



Kawakawa Bay Wastewater Treatment Plant 2024-2025 Annual Report


Final - September 2025

Watercare 


QUALITY INFORMATION

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Name and position of originator	Emma Baker, Environmental Scientist
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REVISION HISTORY

Rev	Revision Date	Name	Position	Signature
1	25/09/2025	Michiel Jonker	Environmental Care Manager	
2	26/09/2025	Iris Tscharntke	Operations Controller	
3	29/09/2025	Jonathan Piggot	Head of Wastewater	

APPROVED

Date	Name	Position	Signature
29/09/2025	Michiel Jonker	Environmental Care Manager	

CONSENT CHANGE AND MONITORING HISTORY

Change type	Description	Effective date	Reference / condition	Reporting / monitoring implications
Management plan update	Kawakawa Bay Wastewater Collection and Treatment System Operation Management Plan updated to reflect current operations	2016		N/A

EXECUTIVE SUMMARY

This report presents the performance, compliance, and monitoring outcomes for the Kawakawa Bay Wastewater Treatment Plant (WWTP) for the period from 1 July 2024 to 30 June 2025. The WWTP, which employs membrane bioreactor technology, continues to operate in accordance with its consents and management plans, providing efficient wastewater treatment services while adhering to consent conditions.

Key findings of the annual report include:

- **Compliance performance:** The plant has maintained full compliance (Category 1) with all relevant consents throughout the reporting period, including discharges to land and air, stormwater management, and effluent quality. No significant non-compliances or incidents were recorded during this period.
- **Effluent discharge:** Daily discharge volumes remained well within the maximum consent limit of 800 m³/day, with an average discharge of 69 m³/day. The irrigation to the Glen Forest effluent irrigation field was carried out in compliance with all conditions, and no effluent was discharged to the Rautawa Stream during this period.
- **Effluent quality:** Regular monitoring demonstrated that effluent quality parameters, including faecal coliforms and ammoniacal nitrogen, remained within consented limits.
- **Environmental impact:** Monitoring of the receiving environment was not required in the 2024-2025 reporting period. The next assessment will occur in 2026.
- **Air quality:** The plant maintained full compliance with air quality standards.
- **Complaints and incidents:** There were no complaints or incidents reported related to the plant's operation. Routine inspections and maintenance have ensured the continued minimization of odours and emissions from the site.

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ABBREVIATIONS AND ACRONYMS

Abbreviation	Description
cBOD ₅	5-day carbonaceous biochemical oxygen demand
DO	Dissolved oxygen
<i>E. coli</i>	<i>Escherichia coli</i>
MBR	Membrane bioreactor
NH _x	Ammonia and ammonium, reported in milligrams nitrogen
NO ₃	Nitrate as measured in units of nitrogen
TN	Total nitrogen
DRP	Dissolved reactive or soluble reactive phosphorus (synonyms)
REMP	Receiving Environment Monitoring Plan
TP	Total phosphorus
TSS	Total suspended solids
Watercare	Watercare Services Limited
WAS	Waste activated sludge
WWTP	Wastewater treatment plant

1 INTRODUCTION

This annual report presents the results for the Kawakawa Bay Wastewater Treatment Plant (WWTP) from 1 July 2024 to 30 June 2025. The report includes:

- Description of the WWTP
- Relevant consents and management plans
- Plant performance
- Summary of compliance

Table 1-1 lists the active consents for the Kawakawa Bay WWTP. Watercare made no changes to these consents in 2024-2025.

A separate report covers the annual findings for consent 31272 (discharge in the collection network). This annual report does not include the results for that consent.

A Receiving Environment Monitoring Plan (REMP) was written in 2010 by Earth Consult Limited in accordance with Consent DIS60262735 condition 40. The REMP details the receiving environment monitoring scheme which is used to assess the potential effects on the Rautawa Stream and Kawakawa Bay to which it discharged. The 2024-2025 impact assessment report, which fulfils the conditions of the REMP, can be found in Appendix B.

Table 1-1: Kawakawa Bay WWTP resource consents

Consent type	Consent number	Council Number	Expiration date
Discharge to Air	30829	DIS60265275	31/12/2042
Discharge to Stormwater	30830	DIS60262712	31/12/2042
Discharge to Ground	30833	DIS60262735	31/12/2042
Discharge to Stream	33143	DIS60266313	31/12/2027
Discharge to Land or Water from Collection Network	31272	DIS60264767	31/12/2042

2 TREATMENT PLANT

The Kawakawa Bay WWTP is a membrane bioreactor (MBR) based wastewater treatment plant that consists of the following major treatment devices and processes:

- Inlet screen and grit removal
- Two balancing tanks
- Two-anoxic and one-aerobic tanks
- One membrane bioreactor
- Effluent storage lagoons (one operational, one seasonal)
- Irrigation fields
- Waste activated sludge (WAS) storage tanks.

The treated effluent discharges to the effluent irrigation field at Glen Forest. Should discharging to the irrigation field not be possible, the WWTP can discharge to the Rautawa Stream between May and October (inclusive) subject to meeting specific consent conditions. To date, Watercare has never directly discharged treated wastewater to the Rautawa Stream.

Waste activated sludge from the bioreactors is temporarily stored in WAS tanks on-site before the sludge goes to the Māngere WWTP.

2.1 Changes in 2024-2025

Watercare made no changes to the WWTP in 2024-2025.

2.2 Future changes

Watercare does not intend to complete any upgrades at the WWTP in 2025-2026.

3 COMPLIANCE

3.1 Introduction

Watercare assesses compliance with consent using the same compliance rating system utilised by the Auckland Council (Table 3-1).

The assessment of WWTP performance considers:

- Results of compliance monitoring
- Recorded incidents and complaints
- Receiving environment monitoring results for Kawakawa Bay.

Table 3-1: Compliance assessment criteria

Rating	Detail
Category 1	Watercare has complied with the consent condition. Where a resource consent condition refers to a provision in a Management Plan, then the plan has been referred to in assessing consent compliance.
Category 2	Watercare has not complied with the consent condition. Watercare has assessed the non-compliance as technical or having no more than minor adverse effect.
Category 3	Watercare has not complied with the consent condition. Watercare has assessed the non-compliance having the potential to result in more than minor adverse effects on the environment. Alternatively, since the last audit, there is evidence of repeat Category 2 non-compliance.
Category 4	Watercare has not complied with the consent condition. Watercare has assessed the non-compliance as having the potential to cause significant adverse effects on the environment. Alternatively, since the last audit, there is evidence of repeat Category 3 non-compliance.

3.2 Method statement

Effluent flow and irrigation volumes were sourced directly from the site SCADA system (pi tags listed in Appendix D). Effluent quality samples were collected from the permeate tank in accordance with consent conditions and analysed by Watercare's laboratory. The monitoring schedule followed consent 30833 Conditions 24–25, with pH and ammoniacal nitrogen monitoring only required May–October inclusive but is tested throughout the reporting period. Stormwater audits and soil monitoring were undertaken in line with the procedures specified in the Operations Management Plan and relevant consent conditions.

3.3 Plant performance

3.3.1 Effluent volumes

Consent 30833 condition 3 limits the maximum daily discharge of treated final effluent to Glen Forest to ≤ 800 m³/day. Figure 3-1 shows the daily discharge volumes for 2024-2025.

The daily discharge volumes were below the consent daily maximum limit for 2024-2025. The average discharge volume was 69 m³/day, and the total for the reporting period was 25,265 m³.

Production for this reporting period was consistent with the 2023-2024 period when the average volume was 67 m³/day (total 24,567 m³).

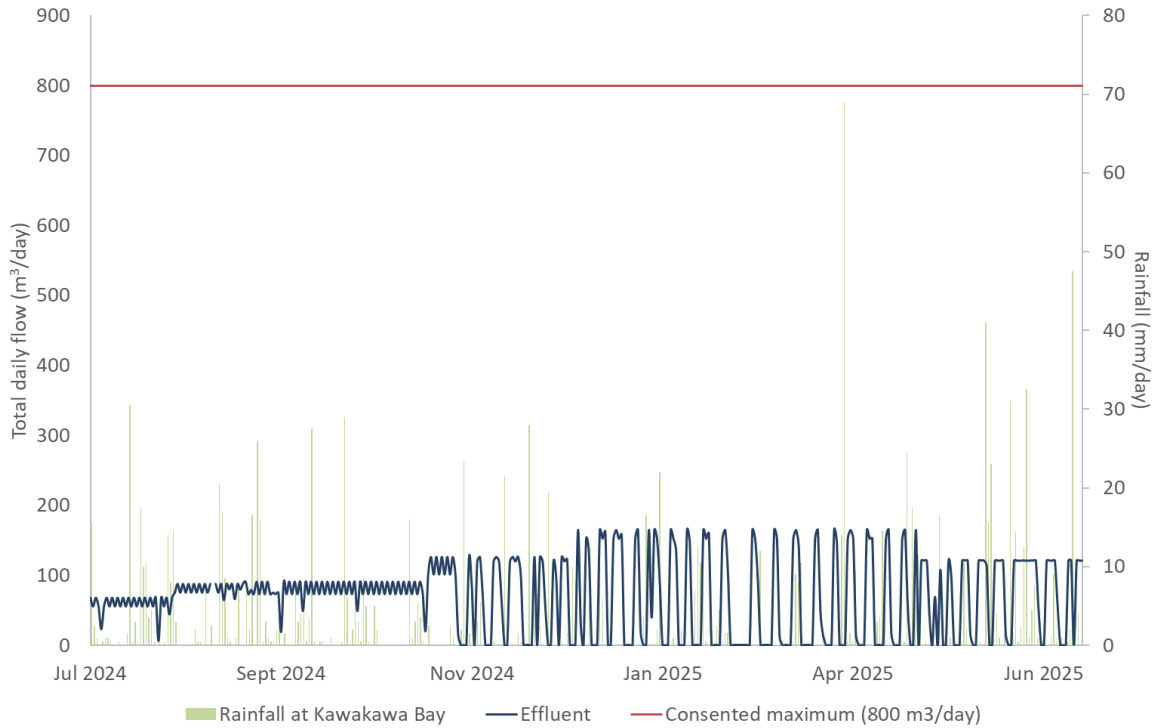


Figure 3-1: Kawakawa Bay WWTP effluent discharge volumes and rainfall for the reporting period 2024-2025.

The Glen Forest comprises four effluent disposal fields (EDF). Condition 16, as summarised in Table 3-2, prescribes the daily maximum block irrigation rates (mm/day) and irrigation volumes to the irrigated areas respectively for the summer (November – April) and winter (May – October) periods.

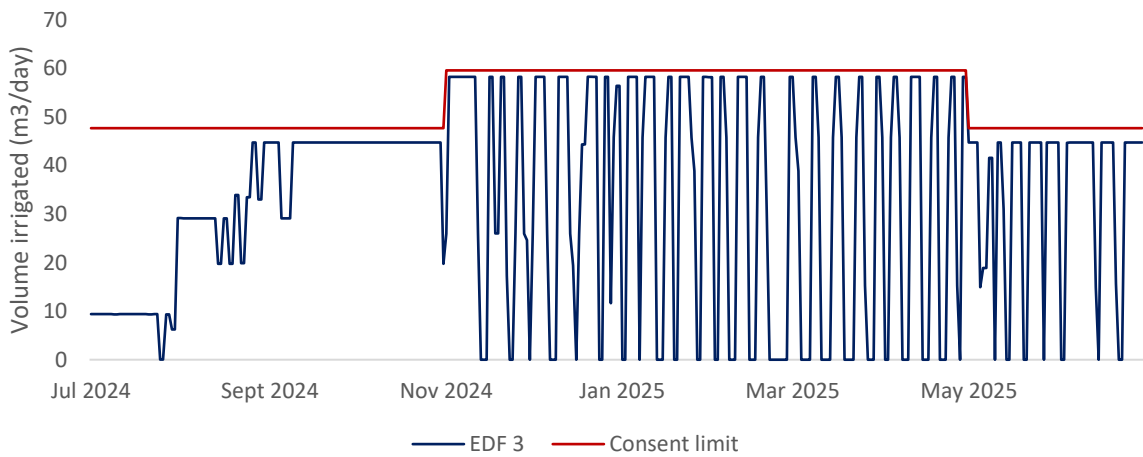
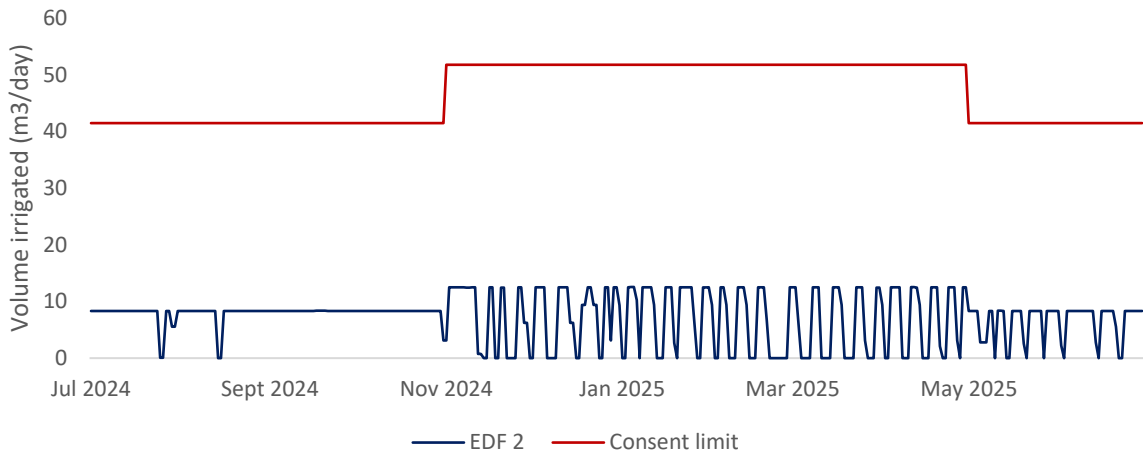
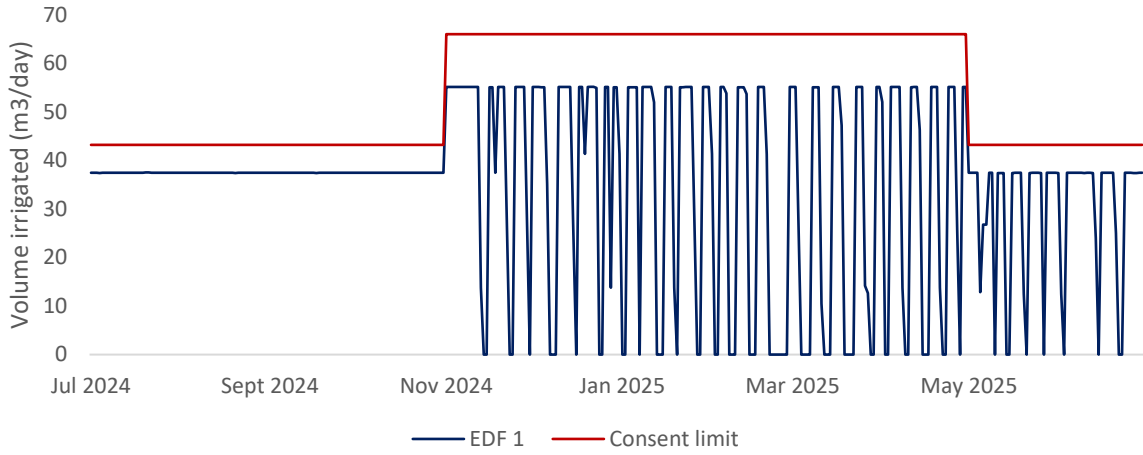
Table 3-2: Seasonal irrigation rate limits for Glen Forest blocks

Block	Net irrigation area (m ²)	Slope	Irrigation rate (mm/day)		Maximum daily irrigation volume limit (m ³ /day)	
			Summer	Winter	Summer	Winter
Block 1	25,389	0-20°	2.6	1.7	66.0	43.2
Block 2	34,564	20-30°	1.5	1.2	51.8	41.5
Block 3	39,722	20-30°	1.5	1.2	59.6	47.7
Block 4	26,500	20-30°	1.5	1.2	39.8	31.8

The daily irrigation cycles and durations to Glen Forest are automated. The effluent volume depends on the irrigation volume set points for the respective blocks. Figure 3-2 shows the irrigated volumes to the irrigation blocks.

Irrigation rates for block 3 and 4 for winter and summer were close to their calculated maximum rates. Block 2 had more capacity for irrigation throughout the monitoring period. The irrigation schedule was modified in November to account for a potential increase of flows due to a new subdivision. Where there are periods of no irrigation to Glen Forest, the final effluent remains in the

lagoon and irrigation resumed as required. There were no discharges above consent limits during the monitoring period.



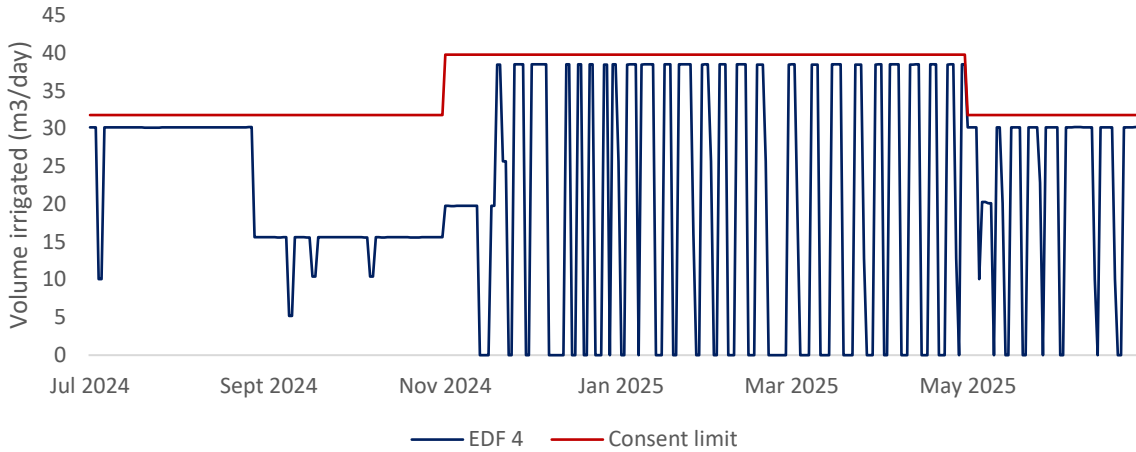


Figure 3-2: Effluent volumes by irrigation block for the reporting period 2024-2025.

3.3.2 Effluent quality

Parameters within consent limits

Condition 24 requires fortnightly monitoring of the treated effluent from the permeate tank, and Condition 25 lists the test parameters. Table 3-3 shows a summary of effluent monitoring for 2024-2025, with the raw data listed in Appendix A. Since Watercare has not used the stream discharge to the Rautawa Stream, consent 33143 effluent monitoring and performance requirements do not apply.

Effluent was within the consented medians for E. coli and faecal coliforms throughout the monitoring period, and most individual results were below the detection limit. Ammoniacal nitrogen was also typically below the detection limit throughout the period. All the parameters were within similar ranges to the previous monitoring period.

Effluent quality: soil implications

Main cation parameters (magnesium, sodium and calcium) included the effluent quality results show consistently moderate concentrations. These cations are important for soil chemistry, as they influence the cation exchange capacity (CEC) and the relative balance between exchangeable sodium, calcium, and magnesium.

Effluent sodium levels are within the same range as previous years, while calcium and magnesium remain at concentrations sufficient to buffer the sodium effect (see Appendix A). This suggests that the effluent quality is unlikely to cause adverse soil structural changes under the current irrigation regime.

Ongoing monitoring of soil quality (Condition 28, with the next assessment due in 2026) will confirm whether the balance of exchangeable cations is being maintained. Previous soil surveys have not identified soil degradation, indicating that current effluent quality and irrigation management practices are sustainable in terms of maintaining soil CEC and structural integrity.

3.3.3 Air quality

The WWTP was fully compliant with its air discharge consent requirements. A controlled set point at 2 mg O₂/L maintains the dissolved oxygen levels within the aerobic treatment tank above the minimum limit of 1 mg O₂/L. All emissions control equipment, fans and ducting were maintained in good condition, and activities onsite were carried out in a manner that minimised odour. Walkover inspections were completed a minimum of twice weekly and did not identify any significant odours.

3.3.4 Stormwater monitoring

Consent 30830 Condition 16 requires an annual audit of the WWTP. Watercare carried out an audit of the stormwater and industrial/trade processes on 25 July 2025. The audit found the site fully compliant with consent requirements, and there were no issues to address. Appendix B includes a copy of this report.

3.3.5 Stream and receiving environment monitoring

Watercare has never used the stream discharge to the Rautawa Stream since commissioning of the WWTP. As a result, the conditions in Consent 33143 were not applicable during the reporting year 2024-2025.

An ecological assessment of the Rautawa Stream is required every two years together with an assessment of part of the coastal marine area of Kawakawa Bay. The most recent assessments occurred on 26 and 27 March 2024 and is included in the 2023-2024 Kawakawa Bay WWTP annual report. The next assessment is required in 2026.

Conditions 28 – 31 requires monitoring of soil in the irrigated and non-irrigated fields in two-yearly intervals. Condition 41 prescribes the monitoring procedures. Manaaki Whenua carried out the Kawakawa Bay soil sampling and testing in May 2024 and is included in the 2023-2024 Kawakawa Bay WWTP annual report. The next assessment is required in 2026.

The receiving environment monitoring of the irrigation block soil, the Rautawa Stream and coastal marine area have consistently determined no evidence of significant adverse effects as a result of the operation of the Kawakawa Bay WWTP.

3.4 Complaints and incidents

There were no incidents at the Kawakawa Bay WWTP between July 2024 and June 2025. The WWTP did not receive any complaints related to its operation or maintenance.

Table 3-3: Effluent compliance summary 2024-2025

Parameter	Units	n	Minimum	Average	Maximum	Consented Maximum	Median	Consented Median	Compliant
Discharge Volume	m ³ /day	365	0.00	69.22	164.38	800	72.81	-	Yes
pH	-	52	7.00	7.44	7.80	-	7.50	-	-
Sodium	mg/L	52	53.00	76.88	100.00	-	75.00	-	-
Magnesium	mg/L	52	3.50	5.10	8.00	-	4.95	-	-
Calcium	mg/L	52	15.00	17.92	23.00	-	18.00	-	-
NH _x -N	mg/L	52	0.03	0.27	1.10	-	0.20	-	-
Nitrate Nitrogen	mg/L	52	0.02	6.74	18.10	-	7.15	-	-
DRP	mg/L	52	0.06	5.38	11.10	-	5.93	-	-
Faecal Coliforms	cfu/100mL	52	1.60	30.53	530.00	-	<1.60	≤1,000	Yes
<i>Escherichia coli</i>	cfu/100mL	52	1.60	22.32	420.00	-	<1.60	≤1,000	Yes

Note: Condition 25 requires effluent pH and Ammonia testing only for May to October inclusive.

4 CONCLUSIONS

Across all consents, the WWTP was **Category 1** in 2024-2025 (fully compliant). Appendix C lists a condition-by-condition assessment of compliance for the Kawakawa Bay WWTP.

Discharge volumes and quality were within the consented limits throughout the reporting period. Receiving environment monitoring of the irrigation block soil and the Rautawa Stream and coastal marine area in previous reporting periods did not determine any significant adverse effects as a result of the operation of the Kawakawa Bay WWTP, with the next monitoring in 2025-2026. There were no incidents or complaints during the reporting period.

