimated annual areal nitrogen load applied to each of the irrigation areas. This shall be estimated using flow records and sample results.<br>g. Summary details of inspections, maintenance and upgrades of the wastewater treatment and land application systems since the previous annual report. |
| | **Compliance via this report; CCC to distribute** |
| **26** | 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 effect 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 effect on the environment; or<br>c. requiring the consent holder to conduct monitoring instead of, or in addition to, that required by the consent. |
| | **ECAN to request** |
| **27** | The lapsing date for the purposes of section 125 of the Resource Management Act shall be 10 years after the date of resource consent commencement. |
| | **Compliance** |
| **28** | This consent shall expire 35 years after the date of resource consent commencement<br>. |
| | **Compliance** |

**Monitoring Summary**

*This annual report covers the period from July 1, 2019 through June 30, 2020 based on the conditions of CRC091580.*

**Irrigation Field Flow Monitoring**

Flows to the Wainui Wastewater Treatment Plant (WWTP) Irrigation Field were less than 7.1 $m^3$/d for 95% of flows (Attachment 1). The maximum daily flow was 15.86 $m^3$/d (28June20), which was well below the consented 250, 214, and 125 $m^3$/d limits for daily, weekly average, and annual average periods. Based on the 10,000 $m^2$ irrigation area for IA2, the maximum application rate was 1.59 mm/d (28June20). Thus, this flow was well within the consented rates of 12, 7.2, and 3.3 mm/d based on daily, weekly average, and annual average periods, respectively.

Plant performance relating to $BOD_5$, TN, TSS was generally good. However, there were two elevated single samples for TSS at 43 and 110 mg/l and for which the highest 5 median value was 6.6 mg/l which is well below the consent limit of 20 mg/l. There were 3 accounts of exceeded FEC samples at 13000, 37000 and 220000 cfu/100ml with 1 elevated result of the 5-median sample at 13,000. This elevated FC result prompted a full service of the UV system (Jan20) which has resulted in full compliance since.

The annual TN load was calculated as 32.8 kg TN/ha based on the annual average of TN (37.4 mg/L), the total annual flow (877.7 $m^3$), and the irrigation area available (IA2 = 10,000 $m^2$). This nutrient load was well below the annual maximum of 200 kg TN/ha.

**Table 1. Summary of Exceedances from July 2019-June 2020.**

| Parameter | Single Samples Above Limit | Trigger Limit Exceedances | Condition Non-Compliances |
|---|---|---|---|
| Flow | 0 | 0 | 0 |
| Application Rate | 0 | 0 | 0 |
| $BOD_5$ | 0 | 0 | 0 |
| TSS | **2** | 0 | 0 |
| FEC | **3** | 0 | **1** |
| Annual TN Load | 0 | 0 | 0 |
| **Total** | **5** | **0** | **1** |

**WWTP and Irrigation Field O&M:**

Full service of UV system was undertaken after the very high FC result in January at the WWTP. No other non-routine maintenance was conducted during this reporting period. Routine O&M tasks are summarised in Attachment 3. These rounds include equipment checks and O&M on a regular basis to ensure that the WWTP and irrigation field are operating as designed and any problems are identified quickly.

## Attachment 1.1: Irrigation Field Flows, Wainui, Data

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| **Plant:** | **Wainui Wastewater Treatment: Irrigation Field, Banks Peninsula: Daily Flows** |
| **Asset Owner:** | **Christchurch City Council** |
| **Laboratory:** | **Christchurch City Council Laboratory, City Water and Waste Unit** |

