Rosedale Wastewater Treatment Plant
2024-2025 Annual Compliance Report

FINAL - September 2025

Watercare

QUALITY INFORMATION

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Revision History

Rev	Revision Date	Name	Position	Signature
1	05/09/2025	Michiel Jonker	Environmental Care Manager	
2	22/09/2025	Mai Hoque	Operations Controller - Rosedale WWTP	
3	22/09/2025	Kenny Williamson	Production Manager Wastewater North	

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
Monitoring Management Plan	The Monitoring Management Plan (MMP) required by consent 23798 shall be reviewed prior to exercising this consent, and shall be approved by the Manager within 3 months of the exercising of the consent. MMP covers multiple site consents.	2003 (initial version). 2021 (last full review) 2023 (last update approved by AC – changes made to Section 4 (air quality)	Condition 6	Site must comply with the Plan which shall stipulate the precise technical details of monitoring programmes required for the compliance with the conditions of this consent.
Outfall health risk assessment	Undertake a detailed health risk assessment of the effects of the outfall, two years after the exercise of the consent and every five years thereafter.	2025	Condition 11	Report completed by ESR and submitted to AC. Next due 2030.
Trade waste programme review	Review the current Trade Waste Programme upon the exercise of this consent, and at five-yearly intervals in consultation with the ARC and any other reasonably affected parties the consent holder identifies through that review process.	2022	Condition 15	Rosedale Wastewater Treatment Plant BPO and Trade Waste Reviews – December 2022
Alternative disposal options	Investigate alternative disposal options and beneficial reuse trials in consultation with the council, Tangata Whenua, and the community within 6 months of the exercise of this consent, and at five-yearly intervals thereafter.	2022	Condition 16	Rosedale Wastewater Treatment Plant BPO and Trade Waste Reviews – December 2022

EXECUTIVE SUMMARY

This Annual compliance report outlines the operational performance and regulatory compliance of the Rosedale Wastewater Treatment Plant (WWTP) for the period from 1 July 2024 to 30 June 2025. The plant operates under several resource consents for discharges to water, air, and land, along with stormwater management. The compliance assessment includes effluent quality, air quality, environmental monitoring, and incident reporting.

Key points from the 2024-2025 reporting period include:

- Effluent discharge: The plant discharged a total of 21,927,532 m^3 of treated effluent, a 5% reduction compared to the previous year. The effluent quality consistently met consent limits for parameters such as biochemical oxygen demand (BOD_5), total suspended solids (TSS), nitrogen (TN), and pathogens.
- Air quality: No significant issues were reported by the independent peer review panel.
- Four incidents relating to the release of unburnt biogas occurred during the reporting period. These were reported to Auckland Council (AC) at the time. On all four occasions, causes were identified and corrective actions implemented. The peer review panel agreed that any effects of the discharge were likely to be minor.
- A number of odour complaints received between September and December 2024 from the Unsworth Heights residential area alleged odour disturbance from the plant. Extensive investigations and monitoring carried out onsite and within the community identified a series of unsealed manholes near Upper Harbour Highway that was the source of the odour, not the WWTP. The seals were repaired, and no further complaints have been received since. The site odour management system continues to function effectively.
- The community odour survey was completed in August 2025 and provided to AC. Whilst there was a reduction in response rate to the survey compared to previous surveys, the results found that the overall number of respondents that experienced odour effects was consistent with previous reporting years. The next survey is due in 2027.
- Receiving environment monitoring: Water quality samples taken from sites near the effluent outfall showed no adverse ecological effects, ensuring the plant's discharges do not impact the receiving environment.
- A 5-yearly microbiological health risk assessment in relation to the effluent outfall was undertaken during this reporting period and provided to AC. The assessment determined the WWTP was achieving the necessary virus removal to manage health risks in the receiving environment.
- Compliance: No significant environmental effects were noted during the reporting period. The plant achieved compliance with all monitored consent conditions, categorized as Category 1.

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ABBREVIATIONS AND ACRONYMS

Abbreviation	Description
AC	Auckland Council
AUR	Asset Upgrades & Renewals
$cBOD_5$	Carbonaceous 5-day biochemical oxygen demand
CFU	Colony-Forming Unit
COD	Chemical Oxygen Demand
DAF	Dissolved Air Flotation
DO	Dissolved oxygen
DRP	Dissolved reactive phosphorus or dissolved soluble phosphorus (synonyms)
E. coli	*Escherichia coli*
g/m^3	Grams per Cubic Meter
GBT	Gravity Belt Thickener
mg/L	Milligrams per Litre
MLE	Modified Ludzack Ettinger
MMP	Monitoring Management Plan
NFR	Non filterable residue
NH_x	Ammonia and ammonium, reported in milligrams nitrogen
NO_2	Nitrite, reported in milligrams nitrogen
NO_3	Nitrate, reported in milligrams nitrogen
PRP	Peer Review Panel
PST	Primary sedimentation tanks
QMRA	Quantitative Microbial Risk Assessment
REMP	Receiving Environment Monitoring Plan
TN	Total nitrogen
TP	Total phosphorus
TSS	Total suspended solids
UPS	Uninterrupted Power Supply
UV	Ultra-violet
Watercare	Watercare Services Limited
WWTP	Wastewater treatment plant

1 INTRODUCTION

1.1 Outline

This report covers resource consent compliance for the Rosedale Wastewater Treatment Plant (WWTP) from 1 July 2024 to 30 June 2025. The report includes:

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

1.2 Consents and plans

1.2.1 Consents

Table 1-1 lists the active resource consents for the Rosedale WWTP.

The Red Bluff outfall is only used when the Mairangi Bay outfall cannot be used because of programmed maintenance. The Red Bluff outfall was not operational in this reporting period.

Table 1-1 Rosedale WWTP resource consents

Consent type	Consent number	Expiration date
Discharge to Water (Mairangi Bay outfall)	23799/ CST60260652	31/12/2030
Discharge to Water (Red Bluff outfall)	23798/ CST60260647	31/12/2030
Discharge to Air	30249/ 23792/ DIS80298643	31/12/2030
Discharge to Land	23801/ DIS60265035	01/07/2037
Discharge to Stormwater	24955	31/12/2030

1.2.2 Plans

The Rosedale WWTP has one overarching management plan which contains five operational management sub-plans as required under the resource consents. Table 1-2 lists these plans.

Table 1-2 Rosedale WWTP management plans

Primary Management Plan	Revision date
Rosedale Wastewater Treatment Plant Auckland Council Operation Management Plan	November 2021
Secondary Plans	**Consent number**
Effluent Monitoring Plan	23798 & 23799
Monitoring Management Plan (Receiving Environment)	23798 & 23799
Plant Operations and Monitoring Management Plan (Air Quality)	30249
Rosedale Oxidation Dam Management Plan	38973
Plant Operations & Monitoring Management Plan (Discharges to Land)	23801

2 TREATMENT PLANT

2.1 Current operation

The Rosedale WWTP's treatment system includes:

- Preliminary treatment, including screening and grit removal.
- Primary Sedimentation Tanks (PSTs) to remove primary sludge and scum by settling and flotation respectively.
- Secondary treatment using activated sludge process in MLE configuration for biological nitrogen reduction with separate clarifiers.
- Anaerobic digestion to convert primary and waste activated sludge to a stable product, reducing odours and pathogens in the solids stream, and recovering energy via biogas generation.
- UV disinfection.
- Sludge thickening (upstream of digesters) using DAF and GBTs.
- Digested sludge dewatering using centrifuges.
- Biogas treatment plant to remove contaminants from the biogas i.e. hydrogen sulphide, moisture, siloxane and some particulates.
- Cogeneration plant that utilises the methane gas to generate electricity and heat.

2.2 Changes to the Treatment Plant

2.2.1 2024-2025

- Refurbishment of Digester 3 was completed in June 2025. Watercare has continued work to refurbish the second of its four digesters.
- Work is ongoing on the refurbishment of the odour biofilters, including media replacement and improvements to irrigation. Rehabilitation of dewatering biofilter cells #3 and #5 has been completed this September 2025. The media used is Biofilm (Azwood), consistent with Stantec's design. The diffuser/drain layer material has been changed from concrete blocks to a plastic substitute to address corrosion.
- Refurbishment has begun on one of the four MLEs, including diffuser and valve replacement as well as concrete inspections and repairs. This work will continue successively throughout the year.
- Completed upgrades this year include the control systems to Emerson DeltaV and the upgrade of the MLE aeration blower local and control panels.

2.2.2 Future changes

- Refurbishment of Digesters 1 and 2 will be carried out sequentially.
- The remaining four biofilters will be rehabilitated over approximately two years through the AUR programme.
- Other projects currently underway include the Northern Interceptor Integration (led by Watercare's Programme Delivery team) and Stage 2 of the Pond Link automation project.
- Although this does not represent a change to the site, it is noted that the DAFs and primary sedimentation tanks will be successively taken out of service for major maintenance. The COGEN engine will also undergo refurbishment, including a long-block replacement.
- The existing emulsion polymer system for the centrifuge will be upgraded and replaced with a bulk delivery system, moving away from the current IBC delivery method.

3 COMPLIANCE ASSESSMENT

3.1 Introduction

The assessment of WWTP performance considers:

- Results of required WWTP monitoring
- Recorded incidents and complaints.

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

Table 3-1 Compliance assessment criteria

Rating	Detail
Category 1	Watercare has complied with the consent condition. Where a 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 Plant performance

3.2.1 Effluent volumes

Figure 3-1 provides rainfall data and peak discharge rates (i.e., maximum instantaneous flow rate each day) from the Mairangi Bay outfall over the 2024-2025 period. The plant was fully compliant with its instantaneous flow limit of 6 m^3/s.

The total volume of effluent discharged during the reporting year was 21,927,532 m^3. This is a decrease of approximately 5% in annual total compared to the previous reporting period (23,131,738m^3). Figure 3-2 shows daily volumes of effluent discharged from the Mairangi Bay outfall across the reporting period.

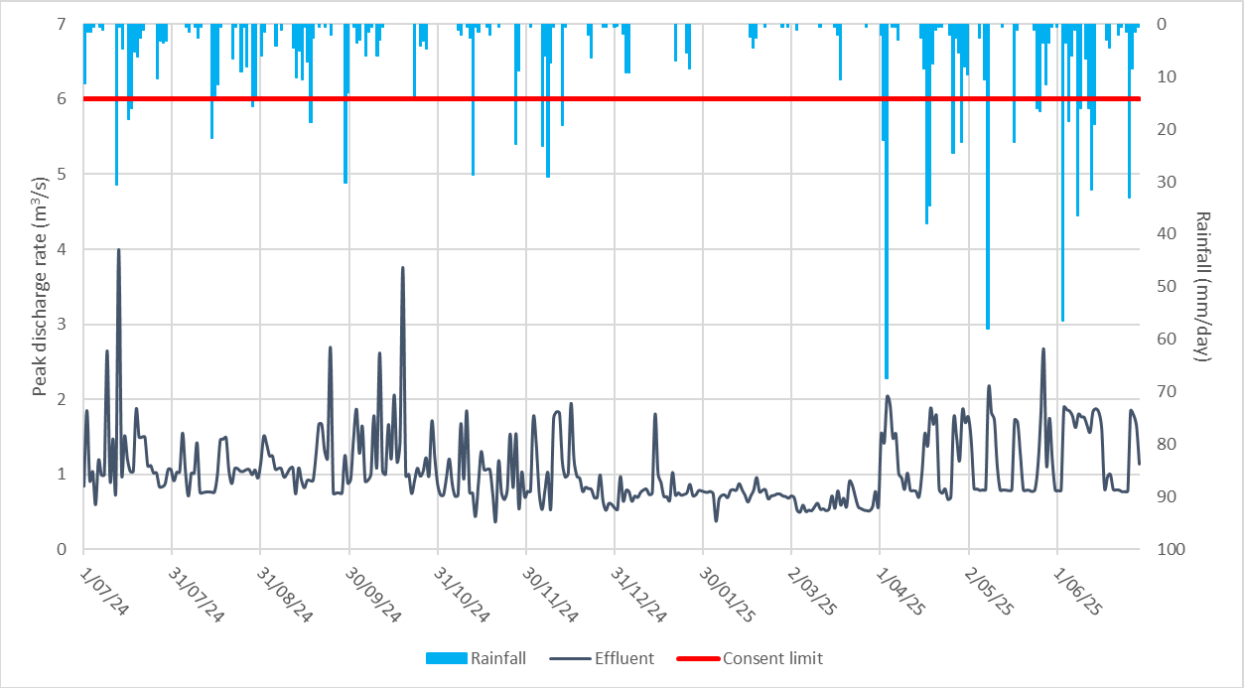


Figure 3-1 Rosedale WWTP rainfall and peak discharge rates for 2024-2025.

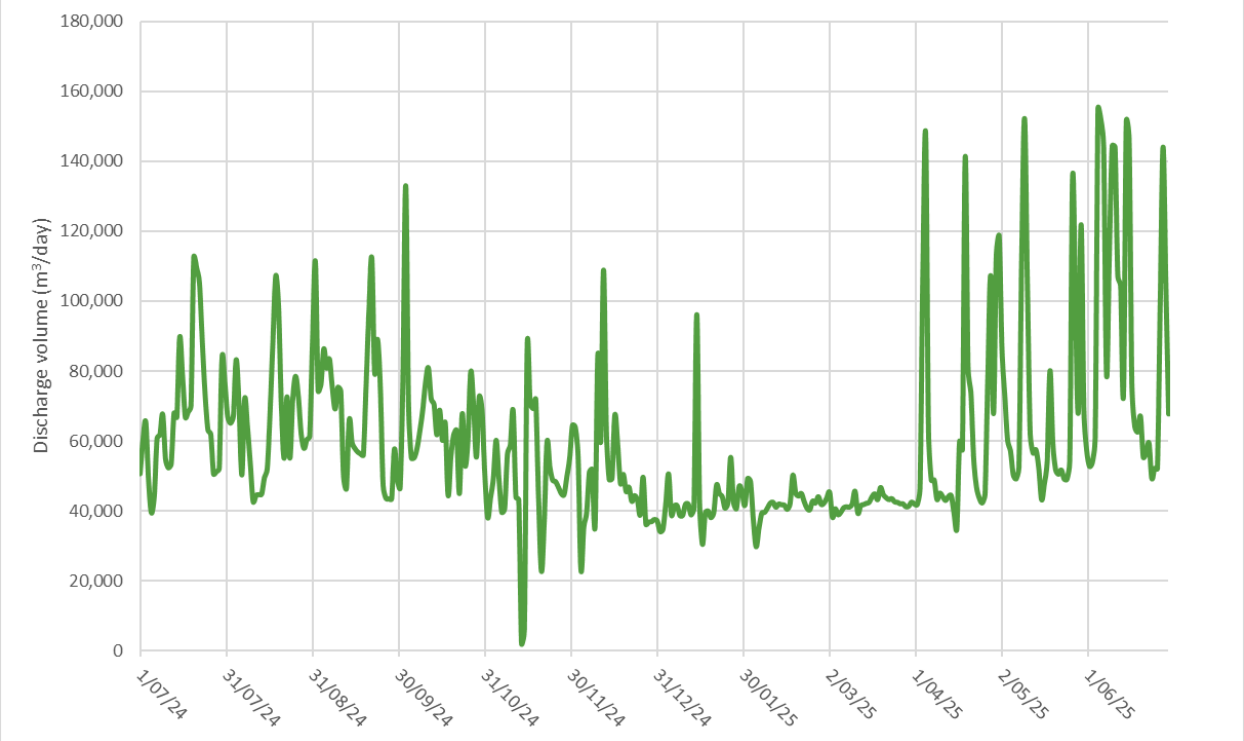


Figure 3-2 Daily discharge volumes for 2024-2025.

3.2.2 Effluent quality

Table 3-2 provides a summary of effluent quality. Raw data is provided in Appendix A. Trace metals and pathogens are included in the Receiving Environment Monitoring Report (REMP) (refer Appendix B). The monitoring data and source tag references used for this assessment, together with those for REMP, are also provided in Appendix C (Data Sources).

As shown in Table 3-2, the WWTP was fully compliant with its discharge quality parameters in 2024-2025.

3.2.3 Air quality

Air quality matters are considered quarterly by an independent Peer Review Panel (PRP). The PRP did not raise any issues associated with air quality in 2024-2025 and will summarise their site assessment in their annual report. Summer odour discharge monitoring in accordance with Condition 41 of Consent 30249 was undertaken between January and May 2025. The monitoring was unable to be completed entirely in summer, as required by the consent, due to an unexpected olfactometer instrument failure at the air quality lab. The report is attached as Appendix D.

A Community Liaison Group (CLG) Meeting was held on 15 November 2024. No complaints or concerns were raised by the community members present. The next CLG meeting will be held in late 2025.

A number of odour complaints were attributed to the plant across the 2024-2025 reporting period. Additionally, four incidents relating to the release of unburnt biogas from the flare were recorded. Complaints and incidents are explained further in Section 3.5. Weekly site-based and monthly community odour scouting continued throughout the reporting period, with no obvious or offensive odours detected offsite.

A community odour survey was completed in 2025 in accordance with Conditions 39 and 40 of the air discharge consent (Permit No. 30249). The survey report was provided to AC on 11 August 2025. Analysis of survey responses found an increase in the proportion of respondents being affected by odour; although the total number of those impacted was consistent with previous surveys. The total number of responses was significantly less compared to previous survey periods; therefore, the increased proportion was attributed to sampling bias (i.e. people that are affected by odour are more likely to respond to the survey than those that are not). The next survey is due in 2027.

3.3 Receiving environment monitoring

Watercare undertakes routine water quality samples from sites north and south of the outfall. Results for receiving environmental monitoring are summarised and discussed in a report included in Appendix B. A summary of the main findings from the receiving environment monitoring report (2024-2025) include:

- The effluent discharged from the WWTP was well below the consent limits for key contaminants such as total suspended solids, biochemical oxygen demand, nitrogen, and phosphorus. The heavy metals copper and zinc were elevated above point source guideline values for marine environments, but their concentrations are unlikely to have significant ecological effects due to the dilution within the receiving environment.
- Long-term effluent data indicates reducing trends for multiple parameters and increasing trends for phosphorus (total and dissolved reactive) and chemical oxygen demand. These trends are not thought to be of significance.

- A localised increase in total oxidised nitrogen was observed near the outfall diffuser. However, this effect did not extend beyond the immediate area of the diffuser; with many surveillance sites away from the diffuser displaying long-term decreasing nitrogen trends.
- Localised elevated phosphorus was also evident when sites were grouped as diffuser and sentinel (surveillance) sites. However, the differences were not significant when sites were analysed individually; indicating the differences are small and/or there is insufficient monitoring data to analyse further.
- The concentrations of faecal bacteria indicators were low at all monitored sites.
- Chlorophyll-a concentrations, which serve as a proxy for primary productivity, were similar at all sites, indicating that the plant's discharge is not causing eutrophication or harmful algal growth.
- A reducing pH trend at the Red Bluff sentinel site is not believed to be related to the wastewater discharge.
- Overall, water quality in the monitored areas of the Hauraki Gulf has remained stable over time.
- Ecological impact: The report concludes that the discharge from the WWTP is having minor localised effects on water quality near the outfall but there is no evidence the discharge is contributing to any significant ecological effects in the receiving environment.

Details of the monitoring data sources used for the REMP assessment are also included in Appendix C (Data Sources)

3.4 Quantitative Microbial Risk Assessment

Consent 23799 requires Watercare to undertake a 5-yearly risk assessment in relation to microbiological health risks associated with the outfall and effluent discharge. This review was completed in May 2025, and conservatively determined Rosedale WWTP is achieving sufficient viral removal during treatment to reduce health risks from contact recreation (swimming) and shellfish consumption within the receiving environment to a safe level.

3.5 Dam monitoring

The dam certificate and dam level monitoring report for 2024-2025 are included in Appendix E. The treatment ponds are fully compliant with their associated dam conditions.

Table 3-2 Summary of effluent quality monitoring for the Rosedale WWTP 2024-2025.

Parameter	Units	n	Average	Range	Median	Consented Median	95th Percentile	Consented 95th Percentile	Standard	Compliant
$cBOD_5$ (total)	mg/L	51	1.4	0.5 - 4.2	1.1	20	2.9		Over 1 year, no more than 16 exceedances above 20	Yes
TSS	g/m^3	156	6.7	1.0 – 22.0	5.8	35	15	75	For any 3-month period, no more than 23 exceedances above 35 and no more than 4 exceedances above 75	Yes
TN	g/m^3	12	8.8	6.3 – 12.0	8.6	30	11		Over 1 year, no more than 8 exceedances above 30	Yes
Ammoniacal Nitrogen	g/m^3	12	0.53	0.03 - 1.40	0.41	10	1.3		Over 1 year, no more than 8 exceedances above 10	Yes
DRP	g/m^3	12	3.60	2.41 - 5.10	3.60	10	4.8		Over 1 year, no more than 8 exceedances above 10	Yes
Faecal coliforms	cfu/100 mL	157	253.0	1.6 – 4,600.0	3.3	1,000	1,440	10,000	For any 3-month period, no more than 23 exceedances above 1,000 and no more than 4 exceedances above 10,000	Yes
Enterococci	cfu/100 mL	157	43.0	1.6 – 590.0	1.6	100	250	1,000	For any 3-month period, no more than 23 exceedances above 100 and no more than 4 exceedances above 1,000	Yes
Temperature	°C	216	19.0	6.8 - 25.6	19.0	N/A	23	N/A	N/A	N/A
pH	-	215	7.50	5.51 - 8.72	7.50	N/A	8.2	N/A	N/A	N/A
DO	mg O_2/L	217	8.40	4.62 - 13.06	8.20	N/A	11.3	N/A	N/A	N/A
TP	mg/L	12	4.00	2.78 - 5.78	3.70	N/A	5.4	N/A	N/A	N/A

Note: Yellow indicates consent limits and green indicates compliance with the consent limits.

3.6 Complaints and incidents

The Rosedale WWTP received no noise-related complaints over the 2024-2025 reporting period.

Two complaints related to nuisance midge activity were received over the 2024-2025 reporting period; the complaints were lodged on the 24th and 25th of September 2024 from separate locations. Midge monitoring undertaken at this time from traps and community surveys did observe an increase in midge numbers. As a response, the frequency of contact spray insecticide application was increased from 3-weekly to 2-weekly. Both complainants were advised of the change via email. No further complaints were received.

Between 23 September and 22 December 2024, Watercare received a total of seventeen odour complaints from the Unsworth Heights residential area alleging odour disturbance from the WWTP. During this time there were no changes in treatment processes and no activities out of the ordinary occurring on site that could have attributed excessive odour. Weekly and monthly odour monitoring continued throughout this period with no excessive odours detected. Additional investigations carried out in response to the complaints between October 2024 and January 2025, which included site inspections and odour scouting downwind of the plant, identified a number of unsealed wastewater transmission manholes around the area of the Northern Corridor Improvement project that were the likely source of the odour disturbance. Commissioning of the East Coast Bay link in June-July 2024 changed the flows through the pipes in this area, which was causing stronger odour emissions from the manholes. Replacement of manhole seals was completed by March 2025, and no further complaints have been received since this work was completed. The community was updated of results of the investigation via a post on the Unsworth Heights Community Facebook Group.

Four incidents relating to the release of unburnt biogas occurred over the reporting period – these were reported to AC at the time:

- Saturday 30 November 2024:

  An electrical issue with the uninterrupted power supply (UPS) circuit breaker resulted in a power loss to the entire cogeneration and flare systems. As a result of the power loss, the flare vent valves went to their fail-safe open position for a period of approximately 1 hour and 13 minutes, leading to the release of 1,200 Nm^3 of unburnt biogas.

  As a resolution to prevent recurrence, the circuit breaker was replaced in May 2025.

- Monday 2 December 2024: Lasted approximately 1 hour, with a total release of 321 Nm^3.

  During the routine flare exercise, it was noticed that the flare was shutting down due to low flow. The low flow was caused by one of the main shut-off valves not opening. Instrument technicians were called out to repair, and they found that a solenoid needed replacement. To carry out the repair, the power to the flare electrical panel was turned off, causing the flare vent valves to go to the open fail-safe position. Vent valves were open for approximately 1 hour and 3 minutes, with the engine running for most of that duration releasing 321 Nm^3 of unburnt biogas.

- Sunday 18 May 2025: Lasted approximately 9 hours, with a total release of 3,132 Nm^3.

- Friday 23 May 2025: Lasted 40 minutes, with a release of 232 Nm^3.

  In both May 2025 instances, duty operators in the Control Room were alerted to a significant reduction in the biogas flow to the flare. Investigations by the Operations and Maintenance teams

concluded that emergency maintenance was required to prevent a potentially sustained and uncontrolled release. This maintenance work required a temporary shutdown of the flare system, which, due to limited biogas storage capacity available within the treatment process, resulted in release of unburnt biogas to the atmosphere.

Post-incident investigations identified a blockage in the flare flame arrester caused by sand-like particulate matter, which restricted flow to the flare. Further tracing identified the source of the material as a blower unit that had not been in service for several years. This blower was recently exercised as part of a control system testing activity under an automation upgrade project. It is likely that operating the rarely used blower dislodged residual particulates, which were subsequently entrained into the flare flame arrester, resulting in flow obstruction.

The flare line, blower and flame arrester were cleaned, and the suspected source of the particulate material was addressed. Measures have been implemented to prevent recurrence, including enhanced monitoring and more frequent preventive maintenance and inspection routines for the flare system and associated equipment.

The main risk from the release of unburnt biogas is its flammability (i.e., before dispersion into the atmosphere), which was managed during the incidents above. As biogas is predominantly methane, which is non-toxic but an asphyxiant in confined spaces, the releases did not result in any localised or short-term adverse environmental or health effects. Preventive measures, including enhanced monitoring and more frequent maintenance of the flare system, have been implemented to reduce the likelihood of recurrence.

There are no other incidents to report which required corrective action.

3.7 Summary of compliance

Appendix F lists a condition-by-condition assessment of compliance for the Rosedale WWTP.

4 CONCLUSION

The 2024–2025 reporting period demonstrated consistent and effective compliance at the Rosedale WWTP with all relevant discharge limits in the consent conditions. The plant successfully managed both effluent quality and discharge volumes, remaining within the consented limits for all key parameters, including biochemical oxygen demand, total suspended solids, and nitrogen compounds.

Air quality and environmental monitoring reports also confirmed that emissions from the plant were controlled and did not adversely impact the surrounding environment. A spike in odour complaints in late 2024 from around the Unsworth Heights residential area, that were attributed to the plant, were found to be related to the wastewater transmission network and corrective works resolved the issue.

The 2-yearly community odour survey was completed during this reporting period and the report was provided to council previously. The survey found that, whilst there was an increase in the proportion of respondents that were impacted by odour compared to previous surveys, the total number affected was consistent with previous surveys. Therefore, the increase in proportion was attributed to sampling bias (i.e. those that were affected were more likely to respond to the survey). The majority of respondents impacted came from the Unsworth Heights area and it is considered the recent transmission line odour issues could have impacted survey responses from this area.

Two complaints in September 2024 related to disturbance from midges were resolved through increased frequency of insecticide spraying at the time. There were no major environmental incidents during the reporting period.

In addition, four incidents involving the release of unburnt biogas from the flare system occurred during the reporting period. These were promptly reported to AC, investigated, and corrective measures implemented. The incidents did not result in any adverse environmental or health effects, and preventive actions have been adopted to minimise the risk of recurrence.

A 5-yearly microbial risk assessment of the area surrounding the discharge outfall was undertaken during this reporting period and provided to council previously. The assessment conservatively determined Rosedale WWTP is achieving sufficient viral removal through treatment to reduce health risks from contact recreation (swimming) and shellfish consumption within the receiving environment to a safe level.

Appendix A. Supplementary Data

This report for the period of Midnight, 01/07/24 to Midnight, 01/08/24 passed

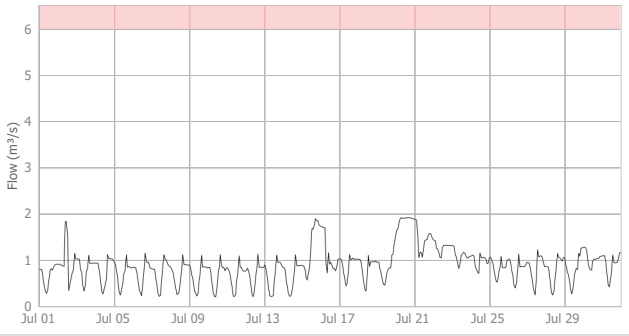
Effluent flows

Day	Maximum flow rate (≤6 m³/s)	Average flow rate (m³/s)	Total volume (m³/day)
1 Jul	0.9	0.6	55,156
2 Jul	1.8	0.8	71,778
3 Jul	1.1	0.8	65,515
4 Jul	1.1	0.7	59,000
5 Jul	1.1	0.6	55,167
6 Jul	1.2	0.7	56,715
7 Jul	1.1	0.7	56,533
8 Jul	1.1	0.6	54,464
9 Jul	1.1	0.6	51,853
10 Jul	1.1	0.6	51,534
11 Jul	1.1	0.6	50,476
12 Jul	1.1	0.6	53,326
13 Jul	1.1	0.6	52,106
14 Jul	1.1	0.6	50,640
15 Jul	1.9	1.2	103,167
16 Jul	1.7	1	89,220
17 Jul	1.1	0.8	71,326
18 Jul	1.1	0.8	66,376
19 Jul	1.4	0.8	66,821
20 Jul	1.9	1.8	157,019
21 Jul	1.9	1.4	119,366
22 Jul	1.4	1.2	107,372
23 Jul	1.3	1	89,949
24 Jul	1.2	0.9	78,805
25 Jul	1.1	0.8	67,545
26 Jul	1.1	0.7	63,138
27 Jul	1.2	0.7	64,041
28 Jul	1.1	0.7	61,133
29 Jul	1.3	0.7	61,901
30 Jul	1.3	1	86,026
31 Jul	1.2	0.8	71,676

Consent conditions

Condition 4
The maximum discharge rate of treated effluent shall be 6 m³/s.
Condition 6
The above parameters, and any others, are to be monitored, analysed and reported generally in accordance with Technical Report 33 submitted in support of this application. Note - flow, six-monthly and annual parameters are on separate batch reports.
Monitoring requirements specific to this batch report are:
Daily
Flow (m³/day)
Consent
23799 / CST60260652 - https://app.infrastructuredata.nz/Consents/24/4969
Devices
DTROS - PI https://app.infrastructuredata.nz/WTD/Devices/6481)

Flow trend



This report for the period of Midnight, 01/08/24 to Midnight, 01/09/24 passed

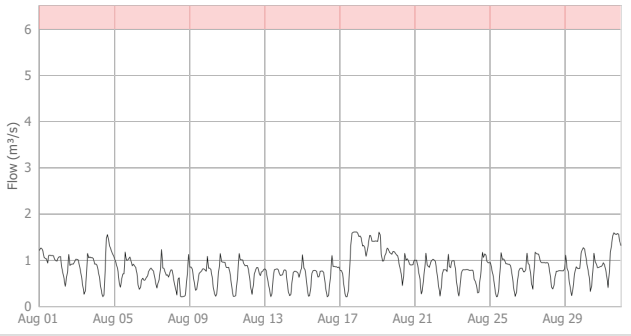
Effluent flows

Day	Maximum flow rate (≤6 m³/s)	Average flow rate (m³/s)	Total volume (m³/day)
1 Aug	1.3	1.1	90,916
2 Aug	1.1	0.8	69,184
3 Aug	1.1	0.8	64,809
4 Aug	1.6	0.8	70,449
5 Aug	1.2	0.8	65,917
6 Aug	0.9	0.6	53,540
7 Aug	1.2	0.6	55,299
8 Aug	0.8	0.4	34,264
9 Aug	1.1	0.7	56,506
10 Aug	1.1	0.7	56,557
11 Aug	1.1	0.6	54,698
12 Aug	0.9	0.6	54,482
13 Aug	0.8	0.6	50,482
14 Aug	0.8	0.6	49,218
15 Aug	1.1	0.6	50,762
16 Aug	1.1	0.6	53,472
17 Aug	1.6	0.9	75,640
18 Aug	1.5	1.3	115,078
19 Aug	1.6	1.1	98,092
20 Aug	1.1	0.8	72,182
21 Aug	1.2	0.7	63,095
22 Aug	1.1	0.7	58,315
23 Aug	1	0.7	57,259
24 Aug	1.2	0.7	60,934
25 Aug	1.2	0.7	57,508
26 Aug	1.1	0.6	53,975
27 Aug	1.2	0.8	71,635
28 Aug	0.9	0.7	58,298
29 Aug	1.2	0.7	57,575
30 Aug	1.2	0.8	67,494
31 Aug	1.6	1.1	92,441

Consent conditions

Condition 4
The maximum discharge rate of treated effluent shall be 6 m³/s.
Condition 6
The above parameters, and any others, are to be monitored, analysed and reported generally in accordance with Technical Report 33 submitted in support of this application. Note - flow, six-monthly and annual parameters are on separate batch reports.
Monitoring requirements specific to this batch report are:
Daily
Flow (m³/day)
Consent
23799 / CST60260652 - https://app.infrastructuredata.nz/Consents/24/4969
Devices
DTROS - PI https://app.infrastructuredata.nz/WTD/Devices/6481)

Flow trend



This report for the period of Midnight, 01/09/24 to Midnight, 01/10/24 passed

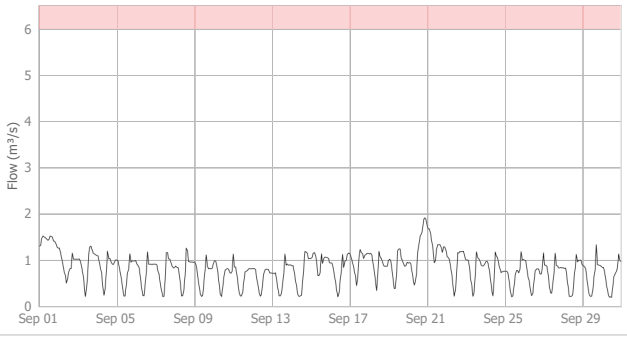
Effluent flows

Day	Maximum flow rate (≤6 m³/s)	Average flow rate (m³/s)	Total volume (m³/day)
1 Sep	1.5	1.4	120,270
2 Sep	1.3	0.8	73,341
3 Sep	1.3	0.8	71,722
4 Sep	1.2	0.8	66,325
5 Sep	1.1	0.7	58,784
6 Sep	1.2	0.7	58,579
7 Sep	1.2	0.7	57,415
8 Sep	1.3	0.7	59,557
9 Sep	1.1	0.6	53,859
10 Sep	1	0.6	54,638
11 Sep	1.1	0.6	49,595
12 Sep	0.8	0.6	50,816
13 Sep	1.1	0.6	52,107
14 Sep	1.2	0.7	56,546
15 Sep	1.2	0.9	79,597
16 Sep	1.2	0.7	60,429
17 Sep	1.2	0.9	76,167
18 Sep	1.2	0.8	70,881
19 Sep	1.2	0.8	69,443
20 Sep	1.9	1.1	95,332
21 Sep	1.7	1.2	107,508
22 Sep	1.2	0.8	70,759
23 Sep	1.2	0.7	64,124
24 Sep	1.2	0.7	59,760
25 Sep	1.2	0.6	52,659
26 Sep	1.2	0.6	53,314
27 Sep	1.1	0.7	57,570
28 Sep	1	0.6	52,406
29 Sep	1.3	0.6	51,701
30 Sep	1.1	0.5	46,049

Consent conditions

Condition 4
The maximum discharge rate of treated effluent shall be 6 m³/s.
Condition 6
The above parameters, and any others, are to be monitored, analysed and reported generally in accordance with Technical Report 33 submitted in support of this application. Note - flow, six-monthly and annual parameters are on separate batch reports.
Monitoring requirements specific to this batch report are:
Daily
Flow (m³/day)
Consent
23799 / CST60260652 - https://app.infrastructuredata.nz/Consents/24/4969
Devices
DTROS - PI https://app.infrastructuredata.nz/WTD/Devices/6481)

Flow trend



This report for the period of Midnight, 01/10/24 to Midnight, 01/11/24 passed

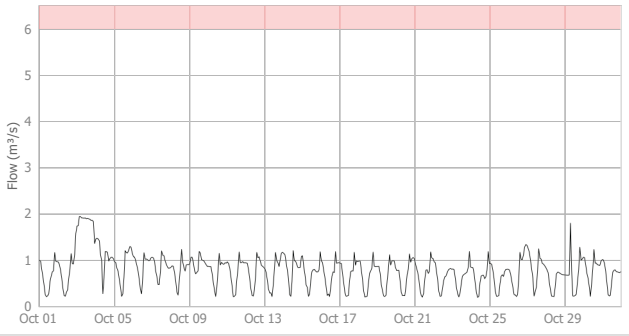
Effluent flows

Day	Maximum flow rate (≤6 m³/s)	Average flow rate (m³/s)	Total volume (m³/day)
1 Oct	1.2	0.6	50,804
2 Oct	1.5	0.6	55,585
3 Oct	1.9	1.8	154,738
4 Oct	1.5	1	85,690
5 Oct	1.3	0.8	67,733
6 Oct	1.2	0.8	67,669
7 Oct	1.2	0.8	68,974
8 Oct	1.2	0.7	58,881
9 Oct	1.2	0.8	73,391
10 Oct	1.1	0.7	59,974
11 Oct	1.2	0.7	58,046
12 Oct	1.2	0.7	57,210
13 Oct	1.2	0.7	56,449
14 Oct	1.2	0.7	63,469
15 Oct	1.2	0.6	54,173
16 Oct	1.2	0.6	52,606
17 Oct	1.2	0.6	52,252
18 Oct	1.2	0.6	52,066
19 Oct	1.1	0.6	52,892
20 Oct	1.1	0.6	52,108
21 Oct	1.2	0.6	52,200
22 Oct	1	0.6	50,491
23 Oct	1.2	0.6	48,455
24 Oct	1.2	0.6	48,441
25 Oct	0.9	0.6	48,790
26 Oct	1.3	0.7	56,878
27 Oct	1.3	0.8	66,211
28 Oct	0.8	0.5	45,705
29 Oct	1.8	0.6	53,274
30 Oct	1.2	0.7	63,324
31 Oct	1	0.6	52,283

Consent conditions

Condition 4
The maximum discharge rate of treated effluent shall be 6 m³/s.
Condition 6
The above parameters, and any others, are to be monitored, analysed and reported generally in accordance with Technical Report 33 submitted in support of this application. Note - flow, six-monthly and annual parameters are on separate batch reports.
Monitoring requirements specific to this batch report are:
Daily
Flow (m³/day)
Consent
23799 / CST60260652 - https://app.infrastructuredata.nz/Consents/24/4969
Devices
DTROS - PI https://app.infrastructuredata.nz/WTD/Devices/6481)

Flow trend



This report for the period of Midnight, 01/11/24 to Midnight, 01/12/24 passed

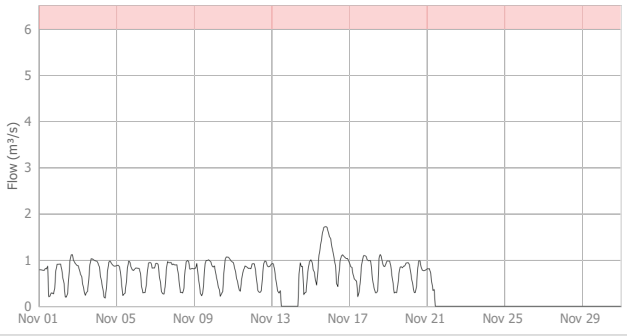
Effluent flows

Day	Maximum flow rate (≤6 m³/s)	Average flow rate (m³/s)	Total volume (m³/day)
1 Nov	0.9	0.6	48,984
2 Nov	1.1	0.7	59,335
3 Nov	1	0.6	55,323
4 Nov	1	0.6	56,053
5 Nov	1	0.6	55,336
6 Nov	0.9	0.6	54,521
7 Nov	1	0.7	57,042
8 Nov	1	0.6	55,718
9 Nov	1	0.7	58,320
10 Nov	1.1	0.7	57,591
11 Nov	0.9	0.7	57,732
12 Nov	1	0.7	56,802
13 Nov	0.9	0.2	20,649
14 Nov	1	0.2	20,465
15 Nov	1.7	1.1	97,724
16 Nov	1.5	0.9	80,403
17 Nov	1.1	0.7	60,231
18 Nov	1.1	0.7	57,115
19 Nov	1	0.6	56,130
20 Nov	1	0.6	55,283
21 Nov	0.8	0.2	20,145
22 Nov	0	0	0
23 Nov	0	0	0
24 Nov	0	0	0
25 Nov	0	0	0
26 Nov	0	0	0
27 Nov	0	0	0
28 Nov	0	0	0
29 Nov	0	0	0
30 Nov	0	0	0

Consent conditions

Condition 4
The maximum discharge rate of treated effluent shall be 6 m³/s.
Condition 6
The above parameters, and any others, are to be monitored, analysed and reported generally in accordance with Technical Report 33 submitted in support of this application. Note - flow, six-monthly and annual parameters are on separate batch reports.
Monitoring requirements specific to this batch report are:
Daily
Flow (m³/day)
Consent
23799 / CST60260652 - https://app.infrastructuredata.nz/Consents/24/4969
Devices
DTROS - PI https://app.infrastructuredata.nz/WTD/Devices/6481)

Flow trend



This report for the period of Midnight, 01/12/24 to Midnight, 01/01/25 passed

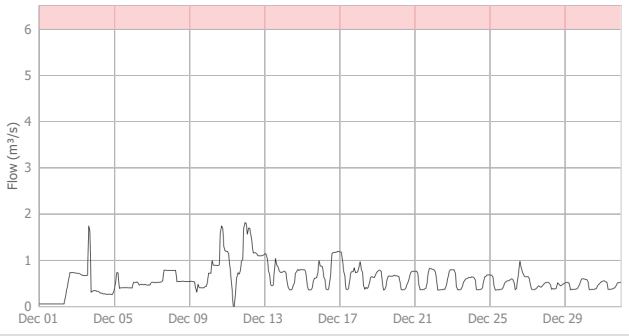
Effluent flows

Day	Maximum flow rate (≤6 m³/s)	Average flow rate (m³/s)	Total volume (m³/day)
1 Dec	0.1	0.1	4,456
2 Dec	0.7	0.4	32,835
3 Dec	1.7	0.6	55,463
4 Dec	0.3	0.3	23,068
5 Dec	0.7	0.4	35,120
6 Dec	0.5	0.5	39,342
7 Dec	0.8	0.6	51,025
8 Dec	0.8	0.6	51,728
9 Dec	0.5	0.4	35,677
10 Dec	1.7	1	84,778
11 Dec	1.8	0.7	59,771
12 Dec	1.8	1.3	108,868
13 Dec	1.1	0.7	63,163
14 Dec	0.8	0.6	48,894
15 Dec	1	0.6	49,199
16 Dec	1.2	0.8	67,338
17 Dec	1.2	0.7	59,010
18 Dec	1	0.6	47,820
19 Dec	0.8	0.6	50,348
20 Dec	0.8	0.5	45,440
21 Dec	0.8	0.5	46,714
22 Dec	0.8	0.5	42,656
23 Dec	0.8	0.5	44,313
24 Dec	0.7	0.5	42,976
25 Dec	0.7	0.4	38,849
26 Dec	1	0.6	49,565
27 Dec	0.6	0.4	36,064
28 Dec	0.5	0.4	36,751
29 Dec	0.6	0.4	36,839
30 Dec	0.6	0.4	37,472
31 Dec	0.6	0.4	37,033

Consent conditions

Condition 4
The maximum discharge rate of treated effluent shall be 6 m³/s.
Condition 6
The above parameters, and any others, are to be monitored, analysed and reported generally in accordance with Technical Report 33 submitted in support of this application. Note - flow, six-monthly and annual parameters are on separate batch reports.
Monitoring requirements specific to this batch report are:
Daily
Flow (m³/day)
Consent
23799 / CST60260652 - https://app.infrastructuredata.nz/Consents/24/4969
Devices
DTROS - PI https://app.infrastructuredata.nz/WTD/Devices/6481)

Flow trend



This report for the period of Midnight, 01/01/25 to Midnight, 01/02/25 passed

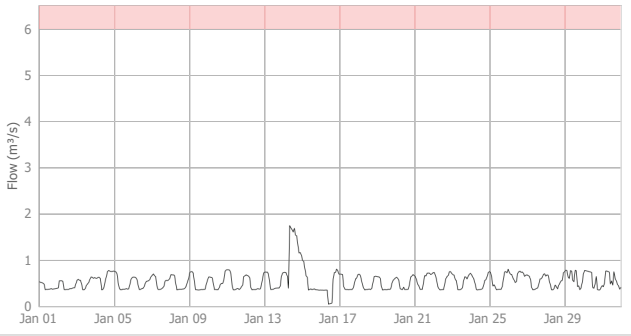
Effluent flows

Day	Maximum flow rate (≤6 m³/s)	Average flow rate (m³/s)	Total volume (m³/day)
1 Jan	0.5	0.4	33,969
2 Jan	0.6	0.4	34,601
3 Jan	0.6	0.5	41,869
4 Jan	0.8	0.6	50,502
5 Jan	0.8	0.4	38,795
6 Jan	0.6	0.5	41,216
7 Jan	0.7	0.5	41,469
8 Jan	0.7	0.4	38,661
9 Jan	0.8	0.4	38,654
10 Jan	0.8	0.5	41,809
11 Jan	0.8	0.5	41,820
12 Jan	0.7	0.4	38,757
13 Jan	0.7	0.5	40,677
14 Jan	1.7	1.1	96,102
15 Jan	1	0.5	41,979
16 Jan	0.8	0.4	30,342
17 Jan	0.7	0.5	39,406
18 Jan	0.7	0.5	39,894
19 Jan	0.6	0.4	37,984
20 Jan	0.7	0.5	39,420
21 Jan	0.7	0.5	47,320
22 Jan	0.7	0.5	44,891
23 Jan	0.7	0.5	43,976
24 Jan	0.7	0.5	40,685
25 Jan	0.8	0.5	42,154
26 Jan	0.8	0.6	55,266
27 Jan	0.7	0.5	42,363
28 Jan	0.7	0.5	40,537
29 Jan	0.8	0.5	46,946
30 Jan	0.8	0.5	45,406
31 Jan	0.8	0.5	41,480

