Waikato Water Treatment Plant
2022-2023 Annual Report

Final - September 2023

Watercare

EXECUTIVE SUMMARY

Watercare's Waikato Water Treatment Plant is the second largest potable water treatment plant in Auckland and takes its water from the Waikato River. The adjacent Waikato 50 Water Treatment Plant became operational in July 2021.

This report is the annual compliance report for the discharge, water take, diversion of water and land use consents associated with Watercare's Waikato and Waikato 50 Water Treatment Plants. Specifically, this report covers compliance associated with the Resource Consents in Table 1-1 for 1 July 2022 to 30 June 2023 (inclusive). The Waikato Water Treatment Plant exceeded the discharge quality for suspended solids in consent AUTH137497.01.01 on the 17 February (routine sampling), 14 April (clarifier drain) and 6 June 2023 (routine sampling). The Waikato and Waikato 50 Water Treatment Plants were fully compliant across all other consents for the conditions considered in this report.

Table 1-1 Resource consents and compliance for 2022-2023

Consent	Consent subcategory	Compliance status
AUTH960089.01.05	Water Take from Waikato River	Compliant
AUTH131259.01.02	Water Take from Waikato River	Compliant
960090	Diversion of water from culverts of an unnamed tributary	Compliant
AUTH137497.02.01	Discharge from back washing of intake screens into the Waikato River	Compliant
AUTH960092.01.04	Land Use intake structure and discharges	Compliant
AUTH137497.03.01	Discharge of stormwater into the Waikato River	Compliant
AUTH137497.01.01	Discharge of process and other water into the Waikato River	Non-compliant
AUTH142778.01.01	Discharge of off-spec and process water from Waikato 50 into the Waikato River	Compliant

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1 INTRODUCTION

1.1 Background

The Waikato Water Treatment Plant (WTP) is Watercare's second largest WTP and has a second, smaller water treatment plant, Waikato 50 (W50) on the same site. To operate, the WTPs hold resource consents to permit raw water take from the Waikato River, discharges of treated off-spec water, stormwater, and process discharges. The resource consents and numbers of the respective conditions which require an annual report are presented in Table 1-1 below.

Watercare have surrendered resource consents AUTH141825.01.01 and AUTH142090.01.01. The new water take consent AUTH131259.01.02 commenced 1 January 2023, and enables a total daily net take volume up to 300,000 m^3 when all consents are considered.

Table 1-1 Resource consent conditions requiring an annual report

Resource Consent	Resource consent type	Condition
AUTH960089.01.05	Water Take (from Waikato River)	20
AUTH131259.01.02	Water Take (from Waikato River)	P
960090	Diversion of Water (from culverts of an unnamed tributary through the intake and Waikato treatment plant)	18
AUTH960092.01.04	Works in a Watercourse (intake structure and discharges)	25
AUTH137497.01.01	Discharge to Water (process water discharges into the Waikato River)	14
AUTH142778.01.01	Discharge to Water (off-spec and process water from STW50 into the Waikato River)	13

1.2 Scope

This report is for the 1 July 2022-30 June 2023 reporting year and covers the matters required by the consent conditions listed in Table 1-1. These matters include:

- A summary and analysis of monitoring data collected in accordance with the Monitoring Plan, including:
  - Quality of raw water taken from the Waikato River;
  - Waikato River flow at the site
  - Intake volumes and abstraction rates;
  - Effects of the intake structure, including fish entrainment and impingement on the intake screens, the effect of the intake structure on fish migration, and the effect of screen sparging on the environment and river ecology;
  - Water quality and volumes of operational discharges to the Waikato River, including process, maintenance and treated off-spec water discharges;
  - Leakages from the water pipeline.
- An overview of water conservation activities;
- Measures to prevent invasive plant and animal pests in the water being transferred into the Auckland Region;
- Details of any equipment failures, chemical spills, or other events related to activities authorised by the consents in Table 1-1 that may cause, or may have caused, an adverse environmental effect.

2 WATER TAKE FROM THE WAIKATO RIVER

2.1 Quality of Raw Water

Although there are no consent conditions related to raw water quality, monitoring of water taken from the Waikato River is required under the current monitoring plan. A summary of the results for the ongoing raw water sampling programme is provided in **Error! Reference source not found.**. These samples and tests are carried out by the Watercare Laboratory Services (WLS). The data shows that river quality was relatively consistent over the year, with maximum and average results similar to those reported for the previous annual reporting period (2021-2022).

Turbidity of the raw water is also measured on a continuous basis using an online turbidimeter. Results from the online turbidimeter are summarised in Figure 2-1. The data shows that raw water turbidity was generally low, with a median value of 16 NTU and a 90th percentile of 26 NTU. However, there were 708 instances where turbidity was above 100 NTU (based on 1-minute intervals), a large increase compared to the 38 instances in the previous annual reporting period. Increased rainfall, both in terms of total amounts and intensity is the likely reason.

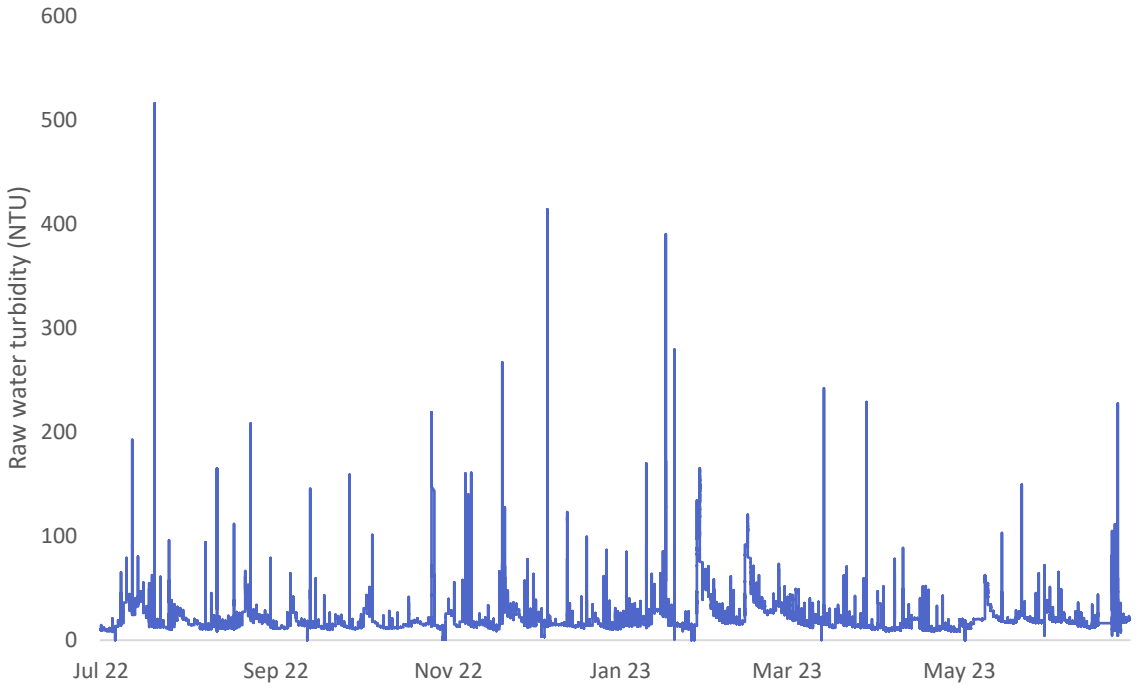


Figure 2-1 Turbidity of raw water taken from Waikato River

2.2 Waikato River Flow Rate and Take Volumes

Resource consents AUTH960089.01.05 and AUTH131259.01.02 authorise a combined maximum daily net take of 300,000 m^{3}water from the Waikato River for municipal supply purposes. The new resource consent facilitates the construction and operation of a new plant that can utilise the additional abstraction volumes, which is currently in the planning phase. In the event the Waikato River seven day rolling average flow at Rangiriri is less than 163.53 m^3/s for 10 or more consecutive days, the average daily net take volume across any consecutive two day period must not exceed 127,500 m^3 for water attributed to the secondary water take consent. The flows at Rangiriri are displayed in Figure 2-2. Watercare does not currently have the production capacity to exceed the

maximum daily net take. The abstraction rate did not exceed the consented limits in the 2022-2023 period.

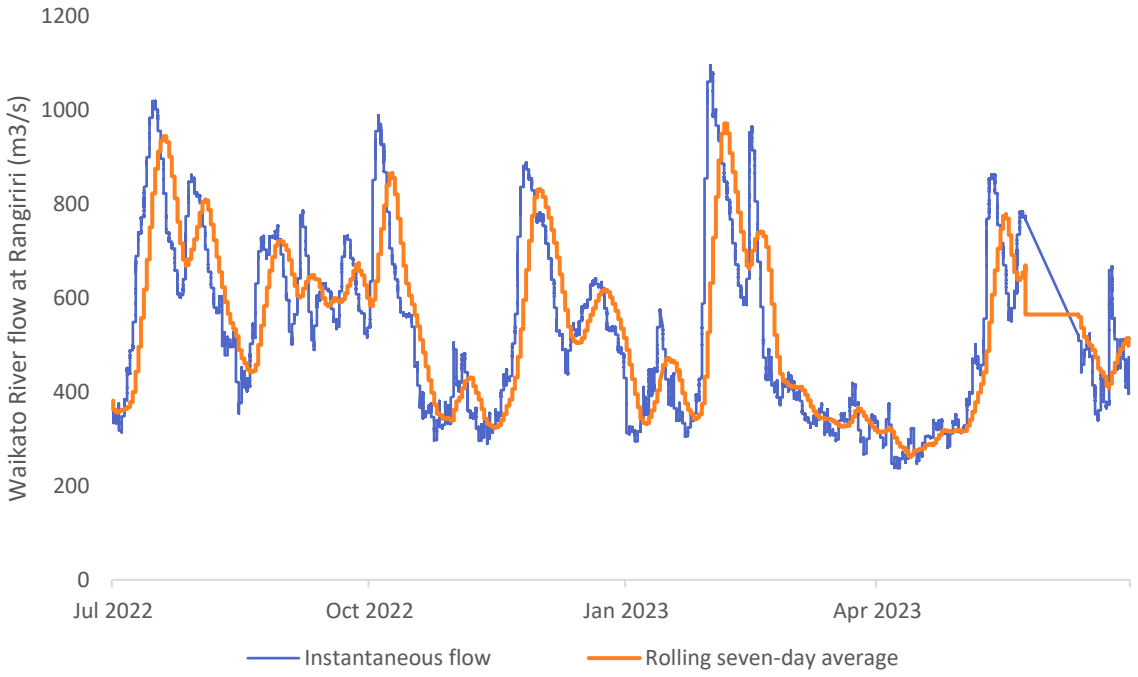


Figure 2-2 Waikato River flow

2.3 Effects of the Intake Structure

2.3.1 Fish entrainment and impingement on intake screens

The Waikato WTP intake structure has been designed to prevent fish entrainment and impingement and this is confirmed in the approved "Fisheries Management Plan (MFPv3 2007)" (FMP), section "3.2.2 Impingement" and "3.2.3 Entrainment". Results of the required monitoring defined in the FMP are described below.

Underwater (SCUBA) video of the exterior of the intake screens and an ichthyoplankton (fish effs and larvae) entrainment survey in the intake wet well were carried out on 29 May 2023 by Tonkin + Taylor and NZDS, followed by cleaning of the screens post-inspection. A copy of the survey report is provided in Appendix B. The key findings were:

- The screens clearance from the riverbed was 2.0 – 3.0 m below Screen 1 and approximately 4.5 m below Screens 2, 3 and 4.
- Water velocity was approximately 3.0 m/s.
- No fish impingement was recorded on any of the intake screens during the survey.
- No visible damage to the screens or openings greater than 2.5 mm were recorded, therefore no repairs or replacement are necessary.
- Build-up of algae was moderate.
- The density of smelt larvae in the penstock was 0.2 smelt/m3, which is well below the maximum density threshold (1.9 smelt/m^3) that would require further investigation. In accordance with the FMP, no further sampling is required in winter 2023.

Dredging below the screens did not occur in 2022-2023.

2.3.2 Effect of the intake structure on fish migration

The intake structure and location has been designed to minimise effects and is discussed in Section 3.1.1. (Upstream Migrations) of the FMP. No further monitoring is deemed necessary.

2.3.3 Effect of screen sparging

The air compressor used for sparging has been fitted with oil/filter traps to ensure oil does not discharge through the intake screens. Oi/filter traps are maintained on a regular basis.

Screen sparging is generally carried out daily to maintain the intake screens as required, based on abstraction rates and raw water conditions. There have been no changes to the installed screens nor their operation over the reporting period. No further monitoring is deemed necessary.

2.4 Cultural Indicators Monitoring and Ecological Enhancement

Resource consent AUTH131259.01.02 requires the invitation of Te Whakakitenga o Waikato Incorporated and Te Taniwha o Waikato to participate in a Waikato River water take "Tangata Whenua Liaison Group" ("TWLG"). A Cultural Indicators Management Plan must be developed to incorporate appropriate matters of importance to the TWLG to assist Watercare and the Waikato Regional Council to understand the cultural effects of the activities authorised by the operation of the WTP.

The first meeting with the TWLG occurred in December 2022 and a second meeting in August 2023. An overview of WTP performance and consent matters was provided. The TWLG have discussed preliminary ideas for the preferred cultural indicators and the group is progressing on actions to creating the Management Plan.

The Ecological Enhancement Plan for Haywards Landing was also discussed by the TWLG. The funding of $2 million per annum to the Waikato River Clean-up Trust began in 2023 which will in part be allocated to transformation of Haywards Landing. At the request of the TWLG, Watercare will propose potential enhancement works to the group for review, which will occur in 2023-2024.

3 DISCHARGES TO THE WAIKATO RIVER

3.1 Types of discharges

3.1.1 Operational discharges

Resource consent AUTH137497.01.01 and AUTH14278.01.01 authorises the discharge of "*process water and/or other water*" and "*off-spec and process water*" from the Waikato and W50 WTPs respectively into the Waikato River. These include discharges from the treatment process itself, typically called "process discharges", as well as discharges from maintenance activities. To differentiate between the two, the overall discharges authorised under these resource consents are collectively referred to as "operational discharges" in this report, which include the following:

- **Planned process discharges:** these are discharged via the off-spec pipeline and occur because of routine treatment plant processes, including supernatant discharges from solids dewatering, membrane clean or backwash discharges, activated carbon filters backwash discharges and activated carbon filters' filter to waste discharges.
- **Unplanned process discharges:** these may occur when there is a failure of control instruments and/or infrastructure resulting in overflows or rapid draining to prevent further damage. These are primarily discharged to the Waikato River via the off-spec pipeline but can also overflow into Wairiri Stream (referred to as the "unnamed tributary" in the resource consents) through two overflow points.
- **Maintenance discharges:** these are also discharged via the off-spec pipeline and include tank cleaning, replacement or commissioning of plant equipment or infrastructure, and periodical discharge of rainwater from chemical containment bunds.
- **Off-spec discharges:** these are discharged via the off-spec pipeline and comprises of partially treated or fully treated water that does not comply with the Drinking Water Standards for New Zealand (2022).