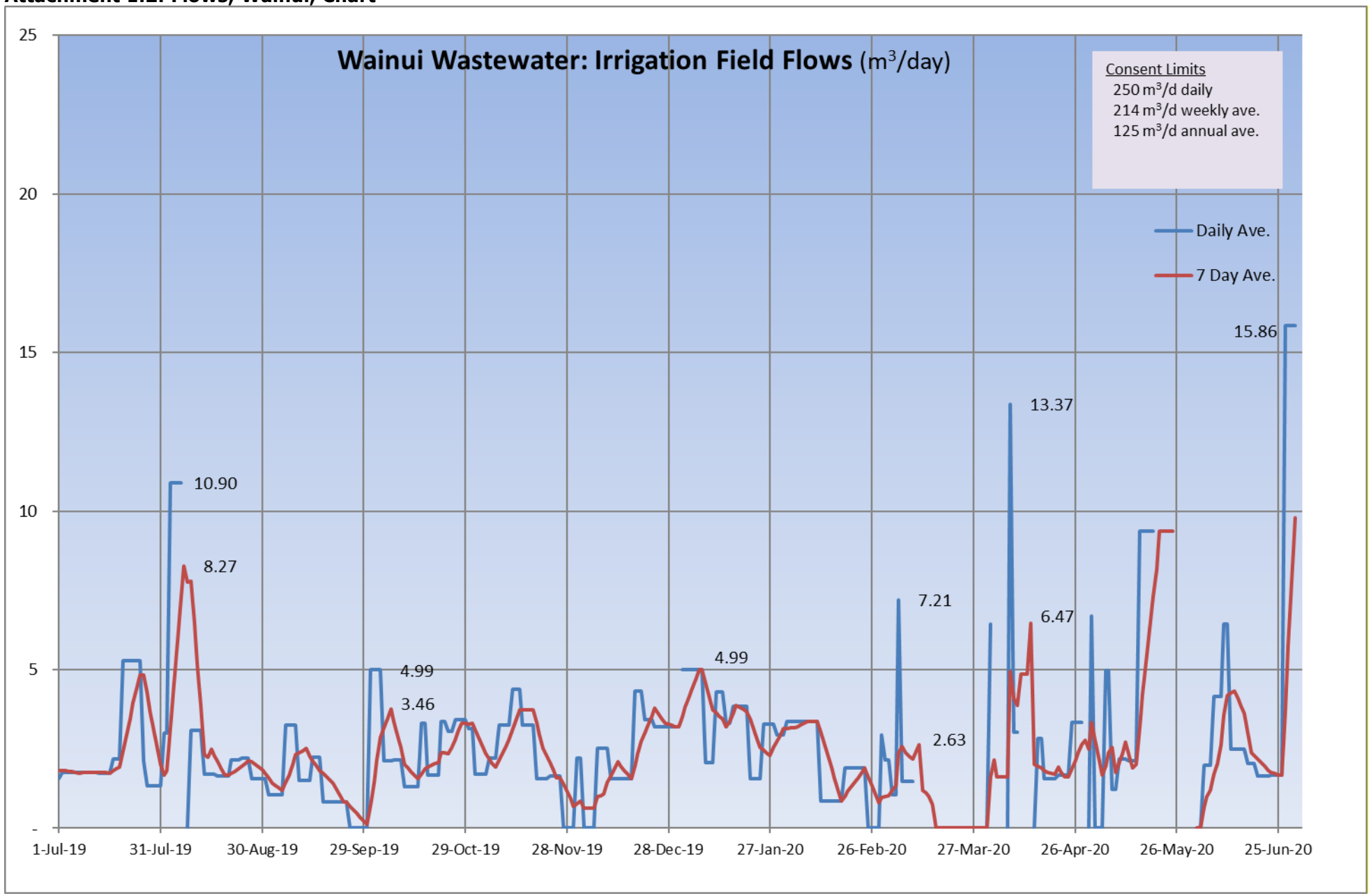
**Consent limits - 125m$^3$/d annual average; 214m$^3$/d weekly average; 250m$^3$/d daily**
**Consent limits - 3.3mm/d annual average; 7.2mm3/d weekly average; 12mm/d daily**