Consent conditions

Condition 4
The maximum discharge rate of treated effluent shall be 6 m³/s.
Condition 6
The above parameters, and any others, are to be monitored, analysed and reported generally in accordance with Technical Report 33 submitted in support of this application. Note - flow, six-monthly and annual parameters are on separate batch reports.
Monitoring requirements specific to this batch report are:
Daily
Flow (m³/day)
Consent
23799 / CST60260652 - https://app.infrastructuredata.nz/Consents/24/4969
Devices
DTROS - PI https://app.infrastructuredata.nz/WTD/Devices/6481)

Flow trend



This report for the period of Midnight, 01/02/25 to Midnight, 01/03/25 passed

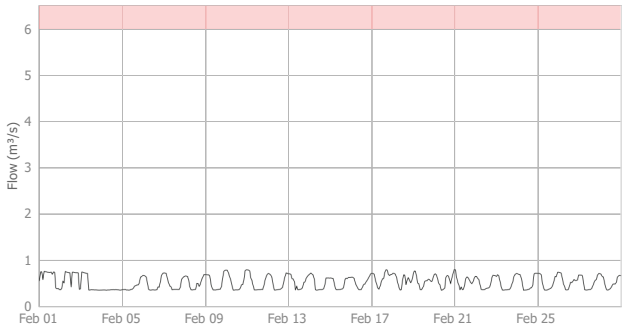
Effluent flows

Day	Maximum flow rate (≤6 m³/s)	Average flow rate (m³/s)	Total volume (m³/day)
1 Feb	0.8	0.6	49,187
2 Feb	0.8	0.6	48,363
3 Feb	0.7	0.4	37,237
4 Feb	0.4	0.3	29,639
5 Feb	0.7	0.4	35,019
6 Feb	0.7	0.5	39,297
7 Feb	0.7	0.5	39,452
8 Feb	0.7	0.5	40,729
9 Feb	0.8	0.5	42,128
10 Feb	0.8	0.5	42,365
11 Feb	0.8	0.5	40,970
12 Feb	0.7	0.5	41,882
13 Feb	0.7	0.5	41,663
14 Feb	0.7	0.5	41,537
15 Feb	0.6	0.5	40,350
16 Feb	0.7	0.5	41,969
17 Feb	0.8	0.6	50,156
18 Feb	0.7	0.5	44,988
19 Feb	0.8	0.5	44,175
20 Feb	0.8	0.5	44,918
21 Feb	0.8	0.5	42,605
22 Feb	0.7	0.5	40,692
23 Feb	0.7	0.5	40,249
24 Feb	0.7	0.5	42,721
25 Feb	0.7	0.5	42,145
26 Feb	0.7	0.5	44,002
27 Feb	0.7	0.5	41,808
28 Feb	0.7	0.5	42,160

Consent conditions

Condition 4
The maximum discharge rate of treated effluent shall be 6 m³/s.
Condition 6
The above parameters, and any others, are to be monitored, analysed and reported generally in accordance with Technical Report 33 submitted in support of this application. Note - flow, six-monthly and annual parameters are on separate batch reports.
Monitoring requirements specific to this batch report are:
Daily
Flow (m³/day)
Consent
23799 / CST60260652 - https://app.infrastructuredata.nz/Consents/24/4969
Devices
DTROS - PI https://app.infrastructuredata.nz/WTD/Devices/6481)

Flow trend



This report for the period of Midnight, 01/03/25 to Midnight, 01/04/25 passed

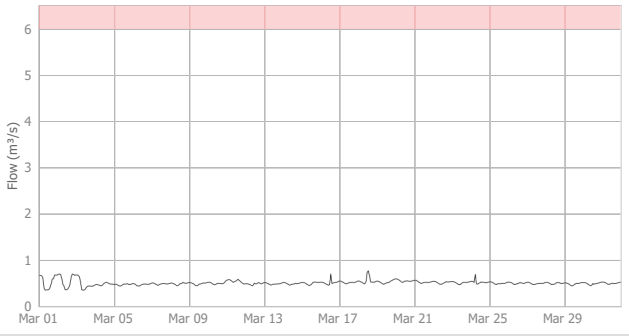
Effluent flows

Day	Maximum flow rate (≤6 m³/s)	Average flow rate (m³/s)	Total volume (m³/day)
1 Mar	0.7	0.5	43,647
2 Mar	0.7	0.5	45,217
3 Mar	0.7	0.4	38,116
4 Mar	0.5	0.5	40,557
5 Mar	0.5	0.4	38,821
6 Mar	0.5	0.5	39,567
7 Mar	0.5	0.5	40,824
8 Mar	0.5	0.5	41,107
9 Mar	0.5	0.5	40,995
10 Mar	0.5	0.5	41,915
11 Mar	0.6	0.5	45,570
12 Mar	0.5	0.5	39,254
13 Mar	0.5	0.5	41,394
14 Mar	0.5	0.5	41,712
15 Mar	0.5	0.5	42,086
16 Mar	0.7	0.5	42,397
17 Mar	0.5	0.5	43,933
18 Mar	0.8	0.5	44,745
19 Mar	0.6	0.5	43,077
20 Mar	0.6	0.5	46,620
21 Mar	0.6	0.5	44,598
22 Mar	0.5	0.5	43,699
23 Mar	0.5	0.5	43,132
24 Mar	0.7	0.5	43,466
25 Mar	0.5	0.5	42,515
26 Mar	0.5	0.5	42,402
27 Mar	0.5	0.5	41,949
28 Mar	0.5	0.5	41,939
29 Mar	0.5	0.5	41,107
30 Mar	0.5	0.5	41,277
31 Mar	0.5	0.5	42,251

Consent conditions

Condition 4
The maximum discharge rate of treated effluent shall be 6 m³/s.
Condition 6
The above parameters, and any others, are to be monitored, analysed and reported generally in accordance with Technical Report 33 submitted in support of this application. Note - flow, six-monthly and annual parameters are on separate batch reports.
Monitoring requirements specific to this batch report are:
Daily
Flow (m³/day)
Consent
23799 / CST60260652 - https://app.infrastructuredata.nz/Consents/24/4969
Devices
DTROS - PI https://app.infrastructuredata.nz/WTD/Devices/6481)

Flow trend



This report for the period of Midnight, 01/04/25 to Midnight, 01/05/25 passed

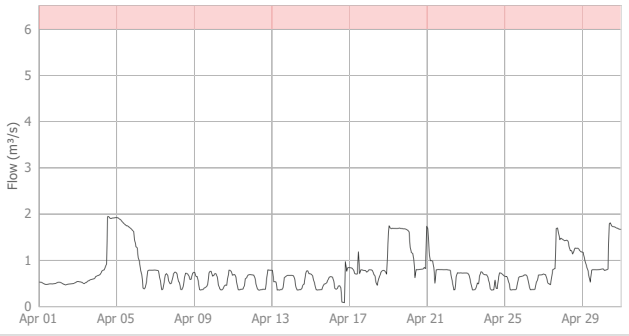
Effluent flows

Day	Maximum flow rate (≤6 m³/s)	Average flow rate (m³/s)	Total volume (m³/day)
1 Apr	0.5	0.5	41,891
2 Apr	0.5	0.5	41,699
3 Apr	0.7	0.5	46,477
4 Apr	1.9	1.2	107,853
5 Apr	1.9	1.7	147,614
6 Apr	1.3	0.7	64,041
7 Apr	0.8	0.6	48,665
8 Apr	0.7	0.6	48,825
9 Apr	0.8	0.5	43,199
10 Apr	0.8	0.5	45,028
11 Apr	0.7	0.5	44,034
12 Apr	0.8	0.5	42,916
13 Apr	0.8	0.5	43,975
14 Apr	0.8	0.5	44,382
15 Apr	0.7	0.5	39,391
16 Apr	1	0.4	34,804
17 Apr	1.2	0.7	59,949
18 Apr	0.8	0.7	57,542
19 Apr	1.7	1.6	141,197
20 Apr	1.6	0.9	81,089
21 Apr	1.7	0.9	73,932
22 Apr	0.8	0.6	54,908
23 Apr	0.7	0.5	46,681
24 Apr	0.7	0.5	43,569
25 Apr	0.7	0.5	42,181
26 Apr	0.7	0.5	44,654
27 Apr	1.7	0.9	78,169
28 Apr	1.4	1.2	107,180
29 Apr	1.2	0.8	67,771
30 Apr	1.8	1.3	113,186

Consent conditions

Condition 4
The maximum discharge rate of treated effluent shall be 6 m³/s.
Condition 6
The above parameters, and any others, are to be monitored, analysed and reported generally in accordance with Technical Report 33 submitted in support of this application. Note - flow, six-monthly and annual parameters are on separate batch reports.
Monitoring requirements specific to this batch report are:
Daily
Flow (m³/day)
Consent
23799 / CST60260652 - https://app.infrastructuredata.nz/Consents/24/4969
Devices
DTROS - PI https://app.infrastructuredata.nz/WTD/Devices/6481)

Flow trend



This report for the period of Midnight, 01/05/25 to Midnight, 01/06/25 passed

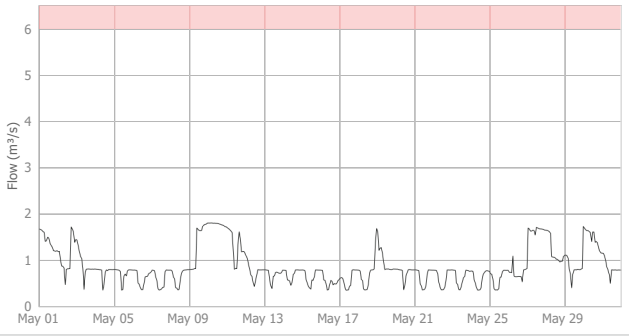
Effluent flows

Day	Maximum flow rate (≤6 m³/s)	Average flow rate (m³/s)	Total volume (m³/day)
1 May	1.7	1.4	118,583
2 May	1.7	1	86,356
3 May	1.4	0.8	72,980
4 May	0.8	0.7	60,114
5 May	0.8	0.7	57,142
6 May	0.8	0.6	50,250
7 May	0.8	0.6	49,052
8 May	0.8	0.6	52,358
9 May	1.8	1.3	113,637
10 May	1.8	1.8	152,170
11 May	1.7	1.2	104,931
12 May	1.1	0.7	61,884
13 May	0.8	0.7	56,527
14 May	0.8	0.7	57,441
15 May	0.8	0.6	52,349
16 May	0.8	0.5	43,133
17 May	0.8	0.6	47,697
18 May	1.7	0.6	54,012
19 May	1.7	0.9	80,076
20 May	0.8	0.7	59,343
21 May	0.8	0.6	51,685
22 May	0.8	0.6	50,407
23 May	0.8	0.6	51,626
24 May	0.8	0.6	49,071
25 May	0.8	0.6	48,947
26 May	1.1	0.6	54,363
27 May	1.7	1.6	135,457
28 May	1.6	1.2	100,010
29 May	1.1	0.8	68,181
30 May	1.7	1.4	121,843
31 May	1.2	0.8	68,472

Consent conditions

Condition 4
The maximum discharge rate of treated effluent shall be 6 m³/s.
Condition 6
The above parameters, and any others, are to be monitored, analysed and reported generally in accordance with Technical Report 33 submitted in support of this application. Note - flow, six-monthly and annual parameters are on separate batch reports.
Monitoring requirements specific to this batch report are:
Daily
Flow (m³/day)
Consent
23799 / CST60260652 - https://app.infrastructuredata.nz/Consents/24/4969
Devices
DTROS - PI https://app.infrastructuredata.nz/WTD/Devices/6481)

Flow trend



This report for the period of Midnight, 01/06/25 to Midnight, 01/07/25 passed

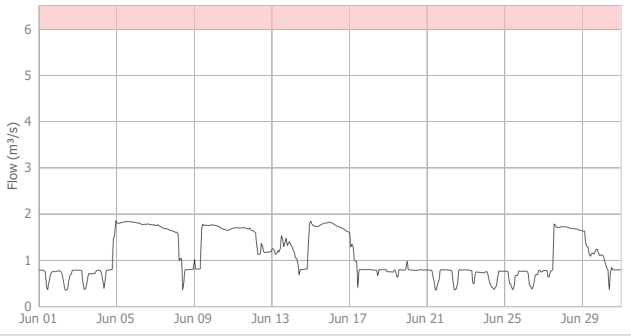
Effluent flows

Day	Maximum flow rate (≤6 m³/s)	Average flow rate (m³/s)	Total volume (m³/day)
1 Jun	0.8	0.7	57,067
2 Jun	0.8	0.6	52,637
3 Jun	0.8	0.6	53,858
4 Jun	1.9	0.7	60,788
5 Jun	1.8	1.8	155,146
6 Jun	1.8	1.8	151,937
7 Jun	1.8	1.7	144,023
8 Jun	1.6	0.9	78,858
9 Jun	1.8	1.3	113,598
10 Jun	1.8	1.7	144,468
11 Jun	1.7	1.7	144,014
12 Jun	1.6	1.2	107,103
13 Jun	1.5	1.2	104,305
14 Jun	1.8	0.8	73,223
15 Jun	1.8	1.8	151,349
16 Jun	1.8	1.7	146,433
17 Jun	1.6	0.9	75,596
18 Jun	0.8	0.7	64,019
19 Jun	1	0.7	62,451
20 Jun	1	0.8	66,966
21 Jun	0.8	0.6	55,286
22 Jun	0.8	0.7	56,232
23 Jun	0.8	0.7	59,337
24 Jun	0.8	0.6	49,279
25 Jun	0.8	0.6	52,093
26 Jun	0.8	0.6	51,970
27 Jun	1.8	1.1	98,696
28 Jun	1.7	1.7	144,068
29 Jun	1.6	1.2	105,146
30 Jun	1.1	0.8	67,649

Consent conditions

Condition 4
The maximum discharge rate of treated effluent shall be 6 m³/s.
Condition 6
The above parameters, and any others, are to be monitored, analysed and reported generally in accordance with Technical Report 33 submitted in support of this application. Note - flow, six-monthly and annual parameters are on separate batch reports.
Monitoring requirements specific to this batch report are:
Daily
Flow (m³/day)
Consent
23799 / CST60260652 - https://app.infrastructuredata.nz/Consents/24/4969
Devices
DTROS - PI https://app.infrastructuredata.nz/WTD/Devices/6481)

Flow trend



This report for the period of Midnight, 01/07/24 to Midnight, 01/10/24 passed

Daily-weekly grab samples

Day	DO (g O_2/m^3)	Temperature (°C)	pH	TSS / NFR (g/m^3)	Faecal coliforms (cfu/100mL)	Enterococci (cfu/100 mL)	Total BOD_5 (g O_2/m^3)
1 Jul	8.32	13.5	7.07	7.6	1.6	1.6	---
2 Jul	7.42	13.8	7.06	4.6	1.6	1.7	---
3 Jul	9.01	13.1	7.62	3.8	1.6	1.6	1.9
8 Jul	8.65	12.4	7.9	6	1.6	1.6	---
9 Jul	7.99	13.2	7.69	2.4	1.6	1.6	---
10 Jul	7.96	12.7	7.78	---	1.6	1.6	0.67
15 Jul	7.75	12.7	7.36	6.4	1.6	1.6	---
16 Jul	7.78	12.9	7.66	7	1.6	1.6	---
17 Jul	8.09	13.9	7.66	3.4	1.6	1.6	0.77
22 Jul	8.03	14	7.78	3.8	1.6	1.6	---
23 Jul	8.13	13.9	7.8	3.4	1.6	1.6	---
24 Jul	8.05	13.7	7.83	5.2	1.6	1.6	0.82
29 Jul	7.28	13.9	7.21	0	1.6	1.6	---
30 Jul	8.02	14.3	7.03	0	1.6	1.6	---
31 Jul	8.1	14	7.08	4	---	---	1.1
1 Aug	---	---	---	---	4.9	1.6	---
5 Aug	8.59	13	7.17	0	1.6	1.6	---
6 Aug	8.02	22.5	7.21	4.2	1.6	1.6	---
7 Aug	9.05	13	7.01	5.4	1.6	1.6	0.66
12 Aug	10.35	12.2	7.16	3.2	4.9	23	---
13 Aug	8.9	12.9	7.74	1.2	4.9	1.6	---
14 Aug	13.06	12.6	7.14	3.6	140	25	1.8
19 Aug	8.36	14.1	7.18	8.4	2,600	590	---
20 Aug	11.21	9.9	7.38	4.4	1.6	1.6	---
21 Aug	8.92	13.3	7.69	4.6	9.1	1.6	0.52
26 Aug	8.06	14.7	6.99	1	1.6	1.6	---
27 Aug	10	15	7.45	5.6	1.6	1.6	---
28 Aug	9.26	18	6.84	7.6	1.6	1.6	1.1
2 Sep	8.93	16.4	6.91	4.2	1.6	1.6	---
3 Sep	9.03	16.5	6.96	2	1.6	1.6	---
4 Sep	8.43	16.3	7.03	2.8	1.6	1.6	0.55
9 Sep	9.22	14.8	7.08	5.8	9.8	3.3	---
10 Sep	8.61	16.8	7.06	0	1.6	1.6	---
11 Sep	8.68	15.2	7.66	4.2	1.6	1.6	0.72
16 Sep	8.33	15.7	7.42	4	1.6	1.6	---
17 Sep	11.18	9.8	7.99	6.6	1.6	1.6	---
18 Sep	8.91	13.8	7.22	5.8	1.6	1.6	2
23 Sep	7.94	16.5	7.97	3	1.6	1.6	---
24 Sep	8.24	16.3	7.92	5.2	1.6	1.6	---
25 Sep	8.28	15.8	7.22	1	1.6	1.6	0.71
30 Sep	8.84	15.4	7.26	3	1.6	1.6	---

This report for the period of Midnight, 01/10/24 to Midnight, 01/01/25 passed

Daily-weekly grab samples

Day	DO (g O_2/m^3)	Temperature (°C)	pH	TSS / NFR (g/m^3)	Faecal coliforms (cfu/100mL)	Enterococci (cfu/100 mL)	Total BOD_5 (g O_2/m^3)
1 Oct	8.25	16.7	7.28	1	1.6	1.6	---
2 Oct	7.8	17.4	7.28	3.8	1.6	1.6	0.7
7 Oct	7.84	17.8	7.39	4.8	1.6	1.6	---
8 Oct	8.48	17.2	7.3	5.4	1.6	1.6	---
9 Oct	8.19	18	7.44	15	1.6	1.6	0.57
10 Oct	7.96	17.1	7.63	---	---	---	---
11 Oct	9.05	10.5	7.29	---	---	---	---
14 Oct	---	---	---	6.4	1.6	1.6	---
15 Oct	8.35	16.4	8.72	4.6	8.2	1.6	---
16 Oct	8.84	15.9	7.47	6.8	1.6	1.6	0.54
17 Oct	8.75	17.5	7.37	---	---	---	---
18 Oct	8.08	18.1	7.29	---	---	---	---
21 Oct	8.82	18.1	---	5.4	1.6	1.6	---
22 Oct	8.44	17.9	7.77	5.8	1.6	1.6	---
23 Oct	8.3	18.1	7.56	3.6	1.6	1.6	0.63
24 Oct	8.09	18	7.96	---	---	---	---
25 Oct	8.09	19	7.31	---	---	---	---
29 Oct	11.21	17.9	8	5.2	1.6	1.6	---
30 Oct	10.6	0	8.01	14	50	20	1.4
31 Oct	11.29	18.05	8.06	5.6	1.6	1.6	---
1 Nov	12.58	18.1	8.13	---	---	---	---
4 Nov	12.49	17.9	6.57	22	1.6	1.6	---
5 Nov	12.24	17.8	5.93	15	1.6	1.6	---
6 Nov	12.12	18.7	8.71	---	1.6	1.6	---
7 Nov	11.56	19.7	8.11	---	---	---	---
8 Nov	9.67	18.9	6.04	---	---	---	---
9 Nov	7.83	19.8	7.5	---	---	---	---
10 Nov	8.84	19.6	7.85	---	---	---	---
11 Nov	9.39	16.5	7.41	0	1.6	1.6	---
12 Nov	8.96	20.6	8.05	4.2	1.6	1.6	---
13 Nov	7.3	20.9	6.97	4.4	1.6	1.6	1.1
14 Nov	7.09	21.3	7.78	---	---	---	---
15 Nov	7.1	21.1	7.02	---	---	---	---
16 Nov	7.14	23.2	6.97	---	---	---	---
17 Nov	8.19	25.6	7.02	---	---	---	---
18 Nov	7.12	23.6	7.44	6.2	1.6	1.6	---
19 Nov	9.59	23.7	7.68	8.2	1.6	1.6	---
20 Nov	9.79	16.3	5.51	9.6	1.6	1.6	1.3
21 Nov	9.4	21.6	7.52	---	---	---	---
22 Nov	9.62	22.5	7.79	---	---	---	---
23 Nov	9.55	21.5	7.72	---	---	---	---
24 Nov	11.69	24.9	8.72	---	---	---	---
25 Nov	9.27	22.5	7.67	9.6	1.6	1.6	---
26 Nov	---	21	7.54	7.2	1.6	1.6	---
27 Nov	8.2	22	7.45	5.6	3.3	1.6	0.79
28 Nov	8.79	21.5	7.78	---	---	---	---
29 Nov	9.89	22.1	7.08	---	---	---	---
2 Dec	7.09	21.3	7.78	4.2	84	4.9	---
3 Dec	7.1	21.1	7.02	3.4	40	3.3	---
4 Dec	7.14	23.2	6.97	7.8	8.2	4.9	1.4
5 Dec	8.19	25.6	7.02	---	---	---	---
6 Dec	7.12	23.6	7.44	---	---	---	---
9 Dec	9.59	0	7.68	10	1.6	1.6	---
10 Dec	9.79	16.3	5.51	15	48	42	---
11 Dec	9.4	21.6	7.52	9.6	---	---	2.7
12 Dec	9.62	22.5	7.79	---	---	---	---
13 Dec	9.55	21.5	7.72	---	---	---	---
16 Dec	11.69	24.9	8.72	14	1.6	68	---
17 Dec	9.27	22.5	7.67	8.6	1.6	1.6	---
18 Dec	8.78	21	7.54	6.4	1.6	100	1.3
19 Dec	8.2	22	7.45	---	---	---	---
20 Dec	8.79	21.5	7.78	---	---	---	---
23 Dec	9.89	22.1	7.08	9	31	1.6	---
24 Dec	7.04	22	7.5	12	1,400	44	---
27 Dec	7.06	22.1	7.61	10	280	76	1.9
30 Dec	7.9	21.5	7.72	9.4	140	44	---
31 Dec	7.65	20.8	7.7	9.8	240	74	---

This report for the period of Midnight, 01/01/25 to Midnight, 01/04/25 passed

Daily-weekly grab samples

Day	DO (g O_2/m^3)	Temperature (°C)	pH	TSS / NFR (g/m^3)	Faecal coliforms (cfu/100mL)	Enterococci (cfu/100 mL)	Total BOD_5 (g O_2/m^3)
3 Jan	7.93	25	7.84	13	320	84	1.9
6 Jan	---	---	---	13	140	38	---
7 Jan	8.23	19.9	7.68	7.8	200	46	---
8 Jan	8.08	20.7	7.74	6.6	220	38	2.1
9 Jan	7.95	20.3	7.74	---	---	---	---
10 Jan	7.75	21.2	7.8	---	---	---	---
13 Jan	7.65	20.9	7.8	6.2	420	84	---
14 Jan	7.66	21	7.61	13	310	52	---
15 Jan	7.8	21.1	7.36	8	2,600	64	1.8
16 Jan	7.09	21.7	7.42	---	---	---	---
17 Jan	8.15	21.9	0	---	---	---	---
20 Jan	8.07	21.3	7.58	13	4,600	120	---
21 Jan	7.92	21	7.47	11	2,800	120	---
22 Jan	7.62	20.2	7.6	15	2,300	250	1.8
23 Jan	8.4	21.2	7.2	---	---	---	---
24 Jan	8.17	21.5	7.67	---	---	---	---
28 Jan	6.42	20.7	7.45	9	350	48	---
29 Jan	5.6	21.6	7.42	8.8	530	54	1.7
30 Jan	6.8	21.2	7.36	7.6	830	50	---
31 Jan	7.8	23.7	7.47	---	---	---	---
3 Feb	4.62	23.5	7.26	4	560	78	---
4 Feb	5.28	23.4	7.28	7.6	640	110	---
5 Feb	7.5	22.2	7.43	11	1,600	290	2.2
7 Feb	5.89	23.6	7.34	---	---	---	---
10 Feb	8.11	23.4	7.64	11	480	100	---
11 Feb	6.21	22	7.29	13	380	120	---
12 Feb	8.01	22.8	7.64	16	450	120	1.6
13 Feb	10.36	23.2	7.42	---	---	---	---
14 Feb	10.3	22.7	8.67	---	---	---	---
17 Feb	8.25	21.8	8.29	21.6	800	170	---
18 Feb	8.55	21.9	8.32	12	370	90	---
19 Feb	9.18	21.8	8.5	15	470	40	2.2
20 Feb	8.16	22.2	8.1	---	---	---	---
21 Feb	8.34	21.8	8.46	---	---	---	---
24 Feb	8.83	22.8	7.46	19	260	94	---
25 Feb	6.23	23.2	7.21	7.4	420	200	---
26 Feb	6.03	22.6	7.5	7.4	460	160	3.9
27 Feb	8.92	23.3	7.8	---	---	---	---
28 Feb	8.53	22.3	7.42	---	---	---	---
3 Mar	8.83	22.83	7.46	7.2	2,600	120	---
4 Mar	6.23	23.2	7.21	7.6	800	250	---
5 Mar	6.03	22.6	7.5	11	610	270	1.5
6 Mar	8.92	23.3	7.52	---	---	---	---
7 Mar	5.56	22.3	7.42	---	---	---	---
10 Mar	7.17	19.8	7.62	8.6	430	150	---
11 Mar	9.46	13.1	7.64	7.4	610	270	---
12 Mar	6.87	21.1	7.6	9	590	490	1.7
13 Mar	6.94	20.1	7.59	---	---	---	---
17 Mar	---	---	---	5.2	20	8.2	---
18 Mar	---	---	---	5.8	4.9	1.6	---
19 Mar	---	---	---	1	4.9	3.3	0.61
24 Mar	---	---	---	5.4	1.6	1.6	---
25 Mar	---	---	---	5.4	1.6	1.6	---
26 Mar	---	---	---	2.8	1.6	1.6	0.79
31 Mar	---	---	---	5.8	11	4.9	---

This report for the period of Midnight, 01/04/25 to Midnight, 01/05/25 passed

Daily-weekly grab samples

Day	DO (g O_2/m^3)	Temperature (°C)	pH	TSS / NFR (g/m^3)	Faecal coliforms (cfu/100mL)	Enterococci (cfu/100 mL)	Total BOD_5 (g O_2/m^3)
1 Apr	7.199999809	20.39999962	7.670000076	4.8	3.3	1.6	---
2 Apr	6.929999828	20.70000076	7.570000172	11	28	16	0.85
3 Apr	6.989999771	20.20000076	7.760000229	---	---	---	---
4 Apr	7.349999905	20	7.460000038	---	---	---	---
7 Apr	7.289999962	19.60000038	7.71999979	8.8	25	1.6	---
8 Apr	7.369999886	19.39999962	7.639999866	4.8	28	16	---
9 Apr	7.340000153	18.39999962	7.429999828	6.2	82	30	1.1
10 Apr	7.809999943	19.5	7.510000229	---	---	---	---
11 Apr	7.639999866	18.4	8.229999542	---	---	---	---
14 Apr	7.630000114	18.5	8.140000343	5.8	28	13	---
15 Apr	7.420000076	19.39999962	7.440000057	8.4	18	9.8	---
16 Apr	7.460000038	19.39999962	8.050000191	14	60	11	1.8
22 Apr	7.400000095	19.89999962	7.789999962	7.8	1.6	1.6	---
23 Apr	7.179999828	19.39999962	7.840000153	9.2	1.6	1.6	0.61
24 Apr	7.239999771	18.70000076	7.929999828	6.2	1.6	1.6	---
28 Apr	7.440000057	18.79999924	7.860000134	6.8	4.9	1.6	---
29 Apr	7.440000057	18.20000076	7.809999943	4.8	4.9	1.6	---
30 Apr	7.159999847	18.89999962	8.010000229	15	4,600	540	4.2

This report for the period of Midnight, 01/05/25 to Midnight, 01/06/25 passed

Daily-weekly grab samples

Day	DO (g O_2/m^3)	Temperature (°C)	pH	TSS / NFR (g/m^3)	Faecal coliforms (cfu/100mL)	Enterococci (cfu/100 mL)	Total BOD_5 (g O_2/m^3)
1 May	8.289999962	16	8.010000229	---	---	---	---
2 May	8.840000153	14.89999962	8.56000042	---	---	---	---
5 May	7.070000172	19.29999924	7.699999809	1.6	28	6.6	---
6 May	7.440000057	18.79999924	7.860000134	4.6	210	26	---
7 May	8.800000191	16	8.600000381	3.4	68	8.2	2
8 May	7.829999924	15.5	7.800000191	---	---	---	---
9 May	8.199999809	16	7.5	---	---	---	---
12 May	9.640000343	17.79999924	7.650000095	4.6	3.3	3.3	---
13 May	8.710000038	18.5	7.710000038	4.4	270	44	---
14 May	8.710000038	18.5	7.710000038	4.4	1.6	1.6	3
15 May	8.12	17.79999924	7.690000057	---	---	---	---
19 May	7.840000153	17.29999924	7.690000057	4.2	8.2	1.6	---
20 May	7.440000057	15.80000019	7.510000229	5.4	1.6	1.6	---
21 May	7.71999979	15.39999962	7.820000172	3.2	1.6	1.6	0.5
22 May	11.47000027	9.800000191	7.75	---	---	---	---
23 May	9.770000458	15.39999962	7.510000229	---	---	---	---
26 May	7.570000172	18	7.349999905	0	36	9.8	---
27 May	7.440000057	18.60000038	7.260000229	4.8	16	20	---
28 May	7.440000057	18.10000038	7.550000191	5.2	1.6	1.6	1.2
29 May	9.039999962	16.5	7.510000229	---	---	---	---
30 May	9.789999962	15.10000038	7.25	---	---	---	---

This report for the period of Midnight, 01/06/25 to Midnight, 01/07/25 passed

Daily-weekly grab samples

Day	DO (g O_2/m^3)	Temperature (°C)	pH	TSS / NFR (g/m^3)	Faecal coliforms (cfu/100mL)	Enterococci (cfu/100 mL)	Total BOD_5 (g O_2/m^3)
3 Jun	7.400000095	17.10000038	7.050000191	3.4	110	84	---
4 Jun	9.149999619	16.5	7.260000229	8.8	250	68	0.65
5 Jun	---	---	---	8.4	380	430	---
6 Jun	10.89000034	11.19999981	7.050000191	---	---	---	---
9 Jun	9.68999958	14.5	7.349999905	3.2	3.3	1.6	---
10 Jun	6.96999979	15.39999962	7.539999962	3.4	1.6	1.6	---
11 Jun	---	---	---	3.8	20	4.9	0.72
12 Jun	9.890000343	13.19999981	7.300000191	---	---	---	---
13 Jun	10.68000031	13	7.400000095	---	---	---	---
16 Jun	12.52000046	7.400000095	7.5	3	4.9	1.6	---
17 Jun	12.38000011	6.800000191	7.25	3.4	1.6	1.6	---
18 Jun	7.079999924	13.39999962	7.329999924	2.4	1.6	1.6	0.68
23 Jun	10.60000038	12.5	7.289999962	6.8	20	8.2	---
24 Jun	11.31000042	10.60000038	7.21999979	0	46	21	---
25 Jun	---	---	---	5	6.6	4.9	---
26 Jun	10.21000004	14.60000038	7.199999809	---	---	---	---
27 Jun	9.93999958	16.39999962	7.340000153	---	---	---	---
30 Jun	8.569999695	14.19999981	7.739999771	2.4	3.3	1.6	---

This report for the period of Midnight, 01/07/24 to Midnight, 01/10/24 passed

Physico-chemical compliance statistics

Month	Median total BOD_5 (Annual - ≤20 g O_2/m^3)	Total BOD_5 (≤8 results per year >20 g O_2/m^3)	Median TSS/NFR (3 months - ≤35 g/m^3)	95%ile TSS/NFR (3 months - ≤75 g/m^3)	TSS/NFR (≤23 results per 3 months >35 g/m^3)	TSS/NFR (≤4 results per 3 months >75 g/m^3)
July	1.2	0	4.75	13.4	0	0
August	1.15	0	4.3	13.4	0	0
September	1.1	0	4.1	13.4	0	0

Compliance statistics - Nutrients

Month	Median NH_x (Annual - ≤10 g N/m^3)	NH_x (≤8 results per year >10 g N/m^3)	Median TN (Annual - ≤30 g N/m^3)	TN (≤8 results per year >30 g N/m^3)	Median DRP (Annual - ≤10 g P/m^3)	DRP (≤8 results per year >10 g P/m^3)
July	0.4285	0	9.4	0	3.405	0
August	0.4285	0	9.55	0	3.465	0
September	0.457	0	9.75	0	3.62	0

Compliance statistics - Bacteria

Month	Median faecal coliforms (3 month ≤1,000 cfu/100 ml)	95%ile faecal coliforms (3 month - ≤10,000 cfu/100 ml)	Faecal coliforms (≤23 results per 3 months >1,000 cfu/100 ml)	Faecal coliforms (≤4 results per 3 months >1,0000 cfu/100 ml)	Median enterococci (3 month - ≤100 cfu/100 ml)	95%ile enterococci (3 month - ≤1,000 cfu/100 ml)	Enterococci (≤23 results per 3 months >100 cfu/100 ml)	Enterococci (≤4 results per 3 months >1,000 cfu/100 ml)
July	2	31	0	0	2	11	0	0
August	2	52	1	0	2	25	1	0
September	2	52	1	0	2	25	1	0

Consent conditions

Condition 5
The quality of the effluent to be discharged shall be equal to or better than the following parameter concentrations before discharge:
Total BOD_5 ($g\ O_2/m^3$) - median 20, over 1 year no more than 16 exceedances above 20
Non-filterable residue (g/m^3) - median 35, 95th percentile 75, for any three month period, no more than 23 exceedances above 35 and no more than 4 exceedances above 75
Total nitrogen ($g\ N/m^3$) - from 1 July 2001, median 30, over one year no more than 8 exceedances above 30
Ammoniacal nitrogen ($g\ N/m^3$) - median 10, over 1 year no more than 8 exceedances above 10
DRP ($g\ P/m^3$) - median 10, over 1 year no more than 8 exceedances above 10
Faecal coliforms (cfu/100mL) - median 1,000, 95th percentile 10,000, for any 3 month period no more than 23 exceedances above 1,000 and no more than 4 exceedances above 10,000
Enterococci (cfu/100mL) - median 100, 95th percentile 1,000, for any 3 month period no more than 23 exceedances above 100 and no more than 4 exceedances above 1,000
Condition 6
The above parameters, and any others, are to be monitored, analysed and reported generally in accordance with Technical Report 33 submitted in support of this application. Note - flow, six-monthly and annual parameters are on separate batch reports.
Monitoring requirements specific to this batch report are:
Three times per week
Dissolved oxygen ($g\ O_2/m^3$)
Temperature (°C)
pH
Non-filterable residue (g/m^3)
Faecal coliforms (cfu/100 mL)
Enterococci (cfu/100 mL)
Fortnightly
Total BOD_5 ($g\ O_2/m^3$)
Monthly
Ammoniacal nitrogen ($g\ N/m^3$)
Nitrite ($g\ N/m^3$)
Nitrate ($g\ N/m^3$)
Total nitrogen ($g\ N/m^3$)
Dissolved reactive phosphorus ($g\ N/m^3$)
Total phosphorus ($g\ N/m^3$)
Six-monthly
Trace metals ($mg\ O/m^3$)
Pathogens
Annually
Persistent organics
Consent
23799 / CST60260652 - (https://app.infrastructuredata.nz/Consents/24/4969)
Devices
WSL*ROSE*FINALLEFF (https://app.infrastructuredata.nz/WTD/Devices/6362)
WSL*RW*FINAL (https://app.infrastructuredata.nz/WTD/Devices/6648)

This report for the period of Midnight, 01/07/24 to Midnight, 01/10/24 passed

Monthly grab samples

Day	NH_x (g N/m³)	NO_2 (g N/m³)	NO_3 (g N/m³)	TN (g N/m³)	DRP (g P/m³)	TP (g P/m³)
3 Jul	0.4	0.04	8.93	10	3.2	3.03
7 Aug	0.516	0.04	8.1	9.9	3.51	3.64
4 Sep	0.55	0.07	8.3	12	3.73	3.78

This report for the period of Midnight, 01/10/24 to Midnight, 01/01/25 passed

Physico-chemical compliance statistics

Month	Median total BOD_5 (Annual - ≤20 g O_2/m^3)	Total BOD_5 (≤8 results per year >20 g O_2/m^3)	Median TSS/NFR (3 months - ≤35 g/m^3)	95%ile TSS/NFR (3 months - ≤75 g/m^3)	TSS/NFR (≤23 results per 3 months >35 g/m^3)	TSS/NFR (≤4 results per 3 months >75 g/m^3)
October	1.1	0	4.6	14	0	0
November	1.1	0	5.4	15	0	0
December	1.1	0	7.2	15	0	0

Compliance statistics - Nutrients

Month	Median NH_x (Annual - ≤10 g N/m^3)	NH_x (≤8 results per year >10 g N/m^3)	Median TN (Annual - ≤30 g N/m^3)	TN (≤8 results per year >30 g N/m^3)	Median DRP (Annual - ≤10 g P/m^3)	DRP (≤8 results per year >10 g P/m^3)
October	0.4285	0	9.75	0	3.73	0
November	0.4285	0	9.75	0	3.825	0
December	0.4285	0	9.75	0	3.92	0

Compliance statistics - Bacteria

Month	Median faecal coliforms (3 month ≤1,000 cfu/100 ml)	95%ile faecal coliforms (3 month - ≤10,000 cfu/100 ml)	Faecal coliforms (≤23 results per 3 months >1,000 cfu/100 ml)	Faecal coliforms (≤4 results per 3 months >1,0000 cfu/100 ml)	Median enterococci (3 month - ≤100 cfu/100 ml)	95%ile enterococci (3 month - ≤1,000 cfu/100 ml)	Enterococci (≤23 results per 3 months >100 cfu/100 ml)	Enterococci (≤4 results per 3 months >1,000 cfu/100 ml)
October	2	50	1	0	2	23	1	0
November	2	50	1	0	2	23	1	0
December	2	240	1	0	2	74	0	0

Consent conditions

Condition 5
The quality of the effluent to be discharged shall be equal to or better than the following parameter concentrations before discharge:
Total BOD_5 ($g\ O_2/m^3$) - median 20, over 1 year no more than 16 exceedances above 20
Non-filterable residue (g/m^3) - median 35, 95th percentile 75, for any three month period, no more than 23 exceedances above 35 and no more than 4 exceedances above 75
Total nitrogen ($g\ N/m^3$) - from 1 July 2001, median 30, over one year no more than 8 exceedances above 30
Ammoniacal nitrogen ($g\ N/m^3$) - median 10, over 1 year no more than 8 exceedances above 10
DRP ($g\ P/m^3$) - median 10, over 1 year no more than 8 exceedances above 10
Faecal coliforms (cfu/100mL) - median 1,000, 95th percentile 10,000, for any 3 month period no more than 23 exceedances above 1,000 and no more than 4 exceedances above 10,000
Enterococci (cfu/100mL) - median 100, 95th percentile 1,000, for any 3 month period no more than 23 exceedances above 100 and no more than 4 exceedances above 1,000
Condition 6
The above parameters, and any others, are to be monitored, analysed and reported generally in accordance with Technical Report 33 submitted in support of this application. Note - flow, six-monthly and annual parameters are on separate batch reports.
Monitoring requirements specific to this batch report are:
Three times per week
Dissolved oxygen ($g\ O_2/m^3$)
Temperature (°C)
pH
Non-filterable residue (g/m^3)
Faecal coliforms (cfu/100 mL)
Enterococci (cfu/100 mL)
Fortnightly
Total BOD_5 ($g\ O_2/m^3$)
Monthly
Ammoniacal nitrogen ($g\ N/m^3$)
Nitrite ($g\ N/m^3$)
Nitrate ($g\ N/m^3$)
Total nitrogen ($g\ N/m^3$)
Dissolved reactive phosphorus ($g\ N/m^3$)
Total phosphorus ($g\ N/m^3$)
Six-monthly
Trace metals ($mg\ O/m^3$)
Pathogens
Annually
Persistent organics
Consent
23799 / CST60260652 - (https://app.infrastructuredata.nz/Consents/24/4969)
Devices
WSL*ROSE*FINALLEFF (https://app.infrastructuredata.nz/WTD/Devices/6362)
WSL*RW*FINAL (https://app.infrastructuredata.nz/WTD/Devices/6648)

This report for the period of Midnight, 01/10/24 to Midnight, 01/01/25 passed

Monthly grab samples

Day	NH_x (g N/m³)	NO_2 (g N/m³)	NO_3 (g N/m³)	TN (g N/m³)	DRP (g P/m³)	TP (g P/m³)
2 Oct	0.4	0.07	6.2	7.1	2.87	3.46
6 Nov	0.027	0.03	7.5	7.7	4.49	5.78
4 Dec	0.35	0.05	7.64	9.5	5.1	5.03

This report for the period of Midnight, 01/01/25 to Midnight, 01/04/25 passed

Physico-chemical compliance statistics

Month	Median total BOD_5 (Annual - ≤20 g O_2/m^3)	Total BOD_5 (≤8 results per year >20 g O_2/m^3)	Median TSS/NFR (3 months - ≤35 g/m^3)	95%ile TSS/NFR (3 months - ≤75 g/m^3)	TSS/NFR (≤23 results per 3 months >35 g/m^3)	TSS/NFR (≤4 results per 3 months >75 g/m^3)
January	1.1	0	9.2	14	0	0
February	1.1	0	9.8	15	0	0
March	1.1	0	10	15	0	0

Compliance statistics - Nutrients

Month	Median NH_x (Annual - ≤10 g N/m^3)	NH_x (≤8 results per year >10 g N/m^3)	Median TN (Annual - ≤30 g N/m^3)	TN (≤8 results per year >30 g N/m^3)	Median DRP (Annual - ≤10 g P/m^3)	DRP (≤8 results per year >10 g P/m^3)
January	0.457	0	9.9	0	3.825	0
February	0.4335	0	9.7	0	3.92	0
March	0.457	0	9.7	0	3.825	0

Compliance statistics - Bacteria

Month	Median faecal coliforms (3 month ≤1,000 cfu/100 ml)	95%ile faecal coliforms (3 month - ≤10,000 cfu/100 ml)	Faecal coliforms (≤23 results per 3 months >1,000 cfu/100 ml)	Faecal coliforms (≤4 results per 3 months >1,0000 cfu/100 ml)	Median enterococci (3 month - ≤100 cfu/100 ml)	95%ile enterococci (3 month - ≤1,000 cfu/100 ml)	Enterococci (≤23 results per 3 months >100 cfu/100 ml)	Enterococci (≤4 results per 3 months >1,000 cfu/100 ml)
January	44	2,600	5	0	38	120	3	0
February	360	2,600	6	0	71	200	10	0
March	450	2,600	7	0	90	270	16	0

