TO:	[redacted]	Date:	12 February 2025
COPY TO:		Document No:	10122-004-3
FROM:			

DELMORE PROPOSED WWTP DISCHARGE: IMPACT ON WATER QUALITY

Background

Vineway Limited (Vineway) is proposing to develop approximately 109 ha of land in six contiguous lots at 88, 130 and 132 Upper Ōrewa Road and 53A, 53B and 55 Russell Road ('the Delmore development'). If connecting to the Watercare wastewater network is not feasible for one or both of the primary development stages, Vineway intends to construct a private, on-site wastewater treatment plant (WWTP) at 55 Russell Road ('the site'; Figure 1), to accommodate the domestic effluent generated by the development. Treated wastewater will be disposed to land via an an infiltration bed and an irrigation system, where it can be absorbed by the land and vegetation. However, there is a risk effluent will find its way into an unnamed tributary of the Ōrewa River that runs through the proposed Delmore development.

Vineway engaged Viridis Limited (Viridis) to investigate the potential environmental effects of discharges from the WWTP to the unnamed stream during Stage 1 of the development. The stream, which was sampled on 31 December 2024 and 28 January 2025, may receive varying volumes of treated discharge, depending on weather and seasonal conditions. Apex (2025) identified three typical scenarios for discharges from the WWTP (representative of summer, average and winter conditions). Each of these scenarios has been modelled to determine the level of effect on the stream.