3.1.2 Stormwater discharges

Authorised by resource consent AUTH137497.03.01, these discharges include stormwater from the plant which is directed into a detention pond. When full, the detention pond discharges to the Wairiri Stream that runs adjacent to the WTP and flows into the Waikato River.

3.2 Quality of Operational Discharges

3.2.1 Introduction

Resource consents AUTH137497.01.01 and AUTH142778.01.01 requires the quality of operational discharges to be within the following limits during the period of two years following commencement of the consents (stage one discharge):

- pH between 6.5-9
- Total residual chlorine ≤ 0.25 mg/L
- Fluoride ≤ 2 mg/L
- Suspended solids ≤ 100 mg/L
- Total soluble aluminium ≤ 8.0 mg/L

Stage two discharge limits applied from 25 May 2023. A reduction in the suspended solids and dissolved aluminium limits are effective from this date. From 25 May, the quality of the operational discharges is required to be within the following limits (changes to previous limits in bold):

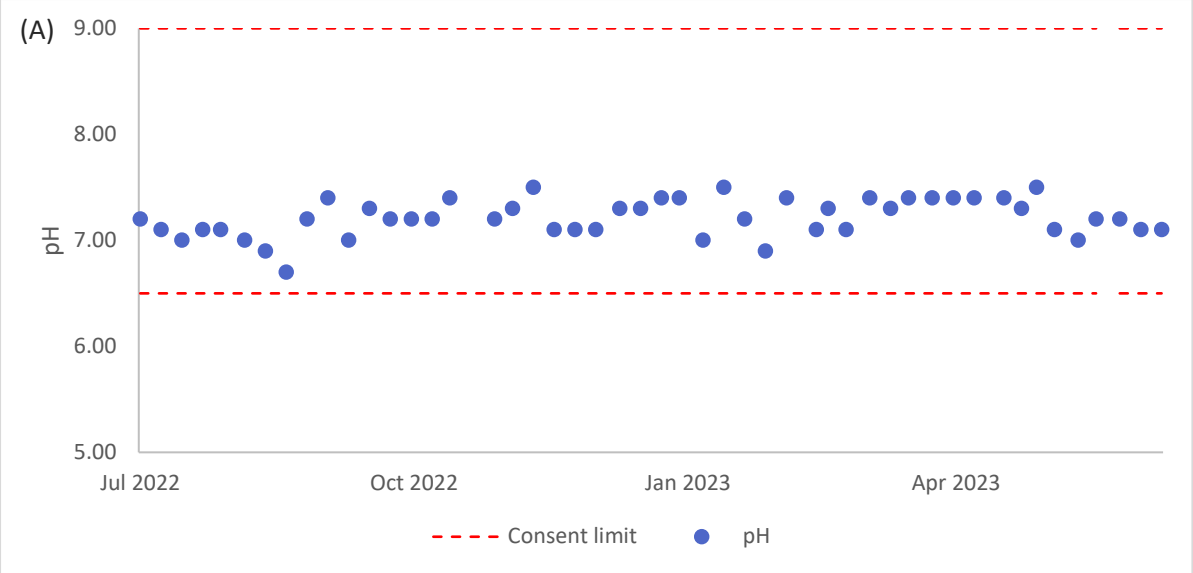
- pH between 6.5-9
- Total residual chlorine ≤ 0.25 mg/L
- Fluoride ≤ 2 mg/L
- **Suspended solids ≤ 50 mg/L**
- **Total soluble aluminium ≤ 4.0 mg/L**

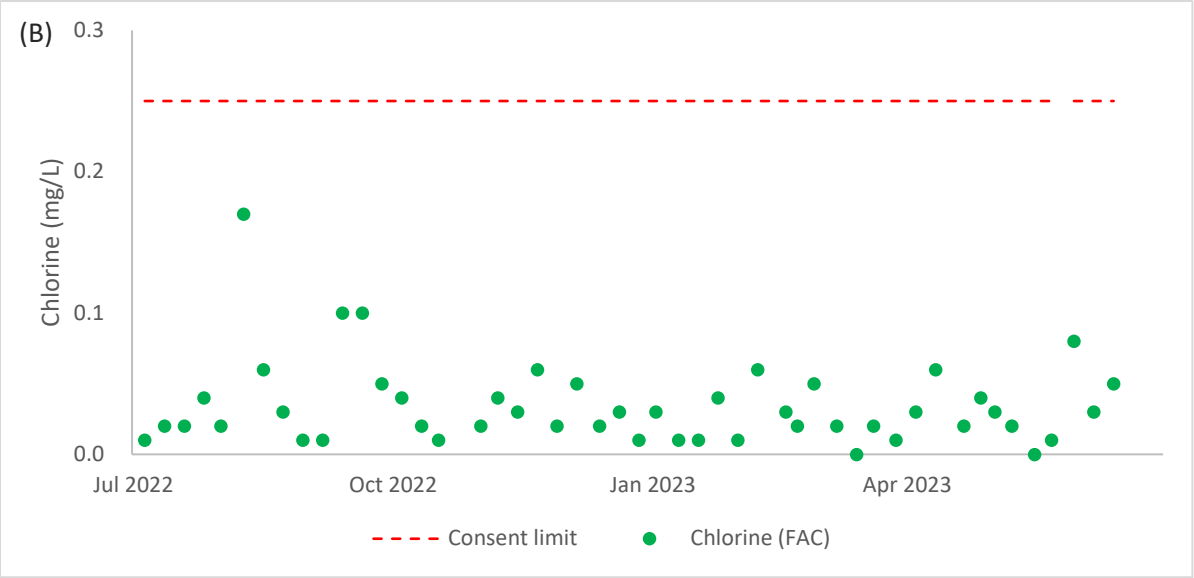
The quality of operational discharges is summarised in the following sub-sections.

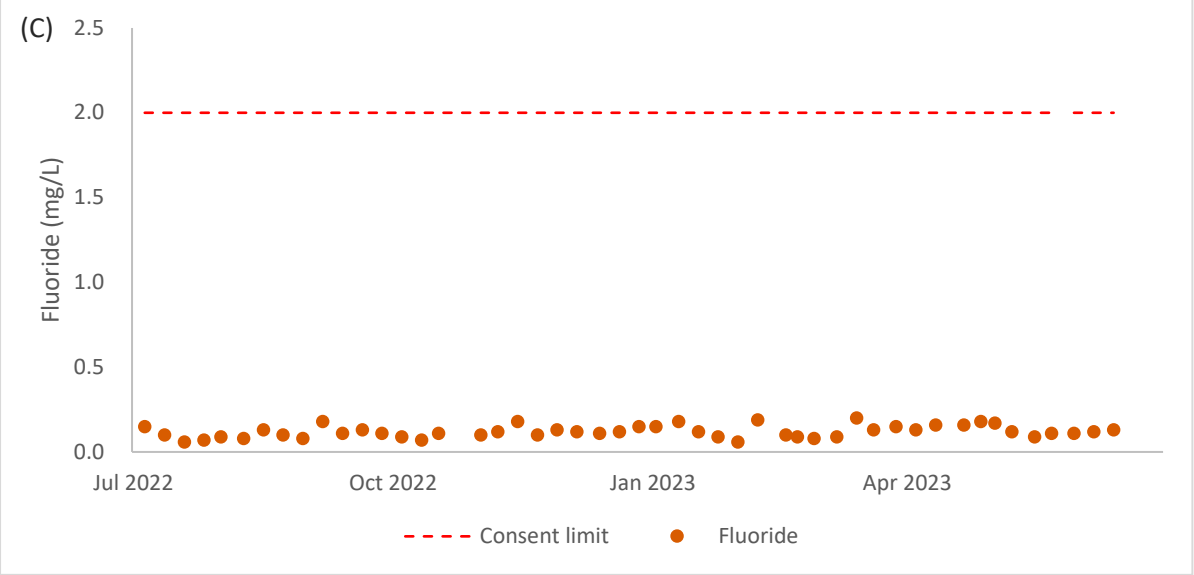
3.2.2 Planned process discharges

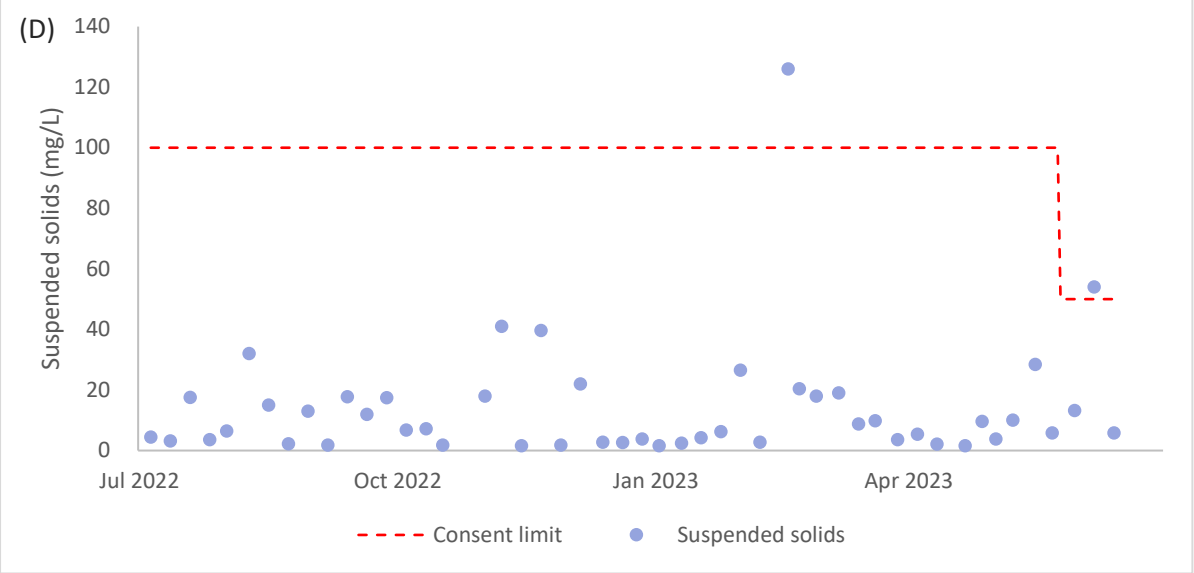
Samples of operational discharges are taken weekly from the off-spec pipeline and tested by WLS. Given these samples are taken once a week, they are representative of the planned process discharges which occur on a continuous basis. The off-spec pipeline discharges directly to the Waikato River and has two overflow points to the Wairiri Stream. The plant staff did not report any overflows to the stream in this reporting period. No glycerine discharges occurred in this monitoring period.

The sample results for the reporting period are provided in **Error! Reference source not found.** and illustrated in Figure 3-1 (A-E). Four sets of samples, except chlorine, are missing on the dates 24th October 2022, 20 June 2023, and 27 June 2023 due to a breakdown of internal processes. As shown in Figure 3-2 Process discharges for 2022-2023Figure 3-1(D), there were two exceedances of suspended solids in the monitoring period. The suspended solids result of 126 mg/L on 17 February was a result of high incoming turbidity and organics from the Waikato River. The high organic concentrations meant the plant was unable to run the wastewater recycle, therefore the clarified water waste overflows to the off-spec pipeline. The result of 54 mg/L on 6 June 2023 breached the lower stage 2 discharge limit of 50 mg/L, however investigations did not find the cause of the exceedance.




(B)
0.3
0.2
0.1
0.0
Chlorine (mg/L)
Jul 2022
Oct 2022
Jan 2023
Apr 2023
Consent limit
Chlorine (FAC)


(C)
2.5
2.0
1.5
1.0
0.5
0.0
Fluoride (mg/L)
Jul 2022
Oct 2022
Jan 2023
Apr 2023
Consent limit
Fluoride


(D)
140
120
100
80
60
40
20
0
Suspended solids (mg/L)
Jul 2022
Oct 2022
Jan 2023
Apr 2023
Consent limit
Suspended solids

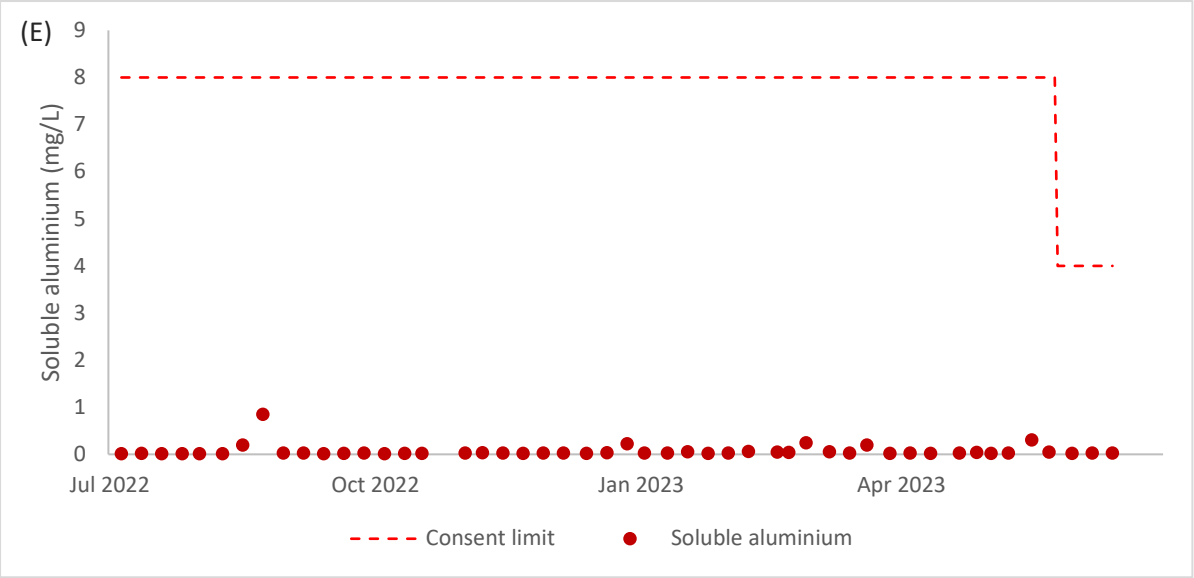


Figure 3-1(A-E) Discharge chemistry results for Waikato WTP discharges (2022-2023).

3.2.3 Unplanned process discharges

As the unplanned process discharges are intermittent and unpredictable in nature, they are not always captured by routine weekly sampling. Notwithstanding this, the following is noted about unplanned discharges:

- Unplanned process discharges result from the Membrane Inlet Channel (MIC) and activated carbon filter overflows, which occur on average between two to three times per week and results on an average discharge volume of approximately 477 m^3 each time;
- No unplanned discharges contained chlorinated or fluoridated water;
- The discharges made were all returned back to the Waikato River via the off-spec pipeline;
- Water that is discharged from the MIC has been coagulated and passed through the clarifiers;
- Water that is discharged from the activated carbon filters inlet channel has passed through the membranes but not the activated carbon;
- The pH of the water at the activated carbon filters inlet channel is between 6 and 7.