Consent conditions

Condition 5
The quality of the effluent to be discharged shall be equal to or better than the following parameter concentrations before discharge:
Total BOD_5 ($g\ O_2/m^3$) - median 20, over 1 year no more than 16 exceedances above 20
Non-filterable residue (g/m^3) - median 35, 95th percentile 75, for any three month period, no more than 23 exceedances above 35 and no more than 4 exceedances above 75
Total nitrogen ($g\ N/m^3$) - from 1 July 2001, median 30, over one year no more than 8 exceedances above 30
Ammoniacal nitrogen ($g\ N/m^3$) - median 10, over 1 year no more than 8 exceedances above 10
DRP ($g\ P/m^3$) - median 10, over 1 year no more than 8 exceedances above 10
Faecal coliforms (cfu/100mL) - median 1,000, 95th percentile 10,000, for any 3 month period no more than 23 exceedances above 1,000 and no more than 4 exceedances above 10,000
Enterococci (cfu/100mL) - median 100, 95th percentile 1,000, for any 3 month period no more than 23 exceedances above 100 and no more than 4 exceedances above 1,000
Condition 6
The above parameters, and any others, are to be monitored, analysed and reported generally in accordance with Technical Report 33 submitted in support of this application. Note - flow, six-monthly and annual parameters are on separate batch reports.
Monitoring requirements specific to this batch report are:
Three times per week
Dissolved oxygen ($g\ O_2/m^3$)
Temperature (°C)
pH
Non-filterable residue (g/m^3)
Faecal coliforms (cfu/100 mL)
Enterococci (cfu/100 mL)
Fortnightly
Total BOD_5 ($g\ O_2/m^3$)
Monthly
Ammoniacal nitrogen ($g\ N/m^3$)
Nitrite ($g\ N/m^3$)
Nitrate ($g\ N/m^3$)
Total nitrogen ($g\ N/m^3$)
Dissolved reactive phosphorus ($g\ N/m^3$)
Total phosphorus ($g\ N/m^3$)
Six-monthly
Trace metals (mg O/m^3)
Pathogens
Annually
Persistent organics
Consent
23799 / CST60260652 - (https://app.infrastructuredata.nz/Consents/24/4969)
Devices
WSL*ROSE*FINALLEFF (https://app.infrastructuredata.nz/WTD/Devices/6362)
WSL*RW*FINAL (https://app.infrastructuredata.nz/WTD/Devices/6648)

This report for the period of Midnight, 01/01/25 to Midnight, 01/04/25 passed

Monthly grab samples

Day	NH_x (g N/m³)	NO_2 (g N/m³)	NO_3 (g N/m³)	TN (g N/m³)	DRP (g P/m³)	TP (g P/m³)
3 Jan	0.082	0.04	5.93	8	4.39	4.74
5 Feb	0.41	0.09	6.44	9.1	4.16	5.04
5 Mar	1.4	0.02	3.96	6.3	2.71	3.18

This report for the period of Midnight, 01/04/25 to Midnight, 01/05/25 passed

Physico-chemical compliance statistics

Month	Median total BOD_5 (Annual - ≤20 g O_2/m^3)	Total BOD_5 (≤8 results per year >20 g O_2/m^3)	Median TSS/NFR (3 months - ≤35 g/m^3)	95%ile TSS/NFR (3 months - ≤75 g/m^3)	TSS/NFR (≤23 results per 3 months >35 g/m^3)	TSS/NFR (≤4 results per 3 months >75 g/m^3)
April	1.1	0	8.4	15	0	0

Compliance statistics - Nutrients

Month	Median NH_x (Annual - ≤10 g N/m^3)	NH_x (≤8 results per year >10 g N/m^3)	Median TN (Annual - ≤30 g N/m^3)	TN (≤8 results per year >30 g N/m^3)	Median DRP (Annual - ≤10 g P/m^3)	DRP (≤8 results per year >10 g P/m^3)
April	0.4335	0	9.7	0	3.83	0

Compliance statistics - Bacteria

Month	Median faecal coliforms (3 month ≤1,000 cfu/100 ml)	95%ile faecal coliforms (3 month - ≤10,000 cfu/100 ml)	Faecal coliforms (≤23 results per 3 months >1,000 cfu/100 ml)	Faecal coliforms (≤4 results per 3 months >1,0000 cfu/100 ml)	Median enterococci (3 month - ≤100 cfu/100 ml)	95%ile enterococci (3 month - ≤1,000 cfu/100 ml)	Enterococci (≤23 results per 3 months >100 cfu/100 ml)	Enterococci (≤4 results per 3 months >1,000 cfu/100 ml)
April	430	2,600	6	0	84	290	16	0

Consent conditions

Condition 5
The quality of the effluent to be discharged shall be equal to or better than the following parameter concentrations before discharge:
Total BOD_5 (g O_2/m^3) - median 20, over 1 year no more than 16 exceedances above 20
Non-filterable residue (g/m^3) - median 35, 95th percentile 75, for any three month period, no more than 23 exceedances above 35 and no more than 4 exceedances above 75
Total nitrogen (g N/m^3) - from 1 July 2001, median 30, over one year no more than 8 exceedances above 30
Ammoniacal nitrogen (g N/m^3) - median 10, over 1 year no more than 8 exceedances above 10
DRP (g P/m^3) - median 10, over 1 year no more than 8 exceedances above 10
Faecal coliforms (cfu/100mL) - median 1,000, 95th percentile 10,000, for any 3 month period no more than 23 exceedances above 1,000 and no more than 4 exceedances above 10,000
Enterococci (cfu/100mL) - median 100, 95th percentile 1,000, for any 3 month period no more than 23 exceedances above 100 and no more than 4 exceedances above 1,000
Condition 6
The above parameters, and any others, are to be monitored, analysed and reported generally in accordance with Technical Report 33 submitted in support of this application. Note - flow, six-monthly and annual parameters are on separate batch reports.
Monitoring requirements specific to this batch report are:
Three times per week
Dissolved oxygen (g O_2/m^3)
Temperature (°C)
pH
Non-filterable residue (g/m^3)
Faecal coliforms (cfu/100 mL)
Enterococci (cfu/100 mL)
Fortnightly
Total BOD_5 (g O_2/m^3)
Monthly
Ammoniacal nitrogen (g N/m^3)
Nitrite (g N/m^3)
Nitrate (g N/m^3)
Total nitrogen (g N/m^3)
Dissolved reactive phosphorus (g N/m^3)
Total phosphorus (g N/m^3)
Six-monthly
Trace metals (mg O/m^3)
Pathogens
Annually
Persistent organics
Consent
23799 / CST60260652 - (https://app.infrastructuredata.nz/Consents/24/4969)
Devices
WSL*ROSE*FINALLEFF (https://app.infrastructuredata.nz/WTD/Devices/6362)
WSL*RW*FINAL (https://app.infrastructuredata.nz/WTD/Devices/6648)

This report for the period of Midnight, 01/04/25 to Midnight, 01/05/25 passed

Monthly grab samples

Day	NH_x (g N/m³)	NO_2 (g N/m³)	NO_3 (g N/m³)	TN (g N/m³)	DRP (g P/m³)	TP (g P/m³)
2 Apr	0.31	0.02	6.92	7.7	3.93	4.95

This report for the period of Midnight, 01/05/25 to Midnight, 01/06/25 passed

Physico-chemical compliance statistics

Month	Median total BOD_5 (Annual - ≤20 g O_2/m^3)	Total BOD_5 (≤8 results per year >20 g O_2/m^3)	Median TSS/NFR (3 months - ≤35 g/m^3)	95%ile TSS/NFR (3 months - ≤75 g/m^3)	TSS/NFR (≤23 results per 3 months >35 g/m^3)	TSS/NFR (≤4 results per 3 months >75 g/m^3)
May	1.2	0	7.6	15	0	0

Compliance statistics - Nutrients

Month	Median NH_x (Annual - ≤10 g N/m^3)	NH_x (≤8 results per year >10 g N/m^3)	Median TN (Annual - ≤30 g N/m^3)	TN (≤8 results per year >30 g N/m^3)	Median DRP (Annual - ≤10 g P/m^3)	DRP (≤8 results per year >10 g P/m^3)
May	0.405	0	9.1	0	3.93	0

Compliance statistics - Bacteria

Month	Median faecal coliforms (3 month ≤1,000 cfu/100 ml)	95%ile faecal coliforms (3 month - ≤10,000 cfu/100 ml)	Faecal coliforms (≤23 results per 3 months >1,000 cfu/100 ml)	Faecal coliforms (≤4 results per 3 months >1,0000 cfu/100 ml)	Median enterococci (3 month - ≤100 cfu/100 ml)	95%ile enterococci (3 month - ≤1,000 cfu/100 ml)	Enterococci (≤23 results per 3 months >100 cfu/100 ml)	Enterococci (≤4 results per 3 months >1,000 cfu/100 ml)
May	82	1,600	3	0	30	290	14	0

Consent conditions

Condition 5
The quality of the effluent to be discharged shall be equal to or better than the following parameter concentrations before discharge:
Total BOD_5 (g O_2/m^3) - median 20, over 1 year no more than 16 exceedances above 20
Non-filterable residue (g/m^3) - median 35, 95th percentile 75, for any three month period, no more than 23 exceedances above 35 and no more than 4 exceedances above 75
Total nitrogen (g N/m^3) - from 1 July 2001, median 30, over one year no more than 8 exceedances above 30
Ammoniacal nitrogen (g N/m^3) - median 10, over 1 year no more than 8 exceedances above 10
DRP (g P/m^3) - median 10, over 1 year no more than 8 exceedances above 10
Faecal coliforms (cfu/100mL) - median 1,000, 95th percentile 10,000, for any 3 month period no more than 23 exceedances above 1,000 and no more than 4 exceedances above 10,000
Enterococci (cfu/100mL) - median 100, 95th percentile 1,000, for any 3 month period no more than 23 exceedances above 100 and no more than 4 exceedances above 1,000
Condition 6
The above parameters, and any others, are to be monitored, analysed and reported generally in accordance with Technical Report 33 submitted in support of this application. Note - flow, six-monthly and annual parameters are on separate batch reports.
Monitoring requirements specific to this batch report are:
Three times per week
Dissolved oxygen (g O_2/m^3)
Temperature (°C)
pH
Non-filterable residue (g/m^3)
Faecal coliforms (cfu/100 mL)
Enterococci (cfu/100 mL)
Fortnightly
Total BOD_5 (g O_2/m^3)
Monthly
Ammoniacal nitrogen (g N/m^3)
Nitrite (g N/m^3)
Nitrate (g N/m^3)
Total nitrogen (g N/m^3)
Dissolved reactive phosphorus (g N/m^3)
Total phosphorus (g N/m^3)
Six-monthly
Trace metals (mg O/m^3)
Pathogens
Annually
Persistent organics
Consent
23799 / CST60260652 - (https://app.infrastructuredata.nz/Consents/24/4969)
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WSL*ROSE*FINALLEFF (https://app.infrastructuredata.nz/WTD/Devices/6362)
WSL*RW*FINAL (https://app.infrastructuredata.nz/WTD/Devices/6648)

This report for the period of Midnight, 01/05/25 to Midnight, 01/06/25 passed

Monthly grab samples

Day	NH_x (g N/m³)	NO_2 (g N/m³)	NO_3 (g N/m³)	TN (g N/m³)	DRP (g P/m³)	TP (g P/m³)
7 May	0.76	0.1	5.21	6.9	2.41	2.86

This report for the period of Midnight, 01/06/25 to Midnight, 01/07/25 passed

Physico-chemical compliance statistics

Month	Median total BOD_5 (Annual - ≤20 g O_2/m^3)	Total BOD_5 (≤8 results per year >20 g O_2/m^3)	Median TSS/NFR (3 months - ≤35 g/m^3)	95%ile TSS/NFR (3 months - ≤75 g/m^3)	TSS/NFR (≤23 results per 3 months >35 g/m^3)	TSS/NFR (≤4 results per 3 months >75 g/m^3)
June	1.2	0	5.4	15	0	0

Compliance statistics - Nutrients

Month	Median NH_x (Annual - ≤10 g N/m^3)	NH_x (≤8 results per year >10 g N/m^3)	Median TN (Annual - ≤30 g N/m^3)	TN (≤8 results per year >30 g N/m^3)	Median DRP (Annual - ≤10 g P/m^3)	DRP (≤8 results per year >10 g P/m^3)
June	0.41	0	9.1	0	3.83	0

Compliance statistics - Bacteria

Month	Median faecal coliforms (3 month ≤1,000 cfu/100 ml)	95%ile faecal coliforms (3 month - ≤10,000 cfu/100 ml)	Faecal coliforms (≤23 results per 3 months >1,000 cfu/100 ml)	Faecal coliforms (≤4 results per 3 months >1,0000 cfu/100 ml)	Median enterococci (3 month - ≤100 cfu/100 ml)	95%ile enterococci (3 month - ≤1,000 cfu/100 ml)	Enterococci (≤23 results per 3 months >100 cfu/100 ml)	Enterococci (≤4 results per 3 months >1,000 cfu/100 ml)
June	18	800	2	0	7	430	7	0

Consent conditions

Condition 5
The quality of the effluent to be discharged shall be equal to or better than the following parameter concentrations before discharge:
Total BOD_5 (g O_2/m^3) - median 20, over 1 year no more than 16 exceedances above 20
Non-filterable residue (g/m^3) - median 35, 95th percentile 75, for any three month period, no more than 23 exceedances above 35 and no more than 4 exceedances above 75
Total nitrogen (g N/m^3) - from 1 July 2001, median 30, over one year no more than 8 exceedances above 30
Ammoniacal nitrogen (g N/m^3) - median 10, over 1 year no more than 8 exceedances above 10
DRP (g P/m^3) - median 10, over 1 year no more than 8 exceedances above 10
Faecal coliforms (cfu/100mL) - median 1,000, 95th percentile 10,000, for any 3 month period no more than 23 exceedances above 1,000 and no more than 4 exceedances above 10,000
Enterococci (cfu/100mL) - median 100, 95th percentile 1,000, for any 3 month period no more than 23 exceedances above 100 and no more than 4 exceedances above 1,000
Condition 6
The above parameters, and any others, are to be monitored, analysed and reported generally in accordance with Technical Report 33 submitted in support of this application. Note - flow, six-monthly and annual parameters are on separate batch reports.
Monitoring requirements specific to this batch report are:
Three times per week
Dissolved oxygen (g O_2/m^3)
Temperature (°C)
pH
Non-filterable residue (g/m^3)
Faecal coliforms (cfu/100 mL)
Enterococci (cfu/100 mL)
Fortnightly
Total BOD_5 (g O_2/m^3)
Monthly
Ammoniacal nitrogen (g N/m^3)
Nitrite (g N/m^3)
Nitrate (g N/m^3)
Total nitrogen (g N/m^3)
Dissolved reactive phosphorus (g N/m^3)
Total phosphorus (g N/m^3)
Six-monthly
Trace metals (mg O/m^3)
Pathogens
Annually
Persistent organics
Consent
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WSL*RW*FINAL (https://app.infrastructuredata.nz/WTD/Devices/6648)

This report for the period of Midnight, 01/06/25 to Midnight, 01/07/25 passed

Monthly grab samples

Day	NH_x (g N/m³)	NO_2 (g N/m³)	NO_3 (g N/m³)	TN (g N/m³)	DRP (g P/m³)	TP (g P/m³)
4 Jun	1.2	0.26	6.99	11	2.8	2.78

Watercare Services Limited
52 Aintree Ave, Māngere, Auckland, 2022
PO Box 107028, Auckland, 2150
T: 0800 522 365
clientsupport@water.co.nz
www.watercarelabs.co.nz

Certificate of Analysis
Laboratory Reference:240813-093

Attention:	Rosedale Reports	*Final Report:*	**560791-0**
Client:	**WATERCARE SERVICES LTD**	*Report Issue Date:*	**26-Aug-2024**
Address:	**2 Jack Hinton Drive, Rosedale, Auckland, 0632**	*Received Date:*	**13-Aug-2024**
Client Reference:	**Rosedale WWTP - 6 Monthly Pathogens (Raw Influent,**	*Laboratory Activity Dates:*	**13-Aug-2024 - 26-Aug-2024**
Purchase Order:	**X-32000-ST-002**	*Quote Reference :*	**1443**

Sample Details

Lab Sample ID:	**240813-093-1**	**240813-093-2**	**240813-093-3**	**240813-093-4**
Client Sample ID:				
Sample Date/Time	13/08/2024 06:20	13/08/2024 06:44	13/08/2024 07:01	13/08/2024 07:15
Description:	Raw Influent Grab	Clarifier Effluent Grab	Pond 1	Final
Sample Parameters and Field Testing				
Laboratory Arrival Date	13/08/2024	13/08/2024	13/08/2024	13/08/2024
Laboratory Arrival Temperature °C	7.9	7.9	7.9	7.9
Laboratory Arrival Time	09:40 AM	09:40 AM	09:40 AM	09:40 AM
Microbiology				
Culturable Enteroviruses (presumptive) by Enumeration				
Enterovirus (presumptive) pfu/100 L	-	240	25	<5.0
Enterovirus (presumptive) pfu/L	11000	-	-	-
F-specific RNA bacteriophage by Enumeration				
Bacteriophage pfu/L	1700000	5200	880	10
Giardia and Cryptosporidium (Envirochek) by Microscopy				
Colorseed Cryptosporidium Recovery %	-	-	69	55
Colorseed Giardia Recovery %	-	-	74	7.0
Confirmed Cryptosporidium (count)	-	-	1	0
Confirmed Cryptosporidium /10 L	-	-	0.67	<1.0
Confirmed Giardia (count)	-	-	1	0
Confirmed Giardia /10 L	-	-	0.67	<1.0
Envirochek G&C sample volume L	-	-	15	10
Envirochek G&C Sampled time	-	-	13/08/2024 07:01:58 AM	13/08/2024 12:00:00 AM
Oocyst details Legd 3	-	-	Refer Legend3	Refer Legend3
Presumptive Cryptosporidium (count)	-	-	7	1
Presumptive Cryptosporidium /10 L	-	-	4.7	1.0
Presumptive Giardia (count)	-	-	19	3
Presumptive Giardia /10 L	-	-	13	3.0
Giardia and Cryptosporidium by Microscopy				
Colorseed Cryptosporidium Recovery %	0.0	27	-	-
Colorseed Giardia Recovery %	0.0	36	-	-
Confirmed Cryptosporidium (count)	0	0	-	-
Confirmed Cryptosporidium per 1L	<1.0	<1.0	-	-
Confirmed Giardia (count)	4	1	-	-
Confirmed Giardia per 1L	4.0	1.0	-	-
Envirochek G&C sample volume L	1	1 *	-	-
Oocyst details Legd 3	Refer Legend3	Refer Legend3	-	-
Presumptive Cryptosporidium (count)	0	0	-	-
Presumptive Cryptosporidium per 1L	<1.0	<1.0	-	-
Presumptive Giardia (count)	82	3	-	-
Presumptive Giardia per 1L	82	3.0	-	-
Salmonella by MPN				
Salmonella MPN/L	5400	10	6.1	<1.0

Sample Details (continued)		WATERS	WATERS	WATERS	WATERS
Lab Sample ID:		**240813-093-1**	**240813-093-2**	**240813-093-3**	**240813-093-4**
Client Sample ID:					
Sample Date/Time:		13/08/2024 06:20	13/08/2024 06:44	13/08/2024 07:01	13/08/2024 07:15
Description:		Raw Influent Grab	Clarifier Effluent Grab	Pond 1	Final
Microbiology					
Thermotolerant Campylobacter (0.20 µm Filtered) by MPN					
Thermotolerant Campylobacter	MPN/L	<18	<10	2.6	<0.38

*Results marked with * are not accredited to International Accreditation New Zealand. A dash indicates no test performed.*

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Legend 3

Presumptive Giardia & Cryptosporidium
Cysts and oocysts which cannot be confirmed by DAPI stain.

Giardia cysts with apple green fluorescence and typical shape and size 8-18 µm long and 5-15 µm wide.

Cryptosporidium oocysts with apple green fluorescence and typical shape and size 4-6 µm in length.

Organisms with a single large DAPI positive nucleus excluded. Organisms with diffuse blue staining are included.

Confirmed Giardia & Cryptosporidium
Giardia cysts with apple green fluorescence and typical shape and size 8-18 µm long and 5-15 µm wide, which are DAPI positive. Typically, they contain 2-4 nuclei but cells with 1 nucleus of typical size which stains DAPI positive are confirmed.

Cryptosporidium oocysts with apple green fluorescence and typical shape and size 4-6 µm in length which are DAPI positive. Typically, they contain 4 nuclei but cells with 3 nuclei which stain DAPI positive are confirmed.

Reference Methods

The sample(s) referred to in this report were analysed by the following method(s)

Analyte	Method Reference	MDL	Samples	Location
Sample Parameters and Field Testing				
Laboratory Arrival Date	APHA (online edition) 2550 B (temperature) or In-house methods (date and time)		All	Auckland
Laboratory Arrival Temperature	APHA (online edition) 2550 B (temperature) or In-house methods (date and time)		All	Auckland
Laboratory Arrival Time	APHA (online edition) 2550 B (temperature) or In-house methods (date and time)		All	Auckland
Microbiology				
Culturable Enteroviruses (presumptive) by Enumeration				
Enterovirus (presumptive)	In-house method MM61	5 pfu/100 L	2, 3, 4	Auckland
Enterovirus (presumptive)	In-house method MM61	100 pfu/L	1	Auckland
F-specific RNA bacteriophage by Enumeration				
Bacteriophage	APHA (online edition) 9224	10 pfu/L	All	Auckland
Giardia and Cryptosporidium (Envirochek) by Microscopy				
Colorseed Cryptosporidium Recovery	in house based on APHA 9711B, USEPA 1623.1, modified (Jan 2012)		3, 4	Auckland
Colorseed Giardia Recovery	in house based on APHA 9711B, USEPA 1623.1, modified (Jan 2012)		3, 4	Auckland
Confirmed Cryptosporidium (count)	in house based on APHA 9711B, USEPA 1623.1, modified (Jan 2012)		3, 4	Auckland
Confirmed Cryptosporidium	in house based on APHA 9711B, USEPA 1623.1, modified (Jan 2012)	0.5 /10 L	3, 4	Auckland
Confirmed Giardia (count)	in house based on APHA 9711B, USEPA 1623.1, modified (Jan 2012)		3, 4	Auckland
Confirmed Giardia	in house based on APHA 9711B, USEPA 1623.1, modified (Jan 2012)	0.5 /10 L	3, 4	Auckland
Oocyst details	in house based on APHA 9711B, USEPA 1623.1, modified (Jan 2012)		3, 4	Auckland
Presumptive Cryptosporidium (count)	in house based on APHA 9711B, USEPA 1623.1, modified (Jan 2012)		3, 4	Auckland
Presumptive Cryptosporidium	in house based on APHA 9711B, USEPA 1623.1, modified (Jan 2012)	0.5 /10 L	3, 4	Auckland
Presumptive Giardia (count)	in house based on APHA 9711B, USEPA 1623.1, modified (Jan 2012)		3, 4	Auckland
Presumptive Giardia	in house based on APHA 9711B, USEPA 1623.1, modified (Jan 2012)	0.5 /10 L	3, 4	Auckland
Giardia and Cryptosporidium by Microscopy				
Colorseed Cryptosporidium Recovery	USEPA 1623.1, modified (Jan 2012)		1, 2	Auckland

Microbiology				
Giardia and Cryptosporidium by Microscopy				
Colorseed Giardia Recovery	USEPA 1623.1, modified (Jan 2012)		1, 2	Auckland
Confirmed Cryptosporidium (count)	USEPA 1623.1, modified (Jan 2012)		1, 2	Auckland
Confirmed Cryptosporidium	USEPA 1623.1, modified (Jan 2012)	5 per 1L	1, 2	Auckland
Confirmed Giardia (count)	USEPA 1623.1, modified (Jan 2012)		1, 2	Auckland
Confirmed Giardia	USEPA 1623.1, modified (Jan 2012)	5 per 1L	1, 2	Auckland
Oocyst details	USEPA 1623.1, modified (Jan 2012)		1, 2	Auckland
Presumptive Cryptosporidium (count)	USEPA 1623.1, modified (Jan 2012)		1, 2	Auckland
Presumptive Cryptosporidium	USEPA 1623.1, modified (Jan 2012)	5 per 1L	1, 2	Auckland
Presumptive Giardia (count)	USEPA 1623.1, modified (Jan 2012)		1, 2	Auckland
Presumptive Giardia	USEPA 1623.1, modified (Jan 2012)	5 per 1L	1, 2	Auckland
Salmonella by MPN				
Salmonella	In-house method based on MIMM 13.2	1 MPN/L	All	Auckland
Thermotolerant Campylobacter (0.20 µm Filtered) by MPN				
Thermotolerant Campylobacter	In-house based on MIMM 13.1	1 MPN/L	All	Auckland
Preparations				
Envirochek G&C sample volume	USEPA 1623.1, modified (Jan 2012)		3, 4	Auckland
Envirochek G&C sample volume	USEPA 1623.1, modified (Jan 2012)		1, 2	Auckland
Envirochek G&C Sampled time	USEPA 1623.1, modified (Jan 2012)		3, 4	Auckland
Nonpotable waters preparation (virus)	In-house method		2, 3, 4	Auckland
Sewage preparation (virus)	In-house method		1	Auckland

The method detection limit (MDL) listed is the limit attainable in a relatively clean matrix. If dilutions are required for analysis the detection limit may be higher. For more information please contact the Compliance and Projects Manager.

Samples, with suitable preservation and stability of analytes, will be held by the laboratory for a period of two weeks after results have been reported, unless otherwise advised by the submitter.

Watercare Laboratory Services is a division of Watercare Services Limited .

Bharathi Pulikesi
KTP Signatory

Tim Richards
KTP - Sampling

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Certificate of Analysis
Laboratory Reference: 250212-013

Attention:	Rosedale Reports	*Final Report:*	**580745-0**
Client:	**WATERCARE SERVICES LTD**	*Report Issue Date:*	**26-Feb-2025**
Address:	**2 Jack Hinton Drive, Rosedale, Auckland, 0632**	*Received Date:*	**12-Feb-2025**
Client Reference:	**Rosedale WWTP - 6 Monthly Pathogens (Raw Influent,**	*Laboratory Activity Dates:*	**12-Feb-2025 - 26-Feb-2025**
Purchase Order:	**3200-OP10-693040**	*Quote Reference :*	**1443**

Sample Details

Lab Sample ID:		**250212-013-1**	**250212-013-2**	**250212-013-3**	**250212-013-4**
Client Sample ID:					
Sample Date/Time		12/02/2025 06:48	12/02/2025 06:48	12/02/2025 06:48	12/02/2025 06:48
Description:		Raw Influent Grab	Clarifier Effluent Grab	Pond 1	Final
Sample Parameters and Field Testing					
Laboratory Arrival Date		12/02/2025	12/02/2025	12/02/2025	12/02/2025
Laboratory Arrival Temperature	°C	25.6	25.6	25.6	25.6
Laboratory Arrival Time		10:27 AM	10:27 AM	10:27 AM	10:27 AM
Microbiology					
Culturable Enteroviruses (presumptive) by Enumeration					
Enterovirus (presumptive)	pfu/100 L	-	<5.0	<5.0	<5.0
Enterovirus (presumptive)	pfu/L	400	-	-	-
F-specific RNA bacteriophage by Enumeration					
Bacteriophage	pfu/L	200000	2700	180	170
Giardia and Cryptosporidium by Microscopy					
Colorseed Cryptosporidium Recovery	%	0.0	76	25	23
Colorseed Giardia Recovery	%	4.0	69	31	30
Confirmed Cryptosporidium (count)		0	1	0	0
Confirmed Cryptosporidium	/10 L	-	-	<0.67	<0.71
Confirmed Cryptosporidium	per 1L	<1.0	1.0	-	-
Confirmed Giardia (count)		62	1	1	3
Confirmed Giardia	/10 L	-	-	0.67	2.1
Confirmed Giardia	per 1L	62	1.0	-	-
Envirochek G&C sample volume	L	1	1 *	-	-
G&C sample volume	L	-	-	15	14
G&C Sampled time		-	-	12/02/2025 06:48:18 AM	12/02/2025 06:48:21 AM
Oocyst details	Legd 3	Refer Legend3	Refer Legend3	Refer Legend3	Refer Legend3
Presumptive Cryptosporidium (count)		0	0	0	0
Presumptive Cryptosporidium	/10 L	-	-	<0.67	<0.71
Presumptive Cryptosporidium	per 1L	<1.0	<1.0	-	-
Presumptive Giardia (count)		321	0	7	3
Presumptive Giardia	/10 L	-	-	4.7	2.1
Presumptive Giardia	per 1L	320	<1.0	-	-
Salmonella by MPN					
Salmonella	MPN/L	16000	110	1.0	2.0
Thermotolerant Campylobacter (0.20 µm Filtered) by MPN					
Thermotolerant Campylobacter	MPN/L	<18	<10	1.0	4.9

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Legend 3

Presumptive Giardia & Cryptosporidium
Cysts and oocysts which cannot be confirmed by DAPI stain.

Giardia cysts with apple green fluorescence and typical shape and size 8-18 µm long and 5-15 µm wide.

Cryptosporidium oocysts with apple green fluorescence and typical shape and size 4-6 µm in length.

Organisms with a single large DAPI positive nucleus excluded. Organisms with diffuse blue staining are included.

Confirmed Giardia & Cryptosporidium
Giardia cysts with apple green fluorescence and typical shape and size 8-18 µm long and 5-15 µm wide, which are DAPI positive. Typically, they contain 2-4 nuclei but cells with 1 nucleus of typical size which stains DAPI positive are confirmed. Typical characteristics by DIC microscopy.

Cryptosporidium oocysts with apple green fluorescence and typical shape and size 4-6 µm in length which are DAPI positive. Typically, they contain 4 nuclei but cells with 3 nuclei which stain DAPI positive are confirmed. Typical characteristics by DIC microscopy.

Reference Methods

The sample(s) referred to in this report were analysed by the following method(s)

Analyte	Method Reference	MDL	Samples	Location
Sample Parameters and Field Testing				
Laboratory Arrival Date	APHA (online edition) 2550 B (temperature) or In-house methods (date and time)		All	Auckland
Laboratory Arrival Temperature	APHA (online edition) 2550 B (temperature) or In-house methods (date and time)		All	Auckland
Laboratory Arrival Time	APHA (online edition) 2550 B (temperature) or In-house methods (date and time)		All	Auckland
Microbiology				
Culturable Enteroviruses (presumptive) by Enumeration				
Enterovirus (presumptive)	In-house method MM61	5 pfu/100 L	2, 3, 4	Auckland
Enterovirus (presumptive)	In-house method MM61	100 pfu/L	1	Auckland
F-specific RNA bacteriophage by Enumeration				
Bacteriophage	APHA (online edition) 9224	10 pfu/L	All	Auckland
Giardia and Cryptosporidium by Microscopy				
Colorseed Cryptosporidium Recovery	USEPA 1623.1 (Modified)		3, 4	Auckland
Colorseed Cryptosporidium Recovery	USEPA 1623.1, modified (Jan 2012)		1, 2	Auckland
Colorseed Giardia Recovery	USEPA 1623.1 (Modified)		3, 4	Auckland
Colorseed Giardia Recovery	USEPA 1623.1, modified (Jan 2012)		1, 2	Auckland
Confirmed Cryptosporidium (count)	USEPA 1623.1 (Modified)		3, 4	Auckland
Confirmed Cryptosporidium (count)	USEPA 1623.1, modified (Jan 2012)		1, 2	Auckland
Confirmed Cryptosporidium	USEPA 1623.1 (Modified)	0.5 /10 L	3, 4	Auckland
Confirmed Cryptosporidium	USEPA 1623.1, modified (Jan 2012)	5 per 1L	1, 2	Auckland
Confirmed Giardia (count)	USEPA 1623.1 (Modified)		3, 4	Auckland
Confirmed Giardia (count)	USEPA 1623.1, modified (Jan 2012)		1, 2	Auckland
Confirmed Giardia	USEPA 1623.1 (Modified)	0.5 /10 L	3, 4	Auckland
Confirmed Giardia	USEPA 1623.1, modified (Jan 2012)	5 per 1L	1, 2	Auckland
Oocyst details	USEPA 1623.1 (Modified)		3, 4	Auckland
Oocyst details	USEPA 1623.1, modified (Jan 2012)		1, 2	Auckland
Presumptive Cryptosporidium (count)	USEPA 1623.1 (Modified)		3, 4	Auckland
Presumptive Cryptosporidium (count)	USEPA 1623.1, modified (Jan 2012)		1, 2	Auckland
Presumptive Cryptosporidium	USEPA 1623.1 (Modified)	0.5 /10 L	3, 4	Auckland
Presumptive Cryptosporidium	USEPA 1623.1, modified (Jan 2012)	5 per 1L	1, 2	Auckland
Presumptive Giardia (count)	USEPA 1623.1 (Modified)		3, 4	Auckland
Presumptive Giardia (count)	USEPA 1623.1, modified (Jan 2012)		1, 2	Auckland
Presumptive Giardia	USEPA 1623.1 (Modified)	0.5 /10 L	3, 4	Auckland
Presumptive Giardia	USEPA 1623.1, modified (Jan 2012)	5 per 1L	1, 2	Auckland
Salmonella by MPN				
Salmonella	In-house method based on MIMM 13.2	1 MPN/L	All	Auckland
Thermotolerant Campylobacter (0.20 µm Filtered) by MPN				
Thermotolerant Campylobacter	In-house based on MIMM 13.1	1 MPN/L	All	Auckland
Preparations				
Envirochek G&C sample volume	USEPA 1623.1, modified (Jan 2012)		1, 2	Auckland
G&C sample volume	USEPA 1623.1 (Modified)		3, 4	Auckland
G&C Sampled time	USEPA 1623.1 (Modified)		3, 4	Auckland

Preparations			
Nonpotable waters preparation (virus)	In-house method	2, 3, 4	Auckland
Sewage preparation (virus)	In-house method	1	Auckland

The method detection limit (MDL) listed is the limit attainable in a relatively clean matrix. If dilutions are required for analysis the detection limit may be higher. For more information please contact the Compliance and Projects Manager.

Samples, with suitable preservation and stability of analytes, will be held by the laboratory for a period of two weeks after results have been reported, unless otherwise advised by the submitter.

Watercare Laboratory Services is a division of Watercare Services Limited .

Robyn Abernethy
Compliance and Projects Manager

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Certificate of Analysis
Laboratory Reference:240827-113

Attention:	Rosedale Reports	*Final Report:*	**561225-0**
Client:	**WATERCARE SERVICES LTD**	*Report Issue Date:*	**30-Aug-2024**
Address:	**2 Jack Hinton Drive, Rosedale, Auckland, 0632**	*Received Date:*	**27-Aug-2024**
Client Reference:	**6 Monthly Metals - Final**	*Laboratory Activity Dates:*	**28-Aug-2024 - 30-Aug-2024**
Purchase Order:	**X-32000-ST-001**	*Quote Reference :*	**1487**

Sample Details

Lab Sample ID:	**240827-113-1**
Client Sample ID:	
Sample Date/Time	27/08/2024 07:30
Description:	Final

Metals

Dissolved Metals by ICP-MS—Ultratrace (Received Filtered)		
Arsenic (Dissolved)	mg/L	0.0014
Cadmium (Dissolved)	mg/L	0.000012
Chromium (Dissolved)	mg/L	0.00091
Copper (Dissolved)	mg/L	0.0029
Lead (Dissolved)	mg/L	0.00014
Mercury (Dissolved)	mg/L	<0.00005
Nickel (Dissolved)	mg/L	0.0031
Zinc (Dissolved)	mg/L	0.037
Total Metals by ICP-MS—Ultratrace (Default Digest)		
Arsenic (Total)	mg/L	0.0016 *
Cadmium (Total)	mg/L	0.000012 *
Chromium (Total)	mg/L	0.0011 *
Copper (Total)	mg/L	0.0039 *
Lead (Total)	mg/L	0.00019 *
Mercury (Total)	mg/L	<0.00005 *
Nickel (Total)	mg/L	0.0031 *
Zinc (Total)	mg/L	0.039 *

*Results marked with * are not accredited to International Accreditation New Zealand. A dash indicates no test performed.*

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Reference Methods
The sample(s) referred to in this report were analysed by the following method(s)

Analyte	Method Reference	MDL	Samples	Location
Metals				
Dissolved Metals by ICP-MS—Ultratrace (Received Filtered)				
Arsenic (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Cadmium (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.000005 mg/L	All	Auckland
Chromium (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Copper (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Lead (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Mercury (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Nickel (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.0002 mg/L	All	Auckland
Zinc (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.0003 mg/L	All	Auckland
Total Metals by ICP-MS—Ultratrace (Default Digest)				
Arsenic (Total)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Cadmium (Total)	APHA (online edition) 3125 B by ICPMS	0.000005 mg/L	All	Auckland
Chromium (Total)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Copper (Total)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Lead (Total)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland

Metals				
Total Metals by ICP-MS—Ultratrace (Default Digest)				
Mercury (Total)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Nickel (Total)	APHA (online edition) 3125 B by ICPMS	0.0002 mg/L	All	Auckland
Zinc (Total)	APHA (online edition) 3125 B by ICPMS	0.0003 mg/L	All	Auckland
Preparations				
Digest for Total Metals in Liquids	APHA 3030E Modified (4:1 Nitric:Hydrochloric Acid: 95°C 2 hours)		All	Auckland

The method detection limit (MDL) listed is the limit attainable in a relatively clean matrix. If dilutions are required for analysis the detection limit may be higher. For more information please contact the Compliance and Projects Manager.

Samples, with suitable preservation and stability of analytes, will be held by the laboratory for a period of two weeks after results have been reported, unless otherwise advised by the submitter.

Watercare Laboratory Services is a division of Watercare Services Limited .

Stephen Money

KTP - Chemistry

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Certificate of Analysis
Laboratory Reference:240828-105

Attention:	Rosedale Reports	*Final Report:*	**561228-0**
Client:	**WATERCARE SERVICES LTD**	*Report Issue Date:*	**30-Aug-2024**
Address:	**2 Jack Hinton Drive, Rosedale, Auckland, 0632**	*Received Date:*	**28-Aug-2024**
Client Reference:	**6 Monthly Metals - Final**	*Laboratory Activity Dates:*	**28-Aug-2024 - 30-Aug-2024**
Purchase Order:	**X-32000-ST-001**	*Quote Reference :*	**1487**

Sample Details

Lab Sample ID:	**240828-105-1**
Client Sample ID:	
Sample Date/Time	28/08/2024 07:30
Description:	Final

Metals

Dissolved Metals by ICP-MS—Ultratrace (Received Filtered)		
Arsenic (Dissolved)	mg/L	0.0016
Cadmium (Dissolved)	mg/L	0.000011
Chromium (Dissolved)	mg/L	0.00088
Copper (Dissolved)	mg/L	0.003
Lead (Dissolved)	mg/L	0.00015
Mercury (Dissolved)	mg/L	<0.00005
Nickel (Dissolved)	mg/L	0.003
Zinc (Dissolved)	mg/L	0.037
Total Metals by ICP-MS—Ultratrace (Default Digest)		
Arsenic (Total)	mg/L	0.0014 *
Cadmium (Total)	mg/L	0.000012 *
Chromium (Total)	mg/L	0.0011 *
Copper (Total)	mg/L	0.0039 *
Lead (Total)	mg/L	0.00026 *
Mercury (Total)	mg/L	<0.00005 *
Nickel (Total)	mg/L	0.0029 *
Zinc (Total)	mg/L	0.038 *

*Results marked with * are not accredited to International Accreditation New Zealand. A dash indicates no test performed.*

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Reference Methods
The sample(s) referred to in this report were analysed by the following method(s)

Analyte	Method Reference	MDL	Samples	Location
Metals				
Dissolved Metals by ICP-MS—Ultratrace (Received Filtered)				
Arsenic (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Cadmium (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.000005 mg/L	All	Auckland
Chromium (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Copper (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Lead (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Mercury (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Nickel (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.0002 mg/L	All	Auckland
Zinc (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.0003 mg/L	All	Auckland
Total Metals by ICP-MS—Ultratrace (Default Digest)				
Arsenic (Total)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Cadmium (Total)	APHA (online edition) 3125 B by ICPMS	0.000005 mg/L	All	Auckland
Chromium (Total)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Copper (Total)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Lead (Total)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland

Metals				
Total Metals by ICP-MS—Ultratrace (Default Digest)				
Mercury (Total)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Nickel (Total)	APHA (online edition) 3125 B by ICPMS	0.0002 mg/L	All	Auckland
Zinc (Total)	APHA (online edition) 3125 B by ICPMS	0.0003 mg/L	All	Auckland
Preparations				
Digest for Total Metals in Liquids	APHA 3030E Modified (4:1 Nitric:Hydrochloric Acid: 95°C 2 hours)		All	Auckland

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Samples, with suitable preservation and stability of analytes, will be held by the laboratory for a period of two weeks after results have been reported, unless otherwise advised by the submitter.

Watercare Laboratory Services is a division of Watercare Services Limited .