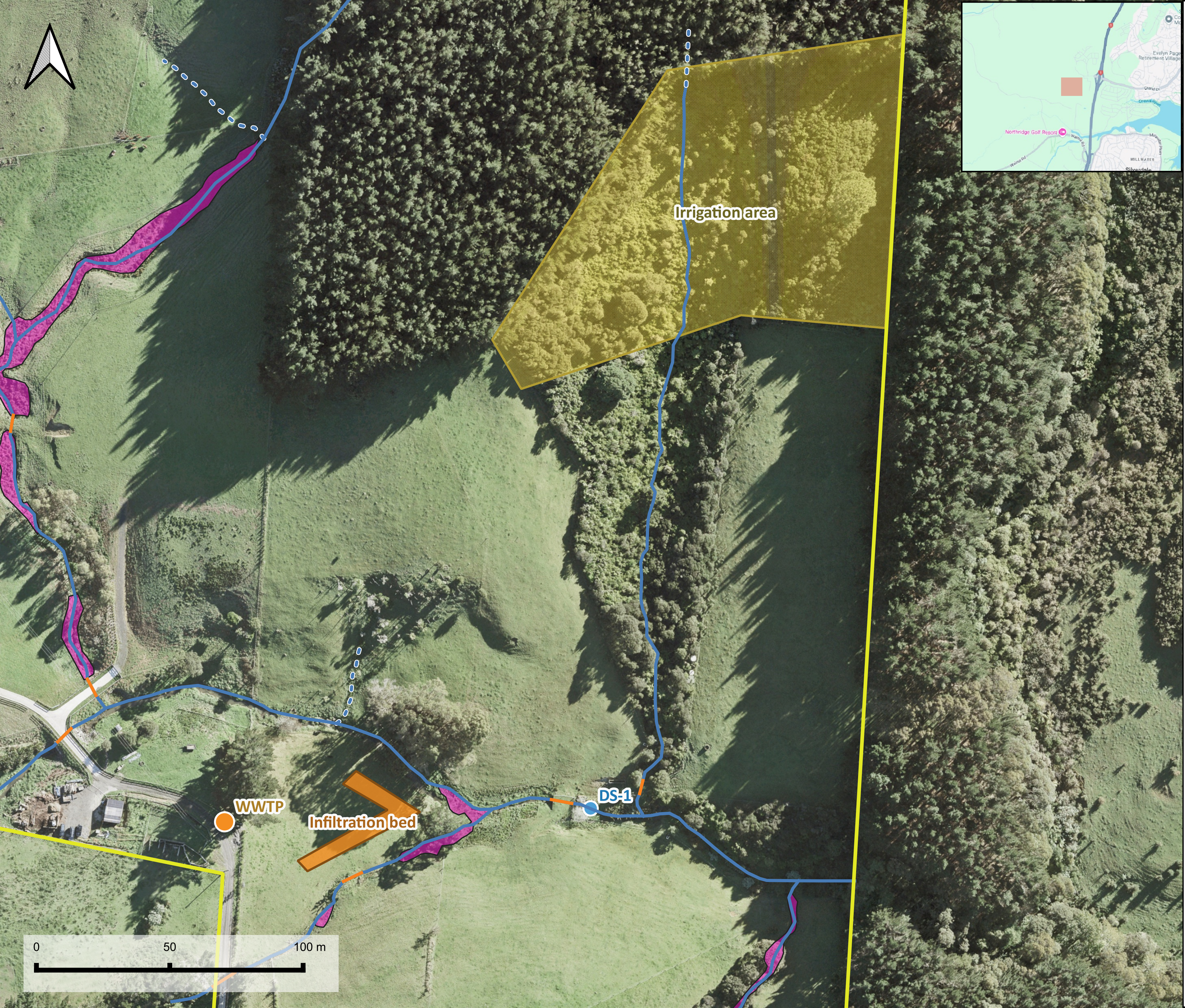
Modelling Assumptions and Methodology

The three discharge scenarios that were modelled are summarised in Table 1, together with the corresponding stream flow conditions. Discharge flow estimates were provided by Apex (2025) for Stage 1 of the Delmore development, which accommodates approximately 600 homes. Flows within the stream under each scenario were obtained from NIWA's river flow prediction website (Whitehead & Booker 2020). These flow estimates range from 3.4 L/s (i.e., the 7-day mean annual low flow, MALF) to 81.6 L/s (the FRE3 flow or three times the median flow).

Table 1. The three modelled scenarios and corresponding discharge and river flows.

Scenario	Description	Discharge flows (Stage 1 only)	River	
			Statistic	Flow (L/s)
1	Dry weather low flow discharge	2.3	7-day MALF	3.4
2	Average weather discharge	2.9	Median flow	27.2
3	Peak wet weather discharge	19.7	FRE3	81.6

Notes: FRE3 is three times the median flow.



VIRIDIS
Environmental Consultants

Figure 1. Site Overview

Delmore Development WWTP

Legend

Site boundary

Wastewater details

- WWTP
- Land infiltration bed discharge
- Irrigation disposal area

Freshwater Features

- Ephemeral overland flow paths
- Orewa River tributaries
- Culverts
- Natural wetlands

SOURCES

Auckland Urban Aerial Photos (2017)

DISCLAIMER:
This map/plan is not an engineering draft. This map/plan is illustrative only and all information should be independently verified on site before taking any action.

SCALE **1:1,800** @ A4

PROJECT NO.	10122
DRAWN BY:	A.N
DATE:	12 February 2025

Employing a mass balance approach, the resulting water quality of the unnamed stream in each discharge scenario was estimated with the following equation:

$$Resultant\ WQ = \frac{(Stream\ flow\ \times\ Background\ WQ) + (Discharge\ \ flow\ \times Discharge\ WQ)}{Stream\ flow + Discharge\ flow}$$

The following assumptions and limitations were made:

- The background quality of the stream was based on the average of water quality samples collected at an ultimate downstream site ('DS-2') on 31 December 2024 and 28 January 2025. Analysis reports have been included as Attachment A. Values below detection limits were modelled as half the detection limit, as is standard practise.
- Discharge loads were presumed to be consistent irrespective of discharge scenario and was based on the estimates provided by Apex (2025) for reverse osmosis treatment. Under Scenario 3, peak wet weather flows were modelled as the WWTP discharge diluted by factor of 6.7, with the dilution water assumed to be of a quality equivalent to that of the stream. This assumption reflects typical dilution dynamics and is considered a reasonable approximation based on available data.
- Under each scenario, the following flow distribution was assumed between the infiltration bed and irrigation lines within the site's northern native bush covenant[1] (Figure 1):
    - Scenario 1: 20% of flows directed to the infiltration bed, with the remaining 80% directed elsewhere[2].
    - Scenarios 2 & 3: 95% of flows directed to the infiltration bed, and 5% directed to the on-site irrigation area.

