

IN THE MATTER of the Resource Management Act 1991

A N D

IN THE MATTER of submissions and further submissions by Rangitata Diversion Race Management Limited (**RDRML**) on proposed Variation 2 to the proposed Canterbury Land & Water Regional Plan

STATEMENT OF REBUTTAL EVIDENCE OF STUART JOHN FORD

Introduction

1. My full name is Stuart John Ford.
2. I provided a statement of evidence dated 15 May 2015 in connection with submissions by RDRML on Variation 2 to the proposed Canterbury Land & Water Regional Plan.
3. I have read the evidence of other submitters that has been made available, and provide rebuttal evidence on the following subject areas:
 - 3.1 what is possible in terms of affordable mitigation within the catchment,
 - 3.2 what can be achieved with Overseer in terms of management of Phosphorus; and
 - 3.3 the impact of Version 6.2 of Overseer on an understanding of the total load of Nitrogen within the Catchment.
4. I confirm that this rebuttal evidence is also prepared in accordance with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014.

Alison Dewes on behalf of Central South Island Fish and Game Council

5. Ms Dewes appears to have misinterpreted the mitigation regime as proposed by the Council in relation to the role of Good Management Practices (GMP) and its contribution to the overall mitigation required. At paragraph 21 of her evidence she states that:

“Variation 2 proposes that established farmers in the lower Hinds Plains Area are required to lower their total N loss to the tune of approximately 15% initially as Good Management Practice (GMP) is implemented, and a further 30% between 2025 and 2035.”

6. As I understand it, the recommendations in the officer’s report at 13.4.13 as shown in the following quote say that:

“(a) requiring, from 1 January 2017, all existing farming activities to discharge no more nitrogen than the loss rate that could reasonably be expected from the implementation of good management practices, calculated on the baseline land uses.

(b) requiring, from 1 January 2020, reductions beyond those set out in (a) of:”

7. By my interpretation this means that Variation 2 as proposed requires that the subsequent set of reductions is on top of those achieved by attaining GMP - not inclusive of GMP as assumed by Ms Dewes.

8. Ms Dewes then goes on in paragraph 84 to paragraph 105 to explain how attaining GMP (albeit not yet defined) should be considered “*as business as usual*” and not that “*any N loss reduction will occur from the implementation of these practices*”.

9. My interpretation of Variation 2 is that it does exactly this, as it calculates any reductions in N leaching on top of those achieved through the attainment of GMP.

10. At P 27 Ms Dewes states that:

“There are numerous examples of farmers and studies reducing Nitrogen loss by 20-60% in both actual and observed cases. In my opinion material

reductions in leaching can be made while a farm remains profitable, and by 2023/2024 there is likely to be an even better understanding of how farms can be optimised. Based on current information, and further supported by the work of Ridler (shown in Appendix 1) it is my opinion that dairy farming can be optimised to still be economically viable while dropping N leach by 30%. This is not likely to be possible for all farm systems nor land uses to the same degree.”

11. In relation to the first sentence I would comment that by far the majority of examples which she provides are for North Island dryland farming systems. These are completely different in their makeup and management systems to irrigated farms in the catchment and have completely different N loss parameters than irrigated South Island farms. Therefore, very limited information can be taken from those farms and applied in the Hinds catchment. I question therefore if the North Island examples have any relevance to the Hinds catchment.
12. Where Ms Dewes does refer to comparable irrigated South Island farms she uses some farm examples contained in her evidence on Variation 1 where she initially refers to as “typical Canterbury farms” (paragraph 44). However, I consider this is quite incorrect and she appears to accept in the same paragraph that the farms relied on are in fact “worst case scenarios”. It is my view that little weight can be placed on her analysis in terms of demonstrating reasonably achievable N loss reductions on a ‘typical Canterbury farm’.
13. In this regard, analysis of the farms assessed reveals that one is a border dyke property in the Culverden Basin and the other two are based in Mid Canterbury and are what could be described as DairyNZ System 5 farms. (This means that they are very highly stocked at 4 and 4.5 cows / ha respectively and bring up to 50% of the feed required to maintain production).
14. Analysis of Ms Dewes Red Sky data, which is appended to her evidence, shows that for the wider Canterbury region the average stocking rate is actually 3.3 cows / ha and that the top 10% of farms averaged only 3.6 cows / ha.

