TO:	Fiona Morton	Date:	31 October 2025
	Horizons Regional Council	Document No:	10001-066-1
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APP-2006012018.02: UPDATED MODELLING FOR REDUCED DISCHARGE VOLUME

Background

Winstone Pulp International Limited (WPI) has applied to Horizons Regional Council (Horizons) to renew its resource consent (ATH-2010011593.01, "the Permit") allowing the discharge of treated pulp mill wastewater to the Whangaehu River. Although pulp mill operations have ceased, WPI seeks a short-term renewal to preserve the site's value and flexibility for future buyers, allowing continued investment potential and facilitating redevelopment opportunities.

As part of the application process, the potential effects on downstream water quality were previously modelled under two scenarios:

- Median baseline (upstream) water quality - presented in the original assessment of environmental effects (AEE) (Viridis 2025a).
- Improved baseline (upstream) water quality - provided in the subsequent response to Horizons' request for further information under s92 of the Resource Management Act 1991 (Viridis 2025b, c).

Both assessments conservatively modelled a maximum discharge volume of 5,200 m^3/day to represent a "worst-case" scenario.

Following consultation with Ngāti Rangi, the application has been revised (Viridis 2025d) to reduce the maximum consented discharge volume to 4,000 m^3/day and to remove the provision to discharge antifoam agents. Accordingly, the modelling for both baseline scenarios has been updated to reflect these changes. This memorandum presents the revised results and supersedes both Table 3 of the original AEE (Viridis 2025a) and Table 1 of the s92 response (Viridis 2025c).

Revision to Compliance Limits

To maintain consistency with the intent of the Permit, the compliance load limits specified under Condition 19 - originally derived for a maximum discharge volume of 5,200 m^3/day - have been proportionally adjusted[1] to reflect the reduced maximum discharge volume of 4,000 m^3/day. The existing and revised limits are summarised in Table 1.

This revision maintains the same effective discharge concentrations that formed the basis for the original consent limits. By scaling the loads in direct proportion to the revised discharge volume, the discharge quality assumptions, dilution relationships, and predicted downstream effects remain consistent with those used in the previous assessments. Updating the limits in this way strengthens environmental protection by ensuring that the same concentration-based standard applies across the full range of permitted discharge volumes.

[1] Revised load limits were calculated by multiplying the existing load limits by a factor of 0.77 (4,000 m^3/day ÷ 5,200 m^3/day) to maintain the same ratio of load to discharge volume as used in the original consent conditions.

Table 1. Existing and revised limits derived from the maximum permitted discharge volume.

Parameter	Load limit (kg/day)	
	Existing[1]	Proposed[2]
Total five-day carbonaceous biochemical oxygen demand	850	654
Soluble five-day carbonaceous biochemical oxygen demand	570	438
Total suspended solids	2,200	1,692
Dissolved reactive phosphorus	18	14
Soluble inorganic nitrogen	44	34
Total sulphide	0.485	0.373

Notes: [1] Load limits originally derived for a maximum discharge volume of 5,200 m^3/day; and [2] revised in proportion to the new maximum discharge volume of 4,000 m^3/day.

Updated Modelling

To assess the potential effects of the discharge on river water quality, downstream concentrations of key contaminants were estimated using a mass-balance model and compared to the following guidance:

- Horizon's One Plan Schedule 5 (RP-SCHED5) surface water quality targets for Whau_1a (the relevant water management sub-area).
- National Policy Statement for Freshwater Management 2020 (NPS-FM) Attribute Bands A though D (MfE 2024).
- Australia New Zealand Guidelines for Freshwater and Marine Quality (ANZG 2018) default guideline values (DGVs) for toxicants (at 99% protection) or physicochemical stressors (based on 80th percentile of minimally impacted reference site data)[2].

For the revised modelling, a maximum discharge volume of 4,000 m^3/day was applied, along with the revised compliance load limits derived from those originally specified under Condition 19 (refer Table 1). As described above, these loads were recalculated in proportion to the reduced discharge volume to maintain the same effective concentrations as those underpinning the original consent limits.

For the improved baseline scenario, the 95th percentile of discharge quality (measured between April 2013 and September 2024) was used for parameters that do not have load limits specified under the Permit. Upstream baseline concentrations were represented by median values for the median-quality scenario and 25th percentile values for the improved-baseline scenario. Low-flow conditions for the receiving environment were assumed (i.e., a 7-day MALF of 2.31 m^3/s, as reported in Horizons (2024), was used as the baseline Whangaehu River flow). The resulting downstream concentrations for each assessment are summarised in Tables 2 and 3.

[2] Based on the river environmental classification of 'Cool Wet Mountain', as per MfE (2010).

Table 2. Updated median baseline assessment of Whangaehu River water quality; supersedes Tables 3 of AEE (Viridis 2025a).