  These flow distributions were informed by the WWTP design (Apex 2025), and the capacity of the stream.
- All water discharged to the infiltration bed was conservatively assumed to eventually reach the stream.
- The irrigation discharge method was assumed to reduce discharge flows by 50%, as a significant portion would be absorbed by vegetation and soils. Various attenuation rates were also applied to the predicted discharge quality parameters, based on estimated soil removal rates (ARC 2003) and findings from irrigation studies (Beggs 2011; Cogger 1987; NZWERF 2004):
    - 90% for total suspended solids (TSS) and *Escherichia coli* (*E. coli*).
    - 80% for carbonaceous five-day biochemical oxygen demand ($cBOD_5$).
    - 60% for total nitrogen and ammoniacal nitrogen.
    - 70% for phosphorus[3].
- The influence of stormwater quality, particularly under Scenario 3 (during peak wet weather), was not considered. Post-development, the influence of urban pollutants may impact the background quality of the receiving environment.

[1] Additional areas of irrigation outside the catchment are currently being explored by Vineway.

[2] Refer to Apex report for more details.

[3] Applied to both total and dissolved reactive phosphorus concentrations.

- The receiving water quality was only modelled for parameters which Apex was able to quantify for the discharge.

Results

The results of modelling are presented in Table 2, alongside the input data for the stream and discharge. Existing stream water quality (at site DS-2) and its projected quality under each scenario were compared against the following guidance:

- National Policy Statement for Freshwater Management (NPS-FM) 2020 Attribute Bands (A to D, with A representing best water quality, and each subsequent band indicating a decline in quality) (MfE 2024).
- Australia and New Zealand Guideline (ANZG 2018) default guideline values (DGVs) for toxicants (at 99% species protection) or physicochemical stressors (based on the 80th percentile of minimally impacted reference site data)[4].
- Ministry for the Environment (MfE 1992) guideline for BOD_5 to limit the growth of sewage fungus.

These values have been included as Attachment B. Cells in Table 2 have been shaded to illustrate which of the NPS-FM Attribute Bands a scenario falls within (defined in the footnote to Table 2). Exceedances of an ANZG DGV (or, in the case of $cBOD_5$, MfE guidance for preventing sewage fungus growth) have been shown in red text, and compliance has been shown in green[5].

Table 2. Input data and results of modelling under each discharge scenario.

Parameter	Baseline stream quality*	Discharge quality	Stream quality after discharge		
			Scenario 1	Scenario 2	Scenario 3
Flow (L/s)	Varies based on scenario (Table 1)		4	30	101
Total suspended solids	3	4	3	3	3
$cBOD_5$	<2	0.5	1	1	1
E. coli (MPN/100 mL) **	435	<4	383	394	420
Ammoniacal nitrogen	<0.01	0.3	0.04	0.03	0.01
Nitrate nitrogen	<0.002	0.5	0.06	0.05	0.02
Total nitrogen	0.30	1	0.38	0.36	0.32
DRP	<0.004	0.07**	0.010	0.008	0.004
Total phosphorus	0.015	0.07**	0.022	0.020	0.017

Notes: Units g/m^3 unless stated; $cBOD_5$ = carbonaceous five-day biochemical demand; DRP = dissolved reactive phosphorus; Attribute A presented in light green, Attribute B presented in blue, Attribute C presented in light orange, Attribute D presented in light red; Exceedances of an ANZG DGV for a physiochemical stressor (or, in the case of BOD, MfE guidance for preventing sewage fungus growth) have been shown in red text, and compliance has been shown in green; *the average result of two sampling events; **compared against NPS-FM excellent, good, fair and poor attribute bands, based on campylobacter infection risk for primary contact sites; **based on the assumption that the majority of TP discharged from the WWTP will be DRP.

[4] Based on the stream's river environment classification (REC) of warm wet, low-elevation (MfE 2010).

[5] While these guidelines can help assess ecological impacts, they are best applied to comprehensive data sets rather than single data points. For example, NPS-FM Attribute Bands for annual medians should be based on the median of multiple data points collected over the course of a year.

