

IN THE MATTER OF the Resource Management Act 1991

AND

IN THE MATTER OF resource consent applications lodged for the water take consents in relation to the Waitaki Basin under section 120 of the Resource Management Act 1991

EVIDENCE OF MELISSA CLARE ROBSON

Introduction

1. My name is Melissa Clare Robson and I am an environmental scientist. My qualifications and experience were outlined in my evidence in chief.
2. I have read the Code of Conduct for Expert Witnesses in the current (2006) Environment Court Practice Note. I agree to comply with this Code of Conduct. The evidence I am giving is within my area of expertise.

Scope of evidence

3. My evidence provides comment on:
 - (a) the evidence of the Environment Canterbury Section 42A Officer's reports, namely, Mr Carl Hanson.
 - (b) the evidence of Meridian Energy's experts, namely, Mr Robert Potts and Dr Mathew Ryan.
 - (c) the evidence of the Department of Conservation's expert Mr Jonathan Bray; and
 - (d) the legal submissions of Mr Ewan Chapman.

Evidence of Dr Matthew Ryan

4. *Paragraphs 20 and 33 of Dr Ryan's evidence state that the average N leaching estimate of 9 kg/ha was used for future case scenarios in the WQS.*
5. This is only partially correct, as substantially higher losses (26-35 kg N) were associated with proposed and existing dairy farms.
6. *In paragraphs 25 and 31, Dr Ryan opines that the data input into OVERSEER nutrient budgeting modelling should have been based on outputs of economic modelling work (EIA) carried out by Mr McFarlane.*
7. OVERSEER was used, by AgResearch, as a reporting tool of nutrient losses from actual on farm activities across more than 50,000 ha in the Upper Waitaki. The typical losses derived from these actual, on-farm activities were felt to be the most robust data available to indicate losses from similar activities in the basin in the future. In addition, the work referred to by Dr Ryan postdated the beginning of the WQS.

8. *In paragraphs 28 and 29 Dr Ryan suggests that the inputs into the WQS model are less robust than the inputs into the EIA partially farmed model, as the amount of fertiliser used in the models to derive the nutrient losses for the WQS is too low. As an example, in paragraph 29 he cites that in the Farm Environmental Management Plans ('FEMPs') for WHL Killermont and Glen Eyrie Downs higher fertiliser amounts were used in the OVERSEER modelling.*
9. There is a misunderstanding here. For the proposed dairy farms, higher fertiliser inputs were used to derive the losses for use in the WQS.
10. Dr Ryan has calculated and compared the predicted leaching loads from the Upper Waitaki from the MWRL study and the EIA farms with either 150 kg N or 200 kg N. However in this calculation he has assumed that all of the farms involved will have sheep and beef enterprises. He has not taken into account the proposed dairy farms that are modelled to have much greater losses associated with them. The current and proposed dairy areas in the Upper Waitaki are greater than 8,000 ha.
11. *Dr Ryan states in paragraphs 38 and 39 that as, in his opinion, the conservative approach was not taken in the WQS in that the EIA farm information was not used, then the highly developed setting in the MWRL study should have been used instead. Dr Ryan continues that the MWRL study has underestimated the total N losses from irrigated land by 40 kg N/ha.*
12. From the figures given in Dr Ryan's Table 3, the difference between the developed state in the WQS and Dr Ryan's recommended EIA, is only 2 kg/ha. ***If*** there is an underestimation made in the WQS, then using the preferred figures of Dr Ryan, the magnitude of this is 56 t N/year rather than the asserted 1,174 t N/year derived from comparing the highly developed losses from the EIA inputs and the developed losses from the MWRL WQS.
13. To give an indication of the consequence if there is this underestimation, in the Ahuriri Arm for example where there are restrictive mitigation required for N, in a comparison between the threshold in Lake Benmore (20 % below the Oligotrophic/Mesotrophic boundary) and the modelled losses from the on farm OVERSEER modelling done for the FEMPs, there is a cushion of over 40,000 kg N. I.e. collectively, the farms are modelled to lose considerably less than they are allowed to (according to their NDAs) when all taken all together. There are approximately 6,200 ha of new and proposed irrigation draining to the Ahuriri Arm (sheep and beef). If the losses from all of this were underestimated by 2 kg/ha, and additional 12,400 kg N would be draining in to Ahuriri Arm – less than one third of the available cushion.
14. In Tables 5, 6 and 7 of Dr Ryan's evidence, he has attempted to calculate 'maximum allowable N leaching loads' from dividing the environmental threshold for each sub-catchment directly by the area of new or renewing irrigation in that sub-catchment. This calculation is not correct and cannot be derived from these numbers. The environmental threshold loads are not based on contributions solely from the irrigated land, and crucially, neither are all losses from each ha of land irrigated or otherwise, necessarily captured at their surface water nodes. A large proportion of the nitrogen for example is modelled to be lost to groundwater and may not recharge surface water until Lake Benmore. As these tables and associated paragraphs 42-48 are based on this mis-calculation, I do not plan to comment on them further.