Stephen Money

KTP - Chemistry

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www.watercarelabs.co.nz

Certificate of Analysis
Laboratory Reference:240829-090

Attention:	Rosedale Reports	*Final Report:*	**561828-0**
Client:	**WATERCARE SERVICES LTD**	*Report Issue Date:*	**05-Sep-2024**
Address:	**2 Jack Hinton Drive, Rosedale, 0632**	*Received Date:*	**29-Aug-2024**
Client Reference:	**6 Monthly Metals - Final**	*Laboratory Activity Dates:*	**29-Aug-2024 - 05-Sep-2024**
Purchase Order:	**X-32000-ST-001**	*Quote Reference :*	**1487**

Sample Details

Lab Sample ID:	**240829-090-1**
Client Sample ID:	
Sample Date/Time	29/08/2024 09:45
Description:	Final

Metals

Dissolved Metals by ICP-MS—Ultratrace (Received Filtered)

Arsenic (Dissolved)	mg/L	0.0015
Cadmium (Dissolved)	mg/L	0.0000093
Chromium (Dissolved)	mg/L	0.00091
Copper (Dissolved)	mg/L	0.0031
Lead (Dissolved)	mg/L	0.00014
Mercury (Dissolved)	mg/L	<0.00005
Nickel (Dissolved)	mg/L	0.003
Zinc (Dissolved)	mg/L	0.036

Total Metals by ICP-MS—Ultratrace (Default Digest)

Arsenic (Total)	mg/L	0.0014
Cadmium (Total)	mg/L	0.000012
Chromium (Total)	mg/L	0.00094
Copper (Total)	mg/L	0.0035
Lead (Total)	mg/L	0.00016
Mercury (Total)	mg/L	<0.00005
Nickel (Total)	mg/L	0.0032
Zinc (Total)	mg/L	0.039

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Dissolved Metals by ICP-MS—Ultratrace (Received Filtered)				
Arsenic (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Cadmium (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.000005 mg/L	All	Auckland
Chromium (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Copper (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Lead (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Mercury (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Nickel (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.0002 mg/L	All	Auckland
Zinc (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.0003 mg/L	All	Auckland
Total Metals by ICP-MS—Ultratrace (Default Digest)				
Arsenic (Total)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Cadmium (Total)	APHA (online edition) 3125 B by ICPMS	0.000005 mg/L	All	Auckland
Chromium (Total)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Copper (Total)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Lead (Total)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Mercury (Total)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland

Metals				
Total Metals by ICP-MS—Ultratrace (Default Digest)				
Nickel (Total)	APHA (online edition) 3125 B by ICPMS	0.0002 mg/L	All	Auckland
Zinc (Total)	APHA (online edition) 3125 B by ICPMS	0.0003 mg/L	All	Auckland
Preparations				
Digest for Total Metals in Liquids	APHA 3030E Modified (4:1 Nitric:Hydrochloric Acid: 95°C 2 hours)		All	Auckland

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Stephen Money

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www.watercarelabs.co.nz

Certificate of Analysis
Laboratory Reference:250120-002

Attention:	Rosedale Reports	*Final Report:*	**577590-0**
Client:	**WATERCARE SERVICES LTD**	*Report Issue Date:*	**29-Jan-2025**
Address:	**2 Jack Hinton Drive, Rosedale, Auckland, 0632**	*Received Date:*	**21-Jan-2025**
Client Reference:	**6 Monthly Metals - Final**	*Laboratory Activity Dates:*	**24-Jan-2025 - 29-Jan-2025**
Purchase Order:	**X-32000-ST-001**	*Quote Reference :*	**1487**

Sample Details

Lab Sample ID:	**250120-002-1**
Client Sample ID:	
Sample Date/Time	20/01/2025
Description:	Final

Metals

Dissolved Metals by ICP-MS—Ultratrace (Received Filtered)		
Arsenic (Dissolved)	mg/L	0.0019
Cadmium (Dissolved)	mg/L	0.0000071
Chromium (Dissolved)	mg/L	0.00066
Copper (Dissolved)	mg/L	0.0035
Lead (Dissolved)	mg/L	0.00011
Mercury (Dissolved)	mg/L	<0.00005
Nickel (Dissolved)	mg/L	0.0033
Zinc (Dissolved)	mg/L	0.019
Total Metals by ICP-MS—Ultratrace (Default Digest)		
Arsenic (Total)	mg/L	0.0016
Cadmium (Total)	mg/L	0.000016
Chromium (Total)	mg/L	0.0011
Copper (Total)	mg/L	0.0046
Lead (Total)	mg/L	0.00035
Mercury (Total)	mg/L	<0.00005
Nickel (Total)	mg/L	0.0037
Zinc (Total)	mg/L	0.029

*Results marked with * are not accredited to International Accreditation New Zealand. A dash indicates no test performed.*

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Reference Methods
The sample(s) referred to in this report were analysed by the following method(s)

Analyte	Method Reference	MDL	Samples	Location
Metals				
Dissolved Metals by ICP-MS—Ultratrace (Received Filtered)				
Arsenic (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Cadmium (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.000005 mg/L	All	Auckland
Chromium (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Copper (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Lead (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Mercury (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Nickel (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.0002 mg/L	All	Auckland
Zinc (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.0003 mg/L	All	Auckland
Total Metals by ICP-MS—Ultratrace (Default Digest)				
Arsenic (Total)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Cadmium (Total)	APHA (online edition) 3125 B by ICPMS	0.000005 mg/L	All	Auckland
Chromium (Total)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Copper (Total)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Lead (Total)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland

Metals				
Total Metals by ICP-MS—Ultratrace (Default Digest)				
Mercury (Total)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Nickel (Total)	APHA (online edition) 3125 B by ICPMS	0.0002 mg/L	All	Auckland
Zinc (Total)	APHA (online edition) 3125 B by ICPMS	0.0003 mg/L	All	Auckland
Preparations				
Digest for Total Metals in Liquids	APHA 3030E Modified (4:1 Nitric:Hydrochloric Acid: 95°C 2 hours)		All	Auckland

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Anel Du Preez

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Certificate of Analysis
Laboratory Reference:250121-093

Attention:	Rosedale Reports	*Final Report:*	**577592-0**
Client:	**WATERCARE SERVICES LTD**	*Report Issue Date:*	**29-Jan-2025**
Address:	**2 Jack Hinton Drive, Rosedale, Auckland, 0632**	*Received Date:*	**23-Jan-2025**
Client Reference:	**6 Monthly Metals - Final**	*Laboratory Activity Dates:*	**24-Jan-2025 - 29-Jan-2025**
Purchase Order:	**X-32000-ST-001**	*Quote Reference :*	**1487**

Sample Details

Lab Sample ID:	**250121-093-1**
Client Sample ID:	
Sample Date/Time	21/01/2025
Description:	Final

Metals

Dissolved Metals by ICP-MS—Ultratrace (Received Filtered)		
Arsenic (Dissolved)	mg/L	0.0018
Cadmium (Dissolved)	mg/L	0.0000095
Chromium (Dissolved)	mg/L	0.00055
Copper (Dissolved)	mg/L	0.0035
Lead (Dissolved)	mg/L	0.00011
Mercury (Dissolved)	mg/L	<0.00005
Nickel (Dissolved)	mg/L	0.0037
Zinc (Dissolved)	mg/L	0.017
Total Metals by ICP-MS—Ultratrace (Default Digest)		
Arsenic (Total)	mg/L	0.0017
Cadmium (Total)	mg/L	0.000016
Chromium (Total)	mg/L	0.00097
Copper (Total)	mg/L	0.0046
Lead (Total)	mg/L	0.00035
Mercury (Total)	mg/L	<0.00005
Nickel (Total)	mg/L	0.0041
Zinc (Total)	mg/L	0.029

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Reference Methods
The sample(s) referred to in this report were analysed by the following method(s)

Analyte	Method Reference	MDL	Samples	Location
Metals				
Dissolved Metals by ICP-MS—Ultratrace (Received Filtered)				
Arsenic (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Cadmium (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.000005 mg/L	All	Auckland
Chromium (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Copper (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Lead (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Mercury (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Nickel (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.0002 mg/L	All	Auckland
Zinc (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.0003 mg/L	All	Auckland
Total Metals by ICP-MS—Ultratrace (Default Digest)				
Arsenic (Total)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Cadmium (Total)	APHA (online edition) 3125 B by ICPMS	0.000005 mg/L	All	Auckland
Chromium (Total)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Copper (Total)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Lead (Total)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland

Metals				
Total Metals by ICP-MS—Ultratrace (Default Digest)				
Mercury (Total)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Nickel (Total)	APHA (online edition) 3125 B by ICPMS	0.0002 mg/L	All	Auckland
Zinc (Total)	APHA (online edition) 3125 B by ICPMS	0.0003 mg/L	All	Auckland
Preparations				
Digest for Total Metals in Liquids	APHA 3030E Modified (4:1 Nitric:Hydrochloric Acid: 95°C 2 hours)		All	Auckland

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Certificate of Analysis
Laboratory Reference:250122-011

Attention:	Rosedale Reports	*Final Report:*	**577593-0**
Client:	**WATERCARE SERVICES LTD**	*Report Issue Date:*	**29-Jan-2025**
Address:	**2 Jack Hinton Drive, Rosedale, Auckland, 0632**	*Received Date:*	**22-Jan-2025**
Client Reference:	**6 Monthly Metals - Final**	*Laboratory Activity Dates:*	**24-Jan-2025 - 29-Jan-2025**
Purchase Order:	**X-32000-ST-001**	*Quote Reference :*	**1487**

Sample Details

Lab Sample ID:	**250122-011-1**
Client Sample ID:	
Sample Date/Time	22/01/2025
Description:	Final

Metals

Dissolved Metals by ICP-MS—Ultratrace (Received Filtered)		
Arsenic (Dissolved)	mg/L	0.0015
Cadmium (Dissolved)	mg/L	0.0000086
Chromium (Dissolved)	mg/L	0.00067
Copper (Dissolved)	mg/L	0.0035
Lead (Dissolved)	mg/L	0.00011
Mercury (Dissolved)	mg/L	<0.00005
Nickel (Dissolved)	mg/L	0.0033
Zinc (Dissolved)	mg/L	0.021
Total Metals by ICP-MS—Ultratrace (Default Digest)		
Arsenic (Total)	mg/L	0.0019
Cadmium (Total)	mg/L	0.000012
Chromium (Total)	mg/L	0.00093
Copper (Total)	mg/L	0.0042
Lead (Total)	mg/L	0.00033
Mercury (Total)	mg/L	<0.00005
Nickel (Total)	mg/L	0.0033
Zinc (Total)	mg/L	0.027

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Metals				
Dissolved Metals by ICP-MS—Ultratrace (Received Filtered)				
Arsenic (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Cadmium (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.000005 mg/L	All	Auckland
Chromium (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Copper (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Lead (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Mercury (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Nickel (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.0002 mg/L	All	Auckland
Zinc (Dissolved)	APHA (online edition) 3125 B by ICPMS	0.0003 mg/L	All	Auckland
Total Metals by ICP-MS—Ultratrace (Default Digest)				
Arsenic (Total)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Cadmium (Total)	APHA (online edition) 3125 B by ICPMS	0.000005 mg/L	All	Auckland
Chromium (Total)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Copper (Total)	APHA (online edition) 3125 B by ICPMS	0.00001 mg/L	All	Auckland
Lead (Total)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland

Metals				
Total Metals by ICP-MS—Ultratrace (Default Digest)				
Mercury (Total)	APHA (online edition) 3125 B by ICPMS	0.00005 mg/L	All	Auckland
Nickel (Total)	APHA (online edition) 3125 B by ICPMS	0.0002 mg/L	All	Auckland
Zinc (Total)	APHA (online edition) 3125 B by ICPMS	0.0003 mg/L	All	Auckland
Preparations				
Digest for Total Metals in Liquids	APHA 3030E Modified (4:1 Nitric:Hydrochloric Acid: 95°C 2 hours)		All	Auckland

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Anel Du Preez

KTP Signatory

Appendix B. Receiving Environment Report

Rosedale Wastewater Treatment Plant
Receiving Environment Monitoring 2024-2025

Final - September 2025

Watercare

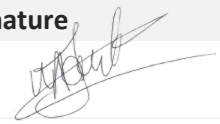
QUALITY INFORMATION

Document	Receiving Environment Monitoring Report
Reference	N/A
Date	24 September 2025
Name and position of originator	Matt Conley, Senior Environmental Scientist

Revision History

Rev	Revision Date	Name	Position	Signature
1	5/09/2025	Michiel Jonker	Environmental Care Manager	

Approved

Date	Name	Position	Signature
24/09/2025	Michiel Jonker	Environmental Care Manager	

Executive Summary

Watercare Services Limited (Watercare) runs a wastewater treatment plant (WWTP) at Rosedale that services most of Auckland's North Shore. This plant discharges treated wastewater via an outfall to the Hauraki Gulf.

Rosedale WWTP's Operations and Management Plan, and Condition 9 of the discharge permit, require water quality sampling at eight locations in the Hauraki Gulf.

Analysis of both receiving environment and effluent discharge data was undertaken for a 10-year period from July 2015 through to June 2025 to assess compliance over the 2024-2025 annual period, as well as long-term trends in the data.

The effluent discharge over the 2024-2025 annual period complied with all consent limits. Analysis of 10-year data identified decreasing trends in the concentration for multiple nutrient, heavy metal, and physicochemical parameters; whilst increasing trends were identified for Chemical Oxygen Demand (COD) as well as both Total and Dissolved Reactive Phosphorus (TP and DRP).

The COD increase is likely an artefact of reduced monitoring frequency since 2017, which makes the data more sensitive to variability. Importantly, influent data shows COD, as well as Biological Oxygen Demand ($cBOD_5$), is actually decreasing; and $cBOD_5$ in the effluent remains consistently well below its consent limit, suggesting no real deterioration in treatment.

For phosphorus, effluent DRP concentrations remain well below the 10 g/m^3 consent limit, with no exceedances over the entire 10-year review period. The observed upward trend reflects a narrowing of the concentration range, where minimum values have increased while maximum values have remained stable. This indicates greater consistency and stability in the treatment process rather than an actual increase in phosphorus loads.

When harbour monitoring locations are grouped into 'Outfall' and 'Sentinel' sites, significant differences exist between the two groups for Total Oxidised Nitrogen (NO_x) and TP over the current reporting year (2024-2025) as well as long-term (2015-2025). In addition, long-term differences exist for DRP and pH.

Analysis of chlorophyll-a, a proxy for primary productivity, found no statistically significant differences between sites; therefore, changes in nutrients are not significantly influencing algal growth. Concentrations of faecal bacteria indicators were generally low at all sites. A decreasing trend in pH is evident at one of the sentinel sites (Red Bluff); however, this is not believed to be related to effluent discharge from the plant.

The effects of the effluent discharge do not persist beyond the area immediately around the diffuser and are likely minor. All sentinel sites showed a decreasing trend for at least one nutrient parameter, and five of the six sentinel sites display decreasing chlorophyll-a trends.

The results indicate relatively stable water quality in the study area.

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ABBREVIATIONS AND ACRONYMS

Abbreviation	Description
AC	Auckland Council
ANZG	Australia & New Zealand Guidelines
$cBOD_5$	Carbonaceous 5-day biochemical oxygen demand
CFU	Colony Forming Units
COD	Chemical oxygen demand
DO	Dissolved oxygen
DRP	Dissolved reactive phosphorus or dissolved soluble phosphorus (synonyms)
IQR	Interquartile range (25^{th} percentile to 75^{th} percentile)
mg/L	Milligrams per Litre
µg/L	Micrograms per Litre
MPN	Most Probable Number
NH_x	Ammonia and ammonium, reported in milligrams nitrogen
NO_x	Total oxidised nitrogen (nitrite + nitrate)
NTU	Nephelometric Turbidity Unit
OMP	Operation Management Plan
PFU	Plaque-Forming Units
TN	Total nitrogen
TP	Total phosphorus
TSS	Total suspended solids
Watercare	Watercare Services Limited
WWTP	Wastewater treatment plant

1 INTRODUCTION

1.1 Background

Watercare runs a wastewater treatment plant at Rosedale that services most of Auckland's North Shore. This plant, which is the second largest in Auckland, discharges treated wastewater via an outfall to the Hauraki Gulf.

Resource Consent 23799 permits the discharge of up to 6 m^3/s of treated wastewater, subject to conditions including limits for contaminants of concern. The consent also requires regular reporting of water quality monitoring.

1.2 Monitoring requirements

Rosedale WWTP's Operation Management Plan (OMP) and Condition 9 of the discharge permit require water quality sampling at eight locations in the Hauraki Gulf. Section 2 describes the programme in greater detail.

1.3 Scope

The purpose of this report is to summarise the results of water quality monitoring collected between July 2024 to June 2025 inclusive. In doing so, this report includes:

- A description of the monitoring programme.
- Sampling details.
- A summary of Effluent quality for 2024-2025.
- An assessment of receiving water quality results for 2024-2025.
- A review of long-term trends in both effluent and the receiving environment between 2015 and 2025.

The inclusion of long-term trend analysis in this year's report provides context beyond the annual compliance snapshot. With ten years of monitoring data now available since commissioning of the long outfall in 2011, sufficient information exists to evaluate whether observed changes reflect consistent trends or short-term variability. This aligns with the intent of Technical Report 34, which anticipated that monitoring frequency and scope should be reviewed once an adequate dataset had been established, and with the consent requirement to periodically reassess the Quantitative Microbial Risk Assessment. By incorporating long-term analysis at this point, we are proactively assessing environmental performance.

2 SAMPLING PLAN

2.1 Locations

Figure 2-1 shows the treatment plant and the sampling locations. Water quality samples come from eight sites north and south of the outfall's diffuser. The purpose of the diffuser is to maximise dispersion and thus dilution of the treated effluent. Treated effluent data comes from the WWTP before it enters the outfall pipe.

2.2 Parameters

Table 2-1 lists the parameters that Watercare routinely measures in effluent and Hauraki Gulf water samples. Field staff measure temperature, salinity, pH, and dissolved oxygen in situ using calibrated hand-held meters. Watercare Laboratories Services analyse the rest of the parameters in their laboratory.

Temperature and salinity are measured at the surface and at a depth of 5 m, all other analysis comes from surface samples.

Table 2-1 Water quality parameters measured in effluent and Hauraki Gulf water quality samples

Parameter	Relevance
Physicochemical	
Temperature	Ecological health
Salinity	Seawater indicator (Hauraki Gulf only)
pH	Ecological health
DO	Ecological health (effluent only)
$cBOD_5$	Sewage fungus indicator/Ecological health (effluent only)
TSS	Ecological health/Recreational contact
Turbidity	Ecological health/Recreational contact (Hauraki Gulf only)
Chemicals and nutrients	
NH_x	Ecological health
NO_x	Ecological health
TN	Eutrophication
DRP	Eutrophication
TP	Eutrophication
Biological indicators	
Chlorophyll-a	Eutrophication (Hauraki Gulf only)
Enterococci spp.	Human health
Faecal coliforms	Human health (effluent only)

In addition to these routine samples, Watercare also analyses its effluent for dissolved metals, persistent organics pesticides and viral pathogens. This report includes these results for 2024-2025.

2.3 Frequencies

In accordance with the OMP, Watercare aims to collect quarterly water quality samples from the receiving environment (one in each season). For the 2024-2025 reporting period samples were collected in August and October 2024, and February and May 2025.

It is noted that, while the OMP stipulates quarterly monitoring, Resource Consent 23799 requires Watercare to "*monitor the receiving environment generally as specified in Technical Report 34*". Technical Report 34 is the Environment Monitoring Plan that was prepared in support of the consent application. It requires quarterly monitoring of coastal water quality for five years after commissioning of the long outfall, which happened in 2011. Technical Report 34 also specified that, after those five years (i.e., by 2016-2017), the monitoring plan should be reviewed to determine if sufficient data had been gathered to satisfy the objectives of that plan, and if so, to recommend the water quality component of the plan to be discontinued or the frequency reduced. The current Operation and Management Plan was prepared in 2017 and partially reviewed in 2021, but no changes to the coastal water quality monitoring frequency were proposed.

Figure 2-1 Rosedale REMP, Hauraki Gulf sampling locations.

3 RESULTS

3.1 Effluent quality

Table 3-1 is a summary of Rosedale WWTP effluent quality data for 2024-2025. As reported in the quarterly results to Auckland Council, the WWTP was well under its consent limits, with the upper inter-quartile range (75%ile) below the median consent limits for all relevant parameters. Concentrations of persistent organic pesticides were below laboratory limits of detection – organic pesticide data is not reproduced here.

For heavy metals in the effluent, without accounting for any dilution within the receiving environment, only concentrations of total copper and total zinc were elevated above respective ANZG 95%ile trigger values for the protection of marine ecosystems. Total copper was below the 80%ile threshold normally applied to "in-pipe" point-source urban discharges (<8 µg/L)[1]. Zinc was elevated above the 80%ile (21 µg/L), but with no allowance for dilution. Given the measurements are for total concentrations, rather than the more ecologically relevant dissolved fraction, it is unlikely the elevated concentrations are ecologically significant. Based on the mean, 4- to 5-fold dilution would be sufficient for both zinc and copper to achieve the 95%ile, and an approximate 10-fold dilution would meet the "pristine" 99%ile threshold of 0.3 µg/L (Copper) and 3.3 µg/L (Zinc).

Table 3-1 Rosedale WWTP effluent quality summary (2024-2025)

Parameter	Unit	n	Mean	IQR	Minimum	Maximum	Limit
Physicochemistry							
Flow rate	m^3/day	361	59,565	43,100-64,500	22,672	156,934	N/A
	m^3/s	523,038	0.70	0.47-0.79	0.00	2.64	6
Temperature	˚C	216	18.6	16-21.5	6.80	26	N/A
pH	-	215	7.5	7.3-7.74	5.51	8.72	N/A
DO	mg O_2/L	217	8.4	7.42-9.04	4.62	13.06	N/A
$cBOD_5$	mg O_2/L	51	1.4	0.705-1.8	0.50	4.2	20 (median)
TSS	mg/L	156	6.7	3.95-8.65	1.00	22	35 (median)
Nutrients							
NH_x	mg N/L	12	0.5	0.34-0.603	0.03	1.4	10 (median)
Nitrite	mg N/L	12	0.1	0.0375-0.075	0.02	0.3	N/A
Nitrate	mg N/L	12	6.8	6.13-7.75	3.96	9	N/A
TN	mg N/L	12	8.8	7.55-9.92	6.30	12	30 (median)
DRP	mg P/L	12	3.6	2.85-4.22	2.41	5.1	10 (median)
TP	mg P/L	12	4.0	3.14-4.97	2.78	5.78	
Bacteria and viruses							
Enterococci spp.	cfu/100 mL	157	43	<1.6-44	<1.6	590	100 (median)
Faecal coliforms	cfu/100 mL	157	253	<1.6-140	<1.6	4,600	1,000 (median)
Bacteriophages	pfu/L	2	90	50-130	<10	170	N/A
Enteroviruses	pfu/L	2	<5	-	<5	<5	N/A
Camplylobacter spp.	MPN/L	2	<1	-	<1	<1	N/A
Salmonella spp.	MPN/L	2	<1	-	<1	<1	N/A

[1] Australia & New Zealand Guidelines for Fresh & Marine Water Quality. Retrieved from https://www.waterquality.gov.au/anz-guidelines. Accessed 15 August 2025.

Parameter	Unit	n	Mean	IQR	Minimum	Maximum	Limit
Total metals							
Arsenic	µg/L*	6	1.6	-	1.4	1.9	4.5**
Cadmium	µg/L*	6	0.01	-	0.01	0.02	5.5**
Chromium	µg/L*	6	1.0	-	0.93	1.1	4.4**
Copper	µg/L*	6	4.1	-	3.5	4.6	1.3**
Mercury	µg/L*	6	<0.05	-	<0.05	<0.05	0.4**
Nickel	µg/L*	6	3.4	-	2.9	4.1	70**
Lead	µg/L*	6	0.27	-	0.16	0.35	4.4**
Zinc	µg/L*	6	33	-	27	39	8.0**

*Units for metals are equivalent to mg/m^3, or parts per billion (ppb).

** Not a consent limit; ANZG 95%ile trigger value for marine waters.

3.2 Receiving water quality

Table 3-2 summarises water quality, averaged from sampling undertaken across the 2024-25 reporting period. Sites G1 and G2 are the outfall sites, and the others are sentinel sites located further away from the discharge (see Figure 2-1).

Table 3-2 Hauraki Gulf water quality summary for the Rosedale WWTP REMP (2024-2025)

Parameter	Unit	G1	G2	Tatarata Point	Mairangi Bay
Temperature*	˚C	17.7 ± 0.44	17.6 ± 0.43	17.5 ± 0.43	17.6 ± 0.43
Salinity*	ms/m	34.4 ± 0.13	34.4 ± 0.13	34.4 ± 0.14	34.4 ± 0.14
pH	-	8.1 ± 0.02	8.1 ± 0.02	8.05 ± 0.014	8.05 ± 0.014
Turbidity	NTU	0.86 ± 0.13	0.828 ± 0.084	0.646 ± 0.086	0.541 ± 0.044
NH_x	mg N/L	0.005 ± 0	0.005 ± 0	0.007 ± 0.001	0.005 ± 0
NO_x	mg N/L	0.011 ± 0.0039	0.008 ± 0.0018	0.0027 ± 0.0003	0.0032 ± 0.0006
TN	mg N/L	0.0855 ± 0.014	0.0973 ± 0.012	0.073 ± 0.0042	0.061 ± 0.005
DRP	mg P/L	0.015 ± 0.0016	0.015 ± 0.0017	0.012 ± 0.0005	0.013 ± 0.0006
TP	mg P/L	0.0198 ± 0.0024	0.0195 ± 0.002	0.0153 ± 0.0011	0.0155 ± 0.0008
Chlorophyll-a	µg/L	1.54 ± 0.36	1.4 ± 0.26	0.6 ± 0	0.75 ± 0.08
Enterococci spp.	cfu/100 mL	2.45 ± 0.41	1.63 ± 0.013	2.88 ± 0.39	2.05 ± 0.21
Faecal coliforms	cfu/100 mL	2.45 ± 0.41	5.23 ± 1.8	5.72 ± 1.3	1.63 ± 0.013
Parameter	**Unit**	**Tipau Point**	**Red Bluff**	**Rahopara Point**	**Black Rock**
Temperature*	˚C	17.5 ± 0.43	17.6 ± 0.44	18 ± 0.46	18 ± 0.47
Salinity*	ms/m	34.5 ± 0.14	34.4 ± 0.14	34.4 ± 0.14	34.3 ± 0.15
pH	-	8.08 ± 0.013	8 ± 0.02	8.05 ± 0.032	8.1 ± 0.041
Turbidity	NTU	0.592 ± 0.029	0.813 ± 0.079	0.662 ± 0.031	0.774 ± 0.076
NH_x	mg N/L	0.005 ± 0	0.005 ± 0	0.005 ± 0	0.005 ± 0
NO_x	mg N/L	0.0029 ± 0.0004	0.0034 ± 0.0004	0.0023 ± 0.0001	0.002 ± 0
TN	mg N/L	0.0815 ± 0.0066	0.0897 ± 0.01	0.0773 ± 0.0063	0.0893 ± 0.01
DRP	mg P/L	0.012 ± 0.0004	0.013 ± 0.0005	0.011 ± 0.0003	0.012 ± 0.0004
TP	mg P/L	0.0133 ± 0.0008	0.017 ± 0.00054	0.0152 ± 0.0009	0.0153 ± 0.0011
Chlorophyll-a	µg/L	0.8 ± 0.07	0.95 ± 0.1	1.63 ± 0.34	0.68 ± 0.03
Enterococci spp.	cfu/100 mL	3.7 ± 0.77	4.55 ± 0.93	1.63 ± 0.013	1.63 ± 0.013
Faecal coliforms	cfu/100 mL	7.72 ± 2.3	4.88 ± 1.4	1.63 ± 0.013	1.63 ± 0.013

Note: Mean values ± standard error. n=4 for all parameters except for temperature and salinity (measured at surface and 5 m deep) where *n=8.

Receiving environment monitoring over the 2024-2025 period was grouped into 'outfall' and 'sentinel' sites to investigate statistically significant differences in monitored parameters between the area around the outfall diffuser and the wider coastal environment. Significant differences (i.e. where p = < 0.05) were detected between outfall and sentinel sites for NO_x (p = 0.0260) and TP (p = 0.0381).

The difference in NO_x between outfall and sentinel sites showed a large effect (Cohen's d^2 = 1.23), indicating that total oxidised nitrogen levels at outfall sites were substantially higher than those at sentinel sites. Similarly, TP concentrations produced a large effect size (Cohen's d = 0.885), with outfall sites showing higher TP compared to sentinel sites. It is noted compiling sites into outfall and sentinel groups produces large variation in sample numbers (for NO_x and TP - outfall sites n = 8, and sentinel sites n = 24); therefore, these effect size estimates should be interpreted with caution. The unequal samples sizes, as well as the relatively small sample size for outfall sites, may affect the stability and precision of the effect size calculations.

3.3 Trends over time

3.3.1 Effluent

Mann-Kendall tests were undertaken to investigate increasing and decreasing trends in the concentration of monitored parameters in the effluent discharge from the treatment plant over the last 10 years (2015 – 2025). Results of significant trends are presented in Table 3-3 below; annual samples (such as organic pesticides) have been excluded from trend analysis. Results display a number of physicochemical, nutrient, and heavy metal parameters have decreased in the effluent discharge over the last 10 years, whilst Chemical Oxygen Demand (COD) and Phosphorus (TP and DRP) have increased.

Table 3-3: Statistically significant trends in effluent discharge (2015 - 2025)

Parameter	n	p-value	Kendall's Tau	Trend Direction
pH	1637	0.0016	-0.055	Decreasing
Total Suspended Solids	1564	0.00004	-0.073	Decreasing
Chemical Oxygen Demand	144	0.0034	0.185	Increasing
Dissolved Reactive Phosphorus	120	0.0064	0.177	Increasing
Total Phosphorus	120	0.0049	0.182	Increasing
Ammoniacal-N	119	0.0170	-0.165	Decreasing
Cadmium (total)	32	0.0155	-0.323	Decreasing
Chromium (total)	32	0.0032	-0.395	Decreasing
Copper (dissolved)	32	0.0458	-0.273	Decreasing
Lead (total)	32	0.0114	-0.335	Decreasing
Nickel (dissolved)	32	0.0159	-0.327	Decreasing
Nickel (total)	32	0.0015	-0.421	Decreasing
Zinc (dissolved)	32	0.00001	-0.603	Decreasing

Notes: Increasing parameters are shaded; p<0.05 considered statistically significant.

[2] Cohen's d expresses the size of the difference between groups in standard deviation units (≈0.2 = small, ≈0.5 = medium, ≥0.8 = large). A value of 1.23 indicates a very large difference statistically; however, given absolute concentrations are low, the ecological significance is likely minor.

Phosphorus discharge is controlled in the consent through limits on DRP. Under Condition 5, the treated effluent has a median limit for DRP of 10 g/m^3, and is allowed no more than eight exceedances of 10 g/m^3 over a one-year period. The median DRP concentration between July 2015 to June 2025 was 3.10 g/m^3. Effluent DRP results are presented in Table 3-4 and Figure 3-1, below; although there is an apparent increasing trend in effluent DRP, concentrations remain well below the consented median, with no exceedances of 10 g/m^3 across the entire 2015 – 2025 reporting period. The trend appears to be influenced by increasing minimum concentrations, whilst maximum concentrations are relatively steady; i.e. there is a decrease in concentration range (Figure 3-2). This is likely reflective of increased stability in treatment processes. Future monitoring will identify if this trend begins to flatten out.

Table 3-4: Analysis of DRP results 2015 - 2025

Date	n	Annual Median	No. of Samples > 10 g/m^3	Minimum	Maximum	IQR	Range
2015-16	12	3.75	0	2.3	4.4	0.77	2.1
2016-17	12	2.05	0	1.1	4.3	1.40	3.2
2017-18	12	2.50	0	1.1	4.5	1.00	3.4
2018-19	12	2.35	0	1.7	4.4	0.90	2.7
2019-20	11	2.30	0	1.3	3.6	0.60	2.3
2020-21	12	4.17	0	1.4	5.5	1.91	4.1
2021-22	12	3.74	0	2.7	4.4	0.93	1.7
2022-23	12	2.81	0	2.0	3.9	0.52	1.9
2023-24	12	3.41	0	2.2	4.9	0.87	2.7
2024-25	12	3.62	0	2.4	5.1	1.36	2.7

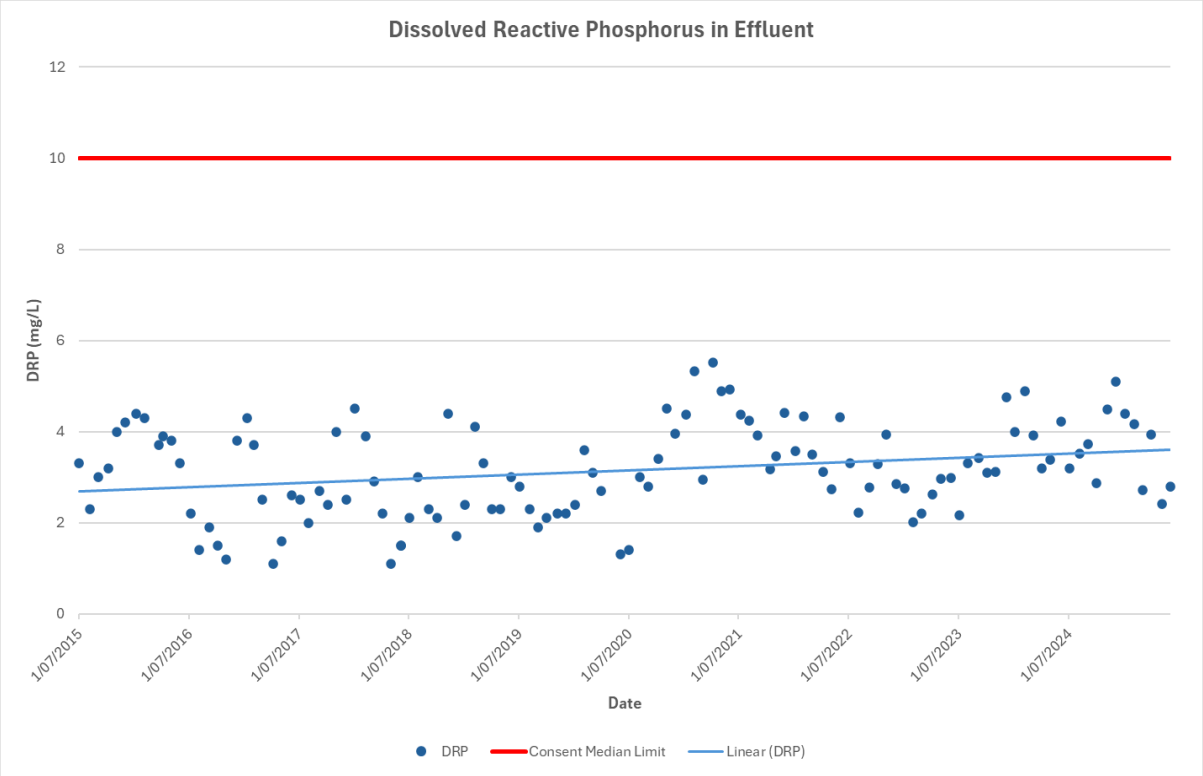

Figure 3-1: DRP results and 10-year trend in relation to the consented median limit, 2015-2025.

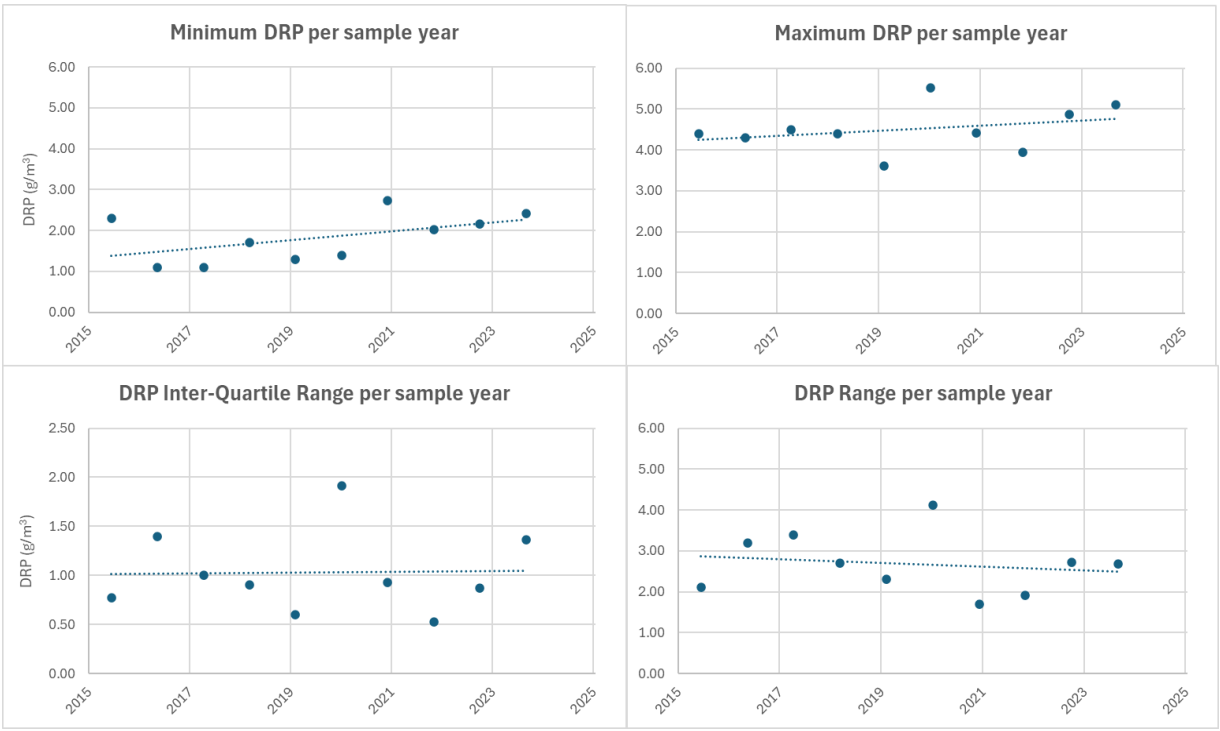

Figure 3-2: Effluent DRP range analysis across sample years.

There is no consent limit for COD, but there is for $cBOD_5$. The $cBOD_5$ consent limit is a median of 20 g/m^3, and no more than 16 exceedances of 20 g/m^3 per year. The median $cBOD_5$ between 2015 and 2025 was 1.0 g/m^3, well below the consent limit. There were no occurrences of results in excess of the median, with a maximum $cBOD_5$ result of 7.4 g/m^3 in March 2024. Furthermore, there was no trend in effluent $cBOD_5$ for 2015 – 2025 monitoring data ($p = 0.5102$) – see Figure 3-3.

Prior to February 2017, both COD and $cBOD_5$ effluent monitoring was undertaken fortnightly. Since February 2017, COD monitoring has reduced to approximately 6-monthly, whilst $cBOD_5$ monitoring is undertaken monthly. It is considered the reduced sampling frequency for COD has skewed the results and overstated the increasing trend, as with less results, concentration variation has a greater impact. It is possible the COD trend is an indication of increasing non-biodegradable chemical contaminants, potentially associated with industrial contributions to the plant; however, plant influent monitoring over the same period indicates a decreasing trend for both $cBOD_5$ and COD (see Figure 3-4). Note, the significance of influent trends has not been investigated.

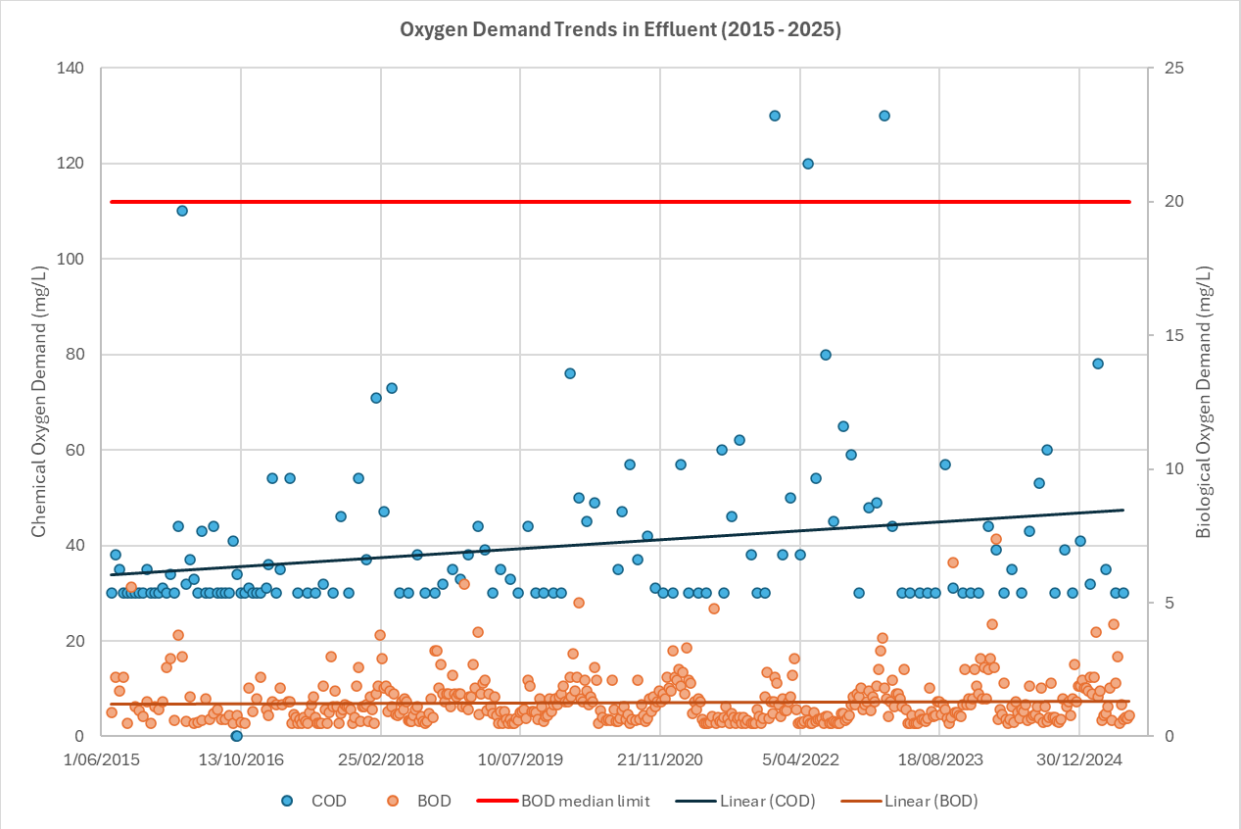

Figure 3-3: Chemical and Biological Oxygen Demand effluent trends between 2015 and 2025.

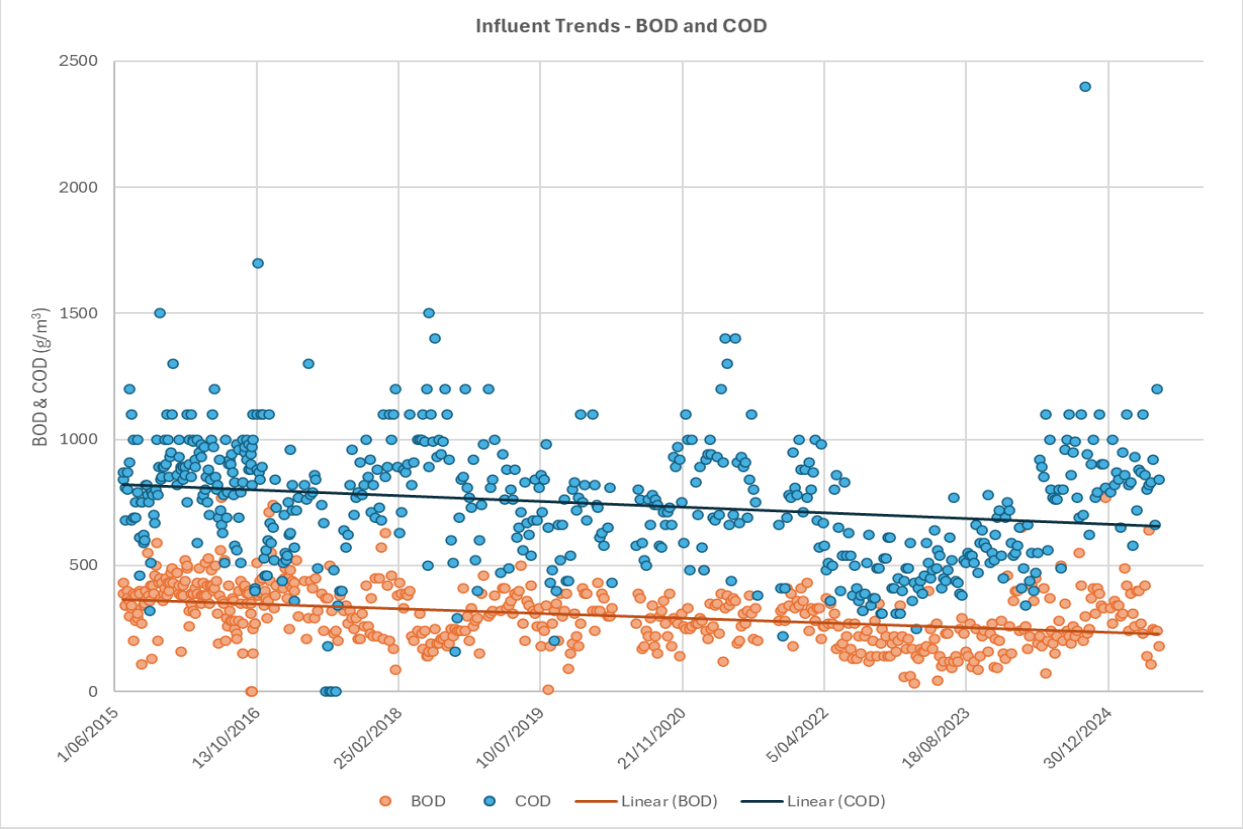

Figure 3-4: Chemical and Biological Oxygen Demand influent trends between 2015 and 2025.

3.3.2 Receiving environment

Figure 3-5 (physicochemistry), Figure 3-6 (nutrients), and Figure 3-7 (biological indicators) show the data for July 2015 – June 2025 inclusive.

Receiving environment monitoring over 2015-2025 was grouped into 'outfall' and 'sentinel' sites to investigate differences in monitored parameters between the area around the outfall diffuser and the wider coastal environment. Results are presented in Table 3-5 and Figure 3-8. Where statistically significant differences are identified in the table, Cohen's d values are provided to indicate the size of the difference between means for outfall and sentinel groups. As with analysis of 2024-2025 annual data, sample size (n) varies considerably between the groups, potentially influencing effect size calculations.

Table 3-5: Statistical differences in water quality between outfall and sentinel sites, 2024-25 monitoring

Parameter	n – Outfall Sites	n – Sentinel Sites	P-value	Cohen's d (Interpretation)
Temperature	144	432	0.8787	N/A
Salinity	144	432	0.7506	N/A
pH	72	216	0.0175	0.164 (Small)
Turbidity	72	216	0.7144	N/A
NH_x	72	216	0.5528	N/A
NO_x	72	216	0.0003	0.653 (Medium)
TN	72	216	0.9576	N/A
DRP	72	216	0.0317	0.569 (Medium)
TP	72	216	0.0137	0.560 (Medium)
Enterococci spp.	72	216	0.1503	N/A
Faecal coliforms	72	216	0.0514	N/A

Notes: Significant results are shaded; $p<0.05$ considered statistically significant.

Figure 3-5 Inner Hauraki Gulf physicochemical water quality data (July 2015-June 2025).

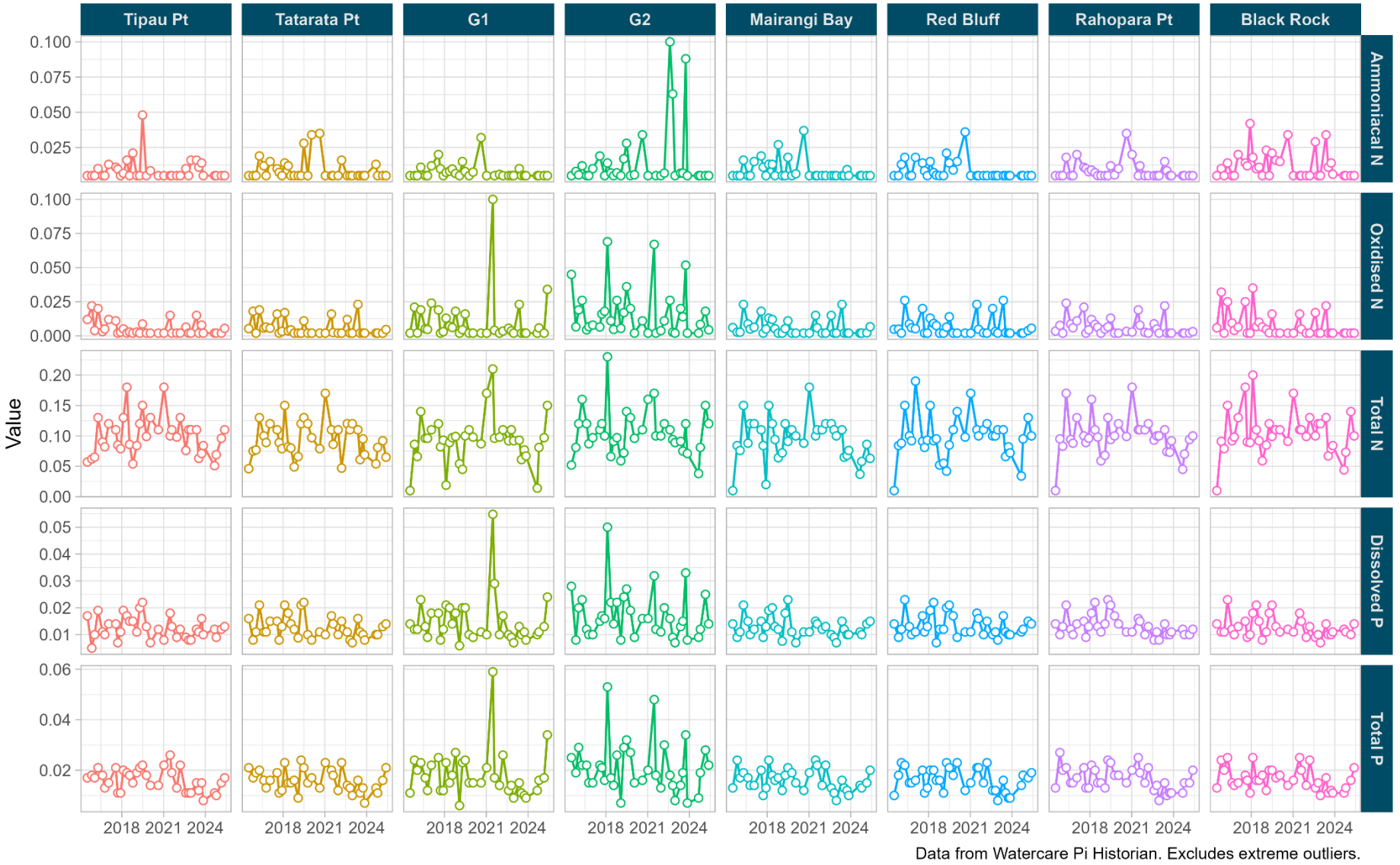

Figure 3-6 Inner Hauraki Gulf nutrient data (July 2015-June 2025).