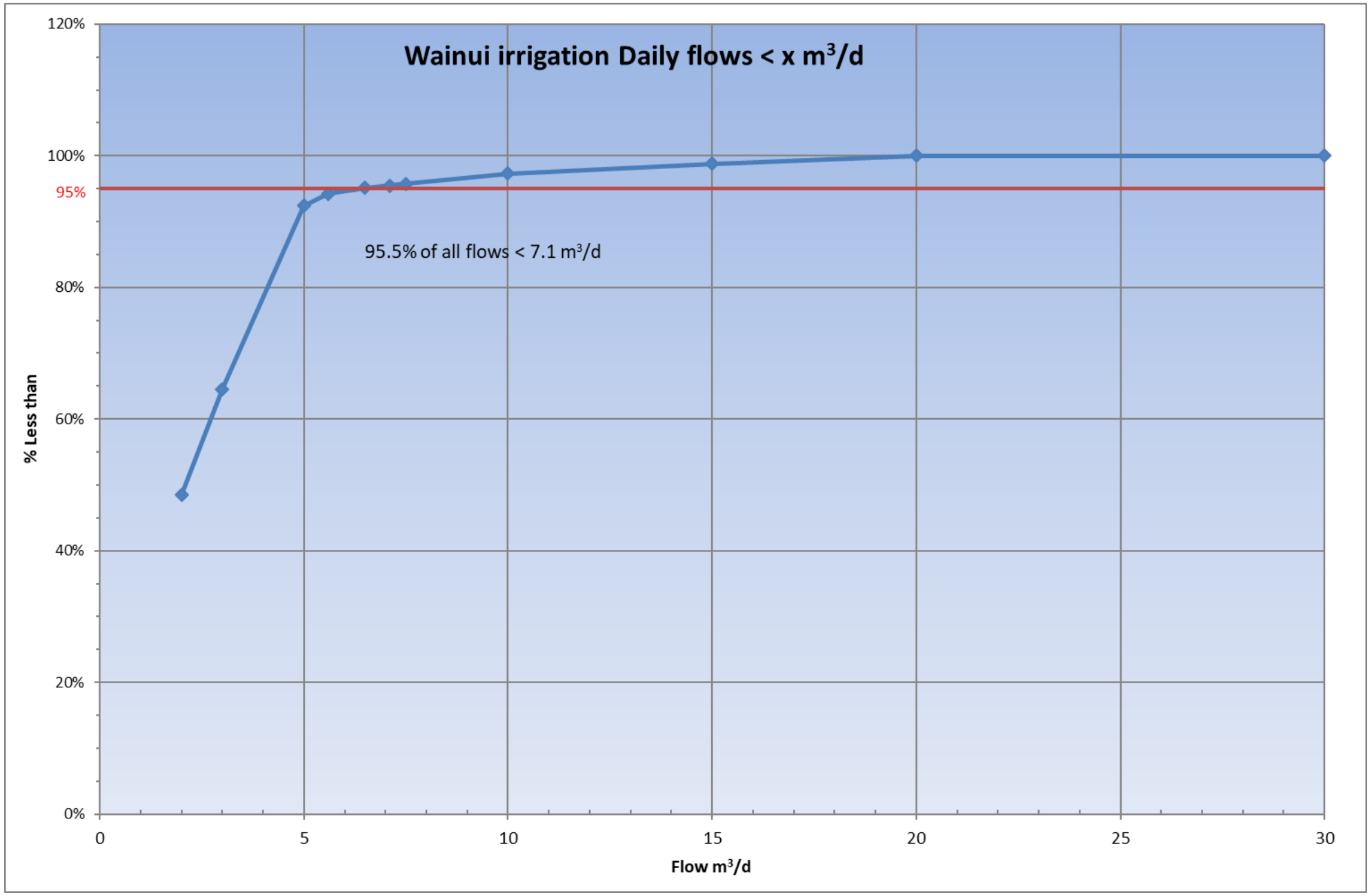
| Date | Flow (m$^3$/d) | Rate (mm/d) | Date | Flow (m$^3$/d) | Rate (mm/d) | Date | Flow (m$^3$/d) | Rate (mm/d) | Date | Flow (m$^3$/d) | Rate (mm/d) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-Jul-19 | 1.55 | 0.15 | 1-Oct-19 | 4.99 | 0.50 | 1-Jan-20 | 4.99 | 0.50 | 1-Apr-20 | 6.43 | 0.64 |
| 2-Jul-19 | 1.77 | 0.18 | 2-Oct-19 | 4.99 | 0.50 | 2-Jan-20 | 4.99 | 0.50 | 2-Apr-20 | | - |
| 3-Jul-19 | 1.77 | 0.18 | 3-Oct-19 | 4.99 | 0.50 | 3-Jan-20 | 4.99 | 0.50 | 3-Apr-20 | - | - |
| 4-Jul-19 | 1.77 | 0.18 | 4-Oct-19 | 4.99 | 0.50 | 4-Jan-20 | 4.99 | 0.50 | 4-Apr-20 | | - |
| 5-Jul-19 | 1.77 | 0.18 | 5-Oct-19 | 2.13 | 0.21 | 5-Jan-20 | 4.99 | 0.50 | 5-Apr-20 | | - |
| 6-Jul-19 | 1.77 | 0.18 | 6-Oct-19 | 2.13 | 0.21 | 6-Jan-20 | 4.99 | 0.50 | 6-Apr-20 | - | - |
| 7-Jul-19 | 1.77 | 0.18 | 7-Oct-19 | 2.13 | 0.21 | 7-Jan-20 | 4.99 | 0.50 | 7-Apr-20 | 13.37 | 1.34 |
| 8-Jul-19 | 1.77 | 0.18 | 8-Oct-19 | 2.15 | 0.22 | 8-Jan-20 | 2.07 | 0.21 | 8-Apr-20 | 3.02 | 0.30 |
| 9-Jul-19 | 1.77 | 0.18 | 9-Oct-19 | 2.15 | 0.22 | 9-Jan-20 | 2.07 | 0.21 | 9-Apr-20 | 3.02 | 0.30 |
| 10-Jul-19 | 1.77 | 0.18 | 10-Oct-19 | 2.15 | 0.22 | 10-Jan-20 | 2.07 | 0.21 | 10-Apr-20 | | - |
| 11-Jul-19 | 1.77 | 0.18 | 11-Oct-19 | 1.30 | 0.13 | 11-Jan-20 | 4.28 | 0.43 | 11-Apr-20 | | - |
| 12-Jul-19 | 1.77 | 0.18 | 12-Oct-19 | 1.30 | 0.13 | 12-Jan-20 | 4.28 | 0.43 | 12-Apr-20 | | - |
| 13-Jul-19 | 1.73 | 0.17 | 13-Oct-19 | 1.30 | 0.13 | 13-Jan-20 | 4.28 | 0.43 | 13-Apr-20 | | - |
| 14-Jul-19 | 1.73 | 0.17 | 14-Oct-19 | 1.30 | 0.13 | 14-Jan-20 | 3.31 | 0.33 | 14-Apr-20 | - | - |
| 15-Jul-19 | 1.73 | 0.17 | 15-Oct-19 | 1.30 | 0.13 | 15-Jan-20 | 3.31 | 0.33 | 15-Apr-20 | 2.83 | 0.28 |