15. *In paragraph 49, Dr Ryan asserts that many of the mitigation measures reported are either not viable mitigations, impractical or are already Best Management Practices ("BMPs") that should already be employed.*
16. Paragraphs 35-47, paragraphs 51-59, paragraphs 63-68, paragraphs 72-82, paragraphs 86-90 and paragraphs 94-105 in my principal evidence are dedicated to describing the previous use and researched efficacy of the mitigation measures used in the toolkit, drawing examples from the UK, Europe, the US as well as NZ . Unless there was reasonable research evidence and examples of previous use in managing diffuse pollution, measures were not taken forward.
17. *In this paragraph Dr Ryan also states that many of the mitigation measures in the toolkit are already assumed in OVERSEER.*
18. Dr Ryan is correct that OVERSEER assumes a level of good practice below which the outputs will not be representative, and the overt or explicit assumptions behind OVERSEER form part of the Mandatory Good Agricultural Practices committed to by all farmers. However, it is precisely because many of the activities on farms that may have environmental impacts are not captured in OVERSEER, that the site-specific farm environmental risks assessment is such a critical part of the FEMP process. It should also be noted that as OVERSEER has integral options that allow non-best management practice, such as winter application of N fertiliser, stock access to streams and fertiliser application within 3 weeks of surface irrigation, and it is therefore incorrect to assert that these measures are already assumed.
19. Dr Ryan is correct in paragraph 50 that many of the mitigation measures are only really applicable on intensively farmed land. This is the intended focus of the toolkit. The mitigation measures outlined in the toolkit address loss mechanisms associated with different farming types, beef and sheep, dairy and arable, as well as different modes of irrigation.
20. *In paragraphs 50-53 Dr Ryan questions the degree of mitigation possible given that he regards that only 2 mitigation measures are available to farmers. He comments that with these 2 mitigations, which are likely to have least effect in sheep farming, that a maximum 27 % reduction is achieved on a sheep farm.*
21. 27% is not an insubstantial amount, and where beef are in the farming system or dairy, these modelled reductions will be greater.
22. Paragraphs 53 and 54 compare this reduction to the miscalculated maximum loads in Tables 5, 6 and 7 and therefore I plan to make no further comment on these.
23. *In paragraph 63 Dr Ryan agrees with the assessment made of the feasibility of nutrient reductions proposed on Killermont and Glen Eyrie Downs Stations, however, goes on to say that these are not typical of stations in the Upper Waitaki.*
24. Of the area of irrigation applied for, approximately 30 % is planned to be farmed in this way. The purpose of these examples was specifically to illustrate that the required mitigation was possible even with the most intensive systems and largest developments in the areas where most mitigation is required.

Evidence of Mr Robert Potts

25. *In paragraph 11 of Mr Potts' evidence he states that the consented but not operative irrigation should have been included as part of the baseline.*
26. Whilst I fully understand why he has made this statement, the reason for the omission was that the current scenario was calibrated against measured data to form the basis of the model going forward, and had large areas of irrigation that do not yet exist been included, this would have skewed the calibrations in these areas.
27. *In paragraph 62.5 Mr Potts indicates that the soil monitoring should be increased to an annual basis and the suite of measures be expanded to include total P and DRP.*
28. In the individual FEMPs, a wider range of soil parameters are recommended to be measured, including Olsen P. However, each paddock is still only recommended to be tested at most, on a 1 in 3 rotation. It is unnecessary in my opinion to test soil nutrients more frequently or to measure total P, however the measurement of soil DRP is an interesting suggestion.
29. The NZFMRA's 'Fertiliser Use on New Zealand Farms' reports the relationship between soil type (using soil anion storage capacity), Olsen P and concentration of DRP in runoff, and presents research findings as to what soil Olsen P concentrations yielded greater than the guideline 0.03 mg/l in runoff from various soil types. The NZFMRA concludes that, among other practices, to minimise transfer of P from land to water, soil Olsen P level should be maintained within agronomic target ranges.
30. For this reason, and the general familiarity of Olsen P and its use within the OVERSEER nutrient budgets, I maintain the recommendation to monitor soil Olsen P.

Legal submission by Mr Ewan Chapman

31. *In paragraph 80, Mr Chapman suggests that the MWRL WQS states that the allocation method adopted was done for reasons of simplicity.*
32. This is correct, however Mr Chapman goes on to say that this allocation was not the study's preferred method. This implied to me that there was another method that was preferred. This is incorrect. While the MWRL summary report states that it does not advocate this allocation method, nor does the MWRL advocate any other method – this was simply not its within its role.
33. *In paragraph 141, Mr Chapman states that the allocation mechanism has lead to inequity of nutrient allocation.*
34. My comment here is that the challenges posed by the allocation mechanism are not borne by 1 set of farmers only, neither new applicants nor renewals, large or small are solely disadvantaged. In relation to Mr Chapman's clients, at the request of UWAG, where farm proposals included a change from border dyke to spray, border dyking was modelled in the proposed systems to allow these farmers to retain all the mitigation benefit of the change. However, as the P losses associated with border dyking greatly exceed those associated with spray irrigation and this created additional burden in the remainder of the catchment.