Parameter	Upstream water quality[1]	Downstream water quality		Water quality guidelines					
				One Plan	ANZG DGVs	NPS-FM Attribute Bands ^			
		Measured[1]	Modelled[2]			A	B	C	D
pH (unitless)	2.8	2.9	-	7-8.2 and Δ 0.5	7.8 [A]				
Un-ionised hydrogen sulphide[3]	0.013	-	0.015		0.001 [B]				
Volatile suspended solids	<3	8	-						
Total suspended solids	18	-	26		11.8 [A]				
Soluble $cBOD_5$ (g O_2/m^3)	<2	-	3.1	1.5					
Total $cBOD_5$ (g O_2/m^3)	<2	-	4.2						
Ammoniacal nitrogen	0.073	0.086	-	0.32	0.32 [B]	≤0.03	>0.03 & ≤0.24	>**0.24** & ≤1.3	>1.3
Nitrate nitrogen	0.043	0.047	-		0.024 [A]	≤1	>1 & ≤2.4	>**2.4** & ≤6.9	>6.9
Soluble inorganic nitrogen	0.11	-	0.28	0.07					
Total nitrogen	0.2	0.4	-		0.085 [A]				
Dissolved reactive phosphorus	0.044	-	0.11	0.006	0.004 [A]	≤0.006	>0.006 & ≤0.01	>0.01 & ≤0.018	>0.018
Total phosphorus	0.059	0.11	-		0.017 [A]				
Escherichia coli (cfu/100 mL)	<1	-	≤260			≤130 [G]	>130 & ≤260 [G]	>260 & ≤540 [G]	>**540** [G]
Aluminium	26	25	-		0.0008 [C]				
Arsenic[4]	0.007	0.0062	-		0.001 [B]				
Boron	0.4	0.4	-		0.34 [B, D]				
Cadmium	0.0005	0.0005	-		0.00006 [B, E]				
Chromium[5]	0.02	0.019	-		0.00001 [B]				
Copper	0.02	0.019	-		0.001 [B]				
Lead	0.003	0.003	-		0.001 [B, E]				
Manganese	0.40	0.43	-		1.2 [B, F]				
Nickel	0.013	0.012	-		0.008 [B, E]				
Zinc	0.057	0.061	-		0.0024 [B, E, F]				

Notes: Units in g/m^3 unless stated; metal concentrations are dissolved; NPS-FM Attribute Band A is light green, Attribute Band B is light blue, Attribute Band C is light orange, Attribute Band D is light red; **bolded** values are NBLs; exceedances of a One Plan value or an ANZG DGV (or both) are shown in red; ^as annual median, unless stated; [1] median; [2] in Table 3 of the AEE (Viridis 2025a), the discharge flow was incorrectly modelled as 0.052 m^3/s instead of 0.060 m^3/s. This has been corrected in the current assessment;[3] un-ionised hydrogen sulphide, measured as [S] - in Table 3 of the AEE (Viridis 2025a), the total sulphide limit was treated as kg/day rather than g/day, resulting in an over-estimation of the corresponding load and downstream concentration. This unit error has been corrected in the current assessment;[4] arsenic (III); [5] hexavalent; [A] physical and chemical stressor for 80th percentile; [B] 99% species level protection for toxicants; [C] toxicant value with level of species protection unknown, applicable at pH < 6.5; [D] based on data from toxicity tests at a pH of 6.8-10 and a hardness of 9.3-250 g/m^3; [E] should be adjusted for site-specific hardness as per Warne *et al.* (2018); [F] DGV may not protect key test species from chronic toxicity; [G] Attribute Bands for excellent, good, fair and poor quality, based on campylobacter infection risk for primary contact sites.

Table 3. Updated improved baseline assessment of Whangaehu River water quality; supersedes Table 1 of s92 response (Viridis 2025b).

Parameter	Upstream water quality	Modelled downstream water quality[1]	Treated effluent quality[2]
pH (unitless)	4.4	-	8.6
Un-ionised hydrogen sulphide[3]	<0.002	0.0028	0.093
Volatile suspended solids	<3	5	180
Total suspended solids	10	18	423
Soluble $cBOD_5$ (g O_2/m^3)	<2	3.1	110
Total $cBOD_5$ (g O_2/m^3)	<2	4.2	163
Ammoniacal nitrogen	0.027	0.22	10
Nitrate nitrogen	0.04	0.08	2.2
Soluble inorganic nitrogen	0.055	0.22	8.5
Total nitrogen	0.12	0.84	37
Dissolved reactive phosphorus	<0.004	0.07	3.5
Total phosphorus	0.019	0.17	7.5
Escherichia coli (cfu/100 mL)	<1	≤260	-
Aluminum	12	12	0.14
Arsenic[4]	0.0013	0.0014	0.011
Boron	0.15	0.14	0.066
Cadmium	0.00021	0.00028	0.0036
Chromium[5]	0.0041	0.0043	0.015
Copper	0.011	0.013	0.10
Lead	0.00011	0.00015	0.002
Manganese	0.3	0.36	3.2
Nickel	0.0097	0.0098	0.02
Zinc	0.037	0.053	0.83

