Waikato, Waikato 50 & Waikato A Water Treatment Plants

2023-2024 Annual Report

Final - September 2024

Watercare

QUALITY INFORMATION

Document	Annual Report
Reference	N/A
Date	30 September 2024
Name and position of originator	Emma Baker, Environmental Scientist

Revision History

Rev	Revision Date	Name	Position	Signature
1	23/09/2024	Michiel Jonker	Environmental Care Manager	
2	30/09/2024	Tom Wallace	Production Manager	

Approved

Date	Name	Position	Signature
30/09/2024	Michiel Jonker	Environmental Care Manager	

EXECUTIVE SUMMARY

Watercare's Waikato Water Treatment Plant (WTP) 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. A third water treatment plant at the site, Waikato A, has been consented and is in the planning and design phases.

This report is the annual compliance report for the discharge, water take, diversion of water and land use consents associated with the Waikato, Waikato 50 and Waikato A WTPs.

The Waikato WTP exceeded the discharge quality for suspended solids in AUTH137497.01.01 on three occasions on 6 March, 15 May and 24 June 2024, caused by planned clarifier cleaning events for gold clam (*Corbicula fluminea)* inspections and routine maintenance. The treatment plants were fully compliant across all other consents for the conditions considered in this report.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS AND ACRONYMS

Abbreviation/Acronym	Full Form
WTP	Water Treatment Plant
AUTH	Authorization (as used in consent numbers)
NTU	Nephelometric turbidity units
TSS	Total suspended solids
MIC	Membrane Inlet Channel
IANZ	International Accreditation New Zealand
WLS	Watercare Laboratory Services
TWLG	Tangata Whenua Liaison Group
FMP	Fisheries management plan
L/s	Litres per second
m^3	Cubic meters

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. Waikato A is to be constructed, with the associated resource consent in effect from January 2023. 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.

Table 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)	B, 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

The report is for the 1 July 2023 to 30 June 2024 reporting year and covers the matters required by the consent conditions listed in Table 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 that may cause, or may have caused, an adverse environmental effect
- Confirmation of restoration funding
- Cultural indicators monitoring.

2 WATER TAKE FROM THE WAIKATO RIVER

2.1 Overview

The raw water intake for the Waikato WTP is located approximately 25 m from the true right bank of the Waikato River, comprising of four Johnson T-54 passive intake screens. These are submerged in the river, marked on the surface with two buoys. The Waikato 50 Water Treatment intake is approximately 20 m from the true right bank, with two AWMA retrievable intake screens and an associated floating pump station. Both intakes are screened with a mesh aperture size of 1.5 mm in diameter.

2.2 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 resource consent monitoring plan. A summary of the results for the ongoing raw water sampling programme is provided in Appendix A. 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 (2022-2023).

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 1. The data shows that raw water turbidity was generally low, with a median value of 21.7 NTU and a 90th percentile of 38.8 NTU. There were only 94 instances where turbidity exceeded 100 NTU, measured in 1-minute intervals over the year. This marks a notable decrease compared to the 708 instances recorded in 2022-2023, a period impacted by numerous severe weather events.

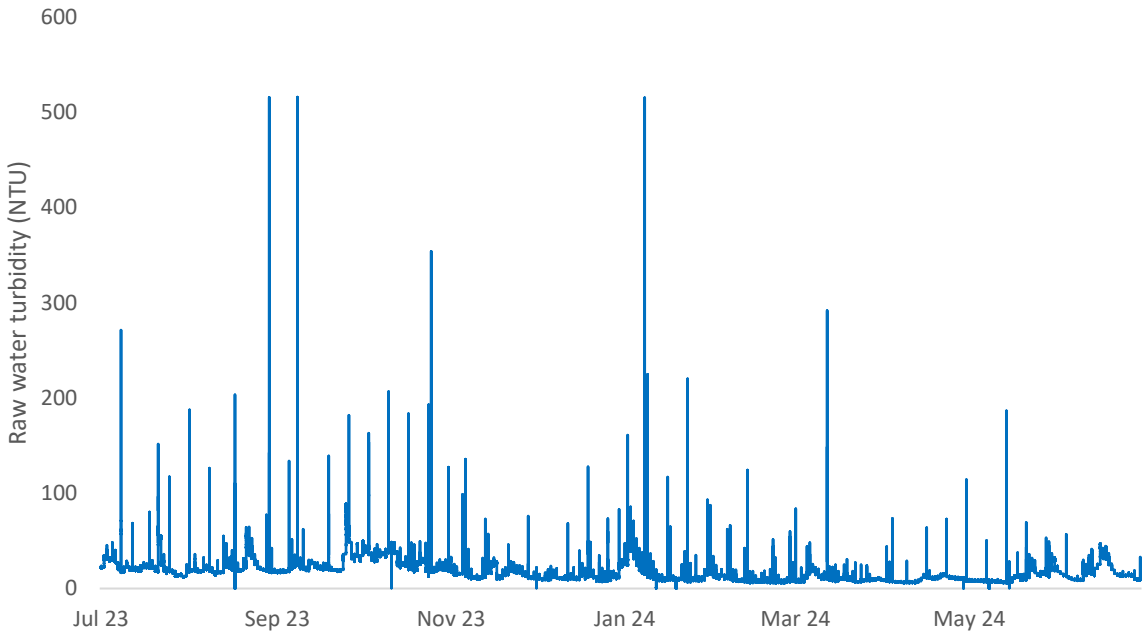


Figure 1: Turbidity of raw water taken from the Waikato River

2.3 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 of 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. 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 2023-2024 period and is displayed in Figure 2. Net take volumes ranged between 13,039 m^3/day to 144,773 m^3/day. The water abstracted was treated primarily at the Waikato plant, with Waikato 50 remaining out of service for much of the reporting period. If the seven-day rolling average flow of the Waikato River at Rangiriri falls below 163.53 m^3/s for 10 or more consecutive days, the average daily net take over any consecutive two-day period must not exceed 127,500 m^3 for water taken under the secondary consent, or 277,500 m^3 when considering both consents combined. The flows at Rangiriri are displayed in Figure 3.

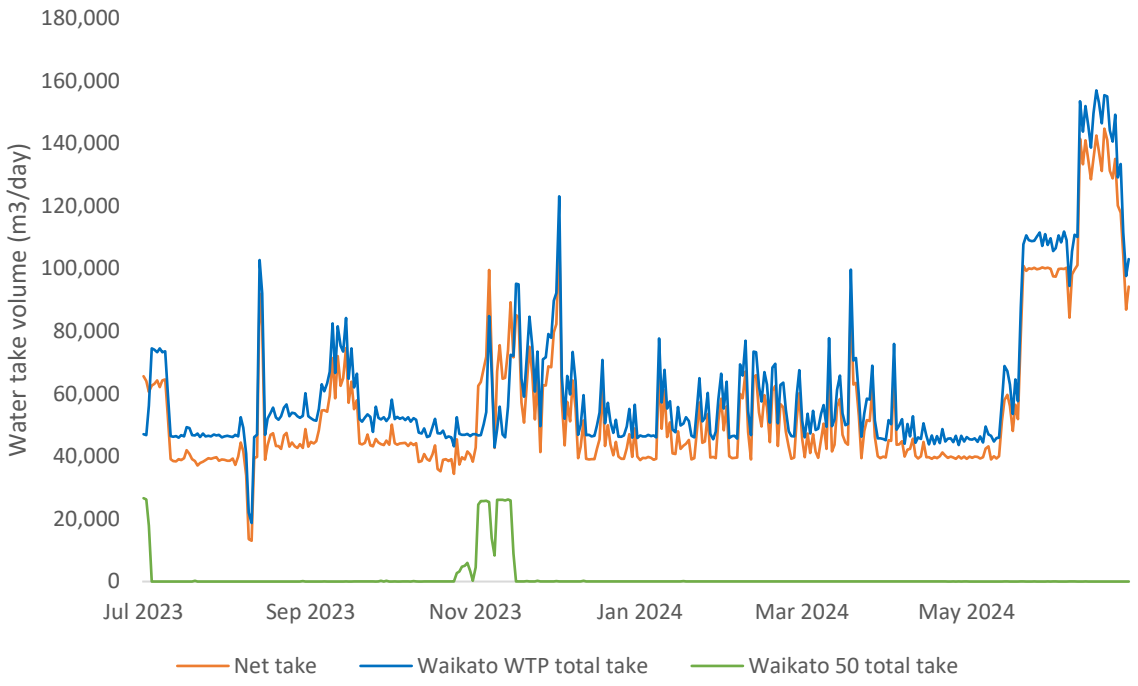


Figure 2: Total and net intake volumes of the Waikato and Waikato 50 plants

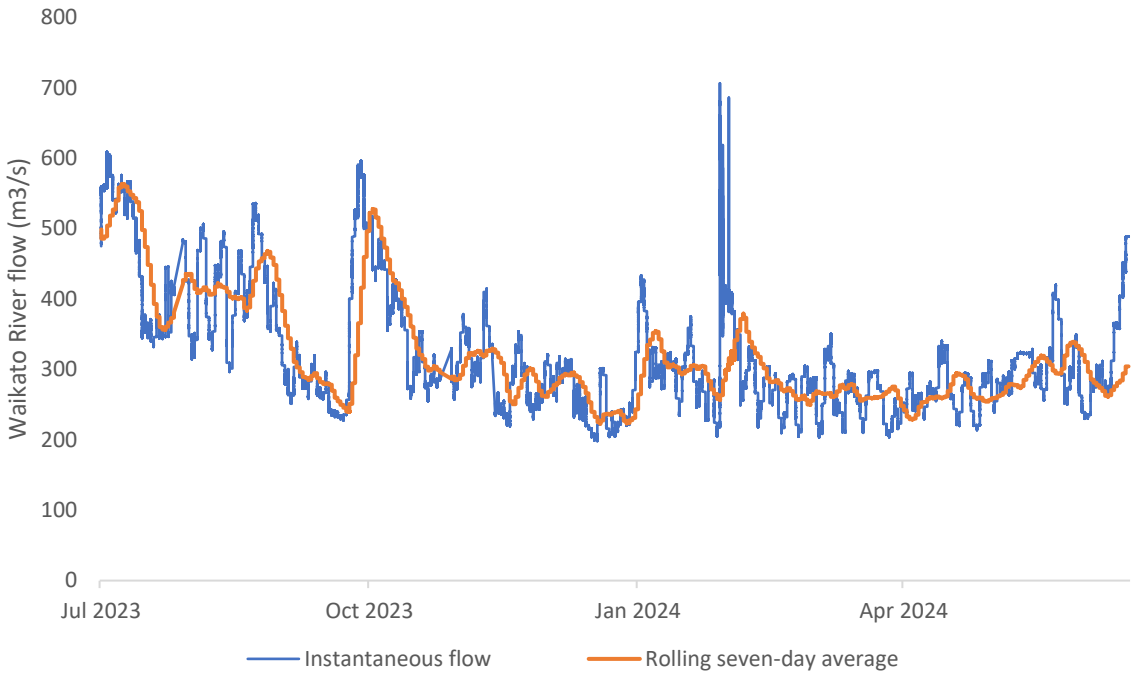


Figure 3: Waikato River flow at Rangiriri

2.4 Waikato River instantaneous take rate and water velocity

Resource consents AUTH960089.01.05 and AUTH131259.01.02 authorise a maximum instantaneous rate of 2,450 L/s and 3.2 m^3/s (3,200 L/s) respectively, for a combined maximum of 5,650 L/s. Water velocity must not exceed 0.15 m/s. The four Waikato WTP intake screens each have an approximate designed intake rate capacity of 745 L/s, allowing a maximum intake rate of 2,980 L/s. The two Waikato 50 intake screens each have a designed maximum flow rate of 347 L/s, or 694 L/s for the whole intake structure. Across both water treatment plant intake structures, the maximum instantaneous take capacity for the reporting period was 3,674 L/s. The Waikato and Waikato 50 intake screens each have a designed maximum intake velocity of 0.15 m/s.

The instantaneous take rate was not exceeded in the reporting period, with a maximum instantaneous take rate of 3,121 L/s on 10 November 2023. The average maximum instantaneous take across the period was 934 L/s. The data is displayed in Figure 4.