Appendix A. Effluent quality data

Table 4-1: Kawakawa Bay effluent quality

Date	E. coli cfu/100 mL	F. coliforms cfu/100 mL	NO ₃ -N mg/L	Ca (Total) mg/L	DRP mg/L P	Mg (total) mg/L	Na (total) mg/L	pH pH unit	NH _x -N mg/L
5-Jul-23	1.60	1.60	9.79	17.00	6.64	4.40	69.00	7.40	0.40
12-Jul-23	1.60	1.60	8.59	17.00	6.88	4.60	66.00	7.50	0.40
19-Jul-23	1.60	1.60	7.60	15.00	6.51	4.60	71.00	7.40	0.40
26-Jul-23	1.60	1.60	6.20	17.00	5.78	4.80	53.00	7.50	0.40
4-Aug-23	1.60	1.60	8.40	17.00	6.60	4.70	68.00	7.40	0.40
9-Aug-23	1.60	1.60	7.20	17.00	6.56	5.40	66.00	7.50	0.40
16-Aug-23	1.60	1.60	7.90	16.00	6.25	4.80	74.00	7.50	0.40
23-Aug-23	1.60	1.60	6.70	16.00	5.73	4.90	60.00	7.50	0.40
30-Aug-23	1.60	1.60	6.80	17.00	7.20	4.80	69.00	7.50	0.40
6-Sept-23	1.60	1.60	5.80	18.00	6.07	4.70	59.00	7.60	0.40
13-Sept-23	1.60	1.60	6.80	16.00	6.65	4.70	68.00	7.60	0.03
20-Sept-23	1.60	1.60	10.00	15.00	7.56	4.80	69.00	7.50	0.03
27-Sept-23	1.70	1.70	3.50	17.00	6.45	5.40	67.00	7.50	0.03
2-Oct-24	1.60	1.60	7.10	16.00	7.00	5.10	73.00	7.60	0.04
9-Oct-24	1.60	1.60	6.80	18.00	4.35	5.30	74.00	7.60	0.03
16-Oct-24	1.60	1.60	8.00	17.00	7.03	5.30	74.00	7.60	0.03
23-Oct-24	1.60	1.60	9.10	18.00	7.25	6.10	84.00	7.50	0.03
30-Oct-24	1.60	1.60	11.00	17.00	7.56	5.70	82.00	7.50	0.04
6-Nov-24	1.70	1.70	15.00	19.00	7.40	6.10	82.00	7.40	0.05
13-Nov-24	1.60	1.60	13.00	18.00	6.13	5.70	82.00	7.50	0.05
20-Nov-24	1.60	1.60	12.40	15.00	8.09	5.30	68.00	7.60	0.04
27-Nov-24	1.60	1.60	18.10	19.00	8.53	5.50	86.00	7.30	0.05
4-Dec-24	1.60	3.30	11.10	17.00	5.61	5.10	79.00	7.60	0.31
11-Dec-24	1.60	1.60	9.81	18.00	6.17	5.30	81.00	7.70	0.03
18-Dec-24	1.60	1.60	8.77	18.00	2.93	4.50	83.00	7.70	0.04
24-Dec-24	1.60	1.60	10.20	18.00	4.20	4.70	77.00	7.30	0.05
31-Dec-24	1.60	1.60	11.50	17.00	0.06	4.10	96.00	7.60	0.06
8-Jan-25	1.60	1.60	9.21	18.00	5.64	5.70	99.00	7.70	0.04
15-Jan-25	1.60	1.60	12.10	23.00	11.10	8.00	100.00	7.40	0.10

Date	E. coli cfu/100 mL	F. coliforms cfu/100 mL	NO ₃ -N mg/L	Ca (Total) mg/L	DRP mg/L P	Mg (total) mg/L	Na (total) mg/L	pH pH unit	NH _x -N mg/L
22-Jan-25	1.60	3.30	11.30	19.00	10.70	6.80	91.00	7.40	0.27
29-Jan-25	6.60	6.60	9.14	19.00	3.89	5.90	87.00	7.60	0.19
5-Feb-25	1.60	1.60	6.64	19.00	1.26	5.20	94.00	7.70	0.06
12-Feb-25	1.60	1.60	7.51	19.00	3.51	5.10	99.00	7.70	0.04
19-Feb-25	3.30	6.60	7.95	23.00	10.50	7.50	88.00	7.50	0.22
26-Feb-25	4.90	6.60	5.40	19.00	8.28	6.70	82.00	7.70	0.21
5-Mar-25	25.00	34.00	3.10	20.00	5.43	5.90	84.00	7.80	1.00
12-Mar-25	20.00	25.00	4.26	19.00	2.08	5.30	85.00	7.70	0.20
19-Mar-25	1.60	3.30	2.52	20.00	0.49	5.00	87.00	7.40	0.81
26-Mar-25	6.60	15.00	0.18	20.00	4.63	5.80	92.00	7.20	0.61
2-Apr-25	1.60	4.90	0.09	19.00	3.65	4.90	78.00	7.30	0.04
9-Apr-25	6.60	13.00	4.83	20.00	0.23	4.40	71.00	7.20	0.18
16-Apr-25	120.00	270.00	0.15	19.00	5.33	4.50	81.00	7.20	1.10
23-Apr-25	260.00	330.00	0.04	21.00	7.60	4.80	81.00	7.30	1.00
30-Apr-25	420.00	530.00	0.02	17.00	2.80	3.80	69.00	7.20	0.39
7-May-25	72.00	88.00	0.04	18.00	2.05	4.20	74.00	7.20	0.39
14-May-25	86.00	94.00	0.13	17.00	3.13	4.00	68.00	7.10	1.10
21-May-25	15.00	18.00	0.81	16.00	0.55	3.50	74.00	7.20	0.48
28-May-25	13.00	13.00	5.23	16.00	1.11	3.60	64.00	7.10	0.03
4-Jun-25	42.00	70.00	0.23	18.00	6.89	5.20	76.00	7.20	0.32
11-Jun-25	1.60	1.60	5.03	18.00	2.20	4.10	57.00	7.10	0.03
18-Jun-25	1.60	1.60	7.24	19.00	3.65	4.30	64.00	7.10	0.04
25-Jun-25	1.60	1.60	0.10	16.00	5.75	4.40	73.00	7.00	0.23

Appendix B. Supplementary reports



Kawakawa Bay Wastewater Treatment Plant Impact Assessment Report

Final - September 2025


QUALITY INFORMATION

Document	Annual Report
Date	30 September 2025
Name and position of originator	Emma Baker, Environmental Scientist
Report directory	\\water.internal\ORG\Ops\Wastewater Operations\Regional Plants\Sth Region\03 Asset Ops_Sth\DTKAW\03-Plant_Ops\03-Resource Consents\03-Administration and Monitoring\02-Reporting\2024-2025 Annual Report

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1	26/09/2025	Michiel Jonker	Environmental Care Manager	
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3	29/09/2025	Jon Piggot	Head of Wastewater	

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CONSENT CHANGE AND MONITORING HISTORY

Change type	Description	Effective date	Reference / condition	Reporting / monitoring implications
REMP update	Rautawa Stream site 7 removed from water quality monitoring programme	Oct 2017	DIS60262735 c.40	Sampling ceased, removed reference from reporting.
REMP update	Ecological monitoring for the Rautawa Stream and coastal marine area frequency reduced to 2 yearly intervals	Oct 2017	DIS60262735 c.40	Surveys conducted biennially instead of biannually.

EXECUTIVE SUMMARY

This report provides the annual review of environmental impacts from the Kawakawa Bay Wastewater Treatment Plant (WWTP). Watercare holds four discharge consents related to the treatment plant:

- DIS60262735, which permits irrigation of fully treated effluent to forestry blocks
- DIS60265275 for air emissions
- DIS6026712 for stormwater
- DIS60266313 for discharges direct to water (currently not in use).

Condition 40 of this consent specifies that the holder develop and implement an approved Receiving Environment Monitoring Plan (REMP) to assess the effects of the WWTP operations on the Rautawa Stream and the Coastal Marine Environment.

This impact assessment report is written to satisfy the conditions of the REMP by summarising and analysing the results of this scheme and reporting this to Auckland Council on an annual basis. This report covers the period of 1 July 2024 to 30 June 2025.

The key points of the 2024-2025 report were:

- Rainfall was similar to the 2023-2024 period and only exceeded 50 mm/day on one occasion
- Irrigation to the forestry block has remained below the consented limit and within effluent quality requirements
- Effluent quality was similar to the previous reporting period (2023-2024)
- No direct discharge has occurred to the Rautawa Stream for the duration of the resource consent
- Physiochemical parameters in the Rautawa Stream were within the range of natural variation
- Ammoniacal nitrogen and nitrate-nitrogen levels in the Rautawa Stream were below the limits set in the National Policy Statement for Freshwater Management (NPS-FM (2024))
- Dissolved reactive phosphorus levels in the Rautawa Stream were slightly improved compared to previous monitoring periods but remain elevated compared to baseline data and the NPS-FM (2024). However, this increase did not correspond to changes in the instream biota, as indicated by the macroinvertebrate and fish biotic indices in the most recent surveys
- *Escherichia coli* and faecal coliforms were consistently higher than baseline data, likely caused by farmland runoff at both Site 3 and Site 6. Bacterial levels in the effluent remain much lower than the receiving environment monitoring
- Bacteria levels at Site 6 in the Rautawa Stream were much higher than Site 3, attributed to the additional farmland catchment and tidal influences.

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ABBREVIATIONS AND ACRONYMS

Abbreviation/Acronym	Full Form
Ammoniacal N	Ammoniacal nitrogen
BOD	Biochemical oxygen demand
cBOD5	Carbonaceous biochemical oxygen demand
cfu	Colony forming units
DO	Dissolved oxygen
DRP	Dissolved reactive phosphorus
<i>E. coli</i>	Escherichia coli
EDF	Effluent disposal field
F. coliforms	Faecal coliforms
N	Nitrogen
NTU	Nephelometric turbidity units
REMP	Receiving Environment Monitoring Programme
TSS	Total suspended solids
TP	Total phosphorus
WWTP	Wastewater Treatment Plant

1 INTRODUCTION

1.1 Background

The Kawakawa Bay Wastewater Treatment Plant (WWTP) treats wastewater from the Kawakawa Bay township. Raw wastewater is conveyed via a vacuum wastewater collection network. A single pump station in Kawakawa Bay regulates the flow of effluent to the plant. This report provides the annual review of environmental impacts from the WWTP. Watercare holds four discharge consents related to the WWTP:

- DIS60262735, which permits Watercare to irrigate fully treated effluent to forestry blocks.
- DIS60265275 for air emissions
- DIS6026712 for stormwater
- DIS60266313 for discharges direct to water

Condition 40 of consent DIS60262735 specifies that the holder develop and implement an approved Receiving Environment Monitoring Plan (REMP) to assess the effects on the Rautawa Stream and the Coastal Marine Environment. The REMP does not cover the effects on air quality associated with the use of DIS60265275 or stormwater (DIS6026712). Such effects are assessed in a separate annual report.

The WWTP provides treatment via a membrane bioreactor process. The WWTP also has two storage lagoons as a buffer capacity for treated effluent and two disposal systems: the land-based effluent disposal field (EDF) via a spray irrigation system to a mature pine forest to the south of the plant and discharge directly to the Rautawa Stream via an overland flow path. There are four effluent disposal fields currently in use within a larger block of forest that acts as the upper catchment for the Rautawa Stream.

Discharges to the stream (DIS60266313; originally 33143) may only occur under the following conditions:

- during winter
- storage capacity is full
- discharge to land is not possible due to saturated soils.

This option has not been used to date.

1.2 Scope

In accordance with condition 40 of resource consent DIS60262735, a REMP was written by Earth Consult Limited in 2010. The REMP details the monitoring requirements to assess the potential effects on the Rautawa Stream and Kawakawa Bay to which it discharges.

Section 4.1 of the REMP states that: *“an annual Impact Assessment Report detailing the methodologies used, the results obtained and an interpretation of the results including trends shall be prepared.”*

This report satisfies this condition for the reporting period of 1 July 2024 to 30 June 2025. All data sources for this report are detailed in Appendix C.

2 MONITORING

2.1 Rainfall

Rainfall data is collected in accordance with condition 29 of consent 30833 using a Hydro Services TB3 0.5 mm tipping bucket and recorded every 10 minutes. Figure 2-1 shows daily totals for the reporting period from midnight to midnight.

The total rainfall for the 2024-2025 year was 1267.5 mm, similar to the volume received in 2023-2024 (1,415.5 mm). Only one day exceeded 50 mm, being 69 mm on 4 April 2025, and the maximum 7-day rainfall was 95 mm between 2 April and 8 April 2025.

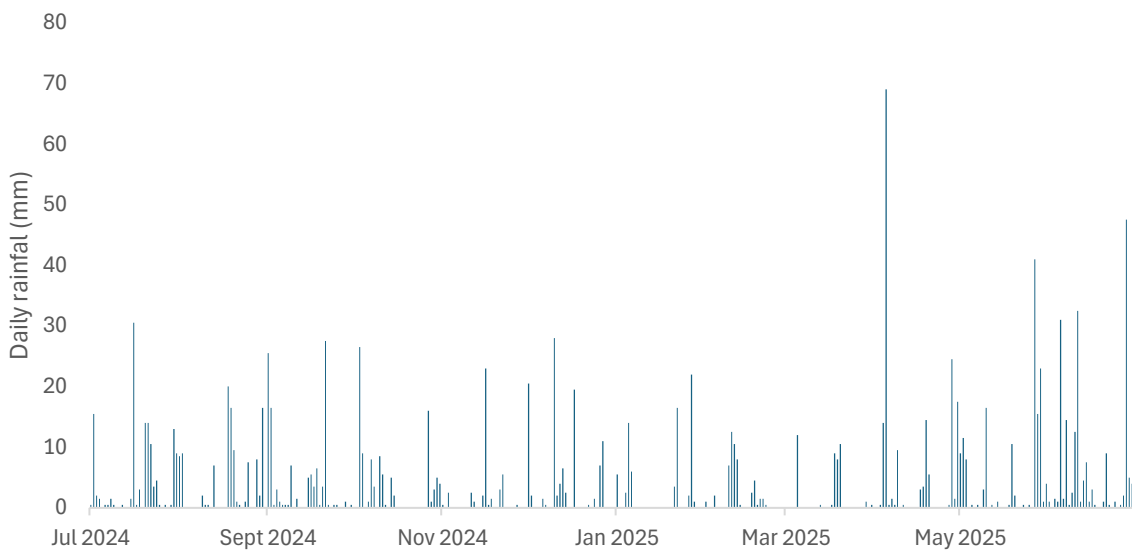


Figure 2-1: Daily rainfall collected at the Kawakawa Bay WWTP rain gauge for the reporting period 2024-2025.

2.2 Influent flow

Total daily flows of wastewater entering the plant, treated effluent to the effluent disposal field (EDF) and flows to each irrigation field are recorded per condition 22 of consent 30833. The Kawakawa Bay wastewater network is under vacuum, which has the benefit of reducing stormwater infiltration, however increased flows still occur during wet weather. Figure 2-2 shows the total influent flows to the plant. The full dataset is in Appendix A. Average inflows were 71.6 m³/day, with peak inflows on 27 June 2025 (137.7 m³).

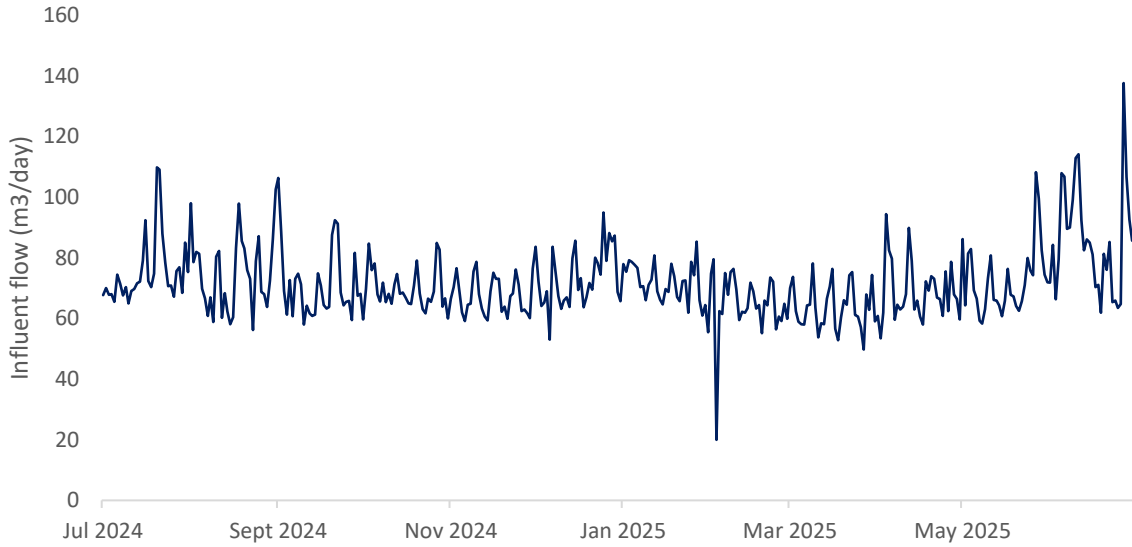


Figure 2-2: Daily influent flows to the Kawakawa Bay WWTP for the reporting period 2024-2025.

2.3 Effluent flow to effluent disposal field

Condition 3 of consent 30833 states that the WWTP is to discharge no more than 800 m³ treated effluent to land per day. The WWTP was compliant with this condition for 2024-2025, with the maximum discharge being 164.38 m³ on 12 April 2025. Figure 2-3 shows the daily final effluent discharge to the EDFs, and the full dataset is attached in Appendix A.

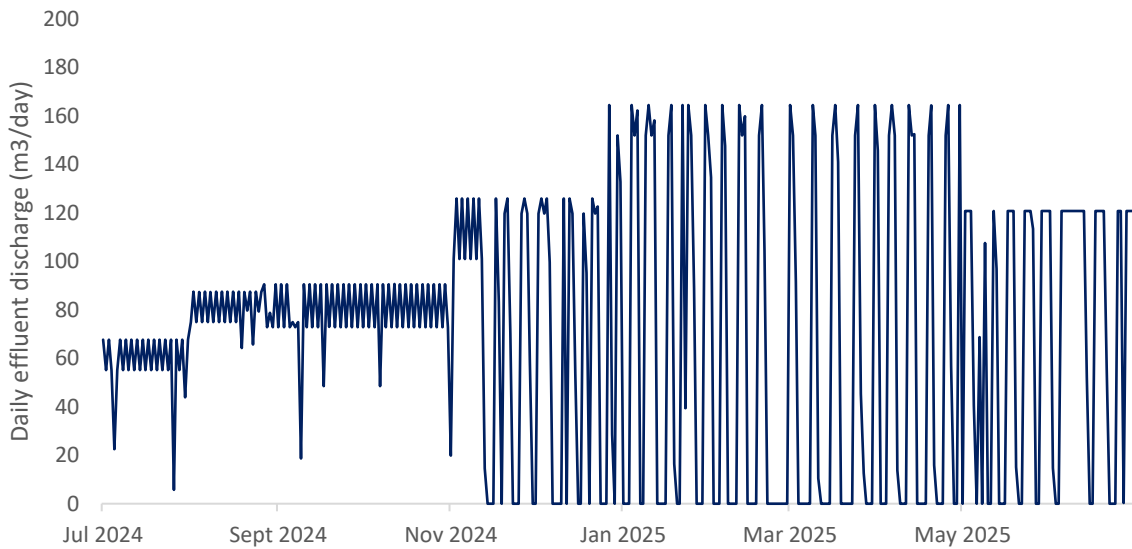


Figure 2-3: Total daily final effluent discharge to the irrigation system for the reporting period 2024-2025.

Condition 16 of consent 30833 sets the maximum irrigation loading rates to land. These rates vary depending on the slope of the land and the season and are detailed in Table 2-1.

At present, the effluent disposal field has four irrigation blocks. Maps of the irrigation blocks and the calculated rates of application are included in Appendix B. For the purposes of the consent, “Winter” is May to October inclusive, and “Summer” is November to April inclusive.

Total daily irrigation volumes to irrigation blocks 1-4 are shown in Figure 2-4. There were no discharges above consent limits during the monitoring period.

Table 2-1: Seasonal irrigation rate limits for Glen Forest blocks

Block	Net irrigation area (m ²)	Slope	Irrigation rate (mm/day)		Maximum daily irrigation volume limit (m ³ /day)	
			Summer	Winter	Summer	Winter
Block 1	25,389	0-20°	2.6	1.7	66.0	43.2
Block 2	34,564	20-30°	1.5	1.2	51.8	41.5
Block 3	39,722	20-30°	1.5	1.2	59.6	47.7
Block 4	26,500	20-30°	1.5	1.2	39.8	31.8

Note: Nominal application rate: 0.3 mm/hour across the entire site

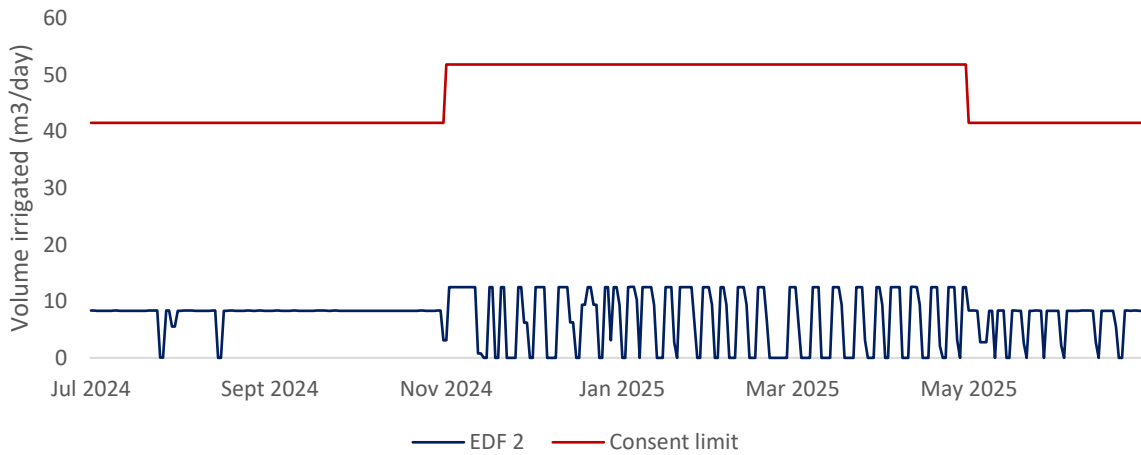
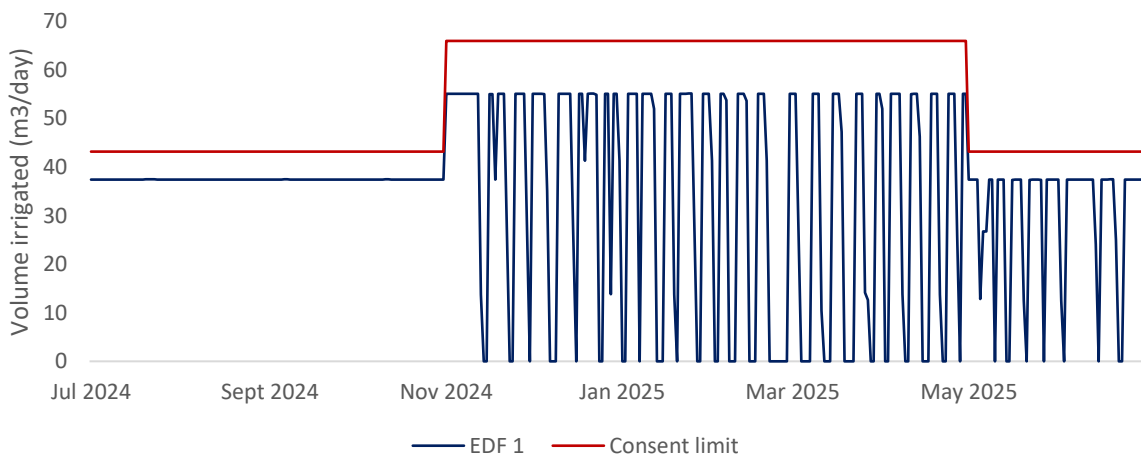




Figure 2-4: Total daily final effluent discharge by EDF (1-4) for the monitoring period 2024-2025.

2.4 Effluent quality

24-hour composite samples of final effluent were obtained weekly and tested by Watercare Laboratory Services for the following parameters per consent 30833 conditions 24-27:

- Nitrate
- Ammoniacal nitrogen
- Dissolved reactive phosphorus
- Sodium
- Calcium
- Magnesium
- pH.

Weekly grab samples were tested for the following:

- *Escherichia coli*
- Faecal coliforms.

In addition to the parameters required by the consent, Watercare tests for the following parameters as a 24-hour composite sample:

- cBOD₅ (as O₂)

- Total suspended solids
- Total nitrogen.

The median and maximum results for the bacterial sampling in the reporting period are shown in Table 2-2. The maximum results for both parameters were higher than in previous periods but did not result in any exceedance of the median as results were typically below the detection level. The elevated results were due to a build-up of biofilm in the pipes, resulting in an increase in bacterial level, and as such, are not reflective of the effluent quality. The pipes were flushed several times with sodium hypochlorite to resolve this. Figure 2-5 to Figure 2-9 display the results of the bacterial, nutrient and mineral testing in the effluent. The data for the sampling is in Appendix A.

Table 2-2: Median and maximum bacteria results (all units cfu/100mL) for the monitoring period 2024-2025.

Parameter	Median	Maximum	Consent median limit
<i>Escherichia coli</i>	<1.60	420.00	1,000
Faecal coliforms	<1.60	530.00	1,000

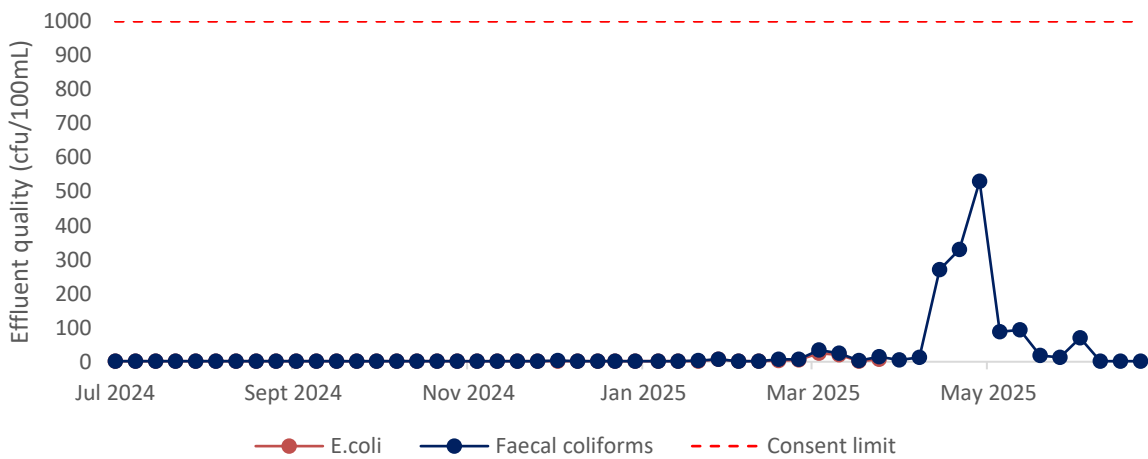


Figure 2-5: Results from the *E. coli* and faecal coliforms in the final effluent for the monitoring period 2024-2025.

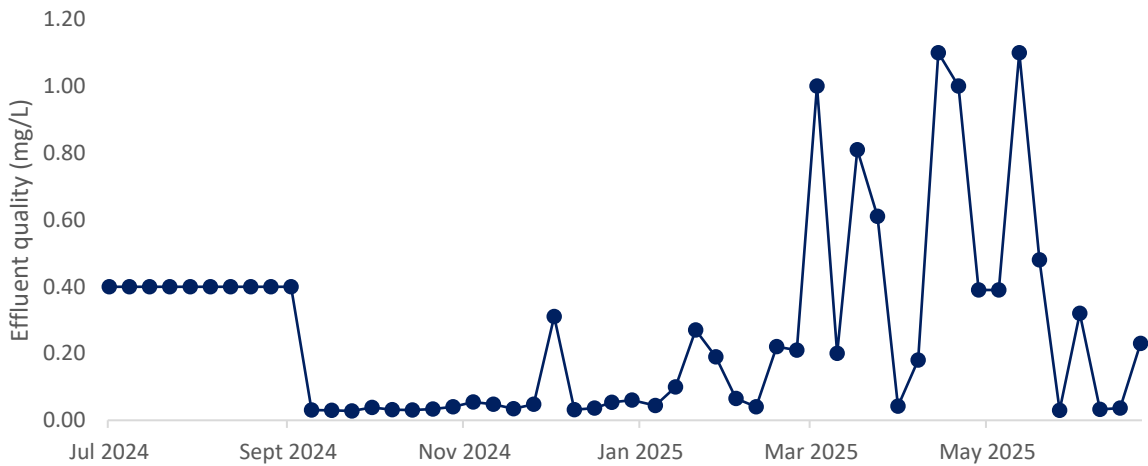


Figure 2-6: Results from the ammoniacal nitrogen in the final effluent for the monitoring period 2024-2025.

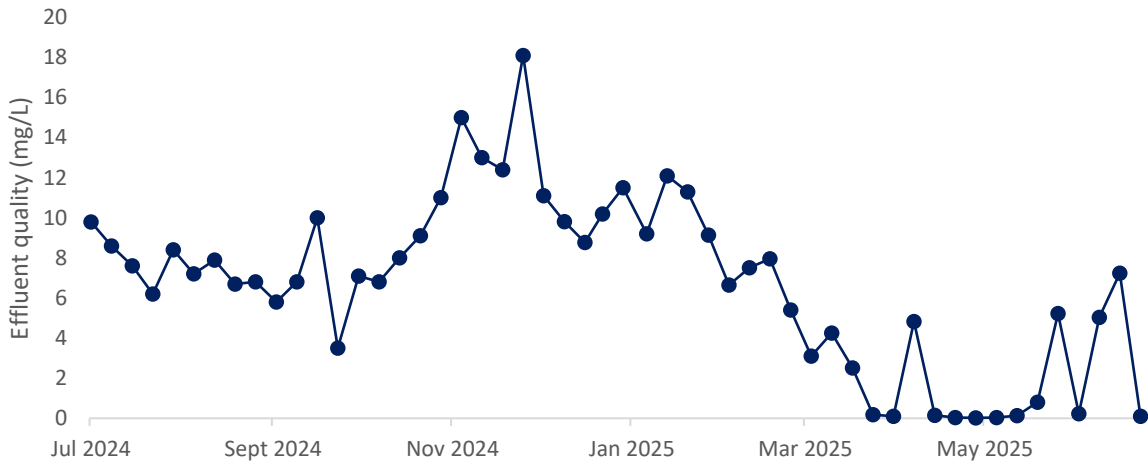


Figure 2-7: Results from the nitrate-nitrogen in the final effluent for the monitoring period 2024-2025.

