

**IN THE ENVIRONMENT COURT
WELLINGTON REGISTRY**

**I TE KŌTI TAIAO O AOTEAROA
TE WHANGANUI-A-TARA ROHE**

UNDER	the Resource Management Act 1991
IN THE MATTER	of appeals under sch 1, cl 14(1) against the decision of Manawatū-Whanganui Regional Council on Plan Change 2 to the One Plan
BETWEEN	TE RUNANGA O RAUKAWA ENV-2021-WLG-20 NGĀTI TURANGA ENV-2021-WLG-21 ANDREW DAY ENV-2021-WLG-22 WELLINGTON FISH AND GAME COUNCIL ENV-2021-WLG-23 Appellants
AND	MANAWATŪ-WHANGANUI REGIONAL COUNCIL Respondent

**FOURTH STATEMENT OF EVIDENCE OF ANTONIUS SNELDER ON BEHALF OF
MANAWATŪ-WHANGANUI REGIONAL COUNCIL**

WATER QUALITY

Dated: 18 March 2024


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FOURTH STATEMENT OF EVIDENCE OF ANTONIUS SNELDER**A. INTRODUCTION**

- [1] My full name is Antonius Hugh Snelder.
- [2] My experience and qualifications are set out in my statement of evidence dated 6 October 2023.
- [3] I repeat the confirmation given in my Evidence that I have read and will comply with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023, and that my evidence has been prepared in compliance with that Code.

B. SCOPE

- [4] I have prepared this brief of evidence to address two questions ([1](a)(ii) and (iii)) from the Court's 1 March 2024 Minute, being:
- (a) The tonnage and percentage of nitrogen reduction required in each targeted WMSZ to meet the relevant One Plan SIN target and the amount by which compliance with Table 14.2 would contribute to those reductions; and
 - (b) To the extent that the answer to (a) above does not address it:
 - (i) If the original Table 14.2 had been fully complied with, what percentage reduction in nitrogen losses would have resulted? (for comparison with targeted reduction percentages);
 - (ii) Would there have been significant differences in different target catchments?
 - (iii) Do things change with a recalibrated Table 14.2?
- [5] These questions had been originally posed by the Court to Professor Horne. However, they sit within my expertise rather than his.

C. NITROGEN LEACHING REDUCTIONS

- [6] The table and figure referred to below are provided in the Appendix to this statement of evidence.
- [7] As a preliminary point, and for the avoidance of doubt, I note that the data shown in most of the tables in my evidence pertains to loads and load reductions in the river at the downstream end of the relevant WMSZs. It should be kept in mind that this does not necessarily equate to the total nitrogen discharged from the WMSZs.¹
- [8] I also note that both modelled scenarios discussed in this evidence demonstrate the results of implementing the Year 20 CNLMs in the relevant version of Table 14.2. These simulations do not account for any 'lead-in' or adjustment time in the regulatory settings, or any lags in the delivery of nitrogen to rivers. This means these simulations represent the long-term 'steady state' (i.e., after all adjustments and lags have come to equilibrium) in-river outcome of achieving the relevant Year 20 CNLMs.
- [9] The tonnage and percentage of nitrogen reduction required in each targeted WMSZ to meet the relevant One Plan SIN target, and the amount by which requiring compliance with the original Table 14.2 would assist in achieving those targets, are shown in **Table 1**. This combines the information provided in Table 4 of my supplementary statement dated 18 January 2024, with the information from the 'Operative Scenario' from the scenario modelling report prepared for the Council-level hearing of this matter (**the Scenario Modelling Report**).² The Operative Scenario simulates the water quality impact anticipated to result where all IFLU comply with the operative Table 14.2 by setting the export coefficients for all IFLU to the Year 20 CNLMs in the operative Table 14.2.

¹ The tables which do pertain to the total nitrogen discharged to the WMSZs are Tables 1 and 2 of my supplementary statement of evidence dated 18 January 2024.