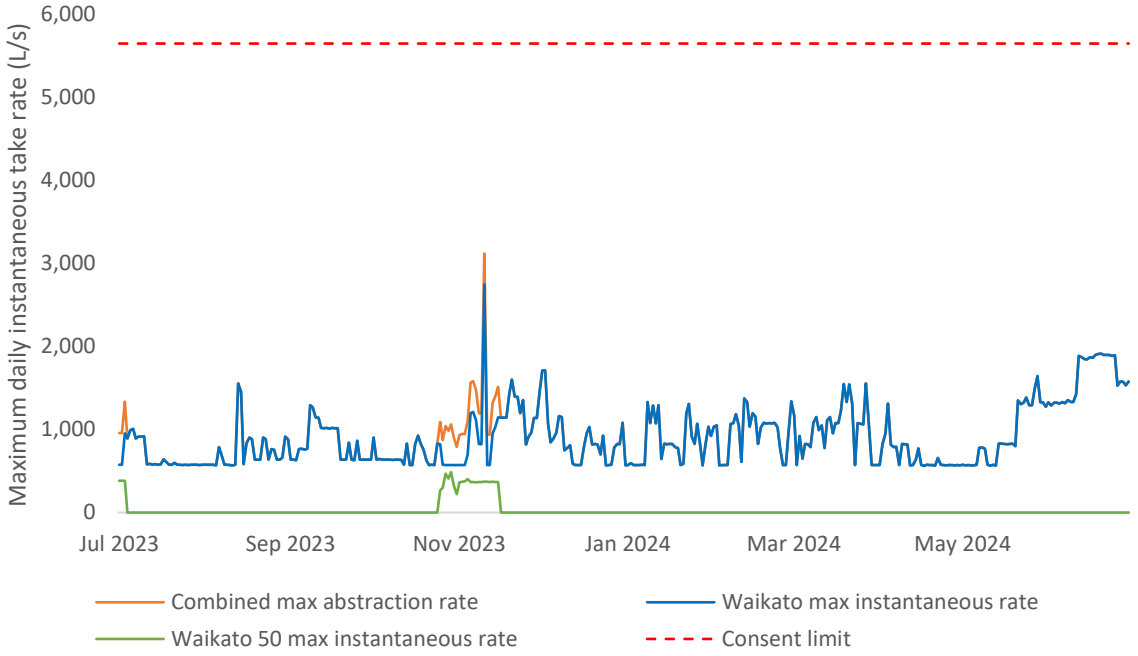


Figure 4: Maximum daily instantaneous take rates of the Waikato and Waikato 50 plants

2.5 Effects of the intake structure

2.5.1 Fish entrainment and impingement in 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 eggs and larvae) entrainment survey in the intake wet well were carried out on 22 May 2024 by Tonkin + Taylor and Deep Dive Division, 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 2.6 below Screen 1 and 1.9 m below Screen 2, 1.3m below Screen 3 and 0.7 m below Screen 4
- Water velocity was moderate, however was not qualitatively assessed. Visual observation expects the FMP velocity guidelines to be met
- 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-high for Screen 1 and moderate for Screen 2, 3 and 4.
- Gold clams (*Corbicula fluminea*) were not observed on or under the screens (although are present in the general area)
- The density of smelt larvae in the penstock was 0.3 smelt/m^3, 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 2024.

Dredging below the screens did not occur in 2023-2024.

2.5.2 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.

2.5.3 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. Oil/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.

2.6 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 in understanding 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, however, they have not appointed Kaitiaki Advisors to implement a Cultural Indicators Monitoring Plan. This will be tabled for discussion at the 2024 meeting, which is outside of the current reporting period.

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 the transformation of Haywards Landing. In the reporting period, payment was completed in January 2024. At the request of the TWLG, Watercare will propose potential enhancement works to the group for review. At the end of the reporting period, Watercare was awaiting further directives from Te Whakakitenga o Waikato Incorporated regarding a refined scope for the enhancement in addition to the requirements outlined in the consent. A preliminary scope has been provided to three consulting firms to create a proposal, which at the request of the TWLG, Watercare will discuss with the group as part of the review process in the next reporting period (2024-2025).

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 discharges occur through the off-spec pipeline as a result of routine treatment plant processes. These include supernatant discharges from solids dewatering, membrane cleaning or backwash, and backwash or filter-to-waste discharges from the activated carbon filters.
- **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 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 from 25 May 2023 (stage two discharge):

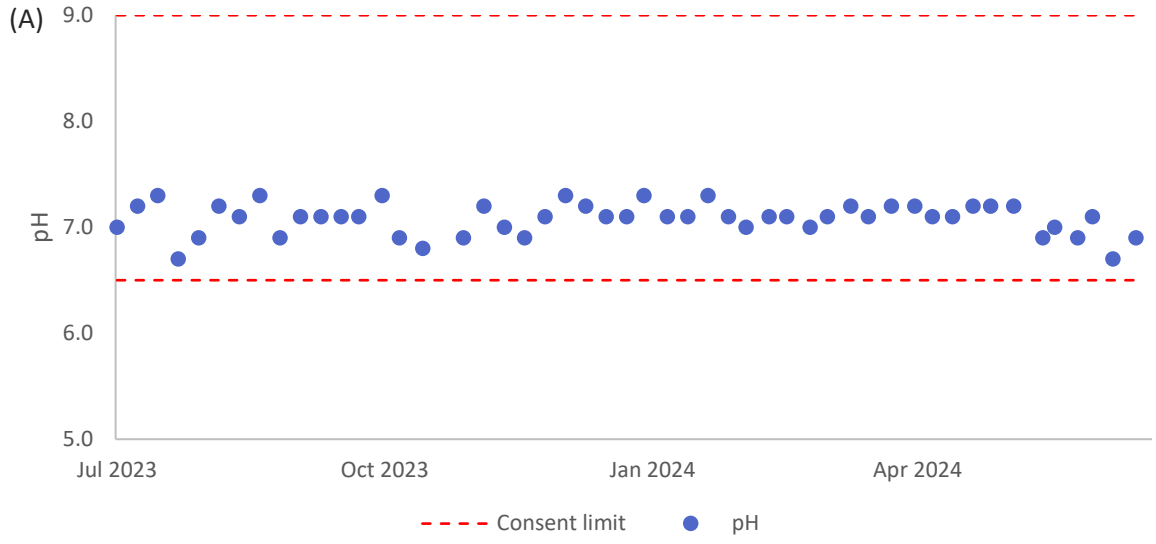
- pH between 6.5-9
- Total residual chlorine ≤ 0.25 mg/L
- Fluoride ≤ 2 mg/L
- Suspended solids ≤ 50 mg/L
- Total soluble aluminium ≤ 4.0 mg/L

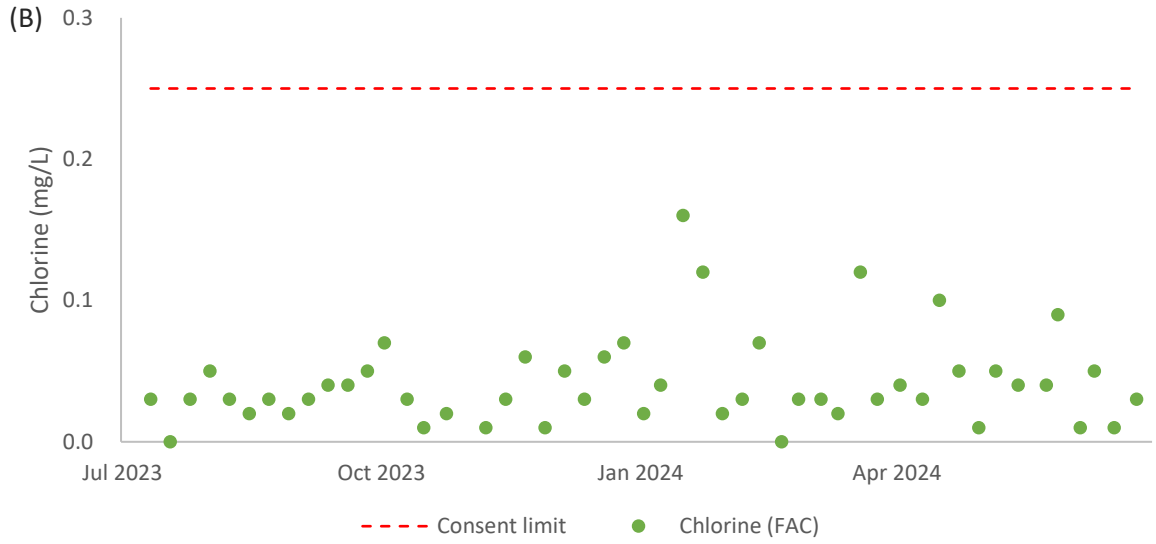
The quality of operational discharges is summarised in the following sub-sections.

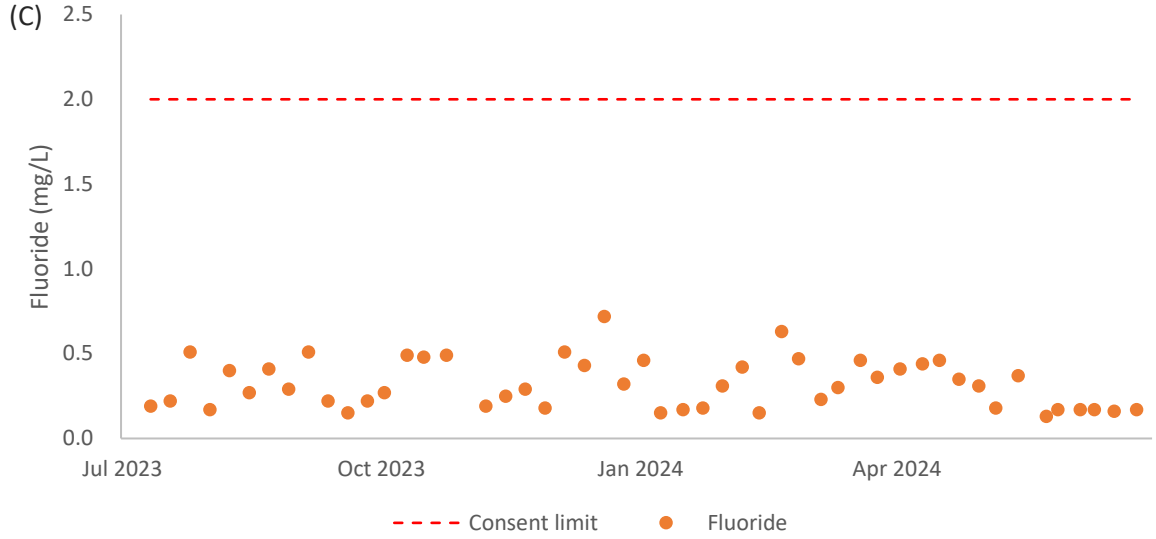
3.2.2 Planned process discharges

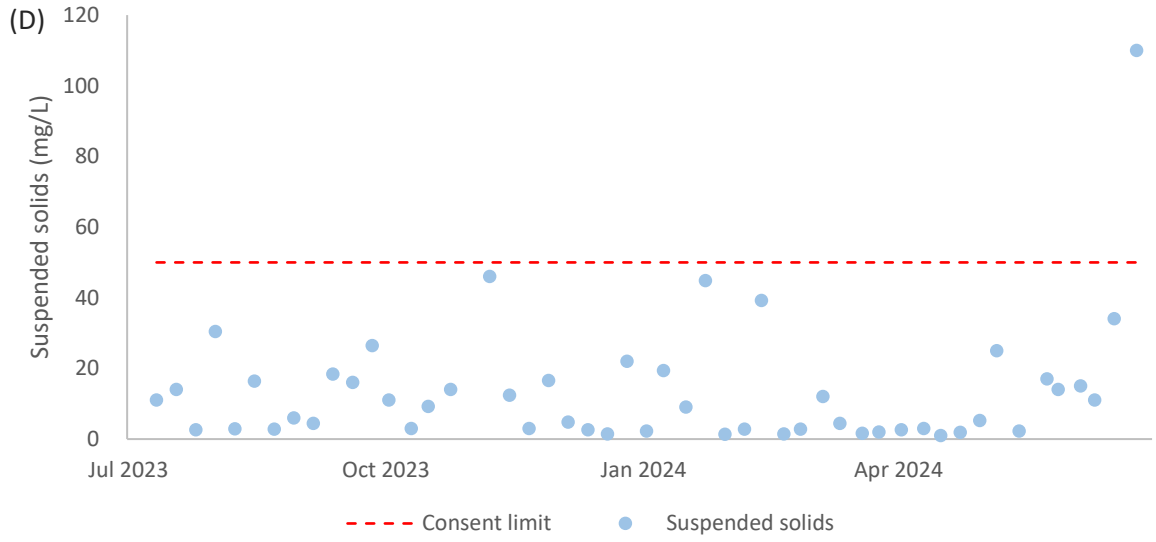
Samples of operational discharges are taken weekly from the off-spec pipeline and tested by WLS. Given these samples are taken once a week, they are representative of the planned process discharges which occur on a continuous basis. The off-spec pipeline discharges directly to the Waikato River and has 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 presented in Appendix C and illustrated in Figure 5(A-E). As shown in Figure 5(D), there was one exceedance of suspended solids at a concentration of 110 mg/L in the routine monitoring on 24 June 2024 as a result of a clarifier clean.