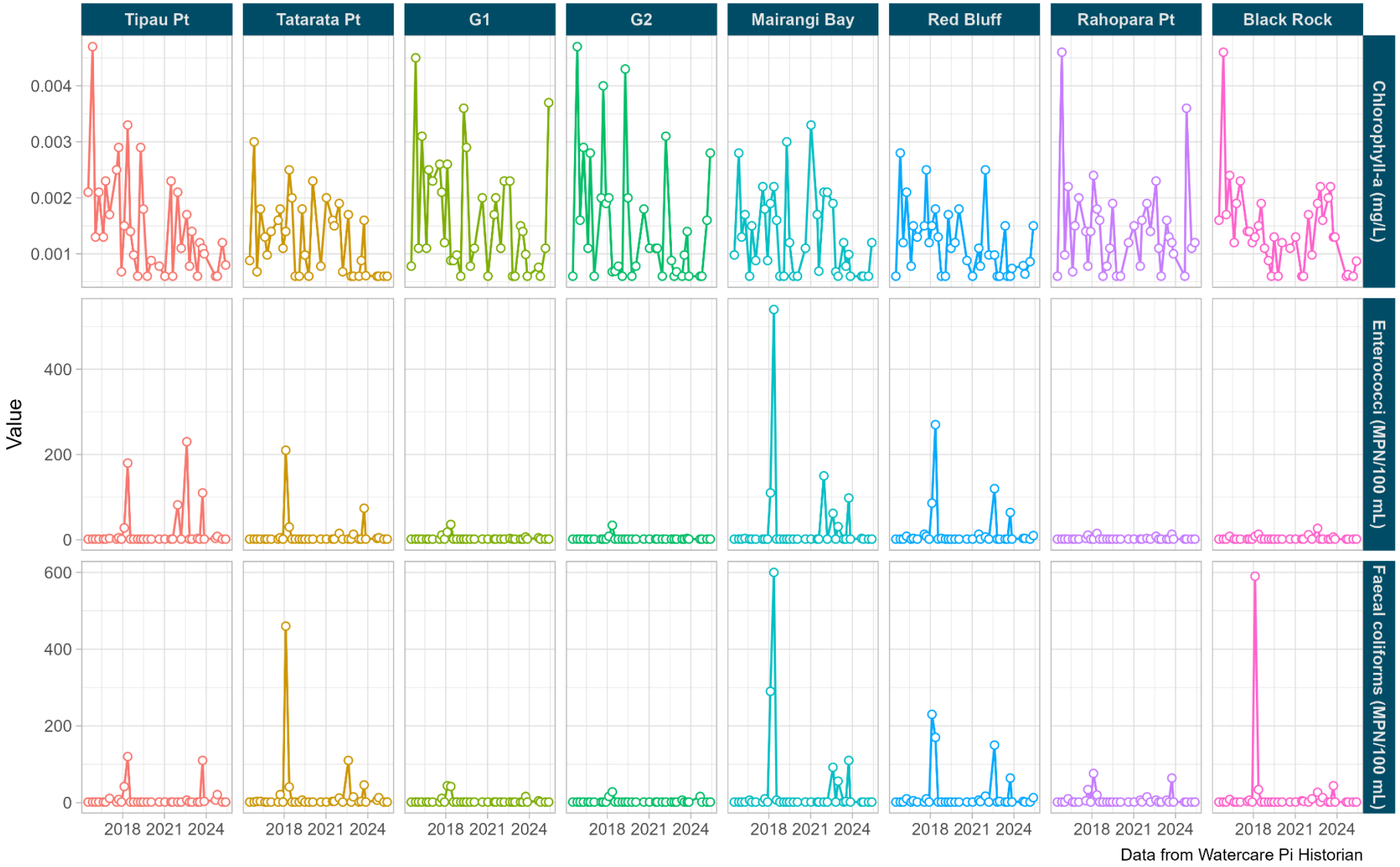

Figure 3-7 Inner Hauraki Gulf biological indicator results (July 2015-June 2025).

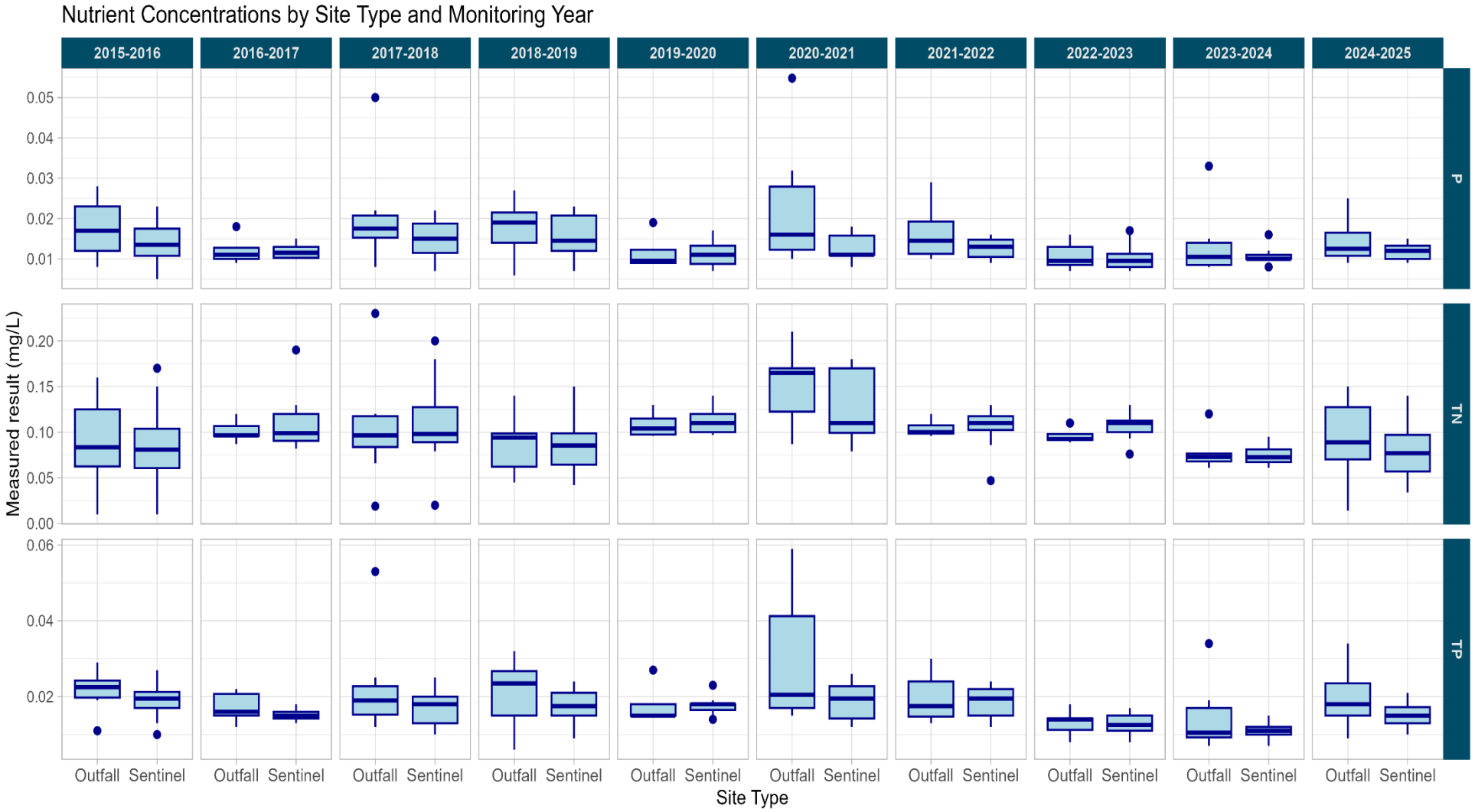

Figure 3-8: Boxplots for parameters with statistically significant differences between Outfall and Sentinel grouped locations (excluding pH) between 2015 and 2025.

Pairwise analysis was undertaken to further investigate statistically significant parameters between all sites to identify where these differences occur. Results indicated that:

- pH at the Red Bluff sentinel site is significantly lower than all other sites, with the exception of Mairangi Bay and Tatarata Point. Although effluent pH is generally lower than pH at sentinel sites, sentinel sites in closer proximity to the outfall than Red Bluff do not display this same reducing pH trend; therefore, the Red Bluff pH is likely a result of site-specific factors or local inputs, rather than the effluent discharge.
- NO_x is significantly higher at the G2 outfall site compared to all sentinel sites, as well as the G1 outfall site. NO_x differences between G1 and all sentinel sites are not statistically significant. Mean NO_x at G2 (2015-2025) is 0.016 mg/L, at G1 is 0.010 mg/L, and across all sentinel sites is 0.006 mg/L. Whilst increased NO_x is apparent around the diffuser, analysis of the effluent did not display a statistically significant trend for NO_x over time, and sentinel sites displayed either no trend or significant decreasing trends for NO_x. This indicates the increase is limited to a localised area around the diffuser.

No significant differences between individual sites were identified for DRP or TP, despite significant differences existing between grouped outfall and sentinel sites. This indicates the difference between outfall and sentinel sites is either too small to detect at the individual site level and/or there are not enough samples at this level for statistical significance. Any effects of higher phosphorus around the outfall are likely to be localised, and not of ecological significance. Future monitoring will help to further understand the phosphorus relationship.

Long-term Kendall Trend analysis (2015-2025) was undertaken to investigate temporal changes in parameters at each individual monitoring site. Significant trends were identified at the following sentinel sites:

- Tipau Point: Decreasing NO_x and TP (see Figure 3-9).
- Tatarata Point: Decreasing NO_x and TP (see Figure 3-9).
- Mairangi Bay: Decreasing NO_x (see Figure 3-10).
- Red Bluff: Decreasing NH_x (see Figure 3-10).
- Black Rock: Decreasing NO_x (see Figure 3-10).
- Rahopara Point: Decreasing DRP, TP, and NO_x (see Figure 3-11).

In addition, at outfall site G1, there is a significant decreasing trend for NH_x ($p = 0.0446$); this matches the observed long-term decreasing trend for ammoniacal-N in the effluent.

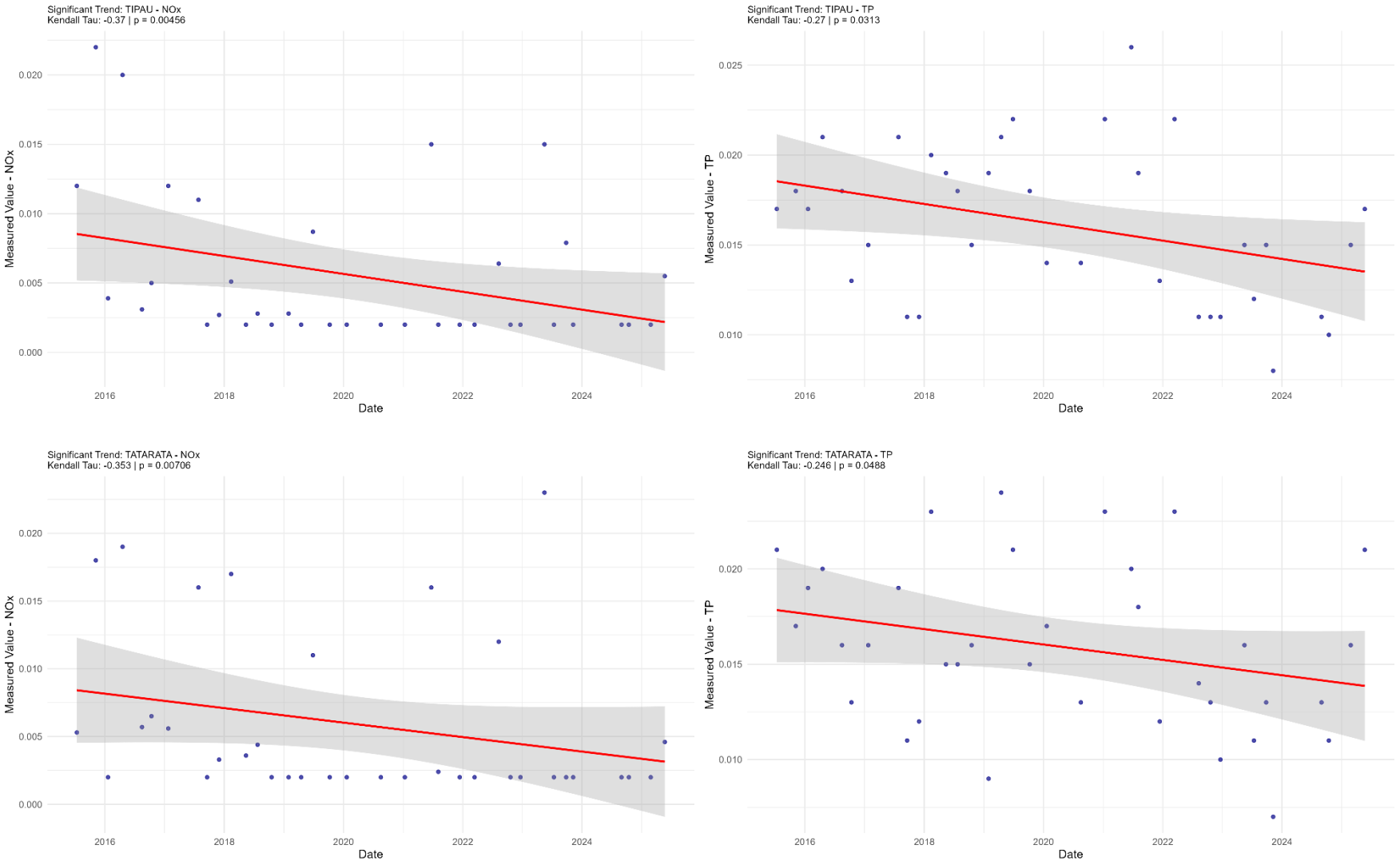

Figure 3-9: Statistically significant trends for Total Oxidised Nitrogen (NO_x) and Total Phosphorus (TP) at Tipau Point and Tatarata Point (2015 – 2025).

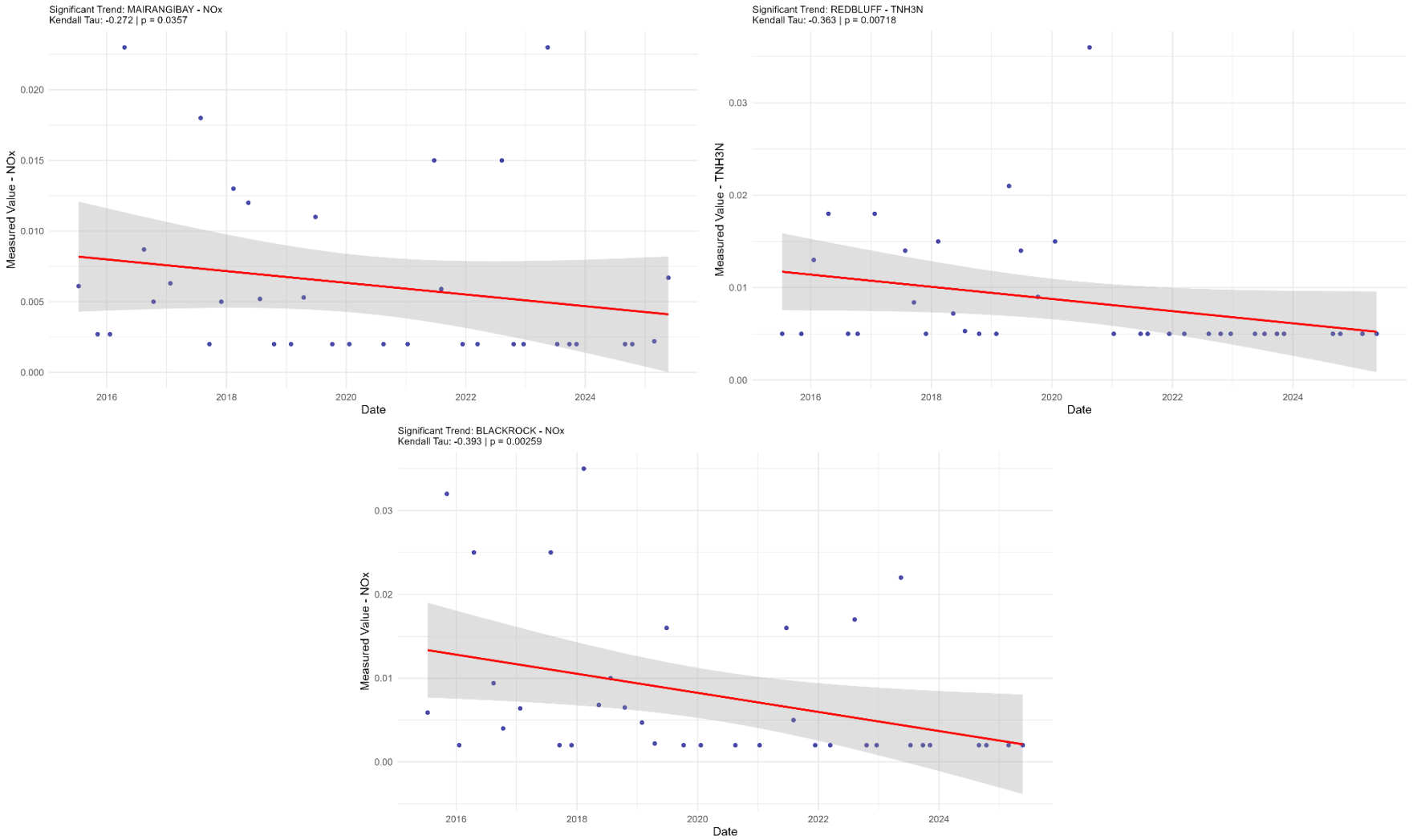

Figure 3-10: Statistically significant trends for Total Oxidised Nitrogen (NO_x) at Mairangi Bay, Ammoniacal-N (referred to in the graph as TNH3N) at Red Bluff, and NO_x at Black Rock (2015 – 2025).

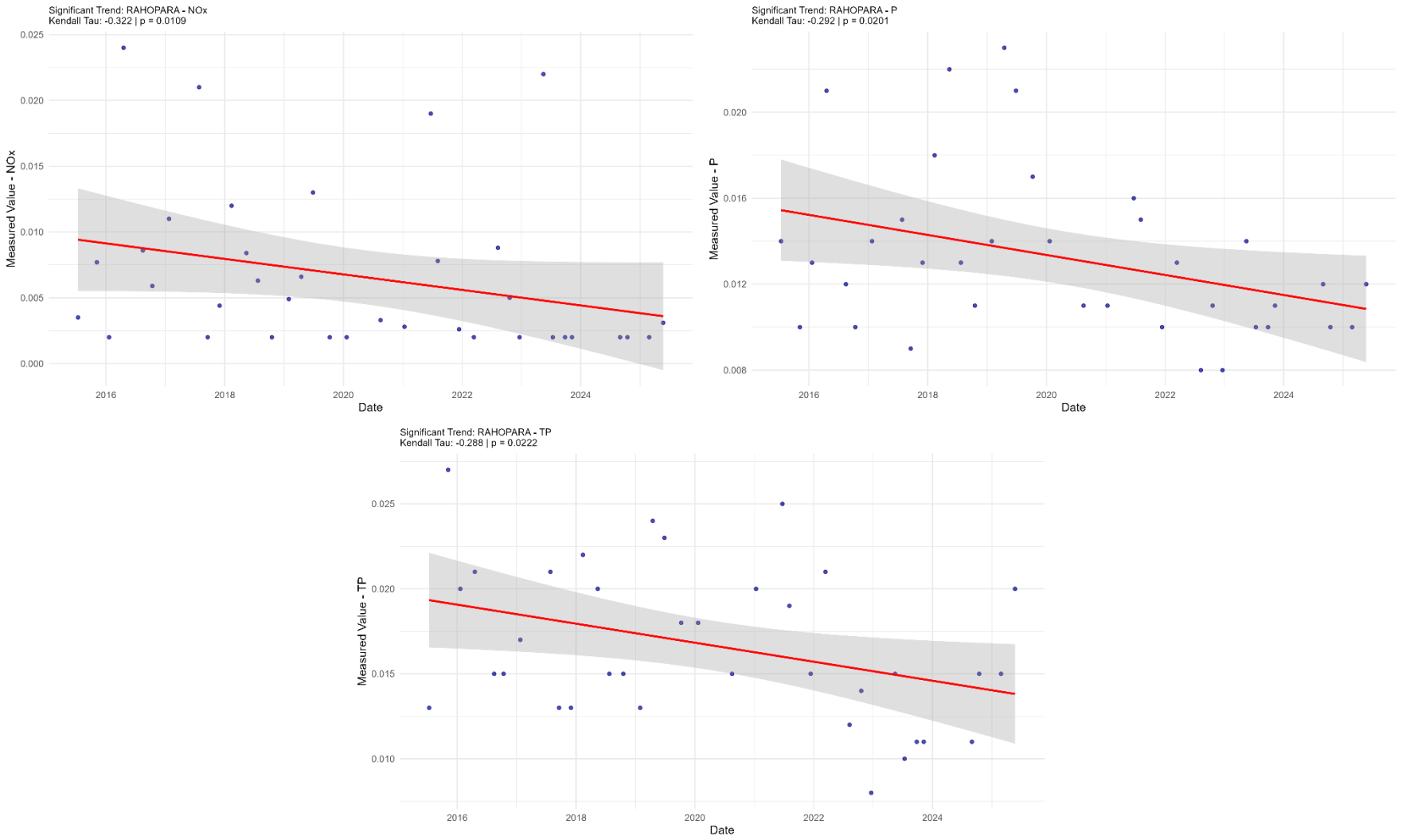

Figure 3-11: Statistically significant trends for Total Oxidised Nitrogen (NO_x), Dissolved Reactive Phosphorus (referred to in the graph as P), and Total Phosphorus (TP) at Rahopara Point (2015 – 2025).

3.3.3 Chlorophyll-a

Chlorophyll-a can be used as an indicator of primary productivity, and therefore, a proxy to indicate differences in nutrient loads. Increased nutrients drive algal production, resulting in increased chlorophyll-a in the receiving environment. To investigate potential impacts of nutrient inputs associated with the effluent discharge, a Kruskal-Wallis statistical test was undertaken to look at changes in chlorophyll-a concentrations between sites over time. The p-value of 0.6426 indicates there has been no statistically significant changes within the receiving environment throughout the 2015 – 2025 monitoring period.

Even when only warmer months are considered (i.e. January-April; when primary production and algal blooms are more likely to occur), there was no difference in chlorophyll-a between sites (p = 0.9491). Furthermore, five of the six sentinel sites displayed decreasing long-term trends for chlorophyll-a when investigated individually, as displayed in Table 3-6. Kendall's Tau values for the outfall sites (G1: -0.243, and G2: -0.238) also indicate decreasing chlorophyll-a trends at both sites; however, these are not statistically significant (p = 0.0504 and 0.0588, respectively).

Table 3-6: Trends for Chlorophyll-a monitoring between 2015 and 2025 at sentinel sites

Site	n	p-value	Kendall's Tau	Trend Direction
Tipau Point	36	0.0018	-0.386	Decreasing
Tatarata Point	36	0.0106	-0.321	Decreasing
Mairangi Bay	36	0.0426	-0.254	Decreasing
Red Bluff	36	0.0105	-0.320	Decreasing
Black Rock	36	0.0184	-0.293	Decreasing

Notes: No significant trend in Chlorophyll-A was identified for Rahopara Point (p = 0.5084), or for the outfall sites.

4 CONCLUSIONS

The principal findings of this report are:

Trends in the effluent discharge

- Multiple nutrient, heavy metal, and physicochemical parameters display decreasing trends in effluent monitoring between 2015 and 2025.
- Chemical Oxygen Demand (COD), Total Phosphorus (TP), and Dissolved Reactive Phosphorus (DRP) display increasing trends in the effluent.
- Of these parameters, only DRP has a consent limit. Results remain well below this limit.
- Whilst COD appears to be increasing in the effluent, Biological Oxygen Demand ($cBOD_5$) is not; and both COD and $cBOD_5$ appear to be decreasing in the plant influent over the same time period. It is considered the COD effluent trend has been overstated as a result of changes to sampling frequency.
- The increasing phosphorus trends appear to be influenced by increasing minimum concentrations whilst maximum concentrations have remained relatively steady (i.e. there is a decrease in concentration range over time). This is likely a result of increased stability in treatment processes.

Receiving Environment - Spatial effects

- When harbour monitoring locations are grouped into 'Outfall' and 'Sentinel' sites, significant long-term (2015 – 2025) differences exist between the two groups for Total Oxidised Nitrogen (NO_x), TP, DRP, and pH.
- When investigated at the individual site level over 2015 - 2025, there is localised elevated NO_x near the outfall diffuser at location G2, but not G1.
- While long-term differences exist between grouped sites for both forms of phosphorus, these differences are not statistically significant at the individual site level.
- Therefore, effects of the effluent discharge do not persist beyond the area immediately around the diffuser.
- The effects are unlikely to be of ecological significance, with no statistically significant difference in chlorophyll-a (as an indicator of primary productivity and algal production) between monitoring sites and observed long-term decreasing nutrient trends at multiple sites.
- There is a reduction in pH at the Red Bluff sentinel site compared to other sites –this is more likely to be a result of localised stormwater, or other inputs.
- Concentrations of faecal bacteria indicators were generally low at all sites.

Receiving Environment - Long term trends

- All sentinel sites show a long-term decreasing trend for at least one nutrient parameter and/or chlorophyll-a (2015-2025).
- Overall, the results indicate relatively stable water quality in the receiving environment over the last 10 years.

Appendix C. Data Sources

Storage location and data tags of environmental monitoring data used in this report.

Category	Parameter	Source platform	Tag/ID	Report
Environmental Monitoring	Rainfall	Pi	DTROS_00_NIT_X01/RAIN_PDAY.CV	Compliance
Effluent Volume	Pond 2 Outlet Flow & Volume	Pi	DTROS55FCALC_X01/PV.CV	Compliance
Reservoir Level Monitoring	Pond 1 Level	Pi	DTROS_53_LIT_012/PV.CV	Dam Certificate
Effluent Quality	Dissolved Oxygen	Pi	DTRLE_55_15.3_FE_DO	Compliance & REMP
Effluent Quality	Enterococci	Pi	DTRLE_55_15.3_FE_EB	Compliance & REMP
Effluent Quality	Faecal Coliforms	Pi	DTRLE_55_15.3_FE_FC	Compliance & REMP
Effluent Quality	Dissolved Reactive Phosphorus	Pi	DTRLE_55_15.3_FE_P	Compliance & REMP
Effluent Quality	pH	Pi	DTRLE_55_15.3_FE_pH	Compliance & REMP
Effluent Quality	Temperature (9:00am)	Pi	DTRLE_55_15.3_FE_TEMP	Compliance & REMP
Effluent Quality	Total Nitrogen	Pi	DTRLE_55_15.3_FE_TN	Compliance & REMP
Effluent Quality	Ammonia Nitrogen (NH3 + NH4)	Pi	DTRLE_55_15.3_FE_TNH3N	Compliance & REMP
Effluent Quality	Total Phosphorus	Pi	DTRLE_55_15.3_FE_TP	Compliance & REMP
Effluent Quality	Total Suspended solids	Pi	DTRLE_55_15.3_FE_TSS	Compliance & REMP
Effluent Quality	Arsenic - Total	Pi	DTRLE_55_15.3_FE_As-tot	REMP
Effluent Quality	MPN Campylobacter	Pi	DTRLE_55_15.3_FE_CAMP	REMP
Effluent Quality	Cadmium - Total	Pi	DTRLE_55_15.3_FE_Cd-tot	REMP
Effluent Quality	Chlorophyll-a	Pi	DTRLE_55_15.3_FE_CHLA	REMP
Effluent Quality	Chemical Oxygen Demand	Pi	DTRLE_55_15.3_FE_COD	REMP
Effluent Quality	Chromium - Total	Pi	DTRLE_55_15.3_FE_Cr-tot	REMP
Effluent Quality	Copper - Total	Pi	DTRLE_55_15.3_FE_Cu-tot	REMP
Effluent Quality	Giardia	Pi	DTRLE_55_15.3_FE_GIARDIA	REMP
Effluent Quality	Mercury - Total	Pi	DTRLE_55_15.3_FE_Hg-tot	REMP
Effluent Quality	Nickel - Total	Pi	DTRLE_55_15.3_FE_Ni-tot	REMP
Effluent Quality	Nitrite Nitrogen	Pi	DTRLE_55_15.3_FE_NO2	REMP
Effluent Quality	Nitrate Nitrogen	Pi	DTRLE_55_15.3_FE_NO3	REMP
Effluent Quality	Lead - Total	Pi	DTRLE_55_15.3_FE_Pb-tot	REMP
Effluent Quality	Bacteriophages	Pi	DTRLE_55_15.3_FE_PHAGE	REMP
Effluent Quality	Salmonella	Pi	DTRLE_55_15.3_FE_SALM	REMP
Effluent Quality	Biological Oxygen Demand	Pi	DTRLE_55_15.3_FE_TBOD	REMP
Effluent Quality	Zinc - Total	Pi	DTRLE_55_15.3_FE_Zn-tot	REMP
Effluent Quality	Arsenic - Dissolved	Pi	DTRLE_55_15.3_FE_As-sol	REMP
Effluent Quality	Cadmium - Dissolved	Pi	DTRLE_55_15.3_FE_Cd-sol	REMP
Effluent Quality	Chromium - Dissolved	Pi	DTRLE_55_15.3_FE_Cr-sol	REMP
Effluent Quality	Copper - Dissolved	Pi	DTRLE_55_15.3_FE_Cu-sol	REMP
Effluent Quality	Mercury - Dissolved	Pi	DTRLE_55_15.3_FE_Hg-sol	REMP
Effluent Quality	Nickel - Dissolved	Pi	DTRLE_55_15.3_FE_Ni-sol	REMP
Effluent Quality	Lead - Dissolved	Pi	DTRLE_55_15.3_FE_Pb-sol	REMP
Effluent Quality	Zinc - Dissolved	Pi	DTRLE_55_15.3_FE_Zn-sol	REMP
Influent Quality	Dissolved Reactive Phosphorus	Pi	DTRLE_20_1_RS_P	REMP
Influent Quality	Total Phosphorus	Pi	DTRLE_20_1_RS_TP	REMP
Influent Quality	Biological Oxygen Demand	Pi	DTRLE_20_1_RS_CBOD	REMP
Influent Quality	Chemical Oxygen Demand	Pi	DTRLE_20_1_RS_COD	REMP

Category	Parameter	Source platform	Tag/ID	Report
Harbour Water Quality	Black Rock - Chlorophyll-a	Pi	DTRLE_55_SEA_BLACKROCK_CHLA	REMP
Harbour Water Quality	Black Rock - Enterococci	Pi	DTRLE_55_SEA_BLACKROCK_EB	REMP
Harbour Water Quality	Black Rock - Faecal Coliforms	Pi	DTRLE_55_SEA_BLACKROCK_FC	REMP
Harbour Water Quality	Black Rock - Nitrite Nitrogen	Pi	DTRLE_55_SEA_BLACKROCK_NO2	REMP
Harbour Water Quality	Black Rock - Nitrate Nitrogen	Pi	DTRLE_55_SEA_BLACKROCK_NO3	REMP
Harbour Water Quality	Black Rock - NO2 and NO3	Pi	DTRLE_55_SEA_BLACKROCK_NOx	REMP
Harbour Water Quality	Black Rock - DRP	Pi	DTRLE_55_SEA_BLACKROCK_P	REMP
Harbour Water Quality	Black Rock - pH	Pi	DTRLE_55_SEA_BLACKROCK_pH	REMP
Harbour Water Quality	Black Rock - Salinity	Pi	DTRLE_55_SEA_BLACKROCK_Sal	REMP
Harbour Water Quality	Black Rock - Temp	Pi	DTRLE_55_SEA_BLACKROCK_TEMP	REMP
Harbour Water Quality	Black Rock - Total Nitrogen	Pi	DTRLE_55_SEA_BLACKROCK_TN	REMP
Harbour Water Quality	Black Rock - Ammoniacal-N	Pi	DTRLE_55_SEA_BLACKROCK_TNH3N	REMP
Harbour Water Quality	Black Rock - Total Phosphorus	Pi	DTRLE_55_SEA_BLACKROCK_TP	REMP
Harbour Water Quality	Black Rock - Turbidity	Pi	DTRLE_55_SEA_BLACKROCK_TUR	REMP
Harbour Water Quality	Outfall Site G1 - Chlorophyll-a	Pi	DTRLE_55_SEA_G1_CHLA	REMP
Harbour Water Quality	Outfall Site G1 - Enterococci	Pi	DTRLE_55_SEA_G1_EB	REMP
Harbour Water Quality	Outfall Site G1 - Faecal Coliforms	Pi	DTRLE_55_SEA_G1_FC	REMP
Harbour Water Quality	Outfall Site G1 - Nitrite Nitrogen	Pi	DTRLE_55_SEA_G1_NO2	REMP
Harbour Water Quality	Outfall Site G1 - Nitrate Nitrogen	Pi	DTRLE_55_SEA_G1_NO3	REMP
Harbour Water Quality	Outfall Site G1 - NO2 and NO3	Pi	DTRLE_55_SEA_G1_NOx	REMP
Harbour Water Quality	Outfall Site G1 - DRP	Pi	DTRLE_55_SEA_G1_P	REMP
Harbour Water Quality	Outfall Site G1 - pH	Pi	DTRLE_55_SEA_G1_pH	REMP
Harbour Water Quality	Outfall Site G1 - Salinity	Pi	DTRLE_55_SEA_G1_Sal	REMP
Harbour Water Quality	Outfall Site G1 - Temp	Pi	DTRLE_55_SEA_G1_TEMP	REMP
Harbour Water Quality	Outfall Site G1 - Total Nitrogen	Pi	DTRLE_55_SEA_G1_TN	REMP
Harbour Water Quality	Outfall Site G1 - Ammoniacal-N	Pi	DTRLE_55_SEA_G1_TNH3N	REMP
Harbour Water Quality	Outfall Site G1 - Total Phosphorus	Pi	DTRLE_55_SEA_G1_TP	REMP
Harbour Water Quality	Outfall Site G1 - Turbidity	Pi	DTRLE_55_SEA_G1_TUR	REMP
Harbour Water Quality	Outfall Site G2 - Chlorophyll-a	Pi	DTRLE_55_SEA_G2_CHLA	REMP
Harbour Water Quality	Outfall Site G2 - Enterococci	Pi	DTRLE_55_SEA_G2_EB	REMP
Harbour Water Quality	Outfall Site G2 - Faecal Coliforms	Pi	DTRLE_55_SEA_G2_FC	REMP
Harbour Water Quality	Outfall Site G2 - Nitrite Nitrogen	Pi	DTRLE_55_SEA_G2_NO2	REMP
Harbour Water Quality	Outfall Site G2 - Nitrate Nitrogen	Pi	DTRLE_55_SEA_G2_NO3	REMP
Harbour Water Quality	Outfall Site G2 - NO2 and NO3	Pi	DTRLE_55_SEA_G2_NOx	REMP
Harbour Water Quality	Outfall Site G2 - DRP	Pi	DTRLE_55_SEA_G2_P	REMP
Harbour Water Quality	Outfall Site G2 - pH	Pi	DTRLE_55_SEA_G2_pH	REMP
Harbour Water Quality	Outfall Site G2 - Salinity	Pi	DTRLE_55_SEA_G2_Sal	REMP
Harbour Water Quality	Outfall Site G2 - Temp	Pi	DTRLE_55_SEA_G2_TEMP	REMP
Harbour Water Quality	Outfall Site G2 - Total Nitrogen	Pi	DTRLE_55_SEA_G2_TN	REMP
Harbour Water Quality	Outfall Site G2 - Ammoniacal-N	Pi	DTRLE_55_SEA_G2_TNH3N	REMP
Harbour Water Quality	Outfall Site G2 - Total Phosphorus	Pi	DTRLE_55_SEA_G2_TP	REMP
Harbour Water Quality	Outfall Site G2 - Turbidity	Pi	DTRLE_55_SEA_G2_TUR	REMP
Harbour Water Quality	Mairangi Bay - Chlorophyll-a	Pi	DTRLE_55_SEA_MAIRANGIBAY_CHLA	REMP

Category	Parameter	Source platform	Tag/ID	Report
Harbour Water Quality	Mairangi Bay - Enterococci	Pi	DTRLE_55_SEA_MAIRANGIBAY_EB	REMP
Harbour Water Quality	Mairangi Bay - Faecal Coliforms	Pi	DTRLE_55_SEA_MAIRANGIBAY_FC	REMP
Harbour Water Quality	Mairangi Bay - Nitrite Nitrogen	Pi	DTRLE_55_SEA_MAIRANGIBAY_NO2	REMP
Harbour Water Quality	Mairangi Bay - Nitrate Nitrogen	Pi	DTRLE_55_SEA_MAIRANGIBAY_NO3	REMP
Harbour Water Quality	Mairangi Bay - NO2 and NO3	Pi	DTRLE_55_SEA_MAIRANGIBAY_NOx	REMP
Harbour Water Quality	Mairangi Bay - DRP	Pi	DTRLE_55_SEA_MAIRANGIBAY_P	REMP
Harbour Water Quality	Mairangi Bay - pH	Pi	DTRLE_55_SEA_MAIRANGIBAY_pH	REMP
Harbour Water Quality	Mairangi Bay - Salinity	Pi	DTRLE_55_SEA_MAIRANGIBAY_Sal	REMP
Harbour Water Quality	Mairangi Bay - Temp	Pi	DTRLE_55_SEA_MAIRANGIBAY_TEMP	REMP
Harbour Water Quality	Mairangi Bay - Total Nitrogen	Pi	DTRLE_55_SEA_MAIRANGIBAY_TN	REMP
Harbour Water Quality	Mairangi Bay - Ammoniacal-N	Pi	DTRLE_55_SEA_MAIRANGIBAY_TNH3N	REMP
Harbour Water Quality	Mairangi Bay - Total Phosphorus	Pi	DTRLE_55_SEA_MAIRANGIBAY_TP	REMP
Harbour Water Quality	Mairangi Bay - Turbidity	Pi	DTRLE_55_SEA_MAIRANGIBAY_TUR	REMP
Harbour Water Quality	Rahopara Point - Chlorophyll-a	Pi	DTRLE_55_SEA_RAHOPARA_CHLA	REMP
Harbour Water Quality	Rahopara Point - Enterococci	Pi	DTRLE_55_SEA_RAHOPARA_EB	REMP
Harbour Water Quality	Rahopara Point - Faecal Coliforms	Pi	DTRLE_55_SEA_RAHOPARA_FC	REMP
Harbour Water Quality	Rahopara Point - Nitrite Nitrogen	Pi	DTRLE_55_SEA_RAHOPARA_NO2	REMP
Harbour Water Quality	Rahopara Point - Nitrate Nitrogen	Pi	DTRLE_55_SEA_RAHOPARA_NO3	REMP
Harbour Water Quality	Rahopara Point - NO2 and NO3	Pi	DTRLE_55_SEA_RAHOPARA_NOx	REMP
Harbour Water Quality	Rahopara Point - DRP	Pi	DTRLE_55_SEA_RAHOPARA_P	REMP
Harbour Water Quality	Rahopara Point - pH	Pi	DTRLE_55_SEA_RAHOPARA_pH	REMP
Harbour Water Quality	Rahopara Point - Salinity	Pi	DTRLE_55_SEA_RAHOPARA_Sal	REMP
Harbour Water Quality	Rahopara Point - Temp	Pi	DTRLE_55_SEA_RAHOPARA_TEMP	REMP
Harbour Water Quality	Rahopara Point - Total Nitrogen	Pi	DTRLE_55_SEA_RAHOPARA_TN	REMP
Harbour Water Quality	Rahopara Point - Ammoniacal-N	Pi	DTRLE_55_SEA_RAHOPARA_TNH3N	REMP
Harbour Water Quality	Rahopara Point - Total Phosphorus	Pi	DTRLE_55_SEA_RAHOPARA_TP	REMP
Harbour Water Quality	Rahopara Point - Turbidity	Pi	DTRLE_55_SEA_RAHOPARA_TUR	REMP
Harbour Water Quality	Red Bluff - Chlorophyll-a	Pi	DTRLE_55_SEA_REDBLUFF_CHLA	REMP
Harbour Water Quality	Red Bluff - Enterococci	Pi	DTRLE_55_SEA_REDBLUFF_EB	REMP
Harbour Water Quality	Red Bluff - Faecal Coliforms	Pi	DTRLE_55_SEA_REDBLUFF_FC	REMP
Harbour Water Quality	Red Bluff - Nitrite Nitrogen	Pi	DTRLE_55_SEA_REDBLUFF_NO2	REMP
Harbour Water Quality	Red Bluff - Nitrate Nitrogen	Pi	DTRLE_55_SEA_REDBLUFF_NO3	REMP
Harbour Water Quality	Red Bluff - NO2 and NO3	Pi	DTRLE_55_SEA_REDBLUFF_NOx	REMP
Harbour Water Quality	Red Bluff - DRP	Pi	DTRLE_55_SEA_REDBLUFF_P	REMP
Harbour Water Quality	Red Bluff - pH	Pi	DTRLE_55_SEA_REDBLUFF_pH	REMP
Harbour Water Quality	Red Bluff - Salinity	Pi	DTRLE_55_SEA_REDBLUFF_Sal	REMP
Harbour Water Quality	Red Bluff - Temp	Pi	DTRLE_55_SEA_REDBLUFF_TEMP	REMP
Harbour Water Quality	Red Bluff - Total Nitrogen	Pi	DTRLE_55_SEA_REDBLUFF_TN	REMP
Harbour Water Quality	Red Bluff - Ammoniacal-N	Pi	DTRLE_55_SEA_REDBLUFF_TNH3N	REMP
Harbour Water Quality	Red Bluff - Total Phosphorus	Pi	DTRLE_55_SEA_REDBLUFF_TP	REMP
Harbour Water Quality	Red Bluff - Turbidity	Pi	DTRLE_55_SEA_REDBLUFF_TUR	REMP
Harbour Water Quality	Tatarata Point - Chlorophyll-a	Pi	DTRLE_55_SEA_TATARATA_CHLA	REMP
Harbour Water Quality	Tatarata Point - Enterococci	Pi	DTRLE_55_SEA_TATARATA_EB	REMP

Category	Parameter	Source platform	Tag/ID	Report
Harbour Water Quality	Tatarata Point - Faecal Coliforms	Pi	DTRLE_55_SEA_TATARATA_FC	REMP
Harbour Water Quality	Tatarata Point - Nitrite Nitrogen	Pi	DTRLE_55_SEA_TATARATA_NO2	REMP
Harbour Water Quality	Tatarata Point - Nitrate Nitrogen	Pi	DTRLE_55_SEA_TATARATA_NO3	REMP
Harbour Water Quality	Tatarata Point - NO2 and NO3	Pi	DTRLE_55_SEA_TATARATA_NOx	REMP
Harbour Water Quality	Tatarata Point - DRP	Pi	DTRLE_55_SEA_TATARATA_P	REMP
Harbour Water Quality	Tatarata Point - pH	Pi	DTRLE_55_SEA_TATARATA_pH	REMP
Harbour Water Quality	Tatarata Point - Salinity	Pi	DTRLE_55_SEA_TATARATA_Sal	REMP
Harbour Water Quality	Tatarata Point - Temp	Pi	DTRLE_55_SEA_TATARATA_TEMP	REMP
Harbour Water Quality	Tatarata Point - Total Nitrogen	Pi	DTRLE_55_SEA_TATARATA_TN	REMP
Harbour Water Quality	Tatarata Point - Ammoniacal-N	Pi	DTRLE_55_SEA_TATARATA_TNH3N	REMP
Harbour Water Quality	Tatarata Point - Total Phosphorus	Pi	DTRLE_55_SEA_TATARATA_TP	REMP
Harbour Water Quality	Tatarata Point - Turbidity	Pi	DTRLE_55_SEA_TATARATA_TUR	REMP
Harbour Water Quality	Tipau Point - Chlorophyll-a	Pi	DTRLE_55_SEA_TIPAU_CHLA	REMP
Harbour Water Quality	Tipau Point - Enterococci	Pi	DTRLE_55_SEA_TIPAU_EB	REMP
Harbour Water Quality	Tipau Point - Faecal Coliforms	Pi	DTRLE_55_SEA_TIPAU_FC	REMP
Harbour Water Quality	Tipau Point - Nitrite Nitrogen	Pi	DTRLE_55_SEA_TIPAU_NO2	REMP
Harbour Water Quality	Tipau Point - Nitrate Nitrogen	Pi	DTRLE_55_SEA_TIPAU_NO3	REMP
Harbour Water Quality	Tipau Point - NO2 and NO3	Pi	DTRLE_55_SEA_TIPAU_NOx	REMP
Harbour Water Quality	Tipau Point - DRP	Pi	DTRLE_55_SEA_TIPAU_P	REMP
Harbour Water Quality	Tipau Point - pH	Pi	DTRLE_55_SEA_TIPAU_pH	REMP
Harbour Water Quality	Tipau Point - Salinity	Pi	DTRLE_55_SEA_TIPAU_Sal	REMP
Harbour Water Quality	Tipau Point - Temp	Pi	DTRLE_55_SEA_TIPAU_TEMP	REMP
Harbour Water Quality	Tipau Point - Total Nitrogen	Pi	DTRLE_55_SEA_TIPAU_TN	REMP
Harbour Water Quality	Tipau Point - Ammoniacal-N	Pi	DTRLE_55_SEA_TIPAU_TNH3N	REMP
Harbour Water Quality	Tipau Point - Total Phosphorus	Pi	DTRLE_55_SEA_TIPAU_TP	REMP
Harbour Water Quality	Tipau Point - Turbidity	Pi	DTRLE_55_SEA_TIPAU_TUR	REMP
Harbour Water Quality	Black Rock - Salinity @ 5m	Pi	DTRLE_55_SEA_5M.BLACKROCK_Sal	REMP
Harbour Water Quality	Black Rock - Temp @ 5m	Pi	DTRLE_55_SEA_5M.BLACKROCK_TEMP	REMP
Harbour Water Quality	Outfall Site G1 - Salinity @ 5m	Pi	DTRLE_55_SEA_5M.G1_Sal	REMP
Harbour Water Quality	Outfall Site G1 - Temp @ 5m	Pi	DTRLE_55_SEA_5M.G1_TEMP	REMP
Harbour Water Quality	Outfall Site G2 - Salinity @ 5m	Pi	DTRLE_55_SEA_5M.G2_Sal	REMP
Harbour Water Quality	Outfall Site G2 - Temp @ 5m	Pi	DTRLE_55_SEA_5M.G2_TEMP	REMP
Harbour Water Quality	Mairangi Bay - Salinity @ 5m	Pi	DTRLE_55_SEA_5M.MAIRANGIBAY_Sal	REMP
Harbour Water Quality	Mairangi Bay - Temp @ 5m	Pi	DTRLE_55_SEA_5M.MAIRANGIBAY_TEMP	REMP
Harbour Water Quality	Rahopara Point - Salinity @ 5m	Pi	DTRLE_55_SEA_5M.RAHOPARA_Sal	REMP
Harbour Water Quality	Rahopara Point - Temp @ 5m	Pi	DTRLE_55_SEA_5M.RAHOPARA_TEMP	REMP
Harbour Water Quality	Red Bluff - Salinity @ 5m	Pi	DTRLE_55_SEA_5M.REDBLUFF_Sal	REMP
Harbour Water Quality	Red Bluff - Temp @ 5m	Pi	DTRLE_55_SEA_5M.REDBLUFF_TEMP	REMP
Harbour Water Quality	Tatarata Point - Salinity @ 5m	Pi	DTRLE_55_SEA_5M.TATARATA_Sal	REMP
Harbour Water Quality	Tatarata Point - Temp @ 5m	Pi	DTRLE_55_SEA_5M.TATARATA_TEMP	REMP
Harbour Water Quality	Tipau Point - Salinity @ 5m	Pi	DTRLE_55_SEA_5M.TIPAU_Sal	REMP
Harbour Water Quality	Tipau Point - Temp @ 5m	Pi	DTRLE_55_SEA_5M.TIPAU_TEMP	REMP

Appendix D. Summer Odour Discharge Report

Watercare Services Limited

Rosedale Wastewater Treatment Plant Summer Odour Monitoring – Report 28 2025

Watercare Laboratory Services **Comprehensive Air Quality Services**


Stack Monitoring


Odour Monitoring


Ambient Monitoring


Data Management

ACCREDITED
IANZ
TESTING LABORATORY

AQ-2025-067

A Report for: Watercare Services Limited

Scope of the Report: Rosedale WWTP Odour Monitoring Summer 2025

Project Team:

Field Technician(s) (sampling):

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Date: 23 May 2025

Reference: X-32000-OC

Report ID: AQ-2025-067

Report Status: FINAL

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TABLES, FIGURES AND APPENDICES

1 INTRODUCTION

1.1 Purpose

Watercare Laboratory Services was commissioned by Rosedale Wastewater Treatment Plant (Rosedale WWTP) to carry out odour monitoring at 2 Jack Hinton Drive, North Shore, Auckland.