² Ton Snelder, Tim Cox, and Tim Kerr *Scenario Modelling of Nitrogen Management in Manawatū-Whanganui Region Supporting Regional Plan Change 2* (Land Water People, September 2020) at sections 3.3.1 and 3.4. This report is attached to my Evidence as Attachment A, at CB **[[202.0731]]–[[202.0799]]**.

- [10] The values shown in columns 7, 8 and 9 of Table 1 provide equivalent information pertaining to the Operative Scenario to the other modelled scenarios that are shown in Tables 5, 6 and 7 of my supplementary statement dated 18 January 2024, respectively.
- [11] **Figure 1** shows the predicted load reductions achieved by the Operative Scenario expressed as a percentage of the pre-regulation load. This map is comparable to the maps shown in Figure 2 of my supplementary statement dated 18 January 2024. Comparison of these respective values indicate that the Operative Scenario always achieves greater reductions at all 36 assessment points than all scenarios included in my supplementary statement dated 18 January 2024.
- [12] If the original Table 14.2 had been fully complied with, the percentage reduction in nitrogen losses that would have resulted are those shown in column 8 (Operative reduction (%)) of Table 1. This means that the mean relative difference over the 36 model assessment points that are downstream of the target catchments are less for the Operative Scenario (24%) than all other scenarios included in my supplementary statement dated 18 January 2024 (range 35.1 to 44.1, see Table 8 of my supplementary statement dated 18 January 2024). This is because the Operative Scenario took leaching data calculated using Overseer v6.3.2 as inputs to the catchment water quality models. However, the Scenario drove farms to the operative CNLMs, which were calculated in an earlier version of Overseer that produced lower estimates of leaching rates (i.e., the mismatch that PC2 was seeking to address by recalibrating Table 14.2). I note that the degree by which the Operative Scenario 'outperformed' the other scenarios would change depending on the 'distance' between the Operative CNLMs and the leaching values being produced by whatever version of Overseer is being used to provide input values (i.e., IFLU leaching rates) to the catchment water quality models.
- [13] Further, it is important to note that the mean relative difference for the Operative Scenario indicates that on average SIN concentrations at the 36 assessment points would exceed the SIN target by 24%. This indicates that application of the proposed cumulative nitrogen leaching maximums

(CNLM) to intensive farming land use (IFLU) cannot, on its own, achieve compliance with the One Plan targets.

- [14] There are differences in the magnitudes of the reductions at each of the 36 model assessment points for the Operative Scenario, as there were for the other scenarios reported in my supplementary statement dated 18 January 2024. All these differences are attributable to the varying amounts of IFLU upstream of each assessment point and therefore differences in the potential for the reductions represented by each scenario to reduce total loads downstream.
- [15] The recalibration of Table 14.2 changes the magnitudes of the reductions at each of the 36 model assessment points. This can be appreciated by comparing the results in Table 1 and shown in Figure 1 below with the results in Tables 5 and 6 for the Proposed Consented Scenario provided in my supplementary statement dated 18 January 2024. It is appropriate to compare these two scenarios because both assume all IFLU complies with the respective CNLM (i.e., Table 14.2 in Operative Plan and the recalibrated Table 14.2 proposed by PC2).
- [16] An alternative comparator would be the Proposed Consented Strict Scenario, which assumed that all unconsented IFLU complied with the respective Year 20 CNLMs, but held consented IFLU at their consented rate if that rate was below the relevant recalibrated Table 14.2 CNLMs. Consented IFLU with consented rates exceeding the Table 14.2 CNLMs were decreased to their relevant CNLMs. The Proposed Consented Strict Scenario reflects the policy framework preventing existing consented IFLU from 'leaching up' to the Table 14.2 values.³