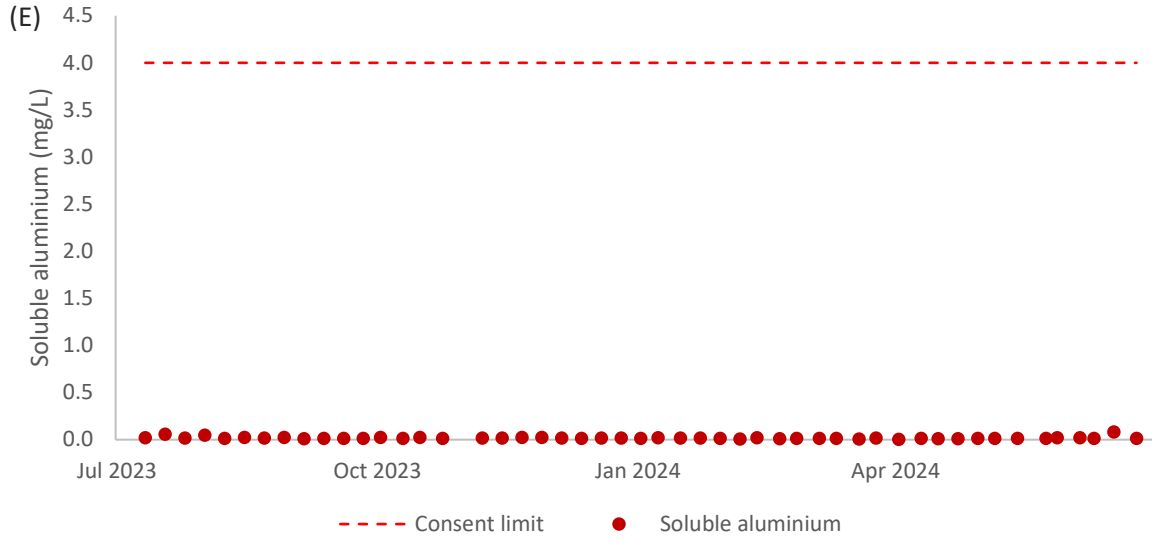


Figure 5(A-E): Discharge chemistry results

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 137 m^3 each time
- No unplanned discharges contained chlorinated or fluoridated water
- The discharges made were all returned 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 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 to the off-spec pipeline. 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 all tests are presented in Appendix D, including bund contents removed via truck. Water was removed via truck on several days throughout the reporting period, and all discharges to the environment met the consent criteria.
- **Draining of clarifiers:** In-house, non-accredited sampling and testing is undertaken during the planned 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 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. Several of the discharges were to geobags rather than the off-spec pipeline, with either significantly lower or no volumes discharged to the environment. These clarifier cleans are now conducted as full annual cleans to inspect for the gold clam, *Corbicula fluminea.*

Five clarifier drain downs occurred in the monitoring period. Drains on 6 March 2024, 15 May 2024, 24 June 2024 exceeded the total suspended solids limit, at 298, 612, and 110 mg/L respectively. The exceedance on 24 June 2024 was also captured in the routine sampling result, discussed in section 3.2.2. A project for the capture and treatment of the discharges to the off-spec

pipeline is currently in the design phase, which should minimise 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 Volume 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 6. During the reporting period, the average total daily discharge volume was 7,769 m^3, with a maximum of 17,428 m^3 recorded on 19 June 2024. There were no exceedances during this monitoring period.

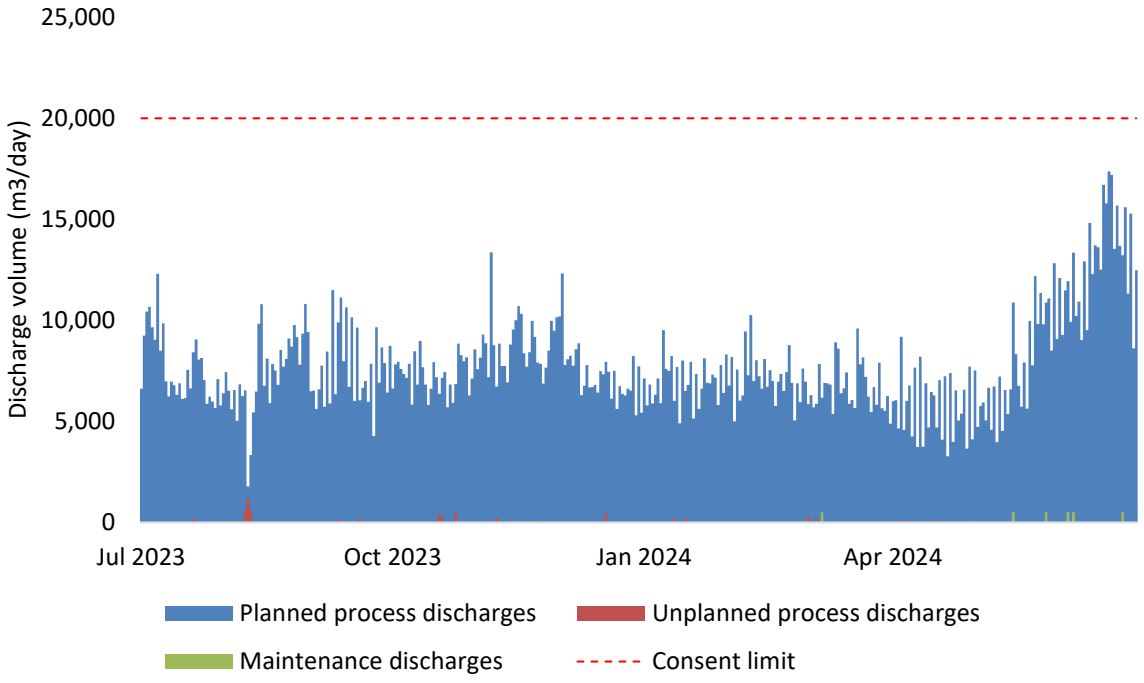


Figure 6: Daily process discharge volumes

3.4 Treated off-spec water discharges

There were no discharges of the 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 WTP is diverted through collection drains that discharge to a culvert downstream of the detention pond to minimise the flow through the WTP 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 7 and Figure 8), which slow high volume discharges and mitigate erosion.

The Wairiri 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 2023-2024 reporting period.

Figure 7: Discharge outlet location into the Wairiri Stream. View looking upstream.

Figure 8: 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 2023 and 30 June 2024.

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 2023-2024, Watercare surveyed 6,000 km of water mains and identified 3,789 leaks across the whole region. Additionally, the average consumption per person per day is ahead of the target for 253 litres per person per day by 2025. 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

Condition 10 of consent AUTH960089.01.05 requires the plant to adopt all practicable means to ensure invasive plant and animal pests are not transferred to the Auckland Region. The WTP has been designed to prevent animal pests and invasive plants from 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.

The invasive gold clam, *Corbicula fluminea* was first detected within the sand separators on 20 February 2024. As stated above, the treatment processes within the plant do not allow transfer of any animal species into the Auckland Region. Watercare has established protocols onsite to ensure the gold clams are not spread to Auckland through other means and continues to work with the Ministry for Primary Industries and Waikato Regional Council to ensure best practice. There have been visits from MPI and WRC to site to show the checks in place.

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.

The Waikato WTP exceeded the suspended solids discharge limit specified in AUTH137497.01.01 during routine sampling on 24 June 2024, due to a clarifier cleaning event. Two additional instances occurred during clarifier drains on 6 March and 15 May 2024, where total suspended solids exceeded the discharge limit before entering the off-spec pipeline. These instances were detected through non-routine onsite sampling. These exceedances were unlikely to have caused any adverse effects due to their relatively short duration and the relatively large variation in total suspended solids in the receiving environment.

The Waikato, Waikato 50 and Waikato A Water Treatment Plants were fully compliant across all other consents for the conditions considered in this report as shown in Table 2.

Table 2: Resource consent compliance summary for 2023-2024

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 into the Waikato River	Compliant

Appendix A. Raw Water Quality Data

Waikato WTP Raw

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	0	0	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	0.39	0.03	0.1	0.005
Alkalinity Total	mg/L	13	41	27	35.85	1
Aluminium	mg/L	53	3.6	0.17	0.68	0.005
Bromate	mg/L	13	0	0	0	0.005

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Bromide	mg/L	13	0.06	0.04	0.05	0.005
Calcium	mg/L	16	9	6.1	7.21	0.01
Calcium Hardness	mg/L	16	23	15	18.06	0.025
Chlorate	mg/L	13	0	0	0	0.01
Chloride	mg/L	13	18.6	13.8	15.22	0.02
Chlorite	mg/L	13	0	0	0	0.005
Colour	Hazen Units	13	40	0	19.23	5
Conductivity	mS/m	13	16.6	12.8	15.04	0.5
Cyanide	mg/L	4	0	0	0	0.005
Fluoride	mg/L	13	0.17	0.09	0.13	0.02
Iodide	mg/L	4	0	0	0	0.001
Iron	mg/L	16	3.7	0.34	0.97	0.002
Magnesium	mg/L	16	3.2	2.5	2.73	0.001
Magnesium Hardness	mg/L	16	13	10	11.06	0.0041
Manganese	mg/L	16	0.13	0.03	0.05	0.0005
pH	pH unit	52	8	6.9	7.42	0.1
Potassium	mg/L	4	3.3	2.7	3.02	0.05
Silicon	mg/L	4	41	35	38	0.1
Sodium	mg/L	4	19	15	16.75	0.1
Sulphate	mg/L	13	11.7	8.49	9.68	0.02
Suspended Solids	mg/L	13	65	2.8	18.28	0.4
Total Dissolved Solids	mg/L	13	170	110	127.69	15

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Total Hardness	mg/L	16	35	26	29.31	0.029
Total Organic Carbon TOC	mg/L	13	6.3	1.2	2.78	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	2.7	0	0.89	0.5
Confirmed Giardia per 10L	/10 L	12	2.7	0	0.78	0.5
Escherichia coli	MPN/100mL	17	4,400	52	577.06	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	0.02	0.01	0.02	0.005
Dissolved Reactive Phosphorus	mg/L	13	0.03	0.01	0.02	0.002
Nitrate	mg/L	13	0.9	0.24	0.48	0.002
Nitrite	mg/L	13	0.01	0	0	0.002
TKN	mg/L	4	0.47	0.12	0.34	0.1
Total Phosphorus	mg/L	13	0.25	0.04	0.08	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	26	0	0	0	2
Di(2-ethylhexyl) phthalate	µg/L	26	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	26	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	26	0	0	0	0.01
alpha-Chlordane	µg/L	26	0	0	0	0.01
cis-permethrin	mg/L	26	0	0	0	0.0002
gamma-BHC (lindane)	µg/L	26	0	0	0	0.01
gamma-Chlordane	µg/L	26	0	0	0	0.01
Gamma-chlordane	mg/L	26	0	0	0	0
Heptachlor	µg/L	26	0	0	0	0.01
Heptachlor epoxide	µg/L	26	0	0	0	0.01
Hexachlorobenzene	µg/L	26	0	0	0	0.1
Methoxychlor	µg/L	26	0	0	0	0.2
Permethrin (cis + trans)	µg/L	26	0	0	0	0.2
pp-DDT	µg/L	26	0	0	0	0.2
Procymidone	µg/L	26	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	26	0	0	0	0.2
Atrazine	µg/L	26	0	0	0	0.1
Metolachlor	µg/L	26	0	0	0	0.1
Molinate	µg/L	26	0	0	0	0.1
Pendimethalin	µg/L	26	0	0	0	0.2
Propanil	µg/L	26	0	0	0	0.1
Simazine	µg/L	26	0	0	0	0.1
Terbuthylazine	µg/L	26	0	0	0	0.2
Trifluralin	µg/L	26	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	26	0	0	0	0.2
Diazinon	µg/L	26	0	0	0	0.1
Pirimiphos-methyl	µg/L	26	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	0.02	0.01	0.01	0.0001
Barium	mg/L	4	0.03	0.02	0.02	0.0002
Boron	mg/L	4	0.21	0.16	0.18	0.005
Cadmium	mg/L	4	0	0	0	0
Chromium	mg/L	4	0	0	0	0.0005
Copper	mg/L	4	0	0	0	0.0002
Lead	mg/L	4	0	0	0	0.0001
Lithium	mg/L	4	0.07	0.05	0.06	0.0003
Mercury	mg/L	16	0	0	0	0
Molybdenum	mg/L	4	0	0	0	0.0003
Nickel	mg/L	4	0	0	0	0.0001
Selenium	mg/L	4	0	0	0	0.0005
Zinc	mg/L	4	0	0	0	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	13	0	0	0	0.0001
bromoform	mg/L	13	0	0	0	0.0001
chloroform	mg/L	13	0	0	0	0.0001
dibromochloromethane	mg/L	13	0	0	0	0.0001
THM Ratio		13	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	13	0	0	0	0.0001
1-2-3-trichlorobenzene	mg/L	13	0	0	0	0.0001
1-2-4-trichlorobenzene	mg/L	13	0	0	0	0.0001
1-2-dichlorobenzene	mg/L	13	0	0	0	0.0001
1-2-dichloroethane	mg/L	13	0	0	0	0.0001
1-4-dichlorobenzene	mg/L	13	0	0	0	0.0001
benzene	mg/L	13	0	0	0	0.0001
carbon tetrachloride	mg/L	13	0	0	0	0.0001
ethylbenzene	mg/L	13	0	0	0	0.0001
m- & p-xylene	mg/L	13	0	0	0	0.0001
styrene	mg/L	13	0	0	0	0.0001
tetrachloroethylene	mg/L	13	0	0	0	0.0001
toluene	mg/L	13	0	0	0	0.0001
trans-1-2-dichloroethene	mg/L	13	0	0	0	0.0001
trichloroethylene	mg/L	13	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	52	10,000,000	120,000	1,396,538.46	0.5
Algae and Cyanobacteria cell count	cells/mL	52	13,000	480	3,835.19	5
Algae and Cyanobacteria colony count	colonies/mL	52	12,000	210	1,779.42	5
Colorseed Cryptosporidium recovery	%	12	61	11	33.92	
Colorseed Giardia recovery	%	12	56	16	29.67	
Cyanobacteria biovolume	µm³/mL	52	190,000	0	24,785.38	0.5
Cyanobacteria cell count	cells/mL	52	6,000	0	706.62	5
Cyanobacteria colony count	colonies/mL	52	420	0	70.36	5
Total coliforms	MPN/100mL	17	16,000	700	4,964.71	1