The purpose of this monitoring was to comply with Resource Consent Permit Number 30249. This document, Report 28 of the odour monitoring programme, presents the results of odour emission testing primarily conducted between 14 January 2025 and 26 March 2025. The monitoring was initially planned to be completed during the summer months; however, due to an unexpected olfactometer instrument failure, there was a delay in completing the analysis. In addition, due to a problem identified during initial sample processing, four samples from the Dewatering Biofilter and four from the PST Biofilter were re-collected on 9 May and 12 May, respectively.

In this report we will:

- Present the results of the monitoring carried out from 14 January 2025 to 26 March 2025, along with some re-sampling carried out on 8 May and 12 May.
- Show the methodology used when monitoring.
- Describe the locations where the monitoring took place.
- Append the olfactometry reports and any other relevant material.

2 SAMPLING PROGRAM

The sampling programme used to assess odour emissions from the Rosedale WWTP is displayed in Table 1. Table 1 outlines the sources assessed, the number of samples collected, and the sampling methods used. A copy of the sampling requirements can be found in Appendix A.

Table 1: Rosedale WWTP odour monitoring programme - Summer 2025

Source	Sampling method	Number of samples
MLE 1 – Inlet Zone	S	3
MLE 1 – Middle Zone	S	3
MLE 1 – Outlet Zone	S	3
Clarifier 3 – Inner Zone	S	3
Clarifier 3 – Outer Zone	S	3
CAS (Chemically Assisted Sedimentation) Tanks	S	3
RAS (Return Activated Sludge) Splitter Chamber	S	3
Dewatering Plant Biofilter Inlets (each individual B/F bed inlet)	P	6
Dewatering Plant Biofilter (zones 1 to 6)	B	6
Screening Building Biofilter Inlet	P	3
Screening Biofilter Outlet (zones 1 and 2)	B	6
Primary Sedimentation Tank Biofilter Inlet	P	6
Primary Sedimentation Tank Biofilter (zones 1-6)	B	6
Total:		**54**

Key: S=Static flux chamber

P=Point source

B=Biofilter hood

3 RESULTS

The following section outlines the results of the odour monitoring carried out at the Rosedale WTP. The results are expressed as odour flux ($OU.m^3.s^{-1}.m^{-2}$) and odour emission rates ($OU.m^3.s^{-1}$). The concept of odour units (OU) (expressed as concentration) can be defined as the amount of dilution (dilution factor) required for a panel of trained personnel (qualified panellists) to detect a difference between the diluted odour sample and non-odorous air. A qualified panellist refers to an assessor who meets the selection criterion with the reference odorant (n-butanol).

The odour flux (OF) expressed as $OU.m^3.s^{-1}.m^{-2}$ is determined according to the formula:

$$OF = \frac{V \times C}{A_S}$$

The odour emission rate (ER) expressed as $OU.m^3s^{-1}$ is determined according to the following formulae:

$$ER = \frac{V \times C \times A_T}{A_S}$$

Where:

OF = odour flux ($OU.m^3.s^{-1}.m^{-2}$)

ER = emission rate ($OU.m^3s^{-1}$)

V = flow rate through the chamber ($m^3.s^{-1}$)

A_T = total surface area (of source) (m^2)

A_S = surface area covered by the SFC/biofilter hood (m^2)

C = sample concentration (OU)

Reference AS/NZS 4323.3:2001, the units used in this report are as follows:

Property	Meaning	Units
Odour Unit	Odour concentration	OU
Odour Emission rate	Amount of odour released per unit time	$(OU)(m^3.s^{-1})$
Odour flux	Odour released per unit area per unit time	$(OU)(m^3.s^{-1})(m^{-2})$

Results are contained in the following tables:

- Table 2: Rosedale WWTP MLE 1, Odour Flux, Summer 2025.
- Table 3: Rosedale WWTP Clarifier 3, Odour Flux, Summer 2025.
- Table 4: Rosedale WWTP Primary Sedimentation Tanks (PST) Odour Emission Rates, Summer 2025.
- Table 5: Rosedale WWTP Screening Building Biofilter, Odour Emission Rates, Summer 2025.
- Table 6: Rosedale WWTP RAS Mixing Chamber, Odour Flux, Summer 2025.
- Table 7: Rosedale WWTP CAS Tanks, Odour Flux, Summer 2025.
- Table 8: Rosedale WWTP Dewatering Plant Biofilter, Odour Flux, Summer 2025.
- Table 9: Rosedale WWTP Screening Building Biofilter, Primary Sedimentation Tanks (PST) and Dewatering Plant Biofilter Removal Efficiency, Summer 2025.

The olfactometry reports can be found in Appendix B.

Table 2: Rosedale WWTP MLE 1 Odour Flux - Summer 2025.

Source	Samples	Date Sampled	Odour Conc. (OU)	Sampling Method	Area SFC (m^2)	Sweep Air Rate ($m^3.s^{-1}$)	Sample Temp (°C)	Odour Flux ($OU.m^3.s^{-1}.m^{-2}$)	Odour Flux* ($OU.m^3.s^{-1}.m^{-2}$)	Odour Character
MLE 1 Inlet Zone	1	20/01/2025	663	S	0.132	$8.3*10^{-5}$	27.1	0.42	0.41	Light - Chemical/Vegetation
MLE 1 Inlet Zone	1	13/03/2025	103	S	0.132	$8.3*10^{-5}$	32.2	0.07	0.06	Light - Musty/Vegetation
MLE 1 Inlet Zone	1	24/03/2025	717	S	0.132	$8.3*10^{-5}$	26.1	0.45	0.44	Light - Sewage/Vegetation
MLE 1 Mid Zone	1	20/01/2025	486	S	0.132	$8.3*10^{-5}$	26.7	0.31	0.30	Light - Chemical/Vegetation
MLE 1 Mid Zone	1	13/03/2025	203	S	0.132	$8.3*10^{-5}$	27.8	0.13	0.12	Light - Earthy/Vegetation
MLE 1 Mid Zone	1	24/03/2025	1482	S	0.132	$8.3*10^{-5}$	26.7	0.94	0.91	Moderate - Vegetation/Sewage
MLE 1 Outlet Zone	1	20/01/2025	355	S	0.132	$8.3*10^{-5}$	27.3	0.22	0.22	Light - Chemical/Vegetation
MLE 1 Outlet Zone	1	13/03/2025	166	S	0.132	$8.3*10^{-5}$	27.1	0.10	0.10	Light - Vegetation/Musty
MLE 1 Outlet Zone	1	24/03/2025	352	S	0.132	$8.3*10^{-5}$	27.0	0.22	0.22	Light - Chemical/Vegetation
Key: S = Static Flux Chamber (SFC)			Odour Flux = Odour conc. x sweep air rate/SFC area					* = Corrected to 20°C		

Table 3: Rosedale WWTP Clarifier 3, Odour Flux - Summer 2025.

Source	Samples	Date Sampled	Odour Conc. (OU)	Sampling Method	Area SFC (m^2)	Sweep Air Rate ($m^3.s^{-1}$)	Sample Temp (°C)	Odour Flux ($OU.m^3.s^{-1}.m^{-2}$)	Odour Flux* ($OU.m^3.s^{-1}.m^{-2}$)	Odour Character
Secondary Clarifier 3 Inner Zone	1	13/03/2025	118	S	0.132	$8.3*10^{-5}$	30.1	0.07	0.07	Light – Musty/Vegetation
Secondary Clarifier 3 Inner Zone	1	25/03/2025	1074	S	0.132	$8.3*10^{-5}$	41.4	0.68	0.63	Light – Rotten vegetation/Pond
Secondary Clarifier 3 Inner Zone	1	26/03/2025	457	S	0.132	$8.3*10^{-5}$	38.7	0.29	0.27	Light – Pond/Vegetation
Secondary Clarifier 3 Outer Zone	1	13/03/2025	108	S	0.132	$8.3*10^{-5}$	29.1	0.07	0.07	Light – Vegetation
Secondary Clarifier 3 Outer Zone	1	25/03/2025	1176	S	0.132	$8.3*10^{-5}$	40.2	0.74	0.70	Moderate – Rotten vegetation/Musty
Secondary Clarifier 3 Outer Zone	1	26/03/2025	384	S	0.132	$8.3*10^{-5}$	39.4	0.24	0.23	Light – Rotten vegetation
Key: S = Static Flux Chamber (SFC)			Odour Flux = Odour conc. x sweep air rate/SFC area					* = Corrected to 20°C		

Table 4: Rosedale WWTP Primary Sedimentation Tanks Biofilter (PST) Odour Emission Rates, Summer 2025

Source	Date Sampled	Odour Concentration Certainty (OU)	Sampling Method	Area (m^2)	Flow Rate ($m^3.s^{-1}$)	Sample Temp. (°C)	Odour Flux ($OU.m^3.s^{-1}.m^{-2}$)	Odour Flux ($OU.m^3.s^{-1}.m^{-2}$)*	Odour Emission ($OU.m^3.s^{-1}$)	Odour Emission ($OU.m^3.s^{-1}$)*	Character
PST Biofilter Inlet Airflow Cell 1	20/01/2025	72,763	P	0.28	0.44	23.60	114238	112852	32300	31908	Strong – Sewage
PST Biofilter Inlet Airflow Cell 2	12/05/2025	58,451	P	0.28	0.48	20.20	98782	98715	27930	27911	Strong – Sewage
PST Biofilter Inlet Airflow Cell 3	12/05/2025	62,368	P	0.28	1.06	22.60	233880	231824	66128	65547	Strong – Sewage
PST Biofilter Inlet Airflow Cell 4	24/03/2025	78,276	P	0.28	0.56	26.30	155769	152492	44043	43116	Strong – Sewage
PST Biofilter Inlet Airflow Cell 5	24/03/2025	64,152	P	0.28	0.61	26.90	137285	134128	38816	37924	Strong – Sewage
PST Biofilter Inlet Airflow Cell 6	24/03/2025	78,276	P	0.28	0.56	27.20	154986	151271	43821	42771	Strong – Sewage
PST Biofilter Outlet Zone 1	20/01/2025	138	B	144.5	0.001	29.30	0.25	0.24	36	34	Light – Vegetation/Earthy
PST Biofilter Outlet Zone 2	12/05/2025	268	B	144.5	0.001	22.30	0.27	0.27	39	39	Light Chemical/Vegetation
PST Biofilter Outlet Zone 3	12/05/2025	402	B	144.5	0.001	26.30	0.41	0.40	59	58	Light – Chemical/Vegetation
PST Biofilter Outlet Zone 4	24/03/2025	90	B	144.5	0.001	30.10	0.08	0.08	12	12	Light – Vegetation
PST Biofilter Outlet Zone 5	24/03/2025	389	B	144.5	0.001	34.20	0.32	0.30	46	44	Light – Rotten vegetation
PST Biofilter Outlet Zone 6	24/03/2025	458	B	144.5	0.001	32.70	0.39	0.37	56	53	Light – Chemical/Vegetation

Key: B = Biofilter Sampling Hood
P = Point Source Sampling

* = Corrected to 20°C

Table 5: Rosedale WWTP Screening Building Biofilter (SBB), Odour Emission Rates - Summer 2025

Source	Date Sampled	Odour Concentration Certainty (OU)	Sampling Method	Area (m^2)	Flow Rate ($m^3.s^{-1}$)	Sample Temp. (^oC)	Odour Flux ($OU.m^3.s^{-1}.m^{-2}$)	Odour Flux ($OU.m^3.s^{-1}.m^{-2}$)*	Odour Emission ($OU.m^3.s^{-1}$)	Odour Emission ($OU.m^3.s^{-1}$)*	Character
Screening Building Biofilter Inlet Airflow	20/01/2025	64,740	P	0.28	1.21	24.30	277735	273720	78528	77392	Strong – Sewage
Screening Building Biofilter Inlet Airflow	4/02/2025	31,596	P	0.28	1.24	34.30	138075	131652	39040	37224	Strong – Sewage
Screening Building Biofilter Inlet Airflow	21/03/2025	40,726	P	0.28	1.21	23.30	174715	172770	49399	48849	Strong – Sewage
Screening Building Biofilter Outlet Zone 1	20/01/2025	285	B	108.25	0.002	20.40	0.71	0.71	77	77	Light – Vegetation
Screening Building Biofilter Outlet Zone 1	4/02/2025	60	B	108.25	0.001	35.40	0.07	0.07	8	8	Light – Earthy/Vegetation
Screening Building Biofilter Outlet Zone 1	21/03/2025	34	B	108.25	0.001	24.30	0.03	0.03	3	3	Light - Vegetation
Screening Building Biofilter Outlet Zone 2	20/01/2025	220	B	108.2	0.002	21.20	0.48	0.47	52	51	Light – Vegetation
Screening Building Biofilter Outlet Zone 2	21/03/2025	21	B	108.2	0.001	17.80	0.02	0.02	2	2	Light – Earthy/Musty
Screening Building Biofilter Outlet Zone 2	26/03/2025	204	B	108.2	0.001	26.20	0.18	0.17	19	19	Light – Vegetation/Sweet
Key: B = Biofilter Sampling Hood P = Point Source Sampling								* = Corrected to 20°C			

Table 6: Rosedale WWTP RAS Mixing Chamber, Odour Flux - Summer 2025

Source	Date Sampled	Odour Conc. (OU)	Sampling Method	Area SFC (m^2)	Sweep Air Rate ($m^3.s^{-1}$)	Sample Temp (°C)	Odour Flux ($OU.m^3.s^{-1}.m^{-2}$)	Odour Flux* ($OU.m^3.s^{-1}.m^{-2}$)	Odour Character
RAS Splitter	14/01/2025	472	S	0.132	$8.3*10^{-5}$	38.40	0.30	0.28	Light – Earthy/Vegetation/Sewage
RAS Splitter	20/01/2025	574	S	0.132	$8.3*10^{-5}$	29.70	0.36	0.35	Light – Chemical/Vegetation
RAS Splitter	26/03/2025	654	S	0.132	$8.3*10^{-5}$	33.40	0.41	0.39	Light – Chemical/Vegetation/Earthy
Key: S = Static Flux Chamber (SFC)		Odour Flux = Odour conc. x sweep air rate/SFC area					* = Corrected to 20°C		

Table 7: Rosedale WWTP CAS Tanks, Odour Flux - Summer 2025

Source	Date Sampled	Odour Conc. (OU)	Sampling Method	Area SFC (m^2)	Sweep Air Rate ($m^3.s^{-1}$)	Sample Temp (°C)	Odour Flux ($OU.m^3.s^{-1}.m^{-2}$)	Odour Flux* ($OU.m^3.s^{-1}.m^{-2}$)	Odour Character
CAS Tanks	14/01/2025	199	S	0.132	$8.3*10^{-5}$	29.5	0.13	0.12	Light – Earthy/Vegetation
CAS Tanks	14/01/2025	149	S	0.132	$8.3*10^{-5}$	31.2	0.09	0.09	Light – Earthy/Vegetation
CAS Tanks	13/03/2025	113	S	0.132	$8.3*10^{-5}$	23.4	0.07	0.07	Light – Earthy/Vegetation
Key: S = Static Flux Chamber (SFC)		Odour Flux = Odour conc. x sweep air rate/SFC area					* = Corrected to 20°C		

Table 8: Rosedale WWTP Dewatering Plant Biofilter - Odour Emission Rates - Summer 2025

Source	Date Sampled	Odour Concentration Certainty (OU)	Sampling Method	Area (m^2)	Flow Rate ($m^3.s^{-1}$)	Sample Temp. (°C)	Odour Flux ($OU.m^3.s^{-1}.m^{-2}$)	Odour Flux ($OU.m^3.s^{-1}.m^{-2}$)*	Odour Emission ($OU.m^3/s$)	Odour Emission ($OU.m^3/s$)*	Character
Dewatering Plant Biofilter Inlet 1	3/02/2025	22942	P	0.20	0.26	24.10	30283	29866	6057	5973	Strong – Sewage
Dewatering Plant Biofilter Inlet 2	3/02/2025	14394	P	0.20	0.29	34.10	21015	20051	4203	4010	Moderate – Sewage
Dewatering Plant Biofilter Inlet 3	8/05/2025	39199	P	0.20	0.38	20.30	73694	73619	14739	14724	Strong – Sewage
Dewatering Plant Biofilter Inlet 4	4/02/2025	37,627	P	0.20	0.26	31.10	49,291	47,493	9,858	9,499	Moderate – Sewage
Dewatering Plant Biofilter Inlet 5	3/02/2025	3,762	P	0.20	0.31	34.10	5,869	5,599	1,174	1,120	Moderate – Sewage
Dewatering Plant Biofilter Inlet 6	8/05/2025	16,372	P	0.20	0.20	20.60	16,536	16,502	3,307	3,300	Strong – Sewage
Dewatering Plant Biofilter Zone 1	3/02/2025	104	B	144.5	0.001	25.00	0.08	0.08	12	12	Light – Vegetation
Dewatering Plant Biofilter Zone 2	3/02/2025	86	B	144.5	0.001	38.60	0.09	0.08	13	12	Light – Vegetation
Dewatering Plant Biofilter Zone 3	8/05/2025	113	B	144.5	0.001	20.00	0.13	0.13	19	19	Light – Mouldy/Vegetation
Dewatering Plant Biofilter Zone 4	3/02/2025	87	B	144.50	0.001	37.80	0.12	0.12	18	17	Light – Earthy/Vegetation
Dewatering Plant Biofilter Zone 5	4/02/2025	177	B	144.50	0.001	36.40	0.23	0.22	33	31	Light – Earthy/Vegetation
Dewatering Plant Biofilter Zone 6	8/05/2025	55	B	144.50	0.001	20.80	0.08	0.08	12	12	Light – Earthy/Vegetation
Key: B = Biofilter Sampling Hood P = Point Source Sampling								* = Corrected to 20°C			

Table 9: Rosedale WWTP Screening Building Biofilter, Primary Sedimentation Tanks (PST) and Dewatering Plant Biofilter – Odour Removal Efficiency – Summer 2025

Sample Description	Date Sampled	Inlet Odour Concentration (OU)	Outlet Odour Concentration (OU)	Removal Efficiency (%)
Screening Building Biofilter Zone 1	20/01/2025	64,740	285	99.6%
Screening Building Biofilter Zone 1	4/02/2025	31,596	60	99.8%
Screening Building Biofilter Zone 1	21/03/2025	40,726	34	99.9%
Screening Building Biofilter Zone 2	20/01/2025	64,740	220	99.7%
Screening Building Biofilter Zone 2	21/03/2025	31,596	21	99.9%
Screening Building Biofilter Zone 2	26/03/2025	40,726	204	99.5%
PST Biofilter Zone 1	20/01/2025	72,763	138	99.8%
PST Biofilter Zone 2	12/05/2025	58,451	268	99.5%
PST Biofilter Zone 3	12/05/2025	62,368	402	99.4%
PST Biofilter Zone 4	24/03/2025	78,276	90	99.9%
PST Biofilter Zone 5	24/03/2025	64,152	389	99.4%
PST Biofilter Zone 6	24/03/2025	78,276	458	99.4%
Dewatering Plant Biofilter Zone 1	3/02/2025	22,942	104	99.5%
Dewatering Plant Biofilter Zone 2	3/02/2025	14,394	86	99.4%
Dewatering Plant Biofilter Zone 3	8/05/2025	39,199	113	99.7%
Dewatering Plant Biofilter Zone 4	3/02/2025	37,627	87	99.8%
Dewatering Plant Biofilter Zone 5	4/02/2025	3,762	177	95.3%
Dewatering Plant Biofilter Zone 6	8/05/2025	16,372	55	99.7%

Figure 1: Rosedale WWTP Odour Monitoring Programme Summer 2016 - 2025: Inlets.

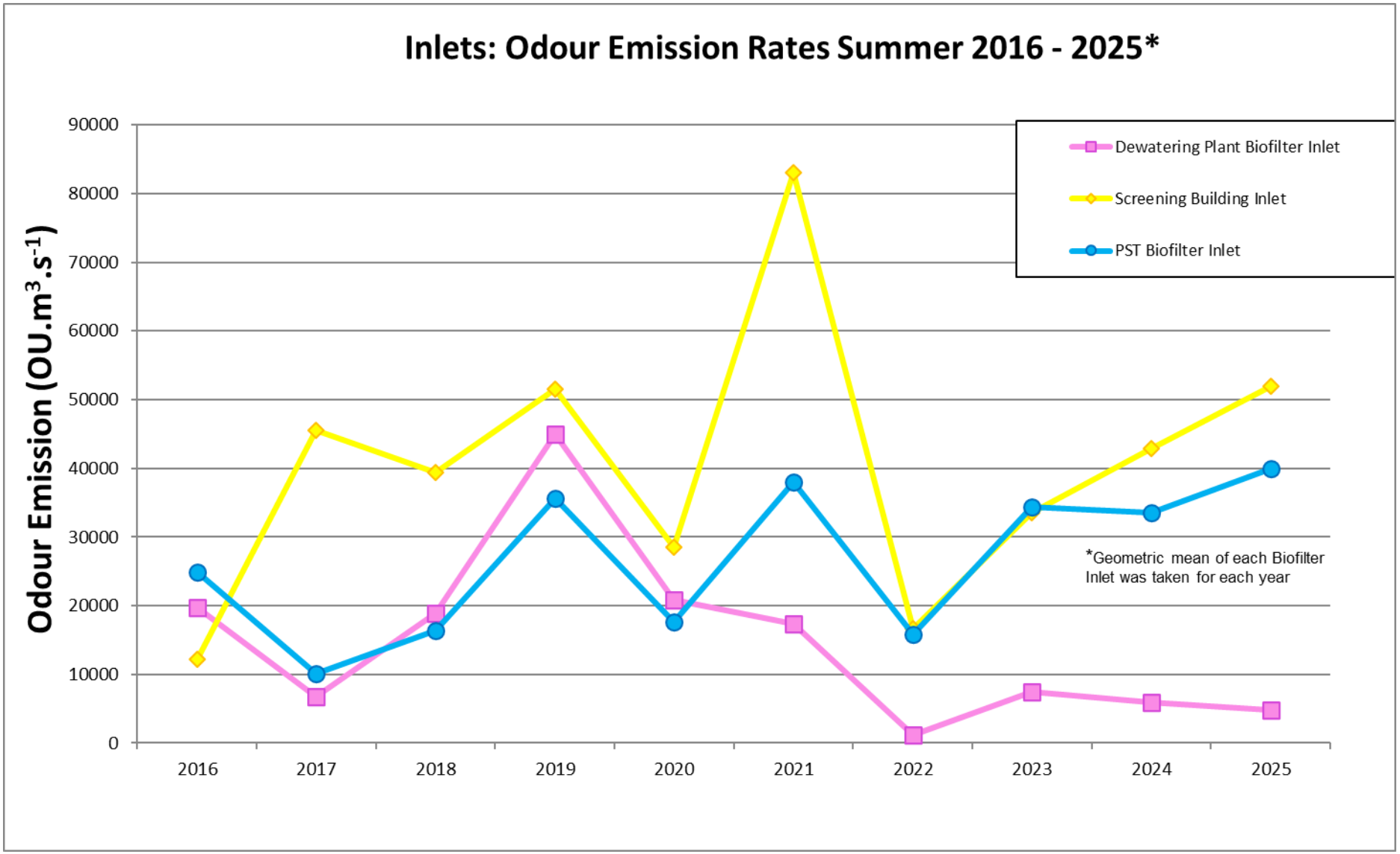


Figure 2: Rosedale WWTP Odour Monitoring Programme Summer 2016 - 2025: Outlets.

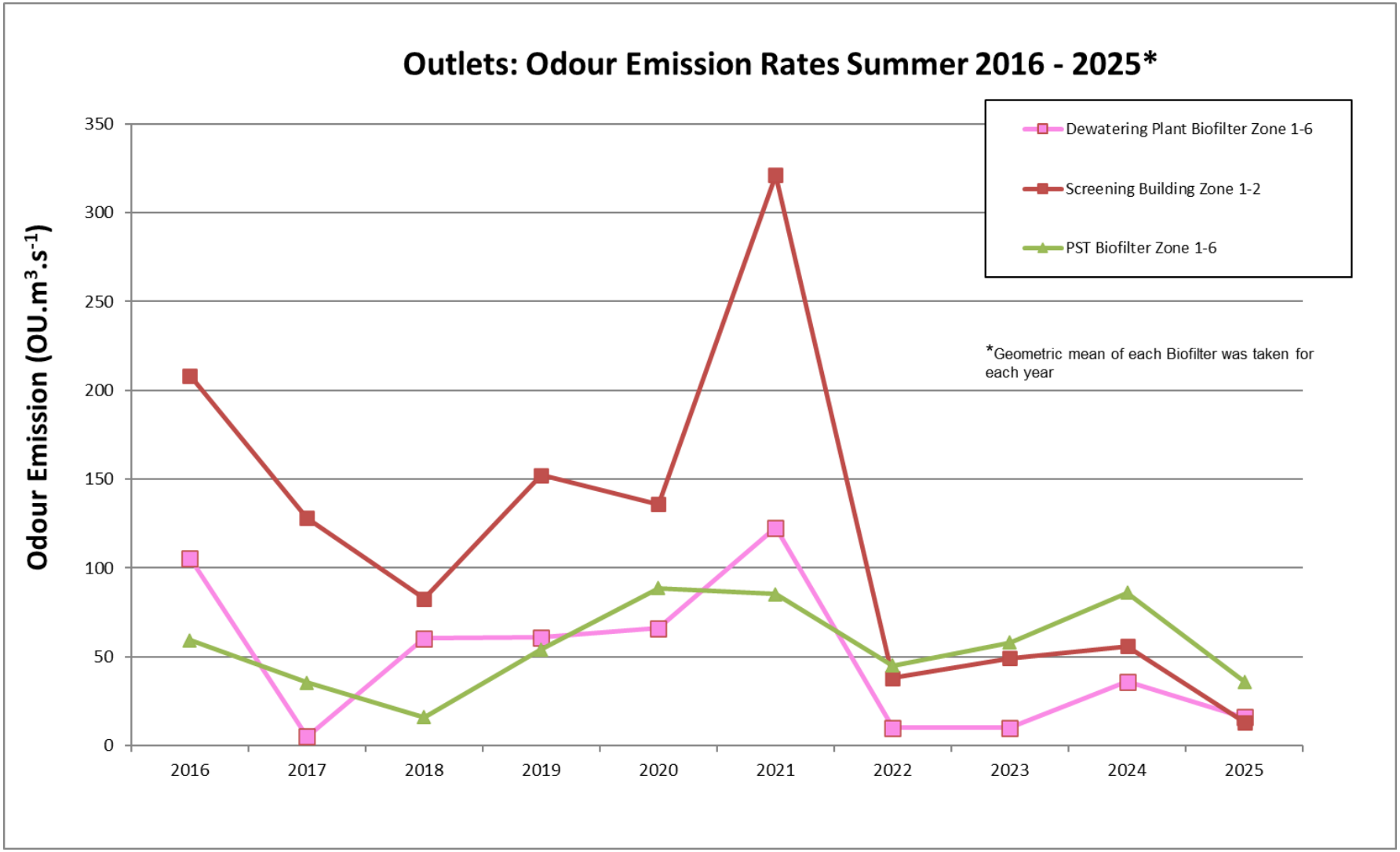


Figure 3: Rosedale WWTP Odour Monitoring Programme Summer 2016 - 2025: MLE

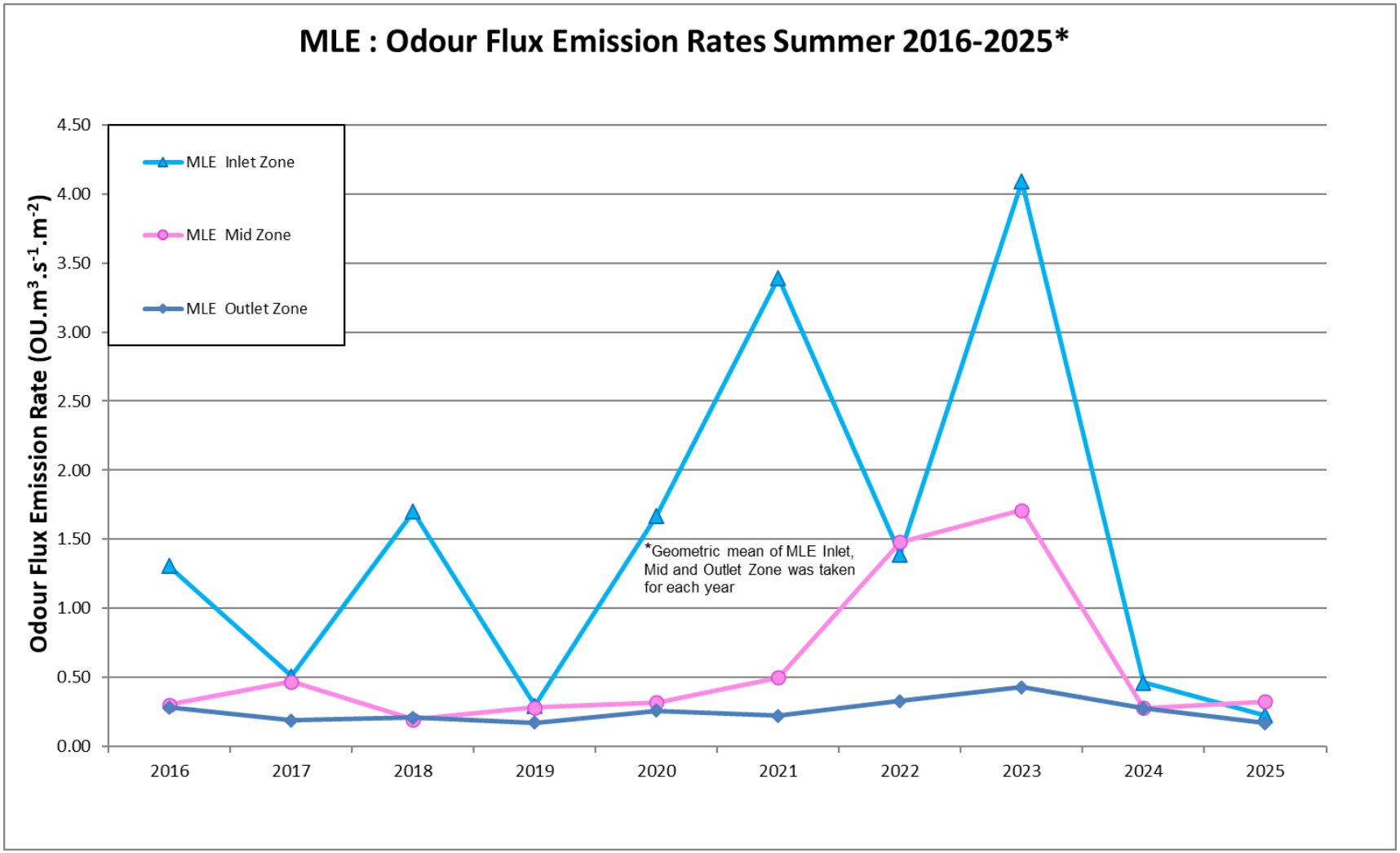


Figure 4: Rosedale WWTP Odour Monitoring Programme Summer 2016 - 2025: Clarifiers

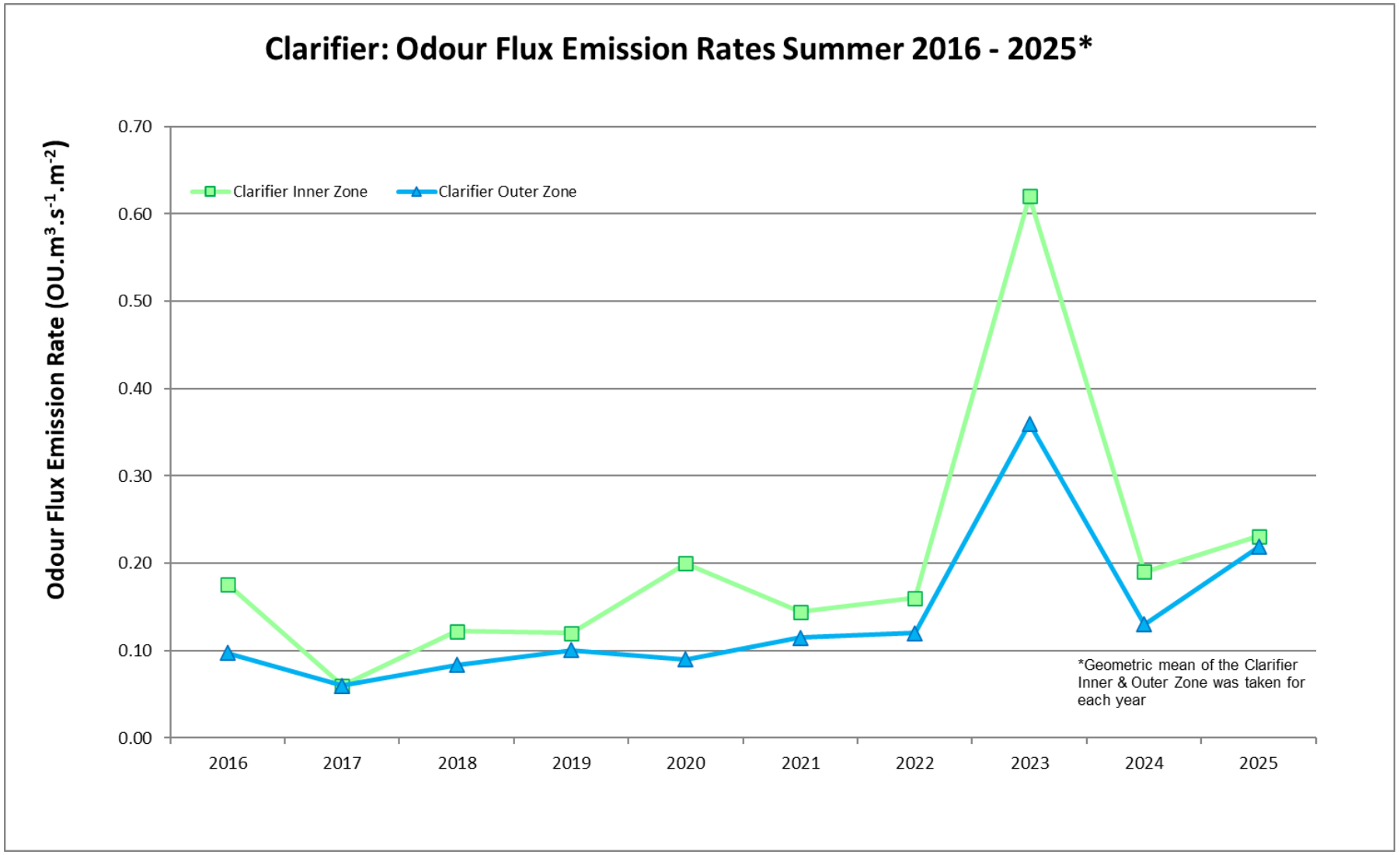


Figure 5: Rosedale WWTP Odour Monitoring Programme Summer 2016 - 2025: RAS Mixing Chamber

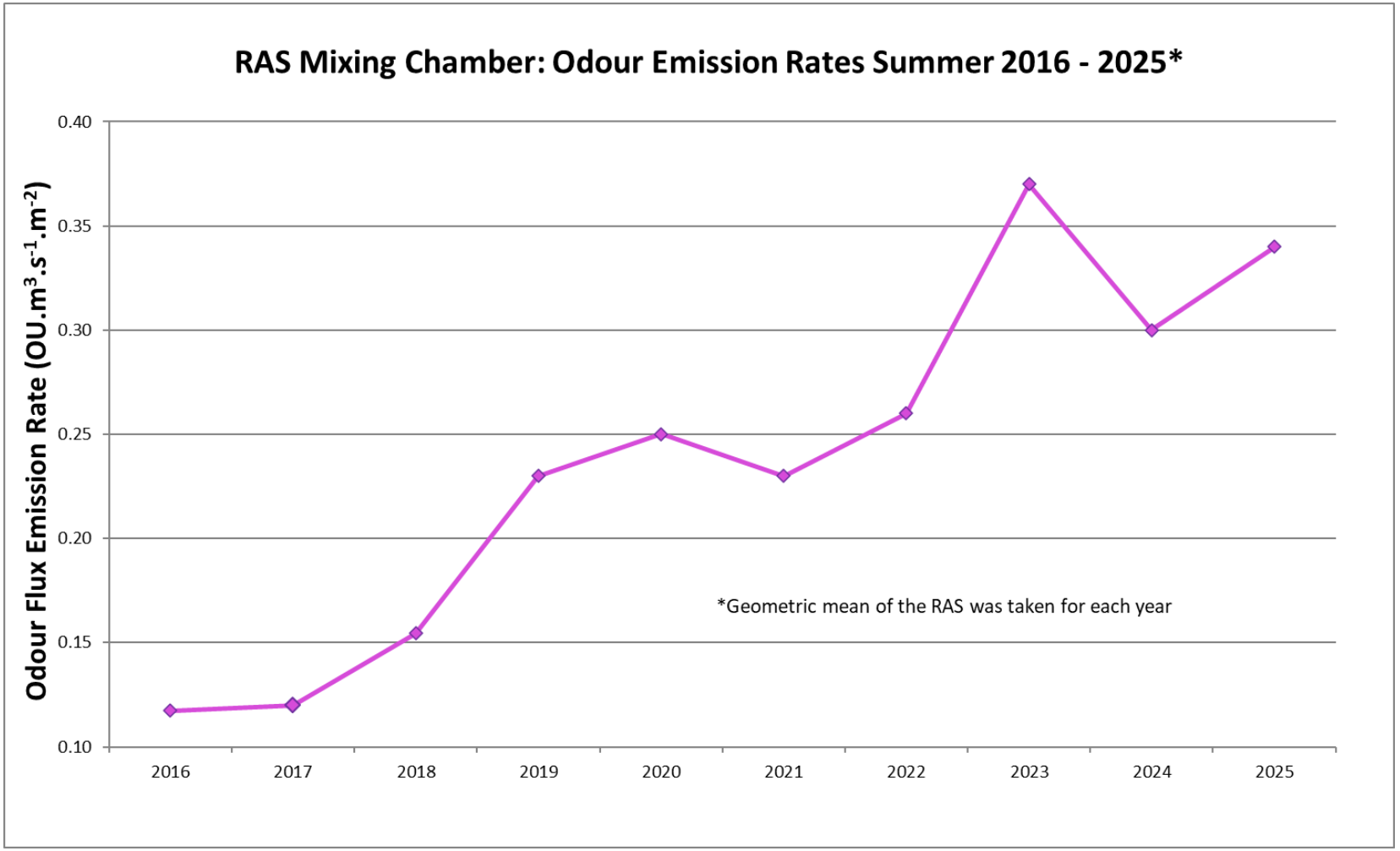


Figure 6: Rosedale WWTP Odour Monitoring Programme Summer 2016 - 2025: CAS Tanks

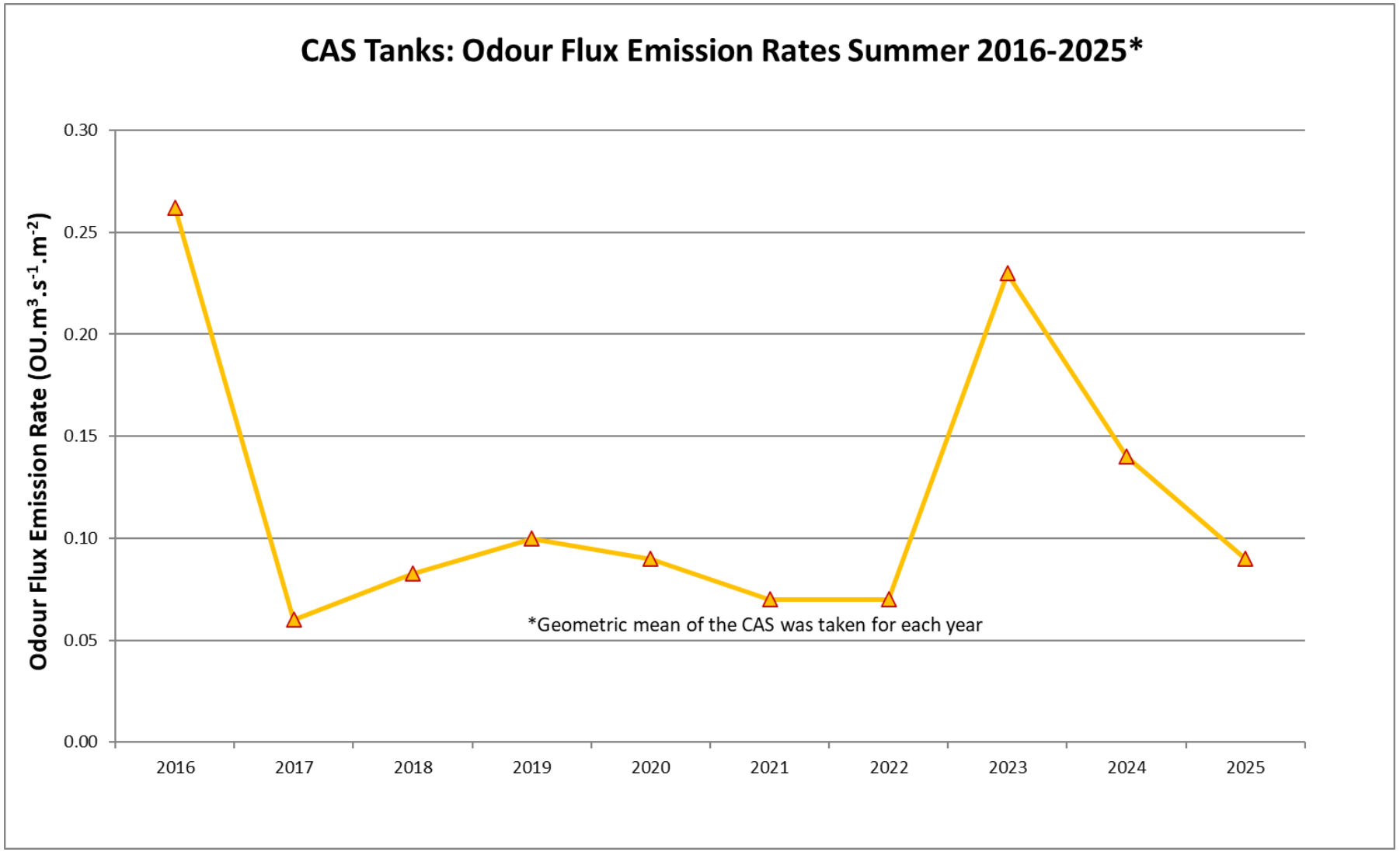
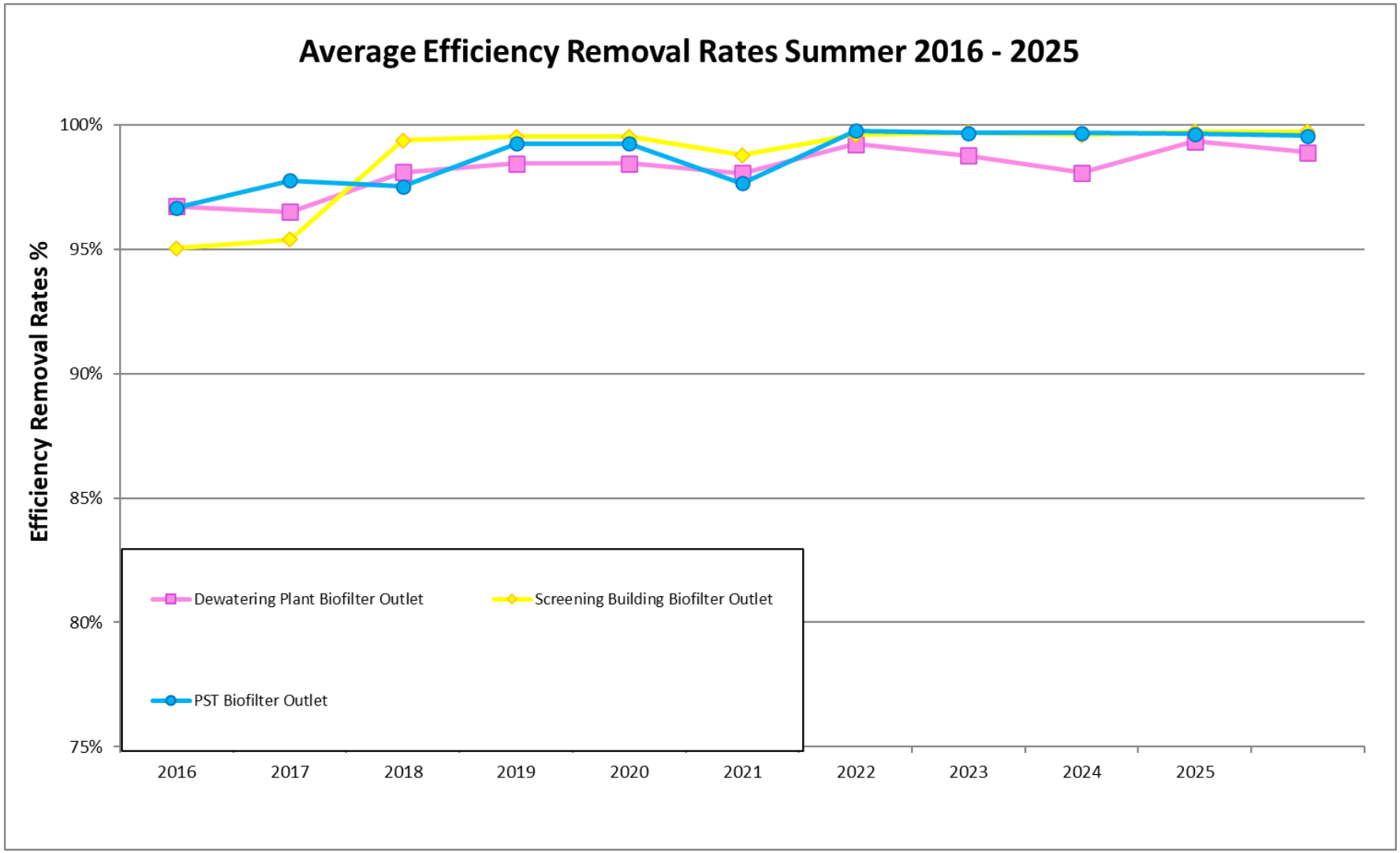


Figure 7: Rosedale WWTP Odour Monitoring Programme Summer 2016 - 2025: Efficiency Removal Rates.