15. I therefore consider that the three farms Ms Dewes uses in support of her evidence are very atypical of dairy farming within the Hinds catchment. Accordingly, the results of her assessment can only be considered to be extreme examples of what is possible in terms of N leaching reductions and it would not be appropriate to 'scale up' her assessment in terms of representing what might be possible across the wider catchment. Put simply, for many existing irrigated farms within the catchment it will not be easy to achieve significant reductions in N loss without also having significant effects on operating profit (or requiring extensive capital input). I believe that, that point is set out in my evidence in chief.
16. I agree entirely with her second sentence of the quote, highlighted at paragraph 10 of this statement, as I believe that the suite of mitigation options which farmers will be using in 2025 will be entirely different than what the industry is modelling at present.
17. Ms Dewes then says that "*Based on current information, and further supported by the work of Ridler (shown in Appendix 1) it is my opinion that dairy farming can be optimised to still be economically viable while dropping N leach by 30%.*" I have not seen any evidence which indicates that Dairy farming as represented by the average farmer in the Catchment would remain viable while reducing their N load by 30%, and Ms Dewes does not produce any in her evidence. So it is difficult to determine what she is referring to as current information.
18. I have examined Mr Ridler's analysis contained in Appendix 1. What Mr Ridler presents is the results of his GSL modelling which is Linear Programming which is designed to achieve the maximum possible combinations of inputs and outputs given any constraints which are able to be imposed. It is a highly mathematical model. It assumes that management of the farm is at the best possible level. I have not seen any independent peer review of the model. Such reviews are, in my opinion, both common place and critical in an area that out of necessity involves a number of critical assumptions being made.
19. In it he says that he has assumed in his two base models "*Same resources, costs, prices and production as in MRB report.*" However on examination of

the tables describing the models it is apparent that both models are set up to have all young stock grazing on the property and all of the dairy cows wintered on the property on a crop of Kale. This is not comparable with the MRB models which have all young stock and wintered cows grazing off the property. In the later mitigation options he starts to graze higher proportions of the stock off the farm.

20. It is also not comparable with common practice in the area. I have asked Mr Reuben Edkins of RDRML¹ if he knew of any dairy farms within the catchment where this was a common practice, and he informs me that he doesn't know of a single farmer that runs that sort of system. The results of Mr Ridler's modelling therefore show a change from something which is not adopted within the area to something which is common practice within the area already.
21. Accordingly, while Ms Dewes claims that it would be economically viable to optimise dairy farming while dropping N leaching by 30%, based on Mr Ridler's modelling, Mr Ridler's modelling does not represent anything like the average farm in the area. All of the farms have already achieved the majority of the N leaching gains which he represents by not grazing their wintering cows at home.
22. I do agree with her final sentence, of the paragraph that I quote in paragraph 10, in that it is not possible for all famers to achieve the same level of reductions that is why RDRML proposes to manage the reductions by dealing with the farmers on a one to one basis through engagement on their Farm Environment Plans.
23. At paragraph 28 and paragraph 59 Ms Dewes contends that *"The move to active management" for irrigation scheduling, for example, is a key mitigation delivering 30 – 50% reductions in nitrogen leaching.*" At no point does she define what she means by active management nor does she give any examples of how the order of reductions which she states are possible can be achieved. The only possible use of the word active management in relation to irrigation could come from the old Version 6.1.3 of Overseer which had an

¹ Reuben Edkins RDRML Environmental Compliance Manager, M Comm Ag, 8 years experience working in the area including six months working for Mayfield Hinds Irrigation Scheme carrying out Overseer modelling on all of their shareholders properties.

option to choose active management when choosing the irrigation application method. The Best Practice Data Input Standards recommendation was to *“NOTE: DO NOT use actively managed at this time”* and that *“Actively managed is there for demonstration purposes to show the effect of eliminating all system losses, and accurately predicating weather 5–6 days in advance.”*

24. Therefore, if this is what Ms Dewes is referring to, it was a means of showing what was technically possible and was not recommended for use in a practical sense. Version 6.2 does not include the capability to run this option.
25. In my opinion Ms Dewes does not produce any evidence which is able to demonstrate that any amount of N leaching reductions are affordable on farms within the Hinds catchment. In this regard, nothing in her evidence has caused me to change the opinion and conclusions set out in my evidence in chief.