Scenario 1

Under Scenario 1, which is representative of summer conditions, the discharge (i.e., 20% of total volume, with 80% directed elsewhere) was projected to increase concentrations of total ammoniacal nitrogen and dissolved reactive phosphorus (DRP) in the tributary, shifting water quality from NPS-FM Attribute Band A to Band B. This shift indicates nutrient levels that may begin to affect the most sensitive aquatic species (MfE 2024). In some situations, this might be of concern, however, macroinvertebrate survey results indicate that in this case the stream's invertebrate community is dominated by taxa tolerant of inorganic pollution and nutrient enrichment (Viridis 2025). All monitored sites had Macroinvertebrate Community Index (MCI-sb) and Quantitative MCI (QMCI-sb) scores within Attribute Band D, below the national bottom line (NBL). Given the existing degraded condition of the macroinvertebrate community, and its being dominated by non-sensitive, pollution-tolerant aquatic species, the predicted increase in ammoniacal nitrogen and DRP is not expected to have a significant ecological impact.

Other key water quality parameters, including total suspended solids (TSS), carbonaceous biological oxygen demand ($cBOD_5$), nitrate nitrogen, total nitrogen, and total phosphorus, remained comparable to baseline conditions. While *E. coli* counts were slightly improved due to dilution from the discharge, they still remained within the NPS-FM 'Poor' quality band.

Scenario 2

Under average conditions, the discharge is predicted to have minimal impact on receiving water quality. Baseline monitoring showed ammoniacal nitrogen and nitrate nitrogen concentrations within Attribute Band A, and this classification remained unchanged post-discharge. However, similar to Scenario 1, DRP concentrations shifted from Attribute Band A to Band B, indicating a level above natural reference conditions (MfE 2024). Despite this shift, no significant adverse effects on the invertebrate community are expected due to the dominance of pollution-tolerant taxa as discussed above.

Total nitrogen concentrations showed a slight increase, but were already above the ANZG DGV during baseline monitoring. As such, this increase is unlikely to cause material harm to aquatic organisms residing in the stream. Other water quality parameters, including TSS and BOD_5, remained stable, and *E. coli* counts continued to fall within the 'Poor' quality band.

Scenario 3

Under peak wet weather conditions (Scenario 3), discharges from the WWTP are expected to have minimal impact on receiving water quality. The primary effect is a slight increase in contaminant concentrations compared to baseline conditions; however, these changes do not result in a shift in Attribute Bands or exceed ANZG DGV. Overall, water quality is expected to remain stable.

Summary

The results of modelling have shown that under summer, typical (median) and peak wet weather flow conditions, the proposed discharge of treated wastewater will avoid significant impact on receiving water quality. The increases in total ammoniacal nitrogen and DRP under Scenarios 1 and 2 are not expected to result in material harm to the stream's aquatic community, as concentrations remain within NPS-FM Attribute Band B and comply with relevant ANZG DGVs. Furthermore, the stream's invertebrate community is dominated by non-sensitive, pollution-tolerant aquatic species. Overall, the proposal was found to provide sufficient protection of the water quality and ecological values of the stream.

Attachments

Attachment A – Analysis Reports

Attachment B – Receiving Water Guidelines

References

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Apex 2025. RE: Delmore: Confirming flows & WQ for updated model. An email from Jack Taylor (Apex Water Limited) to Amanda Naude (Viridis Limited) and Matt Savage (Apex Water Limited), copied to Dr Grant Allen (Viridis Limited). 24 January 2025.

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Whitehead AL, Booker DJ 2020. NZ River Maps: An interactive online tool for mapping predicted freshwater variables across New Zealand. NIWA, Christchurch. https://shiny.niwa.co.nz/nzrivermaps/

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Certificate of Analysis

Client:	Viridis Limited	**Lab No:**	3748012 SPv2
Contact:	Amanda Naude	**Date Received:**	30-Dec-2024
	C/- Viridis Limited	**Date Reported:**	24-Jan-2025 **(Amended)**
	PO Box 301709	**Quote No:**	135466
	Albany	**Order No:**	10122
	Auckland 0752	**Client Reference:**	
		Submitted By:	Dr Grant Allen