Waikato 50 WTP Raw

Acid Herbicides

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
2-4-5-Trichlorophenoxyacetic	mg/L	1	0	0	0	0.0001
2-4-Dichlorophenoxyacetic acid	mg/L	1	0	0	0	0.0001
4-(2-4-Dichlorophenoxy) butano	mg/L	1	0	0	0	0.0001
Bentazone	mg/L	1	0	0	0	0.0001
Dichlorprop	mg/L	1	0	0	0	0.0001
MCPA	mg/L	1	0	0	0	0.0001
Mecoprop (MCPP)	mg/L	1	0	0	0	0.0001
Picloram	mg/L	1	0	0	0	0.0001
Triclopyr	mg/L	1	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	1	0.1	0.1	0.1	0.005
Alkalinity Total	mg/L	1	39	39	39	1
Aluminium	mg/L	2	0.56	0.52	0.54	0.005
Bromate	mg/L	1	0	0	0	0.005
Bromide	mg/L	1	0.05	0.05	0.05	0.005
Calcium	mg/L	1	7.2	7.2	7.2	0.01

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Calcium Hardness	mg/L	1	18	18	18	0.025
Chlorate	mg/L	1	0	0	0	0.01
Chloride	mg/L	1	16.1	16.1	16.1	0.02
Chlorite	mg/L	1	0	0	0	0.005
Colour	Hazen Units	1	7.5	7.5	7.5	5
Conductivity	mS/m	4	16.2	14.4	14.9	0.5
Cyanide	mg/L	1	0	0	0	0.005
Fluoride	mg/L	1	0.15	0.15	0.15	0.02
Iodide	mg/L	1	0	0	0	0.001
Iron	mg/L	1	0.89	0.89	0.89	0.002
Magnesium	mg/L	1	2.9	2.9	2.9	0.001
Magnesium Hardness	mg/L	1	12	12	12	0.0041
Manganese	mg/L	1	0.05	0.05	0.05	0.0005
pH	pH unit	5	7.5	6.8	7.1	0.1
Potassium	mg/L	1	3.3	3.3	3.3	0.05
Silicon	mg/L	1	39	39	39	0.1
Sodium	mg/L	1	17	17	17	0.1
Sulphate	mg/L	1	10.2	10.2	10.2	0.02
Suspended Solids	mg/L	1	14	14	14	0.4
Total Dissolved Solids	mg/L	1	140	140	140	15
Total Hardness	mg/L	1	30	30	30	0.029
Total Organic Carbon TOC	mg/L	1	2.4	2.4	2.4	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	2	1.3	0	0.65	0.5
Confirmed Giardia per 10L	/10 L	2	1.3	0	0.65	0.5
Escherichia coli	MPN/100mL	2	110	63	86.5	1

Nutrients

Component Name	Component Units	Number of Samples	Max Test Result	Min Test Result	Ave Test result	Component Detection Limit
Ammonia	mg/L	1	0.01	0.01	0.01	0.005
Dissolved Reactive Phosphorus	mg/L	1	0.02	0.02	0.02	0.002
Nitrate	mg/L	1	0.55	0.55	0.55	0.002
Nitrite	mg/L	1	0	0	0	0.002
TKN	mg/L	1	0.27	0.27	0.27	0.1
Total Phosphorus	mg/L	1	0.05	0.05	0.05	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	1	0	0	0	2
Di(2-ethylhexyl) phthalate	µg/L	1	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	1	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	1	0	0	0	0.01
alpha-Chlordane	µg/L	1	0	0	0	0.01
cis-permethrin	mg/L	1	0	0	0	0.0002
gamma-BHC (lindane)	µg/L	1	0	0	0	0.01
gamma-Chlordane	µg/L	1	0	0	0	0.01
Gamma-chlordane	mg/L	1	0	0	0	0
Heptachlor	µg/L	1	0	0	0	0.01
Heptachlor epoxide	µg/L	1	0	0	0	0.01
Hexachlorobenzene	µg/L	1	0	0	0	0.1
Methoxychlor	µg/L	1	0	0	0	0.2
Permethrin (cis + trans)	µg/L	1	0	0	0	0.2
pp-DDT	µg/L	1	0	0	0	0.2
Procymidone	µg/L	1	0	0	0	0.2
trans-permethrin	mg/L	1	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	1	0	0	0	0.2
Atrazine	µg/L	1	0	0	0	0.1
Metolachlor	µg/L	1	0	0	0	0.1
Molinate	µg/L	1	0	0	0	0.1
Pendimethalin	µg/L	1	0	0	0	0.2
Propanil	µg/L	1	0	0	0	0.1
Simazine	µg/L	1	0	0	0	0.1
Terbuthylazine	µg/L	1	0	0	0	0.2
Trifluralin	µg/L	1	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	1	0	0	0	0.2
Diazinon	µg/L	1	0	0	0	0.1
Pirimiphos-methyl	µg/L	1	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	1	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	1	0	0	0	0.001
Arsenic	mg/L	1	0.01	0.01	0.01	0.0001
Barium	mg/L	1	0.03	0.03	0.03	0.0002
Boron	mg/L	1	0.19	0.19	0.19	0.005
Cadmium	mg/L	1	0	0	0	0
Chromium	mg/L	1	0	0	0	0.0005
Copper	mg/L	1	0	0	0	0.0002
Lead	mg/L	1	0	0	0	0.0001
Lithium	mg/L	1	0.05	0.05	0.05	0.0003
Mercury	mg/L	1	0	0	0	0
Molybdenum	mg/L	1	0	0	0	0.0003
Nickel	mg/L	1	0	0	0	0.0001
Selenium	mg/L	1	0	0	0	0.0005
Zinc	mg/L	1	0	0	0	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	1	0	0	0	0.0001
bromoform	mg/L	1	0	0	0	0.0001
chloroform	mg/L	1	0	0	0	0.0001
dibromochloromethane	mg/L	1	0	0	0	0.0001
THM Ratio		1	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	1	0	0	0	0.0001
1-2-3-trichlorobenzene	mg/L	1	0	0	0	0.0001
1-2-4-trichlorobenzene	mg/L	1	0	0	0	0.0001
1-2-dichlorobenzene	mg/L	1	0	0	0	0.0001
1-2-dichloroethane	mg/L	1	0	0	0	0.0001
1-4-dichlorobenzene	mg/L	1	0	0	0	0.0001
benzene	mg/L	1	0	0	0	0.0001
carbon tetrachloride	mg/L	1	0	0	0	0.0001
ethylbenzene	mg/L	1	0	0	0	0.0001
m- & p-xylene	mg/L	1	0	0	0	0.0001
styrene	mg/L	1	0	0	0	0.0001
tetrachloroethylene	mg/L	1	0	0	0	0.0001
toluene	mg/L	1	0	0	0	0.0001
trans-1-2-dichloroethene	mg/L	1	0	0	0	0.0001
trichloroethylene	mg/L	1	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	2	1,700,000	380,000	1,040,000	0.5
Algae and Cyanobacteria cell count	cells/mL	2	3,800	1,300	2,550	5
Algae and Cyanobacteria colony count	colonies/mL	2	1,500	370	935	5
Colorseed Cryptosporidium recovery	%	2	28	18	23	
Colorseed Giardia recovery	%	2	43	32	37.5	
Cyanobacteria biovolume	µm³/mL	2	84	0	42	0.5
Cyanobacteria cell count	cells/mL	2	280	0	140	5
Cyanobacteria colony count	colonies/mL	2	8.8	0	4.4	5
Total coliforms	MPN/100mL	2	1,000	990	995	1

Appendix B. Screen Entrainment Survey Report

10 July 2024
Job No: 0020973.7000

Watercare Services Limited
73 Remuera Road
Remuera
Auckland 1050

Attention: Emma Baker

Dear Emma

Waikato Water Treatment Plant Intake
Fish Impingement and Entrainment Survey - Autumn 2024

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 22 May 2024. The SCUBA work was carried out by Deep Dive Division, under the direction of a Tonkin & Taylor Ltd (T+T) freshwater biologist who was at the surface with a real-time audio link. Weather during the survey was overcast and it had rained 24 hours prior to the survey. The river water was turbid, based on visual observations.

An ichthyoplankton (fish eggs and larvae) entrainment survey was also carried out on 22 May 2024 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 (63 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 Table 3.1below.

[1] Variation email dated May 17 2024.

Tonkin & Taylor Ltd | Norris Ward McKinnon House, Level 5, 711 Victoria Street, Hamilton 3204, New Zealand
PO Box 9544, Hamilton 3204 P +64-7-834 7320 F +64-9-307 0265 E ham@tonkintaylor.co.nz

Table 3.1: Results

Parameter	Findings
Riverbed profiles and position relative to intake screens	The general river-bed level was 2.6 m below the underside of Screen 1 , 1.9 m below Screen 2, 1.3 m below Screen 3 and 0.7 m below Screen 4. A tree branch wedged between screen 3 and 4 was causing a build-up of sediment immediately downstream of screen 3 and around screen 4. The sediment deposit was removed (along with the branch) after the screen inspection. No dredging is required, as the clearance is greater than 0.5 m at all screens, as per conditions of consent.
Water velocities	Heavy rain had fallen in the catchments upstream of the Waikato Water Treatment Plant (WTP) 24 hours prior to the survey. The Waikato River flow was recorded as 337 m^3/s at Mercer Bridge. From visual observations at and below the surface by the diver, flow velocities were moderate. Water velocities were slightly higher at screen 4. Qualitative measures only were recorded during the survey as there was no flow meter available. Therefore, we are unable to comment on whether the "sweep" velocities are at least twice the design "approach" velocity as required by the FMP guideline. Based on visual comparisons with previous screen surveys we expect this guideline continues to be met. We will confirm during the next survey, scheduled for Spring 2024.
Distribution of debris	One branch was observed to be stuck on one of the concrete blocks underneath Screen 3 which was starting to cause a build-up of sediment in its lee. We understand the branch was removed by Deep Dive Division following the screen inspection.
Fish impingement on screens	None recorded visually by the diver, or by video analysis.
Species composition, abundance, size range of impinged organisms	None recorded visually by the diver, 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 (80 – 90 %) build-up of algae, all could be wiped away by hand. Some fouling in slots including small stones/pumice. • Screen 1 downstream section: Moderate-high (60 – 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 (60 – 80 %) build-up of algae, all could be wiped away by hand. Some fouling in slots including small stones/pumice (30%). • Screen 2 downstream section: Moderate (70 – 80 %) build-up of algae, all could be wiped away by hand. Some fouling in slots including small stones/pumice (10 - 30%). • Screen 3 upstream section: Moderate (50 – 80 %) build-up of algae, all could be wiped away by hand. A moderate amount of fouling in slots including small stones/pumice (10 – 50 %).