4 SAMPLING METHODS AND LOCATIONS

4.1 MLE Sampling

During the current round of testing all **MLE** samples were collected from **MLE 1**. The MLE was subdivided into three separate zones - 'Inlet', 'Middle' and 'Outlet' zones. The Inlet zone was located in the chamber where the raw effluent and re-circulated liquid mix. The Middle zone was located in the first of the aerated sections of the MLE. The Outlet zone was situated just prior to the outlet from the MLE. All three zones were sampled on the same sampling day using a static flux chamber to obtain a representative range of odour emission rates from across the MLE.

Figure 8: Middle zone MLE sampling position

4.2 Clarifier Sampling

During the current round of testing all clarifier samples were collected from **Clarifier 3**. The Clarifier was subdivided into two separate zones, representing the inner zone and the outer zone of the clarifier. These were sampled using a static flux chamber.

Figure 9: Inner zone and outer zone sampling on a clarifier

4.3 CAS Tank Sampling

CAS Tank sampling was done using a static flux chamber.

Figure 10: CAS Tank at Rosedale WWTP.

4.4 RAS Splitter Sampling

RAS Splitter sampling was done using a static flux chamber.

Figure 11: RAS Splitter sampling

4.5 Dewatering Plant Biofilter Sampling

Point source sampling was undertaken at the individual inlet pipes for each zone of the Dewatering Plant Biofilter whilst sampling was undertaken of each zone's outlet using the biofilter hood.

Figure 12: Dewatering Building biofilter sampling (zone 5)

4.6 Screening Building Biofilter

Point source sampling was undertaken of the inlet airflow into the biofilter, whilst sampling was undertaken on zone 1 and zone 2 of the Screening Building biofilter.

Figure 13: Sampling the Screening Building biofilter (zone 2)

4.7 Primary Sedimentation Tank Biofilter

Point source sampling was undertaken of the inlet airflow into the Primary Sedimentation Tank biofilter, whilst sampling was undertaken on zones 1 to 6 of the biofilter.

Figure 14: Sampling Primary Sedimentation Tank biofilter (zone 1)

5 METHODOLOGY

5.1 Sampling

The following section outlines the odour sampling methodology employed at the Rosedale WWTP.

Odour samples from the biofilter outlets were collected using a biofilter sampling hood placed on the surface of the biofilter, as shown in figures 12, 13 and 14. The sampling hood covers a surface area of 0.785 m^2 and channels air passing through the biofilter under positive pressure. Samples are collected by inserting a Teflon sampling line into the sampling hood, which is connected by Swagelok fittings to the sampling barrel. The samples were collected at a flow rate of approximately 5 l/min. Prior to collection of the sample, the "Nalophan" sampling bag were conditioned by half filling the bag with sample and then evacuating. Sampling hood is not IANZ accredited.

Odour samples from biofilter inlets were collected using point source sampling methodology. Point source sampling was carried out using a sampling train consisting of a sample line, a sample bag, and vacuum chamber. A Teflon sampling line was inserted into the duct and the sampling port sealed. The line was then connected to a vacuum case via Teflon tubing with Swagelok fittings. The sampling barrel was evacuated, drawing a sample into a sampling bag at a flow rate of approximately 1 l/min. Prior to collection of the sample for analysis, the sampling bag was conditioned by half filling the bag with sample and then evacuating. The duct velocity and temperature were determined using Testo 405i Thermal Anemometer. Point source sampling is based on USEPA Method 18[1].

The MLE, Clarifier, RAS Mixing Chamber, and CAS Tanks were sampled using a US EPA Static Flux Chamber (SFC) following AS/NZS 4323.4:2009 Stationary source emissions; Method 4: Area source sampling – Flux chamber technique. In principle, odour emissions are collected from an isolated area within the SFC. Clean, dry sweep air (odourless air) is added to the chamber at a fixed, controlled flow rate of 5 l/min. After conditioning the chamber for 24 minutes, the contents are sampled at a rate of 2.5 l/min using an odour sampling barrel connected via Teflon tubing with Swagelok fittings. Prior to collection of the sample for analysis, the sampling bag was conditioned by half filling the bag with sample and then evacuating. The temperature of the Flux Chamber was measured using a "K" type thermocouple and digital thermometer.

[1] Biofilter and point source sampling uses procedures from AS/NZS 4323.4 and USEPA Method 18.

5.2 Analysis

The odour samples collected were quantified using forced choice dynamic dilution olfactometry. Analysis of the samples was carried out at Watercare Laboratory Services' purpose-built Sensory Evaluation Unit in Auckland. Olfactometry analysis was carried out in compliance with the following methodology:

AS/NZS 4323.3:2001 Stationary Source Emissions Part 3: Determination of Odour Concentration by Dynamic Olfactometry.

Watercare Laboratory Services Limited is IANZ accredited for AS/NZS 4323.3:2001. However, this report retains the European odour units[2] (per European Standard EN13725) and calculates odour emission and odour flux, for comparison with the previous results.

[2] AS/NZS standard: n-butanol (CAS 71-36-3) one ROM (Reference Odour Mass) is 132µg.

European standard: n-butanol (CAS 71-36-3) one EROM (European Reference Odour Mass) is 123µg.

Appendix A Sampling Requirements

Appendix A contains 5 pages including cover page.

Rosedale WWTP Odour Monitoring – Summer 2025 (54 samples total)

MLE Biological Reactors (9 samples total)

MLE 1 Inlet Zone

MLE 1 Mid Zone

MLE 1 Outlet Zone

1 samples of each zone above with each zone sampled on the same day.

Secondary Clarifiers (6 samples Total)

Clarifier 3 Inner zone

Clarifier 3 Outer zone

1 sample of each zone above with each zone sampled on the same day.

CAS Tanks (3 samples total)

3 samples

RAS Splitter (3 samples total)

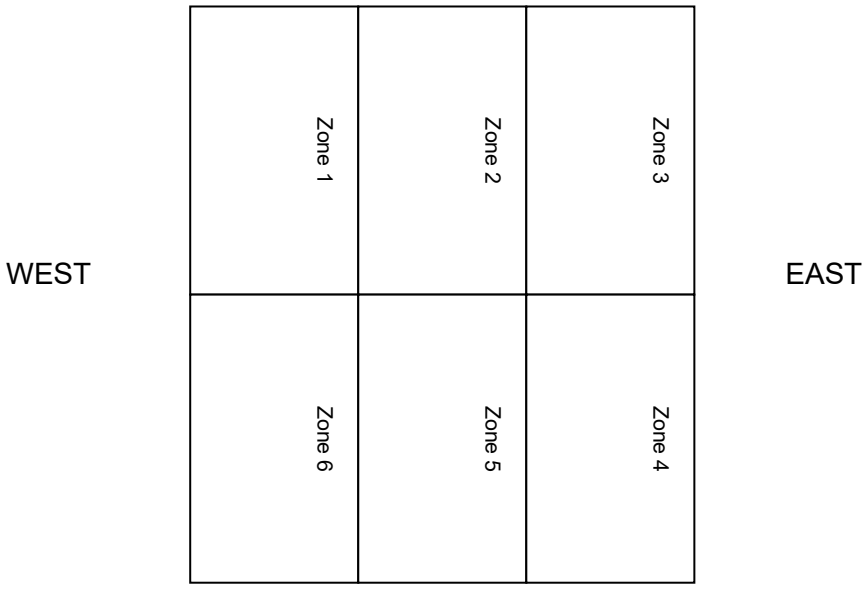
3 samples

Dewatering Plant Biofilter (12 samples total)

Dewatering Plant biofilter inlets (*6 samples*)

Dewatering Plant biofilter outlet - 6 zones (6 *samples – zone 1, zone 2, zone 3, zone 4, zone 5 and zone 6 at same time as inlet samples)*

Dewatering Plant Biofilter Schematic

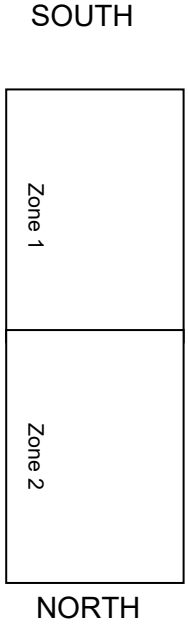


Screening Building Biofilter (9 samples total)

Screening biofilter Inlet airflow (*3 samples)*

Screening Biofilter outlet samples *1 sample from each of the two biofilter cells at time of sample inlet (2 x 3 = 6 samples total)*

Screenings/Grit Biofilter Schematic

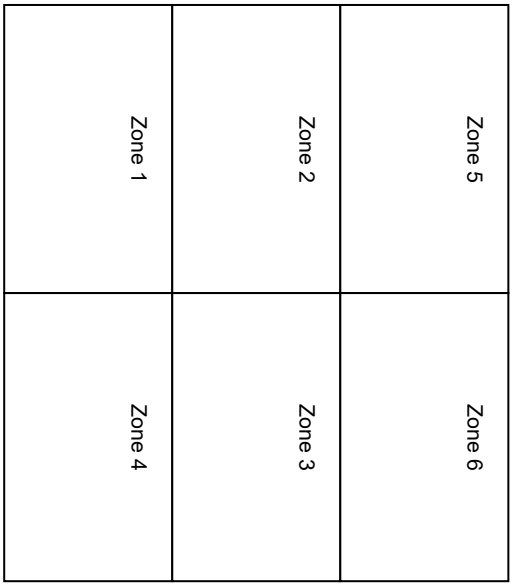


PST Biofilter (12 samples total)

PST Biofilter Inlets airflow (6 *samples)*

PST Biofilter Outlet samples (6 *samples – zone 1, zone 2, zone 3, zone 4, zone 5 and zone 6 at time of inlet samples)*

NORTH



WEST

EAST

SOUTH

Appendix B Laboratory Reports

This appendix contains 23 pages including this page.

Watercare
Laboratory Services

Sensory Evaluation Unit

Olfactometry Results (Forced Choice)

Client:	**Rosedale WWTP**
Contact:	**Mai Hoque**
Address:	**1 Jack Hinton Drive, Rosedale, Auckland.**
Date Received:	**15/01/2025**
Report Date:	**13/05/2025**
Report Number:	**rp 25019s**

- Odour concentration analysed in accordance with AS/NZS 4323.3:2001: "Determination of odour concentration by dynamic olfactometry" using Olfasense – TO-Evolution. Calibration set by Watercare in January 2025.

- Odour character analysed in accordance with Watercare Services Ltd: Method EM02.159 Section 4.6.

Panel Threshold for measurement (AS/NZS 4323.3:2001)[1]:

Panellist	Average Threshold (ppb)	Standard Deviation	Acceptable Range	Qualified
Panellist 1	27.6	1.52	Threshold range: 20-80ppb Standard Deviation: ≤ 2.3	Yes
Panellist 2	47.5	1.32		Yes
Panellist 3	38.0	1.35		Yes
Panellist 4	46.1	1.36		Yes
Panellist 5	32.8	1.58		Yes

[1]Average taken from 20 individual threshold estimates (ITEs) for reference gas (n-butanol 60ppm, ID: D863036).

Environmental Conditions for measurement (AS/NZS 4323.3:2001 Section 9.6)[2]:

Temperature Range	Ventilation	Environment odourless and pleasant	Noise or light Interference
20.8 °C – 21.1 °C	35.75 – 39.83m^3/hr/person	Yes	No

[2]Section 9.6 (AS/NZS 4323.3:2001) states temperature fluctuations during the measuring process shall be less than ± 3°C and that the maximum temperature is 25°C. Minimum ventilation rate of 4.4m^3/ hour per person.

Actual Sampling Conditions:

Lab Reference	Description	Temperature (°C)
250115-1	RAS Splitter	38.4
250115-2	CAS Tank Mid Zone	31.2
250115-3	CAS Tank Inlet Zone	29.5

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Odour Concentration (AS/NZS 4323.3:2001)[4]:

Sample Date & Time		Analysis Date & /Time		Description	Results (OU)	Lab. Reference	Sampling Method
14/01/2025	10:43	15/01/2025	12:12	RAS Splitter	**472**	250115-1	SFC
14/01/2025	14:31	15/01/2025	12:27	CAS Tank Mid Zone	**149**	250115-2	SFC
14/01/2025	12:51	15/01/2025	12:50	CAS Tank Inlet Zone	**199**	250115-3	SFC

[4] < LOD is < 20 OU, the lowest detectable odour concentration that can be determined with 95% statistical confidence.

Odour Character (Watercare Services Ltd method EM02.159, section 4.6):

Laboratory Reference	Description of Odour
250115-1	Light – Earthy/vegetation/sewage
250115-2	Light – Earthy/vegetation
250115-3	Light – Earthy/vegetation

Comments:

1. A minimum of four panellists were presented with three runs.
2. For Description of Odour, the original sample was presented to the panellists.
3. Process conditions were normal during sampling.
4. Pre-dilution was not required prior to analysis.
5. All samples were collected by Watercare Laboratory Services.

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Author

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Sensory Evaluation Unit

Olfactometry Results (Forced Choice)

Client:	**Rosedale WWTP**
Contact:	**Mai Hoque**
Address:	**1 Jack Hinton Drive, Rosedale, Auckland.**
Date Received:	**21/01/2025**
Report Date:	**13/05/2025**
Report Number:	**rp 25020s**

- Odour concentration analysed in accordance with AS/NZS 4323.3:2001: "Determination of odour concentration by dynamic olfactometry" using Olfasense – TO-Evolution. Calibration set by Watercare in January 2025.

- Odour character analysed in accordance with Watercare Services Ltd: Method EM02.159 Section 4.6.

Panel Threshold for measurement (AS/NZS 4323.3:2001)[1]:

Panellist	Average Threshold (ppb)	Standard Deviation	Acceptable Range	Qualified
Panellist 1	27.1	1.41	Threshold range: 20-80ppb Standard Deviation: ≤ 2.3	Yes
Panellist 2	49.6	1.35		Yes
Panellist 3	38.5	1.36		Yes
Panellist 4	46.0	1.42		Yes
Panellist 5	29.6	1.39		Yes

[1]Average taken from 20 individual threshold estimates (ITEs) for reference gas (n-butanol 60ppm, ID: D863036).

Environmental Conditions for measurement (AS/NZS 4323.3:2001 Section 9.6)[2]:

Temperature Range	Ventilation	Environment odourless and pleasant	Noise or light Interference
20.7 °C – 22.0 °C	35.75 – 39.83m^3/hr/person	Yes	No

[2]Section 9.6 (AS/NZS 4323.3:2001) states temperature fluctuations during the measuring process shall be less than ± 3°C and that the maximum temperature is 25°C. Minimum ventilation rate of 4.4m^3/ hour per person.

Actual Sampling Conditions:

Lab Reference	Description	Temperature (°C)
250121-1	MLE-1 Outlet Zone	27.3
250121-2	MLE-1 Mid Zone	26.7
250121-3	MLE-1 Inlet Zone	27.1
250121-4	RAS Splitter	29.7
250121-5	PST Biofilter Outlet Sample – 1	29.3
250121-6	PST Biofilter Inlet	23.6
250121-7	Screening Building Biofilter Zone 1 Sample - 1	20.4
250121-8	Screening Building Biofilter Zone 2 Sample – 1	21.2
250121-9	Screening Building Biofilter Inlet	24.3

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Odour Concentration (AS/NZS 4323.3:2001)[4]:

Sample Date & Time		Analysis Date & /Time		Description	Results (OU)	Lab. Reference	Sampling Method
20/01/2025	15:10	21/01/2025	13:03	MLE-1 Outlet Zone	**355**	250121-1	SFC
20/01/2025	14:11	21/01/2025	13:49	MLE-1 Mid Zone	**486**	250121-2	SFC
20/01/2025	13:03	21/01/2025	14:04	MLE-1 Inlet Zone	**663**	250121-3	SFC
20/01/2025	11:13	21/01/2025	14:19	RAS Splitter	**574**	250121-4	SFC
20/01/2025	14:12	21/01/2025	14:33	PST Biofilter Outlet Sample – 1	**138**	250121-5	Hood
20/01/2025	13:48	21/01/2025	15:02	PST Biofilter Inlet	**72,763**	250121-6	Point source
20/01/2025	10:47	21/01/2025	15:11	Screening Building Biofilter Zone 1 Sample - 1	**285**	250121-7	Hood
20/01/2025	12:38	21/01/2025	15:25	Screening Building Biofilter Zone 2 Sample – 1	**220**	250121-8	Hood
20/01/2025	12:11	21/01/2025	16:02	Screening Building Biofilter Inlet	**64,740**	250121-9	Point source

[4] < LOD is < 20 OU, the lowest detectable odour concentration that can be determined with 95% statistical confidence.

Odour Character (Watercare Services Ltd method EM02.159, section 4.6):

Laboratory Reference	Description of Odour
250121-1	Light – Chemical/vegetation
250121-2	Light – Chemical/vegetation
250121-3	Light – Chemical/vegetation
250121-4	Light – Chemical/vegetation
250121-5	Light – Vegetation/earthy
250121-6	Strong – Sewage
250121-7	Light – Vegetation
250121-8	Light – Vegetation
250121-9	Strong – Sewage

Comments:

1. A minimum of four panellists were presented with three runs.
2. For Description of Odour, the original sample was presented to the panellists.
3. Process conditions were normal during sampling.
4. Pre-dilution was not required prior to analysis.
5. All samples were collected by Watercare Laboratory Services.

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Sensory Evaluation Unit

Olfactometry Results (Forced Choice)

Client:	**Rosedale WWTP**
Contact:	**Mai Hoque**
Address:	**1 Jack Hinton Drive, Rosedale, Auckland.**
Date Received:	**4/02/2025**
Report Date:	**14/05/2025**
Report Number:	**rp 25021s**

- Odour concentration analysed in accordance with AS/NZS 4323.3:2001: "Determination of odour concentration by dynamic olfactometry" using Olfasense – TO-Evolution. Calibration set by Watercare in January 2025.

- Odour character analysed in accordance with Watercare Services Ltd: Method EM02.159 Section 4.6.

Panel Threshold for measurement (AS/NZS 4323.3:2001)[1]:

Panellist	Average Threshold (ppb)	Standard Deviation	Acceptable Range	Qualified
Panellist 1	31.5	1.46	Threshold range: 20-80ppb Standard Deviation: ≤ 2.3	Yes
Panellist 2	46.3	1.47		Yes
Panellist 3	42.1	1.36		Yes
Panellist 4	38.7	1.38		Yes

[1]Average taken from 20 individual threshold estimates (ITEs) for reference gas (n-butanol 60ppm, ID: D863036).

Environmental Conditions for measurement (AS/NZS 4323.3:2001 Section 9.6)[2]:

Temperature Range	Ventilation	Environment odourless and pleasant	Noise or light Interference
22.7 °C – 23.2 °C	35.75 – 39.83m³/hr/person	Yes	No

[2]Section 9.6 (AS/NZS 4323.3:2001) states temperature fluctuations during the measuring process shall be less than ± 3°C and that the maximum temperature is 25°C. Minimum ventilation rate of 4.4m³/ hour per person.

Actual Sampling Conditions:

Lab Reference	Description	Temperature (°C)
250204-1	Dewatering Biofilter Cell 1	25.0
250204-2	Dewatering Biofilter Cell 2	38.6
250204-3	Dewatering Biofilter Cell 3	34.5
250204-4	Dewatering Biofilter Cell 4	37.8
250204-5	Dewatering Biofilter Cell 1 Inlet	24.1
250204-6	Dewatering Biofilter Cell 2 Inlet	34.1
250204-7	Dewatering Biofilter Cell 4 Inlet	34.1

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Odour Concentration (AS/NZS 4323.3:2001)[4]:

Sample Date & Time		Analysis Date & /Time		Description	Results (OU)	Lab. Reference	Sampling Method
03/02/2025	10:36	04/02/2025	12:19	Dewatering Biofilter Cell 1	**104**	250204-1	Hood
03/02/2025	11:42	04/02/2025	12:29	Dewatering Biofilter Cell 2	**86**	250204-2	Hood
03/02/2025	13:02	04/02/2025	12:45	Dewatering Biofilter Cell 3	**59**	250204-3	Hood
03/02/2025	14:07	04/02/2025	13:00	Dewatering Biofilter Cell 4	**87**	250204-4	Hood
03/02/2025	10:16	04/02/2025	13:20	Dewatering Biofilter Cell 1 Inlet	**22,942**	250204-5	Point source
03/02/2025	11:21	04/02/2025	13:36	Dewatering Biofilter Cell 2 Inlet	**14,394**	250204-6	Point source
03/02/2025	14:51	04/02/2025	13:57	Dewatering Biofilter Cell 4 Inlet	**3,762**	250204-7	Point source

[4] < LOD is < 20 OU, the lowest detectable odour concentration that can be determined with 95% statistical confidence.

Odour Character (Watercare Services Ltd method EM02.159, section 4.6):

Laboratory Reference	Description of Odour
250204-1	Light – Vegetation
250204-2	Light – Vegetation
250204-3	Light – Vegetation
250204-4	Light – Earthy/vegetation
250204-5	Strong – Sewage
250204-6	Moderate – Sewage
250204-7	Moderate – Sewage

Comments:

1. A minimum of four panellists were presented with three runs.
2. For description of odour, the original sample was presented to the panellists.
3. Process conditions were normal during sampling.
4. Pre-dilution was not required prior to analysis.
5. All samples were collected by Watercare Laboratory Services.

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Sensory Evaluation Unit

Olfactometry Results (Forced Choice)

Client:	**Rosedale WWTP**
Contact:	**Mai Hoque**
Address:	**1 Jack Hinton Drive, Rosedale, Auckland.**
Date Received:	**5/02/2025**
Report Date:	**14/05/2025**
Report Number:	**rp 25022s**

- Odour concentration analysed in accordance with AS/NZS 4323.3:2001: "Determination of odour concentration by dynamic olfactometry" using Olfasense – TO-Evolution. Calibration set by Watercare in January 2025.

- Odour character analysed in accordance with Watercare Services Ltd: Method EM02.159 Section 4.6.

Panel Threshold for measurement (AS/NZS 4323.3:2001)[1]:

Panellist	Average Threshold (ppb)	Standard Deviation	Acceptable Range	Qualified
Panellist 1	34.4	1.44	Threshold range: 20-80ppb Standard Deviation: ≤ 2.3	Yes
Panellist 2	45.0	1.51		Yes
Panellist 3	42.2	1.33		Yes
Panellist 4	37.4	1.41		Yes

[1]Average taken from 20 individual threshold estimates (ITEs) for reference gas (n-butanol 60ppm, ID: D863036).

Environmental Conditions for measurement (AS/NZS 4323.3:2001 Section 9.6)[2]:

Temperature Range	Ventilation	Environment odourless and pleasant	Noise or light Interference
22.6 °C – 23.0 °C	35.75 – 39.83m³/hr/person	Yes	No

[2]Section 9.6 (AS/NZS 4323.3:2001) states temperature fluctuations during the measuring process shall be less than ± 3°C and that the maximum temperature is 25°C. Minimum ventilation rate of 4.4m³/ hour per person.

Actual Sampling Conditions:

Lab Reference	Description	Temperature (°C)
250205-1	Screening Building Biofilter Cell 1	35.4
250205-2	Dewatering Building Biofilter Cell 5	36.4
250205-3	Dewatering Building Biofilter Cell 6	37.3
250205-4	Screening Building Biofilter Inlet Cell 1	34.3
250205-5	Dewatering Building Biofilter Inlet Cell 5	31.1

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Odour Concentration (AS/NZS 4323.3:2001)[4]:

Sample Date & Time		Analysis Date & /Time		Description	Results (OU)	Lab. Reference	Sampling Method
04/02/2025	14:51	05/02/2025	12:13	Screening Building Biofilter Cell 1	**60**	250205-1	Hood
04/02/2025	12:26	05/02/2025	12:26	Dewatering Building Biofilter Cell 5	**177**	250205-2	Hood
04/02/2025	13:36	05/02/2025	12:43	Dewatering Building Biofilter Cell 6	**290**	250205-3	Hood
04/02/2025	14:54	05/02/2025	12:56	Screening Building Biofilter Inlet Cell 1	**31,596**	250205-4	Point source
04/02/2025	13:16	05/02/2025	13:09	Dewatering Building Biofilter Inlet Cell 5	**37,627**	250205-5	Point source

[4] < LOD is < 20 OU, the lowest detectable odour concentration that can be determined with 95% statistical confidence.

Odour Character (Watercare Services Ltd method EM02.159, section 4.6):

Laboratory Reference	Description of Odour
250205-1	Light – Earthy/Vegetation
250205-2	Light – Earthy/Vegetation
250205-3	Light – Vegetation
250205-4	Strong – Sewage
250205-5	Strong – Sewage

Comments:

1. A minimum of four panellists were presented with three runs.
2. For dsescription of Odour, the original sample was presented to the panellists.
3. Process conditions were normal during sampling.
4. Pre-dilution was not required prior to analysis.
5. All samples were collected by Watercare Laboratory Services.

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Sensory Evaluation Unit

Olfactometry Results (Forced Choice)

Client:	**Rosedale WWTP**
Contact:	**Mai Hoque**
Address:	**1 Jack Hinton Drive, Rosedale, Auckland.**
Date Received:	**14/03/2025**
Report Date:	**14/05/2025**
Report Number:	**rp 25023s**

- Odour concentration analysed in accordance with AS/NZS 4323.3:2001: "Determination of odour concentration by dynamic olfactometry" using Olfasense – TO-Evolution. Calibration set by Watercare in January 2025.

- Odour character analysed in accordance with Watercare Services Ltd: Method EM02.159 Section 4.6.

Panel Threshold for measurement (AS/NZS 4323.3:2001)[1]:

Panellist	Average Threshold (ppb)	Standard Deviation	Acceptable Range	Qualified
Panellist 1	33.9	1.40	Threshold range: 20-80ppb Standard Deviation: ≤ 2.3	Yes
Panellist 2	36.4	1.51		Yes
Panellist 3	29.0	1.32		Yes
Panellist 4	48.5	1.61		Yes

[1]Average taken from 20 individual threshold estimates (ITEs) for reference gas (n-butanol 60ppm, ID: D863036).

Environmental Conditions for measurement (AS/NZS 4323.3:2001 Section 9.6)[2]:

Temperature Range	Ventilation	Environment odourless and pleasant	Noise or light Interference
22.7 °C – 24.3 °C	35.75 – 39.83m³/hr/person	Yes	No

[2]Section 9.6 (AS/NZS 4323.3:2001) states temperature fluctuations during the measuring process shall be less than ± 3°C and that the maximum temperature is 25°C. Minimum ventilation rate of 4.4m³/ hour per person.

Actual Sampling Conditions:

Lab Reference	Description	Temperature (°C)
250314-1	MLE 1 Mid Zone	27.8
250314-2	MLE 1 Outlet Zone	27.1
250314-3	CAS Tank Outlet Zone	23.4
250314-4	Clarifier 3 Inner Zone	30.1
250314-5	Clarifier 3 Outer Zone	29.1
250314-6	MLE 1 Inlet Zone	32.2

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Odour Concentration (AS/NZS 4323.3:2001)[4]:

Sample Date & Time		Analysis Date & /Time		Description	Results (OU)	Lab. Reference	Sampling Method
13/03/2025	12:34	14/03/2025	13:47	MLE 1 Mid Zone	**203**	250314-1	SFC
13/03/2025	13:49	14/03/2025	14:02	MLE 1 Outlet Zone	**166**	250314-2	SFC
13/03/2025	11:30	14/03/2025	14:15	CAS Tank Outlet Zone	**113**	250314-3	SFC
13/03/2025	14:15	14/03/2025	14:28	Clarifier 3 Inner Zone	**118**	250314-4	SFC
13/03/2025	13:15	14/03/2025	14:54	Clarifier 3 Outer Zone	**108**	250314-5	SFC
13/03/2025	11:20	14/03/2025	15:10	MLE 1 Inlet Zone	**103**	250314-6	SFC

[4] < LOD is < 20 OU, the lowest detectable odour concentration that can be determined with 95% statistical confidence.

Odour Character (Watercare Services Ltd method EM02.159, section 4.6):

Laboratory Reference	Description of Odour
250314-1	Light – Earthy/Vegetation
250314-2	Light – Vegetation/Musty
250314-3	Light – Earthy/Vegetation
250314-4	Light – Musty/Vegetation
250314-5	Light – Vegetation
250314-6	Light – Musty/Vegetation

Comments:

1. A minimum of four panellists were presented with three runs.
2. For description of odour, the original sample was presented to the panellists.
3. Process conditions were normal during sampling.
4. Pre-dilution was not required prior to analysis.
5. All samples were collected by Watercare Laboratory Services.

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Sensory Evaluation Unit

Olfactometry Results (Forced Choice)

Client:	**Rosedale WWTP**
Contact:	**Mai Hoque**
Address:	**1 Jack Hinton Drive, Rosedale, Auckland.**
Date Received:	**21/03/2025**
Report Date:	**14/05/2025**
Report Number:	**rp 25024s**

- Odour concentration analysed in accordance with AS/NZS 4323.3:2001: "Determination of odour concentration by dynamic olfactometry" using Olfasense – TO-Evolution. Calibration set by Watercare in March 2025.

- Odour character analysed in accordance with Watercare Services Ltd: Method EM02.159 Section 4.6.

Panel Threshold for measurement (AS/NZS 4323.3:2001)[1]:

Panellist	Average Threshold (ppb)	Standard Deviation	Acceptable Range	Qualified
Panellist 1	35.7	1.37	Threshold range: 20-80ppb Standard Deviation: ≤ 2.3	Yes
Panellist 2	34.2	1.45		Yes
Panellist 3	43.5	1.33		Yes
Panellist 4	28.9	1.31		Yes

[1]Average taken from 20 individual threshold estimates (ITEs) for reference gas (n-butanol 60ppm, ID: D863036).

Environmental Conditions for measurement (AS/NZS 4323.3:2001 Section 9.6)[2]:

Temperature Range	Ventilation	Environment odourless and pleasant	Noise or light Interference
22.1 °C – 22.5 °C	32.30 – 39.20m³/hr/person	Yes	No

[2]Section 9.6 (AS/NZS 4323.3:2001) states temperature fluctuations during the measuring process shall be less than ± 3°C and that the maximum temperature is 25°C. Minimum ventilation rate of 4.4m³/ hour per person.

Actual Sampling Conditions:

Lab Reference	Description	Temperature (°C)
250321-1	Screening Building Biofilter Zone 1	24.3
250321-2	Screening Building Biofilter Zone 2	17.8
250321-3	Screening Building Biofilter Inlet	23.3

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Odour Concentration (AS/NZS 4323.3:2001)[4]:

Sample Date & Time		Analysis Date & /Time		Description	Results (OU)	Lab. Reference	Sampling Method
21/03/2025	10:08	21/03/2025	13:38	Screening Building Biofilter Zone 1	**34**	250321-1	Hood
21/03/2025	08:35	21/03/2025	13:50	Screening Building Biofilter Zone 2	**<LOD**	250321-2	Hood
21/03/2025	09:23	21/03/2025	14:12	Screening Building Biofilter Inlet	**40,726**	250321-3	Point source

[4] < LOD is < 21 OU, the lowest detectable odour concentration that can be determined with 95% statistical confidence.

Odour Character (Watercare Services Ltd method EM02.159, section 4.6):

Laboratory Reference	Description of Odour
250321-1	Light – Vegetation
250321-2	Light – Earthy/Musty
250321-3	Strong – Sewage

Comments:

1. A minimum of four panellists were presented with three runs.
2. For description of odour, the original sample was presented to the panellists.
3. Process conditions were normal during sampling.
4. Pre-dilution was not required prior to analysis.
5. All samples were collected by Watercare Laboratory Services.

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Sensory Evaluation Unit

Olfactometry Results (Forced Choice)

Client:	**Rosedale WWTP**
Contact:	**Mai Hoque**
Address:	**1 Jack Hinton Drive, Rosedale, Auckland.**
Date Received:	**25/03/2025**
Report Date:	**14/05/2025**
Report Number:	**rp 25025s**

- Odour concentration analysed in accordance with AS/NZS 4323.3:2001: "Determination of odour concentration by dynamic olfactometry" using Olfasense – TO-Evolution. Calibration set by Watercare in March 2025.

- Odour character analysed in accordance with Watercare Services Ltd: Method EM02.159 Section 4.6.

Panel Threshold for measurement (AS/NZS 4323.3:2001)[1]:

Panellist	Average Threshold (ppb)	Standard Deviation	Acceptable Range	Qualified
Panellist 1	35.7	1.37	Threshold range: 20-80ppb Standard Deviation: ≤ 2.3	Yes
Panellist 2	34.2	1.45		Yes
Panellist 3	43.5	1.33		Yes
Panellist 4	28.9	1.31		Yes

[1]Average taken from 20 individual threshold estimates (ITEs) for reference gas (n-butanol 60ppm, ID: D863036).

Environmental Conditions for measurement (AS/NZS 4323.3:2001 Section 9.6)[2]:

Temperature Range	Ventilation	Environment odourless and pleasant	Noise or light Interference
22.3 °C – 22.6 °C	32.30 – 39.20m³/hr/person	Yes	No

[2]Section 9.6 (AS/NZS 4323.3:2001) states temperature fluctuations during the measuring process shall be less than ± 3°C and that the maximum temperature is 25°C. Minimum ventilation rate of 4.4m³/ hour per person.

Actual Sampling Conditions:

Lab Reference	Description	Temperature (°C)
250325-1	PST Biofilter Cell 4	30.1
250325-2	PST Biofilter Cell 5	34.2
250325-3	PST Biofilter Cell 6	32.7
250325-4	MLE 1 Outlet Zone	27.0
250325-5	MLE 1 Mid Zone	26.7
250325-6	MLE 1 Inlet Zone	26.1
250325-7	PST Biofilter Cell 4 Inlet	26.3
250325-8	PST Biofilter Cell 5 Inlet	26.9
250325-9	PST Biofilter Cell 6 Inlet	27.2

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Odour Concentration (AS/NZS 4323.3:2001)[4]:

Sample Date & Time		Analysis Date & /Time		Description	Results (OU)	Lab. Reference	Sampling Method
24/03/2025	11:41	25/03/2025	09:01	PST Biofilter Cell 4	**90**	250325-1	Hood
24/03/2025	12:57	25/03/2025	09:10	PST Biofilter Cell 5	**389**	250325-2	Hood
24/03/2025	14:24	25/03/2025	09:20	PST Biofilter Cell 6	**458**	250325-3	Hood
24/03/2025	14:25	25/03/2025	09:32	MLE 1 Outlet Zone	**352**	250325-4	SFC
24/03/2025	13:15	25/03/2025	09:46	MLE 1 Mid Zone	**1,482**	250325-5	SFC
24/03/2025	11:52	25/03/2025	09:55	MLE 1 Inlet Zone	**717**	250325-6	SFC
24/03/2025	11:14	25/03/2025	10:08	PST Biofilter Cell 4 Inlet	**78,276**	250325-7	Point source
24/03/2025	12:30	25/03/2025	10:18	PST Biofilter Cell 5 Inlet	**64,152**	250325-8	Point source
24/03/2025	13:55	25/03/2025	10:27	PST Biofilter Cell 6 Inlet	**78,276**	250325-9	Point source

[4] < LOD is < 21 OU, the lowest detectable odour concentration that can be determined with 95% statistical confidence.

Odour Character (Watercare Services Ltd method EM02.159, section 4.6):

Laboratory Reference	Description of Odour
250325-1	Light – Vegetation
250325-2	Light – Rotten vegetation
250325-3	Light – Chemical/Vegetation
250325-4	Light – Chemical/Vegetation
250325-5	Moderate – Vegetation/Sewage
250325-6	Light – Sewage/Vegetation
250325-7	Strong – Sewage
250325-8	Strong – Sewage
250325-9	Strong – Sewage

Comments:

1. A minimum of four panellists were presented with three runs.
2. For description of odour, the original sample was presented to the panellists.
3. Process conditions were normal during sampling.
4. Pre-dilution was not required prior to analysis.
5. All samples were collected by Watercare Laboratory Services.

Sara Abayaratne
Author

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Laboratory Services

Sensory Evaluation Unit

Olfactometry Results (Forced Choice)

Client:	**Rosedale WWTP**
Contact:	**Mai Hoque**
Address:	**1 Jack Hinton Drive, Rosedale, Auckland.**
Date Received:	**26/03/2025**
Report Date:	**14/05/2025**
Report Number:	**rp 25026s**

- Odour concentration analysed in accordance with AS/NZS 4323.3:2001: "Determination of odour concentration by dynamic olfactometry" using Olfasense – TO-Evolution. Calibration set by Watercare in March 2025.

- Odour character analysed in accordance with Watercare Services Ltd: Method EM02.159 Section 4.6.

Panel Threshold for measurement (AS/NZS 4323.3:2001)[1]:

Panellist	Average Threshold (ppb)	Standard Deviation	Acceptable Range	Qualified
Panellist 1	33.3	1.37	Threshold range: 20-80ppb Standard Deviation: ≤ 2.3	Yes
Panellist 2	35.8	1.48		Yes
Panellist 3	40.7	1.40		Yes
Panellist 4	28.3	1.33		Yes

[1]Average taken from 20 individual threshold estimates (ITEs) for reference gas (n-butanol 60ppm, ID: D863036).

Environmental Conditions for measurement (AS/NZS 4323.3:2001 Section 9.6)[2]:

Temperature Range	Ventilation	Environment odourless and pleasant	Noise or light Interference
22.5 °C – 22.8 °C	32.30 – 39.20m³/hr/person	Yes	No

[2]Section 9.6 (AS/NZS 4323.3:2001) states temperature fluctuations during the measuring process shall be less than ± 3°C and that the maximum temperature is 25°C. Minimum ventilation rate of 4.4m³/ hour per person.

Actual Sampling Conditions:

Lab Reference	Description	Temperature (°C)
250326-1	PST Biofilter Cell 2	32.2
250326-2	PST Biofilter Cell 3	31.9
250326-3	Clarifier 3 Outer Zone	40.2
250326-4	Clarifier 3 Inner Zone	41.4

Odour Concentration (AS/NZS 4323.3:2001)[4]:

Sample Date & Time		Analysis Date & /Time		Description	Results (OU)	Lab. Reference	Sampling Method
25/03/2025	14:02	26/03/2025	12:46	PST Biofilter Cell 2	**586**	250326-1	Hood
25/03/2025	12:49	26/03/2025	12:59	PST Biofilter Cell 3	**308**	250326-2	Hood
25/03/2025	12:40	26/03/2025	13:11	Clarifier 3 Outer Zone	**1,176**	250326-3	SFC
25/03/2025	13:55	26/03/2025	13:24	Clarifier 3 Inner Zone	**1,074**	250326-4	SFC

[4] < LOD is < 21 OU, the lowest detectable odour concentration that can be determined with 95% statistical confidence.

Odour Character (Watercare Services Ltd method EM02.159, section 4.6):

Laboratory Reference	Description of Odour
250326-1	Light – Vegetation/Earthy
250326-2	Light – Rotten Vegetation
250326-3	Moderate – Rotten vegetation/Musty
250326-4	Moderate – Rotten vegetation/Pond

Comments:

1. A minimum of four panellists were presented with three runs.
2. For description of odour, the original sample was presented to the panellists.
3. Process conditions were normal during sampling.
4. Pre-dilution was not required prior to analysis.
5. All samples were collected by Watercare Laboratory Services.