3.2.4 Maintenance discharges

In addition to the weekly monitoring by WLS, some sampling and testing is also carried out by the WTP operators during maintenance activities. The laboratory at the WTP is not IANZ accredited, however, they provide a useful indication of the water quality for these irregular, low volume/short duration discharges which can often happen outside of the routine sampling days.

The maintenance activities and results from in-house testing of their discharges are summarised as follows:

- **Draining of chemical bunds:** Stormwater collected in the chemical bunds can only be drained by manual operation of a valve, the position of which is monitored by the plant control system and will generate an alarm if the valve is left open for more than 30 minutes. The water collected in the chemical containment bunds is tested for contaminants to confirm it meets discharge criteria before the bunds are drained. If the discharge criteria are not met, then a vacuum truck is used to remove the water in the containment bunds and dispose off-site. The water quality

results for the discharges from the chemical containment bunds into the off-spec pipeline are presented in Appendix D. As can be seen, all parameters met the discharge criteria.

- **Draining of clarifiers:** In-house, non-accredited sampling and testing is undertaken during draining of clarifiers. Details regarding these events and in-house test results are provided in Appendix E. As these samples were taken specifically during the discharge of clean out water from the clarifier, the total suspended solids (TSS) results can be high. It is noted that each clarifier draining event lasts for up to approximately two hours and result in an additional discharge of between 400 to 600 m^3 into the off-spec pipeline, in combination with the near continuous planned process discharges and as such, the TSS elevated <10 mg/L above the consented limit from the clarifiers are expected to be compliant in the discharge to the Waikato River with mixing. Given this limited volume and duration, it is expected that shortly after that period of two hours, the TSS concentrations in the overall discharge would go back to the levels prior to the clarifier being drained.

One of the two clarifier drains undertaken in 2022-2023 was non-compliant for TSS. The drain occurred on the 14 April 2023 and reported TSS results of 137 mg/L at 5 minutes into the discharge and 142 mg/L at 30 minutes into the discharge. A project for the capture and treatment of the discharges to the off-spec pipeline is currently in the design phase, which should eliminate the intermittent, short-term exceedances during cleaning of clarifiers. In the meantime, the WTP operators are taking all steps possible to minimise the TSS peaks during these events, such as removing as much sludge through blowdown valves as possible before draining.

3.3 Volumes of Operational Discharges

Resource consent AUTH137497.01.01 establishes a daily discharge volume limit of 20,000 m^3 for the operational discharges or an instantaneous discharge rate not exceeding 2,450 L/s. As described in section 3.1, these include the planned and unplanned process discharges, as well as maintenance discharges.

The volume of total process discharges is calculated by adding all planned and unplanned discharges from the various parts of the treatment process, and then subtracting the wastewater that is recycled back to the treatment. The maintenance discharges (e.g., from chemical bunds and clarifier drains) are then added to the process total to estimate the total daily volume of operational discharges. The volume for each clarifier draining event is typically between 400 to 600 m^3, and so an average of 500 m^3 has been used as an estimate for each event.

The daily volumes for the operational discharges are detailed in Appendix F and summarised in Figure 3-2 below.

The average total daily discharge volume during the reporting period was 8,769 m^3 and the maximum total discharge of 19,931 m^3 on 10 February 2023. There were no exceedances in this monitoring period.

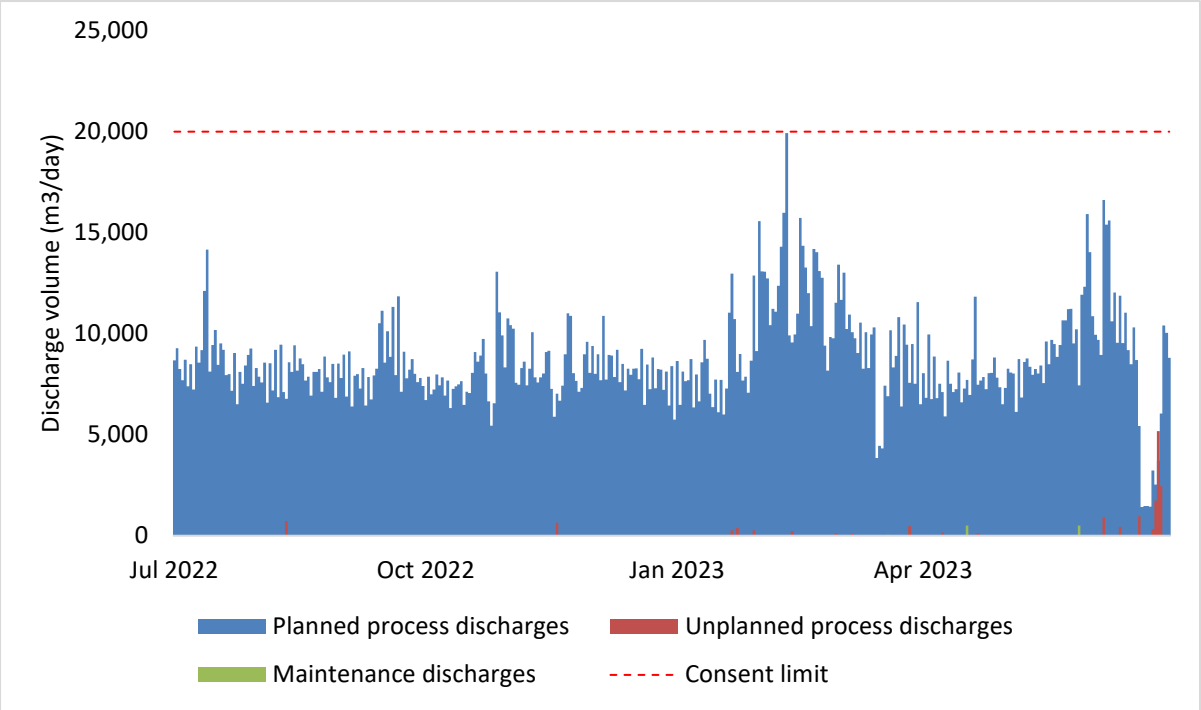


Figure 3-2 Process discharges for 2022-2023

3.4 Treated Off-spec Water Discharges

There were no discharges of off-spec treated water (authorised under resource consent AUTH142778.01.01) during the reporting period.

3.5 Stormwater Discharges

Stormwater runoff from the WTP is discharged to the Wairiri Stream via a treatment pond. No process discharges are connected to the installed stormwater pipework system. Stormwater from the grounds surrounding the plant is diverted through collection drains that discharge to a culvert downstream of the detention pond to minimise the flow through the plant stormwater system. Stormwater collected in the exterior chemical bunded areas are isolated, monitored and drained directly to the off-spec pipeline as described in Section 3.2.4.

No erosion or scouring was evident at the point of discharge. The discharge point has large gravel rocks (see Figure 3-3 and Figure 3-4), which slow high volume discharges and reduce erosion.

Stream banks are gently sloping. Vegetation is limited in some sections of the stream, with small grasses and scrub. In other sections of the stream, vegetation is more developed with Mānuka, and various grasses close to the main path of the stream. There was no evidence of vegetation slumping because of discharges to the unnamed stream.

Overall, no adverse effects from the stormwater discharges were identified during the 2022-2023 reporting period.

Figure 3-3 Discharge outlet location into the Wairiri Stream. View looking upstream.

Figure 3-4 Discharge outlet location into the Wairiri Stream. View looking downstream.

4 WATER CONSERVATION

4.1 Leakages from the Water Pipeline

There were no leakages from the Waikato 1 Treated Watermain between 1 July 2022 and 30 June 2023.

4.2 Water Efficiency Programme

Watercare has published the Auckland Water Efficiency Plan 2021 to 2025[1], which includes a section detailing its water efficiency programmes and achievements. In summary, Watercare's water efficiency strategy has four main pillars:

- **Municipal water efficiency programme**: related to reducing water use by Watercare itself, mainly through reuse at its treatment plants, and by Auckland Council, through initiatives targeted at saving 30% of water use.
- **Residential water efficiency programme**: includes working with schools and sports clubs to raise awareness and water-saving campaigns, and a partnership with EcoMatters to give households the opportunity to have their water use audited and receive a report on the water and dollar savings they can achieve through simple changes.
- **Commercial water efficiency programme:** involves working with key costumers to reduce demand from our largest users, through initiatives such as the digital meter roll-out project across high-use industrial users, schools and sports clubs.
- **Non-revenue water reduction programme**: related to initiatives focused on reducing three aspects of non-revenue water: leakage, under-reading of meters, and unauthorised use.

In 2022-2023, Watercare surveyed 6,000 km of water mains and identified 4,182 leaks across the whole region. More details on water efficiency initiatives, performance, challenges, targets, and strategies for the future are available directly in the Auckland Water Efficiency Plan 2021 to 2025.

[1] https://waterefficiencyplan.watercare.co.nz/

5 MEASURES TO PREVENT PESTS IN WATER

The WTP has been designed to prevent animal pests and invasive plants entering the treated water. For example, all treated water must pass through the membranes that have a pore size of 0.035 microns, which is substantially smaller than any animal or plant. All treated water storage tanks in the treatment plant and along the pipeline have sealed access hatches that prevent entry of foreign matter.

In addition, the treated water pipeline has been designed to always operate under positive pressure, therefore preventing the possibility of ingress of groundwater, invasive plants or pests. Procedural controls are in place during maintenance works that require a drain-down to secure the empty sections and prevent ingress.

6 ENVIRONMENTAL INCIDENTS

There were no equipment failures, chemical spills or maintenance activities undertaken in the reporting period that resulted in any observed adverse environmental effects.

7 CONCLUSIONS

This report presents annual monitoring data for consents AUTH960089.01.05, AUTH131259.01.02, 960090, AUTH137497.02.01, AUTH960092.01.04, AUTH137497.03.01, AUTH137497.01.01 and AUTH142778.01.01.

During clarifier drains there are some instances where total suspended solids are above the discharge limit prior to entering the off-spec pipeline, where it combines with the remainder of the planned process discharge. The Waikato Water Treatment Plant exceeded the discharge quality for suspended solids in AUTH137497.01.01 on 17 February and 14 April 2023 as part of the routine discharge sampling.

The Waikato and Waikato 50 Water Treatment Plants were fully compliant across all other consents for the conditions considered in this report as shown in Table 7-1.

Table 7-1 Resource consent compliance summary for 2022-2023

Consent	Consent subcategory	Compliance status
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AUTH137497.01.01	Discharge of process and other water into the Waikato River	Non-compliant
AUTH142778.01.01	Discharge of off-spec and process water into the Waikato River	Compliant

Appendix A. Raw Water Quality Data

Waikato 175 WTP Raw Water Quality

Acid Herbicides

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
1080 (Sodium floroacetate)	mg/L	2	0	0	0	0
2-4-5-Trichlorophenoxyacetic	mg/L	26	0	0	0	0.0001
2-4-Dichlorophenoxyacetic acid	mg/L	26	0	0	0	0.0001
4-(2-4-Dichlorophenoxy) butano	mg/L	26	0	0	0	0.0001
Bentazone	mg/L	26	0	0	0	0.0001
Dichlorprop	mg/L	26	0	0	0	0.0001
MCPA	mg/L	26	0.00034	0	1.3077E-05	0.0001
Mecoprop (MCPP)	mg/L	26	0	0	0	0.0001
Picloram	mg/L	26	0	0	0	0.0001
Triclopyr	mg/L	26	0	0	0	0.0001

Chemical and Physical

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
abs254	abs units	13	0.23999999	0.099	0.14607692	0.005
Alkalinity Total	mg/L	13	36	24	31.3846154	1
Aluminium	mg/L	51	5.5999999	0.28999999	0.94862745	0.005
Bromate	mg/L	13	0	0	0	0.005

Bromide	mg/L	13	0.0531	0.036	0.04362308	0.005
Calcium	mg/L	16	10	6.5999999	7.81874999	0.01
Calcium Hardness	mg/L	16	25	17	19.625	0.025
Chlorate	mg/L	13	0	0	0	0.01
Chloride	mg/L	13	20.7999992	10.3000002	13.5307692	0.02
Chlorite	mg/L	13	0	0	0	0.005
Colour	Hazen Units	7	50	15	25.7142857	5
Conductivity	mS/m	13	16.7999992	11.3999996	14.3	0.5
Cyanide	mg/L	4	0	0	0	0.005
Fluoride	mg/L	13	0.14	0.1	0.12307692	0.02
Iodide	mg/L	4	0.0021	0	0.000925	0.001
Iron	mg/L	16	5.30000019	0.70999998	1.51187501	0.002
Magnesium	mg/L	16	3	2.4000001	2.66249999	0.001
Magnesium Hardness	mg/L	16	12	10	11	0.0041
Manganese	mg/L	16	0.18000001	0.055	0.0790625	0.0005
pH	pH unit	51	7.69999981	6.9000001	7.23725486	0.1
Potassium	mg/L	4	3.4000001	2.79999995	3.02500004	0.05
Silicon	mg/L	4	35	33	33.5	0.1
Sodium	mg/L	4	15	13	14	0.1
Sulphate	mg/L	13	12.8999996	7.69999981	10.2861536	0.02
Suspended Solids	mg/L	13	72	12	26.8230768	0.2
Total Dissolved Solids	mg/L	13	150	110	126.153846	15
Total Hardness	mg/L	16	40	27	31.125	0.029
Total Organic Carbon TOC	mg/L	13	6.30000019	2.70000005	3.93846158	0.1

Microbiology

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Confirmed Cryptosporidium per 10L	/10 L	12	3.5999999	0	0.57749999	0.5
Confirmed Giardia per 10L	/10 L	12	0.70999998	0	0.10833333	0.5
Escherichia coli	MPN/100mL	12	7300	31	861.5	1

Nutrients

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Ammonia	mg/L	4	0.061	0.018	0.03625	0.005
Dissolved Reactive Phosphorus	mg/L	13	0.046	0.011	0.02607692	0.002
Nitrate	mg/L	13	0.91900003	0.396	0.58207693	0.002
Nitrite	mg/L	13	0.007	0	0.00379231	0.002
TKN	mg/L	4	0.45199999	0.27500001	0.35224999	0.1
Total Phosphorus	mg/L	13	0.175	0.055	0.09161538	0.004

Plasticisers

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Di(2-ethylhexyl) adipate	µg/L	25	0	0	0	2
Di(2-ethylhexyl) phthalate	µg/L	25	0	0	0	2

Polycyclic aromatic hydrocarbons

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Benzo[a]pyrene	µg/L	25	0	0	0	0.1