35. *In paragraph 154, Mr Chapman states that monitoring at farm level and at nodal level brings in uncertainties, duplication and cost.*
36. In my opinion a multi-tiered monitoring approach is essential in this proposal. It is the environment and adherence to environmental threshold to ensure no significant adverse effect that is the driving force behind the WQS – and therefore to not monitor the environment going forward seems nonsensical. In addition, the farms involved in this consenting process are not the only farms that contribute nutrients to the system.

Evidence of Mr Carl Hanson

37. *Mr Hanson in paragraph 55 opines that the mitigation measures presented in the WQS have not demonstrated efficacy and that no numbers were attached to any mitigation measures to quantify the reduction of nutrient loss.*
38. For almost all of the >30 mitigation measures presented in the toolkit, there are accompanying research data indicating the likely nutrient reductions. Unfortunately the FEMPs were not available for Mr Hanson's review at the time of writing his s42a report. Now that many of the FEMPs are available and all illustrate how the thresholds are met through OVERSEER modelling and the larger developments also illustrate how site-specific farm environmental risks are identified and mitigated, this may go some way to assuaging this particular concern.
39. *In paragraph 56, Mr Hanson states that OVERSEER already assumes that all nutrient management BMPs are inherently assumed within the model.*
40. As has already been stated in my principal evidence, in the WQS Summary Report and the Mitigation Toolkit, the explicit assumptions of OVERSEER have been made Mandatory Good Agricultural Practices. In addition, practices that are not necessarily captured in a nutrient budgeting model, but that may still impact on the environment will be identified and mitigated through the FERA process – an integral part of the FEMP.

Evidence of Mr Jonathan Bray

41. *In paragraph 14, Mr Bray states that land intensification has a number of specific stressors that have not been considered by the applicants including alteration of, and damage to, physical habitat of streams and riparian margins, and point and diffuse sources of nutrients and sediments, Faecal Indicator Organisms and chemicals entering waterways. This is touched again in paragraph 37 and 69.*
42. The Mitigation Toolkit, described in my principal evidence, outlines the FEMP process to be undertaken by all applicants involved in these consent proceedings. In the FEMPs, on farm watercourses are viewed as receiving environments in themselves and through the site specific Farm Environmental Risk Assessment (described in paragraph 26-29 of my principal evidence), the impacts of both current and proposed farm activities on these receiving environments is identified and mitigation measures recommended. Examples of types of mitigation measures and their efficacy are given in paragraphs 31-105 of my principal evidence. In addition, the abbreviated example of Glen Eyrie Downs FEMP, given in paragraphs 106-116, gives an example of how point and diffuse pollution are addressed and how riparian margins are to be protected.

43. For farm specific detail on how local and on farm receiving environments will be protected, individual FEMPs should be consulted.
44. Mr Bray goes on to assert in paragraph 67, that the mitigations laid out in the FEMP will be voluntary. This is not correct. The FEMPs will be a part of the conditions of consent, they will be audited externally and an audit report will be submitted to ECan.
45. *Further to this, Mr Bray states in paragraph 68, that the Toolkit focuses on diffuse pollution.*
46. The Toolkit and the resultant FEMPs tackle both point source and diffuse pollution. Mr Bray also states in paragraph 68 that 'diffuse pollution is very hard to mitigate'. I do not agree with this statement. It is hard to measure as highlighted in paragraph 13 of my principal evidence however, this is not the same as being hard to mitigate.
47. Mr Bray asserts that the Mitigation Toolkit indicates that even where mitigation is implemented and adhered to that there is potential for it to be ineffective. This is a misrepresentation of what has been said in the toolkit. If an individual mitigation measure is ineffective, there are implementation monitoring, environmental monitoring and auditing of the FEMPs to pick this up, and a feedback loop described where this mitigation is replaced or added to. This new measure or combination will then be monitored for efficacy. Mr Bray's statement appeared to encompass all mitigation and assert that there was potential that all the mitigation measures on a farm could all be ineffective. This is not correct.
48. *Finally, in paragraph 75, Mr Bray affirms that while the Mitigation Toolkit is a step in the right direction for minimising impacts.*
49. I understand that he is concerned that there is a lack of specifics in terms of the plan design, implementation and monitoring. I do not think that the individual FEMPs were available for Mr Bray's review at the time of his evidence writing and therefore he was unable to assess the detailed farm environmental risk assessment and resultant mitigations, monitoring and auditing that have been proposed for individual farms. I believe that these FEMPs go much further than a step in the right direction. In my opinion, they outstrip what has yet been seen in New Zealand in terms of combating both diffuse and point source pollution from farms.

Melissa Robson