Adam Canning on behalf of Central South Island Fish and Game Council.

26. At paragraph 41 of his evidence Mr Canning estimates that in order to keep Dissolved Inorganic Nitrogen (DIN) in lowland stream to within his recommended range of 0.1 – 0.7 mg / l that it would be necessary to limit the amount of N coming through the soil profile to 303 tonnes / year. I note that Mr Peter Callender has also offered rebuttal evidence on this point.
27. If that sum is divided by my estimated area of farmed land at 119,026 ha it would mean that the average leaching of N / ha would be 2.54 Kg N / annum. I do not know of any form of farming which would be able to limit the N leaching to such a low figure. Achieving reductions to those recommended by Mr Canning would effectively stop farming within the Hinds Catchment.
28. Mr Canning proposes that limits should be set for Phosphorus, E. coli and ammonia by the imposition of various in river concentrations.
29. Many of the GMP's that are now standard on farms in New Zealand are designed to limit the amount of contamination of surface water bodies. Things such as the Dairy Effluent management rules, Fertiliser Application code of

Practice and the requirement to have all dairy stock excluded from water bodies are all designed to limit the amount of contamination which occurs.

30. However it is very difficult to measure these impacts on an individual farm basis; therefore it would be impossible to set average targets for these figures. Phosphorus runoff is reported in Overseer but it is based on some relatively crude assumptions as to the amount that would run off. It is not really applicable on an individual farm basis because there is nothing that a farmer can do to limit it apart from adopting the appropriate management practices. It is not possible to measure or monitor the other two in order to set targets for farmers to meet.
31. Therefore I believe that these are all best managed by putting restrictions on the management practices which can cause them (which are already in place) rather than to set targets for them.

Peter Brown on behalf of Fonterra and DairyNZ

32. In his evidence at paragraph 6.4 Mr Brown explains how he used the drainage depths from AusFarm to try and replicate similar results from those able to be achieved by modelling in Version 6.2 of Overseer. I would just like to note that my evidence was created entirely through the use of Overseer 6.1.3 therefore this may explain some of the differences from the results which I achieved. Nevertheless I believe that our results were remarkably similar.
33. Running my model through Overseer 6.2 gives the results shown in Table 1. The old results from 6.1.3 are included for comparative purposes.

Table 1: Results of modelling in two versions of Overseer.

	Total N (tonnes)	Average (kg N / ha)	N in drainage (ppm)
Overseer 6.1.3	5,625	47.3	10.3
Overseer 6.2	5,350	45.0	11.6

34. In modelling in Version 6.2 I chose what I estimated to be standard practices for irrigation management choices for each irrigation type. These choices were discussed and confirmed with Andrew Curtis² from Irrigation NZ.
35. The changes in total N and N / ha are all within the natural margin for error in this sort of modelling however the N estimated in the drainage has increased by approximately 13%. Because of the method that I adopted in modelling the irrigation use in 6.1.3 I expected the results for modelling in 6.2 to be fairly similar for total N. However the change in the N in drainage is as a result of a new drainage calculation in Version 6.2.
36. I do not believe that the results of this updated modelling using Overseer 6.2 would alter my conclusions on the total load of N given in my evidence in chief. However the increase in concentration in N in the drainage water, while not altering anything in my evidence in chief, would lead me to the conclusion that there will be increased pressure on MAR to achieve a reduction in water quality in the lowland streams.

Stuart Ford

29 May 2015

² Andrew Curtis CEO Irrigation NZ, 7 years in his current position. Andrew has been tasked with writing the Best Practice Guidelines for the use of the Irrigation section of Overseer Version 6.2.