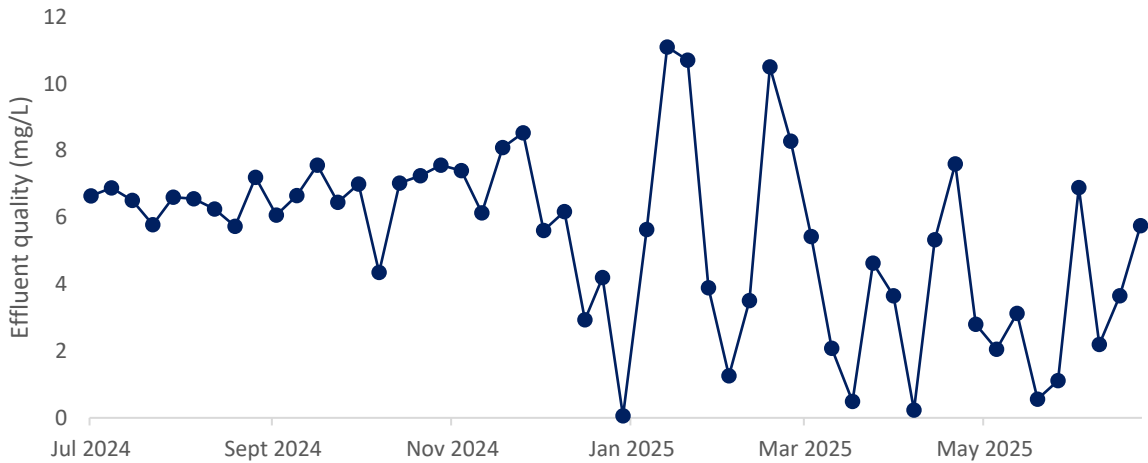


Figure 2-8: Results from the dissolved reactive phosphorus in the final effluent for the monitoring period 2024-2025.

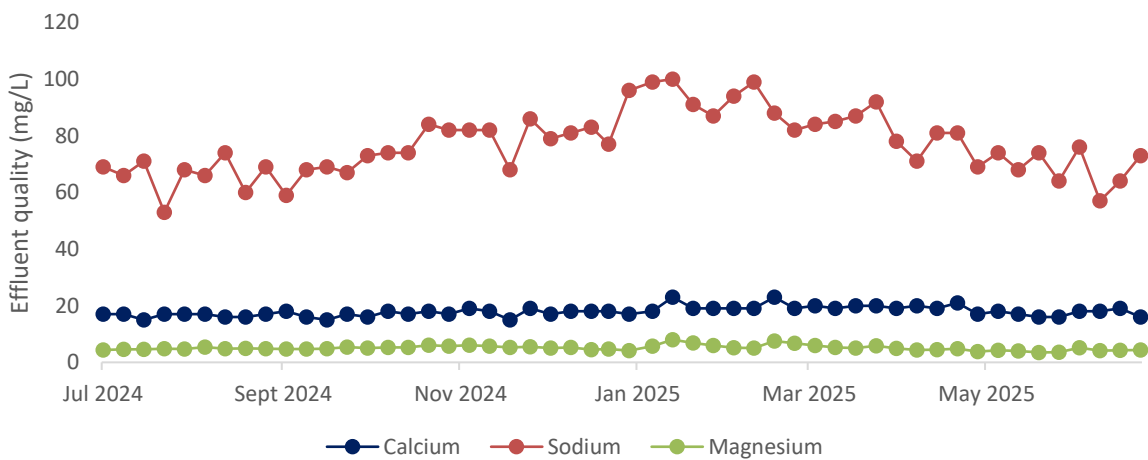


Figure 2-9: Results from the total calcium, sodium, and magnesium in the final effluent for the monitoring period 2024-2025.

2.5 Rautawa Stream flow and water quality

As discussed in Section 1, consent DIS60266313 permits discharges directly to the Rautawa Stream under certain conditions. This option has not been utilised yet as all effluent has been discharged to the EDF irrigation system. The REMP requires monitoring of the stream in two downstream locations from the potential discharge point, shown in Figure 2-10, Site 3 and Site 6 are both located on the Rautawa Stream, downstream of the WWTP. Site 3 is near the boundary of the WWTP property, just upstream of the bridge over Forestry Road and near the weir. Site 6 is located by the footbridge near Rautawa Place and is not far from the foreshore. Site 6 is tidally influenced and was selected as a monitoring site to determine the impact of transition from failing septic tanks within Kawakawa Bay to the reticulated wastewater network and treatment plant.



Figure 2-10: Location of Site 3 on the Rautawa Stream inside the WWTP boundary, Site 6 in Kawakawa Bay town.

2.5.1 Flow rates

The flow rate of the Rautawa Stream is measured at Site 3 from the REMP and the mean daily flow rate is displayed in Figure 2-11. The weir is maintained by Watercare staff and excess sediment is removed when necessary. The mean daily flow rate closely mirrors the rainfall data in Figure 2-1. As no discharge has occurred into the stream this monitoring period, there are no direct impacts of the plant's operation on the flow rate.

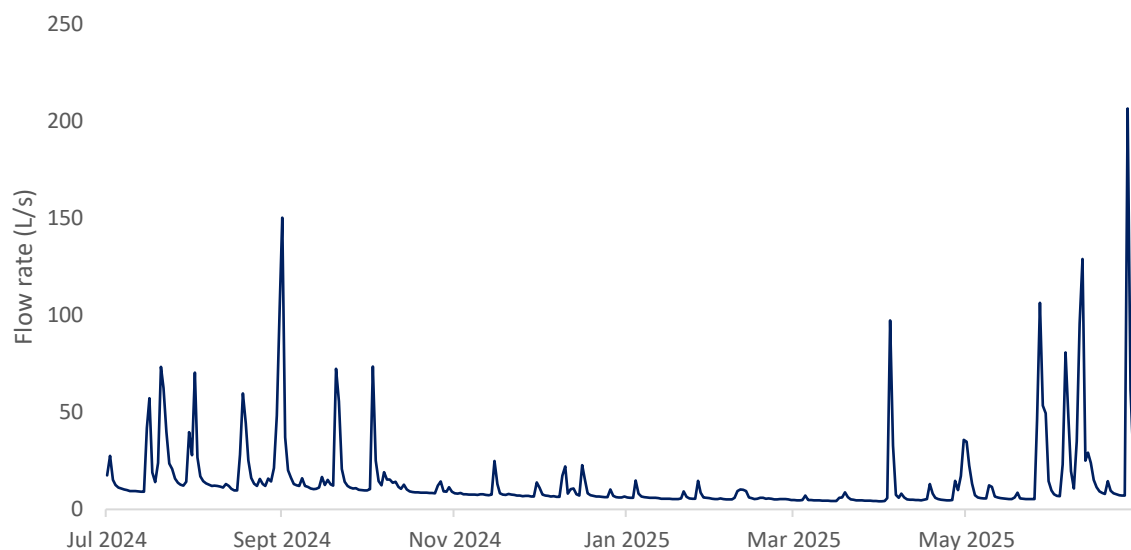


Figure 2-11: Rautawa Stream mean daily flow rate for the monitoring period 2024-2025.

2.5.2 Water quality

The REMP details the monitoring plan for water quality. A summary of this is provided in Table 2-3. All sampling was completed for this reporting period.

Table 2-3: REMP water quality monitoring schedule

Parameter	Site(s)	Frequency
Biological oxygen demand (cBOD ₅)	3	Fortnightly
Total suspended solids	3	Fortnightly
Total oxidised nitrogen (NO ₃ and NO ₂)	3	Fortnightly
Nitrate (NO ₃)	3	Fortnightly
Nitrite (NO ₂)	3	Fortnightly
Ammoniacal nitrogen (NH ₃ and NH ₄)	3	Fortnightly
Un-ionised ammonia nitrogen	3	Fortnightly
Total nitrogen	3	Fortnightly
Dissolved reactive phosphorus	3	Fortnightly
Total phosphorus	3	Fortnightly
Faecal coliforms	3, 6	Fortnightly
E. coli	3, 6	Fortnightly
Enterococci	6	Fortnightly
pH	3	Fortnightly
Dissolved oxygen	3	Fortnightly
Temperature	3	Fortnightly

2.5.3 Site 3

The full results for all the parameters tested at Site 3 are displayed in Figure 2-12 to Figure 2-18 and listed in Appendix A, while Table 2-4 provides a comparison between baseline water quality data.

The temperature and dissolved oxygen levels ranged from 9.8 – 18.4 °C and 9.0 – 11.0 mg/L respectively. Total suspended solids measured a maximum of 100.0 mg/L on 1 September 2024 and an average of 16.4 mg/L. These results are highly consistent with previous monitoring periods.

The annual median ammoniacal nitrogen concentration at Site 3 was 0.014 mg/L, placing it in the National Policy Statement for Freshwater Management 2024 (NPS-FM)¹ attribute band A (≤ 0.03 mg/L), which indicates a 99% species protection level. The annual 95th percentile was 0.04 mg/L, and fell within attribute band A. These levels were similar to the 2023–2024 results (Table 2-4), where the median (0.016 mg/L) was in band A, and the 95th percentile (0.07 mg/L) was in band B (>0.05 and ≤ 0.40 mg/L, offering 95% species protection).

Nitrate-nitrogen had an annual median of 0.089 mg/L and an annual 95th percentile of 0.374 mg/L. These values are within the NPS-FM (2024) guidelines for attribute band A for a high conservation value system, with effects unlikely on sensitive species. Total nitrogen ranged between 0.09 mg/L and 0.68 mg/L, with a median of 0.23 mg/L and a 95th percentile of 0.67 mg/L for the reporting period. This is consistent with previous periods, however there is no NPS-FM (2024) attribute bands for this parameter in river systems.

Dissolved reactive phosphorus median (0.015 mg/L) and 95th percentile (0.042 mg/L) concentrations were both within attribute band C of the NPS-FM (2024). This marks a potential gradual improvement in water quality, as comparatively, the median and 95th percentile in 2023-2024 were within bands C (0.014 mg/L) and D (0.109 mg/L), and the median and 95th percentile in 2022-2023 were within attribute band D, at 0.044 mg/L and 0.131 mg/L respectively. It would be expected that in conditions where eutrophication is favoured, increased dissolved reactive phosphorus enriches algal and plant growth, and moderate to excessive changes in macroinvertebrate and fish communities may occur due to loss of sensitive taxa to hypoxia. Ecological impacts are further discussed in Section 2.5.6

Total phosphorus is also elevated. However, attribute bands are not determined for riverine systems in the NPS-FM (2024). Total phosphorus ranged from 0.016 - 0.079 mg/L, with an average of 0.041 mg/L and a median of 0.035 mg/L. These results are consistent with previous monitoring periods.

The values for *E. coli* and faecal coliforms were generally consistent with previous monitoring periods, ranging between $<1.6 - 4,800$ cfu/100mL and $28 - 23,00$ cfu/100 mL respectively, however the upper ranges exceeded those in 2023-2024 (Table 2-4). *E. coli* was elevated above 1,000 cfu/100mL on two occasions: 4 January 2025 (4,800 cfu/100mL) and 27 April 2025 (1,400 cfu/100mL). Faecal coliforms were elevated above 1,000 cfu/100mL on four occasions: 4 January 2025 (5,900 cfu/100mL), 2 March 2025 (1,900 cfu/100mL), 8 April 2025 (6,700 cfu/100mL) and 27 April 2025 (23,000 cfu/100mL). The results at Site 3 are considerably higher than the levels recorded in the final effluent discharge, therefore indicating that the source is primarily from the

¹ <https://environment.govt.nz/assets/publications/Freshwater/NPSFM-amended-october-2024.pdf>

surrounding catchment runoff, which includes stormwater runoff from the EDF and other forestry areas.

Biochemical oxygen demand ranged between 0.50 – 2.00 mg/L, with an average of 0.82 mg/L and a median of 0.74 mg/L, consistent with previous monitoring periods.

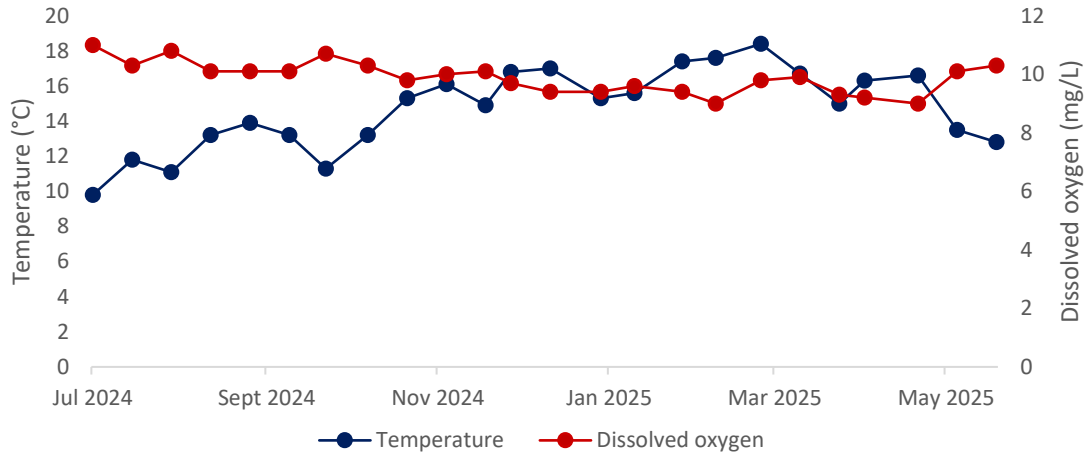


Figure 2-12: Rautawa Stream Site 3 results for temperature and dissolved oxygen for the monitoring period 2024-2025.

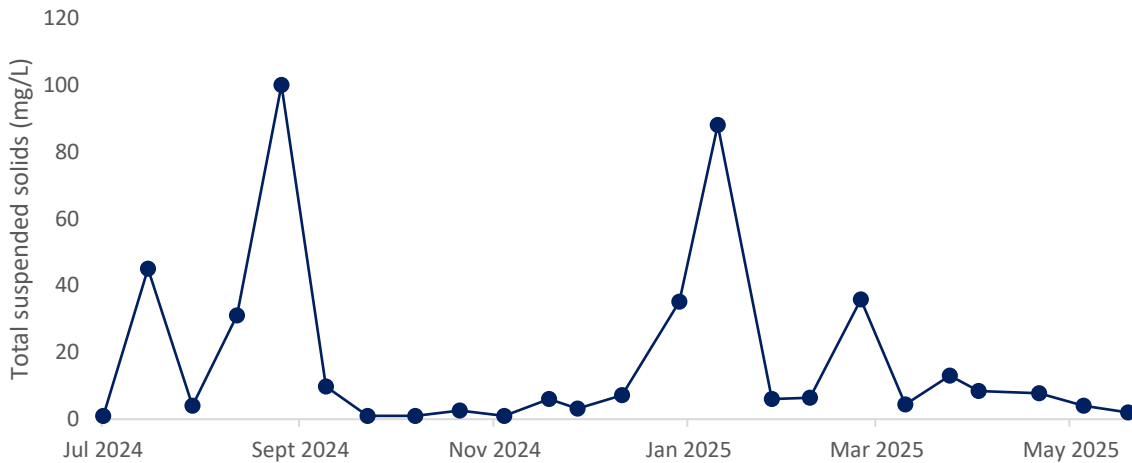


Figure 2-13: Rautawa Stream Site 3 results for total suspended solids for the monitoring period 2024-2025.

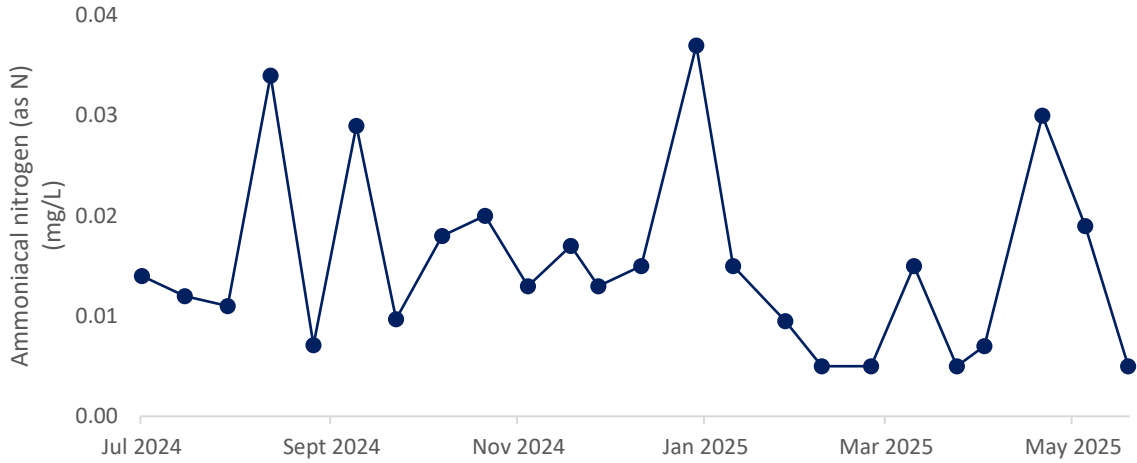


Figure 2-14: Rautawa Stream Site 3 results for ammoniacal nitrogen for the monitoring period 2024-2025.

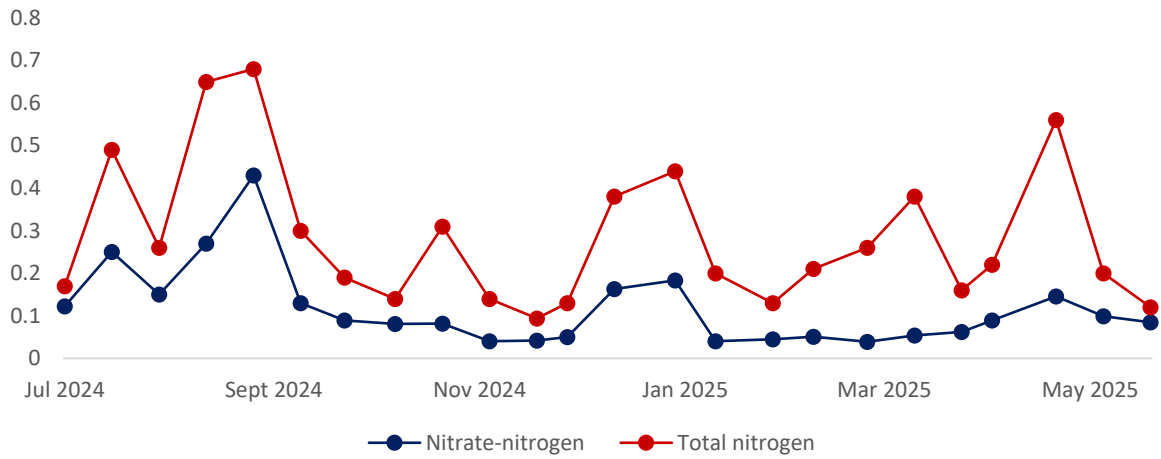


Figure 2-15: Rautawa Stream Site 3 results for nitrate (as nitrogen) and total nitrogen for the monitoring period 2024-2025.

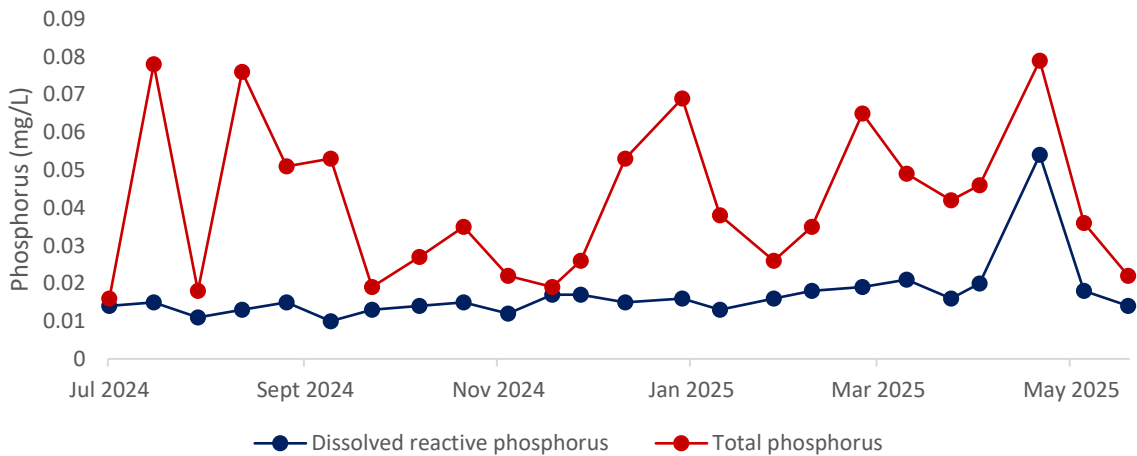


Figure 2-16: Rautawa Stream Site 3 results for total phosphorus and dissolved reactive phosphorus for the monitoring period 2024-2025.

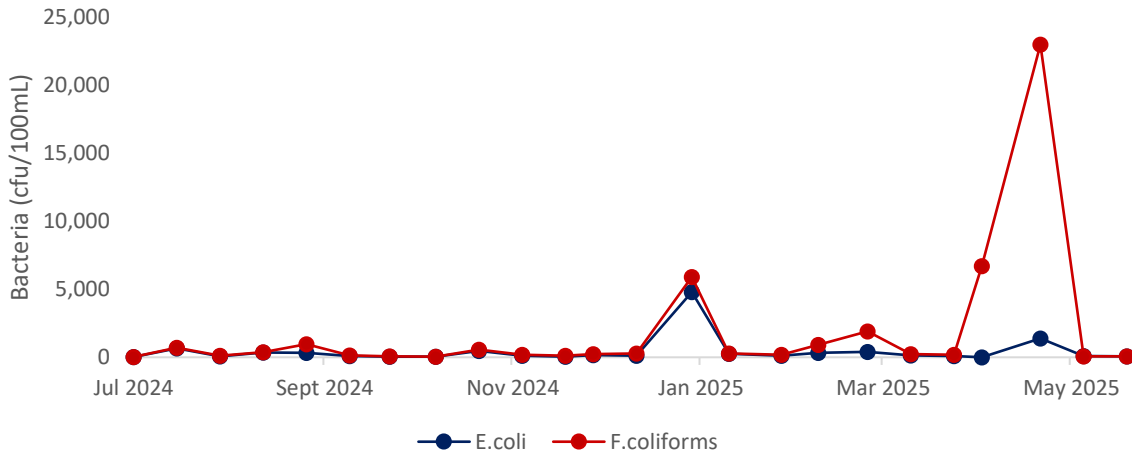


Figure 2-17: Rautawa Stream Site 3 results for E. coli and faecal coliforms for the monitoring period 2024-2025.

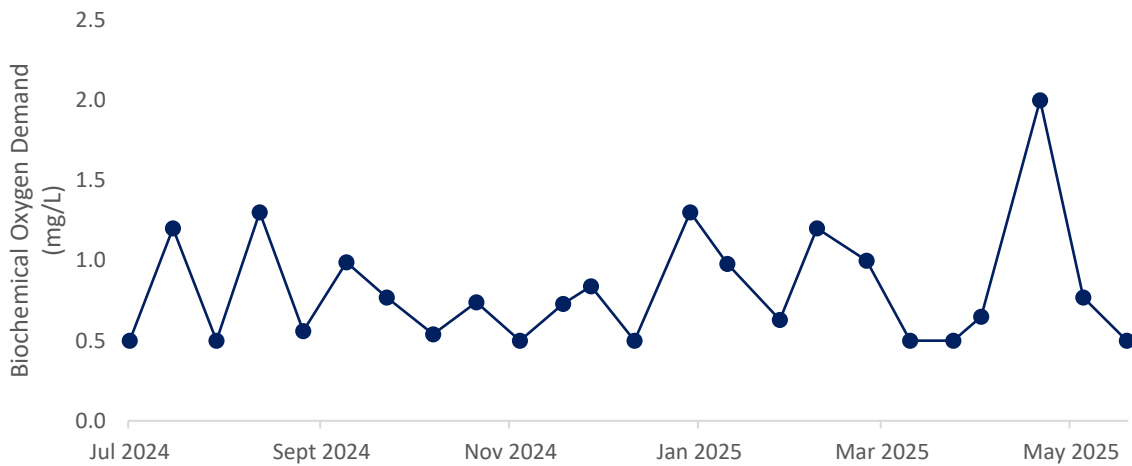


Figure 2-18: Rautawa Stream Site 3 results for biochemical oxygen demand for the monitoring period 2024-2025.

2.5.4 Comparison to baseline water quality data

Bioresearches were commissioned by Manukau Water to undertake an assessment of the aquatic biology and water quality condition of the main stem of the Rautawa Stream to assess the baseline conditions prior to construction of the WWTP². The monitoring was conducted once monthly from May 2004 to January 2005. In the conclusions of that report, the Rautawa Stream was characterised as typical of streams within the Auckland region that flow from agricultural catchments. In Table 2-4 is a summary of the water quality results from that study compared to water quality results from the most recent two years of results. Due to the limited number of results for the baseline survey, the results are indicative of the baseline natural environment but may not include the full range of natural variation within the Rautawa Stream.

² Bioresearches 2005, Stream baseline survey May 2004- January 2005: proposed sewage plant Kawakawa Bay

As shown in Table 2-4, the general physiochemical parameters have remained largely consistent with the baseline survey results on average. Total suspended solids showed some elevated levels in 2024–2025, leading to a wider range compared to the baseline, however the results are consistent with the 2023-2024 monitoring period. The forms of nitrogen in the most recent monitoring periods are similar to the baseline water quality results.

In the most recent monitoring periods, the means for dissolved reactive phosphorus was higher than the baseline range, and a notable increase in the upper range. The phosphorus in the effluent discharge is higher than the stream quality results, and whilst it is primarily adsorbed via natural processes within the irrigation blocks, it may be contributing to the elevated phosphorus downstream. Total phosphorus has remained on average, similar to the baseline water quality survey results.

E. coli and faecal coliform results in 2024-2025 monitoring periods were much higher than results from the baseline monitoring period. As Table 2-2 showed, the *E. coli* and faecal coliforms in the effluent is low, therefore the increased levels in the stream may be due to the wider farmland catchment, and a smaller number of baseline results compared to current monitoring results.