Sara Abayaratne
Author

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Sensory Evaluation Unit

Olfactometry Results (Forced Choice)

Client:	**Rosedale WWTP**
Contact:	**Mai Hoque**
Address:	**1 Jack Hinton Drive, Rosedale, Auckland.**
Date Received:	**27/03/2025**
Report Date:	**14/05/2025**
Report Number:	**rp 25027s**

- Odour concentration analysed in accordance with AS/NZS 4323.3:2001: "Determination of odour concentration by dynamic olfactometry" using Olfasense – TO-Evolution. Calibration set by Watercare in March 2025.

- Odour character analysed in accordance with Watercare Services Ltd: Method EM02.159 Section 4.6.

Panel Threshold for measurement (AS/NZS 4323.3:2001)[1]:

Panellist	Average Threshold (ppb)	Standard Deviation	Acceptable Range	Qualified
Panellist 1	32.3	1.34	Threshold range: 20-80ppb Standard Deviation: ≤ 2.3	Yes
Panellist 2	34.6	1.41		Yes
Panellist 3	38.7	1.44		Yes
Panellist 4	28.0	1.35		Yes

[1]Average taken from 20 individual threshold estimates (ITEs) for reference gas (n-butanol 60ppm, ID: D863036).

Environmental Conditions for measurement (AS/NZS 4323.3:2001 Section 9.6)[2]:

Temperature Range	Ventilation	Environment odourless and pleasant	Noise or light Interference
22.3 °C – 22.8 °C	32.30 – 39.20m³/hr/person	Yes	No

[2]Section 9.6 (AS/NZS 4323.3:2001) states temperature fluctuations during the measuring process shall be less than ± 3°C and that the maximum temperature is 25°C. Minimum ventilation rate of 4.4m³/ hour per person.

Actual Sampling Conditions:

Lab Reference	Description	Temperature (°C)
250327-2	Screening Building Biofilter Zone 1	26.2
250327-3	Screening Building Biofilter Zone 2	26.8
250327-4	Clarifier 3 Outer Zone	39.4
250327-5	Clarifier 3 Inner Zone	38.7
250327-6	Screening Building Biofilter Inlet	25.2
250327-7	RAS Splitter	33.4

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Odour Concentration (AS/NZS 4323.3:2001)[4]:

Sample Date & Time		Analysis Date & /Time		Description	Results (OU)	Lab. Reference	Sampling Method
26/03/2025	11:49	27/03/2025	12:12	Screening Building Biofilter Zone 1	**204**	250327-2	Hood
26/03/2025	13:16	27/03/2025	12:24	Screening Building Biofilter Zone 2	**367**	250327-3	Hood
26/03/2025	12:06	27/03/2025	12:36	Clarifier 3 Outer Zone	**384**	250327-4	SFC
26/03/2025	13:24	27/03/2025	12:48	Clarifier 3 Inner Zone	**457**	250327-5	SFC
26/03/2025	11:24	27/03/2025	13:03	Screening Building Biofilter Inlet	**46,065**	250327-6	Point source
26/03/2025	10:50	27/03/2025	13:32	RAS Splitter	**654**	250327-7	SFC

[4] < LOD is < 21 OU, the lowest detectable odour concentration that can be determined with 95% statistical confidence.

Odour Character (Watercare Services Ltd method EM02.159, section 4.6):

Laboratory Reference	Description of Odour
250327-2	Light – Vegetation/Sweet
250327-3	Light – Perfume/Vegetation
250327-4	Light – Rotten vegetation
250327-5	Light – Pond/Vegetation
250327-6	Strong – Sewage
250327-7	Moderate- Chemical/Vegetation/Earthy

Comments:

1. A minimum of four panellists were presented with three runs.
2. For description of odour, the original sample was presented to the panellists.
3. Process conditions were normal during sampling.
4. Pre-dilution was not required prior to analysis.
5. All samples were collected by Watercare Laboratory Services.

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Author

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Laboratory Services

Sensory Evaluation Unit

Olfactometry Results (Forced Choice)

Client:	**Rosedale WWTP**
Contact:	**Mai Hoque**
Address:	**1 Jack Hinton Drive, Rosedale, Auckland.**
Date Received:	**9/05/2025**
Report Date:	**14/05/2025**
Report Number:	**rp 25032s**

- Odour concentration analysed in accordance with AS/NZS 4323.3:2001: "Determination of odour concentration by dynamic olfactometry" using Olfasense – TO-Evolution. Calibration set by Watercare in March 2025.
- Odour character analysed in accordance with Watercare Services Ltd: Method EM02.159 Section 4.6.

Panel Threshold for measurement (AS/NZS 4323.3:2001)[1]:

Panellist	Average Threshold (ppb)	Standard Deviation	Acceptable Range	Qualified
Panellist 1	41.6	1.49	Threshold range: 20-80ppb Standard Deviation: ≤ 2.3	Yes
Panellist 2	27.7	1.39		Yes
Panellist 3	38.3	1.54		Yes
Panellist 4	35.7	1.55		Yes

[1]Average taken from 20 individual threshold estimates (ITEs) for reference gas (n-butanol 60ppm, ID: D863036).

Environmental Conditions for measurement (AS/NZS 4323.3:2001 Section 9.6)[2]:

Temperature Range	Ventilation	Environment odourless and pleasant	Noise or light Interference
21.3 °C – 22.4 °C	32.30 – 39.20m^3/hr/person	Yes	No

[2]Section 9.6 (AS/NZS 4323.3:2001) states temperature fluctuations during the measuring process shall be less than ± 3°C and that the maximum temperature is 25°C. Minimum ventilation rate of 4.4m^3/ hour per person.

Actual Sampling Conditions:

Lab Reference	Description	Temperature (°C)
250509-1	Dewatering Biofilter Cell 3	20.0
250509-2	Dewatering Biofilter Cell 6	20.8
250509-3	Dewatering Biofilter Cell 3 Inlet	20.3
250509-4	Dewatering Biofilter Cell 6 Inlet	20.6

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Odour Concentration (AS/NZS 4323.3:2001)[4]:

Sample Date & Time		Analysis Date & /Time		Description	Results (OU)	Lab. Reference	Sampling Method
08/05/2025	14:05	09/05/2025	12:30	Dewatering Biofilter Cell 3	**113**	250509-1	Hood
08/05/2025	15:00	09/05/2025	12:42	Dewatering Biofilter Cell 6	**55**	250509-2	Hood
08/05/2025	13:42	09/05/2025	12:54	Dewatering Biofilter Cell 3 Inlet	**39,199**	250509-3	Point source
08/05/2025	14:09	09/05/2025	13:06	Dewatering Biofilter Cell 6 Inlet	**16,372**	250509-4	Point source

[4] < LOD is < 21 OU, the lowest detectable odour concentration that can be determined with 95% statistical confidence.

Odour Character (Watercare Services Ltd method EM02.159, section 4.6):

Laboratory Reference	Description of Odour
250509-1	Light – Mouldy/Vegetation
250509-2	Light – Earthy/Vegetation
250509-3	Strong – Sewage
250509-4	Strong – Sewage/Chemical

Comments:

1. A minimum of four panellists were presented with three runs.
2. For the description of odour, the original sample was presented to the panellists.
3. Process conditions were normal during sampling.
4. Pre-dilution was not required prior to analysis.
5. All samples were collected by Watercare Laboratory Services.

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Olfactometry Results (Forced Choice)

Client:	**Rosedale WWTP**
Contact:	**Mai Hoque**
Address:	**1 Jack Hinton Drive, Rosedale, Auckland.**
Date Received:	**13/05/2025**
Report Date:	**14/05/2025**
Report Number:	**rp 25033s**

- Odour concentration analysed in accordance with AS/NZS 4323.3:2001: "Determination of odour concentration by dynamic olfactometry" using Olfasense – TO-Evolution. Calibration set by Watercare in March 2025.

- Odour character analysed in accordance with Watercare Services Ltd: Method EM02.159 Section 4.6.

Panel Threshold for measurement (AS/NZS 4323.3:2001)[1]:

Panellist	Average Threshold (ppb)	Standard Deviation	Acceptable Range	Qualified
Panellist 1	28.5	1.37	Threshold range: 20-80ppb Standard Deviation: ≤ 2.3	Yes
Panellist 2	44.9	1.51		Yes
Panellist 3	38.3	1.54		Yes
Panellist 4	37.5	1.48		Yes

[1]Average taken from 20 individual threshold estimates (ITEs) for reference gas (n-butanol 60ppm, ID: D863036).

Environmental Conditions for measurement (AS/NZS 4323.3:2001 Section 9.6)[2]:

Temperature Range	Ventilation	Environment odourless and pleasant	Noise or light Interference
20.7 °C – 22.0 °C	32.30 – 39.20m³/hr/person	Yes	No

[2]Section 9.6 (AS/NZS 4323.3:2001) states temperature fluctuations during the measuring process shall be less than ± 3°C and that the maximum temperature is 25°C. Minimum ventilation rate of 4.4m³/ hour per person.

Actual Sampling Conditions:

Lab Reference	Description	Temperature (°C)
250513-2	PST Biofilter Cell 2	22.3
250513-3	PST Biofilter Cell 3	26.3
250513-6	PST Biofilter Cell 2 Inlet	20.2
250513-7	PST Biofilter Cell 3 Inlet	22.6

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Odour Concentration (AS/NZS 4323.3:2001)[4]:

Sample Date & Time		Analysis Date & /Time		Description	Results (OU)	Lab. Reference	Sampling Method
12/05/2025	10:55	13/05/2025	12:28	PST Biofilter Cell 2	**268**	250513-2	Hood
12/05/2025	12:17	13/05/2025	12:46	PST Biofilter Cell 3	**402**	250513-3	Hood
12/05/2025	10:32	13/05/2025	13:43	PST Biofilter Cell 2 Inlet	**58,451**	250513-6	Point source
12/05/2025	11:56	13/05/2025	13:50	PST Biofilter Cell 3 Inlet	**62,368**	250513-7	Point source

[4] < LOD is < 21 OU, the lowest detectable odour concentration that can be determined with 95% statistical confidence.

Odour Character (Watercare Services Ltd method EM02.159, section 4.6):

Laboratory Reference	Description of Odour
250513-2	Light – Chemical/Vegetation
250513-3	Light – Chemical/Vegetation
250513-6	Strong – Sewage
250513-7	Strong – Sewage

Comments:

1. A minimum of four panellists were presented with three runs.
2. For description of odour, the original sample was presented to the panellists.
3. Process conditions were normal during sampling.
4. Pre-dilution was not required prior to analysis.
5. All samples were collected by Watercare Laboratory Services.

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Appendix E. Dam Certificate

Rosedale Oxidation Pond – Annual Reservoir Monitoring Report

Background

This document is a summary of reservoir level monitoring of the Rosedale oxidation pond (also known as "Pond 1") for 1 July 2024 to 30 June 2025 inclusive. The purpose of this report is to satisfy Condition 10 of Discharge Permit 38973 (Auckland Council reference DIS80298643-A; "the Consent").

Data for this report comes from a level logger at the Pond 1 pump station. Condition 8 of the Consent requires Watercare to measure levels using a meter that can record data at least once every 15 minutes.

Meter Details

The meter is capable of reading changes at less than 15-minute frequencies, and therefore meets condition 8 of the Consent. The accuracy of the meter is 1-2 mm, within the 3 mm threshold specified in condition 9.

Condition 9 of the Consent also requires the data record to be at least 98 % intact. In 2023-2024, greater than 99 % of the data were valid in Watercare's data historian (Pi).

Monitoring Results

Table 1 presents summary statistics. Median and quartile pond levels in 2024-2025 are slightly lower, showing a minor (< 1%) downward shift of approximately 0.08 m for the mean. This is not a significant change, and pond levels are otherwise consistent with levels in previous years. Figure 1 shows monitoring results for 2024-2025 in context with previous years.

Table 1: Summary statistics for Rosedale oxidation pond levels.

Statistic	2022-2024	2024-2025
Median	37.56	37.48
25%ile (lower quartile)	37.53	37.44
75%ile (upper quartile)	37.68	37.53

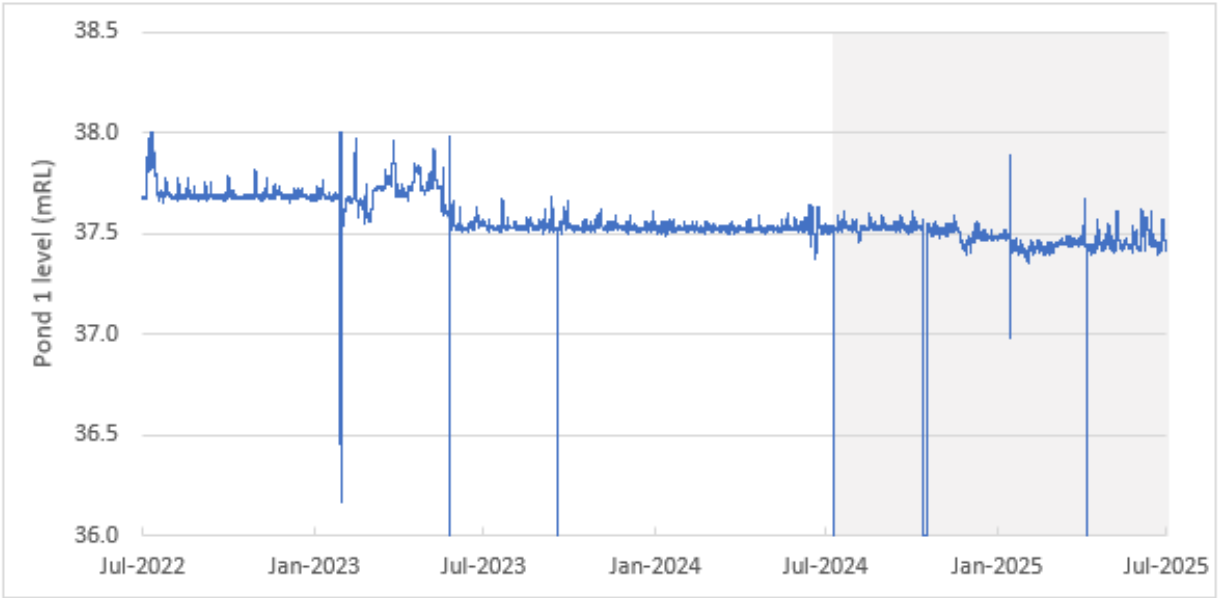

Figure 1: Rosedale oxidation pond levels 2022-2025; note 2024-2025 data is shown in the shaded area.

23 September 2025

Shreesh Basnyat
Dam Safety Manager
Watercare Services Limited
73 Remuera Road
Remuera
Auckland 1050

Dear Shreesh,

2025 Annual Dam Safety Compliance Certificate for Ardmore, Cosseys, Wairoa, Rosedale, Hays Creek, Mangakura No.1 and Mangakura No.3 dams.

Purpose

This letter forms the annual dam compliance certificate for Watercare's dam Resource Consent requirements (Appendix A) as per the brief (Appendix B). This letter covers the following dam sites, henceforth referred to as the dams:

- Ardmore Attenuation Dams
- Cosseys
- Wairoa
- Rosedale
- Hays Creek
- Mangakura Dam No.1 and Dam No.3

This assessment is based on evidence of the respective 2025 Intermediate Dam Safety Reviews and dam safety surveillance information to 17 September 2025[1], and a sighting of the Emergency Preparedness Plan Section A, Section B for Ardmore Attenuation Dams and the Procedure Manual for Wairoa Dam as example documents. The EPP Section A was updated in August 2025. We maintain a high-level overview of Watercare's Dam Safety Management System. The Dam Safety Assurance Programmes for Cosseys, Wairoa, Rosedale and Hays Creek Dams were certified by a DSI Recognised Engineer in accordance with the Building (Dam Safety) Regulations 2022 in June and July 2025.

Dam Safety Management System

Watercare's Dam Safety Management System for the dams is documented in:

- The Dam Safety Management Systems standard operating procedure.
- The scope of services for dam safety assurance (Surveillance and Intermediate Dam Safety Reviews).
- Procedures Manuals detailing operations, maintenance and surveillance requirements.
- Emergency Preparedness Plans – generic to all Watercare dams with site-specific appendices.

These measures are consistent with the NZ Dam Safety Guidelines (NZSOLD 2024) and are appropriate to the respective dam Potential Impact Classifications (PIC).

[1] The Mangakura Dam No. 1 and Dam No. 3, Ardmore Attenuation Dams and Hays Creek Dam IDSR reports were in progress at the time of writing this letter.

Potential Impact Classifications

Potential Impact Classifications (PIC) of the dams are in the table below.

Dam	PIC	Reference for latest PIC assessment or comment (e.g. CDSR)
Ardmore Attenuation Dams	Medium	Ardmore Dams – Dam-Break Flood Hazard Assessment and Potential Impact Classification, Damwatch Engineering. 2024
Cosseys	High	Potential Impact Classification of 13 Watercare Dams. Damwatch, July 2024.
Mangakura No.1 Dam	Low	Potential Impact Classification of 13 Watercare Dams. Damwatch, July 2024.
Mangakura No.3 Dam	Low	Potential Impact Classification of 13 Watercare Dams. Damwatch, July 2024.
Wairoa	High	Potential Impact Classification of 13 Watercare Dams. Damwatch, July 2024.
Rosedale	High	Potential Impact Classification Assessment, Watercare Northern Auckland Wastewater Dams, Rileys, July 2024.
Hays Creek	High	Potential Impact Classification of 13 Watercare Dams. Damwatch, July 2024.

Routine Surveillance

Cosseys, Wairoa, Rosedale and Mangakura No.3 dams continue to be monitored under a routine surveillance programme.

Enhanced Surveillance

The following dams are currently under enhanced surveillance.

Hays Creek Dam

Hays Creek Dam is under enhanced surveillance due to a potential dam safety deficiency arising from uncertainty surrounding piezometric levels and material properties of the downstream shoulder[2]. Watercare have acted on several risk reductions and also planned further action for future financial years, including:

- A new weir was installed to improve observation and measurement of chimney drain seepage. The new weir replaced an existing weir that was susceptible to flooding and stormwater flow. The new weir has been observed to be susceptible to sedimentation since installation and investigations have been undertaken. Through investigations it has been found that the likely source of sediment is from backflowing water during storm events and/or sediment emerging from upstream joints. Watercare investigations are ongoing with a current focus to confirm the source of the sediment in a period of sustained drier weather, followed by appropriate remediation works.
- A stability assessment has been planned for FY2027, or once a site-specific seismic study has been completed.

Ardmore Dams No. 1 and 2

Ardmore Dams No. 1 and 2 were placed under enhanced surveillance in 2005 because seepages from unknown sources were identified at both dams.

[2] Hays Creek Dam Comprehensive Dam Safety Review, Pickford Consulting Ltd & Hydropower Engineering Ltd, March 2018

In April 2016 the surveillance was revised from daily to twice weekly following a surveillance frequency review. The surveillance level remains enhanced as a potential dam safety deficiency still exists (risk of internal erosion) as confirmed by the 2019 Comprehensive Dam Safety Review[3] and supported by the 2023 Comprehensive Dam Safety Review[4].

In January 2025 the surveillance frequency was increased from twice weekly to daily following the observation of a wet spot at the toe of Dam No. 1. A filter blanket with drain was constructed over the wet area beginning on 24 January and additional gravel placed over a further wet area on 19 February. There have been no significant adverse trends or anomalies in instrument data. Enhanced surveillance reduced from daily to three-weekly in June 2025 following 4 months with no other abnormal observations. Watercare have initiated investigations to better understand the mechanism for the seepage, with remedial works subsequently proposed as appropriate.

Mangakura No. 1 Dam

Enhanced surveillance of Mangakura No.1 Dam is undertaken because there are potential dam safety deficiencies relating to cracking at the crest, upper embankment stability, effective length of the spillway crest, potential spillway leakage, identification of voids beneath the spillway invert and overtopping the spillway chute. Enhanced surveillance was moved from daily to twice daily in January 2024 following the commencement of the upgrade works. The upgrade works were completed in September 2024 and addressed the potential dam safety deficiencies relating to cracking at the crest and upper embankment stability. Enhanced surveillance moved to a daily frequency in June 2024 and then to weekly in December 2024.

Review Criteria

This certificate uses the NZ Dam Safety Guidelines (NZSOLD 2024) as the basis for its review of Watercare's Dam Safety Management System.

Review of Operation, Maintenance and Monitoring with Respect to Dam Safety

On the basis of the 2025 Intermediate Dam Safety Reviews' performance evaluations and our familiarity with the dams, we assess that the dams are operated, maintained and monitored to ensure that they are structurally sound and do not pose unacceptable risks to life, property or the natural environment. They are operating within acceptable dam safety limits in accordance with NZ Dam Safety Guidelines (NZSOLD 2024).

Certification

We confirm in this letter, for the dams listed, that Watercare's dam safety and surveillance measures meet the relevant Resource Consent requirements (Appendix A).

Yours sincerely,

Katy Cottingham

Katy Cottingham
Principal Dam Safety Engineer

[3] Ardmore Dams 2019 Comprehensive Dam Safety Review, Damwatch Engineering Limited, May 2019
[4] Ardmore Dams Comprehensive Dam Safety Review 2023, Stantec, July 2024

Appendix A: Watercare Dam Resource Consent Conditions relevant to this Certificate

12(i) The dams and associated structures shall be operated, maintained and monitored to ensure that they are structurally sound, pose no undue risk to life, property or the natural environment and are able to perform satisfactorily to their approved design standard.

12(ii) The Mangakura No. 1 dam, spillway, and associated structures shall be inspected quarterly and during and after extreme weather events.

12(iii) The dam, spillway, and associated structures shall be inspected annually by an appropriately qualified and experienced engineering professional to check the structural integrity and functioning of the dam and associated structures, and to advise on any upgrade or maintenance works that are required.

12(iv) Dam safety and surveillance measures (the measures) shall be identified and documented in accordance with the publication “New Zealand Dam Safety Guidelines” (New Zealand Society of Large Dams) to ensure the dam is able to perform satisfactorily and in accordance with the NZSOLD guidelines. These measures shall be appropriate for the dam’s Potential Impact Classification.

12(v) The documented measures required by condition (iv) shall be updated without delay to incorporate any required remedial measures or additional actions identified by the Dam Safety Assurance Programme or Annual Dam Compliance Certificate.

12(vi) The updated measures required by condition (iv) and (v) shall be implemented thereafter.

12(vii) State whether there are any non-compliances with these conditions, specifying whether any of the non-compliance items are a dam safety deficiency and identify any changes (with timescales for implementation) to measures necessary to address any non-compliance.

Appendix B: Watercare's Brief

Summary

An annual dam safety compliance certificate for part of Watercare's dam inventory is required in order to meet Watercare's dam safety consent compliance.

Background

Those dams covered by this compliance certificate comprise:

- Ardmore Attenuation Dams,
- Cosseys,
- Wairoa,
- Rosedale,
- Hays Creek, and
- Mangakura dams No's 1 and 3

Watercare's dam safety and surveillance measures for each dam are documented in:

- The Dam Safety Management Systems standard operating procedure;
- The scope of services for dam safety assurance (surveillance and Intermediate dam safety reviews);
- Procedures manuals detailing operations, maintenance and surveillance requirements; and
- Emergency preparedness plans – generic to all Watercare dams with site-specific appendices.

Appendix F. Compliance Assessment

Appendix D-1 Assessment of Compliance with Consent Conditions Rosedale WWTP Discharge to Water – Hauraki Gulf of Mairangi Bay (#23799)

Condition Number	Consent Conditions Rosedale WWTP Discharge to Water – Hauraki Gulf of Mairangi Bay (#23799)	Compliance Rating	Comment
01	ARC agents may access the property at reasonable times to carry out inspections, surveys, tests, or measurements, or to take samples.	1	
02	That the Consent Holder shall, as far as practicable, install and operate the works and associated processes in accordance with the documentation submitted to the ARC as part of application number 23799. 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	
03	As allowed for under section 127 (1)(a) of the Resource Management Act 1991, the Consent Holder may apply for a change or cancellation of any condition of this consent other than the duration of consent, in October 2002 and every year thereafter, for the following purposes: a) to modify any monitoring requirement; and/or b) to change any date given in the consent (other than the duration of the consent).	1	
04	The maximum discharge rate of treated effluent shall be 6m3/s.	1	
05	The quality of the effluent to be discharged shall be equal to or better than the following parameter concentrations before discharge: Total BOD5 (gO/m3) - median 20, over 1 year no more than 16 exceedances above 20; non-filterable residue (g/m3) - median 35, 95th percentile 75, for any three month period, no more than 23 exceedances above 35 and no more than 4 exceedances above 75; total nitrogen (gN/m3) - from 1 July 2001, median 30, over one year no more than 8 exceedances above 30; ammoniacal nitrogen (gN/m3) - median 10, over 1 year no more than 8 exceedances above 10; DRP (gP/m3) - median 10, over 1 year no more than 8 exceedances above 10; faecal coliforms (cfu/100mL) - median 1,000, 95th percentile 10,000, for any 3 month period no more than 23 exceedances above 1,000 and no more than 4 exceedances above 10,000; enterococci (cfu/100mL) - median 100, 95th percentile 1,000, for any 3 month period no more than 23 exceedances above 100 and no more than 4 exceedances above 1,000.	1	

Condition Number	Consent Conditions Rosedale WWTP Discharge to Water – Hauraki Gulf of Mairangi Bay (#23799)	Compliance Rating	Comment
06	The above parameters, and any others, are to be monitored, analysed and reported generally in accordance with Technical Report 33 submitted in support of this application. The Monitoring Management Plan required by consent 23798 shall be reviewed prior to exercising this consent, and shall be approved by the Manager within 3 months of the exercising of the consent. The Consent Holder shall comply with the Plan which shall stipulate the precise technical details of monitoring programmes required for the compliance with the conditions of this consent, in particular: a) effluent monitoring requirements; b) specific monitoring locations; c) parameters to be monitored; d) methods and frequency of monitoring; e) "Alert" and "Response" trigger levels defining further contingency actions by the Consent Holder.	1	
07	The Consent Holder shall, to the satisfaction of the Manager, record and report the frequency and duration of plant bypass flows and shall analyse for all parameters and by the methods listed in the Monitoring Management Plan, with the exception of trace metals, persistent organic compounds, each time such a discharge occurs. The Consent Holder shall inform the Manager within 24 hours of use of the by-pass system, and report monitoring data to the Manager within 3 weeks.	1	
08	A zone of non-compliance shall exist within a radius of 150 m of the diffuser ports within which exceedances of water quality parameters for contact recreation (median and alert level 2, MFE 1999) shall be confined. The zone of non-compliance may be reviewed by the Manager, in consultation with the Consent Holder, in the Monitoring Management Plan.	1	
09	The Consent Holder shall, at the least, monitor the receiving environment generally as specified in Technical Report 34 submitted in support of this application. The environmental monitoring, as part of the Monitoring Management Plan is to be approved by the Manager within 6 months of the exercising of this consent. The Consent Holder shall complete and comply with the Monitoring Management Plan which shall stipulate the precise technical details of monitoring programmes required for the compliance with the conditions of this consent, in particular: a) environment monitoring requirements; b) specific monitoring locations; c) parameters to be monitored; d) methods and frequency of monitoring; e) "Alert" and "Response" trigger levels defining further actions by the Consent Holder.	1	

Condition Number	Consent Conditions Rosedale WWTP Discharge to Water – Hauraki Gulf of Mairangi Bay (#23799)	Compliance Rating	Comment
10	Signage shall be erected if considered necessary by the Manager following consultation with the Medical Officer of Health to warn of public health concerns regarding shellfish gathering from occasional or regular effects from the exercise of this consent, within 3 months of the exercise of this consent. The signage wording and location shall be to the satisfaction of the Manager, in consultation with the Medical Officer of Health. A review of the wording, placement of and need for, the signage may be instigated from time to time, by the Manager, in consultation with the Medical Officer of Health and the Consent Holder.	1	
11	The Consent Holder shall provide a detailed health risk assessment of the effects of the outfall, to the satisfaction of the Manager, two years after the exercise of this consent and every five years thereafter. The purpose of the assessment shall be to provide information of the microbiological impacts of the discharge under all flow conditions and include monitoring data from actual discharges at time of high flows.	1	Completed in 2025. Next due 2030.
12	In addition to condition 17, the Consent Holder shall review the treatment plant discharges of contaminants to water with the Manager in 2020. In order to determine if the discharges from the plant and treatment processes remain the best practicable option the review shall commence no later than 1 February 2020 and shall include: a) a health risk assessment of the potential adverse effects of the outfall discharge. The health risk assessment shall consider all flow and discharge data and environmental conditions and any other relevant matters; b) an assessment of alternative disposal options, including disposal to land; and c) the outcomes of public consultation and consultation with Tangata Whenua relating to the discharge of contaminants to water from the outfall. The Consent Holder may be required by the Manager to submit an updated assessment of effects and may be required to provide further information to the Manager in order for the Manager to determine, or recommend to the Minister of Conservation, whether the proposal is currently the best practicable option, or whether the conditions of consent 23799 should be amended in accordance with condition 17(d). This review shall be completed as soon as practicable and in any event no later than 31 December 2022. See consent condition for further detail.	1	
13	The Consent Holder shall provide written notice no less than two weeks (and preferably longer) previous to any programmed unavailability of the Mairangi Bay outfall to the Manager and the Medical Officer of Health.	1	

Condition Number	Consent Conditions Rosedale WWTP Discharge to Water – Hauraki Gulf of Mairangi Bay (#23799)	Compliance Rating	Comment
14	The treatment plant shall be optimised to avoid, as far as practicable, any untreated effluent from entering the ponds. Except in circumstances beyond the reasonable control of the Consent Holder wastewater flows shall not enter the ponds without prior treatment process. When faecal coliform and enterococci levels set out in condition 6 are not achieved through the main treatment process or peak flow treatment and naturally in the ponds, artificial disinfection shall be used to ensure the levels are met. If any test for enterococci or faecal coliforms exceeds the 95 percentile level, it shall be repeated within 24 hours and artificial disinfection shall be used at up to its maximum design capacity so that the level reduces to below the median level at the earliest practicable opportunity.	1	
15	The Consent Holder shall review the current Trade Waste Programme upon the exercise of this consent, and at five yearly intervals in consultation with the ARC and any other reasonably affected parties the consent holder identifies through that review process. The review shall include, amongst other matters, a risk assessment regarding contaminants of relevance to sustainable biosolids reuse.	1	Next due 2027.
16	The Consent Holder shall investigate and report on alternative disposal options and beneficial reuse trials in consultation with the ARC, Tangata Whenua and the community. The report shall include results of irrigation trials at the treatment plant site, results of any other irrigation trials, results and progress of reuse of treated effluent and other matters the Consent Holder considers practicable or appropriate. The report shall be submitted, to the satisfaction of the Manager, 6 months after the exercise of this consent and shall be resubmitted at five yearly intervals thereafter.	1	Next due 2027.
17	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, on 31 December 2012 and every three years thereafter in order to: a) Deal with any significant adverse effect on the environment arising from the exercise of the consent and which is appropriate to deal with at the time of the review; or b) Alter the monitoring requirements, including requiring further monitoring, or increasing or reducing the frequency of monitoring; or c) Implement the rules of any relevant regional plan that is proposed or becomes operative; or d) Require the Consent Holder to adopt the best practicable option to prevent or minimise any adverse effect of any discharge on the environment that may arise from the exercise of this consent, including to take into account any recommendations of the Manager or the Minister of Conservation arising from the review required by condition 12.	1	

Appendix D-2 Assessment of Compliance with Consent Conditions Rosedale WWTP Discharge to Air – Rosedale Road, Albany (#30249)

Condition Number	Consent Conditions Rosedale WWTP Discharge to Air – Rosedale Road, Albany (#30249)	Compliance Rating	Comment
01	ARC agents may access the property at reasonable times to carry out inspections, surveys, tests, or measurements, or to take samples.	1	
02	That the Consent Holder shall, as far as practicable, install and operate the plant and associated processes in accordance with the documentation submitted to the ARC in support of application numbers 23792 and 30249. 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	
03	As allowed for under section 127 (1)(a) of the Resource Management Act 1991, the Consent Holder may apply for a change or cancellation of any condition of this consent other than the duration of consent, in October 2002 and every year thereafter, for the following purposes: a) To modify any monitoring requirement; and/or b) To change any date given in the consent (other than the duration of consent); and/or c) To increase the processing capacity of the plant or to add additional major plant beyond that shown in Drawing X.	1	
04	That the Consent Holder shall maintain an Air Quality Operations and Monitoring Management Plan which accurately records all monitoring, management and operational procedures, methodologies and contingency plans necessary to comply with the conditions of this consent. The Management Plan shall set out a programme for controlling minor odour sources on site within four years of the commencement of the consent. All subsequent substantial changes shall be submitted to the Manager for review prior to becoming operational. The Manager will advise the Consent Holder in writing if any aspects of the Plan are considered to be inconsistent with achieving the provisions of this consent.	1	
05	The Consent Holder shall retain at its cost an independent Peer Review Panel, suitably qualified and knowledgeable in odour assessment and control and wastewater treatment development and operational procedures. The composition of the panel shall be subject to the written approval of the Manager. The Peer Review Panel will be briefed by and report to the Manager and will have no approval rights. The objective of the Peer Review Panel is to review and advise whether all engineering works, operations and related activities associated with the wastewater treatment plant are designed and maintained in accordance with good odour minimisation and control techniques and good engineering practice and whether the plant is operated and managed in accordance with accepted best, practice and in accordance with the intent of the consent conditions.	1	

Condition Number	Consent Conditions Rosedale WWTP Discharge to Air – Rosedale Road, Albany (#30249)	Compliance Rating	Comment
06	The primary function of the Peer Review Panel is to advise the Manager whether the following matters are sufficiently addressed to ensure that the conditions relating to the design, construction and operations are met. These matters are: a) Process design of the wastewater treatment system; b) Odour control; c) Peak flow management and treatment; and d) Contingency Plans.	1	
07	The Consent Holder shall provide the Peer Review Panel with all records, plans, designs and other information that the Peer Review Panel requires to be able to undertake the peer review.	1	
08	Apart from other activities undertaken by the Peer Review Panel, it shall undertake six monthly reviews of treatment plant operations for the first four years of the consent duration and annually thereafter.	1	
09	The Peer Review Panel may, with the written approval of the Manager, seek specialist advice from others on matters panel members are not able to address because these matters are outside their areas of expertise.	1	
10	The Consent Holder shall ensure that record of any investigations and/or test results associated with this consent are kept and that these are forwarded to the Peer Review Panel.	1	
11	Prior to commencing the construction of any works associated with odour control the Consent Holder shall submit all relevant final design calculations, drawings and operational procedures for review by the Peer Review Panel. The Peer Review Panel shall report any findings and recommendations to the Manager.	1	
12	The Consent Holder shall comply with any changes required by the Manager, in design and/or construction and/or operational techniques which may be required at any time based on advice by the Peer Review Panel, if in the Manager's opinion this is necessary to achieve the satisfactory operation of the site and compliance with the conditions of consent.	1	
13	The Consent Holder shall consult with representatives of the local community, including but not limited to, a representative of: a) The local community, including any appropriate local community groups; and b) Users of Rosedale Park; to facilitate the establishment and maintenance of a Treatment Plant Community Liaison Group (TPCLG). The TPCLG should comprise of: no fewer than 5 representatives from those given above, of whom one should ideally be a representative nominated by Tangata Whenua and three should have a clear association with the area in the general vicinity of the treatment plant; and two of the Consent Holder's senior officers to represent it.	1	

Condition Number	Consent Conditions Rosedale WWTP Discharge to Air – Rosedale Road, Albany (#30249)	Compliance Rating	Comment
14	The role of the TPCLG is to provide a forum: a) To facilitate communication and dialogue between the Consent Holder, the ARC, and the community; and b) To facilitate communication and dialogue between the Consent Holder and the local community on effects on the community arising from treatment plant operations, in particular matters relating to odour.	1	
15	The Consent Holder shall use its best endeavours to ensure that formal meetings of the TPCLG are held at least every twelve months. The Consent Holder shall provide an appropriate venue for the meetings of the TPCLG. In addition, extraordinary meetings may be called as circumstances warrant. The Consent Holder shall inform all relevant parties and ARC of any meeting of the TPCLG a minimum of 10 working days in advance of that meeting.	1	
16	The Consent Holder shall ensure that the minutes of the TPCLG meeting are forwarded to all relevant parties within two weeks of the meeting being held.	1	
17	The Consent Holder shall assist the TPCLG to fulfil its purpose including by the: a) Provision of information about any treatment plant odours, concerns and complaints of the local community, aspects of non-compliance and remedial actions or proposals; and b) Dissemination of information about the treatment plant and about any future proposals for the plant.	1	
18	That the 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	
19	That beyond the boundary of the site there shall be no particulate (including dust, aerosol or fume) caused by discharges from the site which, in the opinion of an enforcement officer, is noxious, offensive of objectionable.	1	
20	That beyond the area designated as the "Odour Buffer Zone", there shall be no odour caused by discharges from the site including the treatment plant and associated ponds which, in the opinion of an enforcement officer, is noxious, offensive or objectionable.	1	
21	That the Consent Holder shall at all times operate, maintain, supervise, monitor and control all operations and activities associated with the oxidation ponds to ensure that discharges of odour from the ponds are maintained at the minimum practicable level.	1	
22	That 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, offensive or objectionable.	1	

Condition Number	Consent Conditions Rosedale WWTP Discharge to Air – Rosedale Road, Albany (#30249)	Compliance Rating	Comment
23	That 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 likely to be detrimental to human health or the environment.	1	Discussion with Peer Review Panel determined any effects of unburnt gas incidents would be minor.
24	That the 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 any regional rule or regulations under the Resource Management Act 1991. Furthermore, all plant shall be designed, constructed, and operated so as to ensure that discharges of contaminants to air, in particular odour, are kept to a practicable minimum.	1	
25	That 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 maintained at the minimum practicable level. Without prejudice to 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	
26	That no part of the process shall be operated without the associated emissions control equipment being fully operational and functioning correctly.	1	
27	That all ducting and emissions control equipment shall be maintained in good condition and as far as practicable be free from leaks in order to prevent the escape of fugitive emissions.	1	
28	That 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	
29	That any flares on site shall be operated in such a manner as to prevent visible emissions and to have a flame present at all times the flare is in operation. The pilot flame and flame ionisation detector shall be maintained and operated in accordance with best practice.	2	Four incidents relating to a release of unburnt biogas following issues with the flare. The PRP agreed any effects would be minor.
30	That all sludge digesters shall be sealed to prevent, as far as practicable, fugitive discharges to atmosphere and any contaminated or odorous gases not used to generate electricity or burned in a flare shall be extracted to a biofilter prior to discharging to atmosphere.	1	

Condition Number	Consent Conditions Rosedale WWTP Discharge to Air – Rosedale Road, Albany (#30249)	Compliance Rating	Comment
31	That only aged biosolids and pond sludge shall be disposed of on site. All biosolids generated within the sludge dewatering/biosolids building (new biosolids) shall be disposed of off site to an appropriately authorised facility. Furthermore, composting of new biosolids or any other treatment of new biosolids on site (except preconditioning or dewatering) is not permitted under this consent.	1	
32	That no solid or liquid waste materials shall be disposed of on the site by open burning.	1	
33	That any peak flow storage tanks storing effluent that is not at least secondary treated shall be covered and odorous gases extracted to a biofilter prior to discharge to atmosphere.	1	
34	That any peak flow treatment system shall be operated so as to ensure that discharges of contaminants to air, in particular odour, are kept to a practicable minimum. Any contaminated, odorous gases shall be extracted to a biofilter prior to discharge to atmosphere.	1	
35	That the activated sludge reactors and secondary clarifiers shall be operated and managed so as to ensure that discharges of contaminants to air, in particular odour, from these sources are kept to a practicable minimum.	1	
36	That all loading of biosolids onto trucks shall occur within the biosolids building.	1	
37	That all odorous air from the biosolids building shall be collected and treated in a scrubber and/or biofilter prior to discharging to atmosphere. The method of treatment shall be designed to achieve at least 95% odour removal efficiency. If a scrubber is utilised it shall be operated and maintained to comply with the following criteria: a) The most appropriate liquor shall be selected for the nature and concentration of the contaminants present in the waste gas stream; and b) The liquor shall be maintained in such a manner so as to achieve effective and efficient removal of the contaminants present in the waste stream.	1	
38	That, unless agreed otherwise in writing by the Manager, all biofilters shall be designed, operated and maintained to comply with the following criteria: a) The filter media shall be no less than 1 metre in depth; b) The inlet temperature of any gases entering the bed shall not exceed 35"C; c) The maximum ratio of gas volume to bed cross sectorial area shall not exceed 50m 3/M2/hr; d) The bed moisture content shall be maintained at a level which ensures that there is no breakthrough or bypassing of untreated or partially treated air; e) The distribution system shall ensure even dispersal of gases throughout the filter bed; f) The sides of the filter bed shall ensure there is no breakthrough of untreated air; and g) The beds shall be capable of running with part of the bed isolated from the incoming gas flow for maintenance purposes.	1	

Condition Number	Consent Conditions Rosedale WWTP Discharge to Air – Rosedale Road, Albany (#30249)	Compliance Rating	Comment
39	That the Consent Holder shall undertake a community based odour survey within three months of the commencement of the consent and every two years thereafter for the term of the consent for the purpose of assessing the effectiveness of odour control at the plant and the levels of off-site odour. The survey shall be undertaken to the satisfaction of the Manager and shall be carried out in accordance with procedures set out in the Air Quality Operations and Monitoring Management Plan.	1	
40	The results of the survey including a discussion as to the implication of these results shall be provided to the Manager within 2 months of the survey being undertaken.	1	
41	That the Consent Holder shall undertake monitoring of odour discharge rates every six months until 1 April 2005 and thereafter every 12 months for the term of the consent. The monitoring shall take place during the summer on: a) All biofilters, unless the Manager agrees otherwise in writing; b) The exit point of any other air pollution control equipment; c) At least one chemically assisted sedimentation tank (if operational and uncovered at the time of testing); d) One representative activated sludge reactor tank; and; e) One representative activated sludge clarifier.	1	Most recently completed in May 2025 for monitoring undertaken Jan – March 25. Report attached as Appendix F.
42	That, if the Manager has reason to believe that sources other than those in Condition 41 above are sources of significant odour, the Manager may, in writing, require odour emission rates to be determined for that source.	1	
43	The monitoring shall be carried out in accordance with the procedures set out in the Air Quality Operations and Monitoring Management Plan. The monitoring shall be by Dynamic Dilution Olfactometry and shall include sufficient samples to fully quantify odour discharge rates from each source.	1	
44	That, if the results of odour emission monitoring specified in Conditions 41 and 42 show that the odour emission rates from a source or sources are significantly greater than those used in the atmospheric dispersion modelling supporting the application for this consent (in particular the activated sludge reactors or the activated sludge clarifiers) further atmospheric dispersion modelling may be required by the Manager to better evaluate the actual or potential effects of these emissions. This modelling shall be carried out by the Consent Holder to the satisfaction of the Manager and the results provided to the Manager within 20 working days of receipt of written notification from the Manager. Note: If the results of the monitoring and any modelling specified above demonstrate significant differences with the information presented with the consent application the Manager may review the provisions of the consent in accordance with Section 128(1)(c) of the Resource Management Act 1991.	1	

Condition Number	Consent Conditions Rosedale WWTP Discharge to Air – Rosedale Road, Albany (#30249)	Compliance Rating	Comment
45	That the Consent Holder shall undertake a walkover inspection of the treatment plant and surrounding neighbourhood no less frequently than weekly until 30 June 2005 and fortnightly thereafter until at least 31 December 2005. Monthly walkover inspections may proceed from 1 January 2006 subject to review and approval by the Peer Review Panel and the Manager. Any evidence of actual odour shall be recorded and investigated. Where necessary remedial action shall be undertaken as soon as practicable. The procedures for the walkover, recording of the results and remedial actions shall be detailed in the Air Quality Operations and Monitoring Management Plan.	1	
46	That in the event that regular or frequent complaints regarding dust from the site are received and validated by an enforcement officer, the Consent Holder shall undertake monitoring of total suspended particulate (TSP) to the satisfaction of the Manager.	1	
47	That all monitoring and testing shall be carried out to the satisfaction of the Manager.	1	
48	That the results of all tests, relevant operating parameters, raw data, all calculations, assumptions and an interpretation of the results (including a comparison with previous monitoring) shall be submitted to the Manager within 20 working days of the samples being taken.	1	
49	That on site weather conditions shall be continuously measured and recorded. The parameters measured shall include: a) Wind velocity and direction; b) Rainfall; and c) Temperature.	1	
50	That 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 24 months from the date of each entry.	1	
51	That the 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 has resulted or may result in adverse effects on the environment. In the event of an incident occurring the Consent Holder shall provide a written report to the Manager within 10 days of the occurrence. The report shall give reasons for the incident, mitigation measures taken and any measures taken to prevent its reoccurrence.	1	
52	That the Consent Holder shall log all air quality complaints received. The complaint details shall include: a) The date, time, position and nature of the complaint; b) The name, phone number and address of the complainant, unless the complainant refuses to supply these details: and c) Any remedial actions undertaken.	1	
53	Details of any complaints received shall be provided to the Manager as soon as practicable and at least within 24 hours of receipt of the complaint/s.	1	

Condition Number	Consent Conditions Rosedale WWTP Discharge to Air – Rosedale Road, Albany (#30249)	Compliance Rating	Comment
54	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, in June 2002 and every 2 years thereafter, for the purpose of anything listed in (a) to (j) of the consent condition.	1	