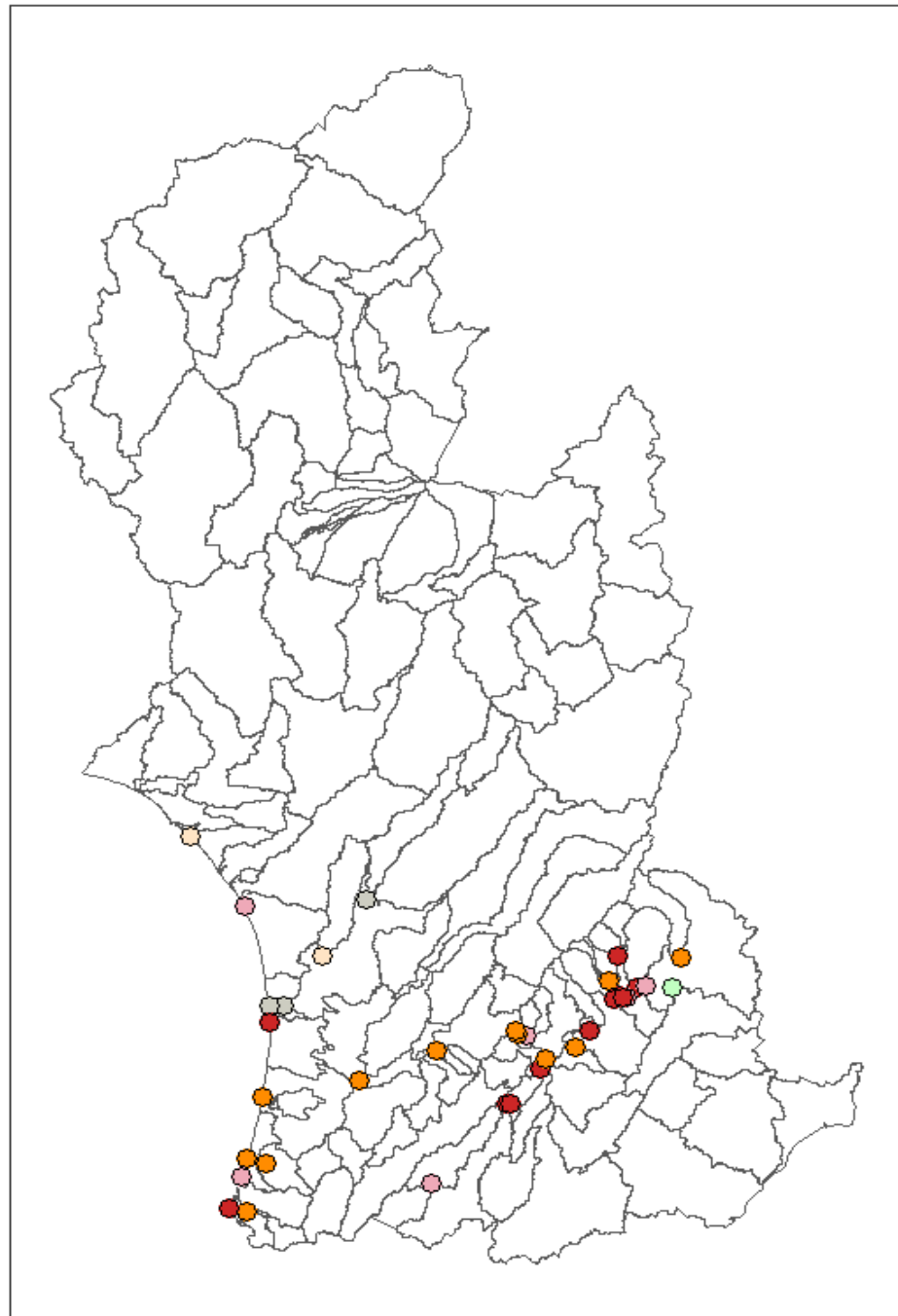
18 March 2024

Antonius Hugh Snelder

³ See Statement of Evidence of Christine Foster (6 October 2023) at [181], CB [[202.1063]].

D. APPENDIX

Figure 1: Predicted reduction of total nitrogen load at each of the 36 assessment points downstream of target catchments for the Operative scenario. The load reductions are expressed as a percentage of the pre-regulation load. This map is comparable to Figure 2 of my supplementary statement dated 18 January 2024.