Table 2-4: Rautawa Stream water quality (Site 3) comparison between 2004-05 (baseline), 2023-24 and 2024-25

Parameter	2004-05 (baseline)		2023-24		2024-25	
	Range	Mean	Range	Mean	Range	Mean
Temperature (°C)	8.8 – 16.3	12.5	9.5 – 18.6	14.3	9.8 – 18.4	14.4
DO (mg/L)	7.69 – 11.04	9.52	9 – 11.2	10.1	9.0 – 11.0	9.9
pH (field) (pH units)	5.7 – 7.4	7.0	6.3 – 7.8	7.1	6.4 – 7.7	7.0
pH (laboratory) (pH units)	6.8 – 7.6	7.3	6.7 – 7.4	7.2	6.9 – 7.6	7.3
TSS (mg/L)	3 – 10	5.2	1 – 97.8	11.1	1.0 – 100.0	16.4
Total ammoniacal-N (mg/L)	<0.01 – 0.06	0.02*	0.005 – 0.076	0.022	0.005 – 0.037	0.015
Total oxidised nitrogen (mg/L)	0.052 – 0.227	0.131	0 – 0.43	0.087	0.04 – 0.43	0.12
Total nitrogen (mg/L)	0.141 – 0.622	0.375	0.1 – 0.88	0.25	0.09 – 0.68	0.28
Nitrate-N (mg/L)	0.051 – 0.225	0.129	<0.04 – 0.435	0.141*	<0.04 – 0.43	0.12*
Nitrite-N (mg/L)	<0.002 – 0.003	0.002*	<0.002 – 0.003	0.002*	<0.002 – 0.003	0.002*
DRP (mg/L)	0.007 – 0.016	0.011	0.01 – 0.147	0.020	0.010 – 0.054	0.017
Total phosphorus (mg/L)	0.021 – 0.212	0.053	0.014 – 0.347	0.049	0.016 – 0.079	0.041
cBOD ₅ (mgO ₂ /L)	<1 – 2	0.67*	0.5 – 5.3	1.104*	<0.5 – 2.0	0.8*
<i>Escherichia coli</i> (cfu/100mL)	20 – 470	141	11 – 2500	245	<1.60 – 4,800	399*
Faecal Coliforms (cfu/100mLI)	22 – 560	158	8.2 – 3600	313	28 – 23,000	1,669

*Includes value(s) below detection limit

2.5.5 Site 6

The *E. coli* and faecal coliforms results at Site 6 were much higher than those at Site 3, consistent with previous monitoring periods. *Enterococci*, faecal coliforms and *E. coli* ranged between 23 – 42,000, 440 – 73,000 and 460 – 68,000 cfu/100mL respectively.

The Rautawa Stream passes through farmland without riparian vegetation or fenced separation from stock before it enters the Kawakawa Bay town. In comparison to Site 3’s approximate catchment of 1.68 km², Site 6 has an estimated = catchment of 6.92 km² with a higher proportion of this catchment being farmland. Site 6 is also influenced by the high tide, with mangroves forming a large proportion of the vegetation of this site. As such, these results more closely reflect the agricultural land use of the catchment downstream in addition to tidal influences from the bay.

The results for all the parameters tested at Site 6 are displayed in Figure 2-19 and listed in Appendix A.

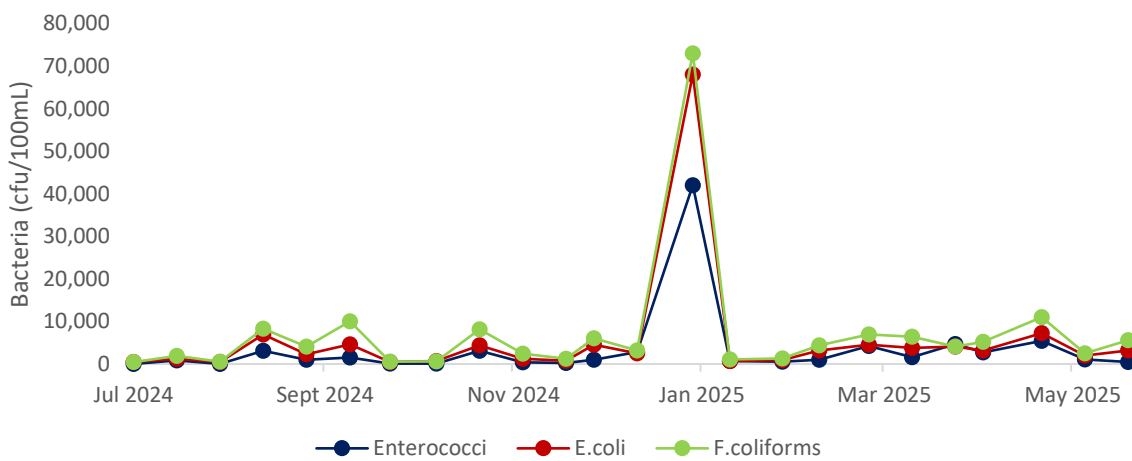


Figure 2-19: Rautawa Stream site 6 results for bacterial parameters for the monitoring period 2024-2025.

2.5.6 Ecological assessment of the Rautawa Stream and coastal marine area

An ecological assessment of the Rautawa Stream is required every two years together with an assessment of part of the coastal marine area of Kawakawa Bay. The assessments were most recently undertaken by Viridis Limited in March 2024³ and is included in the 2023-2024 Kawakawa Bay Impact Assessment Report. Site 3 within the Viridis assessment is the same site as the Site 3 monitored in routine operations, displayed in Figure 10. Sites 1, 2 and 5 are exclusively monitored in the ecological assessments and are not monitored in routine operations. The next assessment is due in 2026.

The main conclusions from the 2024 report were:

- Key habitat characteristics at each survey site were similar to previous surveys, although there was reduced riparian shading at Site 3 due to felling of pine trees

³ Viridis 2024, Kawakawa Bay Sewage Treatment Plant Stream and Coastal Marine Monitoring 2024

- Macrophyte cover was comparable to riparian shading with Site 1 (open channel) having the highest macrophyte cover and species diversity compared to Site 5 (well-shaded) where macrophytes were absent
- Invertebrate community composition was similar to historical surveys, and differences between each site was not attributed to the WWTP
- Fish abundance and index of biological integrity scores appear to be trending upwards, with differences in sites attributed to difference in habitat characteristics
- In the Coastal Marine Area, shell and macroalgae cover appear to increase relative to the distance from the shore
- The long-term monitoring of freshwater stream sites and the coastal marine area of Kawakawa Bay continues to demonstrate that the WWTP is not having an adverse impact on the ecology of the receiving environment. Given that the WWTP's discharges have continued to occur only via land irrigation, the changes between sites on the Rautawa Stream are considered attributable to natural variation.

3 CONCLUSIONS

For the monitoring period 1 July 2024 to 30 June 2025, the operation of the Kawakawa Bay Wastewater Treatment Plant is within the specifications of consent 30833 and the REMP with all the appropriate monitoring being undertaken at or more frequently than the schedule required by the consent.

Irrigation volumes and effluent quality were within the consented limits and similar to the previous monitoring period. No direct discharge occurred to the Rautawa Stream in this period, however, dissolved reactive phosphorus and bacteria levels in the stream are elevated beyond what is recommended in the NPS-FM (2024), and higher than the baseline data. Effluent quality indicates the elevated phosphorus downstream may be attributable to plant operations but ongoing impacts on the invertebrate and fish communities within the receiving environment have not been observed.

Increased bacteria and TSS levels in the Rautawa Stream are likely caused by runoff from the surrounding farmland catchment. Physiochemical parameters in the stream were within the range of natural variation and nitrate-nitrogen and ammoniacal nitrogen levels were low.

Appendix A. Daily rainfall, influent, effluent, EDF flow and environmental data

Rainfall data for 2024-2025

Date	Rainfall (mm)	Date (continued)	Rainfall (mm)	Date (continued)	Rainfall (mm)	Date (continued)	Rainfall (mm)
1/07/2024	0.5	1/10/2024	0	1/01/2025	5.5	1/04/2025	0
2/07/2024	15.5	2/10/2024	0	2/01/2025	0	2/04/2025	0
3/07/2024	2	3/10/2024	26.5	3/01/2025	0	3/04/2025	0.5
4/07/2024	1.5	4/10/2024	9	4/01/2025	2.5	4/04/2025	14
5/07/2024	0	5/10/2024	0	5/01/2025	14	5/04/2025	69
6/07/2024	0.5	6/10/2024	1	6/01/2025	6	6/04/2025	0.5
7/07/2024	0.5	7/10/2024	8	7/01/2025	0	7/04/2025	1.5
8/07/2024	1.5	8/10/2024	3.5	8/01/2025	0	8/04/2025	0.5
9/07/2024	0.5	9/10/2024	0	9/01/2025	0	9/04/2025	9.5
10/07/2024	0	10/10/2024	8.5	10/01/2025	0	10/04/2025	0
11/07/2024	0	11/10/2024	5.5	11/01/2025	0	11/04/2025	0.5
12/07/2024	0.5	12/10/2024	0.5	12/01/2025	0	12/04/2025	0
13/07/2024	0	13/10/2024	0	13/01/2025	0	13/04/2025	0
14/07/2024	0	14/10/2024	5	14/01/2025	0	14/04/2025	0
15/07/2024	1.5	15/10/2024	2	15/01/2025	0	15/04/2025	0
16/07/2024	30.5	16/10/2024	0	16/01/2025	0	16/04/2025	0
17/07/2024	0.5	17/10/2024	0	17/01/2025	0	17/04/2025	3
18/07/2024	3	18/10/2024	0	18/01/2025	0	18/04/2025	3.5
19/07/2024	0	19/10/2024	0	19/01/2025	0	19/04/2025	14.5
20/07/2024	14	20/10/2024	0	20/01/2025	0	20/04/2025	5.5

Date	Rainfall (mm)	Date (continued)	Rainfall (mm)	Date (continued)	Rainfall (mm)	Date (continued)	Rainfall (mm)
21/07/2024	14	21/10/2024	0	21/01/2025	3.5	21/04/2025	0
22/07/2024	10.5	22/10/2024	0	22/01/2025	16.5	22/04/2025	0
23/07/2024	3.5	23/10/2024	0	23/01/2025	0	23/04/2025	0
24/07/2024	4.5	24/10/2024	0	24/01/2025	0	24/04/2025	0
25/07/2024	0.5	25/10/2024	0	25/01/2025	0	25/04/2025	0
26/07/2024	0	26/10/2024	0	26/01/2025	2	26/04/2025	0
27/07/2024	0.5	27/10/2024	16	27/01/2025	22	27/04/2025	0.5
28/07/2024	0	28/10/2024	1	28/01/2025	1	28/04/2025	24.5
29/07/2024	0.5	29/10/2024	3	29/01/2025	0	29/04/2025	1.5
30/07/2024	13	30/10/2024	5	30/01/2025	0	30/04/2025	17.5
31/07/2024	9	31/10/2024	4	31/01/2025	0	1/05/2025	9
1/08/2024	8.5	1/11/2024	0.5	1/02/2025	1	2/05/2025	11.5
2/08/2024	9	2/11/2024	0	2/02/2025	0	3/05/2025	8
3/08/2024	0	3/11/2024	2.5	3/02/2025	0	4/05/2025	0
4/08/2024	0	4/11/2024	0	4/02/2025	2	5/05/2025	0.5
5/08/2024	0	5/11/2024	0	5/02/2025	0	6/05/2025	0
6/08/2024	0	6/11/2024	0	6/02/2025	0	7/05/2025	0.5
7/08/2024	0	7/11/2024	0	7/02/2025	0	8/05/2025	0
8/08/2024	0	8/11/2024	0	8/02/2025	0	9/05/2025	3
9/08/2024	2	9/11/2024	0	9/02/2025	7	10/05/2025	16.5
10/08/2024	0.5	10/11/2024	0	10/02/2025	12.5	11/05/2025	0

Date	Rainfall (mm)	Date (continued)	Rainfall (mm)	Date (continued)	Rainfall (mm)	Date (continued)	Rainfall (mm)
11/08/2024	0.5	11/11/2024	2.5	11/02/2025	10.5	12/05/2025	0.5
12/08/2024	0	12/11/2024	1	12/02/2025	8	13/05/2025	0
13/08/2024	7	13/11/2024	0	13/02/2025	0.5	14/05/2025	1
14/08/2024	0	14/11/2024	0	14/02/2025	0	15/05/2025	0
15/08/2024	0	15/11/2024	2	15/02/2025	0	16/05/2025	0
16/08/2024	0	16/11/2024	23	16/02/2025	0	17/05/2025	0
17/08/2024	0	17/11/2024	0.5	17/02/2025	2.5	18/05/2025	0.5
18/08/2024	20	18/11/2024	1.5	18/02/2025	4.5	19/05/2025	10.5
19/08/2024	16.5	19/11/2024	0	19/02/2025	0.5	20/05/2025	2
20/08/2024	9.5	20/11/2024	0	20/02/2025	1.5	21/05/2025	0
21/08/2024	1	21/11/2024	3	21/02/2025	1.5	22/05/2025	0
22/08/2024	0.5	22/11/2024	5.5	22/02/2025	0.5	23/05/2025	0.5
23/08/2024	0	23/11/2024	0	23/02/2025	0	24/05/2025	0
24/08/2024	1	24/11/2024	0	24/02/2025	0	25/05/2025	0.5
25/08/2024	7.5	25/11/2024	0	25/02/2025	0	26/05/2025	0
26/08/2024	0	26/11/2024	0	26/02/2025	0	27/05/2025	41
27/08/2024	0	27/11/2024	0.5	27/02/2025	0	28/05/2025	15.5
28/08/2024	8	28/11/2024	0	28/02/2025	0	29/05/2025	23
29/08/2024	2	29/11/2024	0	1/03/2025	0	30/05/2025	1
30/08/2024	16.5	30/11/2024	0	2/03/2025	0	31/05/2025	4
31/08/2024	0	1/12/2024	20.5	3/03/2025	0	1/06/2025	1

Date	Rainfall (mm)	Date (continued)	Rainfall (mm)	Date (continued)	Rainfall (mm)	Date (continued)	Rainfall (mm)
1/09/2024	25.5	2/12/2024	2	4/03/2025	0	2/06/2025	0
2/09/2024	16.5	3/12/2024	0	5/03/2025	12	3/06/2025	1.5
3/09/2024	0.5	4/12/2024	0	6/03/2025	0	4/06/2025	1
4/09/2024	3	5/12/2024	0	7/03/2025	0	5/06/2025	31
5/09/2024	1	6/12/2024	1.5	8/03/2025	0	6/06/2025	1.5
6/09/2024	0.5	7/12/2024	0.5	9/03/2025	0	7/06/2025	14.5
7/09/2024	0.5	8/12/2024	0	10/03/2025	0	8/06/2025	0.5
8/09/2024	0.5	9/12/2024	0	11/03/2025	0	9/06/2025	2.5
9/09/2024	7	10/12/2024	28	12/03/2025	0	10/06/2025	12.5
10/09/2024	0	11/12/2024	2	13/03/2025	0.5	11/06/2025	32.5
11/09/2024	1.5	12/12/2024	4	14/03/2025	0	12/06/2025	1
12/09/2024	0	13/12/2024	6.5	15/03/2025	0	13/06/2025	4.5
13/09/2024	0	14/12/2024	2.5	16/03/2025	0	14/06/2025	7.5
14/09/2024	0	15/12/2024	0	17/03/2025	0.5	15/06/2025	1
15/09/2024	5	16/12/2024	0	18/03/2025	9	16/06/2025	3
16/09/2024	5.5	17/12/2024	19.5	19/03/2025	8	17/06/2025	0.5
17/09/2024	3.5	18/12/2024	0	20/03/2025	10.5	18/06/2025	0
18/09/2024	6.5	19/12/2024	0	21/03/2025	0	19/06/2025	0
19/09/2024	0.5	20/12/2024	0	22/03/2025	0	20/06/2025	1
20/09/2024	3.5	21/12/2024	0	23/03/2025	0	21/06/2025	9
21/09/2024	27.5	22/12/2024	0.5	24/03/2025	0	22/06/2025	0.5

Date	Rainfall (mm)	Date (continued)	Rainfall (mm)	Date (continued)	Rainfall (mm)	Date (continued)	Rainfall (mm)
22/09/2024	0.5	23/12/2024	0	25/03/2025	0	23/06/2025	0
23/09/2024	0	24/12/2024	1.5	26/03/2025	0	24/06/2025	1
24/09/2024	0.5	25/12/2024	0	27/03/2025	0	25/06/2025	0
25/09/2024	0.5	26/12/2024	7	28/03/2025	0	26/06/2025	0.5
26/09/2024	0	27/12/2024	11	29/03/2025	1	27/06/2025	2
27/09/2024	0	28/12/2024	0	30/03/2025	0	28/06/2025	47.5
28/09/2024	1	29/12/2024	0	31/03/2025	0.5	29/06/2025	5
29/09/2024	0	30/12/2024	0			30/06/2025	4
30/09/2024	0.5	31/12/2024	0				

Influent flow data for 2024-2025

Date	Influent (m ³ /day)	Date (continued)	Influent (m ³ /day)	Date (continued)	Influent (m ³ /day)	Date (continued)	Influent (m ³ /day)
1/07/2024	67.8	1/10/2024	59.7	1/01/2025	77.9	1/04/2025	60.8
2/07/2024	70.0	2/10/2024	69.7	2/01/2025	75.5	2/04/2025	53.4
3/07/2024	67.8	3/10/2024	84.7	3/01/2025	79.3	3/04/2025	61.9
4/07/2024	68.0	4/10/2024	75.9	4/01/2025	78.7	4/04/2025	94.4
5/07/2024	65.5	5/10/2024	78.2	5/01/2025	77.7	5/04/2025	82.5
6/07/2024	74.4	6/10/2024	67.9	6/01/2025	76.6	6/04/2025	79.8
7/07/2024	71.5	7/10/2024	65.6	7/01/2025	70.4	7/04/2025	59.6
8/07/2024	67.7	8/10/2024	71.9	8/01/2025	70.7	8/04/2025	64.6
9/07/2024	70.4	9/10/2024	65.4	9/01/2025	66.0	9/04/2025	63.0
10/07/2024	65.0	10/10/2024	68.1	10/01/2025	71.0	10/04/2025	63.9
11/07/2024	69.1	11/10/2024	64.9	11/01/2025	72.8	11/04/2025	68.1
12/07/2024	69.7	12/10/2024	71.3	12/01/2025	80.8	12/04/2025	89.8
13/07/2024	71.6	13/10/2024	74.6	13/01/2025	69.0	13/04/2025	79.0
14/07/2024	72.1	14/10/2024	68.1	14/01/2025	66.1	14/04/2025	62.9
15/07/2024	79.1	15/10/2024	68.6	15/01/2025	64.7	15/04/2025	65.9
16/07/2024	92.4	16/10/2024	66.9	16/01/2025	69.7	16/04/2025	60.6
17/07/2024	72.3	17/10/2024	65.0	17/01/2025	68.8	17/04/2025	58.0
18/07/2024	70.3	18/10/2024	64.7	18/01/2025	78.0	18/04/2025	72.2
19/07/2024	74.8	19/10/2024	70.9	19/01/2025	73.9	19/04/2025	69.2
20/07/2024	109.8	20/10/2024	79.1	20/01/2025	67.1	20/04/2025	73.9

Date	Influent (m ³ /day)	Date (continued)	Influent (m ³ /day)	Date (continued)	Influent (m ³ /day)	Date (continued)	Influent (m ³ /day)
21/07/2024	109.1	21/10/2024	68.2	21/01/2025	65.7	21/04/2025	73.1
22/07/2024	87.9	22/10/2024	63.1	22/01/2025	72.4	22/04/2025	66.9
23/07/2024	78.3	23/10/2024	61.7	23/01/2025	72.5	23/04/2025	66.4
24/07/2024	70.7	24/10/2024	66.5	24/01/2025	61.9	24/04/2025	60.9
25/07/2024	70.9	25/10/2024	65.5	25/01/2025	78.7	25/04/2025	75.5
26/07/2024	67.2	26/10/2024	68.9	26/01/2025	74.2	26/04/2025	62.5
27/07/2024	75.7	27/10/2024	85.0	27/01/2025	85.3	27/04/2025	78.7
28/07/2024	76.9	28/10/2024	82.7	28/01/2025	66.0	28/04/2025	68.0
29/07/2024	68.4	29/10/2024	63.9	29/01/2025	60.9	29/04/2025	66.4
30/07/2024	85.0	30/10/2024	66.6	30/01/2025	64.5	30/04/2025	59.7
31/07/2024	75.3	31/10/2024	60.0	31/01/2025	55.5	1/05/2025	86.2
1/08/2024	98.0	1/11/2024	66.4	1/02/2025	74.7	2/05/2025	64.4
2/08/2024	78.5	2/11/2024	70.3	2/02/2025	79.5	3/05/2025	81.5
3/08/2024	82.0	3/11/2024	76.6	3/02/2025	20.0	4/05/2025	82.9
4/08/2024	81.4	4/11/2024	68.9	4/02/2025	62.4	5/05/2025	69.3
5/08/2024	69.9	5/11/2024	62.0	5/02/2025	61.5	6/05/2025	66.6
6/08/2024	66.6	6/11/2024	59.1	6/02/2025	75.0	7/05/2025	59.2
7/08/2024	60.8	7/11/2024	64.5	7/02/2025	67.8	8/05/2025	58.3
8/08/2024	67.0	8/11/2024	64.8	8/02/2025	75.3	9/05/2025	63.1
9/08/2024	58.8	9/11/2024	75.6	9/02/2025	76.3	10/05/2025	73.2
10/08/2024	80.4	10/11/2024	78.7	10/02/2025	69.6	11/05/2025	80.8

Date	Influent (m ³ /day)	Date (continued)	Influent (m ³ /day)	Date (continued)	Influent (m ³ /day)	Date (continued)	Influent (m ³ /day)
11/08/2024	82.3	11/11/2024	68.0	11/02/2025	59.5	12/05/2025	66.1
12/08/2024	60.2	12/11/2024	63.3	12/02/2025	62.3	13/05/2025	65.9
13/08/2024	68.4	13/11/2024	60.6	13/02/2025	61.9	14/05/2025	64.4
14/08/2024	62.3	14/11/2024	59.4	14/02/2025	63.4	15/05/2025	60.8
15/08/2024	58.1	15/11/2024	68.9	15/02/2025	71.8	16/05/2025	65.8
16/08/2024	60.4	16/11/2024	75.1	16/02/2025	69.0	17/05/2025	76.4
17/08/2024	83.3	17/11/2024	73.1	17/02/2025	63.3	18/05/2025	67.8
18/08/2024	98.0	18/11/2024	73.1	18/02/2025	64.4	19/05/2025	67.3
19/08/2024	85.6	19/11/2024	62.3	19/02/2025	55.1	20/05/2025	64.1
20/08/2024	83.1	20/11/2024	63.9	20/02/2025	65.9	21/05/2025	62.6
21/08/2024	76.0	21/11/2024	59.9	21/02/2025	64.4	22/05/2025	65.8
22/08/2024	73.1	22/11/2024	67.4	22/02/2025	73.5	23/05/2025	71.0
23/08/2024	56.2	23/11/2024	68.2	23/02/2025	72.2	24/05/2025	80.0
24/08/2024	78.9	24/11/2024	76.2	24/02/2025	56.4	25/05/2025	75.8
25/08/2024	87.1	25/11/2024	71.2	25/02/2025	60.6	26/05/2025	74.3
26/08/2024	68.7	26/11/2024	62.4	26/02/2025	59.1	27/05/2025	108.3
27/08/2024	68.0	27/11/2024	62.9	27/02/2025	64.9	28/05/2025	99.5
28/08/2024	63.8	28/11/2024	61.7	28/02/2025	59.9	29/05/2025	82.4
29/08/2024	72.5	29/11/2024	60.1	1/03/2025	70.0	30/05/2025	74.5
30/08/2024	86.1	30/11/2024	76.5	2/03/2025	73.8	31/05/2025	71.9
31/08/2024	102.6	1/12/2024	83.7	3/03/2025	62.4	1/06/2025	71.8

Date	Influent (m ³ /day)	Date (continued)	Influent (m ³ /day)	Date (continued)	Influent (m ³ /day)	Date (continued)	Influent (m ³ /day)
1/09/2024	106.4	2/12/2024	72.1	4/03/2025	58.9	2/06/2025	84.3
2/09/2024	88.8	3/12/2024	64.1	5/03/2025	58.1	3/06/2025	66.3
3/09/2024	69.1	4/12/2024	65.3	6/03/2025	58.0	4/06/2025	79.6
4/09/2024	61.3	5/12/2024	68.9	7/03/2025	64.4	5/06/2025	107.9
5/09/2024	72.7	6/12/2024	53.0	8/03/2025	64.6	6/06/2025	106.8
6/09/2024	60.8	7/12/2024	83.6	9/03/2025	78.2	7/06/2025	89.5
7/09/2024	73.1	8/12/2024	75.6	10/03/2025	63.6	8/06/2025	90.0
8/09/2024	74.8	9/12/2024	67.4	11/03/2025	53.8	9/06/2025	99.0
9/09/2024	71.3	10/12/2024	63.1	12/03/2025	58.5	10/06/2025	112.9
10/09/2024	58.0	11/12/2024	65.9	13/03/2025	58.1	11/06/2025	114.2
11/09/2024	64.2	12/12/2024	66.9	14/03/2025	66.5	12/06/2025	92.5
12/09/2024	61.7	13/12/2024	63.8	15/03/2025	70.6	13/06/2025	82.5
13/09/2024	60.9	14/12/2024	79.8	16/03/2025	76.3	14/06/2025	86.1
14/09/2024	61.3	15/12/2024	85.7	17/03/2025	56.7	15/06/2025	85.0
15/09/2024	74.9	16/12/2024	69.4	18/03/2025	52.8	16/06/2025	81.1
16/09/2024	70.9	17/12/2024	73.4	19/03/2025	60.3	17/06/2025	70.3
17/09/2024	64.4	18/12/2024	63.7	20/03/2025	66.0	18/06/2025	71.1
18/09/2024	63.3	19/12/2024	67.0	21/03/2025	64.6	19/06/2025	61.9
19/09/2024	63.8	20/12/2024	71.7	22/03/2025	74.2	20/06/2025	81.3
20/09/2024	87.6	21/12/2024	69.5	23/03/2025	75.3	21/06/2025	76.1
21/09/2024	92.4	22/12/2024	80.1	24/03/2025	61.2	22/06/2025	85.2

Date	Influent (m ³ /day)	Date (continued)	Influent (m ³ /day)	Date (continued)	Influent (m ³ /day)	Date (continued)	Influent (m ³ /day)
22/09/2024	91.2	23/12/2024	78.2	25/03/2025	60.6	23/06/2025	65.4
23/09/2024	68.5	24/12/2024	74.5	26/03/2025	57.2	24/06/2025	65.9
24/09/2024	64.4	25/12/2024	95.0	27/03/2025	49.8	25/06/2025	63.5
25/09/2024	65.5	26/12/2024	79.0	28/03/2025	67.9	26/06/2025	64.8
26/09/2024	65.8	27/12/2024	88.2	29/03/2025	62.8	27/06/2025	137.7
27/09/2024	59.5	28/12/2024	85.5	30/03/2025	74.4	28/06/2025	106.7
28/09/2024	81.6	29/12/2024	87.4	31/03/2025	59.1	29/06/2025	92.7
29/09/2024	67.5	30/12/2024	68.7			30/06/2025	85.7
30/09/2024	68.1	31/12/2024	65.7				