Notes: Units in g/m^3 unless stated; metal concentrations are in the dissolved fraction; NPS-FM attribute bands have been assigned using the annual median thresholds, consistent with the way the original AEE (Viridis 2025a) assessment was framed. NPS-FM Attribute Band A is light green, Attribute Band B is light blue, Attribute Band C is orange; Attribute Band D is light red; exceedances of a One Plan value or an ANZG DGV (or both) are shown in red text. Refer to Table 1 above for the guideline values considered in this assessment; [1] in Table 1 of s92(1) response dated 9 September (Viridis 2025b), the discharge flow was incorrectly modelled as 0.052 m^3/s instead of 0.060 m^3/s. This has been corrected in the current assessment; [2] for parameters that have consent limits, the maximum allowable concentration has been used. For parameters without limits, the 95th percentile of monitoring data (April 2014-September 2024) has been used; [3] un-ionised hydrogen sulphide, measured as [S] in Table 1 of both s92 responses (Viridis 2025b, c), the total sulphide compliance limit was treated as kg/day rather than g/day, resulting in an over-estimation of the corresponding load and downstream concentration. This unit error has been corrected in the present assessment; [4] arsenic (III); [5] hexavalent.

The updated models indicate that downstream concentrations are lower for all parameters than those predicted in the original AEE (Viridis 2025a) and s92(1) response (Viridis 2025b, c). This reflects the reduced discharge volume and proportional reduction in compliance loads.

The conclusions presented in Section 6.4.1 of the AEE (Viridis 2025a) and in the s92 response (Viridis 2025b, c) remain unchanged. Overall, the most notable differences between upstream and downstream water quality were observed for nutrients. While the proposal may influence these parameters, effects are expected to be limited due to the:

- Poor baseline water quality of the Whangaehu River.
- Sparse aquatic community present.
- Low likelihood of full discharge utilisation during the short-term consent period.

In addition, the proposed compliance mechanisms for future operations - such as the submission of a pre-discharge report, as detailed in Viridis (2025b, d) - will ensure compliance with discharge limits. Taking these factors into account, the overall magnitude and duration of potential effects are considered low.

The improved baseline scenario continues to demonstrate that only minor additional exceedances are expected under an improbable alignment of conservative assumptions. The original median-based assessment, therefore, remains the most appropriate and representative depiction of potential effects.

Removal of Antifoam Discharge

In addition to reducing the maximum allowable discharge volume, the updated application also removes the provision to discharge antifoam to the Whangaehu River.

Antifoam was originally proposed as a contingency measure to manage foam generation associated with treated pulp mill wastewater discharges (refer Section 7 of the AEE; Viridis 2025a). However, with the strengthened consent framework - specifically the requirement to demonstrate compliance with discharge conditions, including those prohibiting foams (Condition 20, Parameter 4), through a pre-discharge report (as detailed in Viridis 2025b, d) - the use of antifoam is no longer considered necessary.

This condition provides a clear mechanism to prevent and manage foaming through compliance verification rather than through a reactive measure (i.e., application of antifoam). The removal of the antifoam provision therefore represents an improvement to the discharge proposal, both by reducing the overall discharge volume entering the Whangaehu River and by establishing a more pre-emptive framework for preventing foaming and other potential effects.

References

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MfE 2024. National Policy Statement for Freshwater Management 2020. Ministry for the Environment. October 2024.

Viridis 2025a. Renewal of Discharge Permit 103909. Assessment of Environmental Effects. A report prepared by Viridis Limited for Winstone Pulp International Limited. 31 March 2025. Document no: 10001-012-1.

Viridis 2025b. Re: APP-2006012018.02 - Response to s92(1) Request for Further Information. Letter to Fiona Morton (Horizons Regional Council) from Amanda Good (née Naude) and Dr Grant Allen (Viridis Limited) and Doyle Richardson (Mitchell Daysh Limited) dated 9 September 2025. Document no: 10001-062-1.

Viridis 2025c. RE: Question of clarification: APP-2006012018.02 - Response to s92(1) Request for Further Information. An email from Dr Grant Allen (Viridis Limited) to Fiona Morton (Horizons Regional Council), copied to Laura Hickey (Horizons Regional Council), Mike Ryan (Winstone Pulp International Limited), Doyle Richardson (Mitchell Daysh Limited) and Amanda Good (Viridis Limited) dated 12 September 2025.

Viridis 2025d. Re: APP-2006012018.02 - Clarification and Amendment to Application. Letter to Fiona Morton (Horizons Regional Council) from Dr Grant Allen (Viridis Limited) dated 24 October 2025. Document no: 10001-065-1.

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