Sample Type: Aqueous

Sample Name:		Up-North 30-Dec-2024 2:50 pm	DS-1 30-Dec-2024 3:00 pm	DS-2 30-Dec-2024 3:15 pm
Lab Number:		3748012.1	3748012.2	3748012.3
Individual Tests				
Turbidity	NTU	5.4	4.4	5.0
pH	pH Units	7.2	7.1	7.4
Total Suspended Solids	g/m^3	< 3	< 3	4
Total Nitrogen	g/m^3	0.36	0.33	0.31
Total Kjeldahl Nitrogen (TKN)	g/m^3	0.35	0.32	0.31
Total Phosphorus	g/m^3	0.022	0.021	0.017
Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	$g\ O_2/m^3$	< 2	< 2	< 2
Enterococci	MPN / 100mL	249 #1	411 #1	96 #1
Faecal Coliforms and E. coli profile				
Faecal Coliforms	MPN / 100mL	700 #1	1,100 #1	790 #1
Escherichia coli	MPN / 100mL	490 #1	1,100 #1	790 #1
Nutrient Profile				
Total Ammoniacal-N	g/m^3	< 0.010	< 0.010	< 0.010
Nitrite-N	g/m^3	< 0.002	0.003 #2	< 0.002
Nitrate-N	g/m^3	< 0.002	< 0.002	< 0.002
Nitrate-N + Nitrite-N	g/m^3	0.002	< 0.002	< 0.002
Dissolved Reactive Phosphorus	g/m^3	< 0.004	< 0.004	< 0.004

Analyst's Comments

#1 Please interpret this result with caution as the sample was > 10 °C on receipt at the lab. The sample temperature is recommended by the laboratory's reference methods to be less than 10 °C on receipt at the laboratory (but not frozen). However, it is acknowledged that samples that are transported quickly to the laboratory after sampling, may not have been cooled to this temperature.

#2 It has been noted that the result for Nitrite-N was greater than that for Nitrate-N + Nitrite-N, but within the analytical variation of these methods.

Amended Report: This certificate of analysis replaces report '3748012-SPv1' issued on 07-Jan-2025 at 11:50 am. Reason for amendment: Testing added as requested.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Aqueous

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter.	-	1-3

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Turbidity	Analysis by Turbidity meter. APHA 2130 B (modified) : Online Edition.	0.05 NTU	1-3
pH	pH meter. APHA 4500-H^+ B (modified) : Online Edition. Note: It is not possible to achieve the APHA Maximum Storage Recommendation for this test (15 min) when samples are analysed upon receipt at the laboratory, and not in the field. Samples and Standards are analysed at an equivalent laboratory temperature (typically 18 to 22 °C). Temperature compensation is used.	0.1 pH Units	1-3
Total Suspended Solids	Filtration using Whatman 934 AH, Advantec GC-50 or equivalent filters (nominal pore size 1.2 - 1.5µm), gravimetric determination. APHA 2540 D (modified) : Online Edition.	3 g/m^3	1-3
Total Nitrogen	Calculation: TKN + Nitrate-N + Nitrite-N. Please note: The Default Detection Limit of 0.05 g/m^3 is only attainable when the TKN has been determined using a trace method utilising duplicate analyses. In cases where the Detection Limit for TKN is 0.10 g/m^3, the Default Detection Limit for Total Nitrogen will be 0.11 g/m^3. In-house calculation.	0.05 g/m^3	1-3
Total Ammoniacal-N	Phenol/hypochlorite colourimetry. Flow injection analyser. (NH_4-N = NH_4^+-N + NH_3-N). APHA 4500-NH_3 H (modified) : Online Edition.	0.010 g/m^3	1-3
Nitrite-N	Automated Azo dye colorimetry, Flow injection analyser. APHA 4500-NO_3^- I (modified) : Online Edition.	0.002 g/m^3	1-3
Nitrate-N	Calculation: (Nitrate-N + Nitrite-N) - Nitrite-N. In-House.	0.0010 g/m^3	1-3
Nitrate-N + Nitrite-N	Total oxidised nitrogen. Automated cadmium reduction, flow injection analyser. APHA 4500-NO_3^- I (modified) : Online Edition.	0.002 g/m^3	1-3
Total Kjeldahl Nitrogen (TKN)	Total Kjeldahl digestion, phenol/hypochlorite colorimetry. Discrete Analyser. APHA 4500-N_{org} D (modified) 4500 NH_3 F (modified) : Online Edition.	0.10 g/m^3	1-3
Dissolved Reactive Phosphorus	Filtered sample. Molybdenum blue colourimetry. Flow injection analyser. APHA 4500-P G (modified) : Online Edition.	0.004 g/m^3	1-3
Total Phosphorus	Total phosphorus digestion, automated ascorbic acid colorimetry. Flow Injection Analyser. APHA 4500-P H (modified) : Online Edition.	0.002 g/m^3	1-3
Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	Incubation 5 days, DO meter, nitrification inhibitor added, seeded. APHA 5210 B (modified) : Online Edition.	2 g O_2/m^3	1-3
Enterococci	MPN count using Enterolert, Incubated at 41°C for 24 hours. MIMM 12.4, APHA 9230 D : Online Edition.	1 MPN / 100mL	1-3
Nutrient Profile		0.0010 - 0.010 g/m^3	1-3
Faecal Coliforms and E. coli profile			
Faecal Coliforms	MPN count in LT Broth at 35°C for 48 hours, EC Broth at 44.5° C for 24 hours. APHA 9221 E : Online Edition.	2 MPN / 100mL	1-3
Escherichia coli	MPN count in LT Broth at 35°C for 48 hours, TBX confirmation. APHA 9221 F (modified) : Online Edition.	2 MPN / 100mL	1-3