Effluent disposal field 1-4 daily volumes

Date	EDF 1 daily volume (m ³ /day)	EDF 2 daily volume (m ³ /day)	EDF 3 daily volume (m ³ /day)	EDF 4 daily volume (m ³ /day)
1/07/2024	37.45	8.35	9.37	30.15
2/07/2024	37.44	8.35	9.37	30.16
3/07/2024	37.44	8.33	9.38	30.16
4/07/2024	37.42	8.33	9.38	10.05
5/07/2024	37.43	8.33	9.37	10.05
6/07/2024	37.43	8.33	9.37	30.16
7/07/2024	37.43	8.31	9.39	30.16
8/07/2024	37.46	8.31	9.39	30.15
9/07/2024	37.46	8.34	9.36	30.15
10/07/2024	37.44	8.34	9.36	30.16
11/07/2024	37.44	8.32	9.38	30.16
12/07/2024	37.43	8.32	9.38	30.16
13/07/2024	37.43	8.32	9.38	30.16
14/07/2024	37.44	8.32	9.38	30.15
15/07/2024	37.44	8.33	9.39	30.15
16/07/2024	37.43	8.33	9.39	30.16
17/07/2024	37.43	8.33	9.39	30.16
18/07/2024	37.44	8.33	9.39	30.16
19/07/2024	37.44	8.32	9.40	30.16
20/07/2024	37.49	8.32	9.40	30.14

Date	EDF 1 daily volume (m ³ /day)	EDF 2 daily volume (m ³ /day)	EDF 3 daily volume (m ³ /day)	EDF 4 daily volume (m ³ /day)
21/07/2024	37.49	8.35	9.34	30.14
22/07/2024	37.47	8.35	9.34	30.15
23/07/2024	37.47	8.34	9.37	30.15
24/07/2024	37.46	8.34	9.37	30.14
25/07/2024	37.46	0.06	0.05	30.14
26/07/2024	37.43	0.06	0.05	30.17
27/07/2024	37.43	8.33	9.36	30.17
28/07/2024	37.43	8.33	9.36	30.16
29/07/2024	37.43	5.55	6.26	30.16
30/07/2024	37.44	5.55	6.26	30.16
31/07/2024	37.44	8.30	29.18	30.16
1/08/2024	37.44	8.30	29.18	30.18
2/08/2024	37.44	8.34	29.13	30.18
3/08/2024	37.45	8.34	29.13	30.17
4/08/2024	37.45	8.34	29.13	30.17
5/08/2024	37.44	8.34	29.13	30.18
6/08/2024	37.44	8.33	29.13	30.18
7/08/2024	37.44	8.33	29.13	30.19
8/08/2024	37.44	8.31	29.15	30.19
9/08/2024	37.46	8.31	29.15	30.18
10/08/2024	37.46	8.33	29.14	30.18

Date	EDF 1 daily volume (m ³ /day)	EDF 2 daily volume (m ³ /day)	EDF 3 daily volume (m ³ /day)	EDF 4 daily volume (m ³ /day)
11/08/2024	37.45	8.33	29.14	30.17
12/08/2024	37.45	8.35	29.12	30.17
13/08/2024	37.43	8.35	29.12	30.17
14/08/2024	37.43	0.00	19.77	30.17
15/08/2024	37.45	8.31	19.75	30.17
16/08/2024	37.45	8.31	29.14	30.17
17/08/2024	37.45	8.31	29.14	30.17
18/08/2024	37.45	8.34	19.75	30.17
19/08/2024	37.43	8.34	19.73	30.18
20/08/2024	37.42	8.33	33.95	30.18
21/08/2024	37.43	8.33	33.95	30.19
22/08/2024	37.44	8.31	19.88	30.19
23/08/2024	37.44	8.31	19.88	30.18
24/08/2024	37.44	8.34	33.46	30.18
25/08/2024	37.43	8.34	33.46	30.19
26/08/2024	37.43	8.32	44.73	30.19
27/08/2024	37.43	8.32	44.73	15.61
28/08/2024	37.43	8.35	33.00	15.61
29/08/2024	37.44	8.35	33.00	15.63
30/08/2024	37.44	8.32	44.75	15.63
31/08/2024	37.45	8.32	44.75	15.61

Date	EDF 1 daily volume (m ³ /day)	EDF 2 daily volume (m ³ /day)	EDF 3 daily volume (m ³ /day)	EDF 4 daily volume (m ³ /day)
1/09/2024	37.45	8.32	44.75	15.61
2/09/2024	37.45	8.32	44.75	15.62
3/09/2024	37.45	8.34	44.75	15.62
4/09/2024	37.46	8.34	44.75	15.60
5/09/2024	37.46	8.32	29.13	15.60
6/09/2024	37.47	8.32	29.13	15.61
7/09/2024	37.47	8.32	29.15	15.61
8/09/2024	37.43	8.32	29.15	5.19
9/09/2024	37.43	8.34	44.75	5.19
10/09/2024	37.43	8.34	44.75	15.61
11/09/2024	37.43	8.32	44.77	15.61
12/09/2024	37.44	8.32	44.77	15.62
13/09/2024	37.44	8.31	44.75	15.62
14/09/2024	37.44	8.31	44.75	15.60
15/09/2024	37.44	8.33	44.75	15.60
16/09/2024	37.43	8.33	44.75	10.42
17/09/2024	37.41	8.36	44.76	10.42
18/09/2024	37.45	8.36	44.76	15.62
19/09/2024	37.45	8.35	44.72	15.62
20/09/2024	37.44	8.35	44.72	15.61
21/09/2024	37.44	8.32	44.73	15.61

Date	EDF 1 daily volume (m ³ /day)	EDF 2 daily volume (m ³ /day)	EDF 3 daily volume (m ³ /day)	EDF 4 daily volume (m ³ /day)
22/09/2024	37.44	8.32	44.73	15.62
23/09/2024	37.44	8.34	44.74	15.62
24/09/2024	37.45	8.34	44.74	15.62
25/09/2024	37.45	8.33	44.75	15.62
26/09/2024	37.44	8.33	44.75	15.61
27/09/2024	37.44	8.32	44.75	15.61
28/09/2024	37.43	8.32	44.75	15.62
29/09/2024	37.43	8.33	44.76	15.62
30/09/2024	37.45	8.33	44.76	15.63
1/10/2024	37.45	8.32	44.76	15.63
2/10/2024	37.45	8.32	44.76	15.61
3/10/2024	37.45	8.33	44.75	15.61
4/10/2024	37.44	8.33	44.75	15.60
5/10/2024	37.44	8.32	44.74	15.60
6/10/2024	37.43	8.32	44.74	10.43
7/10/2024	37.44	8.33	44.75	10.43
8/10/2024	37.44	8.33	44.75	15.61
9/10/2024	37.44	8.32	44.75	15.61
10/10/2024	37.45	8.32	44.75	15.60
11/10/2024	37.47	8.33	44.74	15.60
12/10/2024	37.47	8.33	44.74	15.62

Date	EDF 1 daily volume (m ³ /day)	EDF 2 daily volume (m ³ /day)	EDF 3 daily volume (m ³ /day)	EDF 4 daily volume (m ³ /day)
13/10/2024	37.44	8.32	44.74	15.62
14/10/2024	37.43	8.32	44.74	15.61
15/10/2024	37.43	8.32	44.76	15.61
16/10/2024	37.42	8.32	44.76	15.62
17/10/2024	37.43	8.32	44.75	15.62
18/10/2024	37.46	8.32	44.75	15.61
19/10/2024	37.46	8.33	44.74	15.61
20/10/2024	37.45	8.33	44.74	15.59
21/10/2024	37.45	8.33	44.74	15.59
22/10/2024	37.44	8.33	44.74	15.60
23/10/2024	37.44	8.33	44.73	15.60
24/10/2024	37.44	8.33	44.73	15.61
25/10/2024	37.44	8.32	44.74	15.61
26/10/2024	37.44	8.32	44.74	15.61
27/10/2024	37.44	8.32	44.74	15.61
28/10/2024	37.44	8.32	44.74	15.62
29/10/2024	37.43	8.34	44.72	15.62
30/10/2024	37.43	8.34	44.72	15.61
31/10/2024	37.43	3.13	19.75	15.61
1/11/2024	55.11	3.13	25.98	19.78
2/11/2024	55.11	12.49	58.27	19.78

Date	EDF 1 daily volume (m ³ /day)	EDF 2 daily volume (m ³ /day)	EDF 3 daily volume (m ³ /day)	EDF 4 daily volume (m ³ /day)
3/11/2024	55.11	12.49	58.27	19.76
4/11/2024	55.11	12.48	58.28	19.76
5/11/2024	55.11	12.48	58.28	19.77
6/11/2024	55.10	12.48	58.27	19.77
7/11/2024	55.12	12.48	58.27	19.78
8/11/2024	55.12	12.48	58.26	19.78
9/11/2024	55.12	12.48	58.26	19.77
10/11/2024	55.12	12.49	58.25	19.77
11/11/2024	55.11	12.49	58.25	19.78
12/11/2024	55.11	0.76	25.98	19.78
13/11/2024	13.77	0.76	0.00	0.00
14/11/2024	0.00	0.00	0.00	0.00
15/11/2024	0.00	0.00	0.00	0.00
16/11/2024	55.07	12.51	58.26	0.00
17/11/2024	55.07	12.51	58.26	19.78
18/11/2024	37.46	0.00	25.99	19.78
19/11/2024	55.10	0.00	25.99	38.49
20/11/2024	55.11	12.47	58.26	38.49
21/11/2024	55.11	12.47	58.26	25.68
22/11/2024	27.55	0.00	17.32	25.68
23/11/2024	0.00	0.00	0.00	0.00

Date	EDF 1 daily volume (m ³ /day)	EDF 2 daily volume (m ³ /day)	EDF 3 daily volume (m ³ /day)	EDF 4 daily volume (m ³ /day)
24/11/2024	0.00	0.00	0.00	0.00
25/11/2024	55.11	0.00	26.00	38.50
26/11/2024	55.11	12.49	58.27	38.50
27/11/2024	55.11	12.49	58.27	38.50
28/11/2024	55.11	6.23	25.98	38.50
29/11/2024	27.59	6.23	24.61	0.00
30/11/2024	0.00	0.00	0.00	0.00
1/12/2024	55.11	0.00	25.98	38.50
2/12/2024	55.11	12.50	58.27	38.50
3/12/2024	55.11	12.50	58.27	38.51
4/12/2024	55.09	12.51	58.27	38.51
5/12/2024	55.06	12.51	58.27	38.51
6/12/2024	35.13	0.00	25.98	38.51
7/12/2024	0.00	0.00	0.00	0.00
8/12/2024	0.00	0.00	0.00	0.00
9/12/2024	0.00	0.00	0.00	0.00
10/12/2024	55.11	12.48	58.28	0.00
11/12/2024	55.11	12.48	58.28	0.00
12/12/2024	55.12	12.48	58.25	0.00
13/12/2024	55.12	12.48	58.25	38.51
14/12/2024	55.11	6.25	25.98	38.51

Date	EDF 1 daily volume (m ³ /day)	EDF 2 daily volume (m ³ /day)	EDF 3 daily volume (m ³ /day)	EDF 4 daily volume (m ³ /day)
15/12/2024	27.57	6.25	19.43	0.00
16/12/2024	0.00	0.00	0.00	0.00
17/12/2024	55.11	0.00	25.98	38.51
18/12/2024	55.11	9.40	44.33	38.51
19/12/2024	41.32	9.40	44.33	0.00
20/12/2024	55.10	12.48	58.29	0.00
21/12/2024	55.16	12.48	58.29	38.51
22/12/2024	55.16	9.38	58.27	38.51
23/12/2024	54.91	9.38	58.27	0.00
24/12/2024	0.00	0.00	0.00	0.00
25/12/2024	0.00	0.00	0.00	0.00
26/12/2024	55.10	12.48	58.26	38.49
27/12/2024	55.10	12.48	58.26	38.49
28/12/2024	13.79	3.13	11.65	0.00
29/12/2024	55.09	12.49	45.79	38.50
30/12/2024	55.09	12.49	56.40	38.50
31/12/2024	41.34	9.36	56.40	25.66
1/01/2025	0.00	0.00	0.00	0.00
2/01/2025	0.00	0.00	0.00	0.00
3/01/2025	55.09	12.50	58.26	38.49
4/01/2025	55.09	12.54	58.26	38.52

Date	EDF 1 daily volume (m ³ /day)	EDF 2 daily volume (m ³ /day)	EDF 3 daily volume (m ³ /day)	EDF 4 daily volume (m ³ /day)
5/01/2025	55.09	12.54	58.26	38.52
6/01/2025	55.09	10.26	58.26	38.50
7/01/2025	0.00	0.00	0.00	0.00
8/01/2025	55.10	12.49	45.77	38.49
9/01/2025	55.11	12.49	58.26	38.51
10/01/2025	55.11	12.48	58.26	38.51
11/01/2025	55.10	12.48	58.26	38.50
12/01/2025	51.97	9.38	58.26	38.50
13/01/2025	0.00	0.00	0.00	0.00
14/01/2025	0.00	0.00	0.00	0.00
15/01/2025	0.00	0.00	0.00	0.00
16/01/2025	55.10	12.50	45.77	38.50
17/01/2025	55.11	12.50	58.26	38.51
18/01/2025	55.11	12.49	58.26	38.51
19/01/2025	13.77	2.69	0.00	0.00
20/01/2025	0.00	0.00	0.00	0.00
21/01/2025	55.09	12.50	58.26	38.51
22/01/2025	55.09	12.50	58.26	38.51
23/01/2025	55.10	12.49	58.25	38.50
24/01/2025	55.14	12.49	58.25	38.50
25/01/2025	55.14	12.49	45.76	38.50

Date	EDF 1 daily volume (m ³ /day)	EDF 2 daily volume (m ³ /day)	EDF 3 daily volume (m ³ /day)	EDF 4 daily volume (m ³ /day)
26/01/2025	27.56	6.25	38.88	16.05
27/01/2025	0.00	0.00	0.00	0.00
28/01/2025	0.00	0.00	0.00	0.00
29/01/2025	55.10	12.49	58.27	38.48
30/01/2025	55.11	12.49	58.27	38.51
31/01/2025	55.11	12.48	58.19	38.51
1/02/2025	41.33	9.37	58.19	25.67
2/02/2025	0.00	0.00	0.00	0.00
3/02/2025	0.00	0.00	0.00	0.00
4/02/2025	55.10	12.49	58.25	38.50
5/02/2025	55.10	12.49	58.25	38.50
6/02/2025	53.81	9.37	45.75	38.50
7/02/2025	0.00	0.00	0.00	0.00
8/02/2025	0.00	0.00	0.00	0.00
9/02/2025	0.00	0.00	0.00	0.00
10/02/2025	55.09	12.48	58.28	38.50
11/02/2025	55.09	12.48	58.28	38.50
12/02/2025	55.09	12.48	58.26	38.50
13/02/2025	53.66	9.38	58.26	38.50
14/02/2025	0.00	0.00	0.00	0.00
15/02/2025	0.00	0.00	0.00	0.00

Date	EDF 1 daily volume (m ³ /day)	EDF 2 daily volume (m ³ /day)	EDF 3 daily volume (m ³ /day)	EDF 4 daily volume (m ³ /day)
16/02/2025	0.00	0.00	0.00	0.00
17/02/2025	55.11	12.49	45.78	38.49
18/02/2025	55.11	12.51	58.24	38.50
19/02/2025	55.11	12.51	58.24	38.50
20/02/2025	41.31	6.71	30.52	25.66
21/02/2025	0.00	0.00	0.00	0.00
22/02/2025	0.00	0.00	0.00	0.00
23/02/2025	0.00	0.00	0.00	0.00
24/02/2025	0.00	0.00	0.00	0.00
25/02/2025	0.00	0.00	0.00	0.00
26/02/2025	0.00	0.00	0.00	0.00
27/02/2025	0.00	0.00	0.00	0.00
28/02/2025	55.10	12.50	58.26	38.50
1/03/2025	55.11	12.50	58.26	38.50
2/03/2025	55.11	12.49	45.77	38.50
3/03/2025	27.52	6.25	38.85	18.83
4/03/2025	0.00	0.00	0.00	0.00
5/03/2025	0.00	0.00	0.00	0.00
6/03/2025	0.00	0.00	0.00	0.00
7/03/2025	0.00	0.00	0.00	0.00
8/03/2025	55.10	12.48	58.27	38.49

Date	EDF 1 daily volume (m ³ /day)	EDF 2 daily volume (m ³ /day)	EDF 3 daily volume (m ³ /day)	EDF 4 daily volume (m ³ /day)
9/03/2025	55.10	12.49	58.27	38.50
10/03/2025	55.09	12.49	45.78	38.50
11/03/2025	10.47	0.00	0.00	0.00
12/03/2025	0.00	0.00	0.00	0.00
13/03/2025	0.00	0.00	0.00	0.00
14/03/2025	0.00	0.00	0.00	0.00
15/03/2025	55.11	12.49	45.77	38.50
16/03/2025	55.12	12.49	58.27	38.50
17/03/2025	55.12	12.48	58.27	38.50
18/03/2025	47.24	9.37	45.77	38.50
19/03/2025	0.00	0.00	0.00	0.00
20/03/2025	0.00	0.00	0.00	0.00
21/03/2025	0.00	0.00	0.00	0.00
22/03/2025	0.00	0.00	0.00	0.00
23/03/2025	55.10	12.49	45.78	38.49
24/03/2025	55.11	12.49	58.26	38.49
25/03/2025	55.11	12.48	58.26	38.49
26/03/2025	14.14	3.12	15.26	12.84
27/03/2025	12.64	0.00	0.00	0.00
28/03/2025	0.00	0.00	0.00	0.00
29/03/2025	0.00	0.00	0.00	0.00

Date	EDF 1 daily volume (m ³ /day)	EDF 2 daily volume (m ³ /day)	EDF 3 daily volume (m ³ /day)	EDF 4 daily volume (m ³ /day)
30/03/2025	55.10	12.47	58.28	38.49
31/03/2025	55.10	12.47	58.28	38.51
1/04/2025	52.00	9.37	45.78	38.51
2/04/2025	0.00	0.00	0.00	0.00
3/04/2025	0.00	0.00	0.00	0.00
4/04/2025	55.10	12.49	45.80	38.50
5/04/2025	55.10	12.49	58.27	38.50
6/04/2025	55.10	12.49	58.27	38.50
7/04/2025	55.10	12.49	45.77	38.50
8/04/2025	13.79	0.02	0.00	0.00
9/04/2025	0.00	0.00	0.00	0.00
10/04/2025	0.00	0.00	0.00	0.00
11/04/2025	55.07	12.55	58.28	38.49
12/04/2025	55.10	12.55	58.28	38.49
13/04/2025	55.10	12.48	58.24	38.50
14/04/2025	46.30	9.39	58.24	38.50
15/04/2025	0.00	0.00	0.00	0.00
16/04/2025	0.00	0.00	0.00	0.00
17/04/2025	0.00	0.00	0.00	0.00
18/04/2025	55.12	12.48	45.76	38.50
19/04/2025	55.12	12.48	58.24	38.51

Date	EDF 1 daily volume (m ³ /day)	EDF 2 daily volume (m ³ /day)	EDF 3 daily volume (m ³ /day)	EDF 4 daily volume (m ³ /day)
20/04/2025	55.10	12.48	58.24	38.51
21/04/2025	13.78	2.09	0.00	0.00
22/04/2025	0.00	0.00	0.00	0.00
23/04/2025	0.00	0.00	0.00	0.00
24/04/2025	55.10	12.50	45.76	38.49
25/04/2025	55.11	12.50	58.26	38.50
26/04/2025	55.11	12.49	58.26	38.50
27/04/2025	25.67	3.12	15.26	12.84
28/04/2025	0.00	0.00	0.00	0.00
29/04/2025	55.10	12.49	58.25	38.51
30/04/2025	55.10	12.49	58.25	38.51
1/05/2025	37.43	8.34	44.74	30.16
2/05/2025	37.43	8.34	44.76	30.18
3/05/2025	37.43	8.34	44.76	30.18
4/05/2025	37.43	8.32	44.72	30.18
5/05/2025	12.84	2.78	14.93	10.06
6/05/2025	26.77	2.77	18.88	20.30
7/05/2025	26.77	2.77	18.88	20.30
8/05/2025	37.43	8.33	41.56	20.13
9/05/2025	37.43	8.33	41.56	20.13
10/05/2025	0.00	0.00	0.00	0.00

Date	EDF 1 daily volume (m ³ /day)	EDF 2 daily volume (m ³ /day)	EDF 3 daily volume (m ³ /day)	EDF 4 daily volume (m ³ /day)
11/05/2025	37.42	8.36	44.73	30.19
12/05/2025	37.42	8.36	44.73	30.19
13/05/2025	37.42	8.34	31.00	20.10
14/05/2025	0.00	0.00	0.00	0.00
15/05/2025	0.00	0.00	0.00	0.00
16/05/2025	37.39	8.34	44.74	30.17
17/05/2025	37.43	8.34	44.74	30.18
18/05/2025	37.43	8.33	44.73	30.18
19/05/2025	37.42	8.33	44.73	30.17
20/05/2025	12.50	2.57	0.00	0.00
21/05/2025	0.00	0.00	0.00	0.00
22/05/2025	37.40	8.33	44.73	30.18
23/05/2025	37.43	8.33	44.73	30.18
24/05/2025	37.43	8.34	44.73	30.18
25/05/2025	37.43	8.34	44.73	30.18
26/05/2025	37.37	8.32	44.73	22.83
27/05/2025	0.00	0.00	0.00	0.00
28/05/2025	37.44	8.32	44.73	30.18
29/05/2025	37.44	8.32	44.73	30.18
30/05/2025	37.44	8.33	44.74	30.19
31/05/2025	37.43	8.33	44.74	30.19

Date	EDF 1 daily volume (m ³ /day)	EDF 2 daily volume (m ³ /day)	EDF 3 daily volume (m ³ /day)	EDF 4 daily volume (m ³ /day)
1/06/2025	37.41	8.33	44.74	30.18
2/06/2025	12.48	2.21	0.00	0.00
3/06/2025	0.00	0.00	0.00	0.00
4/06/2025	37.43	8.31	44.71	30.18
5/06/2025	37.43	8.31	44.77	30.18
6/06/2025	37.43	8.32	44.77	30.18
7/06/2025	37.44	8.32	44.74	30.19
8/06/2025	37.44	8.32	44.74	30.19
9/06/2025	37.43	8.34	44.74	30.19
10/06/2025	37.42	8.34	44.74	30.18
11/06/2025	37.43	8.34	44.74	30.18
12/06/2025	37.43	8.34	44.74	30.19
13/06/2025	37.41	8.33	44.74	30.19
14/06/2025	24.02	2.78	14.95	10.06
15/06/2025	0.00	0.00	0.00	0.00
16/06/2025	37.44	8.31	44.77	30.18
17/06/2025	37.44	8.32	44.77	30.18
18/06/2025	37.43	8.33	44.76	30.18
19/06/2025	37.48	8.33	44.74	30.18
20/06/2025	37.48	8.32	44.74	30.18
21/06/2025	24.96	5.54	15.64	10.06

Date	EDF 1 daily volume (m ³ /day)	EDF 2 daily volume (m ³ /day)	EDF 3 daily volume (m ³ /day)	EDF 4 daily volume (m ³ /day)
22/06/2025	0.00	0.00	0.00	0.00
23/06/2025	0.00	0.00	0.00	0.00
24/06/2025	37.43	8.33	44.75	30.17
25/06/2025	37.43	8.33	44.75	30.18
26/06/2025	37.43	8.32	44.74	30.18
27/06/2025	37.42	8.35	44.72	30.18
28/06/2025	37.42	8.35	44.73	30.19
29/06/2025	37.43	8.33	44.73	30.19
30/06/2025	37.43	8.33	44.74	30.18

Effluent quality for 2024-2025

Date	cBOD ₅ mg/L	Total Calcium mg/L	Total Sodium mg/L	Total Magnesium mg/L	DRP (as P) mg/L	E. coli cfu/100mL	Faecal coliforms cfu/100mL	Nitrate (as N) mg/L	Ammoniacal N (as N) mg/L	pH mg/L	TSS mg/L
3/07/2024	0.83	17.00	69.00	4.40	6.64	1.60	1.60	10	0.40	7.40	3.20
10/07/2024	1.30	17.00	66.00	4.60	6.88	1.60	1.60	9	0.40	7.50	1.00
17/07/2024	1.20	15.00	71.00	4.60	6.51	1.60	1.60	8	0.40	7.40	1.00
24/07/2024	0.84	17.00	53.00	4.80	5.78	1.60	1.60	6	0.40	7.50	1.00
31/07/2024	1.60	17.00	68.00	4.70	6.60	1.60	1.60	8	0.40	7.40	2.00
7/08/2024	1.10	17.00	66.00	5.40	6.56	1.60	1.60	7	0.40	7.50	9.40
14/08/2024	1.10	16.00	74.00	4.80	6.25	1.60	1.60	8	0.40	7.50	1.80
21/08/2024	0.98	16.00	60.00	4.90	5.73	1.60	1.60	7	0.40	7.50	5.60
28/08/2024	1.50	17.00	69.00	4.80	7.20	1.60	1.60	7	0.40	7.50	4.20
4/09/2024	0.88	18.00	59.00	4.70	6.07	1.60	1.60	6	0.40	7.60	2.80
11/09/2024	0.79	16.00	68.00	4.70	6.65	1.60	1.60	7	0.03	7.60	1.00
18/09/2024	2.30	15.00	69.00	4.80	7.56	1.60	1.60	10	0.03	7.50	1.80
25/09/2024	0.93	17.00	67.00	5.40	6.45	1.70	1.70	4	0.03	7.50	1.00
2/10/2024	1.10	16.00	73.00	5.10	7.00	1.60	1.60	7	0.04	7.60	3.20
9/10/2024	0.85	18.00	74.00	5.30	4.35	1.60	1.60	7	0.03	7.60	5.60
16/10/2024	0.99	17.00	74.00	5.30	7.03	1.60	1.60	8	0.03	7.60	1.00
23/10/2024	1.50	18.00	84.00	6.10	7.25	1.60	1.60	9	0.03	7.50	1.00
30/10/2024	1.00	17.00	82.00	5.70	7.56	1.60	1.60	11	0.04	7.50	1.60
6/11/2024	1.00	19.00	82.00	6.10	7.40	1.70	1.70	15	0.05	7.40	3.00
13/11/2024	1.50	18.00	82.00	5.70	6.13	1.60	1.60	13	0.05	7.50	1.00