Parameter	Findings
	• Screen 3 downstream section: Moderate (80 %) build-up of algae, all could be wiped away by hand. Some fouling in slots including small stones/pumice (30 - 40 %). • Screen 4 upstream section: Moderate (50 – 80 %) build-up of algae, all could be wiped away by hand. Some fouling in slots including small stones/pumice (30 - 50 %). • Screen 4 downstream section: Moderate (80 %) build-up of algae, all could be wiped away by hand. Some fouling in slots including small stones/pumice (40 %). We understand freshwater gold clams (*Corbicula fluminea*) have been confirmed to be present in the Waikato River in the vicinity of the WTP. No freshwater gold clams were observed on or under the screens.
Surface marker buoys	Both intact.

Three smelt (*Retropinna retropinna*) larvae were recorded in the vertical haul sample collected in the penstock. The density of smelt in the penstock was therefore calculated as 0.3 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 the FMP (v.3), no further sampling is required in winter 2024.

4 Conclusions and recommendations

The key conclusions and recommendations of the Autumn 2024 fish impingement and entrainment surveys are detailed below.

- On average the river-bed was 1.6 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.
- Based on visual comparisons with previous screen surveys we expect 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”. We will confirm these measurements during the next survey, scheduled for Spring 2024.”
- 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 and was removed by Deep Dive Division.
- Three smelt were recorded in samples collected from the penstock, but smelt density was 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 2024.

5 Applicability

This report has been prepared for the exclusive use of our client Watercare Services Limited, 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 the Waikato Water Treatment Plant.

Tonkin & Taylor Ltd

Report prepared by:	Authorised for Tonkin & Taylor Ltd by:
.....	.....
Toni Shell	Brett Ogilvie
Freshwater Ecologist	Project Director

Technical review by Liza Kabrle, Principal Freshwater Ecologist.

10-Jul-24
\\ttgroup.local\corporate\auckland\projects\20973\20973.7000\issueddocuments\autumn 2024\20240710.tshe autumn screen survey final.docx

Appendix C. Process Discharge Quality

Date	pH (pH units)	Chlorine (FAC) (mg/L)	Fluoride (mg/L)	Suspended Solids (mg/L)	Soluble Aluminium (mg/L)
11/07/2023	7.00	0.03	0.2	11.0	0.02
18/07/2023	7.20	0.00	0.2	14.0	0.06
25/07/2023	7.30	0.03	0.5	2.6	0.02
1/08/2023	6.70	0.05	0.2	30.4	0.05
8/08/2023	6.90	0.03	0.4	2.9	0.02
15/08/2023	7.20	0.02	0.3	16.4	0.03
22/08/2023	7.10	0.03	0.4	2.8	0.02
29/08/2023	7.30	0.02	0.3	6.0	0.03
5/09/2023	6.90	0.03	0.5	4.4	0.01
12/09/2023	7.10	0.04	0.2	18.4	0.02
19/09/2023	7.10	0.04	0.2	16.0	0.02
26/09/2023	7.10	0.05	0.2	26.4	0.01
2/10/2023	7.10	0.07	0.3	11.0	0.03
10/10/2023	7.30	0.03	0.5	3.0	0.01
16/10/2023	6.90	0.01	0.5	9.2	0.03
24/10/2023	6.80	0.02	0.5	14.0	0.02
7/11/2023	6.90	0.01	0.2	46.0	0.02
14/11/2023	7.20	0.03	0.3	12.4	0.02
21/11/2023	7.00	0.06	0.3	3.0	0.03
28/11/2023	6.90	0.01	0.2	16.6	0.02
5/12/2023	7.10	0.05	0.5	4.8	0.02
12/12/2023	7.30	0.03	0.4	2.6	0.02
19/12/2023	7.20	0.06	0.7	1.4	0.02
26/12/2023	7.10	0.07	0.3	22.0	0.02
2/01/2024	7.10	0.02	0.5	2.2	0.01
8/01/2024	7.30	0.04	0.2	19.4	0.02
16/01/2024	7.10	0.16	0.2	9.0	0.02
23/01/2024	7.10	0.12	0.2	44.8	0.02
30/01/2024	7.30	0.02	0.3	1.3	0.02
6/02/2024	7.10	0.03	0.4	2.8	0.01
12/02/2024	7.00	0.07	0.2	39.2	0.02
20/02/2024	7.10	0.00	0.6	1.4	0.01
26/02/2024	7.10	0.03	0.5	2.8	0.01
5/03/2024	7.00	0.03	0.2	12.0	0.01

Date	pH (pH units)	Chlorine (FAC) (mg/L)	Fluoride (mg/L)	Suspended Solids (mg/L)	Soluble Aluminium (mg/L)
11/03/2024	7.10	0.02	0.3	4.4	0.02
19/03/2024	7.20	0.12	0.5	1.6	0.01
25/03/2024	7.10	0.03	0.4	2.0	0.02
2/04/2024	7.20	0.04	0.4	2.6	0.01
10/04/2024	7.20	0.03	0.4	3.0	0.01
16/04/2024	7.10	0.10	0.5	1.0	0.01
23/04/2024	7.10	0.05	0.3	1.9	0.01
30/04/2024	7.20	0.01	0.3	5.2	0.01
6/05/2024	7.20	0.05	0.2	25.0	0.01
14/05/2024	7.20	0.04	0.4	2.2	0.02
24/05/2024	6.90	0.04	0.1	17.0	0.02
28/05/2024	7.00	0.09	0.2	14.0	0.02
5/06/2024	6.90	0.01	0.2	15.0	0.02
10/06/2024	7.10	0.05	0.2	11.0	0.02
17/06/2024	6.70	0.01	0.2	34.0	0.08
25/06/2024	6.90	0.03	0.2	110.0	0.02

Appendix D. Chemical Bunds Discharges

Table 3: Waikato WTP chemical bund discharges

Date	Source (Bund)	Volume (m^3)	pH* (pH units)	Chlorine (FAC)* (mg/L)	Fluoride* (mg/L)	Suspended solids* (mg/L)	Soluble Aluminium * (mg/L)
01/07/2023	HFA	3	8.7	0.02	1.98	1	0
01/07/2023	Lime	10	8.7	0.02	1.98	15	0
04/07/2023	Hypo Washdown	1.8	6.6	0.22	0.00	3	0
07/07/2023	Sodium Hypochlorite	4	8.1	0.05	0.00	4	0
07/07/2023	Aluminium Sulphate	5	7.1	0.01	0.00	3	0.104
07/07/2023	Lime	3	7.3	0.01	0.00	21	0
21/07/2023	Sodium Hypochlorite	3	8.2	0.01	0.00	48	0
21/07/2023	HFA	2	8.0	0.07	1.53	24	0
21/07/2023	Aluminium Sulphate	2	7.8	0.00	0.00	16	0.28
21/07/2023	Lime	3	8.4	0.02	0.00	37	0
21/07/2023	Hypo Washdown	3	8.1	0.00	0.00	6	0
13/08/2023	Hypo Washdown	2	6.8	0.08	0.00	0	0
13/08/2023	Aluminium Sulphate	1	6.7	0.00	0.00	0	0.897
13/08/2023	Lime	3	8.9	0.02	0.00	0	0
20/08/2023	Sodium Hypochlorite	2	8.3	0.02	0.00	14	0
20/08/2023	Aluminium Sulphate	2	7.1	0.00	0.00	27	2.38
20/08/2023	Lime	2	7.2	0.00	0.00	27	0
21/08/2023	Hypo Washdown	2	6.6	0.18	0.00	5	0
22/08/2023	Hypo Washdown	2	8.5	0.01	0.00	24	0
22/08/2023	Sodium Hypochlorite	2	8.5	0.01	0.00	24	0
22/08/2023	Lime	2	7.8	0.03	0.00	0	0
27/08/2023	Lime	0.3	8.8	0.03	0.00	6	0
09/09/2023	Sodium Hypochlorite	1	6.8	0.02	0.00	6	-
09/09/2023	Aluminium Sulphate	1	6.8	0.02	0.00	6	0.08
09/09/2023	Lime	1	6.8	0.01	0.00	6	0
14/09/2023	Sodium Hypochlorite	2	6.5	0.00	0.00	9	0
14/09/2023	Aluminium Sulphate	1	7.1	0.00	0.00	8	2.01
14/09/2023	Lime	5	7.4	0.01	0.00	9	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)
03/10/2023	Lime	3	7.6	0.06	0.00	16	0
09/10/2023	Aluminium Sulphate	1	7.7	0.06	0.00	6	0
09/10/2023	Sodium Hypochlorite	1	6.7	0.05	0.00	5	0
19/10/2023	Lime	2	7.1	0.05	0.00	6	
19/10/2023	Hypo Washdown	2	7.5	0.01	0.00	6	0
20/10/2023	Sodium Hypochlorite	2	8.7	0.04	0.00	5	0
27/10/2023	Sodium Hypochlorite	1	7.1	0.01	0.00	5	0
27/10/2023	Lime	2	7.1	0.00	0.00	5	0
16/11/2023	Aluminium Sulphate	2	7.5	0.02	0.00	4	0.26
16/11/2023	Lime	2	7.5	0.01	0.00	6	0
21/11/2023	Sodium Hypochlorite	1	7.4	0.04	0.00	3	0
21/11/2023	Aluminium Sulphate	2	7.4	0.10	0.00	6	0.31
21/11/2023	Lime	3	7.4	0.00	0.00	33	0
05/12/2023	Sodium Hypochlorite	3	8.6	0.06	0.00	8	0
05/12/2023	Hypo Washdown	3	7.7	0.00	0.00	28	0
05/12/2023	Lime	3	8.9	0.00	0.00	21	0
05/12/2023	Aluminium Sulphate	3	8.9	0.03	0.00	4	0.21
07/12/2023	Sodium Hypochlorite	1	7.9	0.01	0.00	7	0
07/12/2023	Aluminium Sulphate	2	7.9	0.01	0.00	3	0.556
07/12/2023	Lime	3	7.9	0.01	0.00	5	0
11/12/2023	Sodium Hypochlorite	2	8.6	0.05	0.00	1	0
11/12/2023	Hypo Washdown	2	8.5	0.00	0.00	1	0
18/12/2023	Hypo Washdown	2	6.9	0.03	0.00	1	0
26/12/2023	Aluminium Sulphate	3	7.4	0.02	0.00	5	2.33
26/12/2023	Lime	3	7.4	0.03	0.00	22	0
26/12/2023	Hypo Washdown	3	7.4	0.02	0.00	0	0
31/12/2023	Sodium Hypochlorite	3	8.5	0.05	0.00	2	0
31/12/2023	Aluminium Sulphate	4	8.6	0.02	0.00	2	0.22
31/12/2023	Lime	4	8.9	0.02	0.00	2	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)
01/08/2024	Hypo Washdown	2	8.6	0.04	0.00	5	0
25/01/2024	Hypo Washdown	3	7.2	0.05	0.00	4	0
25/01/2024	Aluminium Sulphate	1	8.9	0.01	0.00	3	0.31
25/01/2024	Lime	2	-	0.02	-	22	0
29/01/2024	Lime	4	7.3	0.05	0.00	2	0
29/01/2024	Sodium Hypochlorite	3	7.3	0.00	0.00	11	0
07/02/2024	Aluminium Sulphate	1.5	4.3	0.00		0	270
16/02/2024	Hypo Washdown	3	6.5	0.03	0.00	2	0
21/02/2024	Lime	1	7.3	0.00	0.00	20	0
22/02/2024	Hypo Washdown	3	6.5	0.03	0.00	0	0
23/02/2024	Aluminium Sulphate	1	3.9	0.05	0.00	2	Above range
27/02/2024	Lime	3	6.6	0.01	0.00	16	0
27/02/2024	Sodium Hypochlorite	3	6.6	0.03	0.00	8	0
08/03/2024	Sodium Hypochlorite	3	8.2	0.01	0.00	6	0
08/03/2024	Lime	5	7.4	0.01	0.00	11	0
13/03/2024	Hypo Washdown	3	6.9	0.02	0.00	2	0
15/03/2024	Sodium Hypochlorite	1	7.7	0.00	0.00	5	0
15/03/2024	Lime	1	7.7	0.02	0.00	10	0
28/03/2024	Sodium Hypochlorite	1	7.7	0.04	0.00	3	0
28/03/2024	Lime	2	6.9	0.02	0.00	30	0
13/04/2024	Sodium Hypochlorite	0.4	6.6	0.03	-	1	-
13/04/2024	Aluminium Sulphate	0.3	6.8	0.03	-	0	0.59
13/04/2024	Lime	1	8.8	0.03	-	5	-
13/04/2024	HFA	0.2	6.8	0.03	0.21	0	-
22/04/2024	Sodium Hypochlorite	2	7.0	0.02	0.00	6	0
22/04/2024	Aluminium Sulphate	2	7.0	0.03	0.00	4	0.17
22/04/2024	Lime	2	7.0	0.00	0.00	50	0
23/04/2024	HFA	1	7.0	0.00	27.00	3	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)
06/05/2024	Hypo Washdown	2	7.4	0.00	0.00	2	0
06/05/2024	Sodium Hypochlorite	0.5	6.9	0.00	0.00	3	0
16/05/2024	Sodium Hypochlorite	2	7.2	0.05	0.00	30	0
16/05/2024	Lime	2	7.2	0.00	0.00	33	0
16/05/2024	Hypo Washdown	4	6.9	0.03	0.00	0	0
31/05/2024	Hypo Washdown	2	7.0	0.01	0.00	7	0
31/05/2024	Sodium Hypochlorite	3	7.0	0.01	0.00	5	0
31/05/2024	Lime	3	7.0	0.01	0.00	28	0
16/06/2024	Hypo Washdown	3	8.3	0.05	0.00	1	0
16/06/2024	Lime	3	8.3	0.00	0.00	29	0
20/06/2024	Hypo Washdown	4	6.8	0.00	0.00	6	0
28/06/2024	Hypo Washdown	2	6.8	0.05	0.00	2	0
29/06/2024	Sodium Hypochlorite	2	6.9	0.02	0.00	5	0
29/06/2024	Aluminium Sulphate	2.5	6.9	0.02	0.00	2	0.029

Source: Operators' bund discharge log.