Semi Volatile Organic Compounds - Organochlorine Pesticides

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Aldrin	µg/L	25	0	0	0	0.01
alpha-Chlordan	µg/L	13	0	0	0	0.01
alpha-Chlordane	µg/L	12	0	0	0	0.01
cis-permethrin	mg/L	26	0	0	0	0.0002
gamma-BHC (lindane)	µg/L	25	0	0	0	0.01
gamma-Chlordane	µg/L	25	0	0	0	0.01
Gamma-chlordane	mg/L	26	0	0	0	0
Heptachlor	µg/L	25	0	0	0	0.01
Heptachlor epoxide	µg/L	25	0	0	0	0.01
Hexachlorobenzene	mg/L	1	0	0	0	0.0005
Hexachlorobenzene	µg/L	25	0	0	0	0.1
Methoxychlor	µg/L	25	0	0	0	0.2
Permethrin (cis + trans)	µg/L	25	0	0	0	0.2
pp-DDT	µg/L	25	0	0	0	0.2
Procymidone	µg/L	25	0	0	0	0.2

trans-permethrin	mg/L	26	0	0	0	0.0002

Semi Volatile Organic Compounds - Organonitrogen Herbicides

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Alachlor	µg/L	25	0	0	0	0.2
Atrazine	µg/L	25	0	0	0	0.1
Metolachlor	µg/L	25	0	0	0	0.1
Molinate	µg/L	25	0	0	0	0.1
Pendimethalin	µg/L	25	0	0	0	0.2
Propanil	µg/L	25	0	0	0	0.1
Simazine	µg/L	25	0	0	0	0.1
Terbuthylazine	µg/L	25	0	0	0	0.2
Trifluralin	µg/L	25	0	0	0	0.2

Semi Volatile Organic Compounds - Organophosphorus Pesticides

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Chlorpyrifos	µg/L	12	0	0	0	0.2
Chlorpyriphos	µg/L	13	0	0	0	0.2
Diazinon	µg/L	25	0	0	0	0.1
Pirimiphos-meth	µg/L	13	0	0	0	0.2
Pirimiphos-methyl	µg/L	12	0	0	0	0.2

Semi Volatile Organic Compounds - Plasticisers

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Methoxychlor	mg/L	26	0	0	0	0.0002

Trace Elements

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Antimony	mg/L	4	0	0	0	0.001
Arsenic	mg/L	16	0.016	0.0076	0.01113125	0.0001
Barium	mg/L	4	0.031	0.022	0.0255	0.0002
Boron	mg/L	4	0.15000001	0.13	0.1425	0.005
Cadmium	mg/L	4	0	0	0	0
Chromium	mg/L	4	0.00075	0	0.0004775	0.0005
Copper	mg/L	4	0.0011	0.0005	0.00072	0.0002
Lead	mg/L	4	0.00034	0.00017	0.00027	0.0001
Lithium	mg/L	4	0.05	0.033	0.04075	0.0003
Mercury	mg/L	16	0	0	0	0
Molybdenum	mg/L	4	0.00037	0	0.00018	0.0003
Nickel	mg/L	4	0.00071	0	0.00035	0.0001
Selenium	mg/L	4	0	0	0	0.0005
Zinc	mg/L	4	0.0052	0.0021	0.003275	0.001

Trihalomethanes

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
bromodichloromethane	mg/L	14	0.0065	0	0.00078571	0.0001
bromoform	mg/L	14	0	0	0	0.0001
chloroform	mg/L	14	0.015	0	0.00192857	0.0001
dibromochloromethane	mg/L	14	0.0035	0	0.00035714	0.0001
THM Ratio		14	0.16	0	0.02	0.1

Volatile Organic Compounds

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
1-1-1-trichloroethane	mg/L	14	0	0	0	0.0001
1-2-3-trichlorobenzene	mg/L	14	0	0	0	0.0001
1-2-4-trichlorobenzene	mg/L	14	0	0	0	0.0001
1-2-dichlorobenzene	mg/L	14	0	0	0	0.0001
1-2-dichloroethane	mg/L	14	0	0	0	0.0001
1-4-dichlorobenzene	mg/L	14	0	0	0	0.0001
benzene	mg/L	14	0	0	0	0.0001
carbon tetrachloride	mg/L	14	0	0	0	0.0001
ethylbenzene	mg/L	14	0	0	0	0.0001
m- & p-xylene	mg/L	14	0	0	0	0.0001
styrene	mg/L	14	0	0	0	0.0001

tetrachloroethylene	mg/L	14	0	0	0	0.0001
toluene	mg/L	14	0	0	0	0.0001
trans-1-2-dichloroethene	mg/L	14	0	0	0	0.0001
trichloroethylene	mg/L	14	0	0	0	0.0001

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Algae and Cyanobacteria biovolume	µm³/mL	51	6000000	0	1312941.18	0.5
Algae and Cyanobacteria cell count	cells/mL	51	17000	0	3700	5
Algae and Cyanobacteria colony count	colonies/mL	51	12000	0	1678.82353	5
COA_File		1				0
COC_File		1				0
Colorseed Cryptosporidium recovery	%	12	42	15	26.6666667	
Colorseed Giardia recovery	%	12	44	15	29.75	
Cyanobacteria biovolume	µm³/mL	51	170000	0	22663.7059	0.5
Cyanobacteria cell count	cells/mL	51	4800	0	780	5
Cyanobacteria colony count	colonies/mL	51	410	0	70.1372549	5
Total coliforms	MPN/100mL	12	24000	2000	7575	1

Waikato 50 WTP Raw Water Quality

Acid Herbicides

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
1080 (Sodium floroacetate)	mg/L	2	0	0	0	0
2-4-5-Trichlorophenoxyacetic	mg/L	27	0	0	0	0.0001
2-4-Dichlorophenoxyacetic acid	mg/L	27	0.00014	0	1E-05	0.0001
4-(2-4-Dichlorophenoxy) butano	mg/L	27	0	0	0	0.0001
Bentazone	mg/L	27	0	0	0	0.0001
Dichlorprop	mg/L	27	0	0	0	0.0001
MCPA	mg/L	27	0	0	0	0.0001
Mecoprop (MCPP)	mg/L	27	0	0	0	0.0001
Picloram	mg/L	27	0	0	0	0.0001
Triclopyr	mg/L	27	0	0	0	0.0001

Chemical and Physical

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
abs254	abs units	13	0.25	0.065	0.13961539	0.005
Alkalinity Total	mg/L	12	37	27	32.0833333	1
Aluminium	mg/L	52	3.20000005	0.28	0.89	0.005

Bromate	mg/L	16	0	0	0	0.005
Bromide	mg/L	16	0.0566	0.026	0.04376875	0.005
Calcium	mg/L	16	10	6.5999999	7.80625001	0.01
Calcium Hardness	mg/L	16	25	16	19.5	0.025
Chlorate	mg/L	16	0	0	0	0.01
Chloride	mg/L	13	17	11.8000002	13.5692307	0.02
Chlorite	mg/L	16	0	0	0	0.005
Colour	Hazen Units	8	45	7.5	23.4375	5
Conductivity	mS/m	193	18.3999996	11.5	14.4661375	0.5
Cyanide	mg/L	4	0	0	0	0.005
Fluoride	mg/L	12	0.16	0.1	0.12083333	0.02
Iodide	mg/L	4	0.0017	0	0.000425	0.001
Iron	mg/L	16	2.79999995	0.63	1.24625	0.002
Magnesium	mg/L	16	3.29999995	2.29999995	2.74375001	0.001
Magnesium Hardness	mg/L	16	14	9.60000038	11.33125	0.0041
Manganese	mg/L	16	0.13	0.043	0.074875	0.0005
pH	pH unit	231	8.89999962	6.69999981	7.16606335	0.1
Potassium	mg/L	4	4.19999981	2.9000001	3.42499995	0.05
Silicon	mg/L	4	38	28	32.75	0.1
Sodium	mg/L	4	15	12	13.5	0.1
Sulphate	mg/L	13	15.3000002	9	10.4561539	0.02
Suspended Solids	mg/L	13	56.7999992	9.39999962	20.976923	0.2
Total Dissolved Solids	mg/L	13	140	84	110.153846	15
Total Hardness	mg/L	16	39	26	30.875	0.029

Total Organic Carbon TOC	mg/L	13	5.69999981	2.4000001	3.73076921	0.1

Microbiology

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Confirmed Cryptosporidium per 10L	/10 L	12	1.29999995	0	0.38416666	0.5
Confirmed Giardia per 10L	/10 L	12	2	0	0.65916666	0.5
Escherichia coli	MPN/100mL	53	14000	0	760.245283	1

Nutrients

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Ammonia	mg/L	4	0.068	0.034	0.047	0.005
Dissolved Reactive Phosphorus	mg/L	13	0.029	0.021	0.02530769	0.002
Nitrate	mg/L	13	0.98100001	0.43799999	0.61376922	0.002
Nitrite	mg/L	13	0.0064	0	0.00313846	0.002
TKN	mg/L	4	0.77499998	0.36399999	0.55625	0.1
Total Phosphorus	mg/L	13	0.107	0.045	0.07838461	0.004

Plasticisers

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Di(2-ethylhexyl) adipate	µg/L	13	0	0	0	2

Di(2-ethylhexyl) phthalate	µg/L	13	0	0	0	2

Polycyclic aromatic hydrocarbons

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Benzo[a]pyrene	µg/L	13	0	0	0	0.1

Semi Volatile Organic Compounds - Organochlorine Pesticides

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Aldrin	µg/L	13	0	0	0	0.01
alpha-Chlordan	µg/L	7	0	0	0	0.01
alpha-Chlordane	µg/L	6	0	0	0	0.01
cis-permethrin	mg/L	27	0	0	0	0.0002
gamma-BHC (lindane)	µg/L	13	0	0	0	0.01
gamma-Chlordane	µg/L	13	0	0	0	0.01
Gamma-chlordane	mg/L	27	0	0	0	0
Heptachlor	µg/L	13	0	0	0	0.01
Heptachlor epoxide	µg/L	13	0	0	0	0.01
Hexachlorobenzene	mg/L	1	0	0	0	0.0005
Hexachlorobenzene	µg/L	13	0	0	0	0.1
Methoxychlor	µg/L	13	0	0	0	0.2
Permethrin (cis + trans)	µg/L	13	0	0	0	0.2

pp-DDT	µg/L	13	0	0	0	0.2
Procymidone	µg/L	13	0	0	0	0.2
trans-permethrin	mg/L	27	0	0	0	0.0002

Semi Volatile Organic Compounds - Organonitrogen Herbicides

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Alachlor	µg/L	13	0	0	0	0.2
Atrazine	µg/L	13	0	0	0	0.1
Metolachlor	µg/L	13	0	0	0	0.1
Molinate	µg/L	13	0	0	0	0.1
Pendimethalin	µg/L	13	0	0	0	0.2
Propanil	µg/L	13	0	0	0	0.1
Simazine	µg/L	13	0	0	0	0.1
Terbuthylazine	µg/L	13	0	0	0	0.2
Trifluralin	µg/L	13	0	0	0	0.2

Semi Volatile Organic Compounds - Organophosphorus Pesticides

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Chlorpyrifos	µg/L	6	0	0	0	0.2
Chlorpyriphos	µg/L	7	0	0	0	0.2
Diazinon	µg/L	13	0	0	0	0.1

Pirimiphos-meth	µg/L	7	0	0	0	0.2
Pirimiphos-methyl	µg/L	6	0	0	0	0.2

Semi Volatile Organic Compounds - Plasticisers

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Methoxychlor	mg/L	27	0	0	0	0.0002

Trace Elements

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Antimony	mg/L	4	0	0	0	0.001
Arsenic	mg/L	16	0.014	0.0076	0.01086875	0.0001
Barium	mg/L	4	0.042	0.027	0.03175	0.0002
Boron	mg/L	4	0.14	0.093	0.1125	0.005
Cadmium	mg/L	4	0	0	0	0
Chromium	mg/L	4	0.0014	0	0.0007075	0.0005
Copper	mg/L	4	0.0041	0.0013	0.002225	0.0002
Lead	mg/L	4	0.0013	0.00037	0.000655	0.0001
Lithium	mg/L	4	0.042	0.028	0.0345	0.0003
Mercury	mg/L	16	0	0	0	0
Molybdenum	mg/L	4	0.00032	0	8E-05	0.0003
Nickel	mg/L	4	0.0011	0.00029	0.0006625	0.0001

Selenium	mg/L	4	0	0	0	0.0005
Zinc	mg/L	4	0.0099	0.0039	0.00565	0.001

Trihalomethanes

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
bromodichloromethane	mg/L	14	0	0	0	0.0001
bromoform	mg/L	14	0	0	0	0.0001
chloroform	mg/L	14	0	0	0	0.0001
dibromochloromethane	mg/L	14	0	0	0	0.0001
THM Ratio		14	0	0	0	0.1

Volatile Organic Compounds

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
1-1-1-trichloroethane	mg/L	14	0	0	0	0.0001
1-2-3-trichlorobenzene	mg/L	14	0	0	0	0.0001
1-2-4-trichlorobenzene	mg/L	14	0	0	0	0.0001
1-2-dichlorobenzene	mg/L	14	0	0	0	0.0001
1-2-dichloroethane	mg/L	14	0	0	0	0.0001
1-4-dichlorobenzene	mg/L	14	0	0	0	0.0001
benzene	mg/L	14	0	0	0	0.0001
carbon tetrachloride	mg/L	14	0	0	0	0.0001

ethylbenzene	mg/L	14	0	0	0	0.0001
m- & p-xylene	mg/L	14	0	0	0	0.0001
styrene	mg/L	14	0	0	0	0.0001
tetrachloroethylene	mg/L	14	0	0	0	0.0001
toluene	mg/L	14	0	0	0	0.0001
trans-1-2-dichloroethene	mg/L	14	0	0	0	0.0001
trichloroethylene	mg/L	14	0	0	0	0.0001

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Algae and Cyanobacteria biovolume	µm³/mL	53	58000000	140000	2986415.09	0.5
Algae and Cyanobacteria cell count	cells/mL	53	13000	570	4255.28302	5
Algae and Cyanobacteria colony count	colonies/mL	53	11000	380	1859.62264	5
COA_File		7				0
COC_File		5				0
Colorseed Cryptosporidium recovery	%	12	60	16	32.4166667	
Colorseed Giardia recovery	%	12	70	17	36.0833333	
Cyanobacteria biovolume	µm³/mL	53	140000	0	19546.2453	0.5
Cyanobacteria cell count	cells/mL	53	5800	0	737.679245	5
Cyanobacteria colony count	colonies/mL	53	400	0	65	5
Total coliforms	MPN/100mL	53	24000	0	6601.88679	1

Appendix B. Screen Entrainment Survey Report

4 July 2023
Job No: 20793.7000

Watercare Services Ltd
Private Bag 92521
Wellesley Street
Auckland 1141

Attention: Emma Baker

Dear Emma

Waikato Water Treatment Plan Intake: Fish Impingement and Entrainment Survey - Autumn 2023

1 Introduction

In accordance with your instructions, and our proposal of 9 January 2006[1], we have coordinated a dive, fish impingement and entrainment survey at the Waikato Raw Water Intake. The survey was carried out in accordance with the Fisheries Management Plan (FMP) for the Waikato Water Treatment Plant (v.3). This report outlines the work carried out and the findings which arose.