| 16-Jul-19 | 1.73 | 0.17 | 16-Oct-19 | 3.30 | 0.33 | 16-Jan-20 | 3.84 | 0.38 | 16-Apr-20 | 2.83 | 0.28 |
| 17-Jul-19 | 2.18 | 0.22 | 17-Oct-19 | 3.30 | 0.33 | 17-Jan-20 | 3.84 | 0.38 | 17-Apr-20 | 1.55 | 0.16 |
| 18-Jul-19 | 2.18 | 0.22 | 18-Oct-19 | 1.67 | 0.17 | 18-Jan-20 | 3.84 | 0.38 | 18-Apr-20 | 1.55 | 0.16 |
| 19-Jul-19 | 2.18 | 0.22 | 19-Oct-19 | 1.67 | 0.17 | 19-Jan-20 | 3.84 | 0.38 | 19-Apr-20 | 1.55 | 0.16 |
| 20-Jul-19 | 5.27 | 0.53 | 20-Oct-19 | 1.67 | 0.17 | 20-Jan-20 | 3.84 | 0.38 | 20-Apr-20 | 1.55 | 0.16 |
| 21-Jul-19 | 5.27 | 0.53 | 21-Oct-19 | 1.67 | 0.17 | 21-Jan-20 | 1.57 | 0.16 | 21-Apr-20 | 1.67 | 0.17 |
| 22-Jul-19 | 5.27 | 0.53 | 22-Oct-19 | 3.37 | 0.34 | 22-Jan-20 | 1.57 | 0.16 | 22-Apr-20 | 1.67 | 0.17 |
| 23-Jul-19 | 5.27 | 0.53 | 23-Oct-19 | 3.37 | 0.34 | 23-Jan-20 | 1.57 | 0.16 | 23-Apr-20 | 1.67 | 0.17 |
| 24-Jul-19 | 5.27 | 0.53 | 24-Oct-19 | 3.05 | 0.30 | 24-Jan-20 | 1.57 | 0.16 | 24-Apr-20 | 1.67 | 0.17 |
| 25-Jul-19 | 5.27 | 0.53 | 25-Oct-19 | 3.05 | 0.30 | 25-Jan-20 | 3.29 | 0.33 | 25-Apr-20 | 3.33 | 0.33 |
| 26-Jul-19 | 2.11 | 0.21 | 26-Oct-19 | 3.43 | 0.34 | 26-Jan-20 | 3.29 | 0.33 | 26-Apr-20 | 3.33 | 0.33 |
| 27-Jul-19 | 1.33 | 0.13 | 27-Oct-19 | 3.43 | 0.34 | 27-Jan-20 | 3.29 | 0.33 | 27-Apr-20 | 3.33 | 0.33 |
| 28-Jul-19 | 1.33 | 0.13 | 28-Oct-19 | 3.43 | 0.34 | 28-Jan-20 | 3.29 | 0.33 | 28-Apr-20 | 3.33 | 0.33 |
| 29-Jul-19 | 1.33 | 0.13 | 29-Oct-19 | 3.43 | 0.34 | 29-Jan-20 | 2.95 | 0.29 | 29-Apr-20 | | - |
| 30-Jul-19 | 1.33 | 0.13 | 30-Oct-19 | 3.15 | 0.32 | 30-Jan-20 | 2.95 | 0.29 | 30-Apr-20 | - | - |
| 31-Jul-19 | 1.33 | 0.13 | 31-Oct-19 | 3.15 | 0.32 | 31-Jan-20 | 2.95 | 0.30 | 1-May-20 | 6.70 | 0.67 |
| 1-Aug-19 | 3.01 | 0.30 | 1-Nov-19 | 1.70 | 0.17 | 1-Feb-20 | 3.37 | 0.34 | 2-May-20 | - | - |