*Note: in-house test results measured at the Waikato Water Treatment Plant, which is not IANZ accredited.

Table 4: Waikato 50 WTP chemical bund discharges

Date	Source (Bund)	Volume (m^3)	pH* (pH units)	Chlorine (FAC) *(mg/L)	Fluoride* (mg/L)	Suspended solids* (mg/L)	Soluble Aluminium * (mg/L)
07/07/2023	Sodium Hypochlorite	6	8.82	0.09	0	1	0
07/07/2023	PACL	6	8.46	0.09	0	1	0.138
07/09/2023	PACL	6	8.79	0.00	0	1	0
07/09/2023	Sodium Hypochlorite	6	8.63	0.00	0	3	0
07/09/2023	Washdown Chamber	25	6.77	0.03	0	0	0
28/09/2023	Washdown Chamber	5	6.60	0.00	0	2	0
20/10/2023	Sodium Hypochlorite	3	8.74	0.04	0	5	0
29/04/2024	PACL	20	7.10	0.19	0	0	0.017
29/04/2024	Washdown Chamber	20	7.00	0.10	0	0	0
30/05/2024	PACL	20	8.30	0.01	0	1	0
30/05/2024	Caustic	20	8.15	0.03	0	1	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

Watercare
An Auckland Council Organisation

Record Sheet
STWKO-00-RS-018

SUBJECT : **Discharge to Environment from Waikato Water Treatment Plant**
OPERATOR : Cody Fox
DATE : 6/3/24

Discharge Date:	6/3/24	**Discharge Start Time:**	

Discharge Type:

Planned:	✓	**Unplanned:**		**Process:**	

Reason for Discharge:	Clarifier 5 drain for clam inspection		
Volume of Discharge:	m^3	**Discharge Rate:**	*L/s*
Discharge Source:	Clarifier 5		
Discharge Point:			
Receiving Environment:	River (Waikato)		

Contaminants in Discharge:

pH:	6.77	**Other:**
Total Residual Chlorine:	0 *mg/L*	
Fluoride:	0 *mg/L*	
Suspended Solids:	298 *g/L*	
Total Soluble Aluminium:	3.82 *mg/L*	

Monitoring/Sampling:

3 Samples taken

Environmental Impact(s):

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

Watercare
An Auckland Council Organisation

Record Sheet
STWKO-00-RS-018

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

Discharge Date:	15-05-2024	**Discharge Start Time:**	0330PM

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	6.95	0.11	1	0.079
1:00	6.92	0	0.176	0.237
2:00	6.85	0	612	0.940

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)

Watercare
An Auckland Council Organisation

Record Sheet
STWKO-00-RS-018

SUBJECT : **Discharge to Environment from Waikato Water Treatment Plant**
OPERATOR : RW + JB
DATE : 27/05/2024

Discharge Date:	27/05/2024	**Discharge Start Time:**	0930

Discharge Type:

Planned:	✓	**Unplanned:**		**Process:**	

Reason for Discharge:	Clarifier cleaning.		
Volume of Discharge:	100 m^3	**Discharge Rate:**	Low & unknown L/s
Discharge Source:	clarifier 3		
Discharge Point:	Drain valve.		
Receiving Environment:	River.		

Contaminants in Discharge:

pH:	6.9	**Other:**
Total Residual Chlorine:	0.03 mg/L	
Fluoride:	0.00 mg/L	
Suspended Solids:	300 NTU ~~g/L~~ → 32 NTU @ End.	
Total Soluble Aluminium:	0.09 mg/L	

Monitoring/Sampling:

Environmental Impact(s):

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

Watercare
An Auckland Council Organisation

Record Sheet
STWKO-00-RS-018

SUBJECT : **Discharge to Environment from Waikato Water Treatment Plant**
OPERATOR : ST & CK
DATE : 4/6/24

Discharge Date:	4/6/24	**Discharge Start Time:**	11.30 am

Discharge Type:

Planned:	X	**Unplanned:**		**Process:**	

Reason for Discharge:	Drain Clarifier #3 for cleaning		
Volume of Discharge:	m^3	**Discharge Rate:**	L/s
Discharge Source:	Clarifier 3		
Discharge Point:	Drain to River Valve Clarifier 3		
Receiving Environment:	Waikato River		

Contaminants in Discharge:

pH:	7,04	**Other:**
Total Residual Chlorine:	0,01 mg/L	
Fluoride:	0 mg/L	
Suspended Solids:	8 g/L	
Total Soluble Aluminium:	0,455 mg/L	

Monitoring/Sampling:

3 Samples taken every 30 minutes

Environmental Impact(s):

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

Clarifier Discharge Sampling

Time from valve opening		pH	FAC	TSS	SOL Alum
11.30am	0:05	7,04	0,01	8	0,45
12.30	1:00	7,12	0,04	8	1,1
13.30	2:00	7,05	0,01	12	0,47

Watercare
An Auckland Council Organisation

Record Sheet
STWKO-00-RS-018

SUBJECT : **Discharge to Environment from Waikato Water Treatment Plant**
OPERATOR : Cody Fox
DATE : 6/6/24

Discharge Date:	6/6/24	**Discharge Start Time:**	

Discharge Type:

Planned:		**Unplanned:**	/	**Process:**	

Reason for Discharge:	Empty clarifier 3 to clean		
Volume of Discharge:	m^3	**Discharge Rate:**	L/s
Discharge Source:	Clarifier 3 Water		
Discharge Point:	River		
Receiving Environment:	River		

Contaminants in Discharge: 12pm

pH:	6.74		**Other:**
Total Residual Chlorine:	0.01	mg/L	
Fluoride:	0.21	mg/L	
Suspended Solids:	49	g/L	
Total Soluble Aluminium:	0.517	mg/L	

Monitoring/Sampling:

Environmental Impact(s):

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

Watercare
An Auckland Council Organisation

Record Sheet
STWKO-00-RS-018

SUBJECT : **Discharge to Environment from Waikato Water Treatment Plant**
OPERATOR : Cody For
DATE : 24/6/24

Discharge Date:	24/6/24	**Discharge Start Time:**	0815

Discharge Type:

Planned:	✓	**Unplanned:**		**Process:**	

Reason for Discharge:	Cleaning of clarifier 1		
Volume of Discharge:	80 m^3	**Discharge Rate:**	*L/s*
Discharge Source:	Clarfier 1		
Discharge Point:	Clarifier 1		
Receiving Environment:	Waikato River		

Contaminants in Discharge:

pH:	6.67	**Other:**
Total Residual Chlorine:	0 *mg/L*	
Fluoride:	0 *mg/L*	
Suspended Solids:	110 *g/L*	
Total Soluble Aluminium:	2.44 *mg/L*	

Monitoring/Sampling:

Sampling was conducted during the draindown from the off spec man hole.

Environmental Impact(s):

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

Appendix F. Volumes of Operational Discharges

Table 5: Volumes of Operational Discharges

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]	
1/07/2023	2405	65	388	860	2905	4	0	0	0	17	6642
2/07/2023	2340	260	1976	1728	2939	4	0	0	0	0	9243
3/07/2023	2730	0	2128	2923	2655	4	0	4	0	0	10442
4/07/2023	3900	65	2374	2142	2188	4	0	0	0	1.8	10672
5/07/2023	4225	260	1183	1810	2179	4	0	0	0	0	9658
6/07/2023	4225	195	1184	1328	2105	4	0	0	0	0	9038
7/07/2023	4225	325	1975	3805	1968	4	0	0	0	24	12324
8/07/2023	4290	195	788	1344	1893	4	0	0	0	0	8510
9/07/2023	4095	260	1976	1613	1901	4	0	0	0	0	9846
10/07/2023	3445	260	789	851	1636	4	0	0	0	0	6982
11/07/2023	2535	195	788	1265	1453	3	0	0	0	0	6237
12/07/2023	2340	260	1590	1375	1395	3	0	0	0	0	6961
13/07/2023	2795	130	1183	1318	1368	3	0	0	0	0	6796
14/07/2023	2470	195	1183	1014	1447	3	0	0	0	0	6310
15/07/2023	2405	520	1184	1357	1420	4	0	0	0	0	6887
16/07/2023	2405	130	1182	965	1436	4	0	0	0	0	6118
17/07/2023	2535	195	1183	622	1626	4	0	0	0	0	6163
18/07/2023	2860	130	1212	1858	1490	3	0	0	0	0	7551
19/07/2023	2535	130	1183	1157	1631	3	1	0	0	0	6637
20/07/2023	3445	130	1579	1616	1649	3	188	0	0	0	8609
21/07/2023	4420	0	1182	1983	1471	3	0	0	0	13	9070

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]	
22/07/2023	3835	0	1580	1317	1329	3	0	0	0	0	8061
23/07/2023	3965	260	787	1791	1338	3	0	0	0	0	8142
24/07/2023	2535	65	1582	1467	1397	4	0	0	0	0	7047
25/07/2023	2535	0	786	904	1647	3	0	0	0	0	5874
26/07/2023	2275	0	1183	1393	1372	3	0	0	0	0	6224
27/07/2023	2210	0	1458	1054	1269	3	0	0	0	0	5992
28/07/2023	2080	195	1184	938	1265	3	0	0	0	0	5661
29/07/2023	2145	195	1609	1892	1247	3	0	0	0	0	7088
30/07/2023	2080	260	1182	944	1321	3	0	0	0	0	5787
31/07/2023	2145	195	1300	1486	1268	3	0	0	0	0	6394
01/08/2023	2145	195	1459	2051	1592	3	0	0	0	0	7442
02/08/2023	2275	390	1182	1418	1263	3	0	0	0	0	6528
03/08/2023	2210	130	1184	848	1233	3	0	0	0	0	5605
04/08/2023	2210	130	1182	1791	1237	3	0	79	0	0	6629
05/08/2023	2275	130	794	595	1245	3	0	0	0	0	5038
06/08/2023	2405	65	1579	1428	1366	3	0	0	0	0	6843
07/08/2023	2470	0	1182	1299	1301	3	0	0	0	0	6252
08/08/2023	2145	0	1579	1384	1434	3	587	0	0	0	7128
09/08/2023	1170	0	-7	-3	622	3	881	317	0	0	2980
10/08/2023	975	0	788	686	889	3	533	73	0	0	3944
11/08/2023	2535	0	787	888	1228	3	0	0	0	0	5438
12/08/2023	2535	0	1578	1130	1239	3	0	0	0	0	6482

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]	
13/08/2023	5200	65	788	1345	2441	3	4	0	0	6	9848
14/08/2023	5005	260	1582	1616	2334	4	0	0	0	0	10796
15/08/2023	2340	455	1184	1301	1478	3	0	0	0	0	6757
16/08/2023	2990	195	1580	1429	1919	3	0	0	0	0	8113
17/08/2023	2730	0	828	736	1612	3	0	0	0	0	5905
18/08/2023	2860	0	1972	1358	1647	3	0	0	0	0	7837
19/08/2023	2535	195	1581	1662	1548	3	0	0	0	0	7520
20/08/2023	2470	195	1577	986	1574	3	0	0	0	6	6808
21/08/2023	2535	260	2374	1751	1609	3	0	0	0	2	8531
22/08/2023	2535	130	1974	1164	1915	3	0	0	0	6	7723
23/08/2023	2795	0	2374	1255	1659	3	0	0	0	0	8084
24/08/2023	2860	390	2775	1492	1588	3	0	0	0	0	9105
25/08/2023	2730	130	787	3303	1745	3	6	0	0	0	8701
26/08/2023	2795	130	1184	4053	1603	3	0	0	0	0	9765
27/08/2023	2860	390	1580	2750	1593	3	0	0	0	0.3	9179
28/08/2023	2795	195	785	2463	1561	3	0	0	0	0	7798
29/08/2023	2860	195	2408	1962	1920	3	0	0	0	0	9345
30/08/2023	3250	650	787	4156	1970	3	0	0	0	0	10813
31/08/2023	2860	455	2186	2818	1104	3	0	0	0	0	9423
01/09/2023	2665	0	1801	1102	929	3	0	0	0	0	6497
02/09/2023	2990	0	1184	1463	890	3	0	0	0	0	6527
03/09/2023	2600	65	1183	843	933	3	0	0	0	0	5624