2 Methods

A SCUBA video survey of the exterior of the intake screens was conducted on 29 May 2023. The SCUBA work was carried out by New Zealand Dive and Salvage (NZDS), under the direction of a Tonkin & Taylor Ltd (T+T) freshwater biologist who was at the surface with a real-time video link. Weather during the survey was overcast and it had rained in the hours immediately prior to the survey. The river water was turbid with approximately 0.3 m visibility, based on visual observations. We understand that a copy of the video recording has been provided to you by NZDS.

An ichthyoplankton (fish eggs and larvae) entrainment survey was also carried out on 29 May 2023 in the Waikato Intake penstocks, between the intake screens and the water treatment plant. A 0.5 m diameter 500 µm mesh net was used, with a concentrating bucket attached. Vertical hauls were repeated (21 times) until at least 10 m^3 of water had been filtered. A composited filtrate sample was sent to NIWA for larval fish and egg identification and counting.

3 Results

The findings of the dive survey are summarised in the table below.

Parameter	Findings
Riverbed profiles and position relative to intake screens	The general river-bed level was 2.0 – 3.0 m below the underside of Screen 1 and approximately 4.5 m below Screen 2, Screen 3 and Screen 4. This is a greater

[1] Variation email dated May 17 2023.

Parameter	Findings
	clearance than observed during recent surveys however, is within historical variability measured at the site since monitoring began in 2003. No dredging is required as the clearance is greater than 0.5 m at all screens, as per conditions of consent.
Water velocities	From visual observations at and below the surface by the diver, water velocities were consistent at all four screens. Flow velocities were moderate-high. The survey was conducted between 9:30 and 10:30 on the outgoing tide (low tide was 11:02). This may have influenced velocities at the screens. The average velocity at the surface was approximately 3.0 m/s. The "sweep" velocities meet the FMP guideline of being at least twice the design "approach" velocity (0.15 m/s).
Distribution of debris	One branch was observed to be stuck on one of the concrete blocks underneath Screen 3. This was relatively small and was not impacting the screens, therefore it is not needing to be cleared immediately but could be cleared when the next screen cleaning is scheduled.
Fish impingement on screens	None recorded visually, or by video analysis.
Species composition, abundance, size range of impinged organisms	None recorded visually, or by video analysis.
Physical damage to screens	No physical damage was recorded on any of the screens.
Fouling of screens	Overall, levels of fouling were moderate and consistent with recent surveys. Details on the fouling status of each screen are as follows: Screen 1 upstream section: Moderate-high (60 - 90 %) build-up of algae, all could be wiped away by hand. Some fouling in slots including small stones/pumice (40 - 70 %). Screen 1 downstream section: Moderate-high (50 – 90 %) build-up of algae, all could be wiped away by hand. Some fouling in slots including small stones/pumice (50 - 60 %). Screen 2 upstream section: Moderate (30 – 70 %) build-up of algae, all could be wiped away by hand. Some fouling in slots including small stones/pumice (50 – 80 %). Screen 2 downstream section: Low (20 – 30 %) build up of algae on top, left and bottom portions of screen, High (90 %) build-up of algae on right portion of screen, all could be wiped away by hand. Some fouling in slots including small stones/pumice (50 – 80 %). Screen 3 upstream section: Low (20 – 30 %) build-up of algae, all could be wiped away by hand. Some fouling in slots including small stones/pumice (10 – 50 %). Screen 3 downstream section: Moderate (30 – 40 %) build-up of algae on top, left and bottom portions of screen, High (90 %) build-up of algae on right portion of screen, all could be wiped away by hand. Some fouling in slots including small stones/pumice (20 – 70 %). Screen 4 upstream section: Low-Moderate (10 – 60 %) build-up of algae, all could be wiped away by hand. Some fouling in slots including small stones/pumice (20 – 60 %). Screen 4 downstream section: Moderate (60 – 70 %) build-up of algae on top, right and bottom portions of screen, Low (20 %) build-up of algae on left portion of screen, all could be wiped away by hand. Some fouling in slots including small stones/pumice (20 – 60 %).

Parameter	Findings
Surface marker buoys	Both intact.

Two smelt (*Retropinna retropinna*) larvae and one freshwater shrimp (Paratya) larvae were recorded in the vertical haul sample collected in the penstock. The density of smelt in the penstock was therefore calculated as 0.2 smelt/m^3, which is well below the maximum density threshold which would require further investigation (1.9 smelt/m^3). In accordance with Section 4.3.2 of FMP (v.3), no further sampling is required in winter 2023.

4 Conclusions and recommendations

The key conclusions and recommendations of the Autumn 2023 fish impingement and entrainment surveys are detailed below.

- On average the river bed was 4.5 m below the underside of the screens, this complies with the required minimum clearance of 0.5 m.
- We recommend that dive surveys be continued on a minimum frequency of once every six months to ensure screen clearances are maintained at greater than 0.5 m from the river bed.
- Water velocity parallel to the screens was at least two times the design "approach velocity" of 0.15 m/s at all four screens. Therefore, water velocities parallel to the screens meet the FMP guideline of being at least twice the design "approach velocity". Water velocities were low at the time of survey, likely due to tidal state at the time of survey (around high tide).
- In general, the build-up of algae was moderate-high.
- No fish impingement was recorded on any of the intake screens during the survey.
- No visible damage to the screens or openings greater than 2.5 mm were observed, therefore no repair or replacement is necessary.
- A small branch was caught below Screen 3, however is not required to be removed as it is not affecting the screens. The branch could be removed by NZDS during their next screen maintenance visit.
- Two smelt were recorded in samples collected from the penstock, but smelt density is well below the maximum density threshold which would require further investigation. In accordance with Section 4.3.2 of the FMP (v.3), no further sampling is required in winter 2023.

4 Applicability

This report has been prepared for the exclusive use of our client Watercare Services Ltd, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that this report will be used by Waikato Regional Council in undertaking its regulatory functions in connection with Waikato Water Treatment Plant.

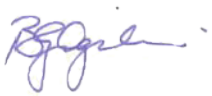
Tonkin & Taylor Ltd

Report prepared by:

.....

Kate Rogers
Ecology Consultant

Authorised for Tonkin & Taylor Ltd by:



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Brett Ogilvie
Project Director

Technical Review by Liza Kabrle, Principal Freshwater Ecologist

T:\Auckland\Projects\20973\20973.7000\IssuedDocuments\20230620 Waikato WTP Screen & Entrainment Survey Reportclean.docx

Appendix C. Process Discharge Water Quality

Appendix C – Process Discharge Water Quality

Reporting Year: 01 July 2022 to 30 June 2023

Date	pH (pH units)	Chlorine (FAC) (mg/L)	Fluoride (mg/L)	Suspended Solids (mg/L)	Soluble Aluminium (mg/L)
5/07/2022	7.20	0.01	0.2	4	0.02
12/07/2022	7.10	0.02	0.1	3	0.02
19/07/2022	7.00	0.02	0.1	18	0.02
26/07/2022	7.10	0.04	0.1	4	0.02
1/08/2022	7.10	0.02	0.1	7	0.02
9/08/2022	7.00	0.17	0.1	32	0.02
16/08/2022	6.90	0.06	0.1	15	0.20
23/08/2022	6.70	0.03	0.1	2	0.85
30/08/2022	7.20	0.01	0.1	13	0.03
6/09/2022	7.40	0.01	0.2	2	0.03
13/09/2022	7.00	0.10	0.1	18	0.02
20/09/2022	7.30	0.10	0.1	12	0.03
27/09/2022	7.20	0.05	0.1	17	0.03
4/10/2022	7.20	0.04	0.1	7	0.02
11/10/2022	7.20	0.02	0.1	7	0.02
17/10/2022	7.40	0.01	0.1	2	0.03
1/11/2022	7.20	0.02	0.1	18	0.03
7/11/2022	7.30	0.04	0.1	41	0.04
14/11/2022	7.50	0.03	0.2	2	0.03
21/11/2022	7.10	0.06	0.1	40	0.03
28/11/2022	7.10	0.02	0.1	2	0.03
5/12/2022	7.10	0.05	0.1	22	0.03
13/12/2022	7.30	0.02	0.1	3	0.03
20/12/2022	7.30	0.03	0.1	3	0.04
27/12/2022	7.40	0.01	0.2	4	0.23
2/01/2023	7.40	0.03	0.2	2	0.03
10/01/2023	7.00	0.01	0.2	2	0.03
17/01/2023	7.50	0.01	0.1	4	0.06
24/01/2023	7.20	0.04	0.1	6	0.02
31/01/2023	6.90	0.01	0.1	27	0.03
7/02/2023	7.40	0.06	0.2	3	0.07
17/02/2023	7.10	0.03	0.1	126	0.05
21/02/2023	7.30	0.02	0.1	20	0.05
27/02/2023	7.10	0.05	0.1	18	0.25
7/03/2023	7.40	0.02	0.1	19	0.05
14/03/2023	7.30	0.00	0.2	9	0.03
20/03/2023	7.40	0.02	0.1	10	0.20
28/03/2023	7.40	0.01	0.2	4	0.02
4/04/2023	7.40	0.03	0.1	5	0.03
11/04/2023	7.40	0.06	0.2	2	0.02

Date	pH (pH units)	Chlorine (FAC) (mg/L)	Fluoride (mg/L)	Suspended Solids (mg/L)	Soluble Aluminium (mg/L)
21/04/2023	7.40	0.02	0.2	2	0.03
27/04/2023	7.30	0.04	0.2	10	0.05
2/05/2023	7.50	0.03	0.2	4	0.02
8/05/2023	7.10	0.02	0.1	10	0.03
16/05/2023	7.00	0.00	0.1	28	0.31
22/05/2023	7.20	0.01	0.1	6	0.05
30/05/2023	7.20	0.08	0.1	13	0.03
6/06/2023	7.10	0.03	0.1	54	0.03
13/06/2023	7.10	0.05	0.1	6	0.03
20/06/2023	-	0.00	-	-	-
27/06/2023	-	0.00	-	-	-

Source: Watercare Laboratory Services. Note: Highlighted values are not within the resource consent limits.

Appendix D. Chemical Bunds Discharges

Appendix D – Waikato and Waikato 50 WTP Chemical Bunds Discharges

Reporting Year: 01 July 2022 to 30 June 2023

Date	Source (Bund)	Volume (m^3)	pH* (pH units)	Chlorine (FAC) *(mg/L)	Fluoride* (mg/L)	Suspended solids* (mg/L)	Soluble Aluminium* (mg/L)
08/07/2022	Sodium Hypochlorite	2	7.56	0.1	0	3	0
08/07/2022	Lime	4	7.56	0.01	0	36	0
12/07/2022	Sodium Hypochlorite	1	6.8	0.1	0	1	0
12/07/2022	Aluminium Sulphate	4	6.8	0.01	0	2	0.282
12/07/2022	Lime	2	6.8	0.01	0	40	0
12/07/2022	HFA	1	6.8	0	1.8	9	0
22/07/2022	Aluminium Sulphate	11	7.18	0.01	0	1	3.692
22/07/2022	Lime	12	7.26	0.02	0	48	0
22/07/2022	Sodium Hypochlorite	4	7.15	0.01	0	3	0
28/07/2022	Sodium Hypochlorite	2	6.96	0.01	0	2	0
28/07/2022	Aluminium Sulphate	2	6.8	0.02	0	0	2.46
28/07/2022	Lime	2	6.8	0	0	45	0
14/08/2022	Sodium Hypochlorite	0.5	7.1	0	0	20	0
14/08/2022	Aluminium Sulphate	2	6.7	0	0	48	2
27/08/2022	Hypo Washdown	2	7.44	0.01	0	1	0
28/08/2022	Sodium Hypochlorite	1.5	6.98	0.03	0	5	0
28/08/2022	Aluminium Sulphate	4	6.98	0.02	0	2	3.961
28/08/2022	Lime	4	6.98	0.02	0	9	0
01/09/2022	Sodium Hypochlorite	1.8	7.25	0.03	0	18	0
07/09/2022	Sodium Hypochlorite	2	7.39	0.04	0	12	0.72
07/09/2022	Aluminium Sulphate	2	7.39	0.04	0	12	0.72
07/09/2022	Lime	2	7.39	0.04	0	12	0.72
10/09/2022	Hypo Washdown	0.8	7.76	0.01	0	16	0
16/09/2022	Hypo Washdown	0.8	7.24	0.1	0	7	0
29/09/2022	Hypo Washdown	0.9	7.89	0.03	0	6.5	0
29/09/2022	Lime	1.5	7.89	0.03	0	6.5	0
29/09/2022	Sodium Hypochlorite	1.8	7.89	0.03	0	6.5	0
30/09/2022	Hypo Washdown	2	7.08	0.01	0	6	0
04/10/2022	Hypo Washdown	1.5	7.36	0.04	0	5	0
08/10/2022	Hypo Washdown	2	7.74	0.02	0	1	0
09/10/2022	Sodium Hypochlorite	2	7.61	0.06	0	5	0
21/10/2022	Sodium Hypochlorite	2	7.9	0.01	0	58	0
04/11/2022	Hypo Washdown	2	7.97	0.03	0	1	0