Date	cBOD ₅ mg/L	Total Calcium mg/L	Total Sodium mg/L	Total Magnesium mg/L	DRP (as P) mg/L	E. coli cfu/100mL	Faecal coliforms cfu/100mL	Nitrate (as N) mg/L	Ammoniacal N (as N) mg/L	pH mg/L	TSS mg/L
20/11/2024	1.50	15.00	68.00	5.30	8.09	1.60	1.60	12	0.04	7.60	1.00
27/11/2024	1.00	19.00	86.00	5.50	8.53	1.60	1.60	18	0.05	7.30	1.00
4/12/2024	1.60	17.00	79.00	5.10	5.61	1.60	3.30	11	0.31	7.60	1.00
11/12/2024	2.30	18.00	81.00	5.30	6.17	1.60	1.60	10	0.03	7.70	1.00
18/12/2024	1.20	18.00	83.00	4.50	2.93	1.60	1.60	9	0.04	7.70	1.00
24/12/2024	1.30	18.00	77.00	4.70	4.20	1.60	1.60	10	0.05	7.30	1.00
31/12/2024	1.60	17.00	96.00	4.10	0.06	1.60	1.60	12	0.06	7.60	2.60
8/01/2025	1.00	18.00	99.00	5.70	5.64	1.60	1.60	9	0.04	7.70	1.00
15/01/2025	0.94	23.00	100.00	8.00	11.10	1.60	1.60	12	0.10	7.40	1.00
22/01/2025	0.99	19.00	91.00	6.80	10.70	1.60	3.30	11	0.27	7.40	6.80
29/01/2025	1.00	19.00	87.00	5.90	3.89	6.60	6.60	9	0.19	7.60	1.00
5/02/2025	1.10	19.00	94.00	5.20	1.26	1.60	1.60	7	0.06	7.70	1.30
12/02/2025	1.50	19.00	99.00	5.10	3.51	1.60	1.60	8	0.04	7.70	1.20
19/02/2025	1.30	23.00	88.00	7.50	10.50	3.30	6.60	8	0.22	7.50	2.40
26/02/2025	1.40	19.00	82.00	6.70	8.28	4.90	6.60	5	0.21	7.70	2.00
5/03/2025	1.10	20.00	84.00	5.90	5.43	25.00	34.00	3	1.00	7.80	5.80
12/03/2025	1.20	19.00	85.00	5.30	2.08	20.00	25.00	4	0.20	7.70	2.80
19/03/2025	1.80	20.00	87.00	5.00	0.49	1.60	3.30	3	0.81	7.40	1.20
26/03/2025	0.50	20.00	92.00	5.80	4.63	6.60	15.00	0	0.61	7.20	1.40
2/04/2025	0.64	19.00	78.00	4.90	3.65	1.60	4.90	0	0.04	7.30	1.00
9/04/2025	0.60	20.00	71.00	4.40	0.23	6.60	13.00	5	0.18	7.20	3.20

Date	cBOD ₅ mg/L	Total Calcium mg/L	Total Sodium mg/L	Total Magnesium mg/L	DRP (as P) mg/L	E. coli cfu/100mL	Faecal coliforms cfu/100mL	Nitrate (as N) mg/L	Ammoniacal N (as N) mg/L	pH mg/L	TSS mg/L
16/04/2025	2.50	19.00	81.00	4.50	5.33	120.00	270.00	0	1.10	7.20	2.80
23/04/2025	0.99	21.00	81.00	4.80	7.60	260.00	330.00	0	1.00	7.30	1.00
30/04/2025	1.20	17.00	69.00	3.80	2.80	420.00	530.00	0	0.39	7.20	1.00
7/05/2025	1.10	18.00	74.00	4.20	2.05	72.00	88.00	0	0.39	7.20	1.00
14/05/2025	1.10	17.00	68.00	4.00	3.13	86.00	94.00	0	1.10	7.10	1.00
21/05/2025	0.60	16.00	74.00	3.50	0.55	15.00	18.00	1	0.48	7.20	1.00
28/05/2025	2.90	16.00	64.00	3.60	1.11	13.00	13.00	5	0.03	7.10	1.00
4/06/2025	0.50	18.00	76.00	5.20	6.89	42.00	70.00	0	0.32	7.20	1.40
11/06/2025	0.50	18.00	57.00	4.10	2.20	1.60	1.60	5	0.03	7.10	1.00
18/06/2025	0.63	19.00	64.00	4.30	3.65	1.60	1.60	7	0.04	7.10	1.40
25/06/2025	1.10	16.00	73.00	4.40	5.75	1.60	1.60	0	0.23	7.00	1.00

Rautawa Stream site 3 water quality monitoring results for 2024-2025

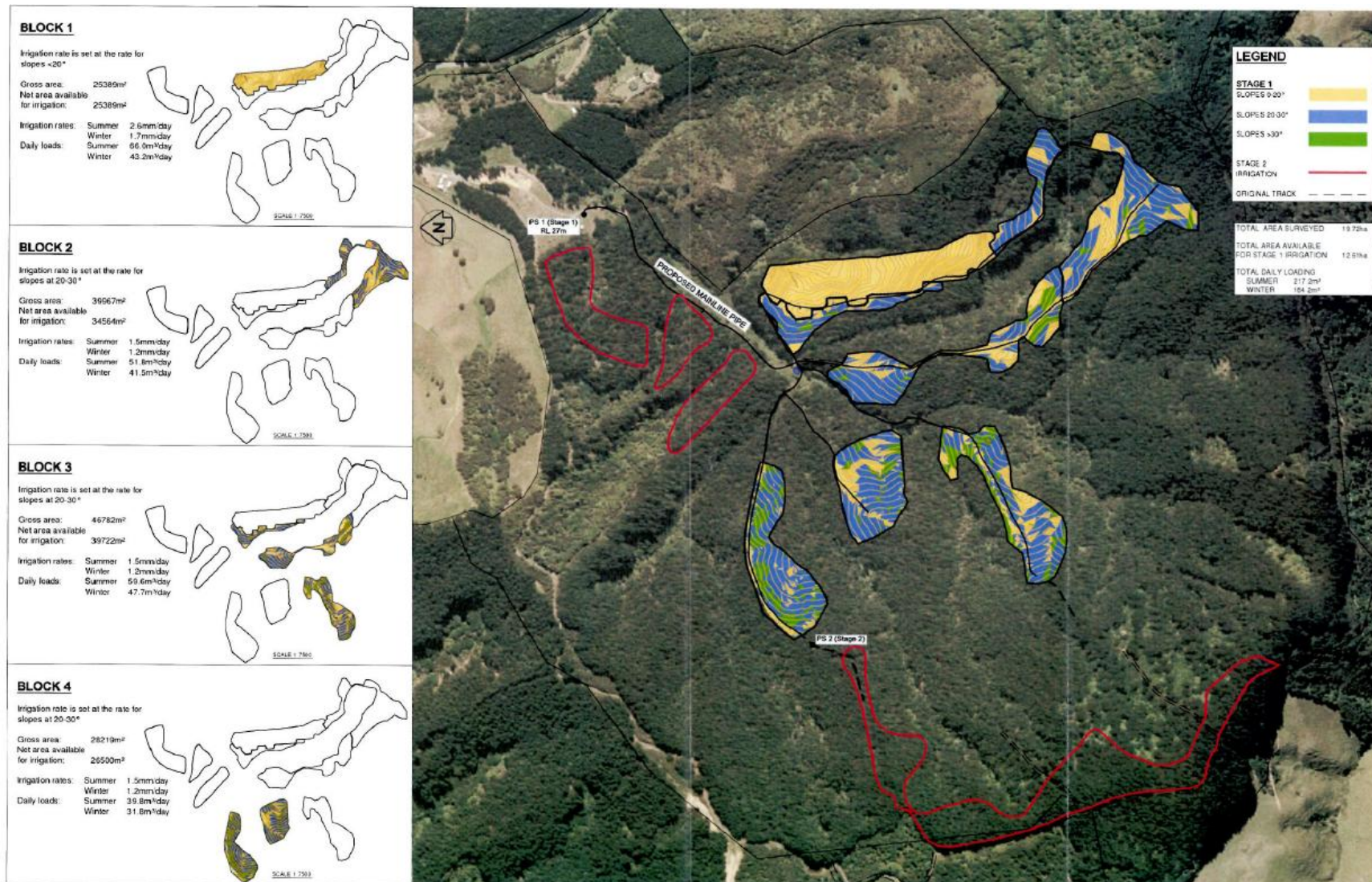
Date	cBOD ₅	DRP	<i>E. coli</i>	Faecal coliforms	NO ₂ -N	NO ₃ -N	NO _x -N	TKN	TN	NH _x -N	Total P	TSS	pH (lab)	pH (field)	Dissolved oxygen (field)	Temperature (field)
	mg/L	mg/L	cfu/100mL	cfu/100mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Unit	Unit	mg/L	°C
07/07/24	0.50	0.014	23	33	0.002	0.122	0.12	0.050	0.17	0.014	0.016	1.0	7.2	7.1	11.0	9.8
21/07/24	1.20	0.015	650	710	0.002	0.25	0.25	0.240	0.49	0.012	0.078	45.0	6.9	7.1	10.3	11.8
04/08/24	0.50	0.011	72	120	0.002	0.15	0.15	0.110	0.26	0.011	0.018	4.0	7.3	7.1	10.8	11.1
18/08/24	1.30	0.013	360	370	0.002	0.27	0.27	0.380	0.65	0.034	0.076	31.0	7.4	6.9	10.1	13.2
01/09/24	0.56	0.015	320	970	0.002	0.43	0.43	0.250	0.68	0.007	0.051	100.0	7.0	6.4	10.1	13.9
15/09/24	0.99	0.01	90	150	0.002	0.13	0.13	0.170	0.3	0.029	0.053	9.8	7.3	6.9	10.1	13.2
28/09/24	0.77	0.013	46	60	0.002	0.089	0.089	0.101	0.19	0.010	0.019	1.0	7.5	6.8	10.7	11.3
13/10/24	0.54	0.014	46	58	0.003	0.081	0.084	0.056	0.14	0.018	0.027	1.0	7.4	7.2	10.3	13.2
27/10/24	0.74	0.015	480	570	0.002	0.082	0.082	0.228	0.31	0.020	0.035	2.6	7.4	7.4	9.8	15.3
10/11/24	0.50	0.012	110	200	0.002	0.04	0.04	0.100	0.14	0.013	0.022	1.0	7.5	7.1	10.0	16.1
24/11/24	0.73	0.017	50	110	0.002	0.042	0.042	0.052	0.094	0.017	0.019	6.0	7.4	7.1	10.1	14.9
03/12/24	0.84	0.017	160	240	0.002	0.05	0.05	0.080	0.13	0.013	0.026	3.2	7.4	6.7	9.7	16.8
17/12/24	0.50	0.015	120	280	0.002	0.163	0.16	0.220	0.38	0.015	0.053	7.2	7.3	7.3	9.4	17.0
04/01/25	1.30	0.016	4800	5900	0.002	0.183	0.18	0.260	0.44	0.037	0.069	35.2	7.2	6.7	9.4	15.3
16/01/25	0.98	0.013	270	280	0.002	0.04	0.04	0.160	0.2	0.015	0.038	88.0	7.6	7.7	9.6	15.6
02/02/25	0.63	0.016	130	190	0.002	0.045	0.045	0.085	0.13	0.009	0.026	6.0	7.5	7.0	9.4	17.4
14/02/25	1.20	0.018	340	920	0.002	0.051	0.051	0.159	0.21	0.005	0.035	6.4	7.4	7.1	9.0	17.6
02/03/25	1.00	0.019	410	1900	0.002	0.039	0.039	0.221	0.26	0.005	0.065	35.8	7.6	7.5	9.8	18.4
16/03/25	0.50	0.021	150	230	0.002	0.054	0.054	0.326	0.38	0.015	0.049	4.4	7.5	7.5	9.9	16.7

Date	cBOD ₅	DRP	<i>E. coli</i>	Faecal coliforms	NO ₂ -N	NO ₃ -N	NO _x -N	TKN	TN	NH _x -N	Total P	TSS	pH (lab)	pH (field)	Dissolved oxygen (field)	Temperature (field)
	mg/L	mg/L	cfu/100mL	cfu/100mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Unit	Unit	mg/L	°C
30/03/25	0.50	0.016	100	200	0.002	0.062	0.062	0.098	0.16	0.005	0.042	13.0	7.4	7.1	9.3	15.0
08/04/25	0.65	0.02	1.6	6700	0.002	0.089	0.089	0.131	0.22	0.007	0.046	8.4	7.1	6.7	9.2	16.3
27/04/25	2.00	0.054	1400	23000	0.002	0.146	0.15	0.410	0.56	0.030	0.079	7.8	7.3	7.1	9.0	16.6
11/05/25	0.77	0.018	92	62	0.002	0.099	0.099	0.101	0.2	0.019	0.036	4.0	7.2	6.7	10.1	13.5
25/05/25	0.50	0.014	72	80	0.002	0.085	0.085	0.035	0.12	0.005	0.022	2.0	7.4	6.8	10.3	12.8
08/06/25	1.00	0.013	44	48	0.002	0.141	0.14	0.110	0.25	0.008	0.033	1.0	7.2	6.6	10.6	10.7
21/06/25	0.62	0.01	43	28	0.002	0.118	0.12	0.120	0.24	0.019	0.028	1.6	7.0	6.6	10.5	11.1

Rautawa Stream site 6 water quality monitoring results for 2024-2025

Date	Enterococci (cfu/100mL)	Faecal coliforms (cfu/100mL)	E. coli (cfu/100mL)
07/07/24	39	440	490
21/07/24	830	1,900	1,200
04/08/24	23	570	460
18/08/24	3,100	8,300	6,900
01/09/24	960	4,100	2,300
15/09/24	1,500	10,000	4,600
28/09/24	66	530	480
13/10/24	72	630	670
27/10/24	3,100	8,100	4,400
10/11/24	390	2,400	1,200
24/11/24	270	1,200	750
03/12/24	1,000	6,000	4,500
17/12/24	2,800	3,200	2,500
04/01/25	42,000	73,000	68,000
16/01/25	700	1,100	720
02/02/25	540	1,300	950
14/02/25	970	4,400	3,200
02/03/25	4,200	6,900	4,500
16/03/25	1,600	6,400	3,800
30/03/25	4,700	4,100	4,100
08/04/25	2,700	5,200	3,200
27/04/25	5,400	11,000	7,200
11/05/25	1,100	2,500	2,000
25/05/25	500	5,600	3,200
08/06/25	540	1,300	1,400
21/06/25	290	860	920

Appendix B. Effluent disposal field maps



Appendix C. Data Sources

Table 3-1: Download location of environmental monitoring data used in this report.

Category	Parameter	Source platform	Tag/ID
Rainfall	N/A	Hydrotel	N/A
Influent volume	N/A	Pi	DTKAW_21_FQ_010_VOLUMEDAY
Effluent volume	N/A	Pi	DTKAW_49_FQ_150_VOLUMEDAY
Irrigation volume	EDF 1	Pi	DTKAW_49_FQ_150_B1VOLDAY
Irrigation volume	EDF 2	Pi	DTKAW_49_FQ_150_B2VOLDAY
Irrigation volume	EDF 3	Pi	DTKAW_49_FQ_150_B3VOLDAY
Irrigation volume	EDF 4	Pi	DTKAW_49_FQ_150_B4VOLDAY
Effluent quality	E. Coli	Pi	DTKAW_52_15_FE_ECOLMTEC
Effluent quality	Faecal Coliforms	Pi	DTKAW_52_15_FE_FC
Effluent quality	Nitrate	Pi	DTKAW_52_15_FE_NO3
Effluent quality	Calcium (Total)	Pi	DTKAW_52_15_FE_Ca-tot
Effluent quality	DRP	Pi	DTKAW_52_15_FE_DRP
Effluent quality	Mg(Total)	Pi	DTKAW_52_15_FE_Mg-tot
Effluent quality	Na(Total)	Pi	DTKAW_52_15_FE_Na-tot
Effluent quality	pH	Pi	DTKAW_52_15_FE_pH
Effluent quality	NH3-N	Pi	DTKAW_52_15_FE_TNH3N
Rautawa Stream	Flow	Pi (or Hydrotel)	DTKAW_16_FT_311
Rautawa Stream	Site 3 quality	Pi	DTKAW_55_RAUTAWA_Site3_
Rautawa Stream	Site 6 quality	Pi	DTKAW_55_RAUTAWA_Site6_



Kawakawa Bay Wastewater Treatment Plant 2025 Stormwater Audit Report

Final - September 2025


QUALITY INFORMATION

Document	Annual Report
Date	30 September 2025
Name and position of originator	Emma Baker, Environmental Scientist
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REVISION HISTORY

Rev	Revision Date	Name	Position	Signature
1	24/09/2025	Michiel Jonker	Environmental Care Manager	
2	26/09/2025	Iris Tscharntke	Operations Controller	
3	29/09/2025	Jonathan Piggot	Head of Wastewater	

APPROVED

Date	Name	Position	Signature
29/09/2025	Michiel Jonker	Environmental Care Manager	

CONSENT CHANGE AND MONITORING HISTORY

Change type	Description	Effective date	Reference / condition	Reporting / monitoring implications
Reporting deadline	A variation of consent 30830 and other associated consents changed the annual performance reporting deadline from 31 May to 30 September.	6/12/2013	19	Annual reports, including the results of the stormwater audit, submitted to Auckland Council by 30 September annually.
Approved assessor	Chris Garton (WSL environmental scientist) approved as an assessor by Auckland Council.	2017	16	Annual audits completed by Chris Garton.
Approved assessor	Emma Baker (WSL environmental scientist) approved as an assessor by Auckland Council.	2017	16	Annual audits completed by Emma Baker.

EXECUTIVE SUMMARY

Resource consent DIS60262712 (30830) authorises the diversion and discharge of stormwater from the Kawakawa Bay Wastewater Treatment Plant. This consent also authorises the discharge of contaminants onto or into land or water from an industrial or trade process (the treatment plant).

This report has been prepared to meet the requirements under condition 16 which states:

That the site shall be audited on an annual basis by a professionally registered auditor, or an alternative assessor approved by the Manager, to assess compliance with the SWEMP and all other conditions of this consent.

The audit, conducted on 25 July 2025 by an approved assessor, found the site was fully compliant.

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1 INTRODUCTION

1.1 Background

Resource consent DIS60262712 (30830) authorises the diversion and discharge of stormwater from the Kawakawa Bay Wastewater Treatment Plant. This consent also authorises the discharge of contaminants onto or into land or water from an industrial or trade process (the treatment plant).

This report has been prepared to meet the requirements under condition 16 which states:

That the site shall be audited on an annual basis by a professionally registered auditor, or an alternative assessor approved by the Manager, to assess compliance with the SWEMP and all other conditions of this consent.

This audit was conducted by environmental scientist Emma Baker and senior environmental scientist Matt Conley. Approval for Emma to conduct the audit was granted in June 2022 by Dani Kleven from Auckland Council in their role as the Manager for this consent.

1.2 Approach

The audit occurred on Wednesday 25 July 2025. The method for this audit was the same as previous audits.

The inspection assessed the site facilities and operational procedures regarding the relevant conditions of consent DIS60262712, Appendices B2 and B3 of the Operations Management Plan, and as-built drawings 120722-SW100, 120722-SW113, and 120722-SW110-AB. The as-built drawings were used for referencing locations only. As-built compliance was confirmed in previous audits.

The main aspects of compliance audited were:

- The chemical storage facilities
- The emergency response plan and procedures
- The condition of stormwater pipe outlets
- The single cartridge stormwater filter
- The swales
- The dry storage pond.

2 AUDIT FINDINGS

2.1 Stormwater infrastructure overview

The stormwater infrastructure for the treatment plant comprises four engineered swales, one dry pond, and one single cartridge stormwater filter. Stormwater 360 installed the filter in 2009.

Three of the swales are adjacent to the road and run from the front gate to the treatment plant. The fourth swale was built around the western side of the treatment plant to divert surface flow from the adjacent hillslope around the plant rather than through it. Appendix A provides as-built drawings of the stormwater infrastructure.

2.2 Swales 1, 2 and 3

Figure 2-1a -c are photos of the stormwater swales. Previous audits have established that the stormwater infrastructure was constructed in general accordance with the as-built drawings (ITP audit, Babbington and Associates (2004) Ltd., 2012). Modifications to swales 2 and 3 were previously made to facilitate the flow of road runoff into the swales at the appropriate locations. No further design modifications have been made.

On the day of the audit, the swales were in good condition and have been maintained to a high standard.



A: Swale 1, looking downhill towards front gate



B: Swale 2, looking downhill towards front gate



C: Swale 3, looking downhill towards front gate

Figure 2-1: Swales for the Kawakawa Bay Wastewater Treatment Plant

2.3 Western swale drains

The western swale diverts runoff from the hill west of the treatment plant around the plant to two drains. These drains are on the northern and southern ends of the treatment plant and pipe the water under the road to outlets east of the treatment plant. Figure 2-2 includes photos of both drains.

The diversion reduces the volume of stormwater entering the treatment plant (see Appendix A for as-built drawings). On the day of the site visit, the swale drain appeared to be in good condition and was performing well. The proportion of bare earth remained similar to previous audits, keeping sediment levels entering the drains minimal. Additionally, the vegetation between the swales and the stream aims to further improve stormwater quality.



A: Drain and gate from northern aspect of western swale



B: Drain and grate from southern aspect of the western swale

Figure 2-2: Western swales for the Kawakawa Bay Wastewater Treatment Plant

2.4 Drain outflow culverts

The drain overflow culverts receive water from the western swale and the Stormwater 360 filter. The outlets in Figure 2-3a – Figure 2-3c show these culverts have been maintained to a high standard and were not overgrown or blocked.



A: Stormwater 360 cartridge outlet



B: Southern aspect of western swale outlet



C: Northern aspect of western swale

Figure 2-3: Drain outflow culverts at Kawakawa Bay Wastewater Treatment Plants

2.5 Dry pond and swale 4

Swale 4 and the dry pond receive flow from the treatment plant and the adjacent roads. This flow enters the roadside grates at the northern end of the treatment plant. The stormwater travels through swale 4 and into the dry pond. Swale 4 is a small swale at the mouth of the dry pond which provides initial filtering of the flow.

The pond is designed to temporarily store and attenuate stormwater during a rain event. The pond also provides water quality treatment through the process of extended detention. Between rain events this pond is normally dry. At the time of the audit, a small volume of water was in the pond. The discharge is piped to an overland flow path to the east of the plant.

During the audit, the dry pond and swale 4 were found to be in good condition and maintained to a high standard as seen in Figure 2-4 and Figure 2-5. The sides of the swale are steep, and the base is very soft. The condition of the vegetation in the swale and the dry pond was appropriate and would provide the desired filtering of stormwater.



Figure 2-4: Swale 4, looking away from dry storage pond



Figure 2-5: Dry storage pond

2.6 Stormwater filter cartridge

The stormwater cartridge is at the southern end of the treatment plant. Stormwater 360, who installed the cartridge, recommends biennial maintenance of the stormwater filter cartridge. On 25 July 2025, the filter’s associated infrastructure was in good condition and no cleaning or repairs were required. The most recent clean and inspection of the filter, prior to the 2025 audit, was undertaken on 14 June 2024.

2.7 Hazardous substances

During the audit, all the potentially environmentally harmful substances were being stored appropriately. The hazardous substances routinely stored onsite are diesel, molasses and citric acid.

The diesel is contained in a concrete bund in accordance with condition 9 of the resource consent. The bund was in good condition and all the rainwater release valves were closed. The molasses is kept in a tank on the gravel bed. These are shown in Figure 2-6. The banded sodium hypochlorite tank next to the membrane tank is only used when membranes are being cleaned and remains empty at all other times. This tank was empty on the day of the audit.



A: Diesel storage tank in concrete bund



B: Molasses tank

Figure 2-6: Hazardous substances tanks at Kawakawa Bay Wastewater Treatment Plant

In the workshop container at the southern end of the treatment plant, a moveable bund stores any remaining chemicals. Within the moveable bund, the chemicals are stored in separate trays for acids

and bases. At the time of the audit, there was 20 L of citric acid stored in a small bund within the main bund.

The emergency spill response kit is stored in a yellow wheelie bin inside the control room. This equipment, along with the two bags of sawdust, is inspected annually, with the last inspection on 9 May 2025 (Appendix B). Environmentally hazardous substances are checked weekly as part of the scheduled checks performed by staff onsite. Records of these inspections are kept in the weekly log sheets. Emergency spill response training procedures are in place with staff undertaking spill training exercises annually. Appendix B provides a copy of the most recent spill training exercise register.



A: Portable chemical bund in workshop container



B: Emergency spill kit in control room

Figure 2-7: Portable chemical bund and spill kit at Kawakawa Bay Wastewater Treatment Plant

3 CONSENT CONDITIONS REVIEW

3.1 Summary

The stormwater system at the Kawakawa Bay Wastewater Treatment Plant is being maintained to a high standard and observed to be operating well. The swales, dry pond and their culverts were all maintained adequately. The western swale is functioning well, with a low level of sediment entering the drains and stream. Any sediment that may enter the drains is unlikely to enter the stream due to the vegetation between the two which aims to improve the stormwater quality.

The environmentally hazardous chemicals were being stored appropriately, and the spill kit was fully stocked and available for use in the event of an emergency.

Section 3.2 is a condition-by-condition comparison. The site was fully compliant with the conditions of consent DIS60262712.