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]	
04/09/2023	2795	195	1258	1319	1024	4	0	0	0	0	6591
05/09/2023	3185	260	1713	1441	1162	4	0	0	0	0	7762
06/09/2023	3055	195	785	665	1034	4	0	0	0	0	5734
07/09/2023	3185	0	1977	1978	1315	4	0	0	0	37	8492
08/09/2023	3185	195	390	309	1817	4	0	0	0	0	5896
09/09/2023	4030	650	1977	2611	2235	4	0	0	0	3	11506
10/09/2023	2990	65	812	655	1823	4	0	0	0	0	6345
11/09/2023	4095	325	1581	1713	2188	4	119	0	0	0	10022
12/09/2023	3705	390	1341	3374	2331	3	0	0	0	0	11141
13/09/2023	3770	390	786	1028	2007	3	0	0	0	0	7981
14/09/2023	4290	520	1977	1628	2230	1	0	0	0	8	10653
15/09/2023	3185	520	510	692	1806	2	0	0	0	0	6713
16/09/2023	3705	390	1976	2042	2030	3	0	0	0	0	10143
17/09/2023	3315	260	389	328	1729	3	0	0	0	0	6021
18/09/2023	3510	260	1977	2029	1874	3	0	0	0	0	9649
19/09/2023	2470	260	819	624	1866	3	187	0	0	0	6226
20/09/2023	2600	0	1184	1317	1564	3	0	0	0	0	6665
21/09/2023	2535	65	1583	1266	1552	3	0	0	0	0	7001
22/09/2023	2405	195	782	1019	1564	3	0	0	0	0	5965
23/09/2023	2730	0	1976	1596	1553	3	0	0	0	0	7855
24/09/2023	2535	195	-8	-4	1557	3	0	0	0	0	4274
25/09/2023	2730	520	2373	2388	1649	3	0	0	0	0	9660

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]	
26/09/2023	2665	195	788	1481	1783	3	0	0	0	0	6912
27/09/2023	2925	130	1975	2086	1550	3	0	0	0	0	8666
28/09/2023	2990	130	1582	1625	1564	3	0	0	0	5	7896
29/09/2023	2795	130	1182	792	1526	3	0	0	0	0	6424
30/09/2023	2925	195	1981	2088	1546	3	0	0	0	0	8734
01/10/2023	3120	260	784	793	1673	3	0	0	0	0	6630
02/10/2023	2925	130	1977	1147	1638	3	0	0	0	0	7817
03/10/2023	2730	0	787	2451	1985	3	0	0	0	3	7955
04/10/2023	2925	0	1977	1173	1526	3	0	0	0	0	7602
05/10/2023	2860	195	1185	1554	1545	3	0	0	0	0	7339
06/10/2023	2665	195	1578	1185	1536	3	0	0	0	0	7159
07/10/2023	2730	260	1581	1706	1572	3	0	0	0	0	7850
08/10/2023	2535	325	785	650	1537	3	0	0	0	0	5833
09/10/2023	2730	130	1979	1984	1649	3	0	0	0	1	8473
10/10/2023	2925	130	1213	575	1975	3	0	0	0	0	6818
11/10/2023	2470	390	1978	2319	1826	3	0	0	0	0	8983
12/10/2023	2405	390	1200	1874	1810	3	0	0	0	0	7680
13/10/2023	2340	195	1579	1167	1534	2	0	0	0	0	6814
14/10/2023	2340	130	788	1135	1425	3	0	0	0	0	5817
15/10/2023	2405	0	1579	1210	1431	3	0	0	0	0	6625
16/10/2023	2405	0	1183	2802	1547	3	0	0	0	0	7936
17/10/2023	2795	0	1183	1621	1593	3	0	0	0	0	7191

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]	
18/10/2023	2470	195	1183	1010	1500	3	218	174	0	0	6750
19/10/2023	2275	195	1583	1393	1718	3	0	279	0	4	7447
20/10/2023	2405	195	1581	1384	1872	3	0	0	0	5	7442
21/10/2023	2405	0	788	1075	1429	3	0	0	0	0	5697
22/10/2023	2340	130	1581	1327	1442	3	0	0	0	0	6820
23/10/2023	2210	130	1096	1030	1451	3	0	0	0	0	5917
24/10/2023	2080	130	1673	721	2245	3	451	12	0	0	7311
25/10/2023	3055	195	2377	1411	1804	0	0	0	0	0	8842
26/10/2023	2340	260	2382	1484	1805	-1	0	0	0	0	8271
27/10/2023	2275	0	2777	1149	1780	3	0	0	0	3	7984
28/10/2023	2275	130	2436	1565	1761	3	0	0	0	0	8167
29/10/2023	2210	0	1181	1134	1766	3	0	0	0	0	6291
30/10/2023	1950	130	2382	910	1756	0	0	0	0	0	7128
31/10/2023	2210	260	2378	1930	1791	-2	0	0	0	0	8568
01/11/2023	2210	130	2379	1066	1792	1	0	0	0	0	7577
02/11/2023	2340	130	1184	1659	2842	2	0	0	0	0	8155
03/11/2023	2535	0	2778	1048	2942	4	0	0	0	0	9303
04/11/2023	2600	0	1582	1723	2961	4	0	0	0	0	8866
05/11/2023	2730	0	785	627	3037	4	0	0	0	0	7180
06/11/2023	4550	0	1592	3331	3894	4	0	0	0	0	13366
07/11/2023	3575	260	1185	906	2841	4	0	0	0	0	8767
08/11/2023	1950	130	1184	763	2693	4	240	12	0	0	6972

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]	
09/11/2023	2470	0	1564	1817	3009	5	0	0	0	0	8860
10/11/2023	2600	65	1181	772	3130	4	0	0	0	0	7748
11/11/2023	1885	130	1187	1651	2897	4	0	0	0	0	7750
12/11/2023	2080	0	1186	801	2861	4	0	0	0	0	6928
13/11/2023	2470	0	1585	1752	2991	4	74	0	0	0	8873
14/11/2023	3380	130	1190	1094	3748	3	0	0	0	0	9543
15/11/2023	3510	195	1991	1713	2603	4	0	0	0	0	10012
16/11/2023	4875	0	1591	1681	2556	4	0	0	0	4	10707
17/11/2023	5005	195	1195	1387	2547	3	0	0	0	0	10328
18/11/2023	3380	195	1590	1337	1874	3	0	0	0	0	8375
19/11/2023	2730	130	1587	1389	1881	4	0	0	0	0	7717
20/11/2023	3640	195	1193	1208	2184	3	0	0	0	0	8420
21/11/2023	3510	390	1590	1660	2820	4	102	0	0	6	10078
22/11/2023	3055	0	1589	2282	2253	3	0	0	0	0	9179
23/11/2023	2405	195	1990	1355	1971	3	0	0	0	0	7916
24/11/2023	2990	0	1204	1542	2109	3	0	0	0	0	7845
25/11/2023	1950	195	1590	1611	1527	3	0	0	0	0	6872
26/11/2023	2665	195	1603	1144	2059	3	0	0	0	0	7665
27/11/2023	2925	260	1598	1653	2071	3	0	0	0	0	8507
28/11/2023	3705	260	1988	1552	2468	3	0	0	0	0	9973
29/11/2023	3835	195	1594	1627	2237	3	0	0	0	0	9488
30/11/2023	4355	130	1591	1346	2733	3	0	0	0	0	10156

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]	
01/12/2023	4160	390	1588	1680	2386	3	0	0	0	0	10204
02/12/2023	5460	130	1995	1705	3027	3	43	0	0	0	12361
03/12/2023	3445	130	1203	1120	1894	3	0	0	0	0	7792
04/12/2023	2730	130	1982	1558	1670	3	0	0	0	0	8070
05/12/2023	3120	195	1586	1295	2055	3	0	0	0	12	8263
06/12/2023	2535	260	1588	1229	2142	3	0	0	0	0	7755
07/12/2023	3380	195	1627	1125	2236	3	0	0	0	6	8569
08/12/2023	2925	130	1984	1792	2040	3	0	0	0	0	8871
09/12/2023	2275	65	1597	837	1532	3	0	0	0	0	6306
10/12/2023	2275	130	1591	1183	1576	3	0	0	0	0	6756
11/12/2023	2730	260	1596	1362	1847	3	0	0	0	4	7800
12/12/2023	2275	260	1191	1140	1810	3	0	0	0	0	6676
13/12/2023	2340	0	1586	1190	1577	3	0	0	0	0	6693
14/12/2023	2145	260	1605	1187	1612	3	0	0	0	0	6809
15/12/2023	2080	130	1588	1091	1546	3	0	0	0	0	6435
16/12/2023	2470	130	2007	1178	1709	3	0	0	0	0	7495
17/12/2023	2600	195	1597	1433	1498	3	0	0	0	0	7323
18/12/2023	3445	130	1588	978	1812	3	412	25	0	2	8393
19/12/2023	2470	0	1631	1769	1580	3	0	0	0	0	7449
20/12/2023	2535	0	1196	919	1474	3	0	0	0	0	6124
21/12/2023	2470	260	1991	1424	1355	3	0	0	0	0	7500
22/12/2023	2015	130	1193	1049	1229	3	0	0	0	0	5615

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]	
23/12/2023	2535	130	1587	1219	1270	3	0	0	0	0	6741
24/12/2023	2015	130	1595	1433	1183	3	0	0	0	0	6356
25/12/2023	2145	130	1593	1230	1180	3	0	0	0	0	6278
26/12/2023	2405	195	1597	1247	1178	3	0	0	0	9	6631
27/12/2023	2665	0	1594	1073	1191	3	0	0	0	0	6524
28/12/2023	2925	130	2039	1845	1297	3	0	0	0	0	8237
29/12/2023	2470	195	1183	281	1170	3	0	0	0	0	5300
30/12/2023	2860	195	1996	1354	1321	3	0	0	0	0	7725
31/12/2023	2275	130	1200	574	1255	3	0	0	0	11	5445
01/01/2024	2275	65	1993	1575	1218	3	0	0	0	0	7126
02/01/2024	2210	195	1198	970	1220	3	0	0	0	0	5792
03/01/2024	2275	0	2004	1366	1177	3	0	0	0	0	6822
04/01/2024	2210	0	1184	1030	1460	3	0	0	0	0	5884
05/01/2024	2080	65	1587	1089	1493	3	0	0	0	0	6314
06/01/2024	2080	195	1998	1694	1150	3	0	0	0	0	7116
07/01/2024	2145	195	1588	834	1146	3	0	0	0	0	5907
08/01/2024	3640	130	1989	2070	1694	3	0	0	0	2	9524
09/01/2024	2860	0	1600	1198	1936	3	0	0	0	0	7594
10/01/2024	3445	195	1202	1050	1619	3	0	0	0	0	7512
11/01/2024	2665	260	2398	1533	1383	3	0	0	0	0	8239
12/01/2024	2665	390	393	1181	1384	3	153	13	0	0	6179
13/01/2024	2470	130	2391	1475	1234	3	0	0	0	0	7699

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]	
14/01/2024	2210	130	798	555	1217	3	0	0	0	0	4910
15/01/2024	2730	0	2216	1672	1390	3	0	0	0	0	8008
16/01/2024	2275	195	1380	1115	1534	3	170	3	0	0	6672
17/01/2024	2405	0	1595	1579	1232	3	0	0	0	0	6810
18/01/2024	2470	195	2399	1618	1261	3	0	0	0	0	7943
19/01/2024	2470	0	683	694	1297	3	0	0	0	0	5144
20/01/2024	2145	195	2385	1407	1206	3	0	0	0	0	7339
21/01/2024	1950	130	1188	1197	1157	3	0	0	0	0	5623
22/01/2024	2340	130	1996	885	1258	3	0	0	0	0	6610
23/01/2024	3380	130	1622	1159	1827	3	0	0	0	0	8118
24/01/2024	2665	0	1591	1345	1310	3	0	0	0	0	6911
25/01/2024	2600	0	1597	1378	1314	3	0	0	0	6	6895
26/01/2024	3120	0	1586	1149	1454	3	0	0	0	0	7309
27/01/2024	2470	0	1991	1537	1171	3	0	0	0	0	7169
28/01/2024	2405	130	1002	803	1474	3	0	0	0	0	5814
29/01/2024	2275	0	2180	1796	1531	3	0	0	0	3	7786
30/01/2024	2925	0	801	814	1869	3	0	0	0	0	6409
31/01/2024	2665	0	2398	1759	1496	3	0	0	0	0	8318
01/02/2024	2405	390	1196	1503	1280	3	0	0	0	0	6774
02/02/2024	2795	260	1996	1699	1437	3	0	0	0	0	8187
03/02/2024	2080	0	1190	624	1108	3	0	0	0	0	5002
04/02/2024	2145	390	1999	1924	1109	3	0	0	0	0	7566