Date	Source (Bund)	Volume (m^3)	pH* (pH units)	Chlorine (FAC) *(mg/L)	Fluoride* (mg/L)	Suspended solids* (mg/L)	Soluble Aluminium* (mg/L)
05/11/2022	Hypo Washdown	1	7.02	0.02	0	1	0
08/11/2022	Lime	12	7.6	0.02	0	6	0
11/11/2022	Hypo Washdown	1.8	8.08	0.03	0	9	0
12/11/2022	Aluminium Sulphate	1	7.43	0	0	1	0.063
14/11/2022	Hypo Washdown	1.6	7.37	0.05	0	31	0
14/11/2022	Aluminium Sulphate	18	7.18	0.04	0	7	1.5
17/11/2022	Hypo Washdown	2	7.05	0.02	0	1	0
21/11/2022	Sodium Hypochlorite	4	7.15	0.02	0	7	0
21/11/2022	Hypo Washdown	2	7.09	0.05	0	45	0
22/11/2022	Lime	6	7.14	0.05	0	7	0
24/11/2022	Lime	6	7.52	0	0	33	0
24/11/2022	Sodium Hypochlorite	6	7.25	0.03	0	6	0
01/12/2022	Sodium Hypochlorite	1	8.21	0.04	0	32	0
01/12/2022	Lime	2	8.21	0.03	0	45	0
05/12/2022	Hypo Washdown	3	7.43	0.04	0	1	0
08/12/2022	Hypo Washdown	1	7	0.04	0	2	0
10/12/2022	Hypo Washdown	2	7.11	0.01	0	2	0
14/12/2022	Sodium Hypochlorite	2	8.14	0.01	0	5	0
14/12/2022	Aluminium Sulphate	2	8.14	0.05	0	9	0.247
14/12/2022	Lime	3	8.14	0.03	0	7	0
17/12/2022	Aluminium Sulphate	2	6.81	0.04	0	1	0.666
17/12/2022	Sodium Hypochlorite	3	6.81	0.04	0	1	0.666
17/12/2022	Hypo Washdown	1	6.81	0.04	0	1	0.666
18/12/2022	Sodium Hypochlorite	1	7.09	0.01	0	2	0
18/12/2022	Aluminium Sulphate	1	6.97	0.01	0	2	0.068
18/12/2022	Lime	1	7.23	0.04	0	6	0
19/12/2022	Hypo Washdown	1	6.64	0	0	6	0
23/12/2022	Hypo Washdown	2	6.56	0.16	0	4	0
11/01/2023	Sodium Hypochlorite	8	7.66	0.1	0	4	0
11/01/2023	HFA	1	8.9	0.01	0.247	1	0
11/01/2023	Aluminium Sulphate	8	7.6	0.01	0	3	0.016
11/01/2023	Lime	8	7.2	0.01	0	30	0
12/01/2023	Hypo Washdown	2	7.11	0.08	0	3	0
19/01/2023	Hypo Washdown	2	6.52	0.02	0	4	0
27/01/2023	Hypo Washdown	1.8	8.79	0.02	0	3	0
28/01/2023	Lime	6	7.6	0	0	2	0
28/01/2023	Hypo Washdown	5	7.6	0.05	0	1	0
28/01/2023	Aluminium Sulphate	5	7.6	0	0	1	0
08/02/2023	Hypo Washdown	10	8.82	0.02	0	0	0

Date	Source (Bund)	Volume (m^3)	pH* (pH units)	Chlorine (FAC) *(mg/L)	Fluoride* (mg/L)	Suspended solids* (mg/L)	Soluble Aluminium* (mg/L)
09/02/2023	Sodium Hypochlorite	10	7.35	0.03	0.63	14	0.815
09/02/2023	Lime	8	7.35	0.03	0.63	14	0.815
09/02/2023	Aluminium Sulphate	8	7.35	0.03	0.63	14	0.815
09/02/2023	HFA	4	6.72	0	0.63	2	0
28/02/2023	Aluminium Sulphate	1	7.07	0.05	0	18	0.03
01/03/2023	Hypo Washdown	16	7.02	0.04	0	8	0
02/03/2023	Hypo Washdown	16	7.07	0.05	0	8	0
19/02/2023	Sodium Hypochlorite	4	7.22	0.02	0	5	0
19/03/2023	Aluminium Sulphate	10	7	0.01	0	6	0.242
09/03/2023	Hypo Washdown	16	6.67	0	0	9	0
16/03/2023	Hypo Washdown	1	7.03	0	0	1	0
19/03/2023	Sodium Hypochlorite	8	7.52	0.09	0	8	0
19/03/2023	Aluminium Sulphate	8	7.52	0.02	0	7	0.124
19/03/2023	Lime	6	7.52	0.02	0	18	0
26/03/2023	Sodium Hypochlorite	15	8.37	0	0	2	0
27/03/2023	Hypo Washdown	1.8	7.25	0.03	0	1	0
07/04/2023	Aluminium Sulphate	1	7.2	0.07	0	14	0.603
07/04/2023	Lime	4	7.2	0.02	0	45.8	0
07/04/2023	Sodium Hypochlorite	15	7.2	0.05	0	44	0
07/04/2023	Hypo Washdown	1	7.2	0.02	0	6	0
22/04/2023	Hypo Washdown	1	6.88	0.15	0	20	0
27/04/2023	Sodium Hypochlorite	3	7.1	0.04	0	5	0
27/04/2023	Lime	4	7.1	0	0	5	0
27/04/2023	Aluminium Sulphate	3	7.1	0.01	0	13	0
05/05/2023	Hypo Washdown	1.8	6.52	0.02	0	1	0
06/05/2023	Sodium Hypochlorite	1.6	6.59	0.01	0	2	0
08/05/2023	Aluminium Sulphate	7	8.96	0.03	0	18	1.175
08/05/2023	Sodium Hypochlorite	10	7.81	0.01	0	7	0
09/05/2023	Hypo Washdown	10	7.22	0.05	0	4	0
09/05/2023	Aluminium Sulphate	10	6.85	0	0	1	0.035
09/05/2023	Lime	10	8.44	0.02	0	23	0
12/05/2023	Hypo Washdown	0.5	6.77	0	0	44	0
17/05/2023	Hypo Washdown	1.5	6.7	0.06	0	14	0
27/05/2023	Sodium Hypochlorite	4	8.1	0.02	0	2	0
27/05/2023	Aluminium Sulphate	4	8	0.01	0	8	3.8
27/05/2023	Lime	4	8.1	0	0	13	0

Date	Source (Bund)	Volume (m^3)	pH* (pH units)	Chlorine (FAC) *(mg/L)	Fluoride* (mg/L)	Suspended solids* (mg/L)	Soluble Aluminium* (mg/L)
27/05/2023	HFA	4	7.9	0	1.86	9	0
04/06/2023	Sodium Hypochlorite	1.25	6.61	0.03	0	0	0
09/06/2023	Hypo Washdown	1	7.4	0.01	0	2	0
09/06/2023	Sodium Hypochlorite	4	7.4	0.03	0	15	0
09/06/2023	Aluminium Sulphate	2	7.4	0	0	2	0.087
09/06/2023	Lime	3	7.4	0	0	9	0

Source: Operators' bund discharge log. *Note: in-house test results measured at the Waikato Water Treatment Plant, which is not IANZ accredited.

Appendix E. Clarifier Draining Record Sheets

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Record Sheet
STWKO-00-RS-018

SUBJECT : **Discharge to Environment from Waikato Water Treatment Plant**

Discharge Date:	17/4/23	Discharge Start Time:	11.00

Discharge Type: Process

Reason for Discharge:	**Draining Down of Clarifier for routine maintenance**
Volume of Discharge:	~400 – 600 m^3
Discharge Source:	Clarifier 5.
Discharge Point:	Off-Spec Pipeline
Receiving Environment:	Waikato River

Contaminants in Discharge: Sampling Results

Time from Valve open	pH	FAC	TSS	Sol Alum
0:05	6.87	0.30	137	2.01
~~1:00~~ 30min	6.67	0.21	142	2.0
~~2:00~~				

Environmental Impact(s):

Any visible scums, foams or oil/grease films in the river?	(No)
Any erosion or scour at the point of discharge?	(No)
Any additional impacts?	(No)

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Record Sheet
STWKO-00-RS-018

SUBJECT **: Discharge to Environment from Waikato Water Treatment Plant**

Discharge Date:	**28/05/2023**	**Discharge Start Time:**	1400

Discharge Type: Process

Reason for Discharge:	**Draining Down of Clarifier for routine maintenance**
Volume of Discharge:	~400 – 600 m^3
Discharge Source:	*Clarifier 3*
Discharge Point:	Off-Spec Pipeline
Receiving Environment:	Waikato River

Contaminants in Discharge: Sampling Results

Time from Valve open	pH	FAC	TSS	Sol Alum
0:05	6.9	0.01	20	0.98
1:00	7.05	0.01	4	0.96
2:00	7.06	0.01	3	0.99

Environmental Impact(s):

Any visible scums, foams or oil/grease films in the river?	No
Any erosion or scour at the point of discharge?	No
Any additional impacts?	No

Appendix F. Volumes of Operational Discharges

Appendix F – Volumes of Operational Discharges

Reporting Year: 01 July 2021 to 30 June 2022

Date	Planned Process Discharges (m^3)						Unplanned Process Discharges (m^3)		Maintenance Discharges (m^3)		Total operational discharges[C] (m^3)
	Membrane Reject	Membrane Cleans	GAC Backwash	GAC Filter to Waste	Supernatant Discharge	WW recycle[A]	MIC Overflow	GAC Overflow	Chemical bunds	Clarifier draining discharges[B]	
1/07/2022	2730	715	787	583	3863	0	27	0	0	0	8706
2/07/2022	2535	0	1980	1412	3354	1	0	0	0	0	9281
3/07/2022	2600	715	1184	996	2757	2	0	0	0	0	8251
4/07/2022	2275	715	1186	1002	2525	2	0	0	0	0	7701
5/07/2022	2730	520	1594	1047	2831	2	0	0	0	0	8719
6/07/2022	2405	130	1215	1181	2464	2	0	0	0	0	7393
7/07/2022	2600	130	1988	1227	2548	2	0	0	0	0	8491
8/07/2022	2665	195	790	1120	2475	1	0	0	6	0	7250
9/07/2022	2730	390	2383	1243	2608	-1	0	0	0	0	9355
10/07/2022	3380	260	1209	1363	2352	-1	0	0	0	0	8564
11/07/2022	3900	520	1193	1062	2502	-1	0	0	0	0	9178
12/07/2022	4095	520	1991	2966	2541	-1	0	0	7	0	12121
13/07/2022	4615	780	1205	4856	2705	0	0	0	0	0	14160
14/07/2022	3185	195	1614	1245	1881	1	0	0	0	0	8119
15/07/2022	4355	650	1178	1022	2243	1	0	0	0	0	9446
16/07/2022	3640	715	1599	1425	2801	2	0	0	0	0	10178
17/07/2022	3965	260	1200	914	2121	2	0	0	0	0	8458
18/07/2022	3640	390	1583	1026	2880	3	0	0	0	0	9517
19/07/2022	2730	390	1588	1235	3257	2	0	0	0	0	9199
20/07/2022	2210	780	1594	1275	2100	2	0	0	0	0	7958
21/07/2022	2535	130	1594	1309	2439	3	0	0	0	0	8005

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Date	Planned Process Discharges (m^3)						Unplanned Process Discharges (m^3)		Maintenance Discharges (m^3)		Total operational discharges[C] (m^3)
	Membrane Reject	Membrane Cleans	GAC Backwash	GAC Filter to Waste	Supernatant Discharge	WW recycle[A]	MIC Overflow	GAC Overflow	Chemical bunds	Clarifier draining discharges[B]	
22/07/2022	2340	130	1200	1035	2479	3	0	0	27	0	7209
23/07/2022	2275	910	1989	1367	2505	2	0	0	0	0	9045
24/07/2022	2340	260	797	719	2395	2	0	0	0	0	6509
25/07/2022	2340	0	1600	1741	2424	3	0	0	0	0	8103
26/07/2022	2925	130	1217	858	2394	4	0	0	0	0	7521
27/07/2022	2470	520	1597	1351	2486	4	0	0	0	0	8421
28/07/2022	2600	325	1988	1233	2810	4	0	0	6	0	8959
29/07/2022	2665	195	1994	1730	2692	3	0	0	0	0	9273
30/07/2022	2535	260	1192	849	2585	3	0	0	0	0	7418
31/07/2022	2665	0	1588	1457	2590	3	0	0	0	0	8296
01/08/2022	2535	520	1193	1067	2557	3	0	0	0	0	7868
02/08/2022	2470	260	1226	840	2794	3	0	0	0	0	7587
03/08/2022	2535	65	1590	1830	2550	3	0	0	0	0	8566
04/08/2022	2275	260	1191	534	2333	3	0	0	0	0	6589
05/08/2022	2730	130	1593	1597	2489	3	0	0	0	0	8537
06/08/2022	2340	130	1197	1085	2442	3	0	0	0	0	7189
07/08/2022	2795	325	1990	1577	2522	4	0	0	0	0	9205
08/08/2022	2470	260	810	830	2494	4	0	0	0	0	6860
09/08/2022	2730	195	2003	1720	2807	4	0	0	0	0	9452
10/08/2022	2665	130	803	954	2567	4	0	0	0	0	7116
11/08/2022	1885	65	1190	916	2722	4	704	14	0	0	7492
12/08/2022	2535	260	1603	1204	2989	3	0	0	0	0	8587
13/08/2022	2665	195	1197	1211	2846	3	0	0	0	0	8110
14/08/2022	2470	650	1991	1427	2892	3	0	0	2.5	0	9430
15/08/2022	2535	325	1197	1202	2910	3	0	0	0	0	8165

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Date	Planned Process Discharges (m^3)						Unplanned Process Discharges (m^3)		Maintenance Discharges (m^3)		Total operational discharges[C] (m^3)
	Membrane Reject	Membrane Cleans	GAC Backwash	GAC Filter to Waste	Supernatant Discharge	WW recycle[A]	MIC Overflow	GAC Overflow	Chemical bunds	Clarifier draining discharges[B]	
16/08/2022	2340	520	1636	1010	3268	4	0	0	0	0	8770
17/08/2022	2795	325	1201	1572	2594	4	0	0	0	0	8483
18/08/2022	2470	195	1591	878	2544	4	0	0	0	0	7675
19/08/2022	2535	130	1589	1468	2155	4	0	0	0	0	7873
20/08/2022	2730	0	1190	869	2157	4	0	0	0	0	6942
21/08/2022	2405	390	1597	1061	2661	4	0	0	0	0	8110
22/08/2022	2730	130	1189	1312	2758	4	0	0	0	0	8114
23/08/2022	2600	0	1594	1318	2741	4	0	0	0	0	8249
24/08/2022	2600	0	799	981	2747	4	0	0	0	0	7123
25/08/2022	2665	0	1989	1733	2480	4	0	0	0	0	8863
26/08/2022	2730	325	1187	1214	2384	4	0	0	0	0	7837
27/08/2022	2535	130	1584	895	2461	4	0	0	2	0	7603
28/08/2022	2600	0	1595	1823	2492	4	0	0	9.5	0	8516
29/08/2022	2535	0	1186	643	2459	4	0	0	0	0	6820
30/08/2022	2730	0	1625	1580	2586	3	0	0	0	0	8518
31/08/2022	2600	0	1188	1153	2867	3	0	0	0	0	7804
01/09/2022	2665	130	1984	1633	2563	4	0	0	1.8	0	8974
02/09/2022	2535	260	791	751	2551	4	0	0	0	0	6885
03/09/2022	2730	130	1983	1779	2498	3	0	0	0	0	9116
04/09/2022	2535	65	793	836	2172	4	0	0	0	0	6397
05/09/2022	2535	0	1988	1316	2081	3	0	0	0	0	7917
06/09/2022	2730	390	1195	1496	2195	3	0	0	0	0	8002
07/09/2022	2535	0	1585	1159	2014	3	0	0	6	0	7296
08/09/2022	2730	325	1601	1682	1966	3	0	0	0	0	8300
09/09/2022	2600	0	1189	760	1904	3	0	0	0	0	6450