| 2-Aug-19 | 3.01 | 0.30 | 2-Nov-19 | 1.70 | 0.17 | 2-Feb-20 | 3.37 | 0.34 | 3-May-20 | - | - |
| 3-Aug-19 | 10.90 | 1.09 | 3-Nov-19 | 1.70 | 0.17 | 3-Feb-20 | 3.37 | 0.34 | 4-May-20 | - | - |
| 4-Aug-19 | 10.90 | 1.09 | 4-Nov-19 | 1.70 | 0.17 | 4-Feb-20 | 3.37 | 0.34 | 5-May-20 | 4.96 | 0.50 |
| 5-Aug-19 | 10.90 | 1.09 | 5-Nov-19 | 2.22 | 0.22 | 5-Feb-20 | 3.37 | 0.34 | 6-May-20 | 4.96 | 0.50 |
| 6-Aug-19 | 10.90 | 1.09 | 6-Nov-19 | 2.22 | 0.22 | 6-Feb-20 | 3.37 | 0.34 | 7-May-20 | 1.24 | 0.12 |
| 7-Aug-19 | - | - | 7-Nov-19 | 2.22 | 0.22 | 7-Feb-20 | 3.37 | 0.34 | 8-May-20 | 1.24 | 0.12 |
| 8-Aug-19 | - | - | 8-Nov-19 | 3.26 | 0.33 | 8-Feb-20 | 3.37 | 0.34 | 9-May-20 | 2.18 | 0.22 |
| 9-Aug-19 | 3.07 | 0.31 | 9-Nov-19 | 3.26 | 0.33 | 9-Feb-20 | 3.37 | 0.34 | 10-May-20 | 2.18 | 0.22 |
| 10-Aug-19 | 3.07 | 0.31 | 10-Nov-19 | 3.26 | 0.33 | 10-Feb-20 | 3.37 | 0.34 | 11-May-20 | 2.18 | 0.22 |
| 11-Aug-19 | 3.07 | 0.31 | 11-Nov-19 | 3.26 | 0.33 | 11-Feb-20 | 0.86 | 0.09 | 12-May-20 | 2.12 | 0.21 |
| 12-Aug-19 | 3.07 | 0.31 | 12-Nov-19 | 4.39 | 0.44 | 12-Feb-20 | 0.86 | 0.09 | 13-May-20 | 2.12 | 0.21 |
| 13-Aug-19 | 1.70 | 0.17 | 13-Nov-19 | 4.39 | 0.44 | 13-Feb-20 | 0.86 | 0.09 | 14-May-20 | 2.12 | 0.21 |
| 14-Aug-19 | 1.70 | 0.17 | 14-Nov-19 | 4.39 | 0.44 | 14-Feb-20 | 0.86 | 0.09 | 15-May-20 | 9.37 | 0.94 |
| 15-Aug-19 | 1.70 | 0.17 | 15-Nov-19 | 3.26 | 0.33 | 15-Feb-20 | 0.86 | 0.09 | 16-May-20 | 9.37 | 0.94 |
| 16-Aug-19 | 1.70 | 0.17 | 16-Nov-19 | 3.26 | 0.33 | 16-Feb-20 | 0.86 | 0.09 | 17-May-20 | 9.37 | 0.94 |
| 17-Aug-19 | 1.64 | 0.16 | 17-Nov-19 | 3.26 | 0.33 | 17-Feb-20 | 0.86 | 0.09 | 18-May-20 | 9.37 | 0.94 |
| 18-Aug-19 | 1.64 | 0.16 | 18-Nov-19 | 3.26 | 0.33 | 18-Feb-20 | 1.89 | 0.19 | 19-May-20 | 9.37 | 0.94 |