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 31-Dec-2024 and 24-Jan-2025. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

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Certificate of Analysis

SPv2

Client:	Viridis Limited	**Lab No:**	3764687
Contact:	Amanda Naude C/- Viridis Limited PO Box 301709 Albany Auckland 0752	**Date Received:**	28-Jan-2025
		Date Reported:	07-Feb-2025
		Quote No:	135466
		Order No:	10122
		Client Reference:	
		Submitted By:	Amanda Naude

Sample Type: Aqueous

Sample Name:		Up-North 28-Jan-2025 2:55 pm	DS-1 28-Jan-2025 3:05 pm	DS-2 28-Jan-2025 3:15 pm
Lab Number:		3764687.1	3764687.2	3764687.3
Individual Tests				
Turbidity	NTU	1.82	3.0	2.4
pH	pH Units	7.2	7.3	7.4
Total Suspended Solids	g/m^3	< 3	< 3	< 3
Total Nitrogen	g/m^3	0.34	0.28	0.29
Total Kjeldahl Nitrogen (TKN)	g/m^3	0.34	0.28	0.29
Total Phosphorus	g/m^3	0.012	0.016	0.013
Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	$g\ O_2/m^3$	< 2	< 2	< 2
Enterococci	MPN / 100mL	365 #1	156 #1	308 #1
Faecal Coliforms and E. coli profile				
Faecal Coliforms	MPN / 100mL	130 #1	240 #1	79 #1
Escherichia coli	MPN / 100mL	130 #1	240 #1	79 #1
Nutrient Profile				
Total Ammoniacal-N	g/m^3	< 0.010	< 0.010	< 0.010
Nitrite-N	g/m^3	< 0.002	< 0.002	< 0.002
Nitrate-N	g/m^3	< 0.002	< 0.002	< 0.002
Nitrate-N + Nitrite-N	g/m^3	0.002	0.002	< 0.002
Dissolved Reactive Phosphorus	g/m^3	< 0.004	< 0.004	< 0.004

Analyst's Comments

#1 Please interpret this result with caution as the sample was > 10 °C on receipt at the lab. The sample temperature is recommended by the laboratory's reference methods to be less than 10 °C on receipt at the laboratory (but not frozen). However, it is acknowledged that samples that are transported quickly to the laboratory after sampling, may not have been cooled to this temperature.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Aqueous

Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter.	-	1-3
Turbidity	Analysis by Turbidity meter. APHA 2130 B (modified) : Online Edition.	0.05 NTU	1-3