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Date	Planned Process Discharges (m^3)						Unplanned Process Discharges (m^3)		Maintenance Discharges (m^3)		Total operational discharges[C] (m^3)
	Membrane Reject	Membrane Cleans	GAC Backwash	GAC Filter to Waste	Supernatant Discharge	WW recycle[A]	MIC Overflow	GAC Overflow	Chemical bunds	Clarifier draining discharges[B]	
10/09/2022	2405	520	1594	1417	1922	3	0	0	0.8	0	7855
11/09/2022	2730	0	1191	1007	1829	4	0	0	0	0	6753
12/09/2022	2470	455	1665	1529	1823	4	0	0	0	0	7938
13/09/2022	3510	0	1185	1137	2443	4	0	0	0	0	8271
14/09/2022	4030	130	1990	1384	2992	4	0	0	0	0	10523
15/09/2022	4550	390	1210	1434	3548	3	0	0	0	0	11129
16/09/2022	3640	65	1194	803	2864	3	0	0	0.8	0	8564
17/09/2022	3835	0	1915	1447	2924	4	0	0	0	0	10118
18/09/2022	3315	390	1255	1202	2700	4	0	0	0	0	8858
19/09/2022	4615	195	1604	1782	3138	4	0	0	0	0	11330
20/09/2022	2730	390	1190	1165	2484	4	0	0	0	0	7955
21/09/2022	4745	260	2004	1737	3101	4	0	0	0	0	11844
22/09/2022	2730	130	798	837	2635	4	0	0	0	0	7127
23/09/2022	2925	0	1990	1534	2656	4	0	0	0	0	9102
24/09/2022	2925	0	1195	1047	2631	4	0	0	0	0	7794
25/09/2022	2795	0	1594	1206	2624	3	0	0	0	0	8215
26/09/2022	2990	130	1597	1395	2642	4	0	0	0	0	8750
27/09/2022	2730	195	1586	1110	2394	4	0	0	0	0	8011
28/09/2022	2600	260	1192	1238	2312	4	0	0	0	0	7600
29/09/2022	2405	260	1584	1338	2227	4	0	0	4.2	0	7815
30/09/2022	2470	0	1603	1190	2154	4	0	0	2	0	7415
01/10/2022	2340	0	1198	962	2215	4	25	0	0	0	6736
02/10/2022	2470	195	1588	1395	2223	4	0	0	0	0	7868
03/10/2022	2405	0	1195	1197	2210	4	0	0	0	0	7005
04/10/2022	2405	0	1379	1010	2454	4	0	0	1.5	0	7246

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Date	Planned Process Discharges (m^3)						Unplanned Process Discharges (m^3)		Maintenance Discharges (m^3)		Total operational discharges[C] (m^3)
	Membrane Reject	Membrane Cleans	GAC Backwash	GAC Filter to Waste	Supernatant Discharge	WW recycle[A]	MIC Overflow	GAC Overflow	Chemical bunds	Clarifier draining discharges[B]	
05/10/2022	2080	390	1831	1430	2248	4	0	0	0	0	7975
06/10/2022	2340	325	1194	1318	2269	4	0	0	0	0	7442
07/10/2022	2470	195	1593	1411	2177	3	0	0	0	0	7842
08/10/2022	2275	0	1189	1147	2325	3	0	0	2	0	6935
09/10/2022	2470	0	1988	1333	1890	4	0	0	2	0	7679
10/10/2022	2340	130	789	1175	1883	4	0	0	0	0	6313
11/10/2022	2470	0	1593	1290	1927	4	0	0	0	0	7276
12/10/2022	2210	455	1194	1251	2286	4	0	0	0	0	7393
13/10/2022	2340	195	1592	1303	2064	4	0	0	0	0	7489
14/10/2022	2470	130	1593	1534	1920	4	0	0	0	0	7643
15/10/2022	2470	130	1195	797	1890	4	0	0	0	0	6479
16/10/2022	2405	0	1593	1330	1807	4	0	0	0	0	7132
17/10/2022	2340	195	1586	1295	1646	4	0	0	0	0	7058
18/10/2022	2405	65	1207	2807	1583	4	0	0	0	0	8063
19/10/2022	2470	325	800	3858	1635	4	0	0	0	0	9085
20/10/2022	2405	260	1986	2327	1642	4	0	0	0	0	8616
21/10/2022	2470	0	1192	3619	1642	4	0	0	2	0	8922
22/10/2022	2535	325	806	4191	1883	4	0	0	0	0	9736
23/10/2022	2405	195	1992	1645	1801	4	0	0	0	0	8034
24/10/2022	2405	260	1195	1177	1621	4	0	0	0	0	6654
25/10/2022	2730	195	1592	1472	2090	2639	18	0	0	0	5458
26/10/2022	2730	390	1195	1113	2643	1521	0	0	0	0	6551
27/10/2022	5265	195	2003	2009	3606	4	0	0	0	0	13074
28/10/2022	5330	390	1198	1187	3729	785	0	0	0	0	11049
29/10/2022	3900	325	1601	1231	2859	4	0	0	0	0	9913

Date	Planned Process Discharges (m^3)						Unplanned Process Discharges (m^3)		Maintenance Discharges (m^3)		Total operational discharges[C] (m^3)
	Membrane Reject	Membrane Cleans	GAC Backwash	GAC Filter to Waste	Supernatant Discharge	WW recycle[A]	MIC Overflow	GAC Overflow	Chemical bunds	Clarifier draining discharges[B]	
30/10/2022	2990	195	1199	1466	2483	4	0	0	0	0	8330
31/10/2022	4355	65	1887	1178	3271	4	0	0	0	0	10752
01/11/2022	4615	130	902	1148	3625	4	0	0	0	0	10416
02/11/2022	3705	130	1992	1424	2994	4	0	0	0	0	10242
03/11/2022	2275	0	1194	1216	2882	4	0	0	0	0	7563
04/11/2022	2470	0	1391	1061	2555	4	0	0	2	0	7475
05/11/2022	2405	260	1404	1477	2764	4	0	0	1	0	8307
06/11/2022	2730	260	1601	1291	2741	4	0	0	0	0	8620
07/11/2022	2405	0	1587	927	2523	4	0	0	0	0	7437
08/11/2022	2665	325	1191	1537	2547	4	0	0	12	0	8274
09/11/2022	4485	0	1588	1237	2770	4	0	0	0	0	10076
10/11/2022	2470	195	1592	1014	2573	4	0	0	0	0	7840
11/11/2022	2210	130	1193	1421	2642	4	0	0	1.8	0	7594
12/11/2022	2470	0	1589	1403	2375	4	0	0	1	0	7834
13/11/2022	2340	260	1590	1156	2679	4	0	0	0	0	8022
14/11/2022	2340	325	1190	2864	2371	4	0	0	19.6	0	9105
15/11/2022	2535	0	1217	2987	2417	4	0	0	0	0	9152
16/11/2022	2340	390	1579	808	2148	4	2	0	0	0	7263
17/11/2022	2275	195	1192	156	2072	4	0	0	2	0	5888
18/11/2022	2210	0	1587	1440	1791	4	508	137	0	0	7668
19/11/2022	2535	0	1187	1057	1903	4	0	0	0	0	6678
20/11/2022	2405	0	1587	1560	1884	4	0	0	0	0	7433
21/11/2022	3510	0	1591	1327	2558	4	0	0	6	0	8988
22/11/2022	5005	130	1222	1329	3325	4	0	0	6	0	11013
23/11/2022	4160	650	1585	1424	3061	4	0	0	0	0	10876

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Date	Planned Process Discharges (m^3)						Unplanned Process Discharges (m^3)		Maintenance Discharges (m^3)		Total operational discharges[C] (m^3)
	Membrane Reject	Membrane Cleans	GAC Backwash	GAC Filter to Waste	Supernatant Discharge	WW recycle[A]	MIC Overflow	GAC Overflow	Chemical bunds	Clarifier draining discharges[B]	
24/11/2022	2730	455	1188	1305	2378	4	0	0	12	0	8064
25/11/2022	2535	0	1587	1256	2296	4	0	0	0	0	7671
26/11/2022	2665	0	1187	985	2293	4	0	0	0	0	7126
27/11/2022	2730	0	1192	1159	2232	4	0	0	0	0	7310
28/11/2022	2535	455	1992	1730	2267	4	0	0	0	0	8976
29/11/2022	3445	260	1205	1415	3279	4	0	0	0	0	9601
30/11/2022	2600	0	1591	1014	2854	4	0	0	0	0	8055
01/12/2022	2925	130	1603	1704	3034	3	0	0	3	0	9395
02/12/2022	2860	0	1202	877	3077	4	0	0	0	0	8012
03/12/2022	2925	130	1592	1722	2620	4	0	0	0	0	8985
04/12/2022	2600	260	1589	860	2393	4	0	0	0	0	7699
05/12/2022	4225	195	1589	1781	3090	4	0	0	3	0	10879
06/12/2022	2665	260	1195	1149	2469	4	0	0	0	0	7733
07/12/2022	3315	390	1192	1059	2996	4	0	0	0	0	8948
08/12/2022	2535	130	1984	1311	2966	4	0	0	1	0	8923
09/12/2022	2665	0	1199	931	3070	4	0	0	0	0	7861
10/12/2022	2535	260	1598	1769	3051	4	0	0	2	0	9212
11/12/2022	2665	325	1193	796	2622	4	0	0	0	0	7597
12/12/2022	2665	130	1597	1638	2481	4	0	0	0	0	8508
13/12/2022	2730	0	1193	901	2365	4	0	0	0	0	7186
14/12/2022	2665	0	1625	1660	2322	4	0	0	7	0	8275
15/12/2022	2665	390	1553	1111	2255	4	10	0	0	0	7981
16/12/2022	2665	0	1587	1601	2425	4	0	0	0	0	8274
17/12/2022	2665	130	1592	1191	2712	4	0	0	6	0	8291
18/12/2022	2665	0	1198	915	2964	4	0	0	3	0	7740

Date	Planned Process Discharges (m^3)						Unplanned Process Discharges (m^3)		Maintenance Discharges (m^3)		Total operational discharges[C] (m^3)
	Membrane Reject	Membrane Cleans	GAC Backwash	GAC Filter to Waste	Supernatant Discharge	WW recycle[A]	MIC Overflow	GAC Overflow	Chemical bunds	Clarifier draining discharges[B]	
19/12/2022	2665	0	1988	1653	2941	4	0	0	1	0	9244
20/12/2022	2405	0	798	644	2641	4	0	0	0	0	6484
21/12/2022	2535	325	1603	1840	2176	4	0	0	0	0	8475
22/12/2022	2730	195	1189	774	2363	4	0	0	0	0	7248
23/12/2022	2535	0	1990	1829	2468	4	0	0	2	0	8821
24/12/2022	2665	0	1188	970	2478	4	0	0	0	0	7297
25/12/2022	2665	130	1584	1425	2452	4	0	0	0	0	8252
26/12/2022	2665	130	1582	1362	2479	4	0	0	0	0	8215
27/12/2022	2600	65	1187	971	2405	4	0	0	0	0	7224
28/12/2022	2340	390	1601	1506	2299	4	10	0	0	0	8142
29/12/2022	2600	130	799	767	2153	4	0	0	0	0	6445
30/12/2022	2405	65	1988	1806	2137	4	0	0	0	0	8398
31/12/2022	2275	195	787	428	2065	4	0	0	0	0	5746
01/01/2023	2470	65	2004	2016	2089	4	0	0	0	0	8640
02/01/2023	2405	0	1188	735	2147	4	0	0	0	0	6471
03/01/2023	2405	195	1604	1793	2127	4	0	0	0	0	8119
04/01/2023	2210	390	1595	949	2505	4	0	0	0	0	7645
05/01/2023	2600	0	1189	1210	2704	4	0	0	0	0	7698
06/01/2023	2665	0	1998	1542	2544	4	0	0	0	0	8746
07/01/2023	2600	130	791	837	1991	4	0	0	0	0	6345
08/01/2023	2795	0	1602	1590	2007	4	0	0	0	0	7990
09/01/2023	2470	325	1191	672	2004	4	0	0	0	0	6658
10/01/2023	2795	0	1591	1730	2477	4	0	0	0	0	8590
11/01/2023	2535	0	1196	3779	2191	4	0	0	25	0	9722
12/01/2023	2340	0	1590	2679	2149	4	0	0	2	0	8756

Date	Planned Process Discharges (m^3)						Unplanned Process Discharges (m^3)		Maintenance Discharges (m^3)		Total operational discharges[C] (m^3)
	Membrane Reject	Membrane Cleans	GAC Backwash	GAC Filter to Waste	Supernatant Discharge	WW recycle[A]	MIC Overflow	GAC Overflow	Chemical bunds	Clarifier draining discharges[B]	
13/01/2023	2015	195	1595	1177	2048	4	0	0	0	0	7027
14/01/2023	2080	0	1187	1104	1997	4	0	0	0	0	6364
15/01/2023	2145	0	1991	1575	2027	4	0	0	0	0	7733
16/01/2023	2145	0	1186	933	1845	4	10	0	0	0	6115
17/01/2023	2210	130	1619	1770	1992	4	0	0	0	0	7717
18/01/2023	2145	0	1191	766	1898	4	0	0	0	0	5995
19/01/2023	2145	0	1589	1615	1944	4	0	0	2	0	7291
20/01/2023	5655	195	1190	862	3722	583	7	0	0	0	11048
21/01/2023	5785	260	1195	1747	3990	4	267	0	0	0	13241
22/01/2023	3900	390	1987	1298	3145	4	0	0	0	0	10716
23/01/2023	3380	195	789	1075	2666	4	345	36	0	0	8482
24/01/2023	2730	260	1995	1528	2495	4	0	0	0	0	9003
25/01/2023	2730	0	1194	1301	2467	4	0	0	0	0	7688
26/01/2023	2665	130	1260	1265	2549	4	0	0	0	0	7865
27/01/2023	2470	0	1261	1119	2235	4	0	0	1.8	0	7083
28/01/2023	3510	0	1593	1568	1996	4	0	0	16	0	8679
29/01/2023	6695	520	1598	1556	2507	4	264	0	0	0	13136
30/01/2023	4550	650	797	1243	1898	4	0	0	0	0	9134
31/01/2023	7150	715	2001	1684	4033	4	0	0	0	0	15579
01/02/2023	6045	910	1197	1442	3498	4	0	0	0	0	13088
02/02/2023	5980	195	1982	1564	3348	4	0	0	0	0	13065
03/02/2023	6370	325	1190	1484	3365	4	0	0	0	0	12729
04/02/2023	4225	0	1989	1501	2717	4	0	0	0	0	10428
05/02/2023	6045	195	811	888	3293	4	0	0	0	0	11228
06/02/2023	4420	325	1989	1632	2727	4	0	0	0	0	11088