| Date | Flow ($m^3$/d) | Rate (mm/d) | Date | Flow ($m^3$/d) | Rate (mm/d) | Date | Flow ($m^3$/d) | Rate (mm/d) | Date | Flow ($m^3$/d) | Rate (mm/d) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 19-Aug-19 | 1.64 | 0.16 | 19-Nov-19 | 1.56 | 0.16 | 19-Feb-20 | 1.89 | 0.19 | 20-May-20 | | - |
| 20-Aug-19 | 1.64 | 0.16 | 20-Nov-19 | 1.56 | 0.16 | 20-Feb-20 | 1.89 | 0.19 | 21-May-20 | | - |
| 21-Aug-19 | 2.16 | 0.22 | 21-Nov-19 | 1.56 | 0.16 | 21-Feb-20 | 1.89 | 0.19 | 22-May-20 | | - |
| 22-Aug-19 | 2.16 | 0.22 | 22-Nov-19 | 1.56 | 0.16 | 22-Feb-20 | 1.89 | 0.19 | 23-May-20 | | - |
| 23-Aug-19 | 2.16 | 0.22 | 23-Nov-19 | 1.64 | 0.16 | 23-Feb-20 | 1.89 | 0.19 | 24-May-20 | | - |
| 24-Aug-19 | 2.22 | 0.22 | 24-Nov-19 | 1.64 | 0.16 | 24-Feb-20 | 1.89 | 0.19 | 25-May-20 | | - |
| 25-Aug-19 | 2.22 | 0.22 | 25-Nov-19 | 1.64 | 0.16 | 25-Feb-20 | - | - | 26-May-20 | | |
| 26-Aug-19 | 2.22 | 0.22 | 26-Nov-19 | 1.64 | 0.16 | 26-Feb-20 | - | - | 27-May-20 | | |
| 27-Aug-19 | 1.55 | 0.16 | 27-Nov-19 | - | - | 27-Feb-20 | - | - | 28-May-20 | | |
| 28-Aug-19 | 1.55 | 0.16 | 28-Nov-19 | - | - | 28-Feb-20 | - | - | 29-May-20 | | |
| 29-Aug-19 | 1.55 | 0.16 | 29-Nov-19 | - | - | 29-Feb-20 | 2.95 | 0.29 | 30-May-20 | | |
| 30-Aug-19 | 1.55 | 0.16 | 30-Nov-19 | - | - | 1-Mar-20 | 2.16 | 0.22 | 31-May-20 | | |
| 31-Aug-19 | 1.55 | 0.16 | 1-Dec-19 | 2.22 | 0.22 | 2-Mar-20 | 2.16 | 0.22 | 1-Jun-20 | - | - |
| 1-Sep-19 | 1.05 | 0.11 | 2-Dec-19 | 2.22 | 0.22 | 3-Mar-20 | 1.05 | 0.11 | 2-Jun-20 | - | - |
| 2-Sep-19 | 1.05 | 0.11 | 3-Dec-19 | - | - | 4-Mar-20 | 1.05 | 0.11 | 3-Jun-20 | 1.99 | 0.66 |
| 3-Sep-19 | 1.05 | 0.11 | 4-Dec-19 | - | - | 5-Mar-20 | 7.21 | 0.72 | 4-Jun-20 | 1.99 | 1.00 |
| 4-Sep-19 | 1.05 | 0.11 | 5-Dec-19 | - | - | 6-Mar-20 | 1.49 | 0.15 | 5-Jun-20 | 1.99 | 1.20 |
| 5-Sep-19 | 1.05 | 0.11 | 6-Dec-19 | - | - | 7-Mar-20 | 1.49 | 0.15 | 6-Jun-20 | 4.15 | 1.69 |
| 6-Sep-19 | 3.27 | 0.33 | 7-Dec-19 | 2.51 | 0.25 | 8-Mar-20 | 1.49 | 0.15 | 7-Jun-20 | 4.15 | 2.04 |
| 7-Sep-19 | 3.27 | 0.33 | 8-Dec-19 | 2.51 | 0.25 | 9-Mar-20 | 1.49 | 0.15 | 8-Jun-20 | 4.15 | 2.63 |
| 8-Sep-19 | 3.27 | 0.33 | 9-Dec-19 | 2.51 | 0.25 | 10-Mar-20 | | - | 9-Jun-20 | 6.44 | 3.55 |
| 9-Sep-19 | 3.27 | 0.33 | 10-Dec-19 | 2.51 | 0.25 | 11-Mar-20 | | - | 10-Jun-20 | 6.44 | 4.19 |
| 10-Sep-19 | 1.51 | 0.15 | 11-Dec-19 | 1.56 | 0.16 | 12-Mar-20 | - | - | 11-Jun-20 | 2.50 | 4.26 |
| 11-Sep-19 | 1.51 | 0.15 | 12-Dec-19 | 1.56 | 0.16 | 13-Mar-20 | | - | 12-Jun-20 | 2.50 | 4.33 |
| 12-Sep-19 | 1.51 | 0.15 | 13-Dec-19 | 1.56 | 0.16 | 14-Mar-20 | | - | 13-Jun-20 | 2.50 | 4.10 |
| 13-Sep-19 | 1.51 | 0.15 | 14-Dec-19 | 1.56 | 0.16 | 15-Mar-20 | | - | 14-Jun-20 | 2.50 | 3.86 |
| 14-Sep-19 | 2.24 | 0.22 | 15-Dec-19 | 1.56 | 0.16 | 16-Mar-20 | 0.00 | 0.00 | 15-Jun-20 | 2.50 | 3.63 |
| 15-Sep-19 | 2.24 | 0.22 | 16-Dec-19 | 1.56 | 0.16 | 17-Mar-20 | | - | 16-Jun-20 | 2.05 | 3.00 |
| 16-Sep-19 | 2.24 | 0.22 | 17-Dec-19 | 1.56 | 0.16 | 18-Mar-20 | - | - | 17-Jun-20 | 2.05 | 2.37 |
| 17-Sep-19 | 0.82 | 0.08 | 18-Dec-19 | 4.33 | 0.43 | 19-Mar-20 | | - | 18-Jun-20 | 2.05 | 2.31 |
| 18-Sep-19 | 0.82 | 0.08 | 19-Dec-19 | 4.33 | 0.43 | 20-Mar-20 | - | - | 19-Jun-20 | 1.65 | 2.19 |
| 19-Sep-19 | 0.82 | 0.08 | 20-Dec-19 | 4.33 | 0.43 | 21-Mar-20 | | - | 20-Jun-20 | 1.65 | 2.07 |
| 20-Sep-19 | 0.82 | 0.08 | 21-Dec-19 | 3.42 | 0.34 | 22-Mar-20 | | - | 21-Jun-20 | 1.65 | 1.94 |
| 21-Sep-19 | 0.82 | 0.08 | 22-Dec-19 | 3.42 | 0.34 | 23-Mar-20 | - | - | 22-Jun-20 | 1.65 | 1.82 |
| 22-Sep-19 | 0.82 | 0.08 | 23-Dec-19 | 3.42 | 0.34 | 24-Mar-20 | | - | 23-Jun-20 | 1.68 | 1.77 |
| 23-Sep-19 | 0.82 | 0.08 | 24-Dec-19 | 3.21 | 0.32 | 25-Mar-20 | | - | 24-Jun-20 | 1.68 | 1.72 |
| 24-Sep-19 | 0.82 | 0.08 | 25-Dec-19 | 3.21 | 0.32 | 26-Mar-20 | - | - | 25-Jun-20 | 1.68 | 1.67 |
| 25-Sep-19 | 0.00 | 0.00 | 26-Dec-19 | 3.21 | 0.32 | 27-Mar-20 | | - | 26-Jun-20 | 1.68 | 1.67 |
| 26-Sep-19 | 0.00 | 0.00 | 27-Dec-19 | 3.21 | 0.32 | 28-Mar-20 | | - | 27-Jun-20 | 15.86 | 3.70 |
| 27-Sep-19 | 0.00 | 0.00 | 28-Dec-19 | 3.21 | 0.32 | 29-Mar-20 | | - | 28-Jun-20 | 15.86 | 5.73 |
| 28-Sep-19 | - | - | 29-Dec-19 | 3.21 | 0.32 | 30-Mar-20 | 0.00 | 0.00 | 29-Jun-20 | 15.86 | 7.76 |
| 29-Sep-19 | - | - | 30-Dec-19 | 3.21 | 0.32 | | - | - | 30-Jun-20 | 15.86 | 9.78 |
| 30-Sep-19 | - | - | 31-Dec-19 | | - | | | | | | |