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]	
05/02/2024	2145	130	1596	962	1191	3	0	0	0	0	6024
06/02/2024	2145	0	1592	1447	1101	3	0	0	0	0	6284
07/02/2024	3705	195	1984	1694	1875	3	0	0	0	1.5	9455
08/02/2024	3055	0	1190	1239	1802	3	0	0	0	0	7286
09/02/2024	3575	130	2521	2088	1942	3	0	0	0	0	10255
10/02/2024	2600	0	1450	1669	1276	3	0	0	0	0	6996
11/02/2024	2145	195	2390	1808	1486	3	0	0	0	0	8024
12/02/2024	3055	0	1912	1067	1203	3	0	0	0	0	7237
13/02/2024	3315	195	1277	1741	1487	1394	0	0	0	0	8015
14/02/2024	2535	195	2385	1847	1131	3	0	0	0	0	8093
15/02/2024	2210	260	1599	1654	994	3	0	0	0	0	6717
16/02/2024	2795	195	1980	1391	1173	3	0	0	0	3	7537
17/02/2024	2535	130	1593	1592	1156	3	0	0	0	0	7005
18/02/2024	2145	130	1600	947	941	3	0	0	0	0	5763
19/02/2024	2730	0	1587	1595	1051	3	0	2	0	0	6964
20/02/2024	2990	195	1586	1080	1490	3	0	0	0	0	7341
21/02/2024	2210	195	1987	1160	952	3	0	0	0	1	6505
22/02/2024	2925	195	1487	1718	1113	3	0	0	0	3	7442
23/02/2024	2665	130	2715	2201	1060	3	0	0	0	1	8771
24/02/2024	2600	130	1587	1604	981	3	0	0	0	0	6903
25/02/2024	2210	0	1188	807	846	3	0	0	0	0	5051
26/02/2024	2145	0	1988	1932	829	3	0	0	0	0	6894

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]	
27/02/2024	1950	195	1598	1094	1121	3	0	0	0	6	5965
28/02/2024	2405	130	2002	2097	980	3	0	0	0	0	7615
29/02/2024	2600	195	1594	1157	1416	3	0	0	0	0	6962
01/03/2024	2145	260	1589	958	911	3	320	0	0	0	6183
02/03/2024	1820	195	1588	1857	839	3	0	0	0	0	6299
03/03/2024	2275	0	1507	1034	884	1	0	0	0	0	5700
04/03/2024	2015	130	1295	1583	849	-3	182	4	0	0	6058
05/03/2024	2405	130	2130	1969	1195	-3	0	0	0	0	7829
06/03/2024	2210	130	908	1975	939	-3	0	0	500	0	6662
07/03/2024	2145	0	2098	1794	854	-2	0	0	0	0	6891
08/03/2024	2275	130	1323	2230	923	-1	0	0	0	8	6889
09/03/2024	2665	130	1903	1161	968	-1	0	0	0	0	6826
10/03/2024	2015	130	1201	1132	880	0	0	0	0	0	5357
11/03/2024	3640	0	1611	2413	1254	3	0	0	0	0	8919
12/03/2024	2470	130	2408	2343	1240	3	0	0	0	0	8591
13/03/2024	2340	130	1223	1806	897	3	0	0	0	3	6398
14/03/2024	3055	0	1602	926	1042	3	0	0	0	0	6625
15/03/2024	2990	260	1187	1898	1084	3	0	0	0	2	7421
16/03/2024	2210	130	1587	1086	864	3	0	0	0	0	5876
17/03/2024	2405	130	1185	1473	872	3	0	0	0	0	6065
18/03/2024	2145	0	1586	1126	813	3	0	0	0	0	5671
19/03/2024	4485	260	1199	1840	1815	3	1	0	0	0	9599

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]	
20/03/2024	3120	195	1595	1806	1109	3	0	0	0	0	7825
21/03/2024	3185	390	1599	1891	1112	3	0	0	0	0	8177
22/03/2024	2730	0	1993	1508	966	3	0	0	0	0	7197
23/03/2024	2145	195	1588	1486	800	3	0	0	0	0	6214
24/03/2024	2275	130	1187	974	889	3	0	0	0	0	5455
25/03/2024	2730	130	1588	1291	961	3	0	0	0	0	6700
26/03/2024	2470	195	788	1100	1273	3	0	0	0	0	5826
27/03/2024	2925	455	1999	1456	1060	3	1	0	0	0	7896
28/03/2024	2665	195	796	1072	929	3	0	0	0	3	5660
29/03/2024	2015	195	1598	921	788	3	0	0	0	0	5516
30/03/2024	1950	260	1589	1647	805	3	0	0	0	0	6250
31/03/2024	2015	195	1187	693	803	3	0	0	0	0	4894
01/04/2024	2015	130	1593	1453	811	3	0	0	0	0	6002
02/04/2024	2080	195	1588	985	1198	3	0	0	0	0	6046
03/04/2024	2145	195	798	638	872	3	0	0	0	0	4647
04/04/2024	3445	130	1996	2406	1213	3	122	0	0	0	9312
05/04/2024	2275	65	796	556	876	3	0	0	0	0	4569
06/04/2024	2470	0	1196	1517	839	3	0	0	0	0	6022
07/04/2024	2600	130	1982	1183	874	3	0	0	0	0	6769
08/04/2024	2340	0	788	310	819	3	0	0	0	0	4257
09/04/2024	2340	130	1993	2034	1160	3	0	0	0	0	7657
10/04/2024	2405	455	75	-5	806	3	0	0	0	0	3735

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]	
11/04/2024	2665	195	2308	2121	914	3	0	0	0	0	8203
12/04/2024	2275	65	391	237	783	3	0	0	0	0	3751
13/04/2024	2275	130	1988	1715	775	3	0	0	0	1.9	6885
14/04/2024	2340	130	795	638	797	3	0	0	0	0	4700
15/04/2024	2730	195	1201	1413	915	3	0	0	0	0	6454
16/04/2024	2665	0	1592	945	1090	3	114	1	0	0	6407
17/04/2024	2145	260	790	781	725	3	0	0	0	0	4701
18/04/2024	2535	130	1980	1637	762	3	0	0	0	0	7044
19/04/2024	2210	130	393	632	732	3	0	0	0	0	4097
20/04/2024	2275	0	2381	1803	784	3	0	0	0	0	7243
21/04/2024	2275	0	-2	232	765	3	0	0	0	0	3270
22/04/2024	2470	130	1988	2011	790	3	0	0	0	6	7394
23/04/2024	2340	0	787	353	504	3	0	0	0	1	3985
24/04/2024	2275	0	1587	1634	1047	3	0	0	0	0	6543
25/04/2024	2340	0	1184	759	770	3	0	0	0	0	5052
26/04/2024	2080	260	1187	1081	781	3	0	0	0	0	5389
27/04/2024	2340	130	1589	1757	755	3	0	0	0	0	6571
28/04/2024	2210	0	391	312	738	3	0	0	0	0	3651
29/04/2024	2340	0	2393	2181	791	3	0	0	0	40	7745
30/04/2024	2275	0	388	343	1102	3	0	0	0	0	4108
01/05/2024	2405	130	1978	1898	1102	3	0	0	0	0	7513
02/05/2024	2405	0	788	794	752	3	0	0	0	0	4739

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]	
03/05/2024	2340	0	1183	1470	768	3	0	0	0	0	5761
04/05/2024	2535	0	1581	1087	740	3	0	0	0	0	5943
05/05/2024	2405	0	792	1123	722	3	0	0	0	0	5042
06/05/2024	2470	0	1978	1430	787	3	0	0	0	2.5	6667
07/05/2024	2210	130	390	782	1071	3	0	0	0	0	4583
08/05/2024	2340	0	2067	1487	830	3	0	0	0	0	6724
09/05/2024	2470	0	389	334	773	3	0	0	0	0	3966
10/05/2024	2275	195	1975	2005	765	3	0	0	0	0	7215
11/05/2024	2275	0	787	713	756	3	0	0	0	0	4532
12/05/2024	2275	130	1582	1801	768	3	0	0	0	0	6556
13/05/2024	2340	195	1183	909	734	3	0	0	0	0	5361
14/05/2024	2795	195	1185	1571	835	3	0	0	0	0	6582
15/05/2024	3575	195	1581	4517	1016	1	0	0	500	0	11384
16/05/2024	3640	130	1183	2341	1031	-1	0	0	0	8	8333
17/05/2024	3315	195	1184	1108	960	0	0	0	0	0	6762
18/05/2024	2730	195	1186	789	824	0	0	0	0	0	5725
19/05/2024	3250	195	1579	1917	967	3	0	0	0	0	7909
20/05/2024	3120	130	787	675	919	3	0	0	0	0	5631
21/05/2024	4355	130	1979	2270	1234	2	0	0	0	0	9967
22/05/2024	5265	260	390	352	1500	3	0	0	0	0	7767
23/05/2024	5655	260	1979	2680	1619	3	8	0	0	0	12202
24/05/2024	5460	195	1183	918	2055	3	2	0	0	0	9812

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]	
25/05/2024	5590	325	1581	2001	1859	3	0	0	0	0	11357
26/05/2024	5590	325	1181	911	1795	3	0	0	0	0	9802
27/05/2024	5460	780	1583	1477	1574	3	1	0	500	0	11375
28/05/2024	5655	520	1581	1776	1558	3	0	0	0	0	11089
29/05/2024	5850	325	528	398	1400	3	0	0	0	0	8501
30/05/2024	6045	130	2373	2642	1634	3	2	0	0	40	12866
31/05/2024	5785	130	787	864	1504	3	2	0	0	8	9081
01/06/2024	5655	260	2372	2214	1602	3	0	0	0	0	12103
02/06/2024	5785	260	788	964	1485	3	0	0	0	0	9282
03/06/2024	5590	845	1579	1956	1509	3	0	0	0	0	11479
04/06/2024	5850	260	1582	2715	1536	3	0	0	500	0	12444
05/06/2024	5395	325	1080	1561	1574	3	0	0	0	0	9935
06/06/2024	5720	325	1683	4032	1587	3	0	0	500	0	13848
07/06/2024	5590	195	789	2064	1571	3	12	0	0	0	10221
08/06/2024	4810	715	1976	2057	1368	3	0	0	0	0	10926
09/06/2024	5785	195	786	739	1526	3	0	0	0	0	9031
10/06/2024	5655	650	2378	2537	1699	3	5	0	0	0	12925
11/06/2024	5980	455	791	706	1589	3	0	0	0	0	9521
12/06/2024	7865	520	1976	2574	1892	3	11	0	0	0	14837
13/06/2024	7605	455	1185	1111	1933	3	1	0	0	0	12290
14/06/2024	7865	650	1221	1787	2190	3	16	0	0	0	13730
15/06/2024	7020	650	1938	1591	2419	3	0	0	0	0	13618

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]	
16/06/2024	7280	520	787	1560	2366	3	1	0	0	6	12520
17/06/2024	7670	845	1977	3650	2573	3	71	0	0	0	16786
18/06/2024	7865	650	391	3911	2978	3	3	0	0	0	15797
19/06/2024	7540	455	2769	3118	3499	3	51	0	0	0	17431
20/06/2024	7215	520	788	4988	3695	3	0	0	0	4	17210
21/06/2024	7670	845	391	823	3817	3	0	0	0	0	13546
22/06/2024	7930	260	1977	2219	3290	3	5	0	0	0	15681
23/06/2024	7410	455	1185	1608	3034	3	0	0	0	0	13692
24/06/2024	6760	975	1183	1256	3053	3	255	0	500	0	13983
25/06/2024	7735	390	1979	2223	3276	3	0	0	0	0	15603
26/06/2024	7085	0	785	584	2861	3	0	0	0	0	11316
27/06/2024	6630	585	2375	2880	2811	3	0	0	0	0	15281
28/06/2024	6175	0	-7	-4	2454	3	0	0	0	2	8620
29/06/2024	5265	0	2771	2471	1978	3	0	0	0	4.5	12489
30/06/2024	5525	455	391	668	2312	3	0	0	0	0	9354