3.2 Consent compliance

3.2.1 Compliance criteria

Grading	Explanation
NA	Not applicable
NE	The consent condition has not been exercised
NI	The consent conditions was not assessed or inspected
Category 1	The consent condition has been complied with
Category 2 - Minor	The consent condition has not been complied with as per the following categories: 2A - Information Self-monitoring or one-off information is incomplete or outstanding 2B - Technical The item has not been constructed, maintained or operated correctly 2C - Combination of 2A and 2B
Category 3 - Moderate	The consent has not been complied with by one or both of the following: - Potential or adverse effect on the environment - Repeat Category 2 non-compliance
Category 4 - Major	The consent has not been complied with by one or both of the following: - Potential or adverse effect on the environment - Repeat Category 3 non-compliance

3.3 Consent conditions and compliance

Number	Condition	Grade	Comment/Action required
1	That the servants or agents of the Council shall be permitted access to the relevant parts of the property at all reasonable times for the purpose of carrying out inspections, surveys, investigations, tests, measurements or taking samples.	1	
2	That the Consent Holder shall design, build and operate the plant and associated processes in accordance with the documentation submitted to the Council as part of application number 30830, where not amended by the conditions of this resource consent. No alterations shall be made to the plant or processes that do not, or are not likely to, comply with the provisions of this consent, a regional rule, or regulations under the Resource Management Act 1991.	1	
3	<p>That the final design of the stormwater management system shall be submitted to the Manager for written approval prior to the commencement of construction works. The final design shall be in accordance with Application Number 30830 and as shown on the Harrison Grierson Consultants Limited plans and calculations received 20 November and 27 November 2006. The final design details shall include, but not be limited to:</p> <ul style="list-style-type: none"> i) An assessment of downstream receiving environment in relation to flood levels within the catchment during a 100 Year ARI rainfall event; ii) Treatment efficiency calculations; iii) Flow attenuation calculations; iv) Flood calculations, overland flow paths; v) Design drawings, inlet, outlet, long section and cross sections; vi) Catchment plans detailing the area draining to the devices; and vii) Outfall locations and design in accordance with TP10. 	1	
4	<p>That the Consent Holder shall construct the stormwater management system as shown in documentation approved under Condition 3. Any amendments that may affect capacity of performance of the stormwater management system shall be approved by the Manager in writing, prior to construction.</p> <p>In particular, this requires that the following stormwater management works are constructed for the following catchment areas and design standards (as defined by TP10 and TP108)</p>	1	

Number	Condition	Grade	Comment/Action required
	<p>Works Access Road and Treatment Plant.</p> <p>Catchment area- impervious 3900m2</p> <p>Catchment area- pervious</p> <p>Design Standard 75% TSS removal</p> <p>2 and 10 Year ARI peak flow attenuation to predevelopment levels.</p> <p>Extended detention of the 34.5mm rainfall event.</p>		
5	That notwithstanding Conditions 3 and 4 the Consent Holder shall ensure that the stormwater management system is constructed and maintained so as to minimise erosion, risk of obstruction of the waterway and hazards to safety.	1	
6	That the Consent Holder or their agent shall arrange and conduct a preconstruction site meeting between ARC and all relevant parties, including the site stormwater engineer, with regard to the stormwater management works for the site, prior to the construction of any infrastructure works on the site. Any resulting amendments to the stormwater management system may be reviewed by the ARC at the time and may be approved in accordance with Condition 3 and 4 above.	NA	
7	That the Consent Holder shall ensure that all storage containers on site shall be covered to prevent rainwater entry.	1	
8	That the Consent Holder shall ensure that all waste compactors and bins shall be located and operated in such a manner as to prevent leachate/wastes from leaking from the bins and entering the stormwater system.	1	
9	<p>That the Consent Holder shall ensure that all environmentally hazardous substances shall be stored in a manner that prevents the entry of rainwater into the container, and when the quantity exceeds that used for domestic purposes, in a secondary containment device (such as a bund) where:</p> <p>i) The device is constructed of impervious materials that are resistant to chemical attack from the substances contained therein;</p> <p>ii) The device is designed, constructed and managed so that uncontaminated stormwater runoff is prevented from flowing into the contained area;</p>	1	<p>The diesel container is sealed to the outside atmosphere. The chemicals in the storage container bund are stored in sealed appropriate containers and it is not possible for rain to enter the bund.</p> <p>Emergency spill response procedures are in place, training is conducted with all</p>

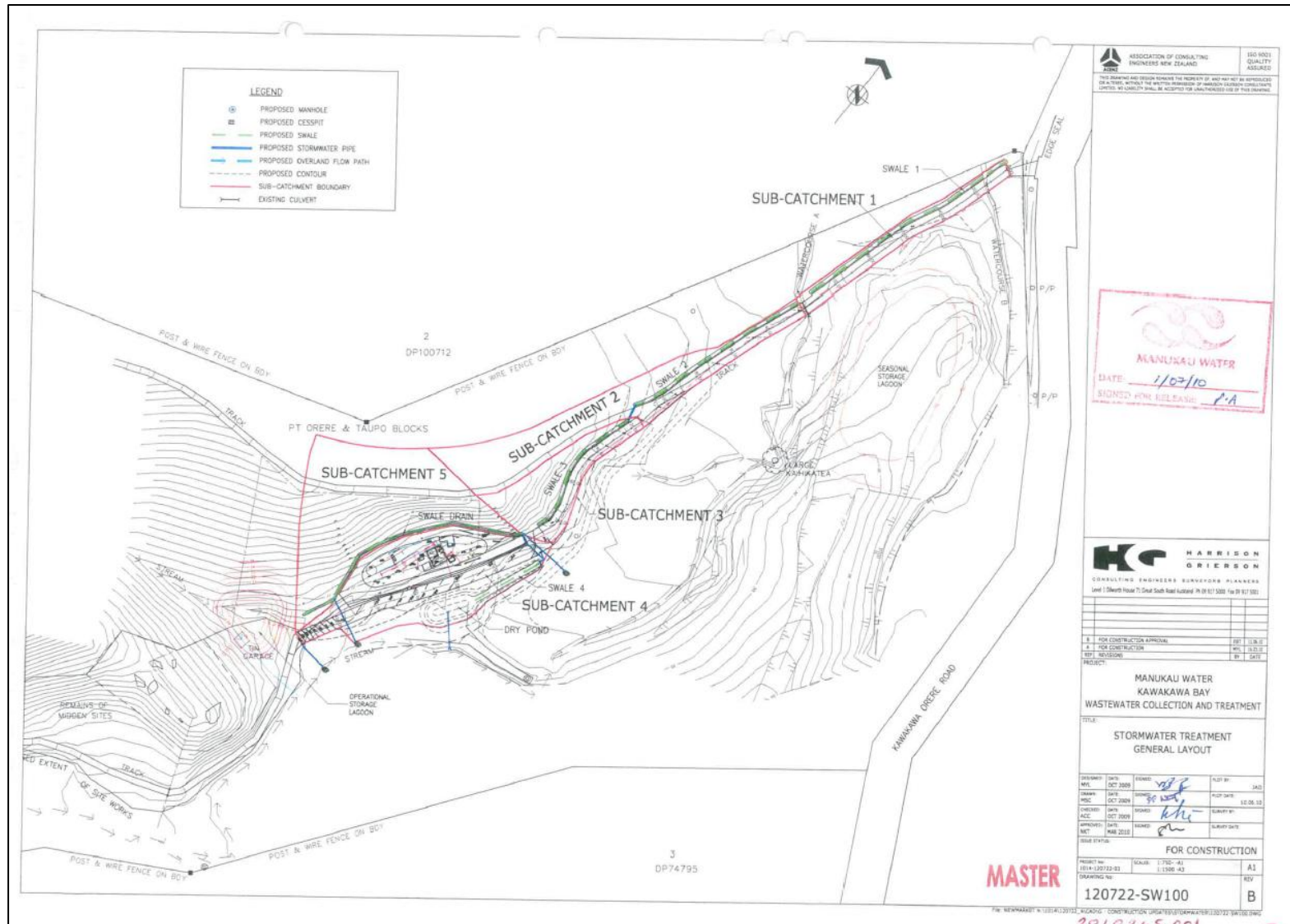
Number	Condition	Grade	Comment/Action required
	<p>iii) There shall be a mechanism/protocol for determining, prior to draining, if any fluid collected in the containment device is contaminated; and</p> <p>iv) In the event of a leak or spill within the containment device, a procedure shall be prepared to dispose of all contaminated water and leaked product.</p>		relevant staff members on an annual basis, and the spill kit is fully checked every 12 months.
10	That the Consent Holder shall ensure that all on-site vehicle refuelling facilities with a total storage capacity of greater than 5000 litres shall be contained and housed under cover, and/or surrounded by a drain that drains to an appropriately designed and sized stormwater treatment and spill containment device fitted with a shut-off valve.	NA	No storage greater than 5,000 m ³ .
11	That the Consent Holder shall ensure that the site is operated and managed in accordance with all components of the Stormwater Environmental Management Plan (SWEMP) as specified in Condition 21	1	
12	That the Consent Holder shall ensure that all spills are stopped, contained and cleaned up as soon as practicable in accordance with the procedures detailed in the Emergency Spill Response Plan required by Condition 20.	1	There were no spills in the previous year.
13	That the Consent Holder shall at all times operate, maintain, supervise, monitor and control all processes on site so that discharges authorised by this consent are maintained at the minimum practicable level.	1	Equipment in sound working condition.
14	That the Consent Holder shall ensure that any discharge of contaminants onto or into land from the activity is avoided, remedied or mitigated to ensure no contaminants from the site in the soil or runoff are present at a concentration that is, or is likely to be, detrimental to human health or the environment.	1	The stormwater system was operating as designed.
15	That the Consent Holder shall ensure that, for stormwater flows in excess of the capacity of the primary systems, secondary flow paths shall be provided and maintained to allow surplus stormwater from critical storms, up to the 100 year ARI event, to discharge with the minimum of nuisance and damage.	1	
16	That the site shall be audited on an annual basis by a professionally registered environmental auditor, or an alternative assessor approved by the Manager, to assess compliance with the SWEMP and all other conditions of this consent.	1	Audit carried out in July 2025 by an approved assessor.
17	Where the audit required by Condition 16 results in satisfactory compliance for three consecutive years, the audit requirement will change to a biennial basis. In the event of non-compliance at any time with the conditions specified in this consent the audit shall revert back to an annual basis.	1	Full compliance achieved for more than three consecutive years. However, stormwater audits will continue on an annual basis.

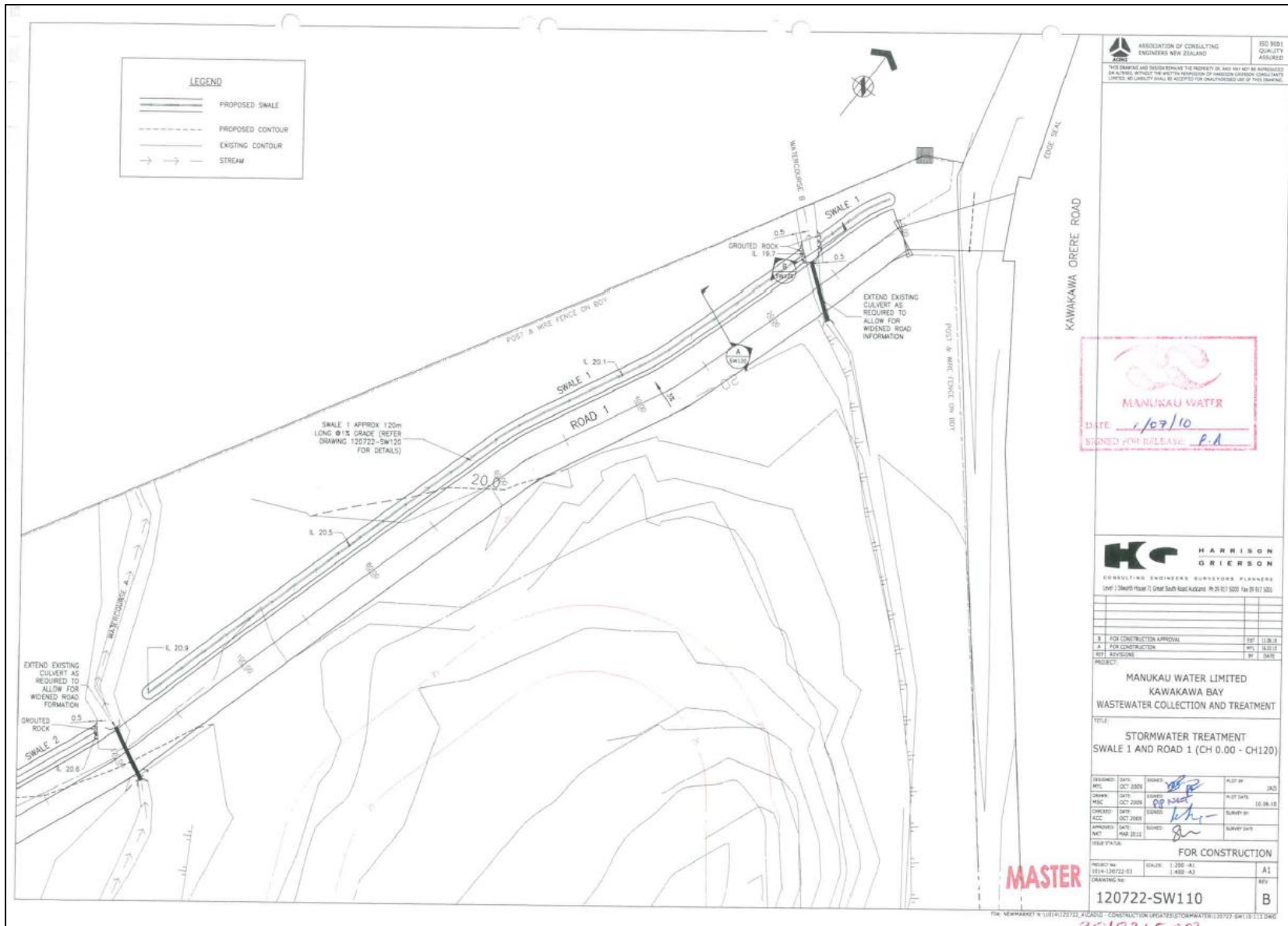
Number	Condition	Grade	Comment/Action required
18	All information required under this consent will be consistent with the requirements of Consent 30833 and in particular the requirements within the Operations Management Plan of Consent 30833. Further, all Plans required under this consent will be included as an appendix to the Operations Management Plan as required by Consent 30833.	1	All plans are present as appendices to the Operations Management Plan.
19	That an annual Performance Report detailing and summarising the plant performance and consent compliance and with the SWEMP shall be submitted to the Manager every by 31 May each year. The report will be consistent with that required in the Operations Management Plan. This checklist forms part of this report.	1	Annual Performance Reports are now submitted by the 30 th of September as approved by Auckland Council in December 2013. The Performance Report has been submitted on time.
20	<p>That the Consent Holder shall ensure that an Emergency Spill Response Plan (ESRP) shall be developed. This Plan will be an appendix to the Operations Management Plan as required by Consent 33143 and shall include:</p> <ul style="list-style-type: none"> i) A schedule of inspection to ensure environmentally hazardous ii) Protocols/methods for identifying and stopping any discharge and ensuring that future events of this nature do not occur; iii) Emergency containment and clean-up procedures; iv) Appropriate spill kits to allow containment and/or absorption of spilled material and the identification of their locations; v) Appropriate signage to identify the location of spill kits and the actions to be taken in the event of a spill; vi) Action to minimise any adverse effects on the environment, public health and safety, including action to take if the spilled material has reached any public stormwater system and/or any waterbody; vii) Methods for disposal of spilled materials and any other contaminated materials used in the spill clean-up; viii) Training of personnel in adequate identification of materials and correct operating procedures to avoid or minimise the likelihood of spills; ix) Up-to-date and accurate copies of all site drainage plans showing location of the final discharge point of the site stormwater system to any public stormwater system and/or any watercourse; x) A procedure for notifying as soon as practicable the ARC’s 24 hour emergency response service in the event of any spill on site that results in contamination of any stormwater system, waterbody, or into land; 	1	

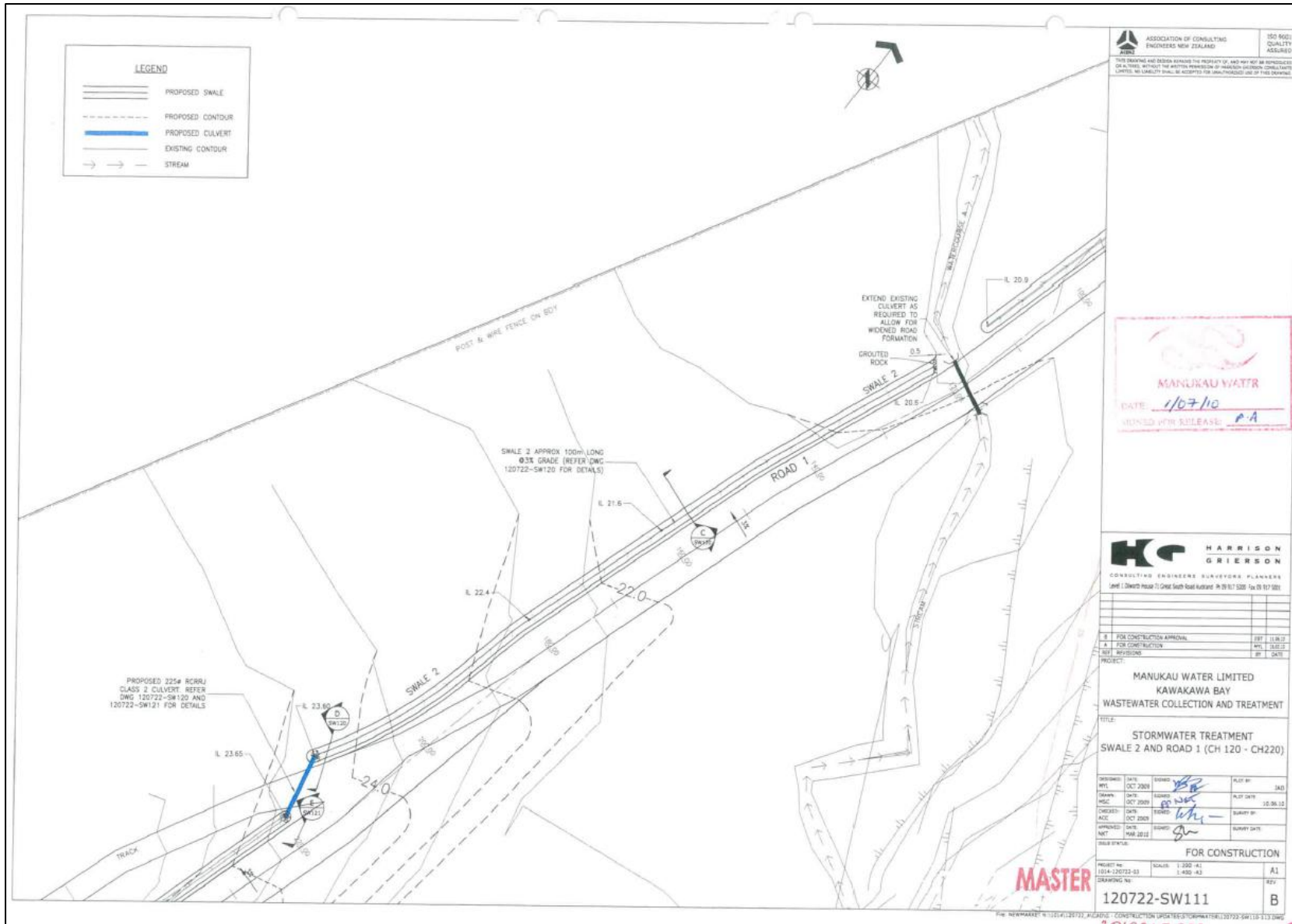
Number	Condition	Grade	Comment/Action required
	<ul style="list-style-type: none"> xi) A procedure to ensure that all spill kits and spill response equipment are inspected and maintained fully stocked and in good working condition, and xii) A procedure for reviewing and revising, where necessary, the spill response plan, particularly after a spill or emergency situation, to prevent a recurrence. 		
21	<p>That the Consent Holder shall ensure that a Stormwater Environmental Management Plan (SWEMP) is submitted to the Manager for review. The Manager will advise the Consent Holder in writing if any aspects of the SWEMP are considered to be inconsistent with this consent.</p> <ul style="list-style-type: none"> i) The identification of the specific activities and contaminants associated with the industrial or trade processes on-site that have the potential to adversely impact the receiving environment; ii) Documented procedures and methods to be used to manage the environmental risk from these activities and to ensure that the contaminants identified avoid contacting stormwater runoff. These should include but not be limited to; <ul style="list-style-type: none"> a) The operation and maintenance of all environmentally hazardous substance storage facilities and compounds in accordance with Condition 9. b) An Emergency Spill Response Plan in accordance with Condition 20. c) The methods, procedures and frequencies for undertaking periodic testing of the Emergency Spill Response Plan (at least twice per annum) and recording the performance and outcomes from this testing. d) The identification of staff training needs and the establishment of appropriate staff induction and training procedures. e) Procedures and methods to be used to manage the environmental risk associated with the activities of any contractors working on the site. iii) An Operation and Maintenance Plan for the site’s stormwater system, which shall be submitted to the Manager for written approval within 30 days of the completion of the installation of the stormwater management system. The Operation and Maintenance Plan shall include, but not be limited to: <ul style="list-style-type: none"> a) Operational details and maintenance requirements for all components of the site’s stormwater system including all swales, the pond and outfall structures under typical and storm flow conditions; b) Frequency of regular and one-off (e.g. post storm) maintenance and inspections; c) General inspection checklists for all aspects of the stormwater system; d) Details of the person or body who will hold responsibility for the on-going operation, maintenance and monitoring of the stormwater system and the organisational structure which will support this process. iv) Staff responsibilities for all procedures and methods contained within the SWEMP; 	1	<p>The storm filter cartridge is maintained on a biennial basis as of 2019. Next service is due 2026.</p>

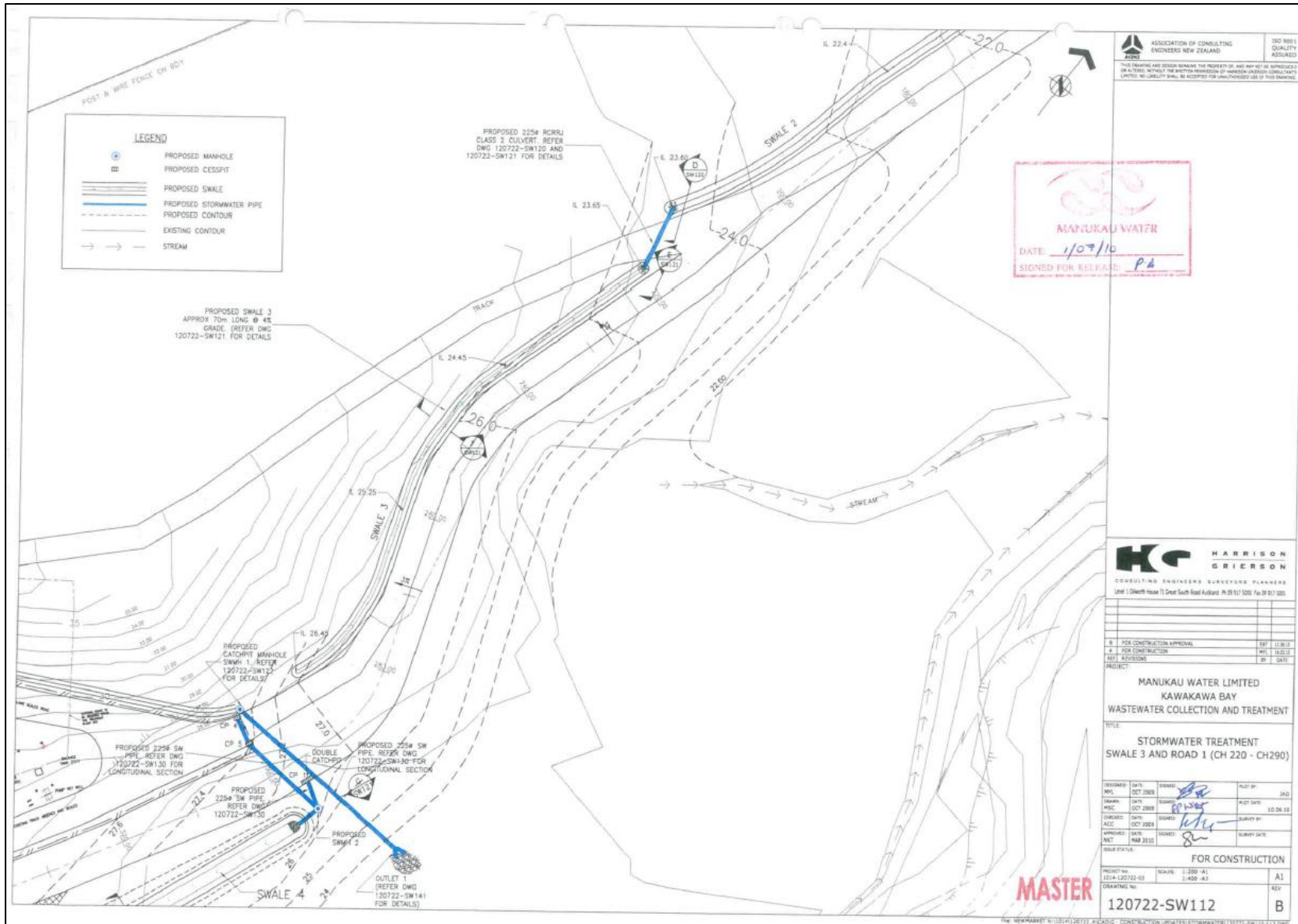
Number	Condition	Grade	Comment/Action required
	<ul style="list-style-type: none"> v) Appropriate internal site auditing requirements to ensure performance of all components of the SWEMP; vi) A method by which the SWEMP is reviewed by management to ensure its continuing suitability, adequacy and effectiveness; and vii) Reporting procedures and frequencies for all aspects of performance of site environmental management. 		
22	That the conditions of this consent may be reviewed by the Manager, pursuant to Section 128 of the Resource Management Act 1991, by the giving of notice pursuant to Section 129 of the Act in June 2008 and every two years thereafter.	NA	

Appendix A. Site as-built drawings

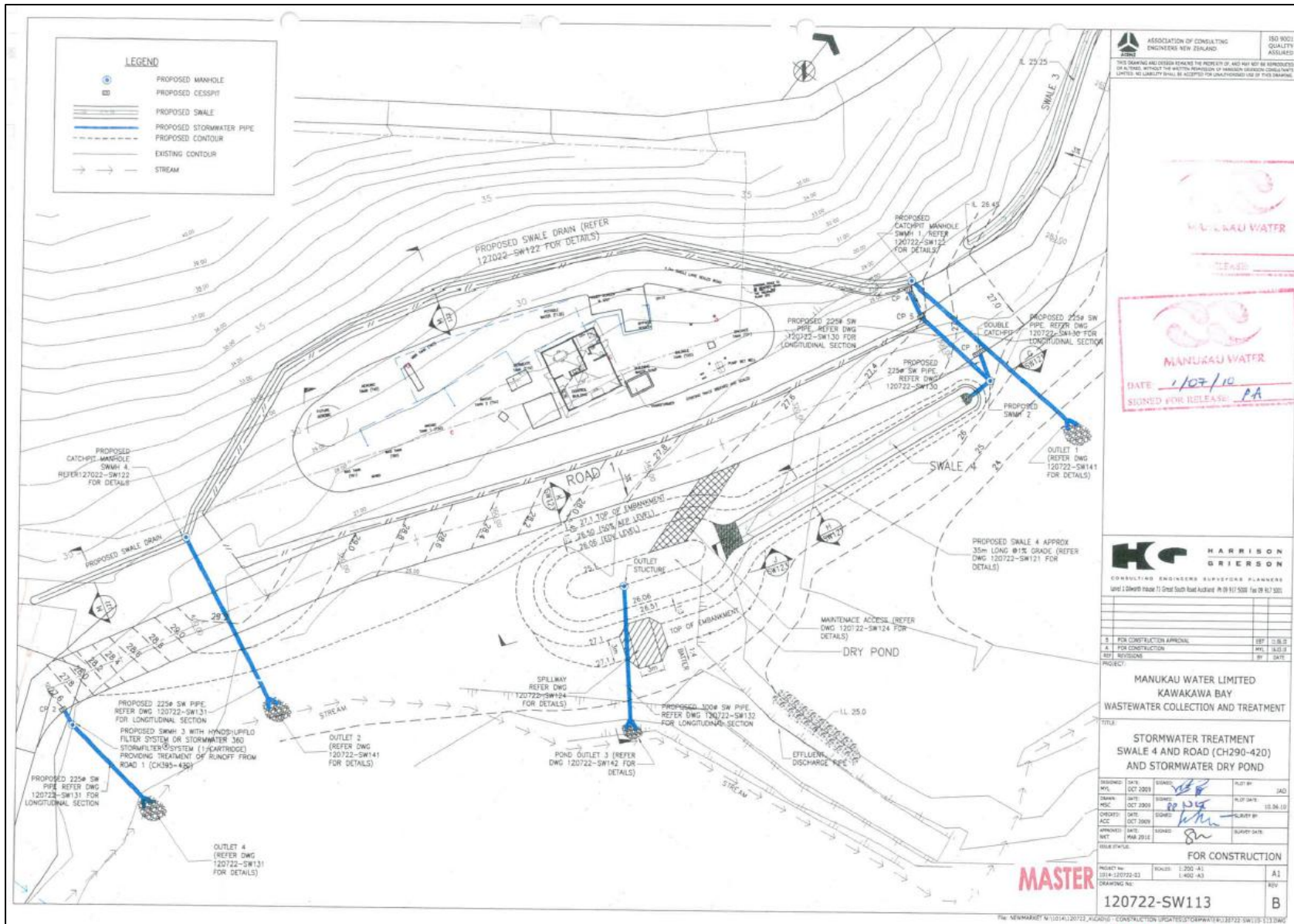








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<p>PROJECT: MANUKAU WATER LIMITED KAWAKAWA BAY WASTEWATER COLLECTION AND TREATMENT</p> <p>TITLE: STORMWATER TREATMENT SWALE 3 AND ROAD 1 (CH 220 - CH290)</p>														
DESIGNED BY:	DATE:	SCALE:												
MDL	OCT 2009	AS SHOWN												
CHECKED BY:	DATE:	SCALE:												
MLC	OCT 2009	AS SHOWN												
APPROVED BY:	DATE:	SCALE:												
ALC	OCT 2009	AS SHOWN												
APPROVED BY:	DATE:	SCALE:												
NCT	MAR 2010	AS SHOWN												
<p>STATUS: FOR CONSTRUCTION</p> <p>PROJECT No: 120722-SW112 DRAWING No: 120722-SW112</p> <p>REV: B</p>														