| Summary Statistics | | |
|---|---|---|
| Daily maxi | 15.86 | $m^3$/d |
| | 1.59 | mm/d |
| Annual av | 2.40 | $m^3$/d |
| | 0.24 | mm/d |

**Attachment 1.2: Flows, Wainui, Chart**




Wainui irrigation Daily flows < x m³/d
120%
100%
95%
80%
60%
40%
20%
0%
% Less than
95.5% of all flows < 7.1 m³/d
0
5
10
15
20
25
30
Flow m³/d

**Attachment 2: Lab Data and Calculations, Wainui**

| | |
|---|---|
| Plant: | **Wainui WWTP Irrigation Field, Banks Peninsula** |
| Asset Owner: | **Christchurch City Council** |
| Laboratory: | **Christchurch City Council Laboratory, City Water & Waste Unit** |

| Date | Lab analysis | | | | IF | 5-Sample Median | | |
|---|---|---|---|---|---|---|---|---|
| | BOD5 [mg/l] | TSS [mg/l] | FEC [cfu/100ml] | TN [mg/l] | Flow [m3/month] | TN Load [kgN/ha] | TSS [mg/l] | FEC [cfu/100ml] |
| 11-Jul-19 | 2.4 | 3 | 50 | 27 | 74.90 | 2.0 | 3.0 | 30 |
| 15-Aug-19 | 1.9 | 12 | 20 | 23 | 96.20 | 2.2 | 3.0 | 20 |
| 11-Sep-19 | 1.9 | 6.8 | 13000 | 29 | 37.60 | 1.1 | 6.8 | 35 |
| 3-Oct-19 | 2.7 | 3 | 220 | 25 | 85.50 | 2.1 | 6.8 | 50 |
| 6-Nov-19 | 3.5 | 6.8 | 37000 | 40 | 65.50 | 2.6 | 6.8 | 220 |
| 5-Dec-19 | 1.3 | 8 | 740 | 44 | 71.10 | 3.1 | 6.8 | 740 |
| 9-Jan-20 | 13 | 43 | 220000 | 61 | 108.10 | 6.6 | 6.8 | 13,000 |
| 3-Feb-20 | 3.2 | 7.1 | 170 | 30 | 55.90 | 1.7 | 7.1 | 740 |
| 3-Mar-20 | 5.2 | 110 | 70 | 51 | 19.60 | 1.0 | 8.0 | 740 |
| 7-Apr-20 | 1.1 | 7.4 | 470 | 64 | 57.70 | 3.7 | 8.0 | 470 |
| 7-May-20 | 2.2 | 7.2 | 50 | 27 | 78.80 | 2.1 | 7.4 | 170 |
| 9-Jun-20 | 2.3 | 5.4 | 8000 | 28 | 126.80 | 3.6 | 7.2 | 170 |
| | | | | | | | | |
| | | | | sum | 877.7 | 31.9 | | |
| **Median:** | 2.4 | 7.2 | 345.0 | 29.5 | 73.0 | | | |
| **90th Percentile:** | 5.0 | 39.9 | 34,600.0 | 60.0 | 106.9 | | | |
| **Average:** | 3.4 | 18.3 | 23,315.8 | 37.4 | 73.1 | | | |
| **Maximum/Limit:** | 13.0 | 110.0 | 220,000.0 | 64.0 | 126.8 | **200** | 20 | 10,000 |
| **Exceedances:** | 0.0 | 2.0 | 3.0 | | | 0 | 0 | 1 |