Date	Planned Process Discharges (m^3)						Unplanned Process Discharges (m^3)		Maintenance Discharges (m^3)		Total operational discharges[C] (m^3)
	Membrane Reject	Membrane Cleans	GAC Backwash	GAC Filter to Waste	Supernatant Discharge	WW recycle[A]	MIC Overflow	GAC Overflow	Chemical bunds	Clarifier draining discharges[B]	
07/02/2023	6825	520	793	744	3490	4	0	0	0	0	12369
08/02/2023	6175	845	1601	1999	3685	4	0	0	10	0	14311
09/02/2023	6175	455	1610	4551	3199	4	0	0	30	0	16016
10/02/2023	8255	260	1195	6842	3384	4	0	0	0	0	19931
11/02/2023	4160	715	1595	1068	2386	4	0	0	0	0	9921
12/02/2023	4030	195	1599	1646	2102	4	237	0	0	0	9805
13/02/2023	4225	390	1604	1240	2502	4	0	0	0	0	9957
14/02/2023	5330	455	1215	1173	2824	4	0	0	0	0	10992
15/02/2023	8190	390	1590	1836	3724	4	0	0	0	0	15726
16/02/2023	7800	650	1214	861	3828	4	0	0	0	0	14349
17/02/2023	5720	845	1570	1864	3276	4	0	0	0	0	13271
18/02/2023	5525	780	1601	1129	2971	4	0	0	0	0	12001
19/02/2023	4355	520	1194	1504	2805	4	0	0	0	0	10374
20/02/2023	7085	0	1995	1471	3653	4	0	0	0	0	14200
21/02/2023	6695	520	1191	1722	3914	4	0	0	0	0	14038
22/02/2023	6825	0	1585	1182	3517	4	0	0	0	0	13106
23/02/2023	6240	585	1203	1302	3448	4	0	0	0	0	12774
24/02/2023	3510	195	1992	1349	2364	4	0	0	0	0	9406
25/02/2023	3055	260	1186	1396	2278	4	0	0	0	0	8171
26/02/2023	4160	0	1591	1474	2618	4	0	0	0	0	9839
27/02/2023	4810	65	1195	925	2784	4	0	0	0	0	9775
28/02/2023	4940	325	1601	1773	2893	4	100	0	4	0	11632
01/03/2023	6110	0	1597	2460	3259	4	0	0	16	0	13438
02/03/2023	5460	260	1188	1701	3072	4	0	0	16	0	11692
03/03/2023	6045	130	1984	1530	3340	4	0	0	0	0	13025

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Date	Planned Process Discharges (m^3)						Unplanned Process Discharges (m^3)		Maintenance Discharges (m^3)		Total operational discharges[C] (m^3)
	Membrane Reject	Membrane Cleans	GAC Backwash	GAC Filter to Waste	Supernatant Discharge	WW recycle[A]	MIC Overflow	GAC Overflow	Chemical bunds	Clarifier draining discharges[B]	
04/03/2023	4550	195	1188	1258	3051	4	0	0	0	0	10239
05/03/2023	4745	0	1588	1566	3047	4	0	0	0	0	10941
06/03/2023	4160	195	1203	1162	3364	4	96	0	0	0	10177
07/03/2023	3640	0	1635	1719	2784	4	0	0	0	0	9774
08/03/2023	3835	0	1606	787	2814	4	0	0	0	0	9039
09/03/2023	4225	130	1211	1944	3041	4	0	0	16	0	10563
10/03/2023	3055	0	1584	1047	2580	4	0	0	0	0	8262
11/03/2023	4030	0	1594	1658	2800	4	0	0	0	0	10078
12/03/2023	2665	390	1596	1326	2332	4	0	0	0	0	8305
13/03/2023	4290	260	796	1310	3313	4	0	0	0	0	9965
14/03/2023	3900	0	1986	1541	2895	4	0	0	0	0	10317
15/03/2023	3185	325	792	918	2667	4038	0	0	0	0	3850
16/03/2023	4030	130	2021	2180	2791	6708	0	0	1	0	4445
17/03/2023	2730	0	1200	1053	2373	3042	0	0	0	0	4314
18/03/2023	2470	130	1980	1507	2195	848	0	0	0	0	7434
19/03/2023	2990	0	797	834	2292	4	0	0	36	0	6946
20/03/2023	3250	195	1985	2172	2568	4	6	0	0	0	10172
21/03/2023	3510	0	1184	1008	2629	4	0	0	0	0	8328
22/03/2023	3380	195	1353	1641	2340	4	0	0	0	0	8906
23/03/2023	3965	0	2241	2088	2524	4	0	0	0	0	10813
24/03/2023	3120	0	388	382	2508	4	0	0	0	0	6394
25/03/2023	2925	585	2380	2271	2290	4	0	0	0	0	10446
26/03/2023	3055	585	1184	2069	2565	4	0	0	15	0	9469
27/03/2023	2665	130	1184	1200	2396	4	479	0	1.8	0	8052
28/03/2023	2925	0	1980	1771	2815	4	0	0	0	0	9487

Date	Planned Process Discharges (m^3)						Unplanned Process Discharges (m^3)		Maintenance Discharges (m^3)		Total operational discharges[C] (m^3)
	Membrane Reject	Membrane Cleans	GAC Backwash	GAC Filter to Waste	Supernatant Discharge	WW recycle[A]	MIC Overflow	GAC Overflow	Chemical bunds	Clarifier draining discharges[B]	
29/03/2023	2795	130	825	1254	2516	4	0	0	0	0	7516
30/03/2023	3640	325	2382	2266	2957	4	0	0	0	0	11566
31/03/2023	2340	325	787	875	2182	4	0	0	0	0	6505
01/04/2023	2600	0	1581	1667	2207	4	0	0	0	0	8052
02/04/2023	2535	0	1185	838	2274	4	0	0	0	0	6829
03/04/2023	3835	0	1583	1843	2710	4	0	0	0	0	9968
04/04/2023	2210	260	1223	866	2212	4	0	0	0	0	6767
05/04/2023	2730	195	1981	1583	2377	4	0	0	0	0	8862
06/04/2023	2145	0	1182	1302	2181	4	0	0	0	0	6806
07/04/2023	2210	130	1581	1426	2174	4	0	0	21	0	7538
08/04/2023	1820	195	1525	1461	2119	4	148	0	0	0	7265
09/04/2023	2015	130	789	870	2103	4	0	0	0	0	5904
10/04/2023	2080	0	2377	2010	2196	4	0	0	0	0	8658
11/04/2023	2665	65	819	1528	2442	4	0	0	0	0	7515
12/04/2023	2145	0	1581	1194	2201	4	0	0	0	0	7117
13/04/2023	2145	195	1184	1116	2624	4	0	0	0	0	7260
14/04/2023	2080	0	1978	1862	2156	4	0	0	0	0	8073
15/04/2023	2145	0	1186	1129	2144	4	0	0	0	0	6600
16/04/2023	1950	130	1580	1557	2076	4	0	0	0	0	7290
17/04/2023	2210	0	1584	1696	2234	4	0	0	0	500	8219
18/04/2023	2340	0	1184	1227	2226	4	0	0	0	0	6973
19/04/2023	2145	0	1182	3101	2299	4	0	0	0	0	8725
20/04/2023	3575	0	1582	3982	2689	4	44	0	0	0	11869
21/04/2023	2405	390	1183	1197	2304	4	95	31	0	0	7602
22/04/2023	2210	195	1581	1543	2153	4	0	0	1	0	7679

Date	Planned Process Discharges (m^3)						Unplanned Process Discharges (m^3)		Maintenance Discharges (m^3)		Total operational discharges[C] (m^3)
	Membrane Reject	Membrane Cleans	GAC Backwash	GAC Filter to Waste	Supernatant Discharge	WW recycle[A]	MIC Overflow	GAC Overflow	Chemical bunds	Clarifier draining discharges[B]	
23/04/2023	2470	0	1583	1476	2336	4	0	0	0	0	7861
24/04/2023	2405	390	1185	984	2288	4	0	0	0	0	7248
25/04/2023	2470	0	1583	1683	2307	4	0	0	0	0	8039
26/04/2023	3315	195	1183	863	2515	4	0	0	0	0	8068
27/04/2023	2470	390	1979	1626	2357	4	0	0	10	0	8829
28/04/2023	2925	0	1183	1284	2428	4	0	0	0	0	7817
29/04/2023	2145	0	1580	1499	2121	4	0	0	0	0	7342
30/04/2023	2145	0	1183	1062	2123	4	0	0	0	0	6510
01/05/2023	1950	325	1566	1339	2137	4	0	0	0	0	7312
02/05/2023	2990	0	1199	1532	2543	4	0	0	0	0	8260
03/05/2023	2535	325	1691	1369	2159	4	0	0	0	0	8075
04/05/2023	2470	130	1582	1687	2166	4	0	0	0	0	8031
05/05/2023	2145	130	1183	567	2099	4	0	0	1.8	0	6123
06/05/2023	2860	0	1582	2072	2230	4	0	0	1.6	0	8742
07/05/2023	2600	0	1183	850	2218	4	0	0	0	0	6847
08/05/2023	2990	130	1579	1589	2316	4	0	0	17	0	8618
09/05/2023	2470	0	1582	2540	2183	4	0	0	30	0	8800
10/05/2023	2405	390	1579	1610	2387	4	0	0	0	0	8367
11/05/2023	2535	0	1185	1446	2811	4	0	0	0	0	7973
12/05/2023	2405	195	1580	1494	2580	3	0	0	0.5	0	8251
13/05/2023	2405	0	1581	1435	2607	3	0	0	0	0	8025
14/05/2023	2470	260	1582	1537	2583	3	0	0	0	0	8428
15/05/2023	2275	130	1185	1315	2650	4	0	0	0	0	7551
16/05/2023	2990	195	1578	1453	3408	4	0	0	0	0	9620
17/05/2023	3055	195	1184	735	3330	4	0	0	1.5	0	8496

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Date	Planned Process Discharges (m^3)						Unplanned Process Discharges (m^3)		Maintenance Discharges (m^3)		Total operational discharges[C] (m^3)
	Membrane Reject	Membrane Cleans	GAC Backwash	GAC Filter to Waste	Supernatant Discharge	WW recycle[A]	MIC Overflow	GAC Overflow	Chemical bunds	Clarifier draining discharges[B]	
18/05/2023	2860	325	1578	1994	2938	4	0	0	0	0	9692
19/05/2023	3640	130	1224	1367	3134	4	0	0	0	0	9491
20/05/2023	2470	455	1579	1607	2743	4	0	0	0	0	8850
21/05/2023	3185	260	1579	1428	2988	4	0	0	0	0	9436
22/05/2023	3835	260	1581	1738	3246	4	0	0	0	0	10656
23/05/2023	3770	390	1581	1417	3502	4	0	0	0	0	10657
24/05/2023	4485	0	1216	1545	3973	4	0	0	0	0	11215
25/05/2023	4875	0	1582	1459	3310	4	0	0	0	0	11222
26/05/2023	4160	0	1184	1086	3099	4	0	0	0	0	9525
27/05/2023	3640	195	1974	1376	3030	4	0	0	16	0	10228
28/05/2023	2795	130	555	981	2987	4	0	0	0	500	7944
29/05/2023	4225	585	1810	2091	3217	4	27	0	0	0	11951
30/05/2023	3770	65	1181	4263	3051	4	0	0	0	0	12326
31/05/2023	4680	130	1845	5948	3313	4	0	0	0	0	15913
01/06/2023	5135	520	1314	3602	3473	4	0	0	0	0	14041
02/06/2023	4420	0	1579	1698	3179	4	0	0	0	0	10873
03/06/2023	3770	65	1579	1450	3088	4	0	0	0	0	9949
04/06/2023	3445	130	1579	1640	2908	4	0	0	1.25	0	9699
05/06/2023	3575	0	1184	1147	3053	4	0	0	0	0	8956
06/06/2023	7670	585	1580	2292	4492	4	893	0	0	0	17507
07/06/2023	8060	260	1185	1032	4863	4	13	0	0	0	15410
08/06/2023	7215	650	1580	1510	4648	4	31	0	0	0	15630
09/06/2023	3965	390	1183	1776	3304	4	0	0	10	0	10624
10/06/2023	4940	325	1579	1595	3604	4	0	0	0	0	12040
11/06/2023	3965	0	1184	1135	3272	4	0	0	0	0	9552

Date	Planned Process Discharges (m^3)						Unplanned Process Discharges (m^3)		Maintenance Discharges (m^3)		Total operational discharges[C] (m^3)
	Membrane Reject	Membrane Cleans	GAC Backwash	GAC Filter to Waste	Supernatant Discharge	WW recycle[A]	MIC Overflow	GAC Overflow	Chemical bunds	Clarifier draining discharges[B]	
12/06/2023	4615	130	1976	1775	3391	4	440	6	0	0	12330
13/06/2023	3510	130	1184	1264	3451	4	0	0	0	0	9535
14/06/2023	4550	195	1579	1561	3156	3	0	0	0	0	11039
15/06/2023	3315	65	1579	1230	2998	2	0	0	0	0	9186
16/06/2023	2470	390	1580	1246	2800	4	0	0	0	0	8482
17/06/2023	2860	455	1183	2733	3087	4	35	0	0	0	10350
18/06/2023	2535	455	1182	1619	2900	4	0	0	0	0	8687
19/06/2023	1560	0	786	919	2171	4	964	0	0	0	6395
20/06/2023	0	0	-8	-3	1430	3	0	0	0	0	1416
21/06/2023	0	0	-8	-3	1489	3	0	0	0	0	1475
22/06/2023	0	0	-8	-3	1481	4	0	0	0	0	1467
23/06/2023	0	0	-8	-3	1452	4	0	0	0	0	1438
24/06/2023	325	0	-8	1005	1914	4	58	277	0	0	3567
25/06/2023	520	0	-8	192	1838	4	1431	306	0	0	4275
26/06/2023	520	0	-7	1103	2102	4	4754	427	0	0	8895
27/06/2023	1300	0	1182	966	2598	4	2427	20	0	0	8489
28/06/2023	2340	0	1184	4035	2858	4	0	0	0	0	10413
29/06/2023	2275	260	2373	2103	3031	4	0	0	0	0	10038
30/06/2023	2405	0	1583	1956	2870	4	0	0	0	0	8811

Source: PI Historian. Notes: (A) Wastewater recycle is presented as negative volumes because it is recirculated back to the treatment process and therefore subtracted from the total process discharges. (B) Volumes for each clarifier draining event is between 400 to 600 m^3, and so an average of 500 m^3 has been added for each event. (C) These volumes are for the total operational discharges allowed under Resource Consent AUTH137497.01.01. They do not include stormwater discharges or treated off-spec water discharges allowed under resource consents AUTH137497.03.01 and AUTH142778.01.01, respectively.