Appendix B. Emergency spill response training register and spill kit inspection

		Training file No.	
Training register			
Project name	Chemical Spill/ERP	Project No.	
Equipment / Plant/ section covered by training			
Attendance register			
Name	Signature	Name	Signature
Vijay Vinod			
Surya Maralaxari			
J. CINCO			
Sanjay Reddy			
Lasanthi J			
Ash.k.			
Training references material		Training completed	
		Training Provider	
		ini T.	
		Date	
		19/6/2025	

8. SPILL KIT - ANNUAL INSPECTION CHECKLIST

SPILL KIT ANNUAL INSPECTION CHECKLIST		
Date Inspected: 9/05/2025		
Location: DT KAW		
	Quantity needed	Quantity in kit
SPILL KIT	1	1
Wheelie bin	1	1
Absorbent mat	20	✓
Absorbent sock	6	2
Rubber mat	At least 3	—
Brush & shovel	1	1
XXL chemical suit	2	1 XXL & 1 XL
Chemical gloves	1 pair	✓
Face Shield	1	✓
Goggles	1	✓
Half mask with filter	1	✓
Rubbish bags	4	✓
Cones	6	4
Barrier tape	1	✓
<p>Name: <i>Lasantha</i> Signature: <i>ML</i></p> <p>Verify all stock is up to date. Out of date stock should be removed and discarded. Replacement of used items to be done immediately after the inspection or usage.</p>		

Appendix C. Compliance assessment

Table 4-2: Assessment of compliance with consent conditions - discharge to air (#30829)

Condition Number	Consent Condition Kawakawa Bay Discharge to Air (#30829)	Compliance Rating	Comments
01	ARC agents may access the property at reasonable times to carry out inspections, surveys, tests, or measurements, or to take samples.	1	Compliant. Most recent inspection undertaken on 29 May 2024.
02	Consent Holder shall design, build and operate the plant and associated processes in accordance with the documentation submitted to the Council as part of application number 30829, where not amended by the conditions of this resource consent. No alterations shall be made to the plant or processes that do not, or are not likely to, comply with the provisions of this consent, a regional rule, or regulations under the RMA 1991.	1	Completed and confirmed by OMP.
03	Consent Holder shall ensure that the design, construction and operation of all plant and processes undertaken on site shall be in accordance with currently recognised good practice for wastewater treatment plants. In particular, the design of the plant shall ensure compliance with the provisions of this consent. Furthermore, the plant shall be designed and constructed so as to ensure that discharges of contaminants to air, in particular odour, are kept to a practicable minimum.	1	Completed and confirmed by OMP.
04	All operations which have the potential for dust emissions, including construction activities, shall be carried out in a manner which ensures that dust emissions are generally maintained at the minimum practicable level. Without limiting the generality of this condition, the Consent Holder shall suppress dust emissions by the application of water whenever weather conditions and activities are such that significant visible dust emissions may or do occur.	1	Ongoing.
05	Except during maintenance, cleaning, or other inspections, the inlet screens, and sludge storage tanks shall be kept closed to ensure fugitive discharges to atmosphere are kept to a minimum practicable level.	1	Ongoing.
06	Consent Holder shall maintain and operate the balance tanks so as to ensure that anaerobic conditions do not develop within the balance tanks. The balance tanks shall be kept closed, except during maintenance, cleaning or other inspections, to ensure fugitive discharges are kept to a minimum practicable level.	1	Ongoing.
07	All emissions control equipment shall be maintained in good working condition and shall be operating whenever the relevant part of the process is operating.	1	Ongoing.
08	All ducting and emissions control equipment shall be maintained in good condition and be free from leaks in order to prevent fugitive discharges to atmosphere.	1	Ongoing.
09	All relevant fans and ducting to air emission control equipment shall draw sufficient negative pressure to ensure that fugitive emissions are kept to a practicable minimum.	1	Ongoing.

Condition Number	Consent Condition Kawakawa Bay Discharge to Air (#30829)	Compliance Rating	Comments
10	The aeration pumps for the aerobic tanks shall draw sufficient air from the inlet screen enclosure to prevent the discharge of odour into air from this enclosure.	NE	Ongoing.
11	Screenings shall be disposed of off site to an appropriately authorised facility.	1	Disposed of at landfill.
12	No solid or liquid waste materials shall be disposed of on the site by open burning.	1	Compliant.
13	Consent Holder shall give consideration to wind direction and the proximity of neighbouring properties prior to undertaking any potentially odorous activities on the site.	1	Ongoing.
14	All sludge removal from the sludge storage tanks shall be carried out in a manner that minimises odour.	1	Ongoing using sucker truck and hoses.
15	Consent Holder shall at all times operate, maintain, supervise, monitor and control all processes on site so that emissions authorised by this consent are maintained at the minimum practicable level.	1	Ongoing.
16	Beyond the boundary of the site there shall be no odour, dust, particulate, smoke, ash or fume caused by discharges from the site which, in the opinion of an enforcement officer, is noxious, dangerous, offensive or objectionable.	1	Did not occur.
17	No discharges from any activity on site shall give rise to visible emissions, other than water vapour and steam, to an extent which, in the opinion of an enforcement officer, is noxious, dangerous, offensive, or objectionable.	1	Did not occur.
18	Beyond the boundary of the site there shall be no hazardous air pollutant caused by discharges from the site, which is present at a concentration that is, or is likely to be, detrimental to human health or the environment.	1	Did not occur.
19	Without limiting the generality of Conditions 15 to 18, the dissolved oxygen level within the aerobic treatment tank shall be maintained above 1 mg O/l at all times. Provision shall be made to aerate the seasonal lagoon in the event that offensive odour occurs.	1	Ongoing PLC controlled set point at 2 mg O ₂ /L.
20	A walkover inspection of the site shall be undertaken at least twice every week to identify any odours that may be originating from the site. Any evidence of significant odour shall be recorded and investigated. Where necessary, remedial actions shall be undertaken as soon as practicable to reduce odour discharges. The procedures for the walkover, recording of the results and any remedial actions taken shall be as specified in the AQMP.	1	Ongoing by the duty plant operator.

Condition Number	Consent Condition Kawakawa Bay Discharge to Air (#30829)	Compliance Rating	Comments
21	All information required under this consent will be consistent with the requirements of Consent 30833. and in particular the requirements within the Operations Management Plan of that consent. Further, all Plans required under this consent will be included as an appendix to the Operations Management Plan as required by Consent 30833.	1	Compliant.
22	All records, monitoring and test results that are required by the conditions of this consent shall be made available on request, during operating hours, to an enforcement officer and shall be kept for a minimum period of 12 months from the date of each entry.	1	Compliant.
23	Consent Holder shall notify an enforcement officer as soon as practicable in the event of any significant increase in the discharge of contaminants to air, which may result in adverse effects on the environment. In the event of an incident, shall provide a written report to the Manager within 7 days of the occurrence. The report shall give reasons for the incident, any remedial actions taken and any mitigation measures taken to prevent its reoccurrence.	1	Not required as condition trigger did not occur.
24	Consent Holder shall log all air quality complaints received. The complaint details shall include: a) date, time, location and nature of the complaint; b) weather conditions at the time of the complaint; c) name, phone number and address of the complainant, unless complainant refuses to supply these details; and d) any remedial actions undertaken.	1	No complaints received.
25	An annual Performance Report detailing and summarising the plant performance and consent compliance and with the Air Quality Management Plan (AQMP) shall be submitted to the Manager by 31 May each year. The report will be consistent with that required in the Operations Management Plan required by Consent 30833.	1	Compliant.
26	Consent Holder shall prepare and maintain an AQMP, which specifies all management and operation procedures necessary to comply with the conditions of this consent. The AQMP shall include but not be limited to details listed in a) to h) of the consent condition.	1	Compliant.
27	Consent Holder shall submit the AQMP to the Manager for review 3 months prior to exercising this consent. Any subsequent changes to the AQMP shall be submitted to the Manager within 1 month of the changes being made. The Manager will advise the Consent Holder in writing if any aspects of the AQMP are considered to be inconsistent with achieving the conditions of this consent.	1	No changes to AQMP since the last submission in December 2010.
28	Conditions of this consent may be reviewed by the Manager pursuant to Section 128 of the RMA 1991, by the giving of notice pursuant to Section 129, one year after the commissioning of the last component of the plant and in June every two years after.	1	Compliant.

Table 4-3: Assessment of compliance with consent conditions - discharge to land (#30833)

Condition Number	Consent Condition Kawakawa Bay Discharge to Land (#33083)	Compliance Rating	Comments
01	ARC agents may access the property at reasonable times to carry out inspections, surveys, tests, or measurements, or to take samples.	1	Compliant. Most recent inspection undertaken on 29 May 2024.
02	Consent Holder shall, as far as practicable, design, construct and operate the plant and associated processes in accordance with the documentation submitted to the Council as part of Application Number 30833 and with the conditions of this consent. No alterations shall be made to the plant or processes that do not, or are not likely to, comply with the provisions of this consent, a regional rule, or regulations under the RMA 1991.	1	Compliant.
03	The maximum allowable discharge of treated domestic wastewater effluent to land is 800m ³ /day but not exceeding irrigation rates given in Condition 16 when applied to areas shown on the drawing (Woodmetrics; 2007) contained in Appendix 1.	1	Daily discharge volumes were well below the consent maximum.
04	No new trade wastes, as defined in s 489 of the LGA 1974, that may compromise the treatment plant performance shall be permitted to be discharged into the treatment plant.	1	Covered by Trade Waste bylaw.
06	If subsurface archaeological evidence should be unearthed during construction (eg intact shell midden, hangi, storage pits relating to Maori occupation, or cobbled floors, brick or stone foundation, and rubbish pits relating to 19th C European occupation, or artefacts relating to Maori or European occupation), work should cease in the immediate vicinity of the remains. The Historic Places Trust, the project archaeologist and tangata whenua should be contacted so that appropriate action can be taken. The appropriate persons must be afforded a reasonable time to record and recover archaeological features and/or artefacts discovered before work may commence. If modification of an archaeological site is necessary, an Authority to modify must be applied for under s 12 of the NZ Historic Places Act 1993 (a legal requirement). In the event of human remains being uncovered, work should cease in the immediate vicinity and the tangata whenua, Historic Places Trust and NZ Police should be contacted so that appropriate arrangements can be made.	1	Completed and the condition trigger did not occur during construction.
07	Consent Holder shall install a spray irrigation land disposal system within the Pine forest and future Eucalyptus plantings in the area shown on the drawing (Woodmetrics; 2007) contained in Appendix 1.	1	Completed and in operation.
08	Consent Holder shall install if necessary surface and/or subsurface diversion drains upslope from the wastewater land disposal systems to divert stormwater runoff away from the land disposal areas.	1	Stormwater diversion drains were not necessary.

Condition Number	Consent Condition Kawakawa Bay Discharge to Land (#33083)	Compliance Rating	Comments
09	Consent Holder shall install soil moisture probes within the spray irrigation areas and record the soil moisture level in accordance with procedures specified in the Wastewater Disposal Area Management Plan as required by Condition 42 to allow determination of the suitability of soils for wastewater irrigation.	1	The soil moisture probes were installed and commissioned. A review found some probes continuously failing and the data collected not representative. The review was submitted to Council. Council approved that there was no further need to have the probes in place and that visual inspections were more beneficial.
10	Consent Holder shall fence the Glen Forest property to discourage access and appropriately signpost the area to warn that wastewater irrigation is undertaken on site.	1	Completed and signage in place.
11	An alternative power supply shall be installed with sufficient capacity to operate the primary processes of the treatment plant.	1	Completed and generator in place.
12	The design and installation of the wastewater treatment disposal system shall be carried out under the supervision of a chartered professional engineer experienced in wastewater treatment and land disposal systems.	1	Compliant.
13	Consent Holder shall retain a trained Wastewater Treatment Plant operator to operate the plant. The operator shall have undergone wastewater training and attained a minimum of "National Diploma in Wastewater Treatment" under the framework of the NZ Qualifications Authority (or equivalent to B Grade Operator) or with the equivalent qualification or experience, who has been approved in writing by the Manager, for the ongoing maintenance of the treatment and disposal systems.	1	Ongoing.
14	Consent Holder shall ensure that appropriate persons shall be available and shall respond as soon as practicable to any alarm sounding or to any other indication of an emergency arising from the wastewater treatment and disposal system 24/7. Contact information for appropriate personnel in the event of an alarm sounding shall be incorporated into the Operations Management Plan.	1	Ongoing.

Condition Number	Consent Condition Kawakawa Bay Discharge to Land (#33083)	Compliance Rating	Comments
15	Consent Holder shall always operate the wastewater treatment system to maximise opportunities for discharge to land as permitted under this consent and only discharge to Rautawa Stream (as permitted under Consent 33143) when land disposal is not practicable.	1	Ongoing. No discharges required to Rautawa Stream during the reporting year 2024-2025.
16	Consent Holder shall irrigate the treated wastewater to land at areal loading rates not exceeding the following rates. Consent Holder may apply to the Manager to increase these irrigation rates following further investigation required in Condition 33. Areal Irrigation Rates: slope angle (degrees) at 0-20: 2.6mm/day in summer, 1.7mm/day in winter. Slope angle at 20-30: 1.5mm/day in summer, 1.2mm/day in winter. Nominal Application Rate: 0.3mm/hour across the entire site.	1	Compliant.
17	Consent Holder shall ensure that the potential for runoff of irrigated wastewater into surface water is minimised.	1	This was achieved through optimisation of the irrigation blocks.
18	Consent Holder shall ensure that a minimum separation distance between the maximum throw from spray nozzles and any surface water and property boundaries shall be no less than 10.0 metres, unless monitoring undertaken in accordance with Condition 40 indicate adverse effects. The spray irrigation system shall be installed and operated to minimise spray drift under all weather conditions.	1	Spray system had been designed to meet the condition.
19	Consent Holder shall maintain the system in an efficient and professional manner, in accordance with the Operations Management Plan and the conditions of this permit, to ensure that it functions efficiently and subject to resource consent requirements shall ensure that any works necessary for this are undertaken.	1	Ongoing.

Condition Number	Consent Condition Kawakawa Bay Discharge to Land (#33083)	Compliance Rating	Comments
20	<p>Consent Holder shall: i) consult with tangata whenua and representatives of local residents (including the Kawakawa Residents Association) to facilitate the establishment of a Community Committee as soon as practicable after the consent becomes operative; ii) invite representatives from the following to attend meetings under this condition: Clevedon Community Board, Kawakawa Residents Association, Tangata whenua, community in general, Manukau Water Ltd, Manukau City Council, ARC; iii) the purpose of the Committee shall be to discuss matters relevant to the installation, operation and maintenance of the wastewater treatment system including, but without limitation, any concerns and complaints of residents and visitors and the timeliness and method of alleviating them; iv) Manukau Water Ltd shall ensure its representatives attend meetings of the Committee which should be held on a 6-monthly basis for the first 2 years and annually thereafter; v) at the meetings, Manukau Water Ltd shall disseminate information to the Committee about the operation of the wastewater treatment system including the results of any monitoring and the timing and extent of any discharges of treated effluent to the Rautawa Stream; vi) the Community Committee set-up required by this condition is also required of Manukau Water Notice of Requirement No. 20 February 2007 and shall be the same.</p>	1	Compliant.
21	<p>The quality of treated wastewater as determined by the analyses required by Conditions 24, 25, 26 and 27 shall comply with the following standards: faecal coliforms - median no more than 1000cfu/100mls; e. coli - median no more than 1000cfu/100mls.</p>	1	Compliant.
22	<p>Consent Holder shall continuously measure and record effluent discharge flow volume to and from the treatment plant and to each part of the disposal field. The flow measuring device shall be capable of providing cumulative measurements to an accuracy of plus or minus 5% and shall be maintained in accordance with the manufacturer's specifications at all times.</p>	1	Recorded in SCADA.
23	<p>Stream sampling shall be undertaken in accordance with the Receiving Environment Monitoring Plan (REMP) required by Condition 40.</p>	1	Ongoing sampling and testing at Stream Site 3 and 6. Site 7 was removed from the monitoring schedule as approved by Council.

Condition Number	Consent Condition Kawakawa Bay Discharge to Land (#33083)	Compliance Rating	Comments
24	Consent Holder shall collect an effluent sample from the permeate tank at fortnightly intervals, in accordance with the Monitoring Procedures required by Condition 41. The sampling frequency may be decreased following at least one year of complete readings which satisfy the conditions of this consent, subject to written approval for a decreased monitoring frequency being provided by the Manager.	1	Our consent sampling is not scheduled fortnightly instead consent sampling is scheduled for every 2nd and 4th Wednesday. This sampling regime was established to facilitate the consistent sampling of the eight southern WWTPs.
25	The samples shall be analysed for the following parameters: a) nitrate gN/m ³ ; b) dissolved reactive phosphorus gP/m ³ ; c) faecal coliforms cfu/100ml; d) e. coli cfu/100ml; e) sodium mg/l; f) magnesium mg/l; g) calcium mg/l; h) pH; i) ammoniacal nitrogen mgN/l. Consent Holder shall sample for pH and Ammoniacal Nitrogen only for the months of May to October inclusive.	1	Ongoing.
26	All sample analyses shall be undertaken to the detection limits identified and the results reported in the units specified in the appended table (Appendix 2).	1	Ongoing.
27	Any samples collected shall be collected and analysed in accordance with the latest edition of "Standard Methods for the Examination of Water and Wastewater", APHA, AWWA, WPCE, or equivalent approved in writing by the Manager.	1	Compliant.
28	Soil samples shall be taken from the land disposal area and a non-irrigated control area in accordance with the Monitoring Procedures required by Condition 41. The samples shall be analysed for the following parameters: a) pH; b) nitrate gN/m ³ ; c) phosphorus gP/m ³ ; d) sodium me/100gm; e) calcium me/100gm; f) potassium me/100gm.	1	Soil sampling and testing was conducted in 2024 by Maaki Whenua Landcare Research. The next survey will be in 2026.
29	Consent Holder shall monitor and record daily rainfall levels within the proximity of the treatment plant and land disposal area at the same time of each day.	1	Ongoing
30	Consent Holder shall inspect the irrigation fields that are in use on every second week to ensure they are operating correctly.	1	Ongoing.
31	Consent Holder shall undertake detailed irrigation trials over at least a 2-year period to reassess the site specific irrigation application rates and regimes.	1	Trials completed in previous years and suspended until flows reach an average flow of 120 m ³ /day.

Condition Number	Consent Condition Kawakawa Bay Discharge to Land (#33083)	Compliance Rating	Comments
32	Within one month of commissioning the entire plant, the Consent Holder shall advise the Manager in writing that the works are completed and commissioned.	1	Completed by Fulton Hogan.
33	Consent Holder shall prepare an Operations Management Plan (OMP) for the entire wastewater collection, treatment and disposal system as required under Consents 31272, 30830, 30832, 30833, 33143. Any plan, report or procedure required under the above mentioned consents shall be incorporated into or included as an appendix to the OMP - refer to Appendix 3. For a list of specifications, see consent condition.	1	Final OMP Doc Ref 9 was issued in May 2012, revised 2015-2016.
34	Wastewater Inspection and Maintenance Procedure shall outline the inspection and maintenance practices and procedures to be adopted to ensure compliance with Consents 30833 and 33143. It shall as a minimum address the following: i) inspection and maintenance program, including schedules and logs, designed to verify the correct functioning of the whole wastewater treatment and disposal system; ii) identification of staff and/or contractor responsibilities; iii) quality control procedures.	1	Ongoing.
35	Consent Holder shall record all complaints received. Recorded details shall include name, date, nature of complaint, contact details, response time and outcome of the resolution.	1	Ongoing.
36	Consent Holder will provide IPENZ Producer Statements - PS1 and PS4, within 3 months of commissioning of the works that includes the treatment plant and disposal area.	1	Overridden by contract requirements.
37	Consent Holder shall supply to the Manager within 3 months of completion of the system drawings, which shall be certified as "As-Built" by a Chartered Engineer. The drawings shall include, but not be limited to: i) surveyed locations and elevations of all structures (pipes, drains, catchpits, treatment practices, discharge structure), which shall be measured to the nearest 0.1 metre with co-ordinates expressed in terms of the NZ Transverse Mercator and the LINZ datum; ii) plans and cross sections of all stormwater management devices, including confirmation of the Water Quality Volume, storage volumes and levels of any outflow control structure; iii) location, dimensions and levels of the major overland flowpaths including cross sections and long sections; iv) documentation of any discrepancies between the approved design plans and the As-Built drawings.	1	Completed.
38	Contingency Plan: Consent Holder shall develop a plan for contingency and incident response planning to avoid non-compliance with Consents numbered 31272, 30830, 30832, 30833, 33143 and shall as a minimum describe in detail the items listed in i) to vi) in the consent condition.	1	Completed.
39	Performance Report - see consent for details	1	Compliant.

Condition Number	Consent Condition Kawakawa Bay Discharge to Land (#33083)	Compliance Rating	Comments
39a	<p>Performance Report - An annual performance report to be submitted by 30 September each year and shall:</p> <ul style="list-style-type: none"> i. Include all annual reporting requirements from Consents 31272, 30830, 30831, 30832, 30833, 33143 ii. Collate, analyse and interpret all relevant data and information for the year. iii. Include comment on general plant performance and any trends in changes in the discharge volume and/or the discharge quality standards over time. iv. Include a consideration of compliance with each consent condition. v. Make recommendations and submit timetable to rectify any non-compliance. vi. Be based upon a template included in the Operations Management Plan 	1	Compliant.
40	<p>Consent Holder shall develop and submit to the Manager for approval a comprehensive REMP that is designed to assess the effects on the Rautawa Stream and the Kawakawa Bay in the vicinity of the Stream outlet from the exercise of Consents 31272, 30830, 30831, 30832, 30833, 33143. Both public health and ecological aspects will be included with the Plan. The Plan shall enable the objective of determining the effects of effluent discharges on the receiving environment ecosystems of the Rautawa Stream and the CMA to be met. Particular emphasis will be placed upon investigation of the effects of nutrients. An annual Impact Assessment Report detailing the results and interpretation of the REMP shall be provided to the Manager by 30 September each year.</p>	1	<p>The annual Ecological Monitoring Rautawa Stream and Coastal Marine Area were undertaken in March 2024. Next monitoring is due in 2026.</p>
41	<p>Monitoring procedures: these procedures shall outline the practices and procedures with respect to monitoring and reporting of Consents 30833 and 33143 to be adopted to demonstrate ongoing compliance with the conditions of this consent and shall as a minimum address the following: i) location and type of monitoring equipment; ii) maintenance and calibration of monitoring equipment; iii) schedule and log of monitoring requirements; iv) methods and quality control procedures for sampling and analyses; identification of staff and or contractor responsibilities.</p>	1	Completed.
42	<p>Wastewater Disposal Area Assessment Plan: Consent Holder shall engage a consultant experienced in wastewater land disposal systems and soil quality to develop this Plan which will include: i) the requirements of the trial as required by Condition 31; ii) determination of the exchangeable sodium percentage and sodium absorption ratio; iii) assessment of the quality of the treated effluent discharged to land; iv) assessment of the effects that wastewater is having or may behaving on the quality of the soils within the disposal areas; v) assessment of the irrigation regime in general and the loading rates in particular; vi) a requirement for annual reporting within the Performance Report.</p>	1	Completed.
43	<p>Landscape and Planting Plan: prior to any works commencing on the site, Manukau Water Ltd shall prepare and submit to the Manager for approval a landscape plan for the site. See consent condition, items a) to d) for further detail.</p>	1	Completed.

Condition Number	Consent Condition Kawakawa Bay Discharge to Land (#33083)	Compliance Rating	Comments
44	Conditions of this consent may be reviewed by the Manager pursuant to Section 128 of the RMA 1991, by the giving of notice pursuant to Section 129, one year after the commissioning of the last component of the plant and in June every two years after.	1	Compliant.

Appendix D. Data sources

Table 4-4: Download location of environmental monitoring data used in this report.

Category	Parameter	Source platform	Tag/ID
Effluent volume	N/A	Pi	DTKAW_49_FQ_150_VOLUMEDAY
Irrigation volume	EDF 1	Pi	DTKAW_49_FQ_150_B1VOLDAY
Irrigation volume	EDF 2	Pi	DTKAW_49_FQ_150_B2VOLDAY
Irrigation volume	EDF 3	Pi	DTKAW_49_FQ_150_B3VOLDAY
Irrigation volume	EDF 4	Pi	DTKAW_49_FQ_150_B4VOLDAY
Effluent quality	E. Coli	Pi	DTKAW_52_15_FE_ECOLMTEC
Effluent quality	Faecal Coliforms	Pi	DTKAW_52_15_FE_FC
Effluent quality	Nitrate	Pi	DTKAW_52_15_FE_NO3
Effluent quality	Calcium (Total)	Pi	DTKAW_52_15_FE_Ca-tot
Effluent quality	DRP	Pi	DTKAW_52_15_FE_DRP
Effluent quality	Mg(Total)	Pi	DTKAW_52_15_FE_Mg-tot
Effluent quality	Na(Total)	Pi	DTKAW_52_15_FE_Na-tot
Effluent quality	pH	Pi	DTKAW_52_15_FE_pH
Effluent quality	NH3-N	Pi	DTKAW_52_15_FE_TNH3N