| | |
|---|---|
| Total flow (m3) | 877.7 |
| Maximum daily flow (m3) | 15.9 |
| Annual average TN (mg/L) | 37.4 |
| Estimated TN load (kg/ha/yr) | 32.8 |

## Attachment 3: O&M Rounds, Wainui

| | Seaview WWTP | | Warnerville Irrigation Field | |
|---|---|---|---|---|
| **Frequency** | **Task Description** | **Comments** | **Task Description** | **Comments** |
| Every Visit | • Check line flow and pressure readings. | Flow meter 205.0 PL002 FT01 readings should range 1.1L/s to 2.2L/s. Pressure transducer 205.0 PL002 PT01 high pressure should not be >900kPa. Pressure switch 205.3PL001PS01 low pressure should not be < -40kPa. | · Check line flow and pressure readings. | Pressure transmitters 315.1 PL001 PT01 & 315.2 PL001 PT01 should range 400kPa to 900 kPa |
| | | | · Check tank level is sufficient for full submergence of pumps 305.0.OP001 & 305.0.OP003. | Normal range of 305.0.OT001LT01 is 1.675m to 3.8m (measured from tank bottom) |
| Every Week | • Visually check for leaks. | | · Check current drawn. | Rated current is 13A |
| | • Check pumps 205.1 & 205.2 OP001 for excessive heat, noise, vibration, and correct operation. | Sound should be < 85dB at 1 m from the pump. Temperature should be < 50°C. | · Monitor motor running currents | By SCADA/VSD |
| | • Check current drawn. | | | |
| | • Level control operation is OK. | | | |
| | • Check for fat build-up in septic tanks | | | |
| | • Check hatches and doors for odour and condition | | | |
| | • Monitor motor running currents | By SCADA/VSD | | |
| Every 6 Months | • Check level switch 010.1 TT001 LS01 and level transducer 0101.1 TT001 LT01 operation | | · Operate all valves and check for gland leakage. | |
| | • Check flow meter 205.0 PL002 FT01 calibration & accuracy | If suspected issue only | · Check flow meters calibration & accuracy 315.1 PL001 FT01 & 315.2 PL001 FT01 | If suspected issue only |
| | • Check pressure transducer 205.0 PL002 PT01 calibration & accuracy | If suspected issue only | · Check pressure transmitters calibration & accuracy 315.1 PL001 PT01 & 315.2 PL001 PT01 | If suspected issue only |
| | • Operate/grease all valves and check for gland leakage. | | | |
| | • Check pump mechanical seals, and replace if necessary. | | <u>Irrigation System:</u> | |
| | • Check shaft or shaft sleeve for scouring. | | · Check main to submain connection | Flush tubes using plastic valve |
| | • Check alignment for pumps and motors. | Visual check | · Check flush points at each zone | |
| | • Check holding down bolt for tightness. | | · Visual check for leaks at top chamber | |
| | • Check coupling for wear. | | · Check even drip distribution | |
| | | | · Check sub main pins are secure | |
| | | | · Check air valve works | Run pump and check valve |
| | | | · Check indexing valve works to each of the 3 zones | Visual monitoring required |
| | | | · Remove and clean twin disk filter | On discharge line to irrigation field (may require confined space entry permit) |
| | | | · Open all flush valves at the end of the drip lines (along fence line) and run for 5 min before closing or once lines are sufficiently flushed. | Check with pressure instrument |
| | | | · Check pressures at the top and bottom of each zone when zone is operating | Normal operating ranges is 141.5 to 222kPa |
| | | | · Open and flush submains at bottom of each zone. | Black polyethylene pipe |
| | | | · Ensure holding downpipes for pumps 305.0.OP001 & 305.0.OP003 are secure. | |
| Every 12 Months | • Check rotating elements for wear. | | · Check operation of electronic controls and test critical alarms. | |
| | • Check mountings are secure. | | · Check mechanical pump seals | |
| | • Check operation of controls and test critical alarms. | | · Test insulation on motors | |
| | • Coordinate RPZ certification | 2 RPZ (1 potable supply and 1 process supply); Martin Fry | · Coordinate RPZ certification | 1 RPZ; Martin Fry |
| Every 5 Years | • Replace motor bearings and check general condition of motor. | As required if noisy | | |