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
pH	pH meter. APHA 4500-H^+ B (modified) : Online Edition. Note: It is not possible to achieve the APHA Maximum Storage Recommendation for this test (15 min) when samples are analysed upon receipt at the laboratory, and not in the field. Samples and Standards are analysed at an equivalent laboratory temperature (typically 18 to 22 °C). Temperature compensation is used.	0.1 pH Units	1-3
Total Suspended Solids	Filtration using Whatman 934 AH, Advantec GC-50 or equivalent filters (nominal pore size 1.2 - 1.5µm), gravimetric determination. APHA 2540 D (modified) : Online Edition.	3 g/m^3	1-3
Total Nitrogen	Calculation: TKN + Nitrate-N + Nitrite-N. Please note: The Default Detection Limit of 0.05 g/m^3 is only attainable when the TKN has been determined using a trace method utilising duplicate analyses. In cases where the Detection Limit for TKN is 0.10 g/m^3, the Default Detection Limit for Total Nitrogen will be 0.11 g/m^3. In-house calculation.	0.05 g/m^3	1-3
Total Ammoniacal-N	Phenol/hypochlorite colourimetry. Flow injection analyser. (NH_4-N = NH_4^+-N + NH_3-N). APHA 4500-NH_3 H (modified) : Online Edition.	0.010 g/m^3	1-3
Nitrite-N	Automated Azo dye colorimetry, Flow injection analyser. APHA 4500-NO_3^- I (modified) : Online Edition.	0.002 g/m^3	1-3
Nitrate-N	Calculation: (Nitrate-N + Nitrite-N) - Nitrite-N. In-House.	0.0010 g/m^3	1-3
Nitrate-N + Nitrite-N	Total oxidised nitrogen. Automated cadmium reduction, flow injection analyser. APHA 4500-NO_3^- I (modified) : Online Edition.	0.002 g/m^3	1-3
Total Kjeldahl Nitrogen (TKN)	Total Kjeldahl digestion, phenol/hypochlorite colorimetry. Discrete Analyser. APHA 4500-N_{org} D (modified) 4500 NH_3 F (modified) : Online Edition.	0.10 g/m^3	1-3
Dissolved Reactive Phosphorus	Filtered sample. Molybdenum blue colourimetry. Flow injection analyser. APHA 4500-P G (modified) : Online Edition.	0.004 g/m^3	1-3
Total Phosphorus	Total phosphorus digestion, automated ascorbic acid colorimetry. Flow Injection Analyser. APHA 4500-P H (modified) : Online Edition.	0.002 g/m^3	1-3
Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	Incubation 5 days, DO meter, nitrification inhibitor added, seeded. APHA 5210 B (modified) : Online Edition.	2 g O_2/m^3	1-3
Enterococci	MPN count using Enterolert, Incubated at 41°C for 24 hours. MIMM 12.4, APHA 9230 D : Online Edition.	1 MPN / 100mL	1-3
Nutrient Profile		0.0010 - 0.010 g/m^3	1-3
Faecal Coliforms and E. coli profile			
Faecal Coliforms	MPN count in LT Broth at 35°C for 48 hours, EC Broth at 44.5° C for 24 hours. APHA 9221 E : Online Edition.	2 MPN / 100mL	1-3
Escherichia coli	MPN count in LT Broth at 35°C for 48 hours, TBX confirmation. APHA 9221 F (modified) : Online Edition.	2 MPN / 100mL	1-3

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 29-Jan-2025 and 07-Feb-2025. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

K Harrison

Kim Harrison MSc
Client Services Manager - Environmental

Table B1. Guideline values for various water quality parameters.

Parameter	NPS-FM attribute states[1]				ANZG DGV[2]	Other	
	A	B	C	D		Value	Source
Total suspended solids					8.8		
Five-day carbonaceous biochemical oxygen demand						2	MfE (1992)
E. coli (MPN/100 mL)	≤130*	>130 and ≤260*	>260 and ≤540*	>**540***			
Total ammoniacal nitrogen	≤0.03	>0.03 and ≤0.24	>**0.24** and ≤1.3	>1.3	0.32**		
Nitrate nitrogen	≤1	>1 and ≤2.4	>**2.4** and ≤6.9	>6.9	0.065		
Total nitrogen					0.292		
Dissolved reactive phosphorus	≤0.006	>0.006 and ≤0.01	>0.01 and ≤0.018	>0.018	0.014		
Total phosphorus					0.024		

Notes: Units are g/m^3 unless stated otherwise; Values in **bold** indicate the national bottom line (NBL), where applicable; [1]as an annual median, unless stated otherwise; [2]physical or chemical stressors, for the 80th %ile, unless stated otherwise; *as 95th percentile, for primary contact sites. Bands correspond to excellent, good, fair and poor water quality; ** toxicant DGV for 99% species protection.