Predicted reduction of total nitrogen load as percentage of pre-regulation load (%)

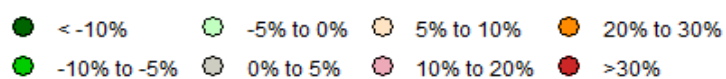


Table 1: Tabulation shown for each of the 36 model assessment points downstream of the target catchments; the SIN target, the predicted pre-regulation SIN concentration, the predicted pre-regulation total nitrogen (TN) load, the total nitrogen reduction required to achieve the target as tonnes per year (t/y) and as a percentage of the pre-regulation TN load (%), the predicted TN load for the Operative scenario as tonnes per year (t/y) and as a percentage of the pre-regulation TN load (%), and the relative difference between the predicted SIN concentration for the pre-regulation condition and the Operative scenario. Note that rows are ordered by Catchment and catchment area.

Assessment point	Catchment	SIN Target (mg/L)	SIN Pre-regulation (mg/L)	TN Pre-regulation (t/y)	Reduction required (%)	TN Operative (t/y)	Operative reduction (%)	Relative Difference Operative (%)
Hoki_1a	Hokio	0.167	2.15	83	92	62	25	89.1
Hoki_1b	Hokio	0.167	2.28	93	93	70	26	89.8
Mana_4	Manawatu	0.07	0.41	16	83	11	30	75.7
Mana_9b	Manawatu	0.444	0.41	26	-7	21	18	-31.3
Mana_3	Manawatu	0.07	0.20	20	66	13	36	46
Mana_5c	Manawatu	0.444	0.80	95	44	52	45	8.9
Mana_5e	Manawatu	0.444	0.41	45	-8	26	42	-64.5
Mana_5d	Manawatu	0.444	0.66	105	33	62	40	-2.9
Mana_8a	Manawatu	0.07	0.09	38	21	33	13	13.3
Mana_1b	Manawatu	0.167	0.51	79	67	55	30	58.5
Mana_2b	Manawatu	0.444	0.66	260	33	172	34	14.3
Mana_9c	Manawatu	0.444	0.44	161	0	121	25	-35.3
Mana_8d	Manawatu	0.444	0.67	309	34	185	40	-3.6
Mana_1c	Manawatu	0.11	0.45	181	76	180	0	75.7
Mana_8b	Manawatu	0.444	0.78	645	43	348	46	10

Mana_8c	Manawatu	0.444	0.91	720	51	403	44	24.7
Mana_1a	Manawatu	0.167	0.44	678	62	598	12	58.2
Mana_2a	Manawatu	0.444	0.45	998	1	822	18	-12
Mana_5b	Manawatu	0.444	0.45	107	1	64	40	-50.9
Mana_5a	Manawatu	0.444	0.52	1524	14	1169	23	-4.2
Mana_6	Manawatu	0.444	0.52	3027	14	2300	24	-5.4
Mana_7b	Manawatu	0.444	0.62	1455	29	1099	24	11.8
Mana_9a	Manawatu	0.444	0.62	3511	28	2645	25	10.1
Mana_10a	Manawatu	0.444	0.50	4019	11	3086	23	-10.1
Mana_11a	Manawatu	0.444	0.61	4865	27	3861	21	11.8
Mana_13a	Manawatu	0.444	0.59	6841	25	5384	21	7.7
Rang_4d	Rangitikei	0.11	0.16	174	31	163	6	20.8
Rang_4c	Rangitikei	0.11	0.42	130	74	126	3	73
Rang_4a	Rangitikei	0.11	0.12	2393	11	2302	4	4.8
Rang_4b	Rangitikei	0.167	0.12	2465	-34	2356	4	-43.7
West_8	West Coast	0.167	2.46	27	93	22	19	90.6
West_9b	West Coast	0.167	0.62	44	73	32	29	63.9
West_4	West Coast	0.167	1.55	79	89	74	6	88.5
West_5	West Coast	0.167	2.38	145	93	122	16	91.7
West_9a	West Coast	0.167	0.27	93	39	61	35	4.9
West_6	West Coast	0.167	2.11	257	92	124	52	83