IN THE MATTER of the Resource Management Act 1991

AND IN THE MATTER of resource consent applications to take and use water for irrigation in the MacKenzie Basin

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STATEMENT OF Valerie Olga Snow

Supplementary Evidence (12 November 2009)

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1. My name is Valerie Olga Snow. My qualifications and experience are set out in my evidence in chief dated 9 August 2009. I confirm that I have read and am familiar with the "Code of Conduct for Expert Witnesses" in the Environment Court Practice Note (31 July 2006). I agree to comply with the Code.

2. The purpose of this statement is to respond to:

    a. clarify a statement made in my rebuttal evidence about the scenarios used by GHD in the water quality study,

    b. correct a potential misunderstanding arising from a question posed to by the Commissioners regarding consent conditions,

    c. provide further information about the effect of the Simons Hill stocking rate on estimated leaching, and

    d. to provide the requested OVERSEER® nutrient flow diagram.

Scenarios Used by GHD in the Water Quality Study

3. I have been asked to provide more information about my statement in Paragraph 46 of my rebuttal evidence that stated that the Water Quality Study was performed using Scenario 1 (current "dryland" state with developed setting in OVERSEER®) and Scenario 4 (future "irrigated" state with the highly developed setting in OVERSEER®). Paragraph 46 of my rebuttal evidence stated:

    > "In Paragraph 20 it would seem that Dr Ryan has not understood which scenarios were used in the water quality

assessment. He will read in the GHD summary report[1] that environmentally-conservative assumptions were made by taking the developed case for assessment of the current nutrient losses, Scenario 1, and the highly developed case for the irrigated nutrient losses, Scenario 4. Much of Dr Ryan's evidence is flavoured, at least to some extent, on his assumption that the developed irrigated case, Scenario 2, was used for the future case."

4. Paragraph 20 of Dr Ryan's evidence stated:

> "However, I should also point out, that although not clearly apparent in any of the technical reports of the Water Quality Assessment, and as Dr Snow has stated in her evidence (see Paragraph 40.iii), the average nutrient loads for the different land uses (i.e. dryland, irrigation etc) from these existing farms were also extrapolated to calculate the nutrient loads from farms under the future case scenario with further irrigation development. And from my understanding from the Summary Report, for irrigated land the average nitrogen leaching estimate from the developed status was used (9 kg N/ha/yr)."

5. I have returned to the "Summary Report" prepared by GHD[1] and compared the information there against my rebuttal evidence and Dr Ryan's evidence paragraph 20. The Summary Report (primarily between pages 48 and 54) provides assessment of the likely impact on water quality in the Mackenzie Basin should the new irrigation area proceed and with the soil in both the developed and the highly developed state.

6. Rather than the Water Quality Study, Dr Ryan may be considering the nutrient losses assumed in the calculation of the Nutrient Discharge Allowances (NDA) and the mitigation requirements. In that case the GHD report[1], and confirmed verbally to me by Dr Robson, indicates that in that calculation of the mitigation requirement to meet water quality standards that the developed case (Scenario 2) was used.

7. It must be noted however that the NDAs were set using the target water quality standards. This means that the NDA is independent of the scenario chosen to quantify the mitigation requirement.

[1] GHD (2009) Cumulative Water Quality Effects of Nutrients from Agricultural Intensification in the Upper Waitaki Basin. Summary Report. Prepared for Mackenzie Water Research Ltd. August 2009. GHD.

Clarification Regarding the Question about Consent Conditions

8. The Commissioners asked me if I had read the consent conditions proposed. I interpreted this as referring to the consent conditions for each of the individual applicants and answered in the negative to this question. It was pointed out to me later in the day that the question probably referred to the proposed generic consent conditions presented in the evidence of Mr Kyle[2] which I had read and discussed with other experts retained by MWRL.

9. I assume that the follow-up question would have been if I agreed that the proposed conditions were satisfactory to ensure that the farm discharges would meet their NDA and that water quality in the Mackenzie Basin would remain within acceptable limits.

10. My answer to that question would have been that the proposed consent conditions are suitable but that I think they are a little too stringent for some properties. As discussed, and agreed, in the nutrient caucus (12 October 2009), I think that soil sampling to determine development status should not be mandatory where properties meet their NDA at the highly developed setting in OVERSEER®. Also as agreed in the caucus, I think that temporal averaging of nutrient loads, of 3 to 5 years depending on transport time lags in the sub-catchment, should be allowed to account for the natural variation in farming practices arising from weather, stock prices, etc.

Stocking Rate Error on Nutrient Losses from Simons Hill Station

11. The Commissioners expressed surprise at the minimal effect of the error in the entry of the stocking units (SU) in the OVERSEER® model created for the current state of Simons Hill Station. It was entered as 7432 when it should have been 9600. Correction of the error resulted in changes in the animal outputs, atmospheric outputs, immobilisation and N fixation but there was no change, within the significance of the OVERSEER® reporting, to nutrient losses.

12. During questioning I suggested that the reason for the lack of response of nutrient losses to the stock units may have been that the wool exports, which are a separate entry in the model to stock units, may have originally been entered correctly but that I would need to check the models to conform this. Correct entry of the wool exports would have muted the effect of the value for stock units on nutrient losses.

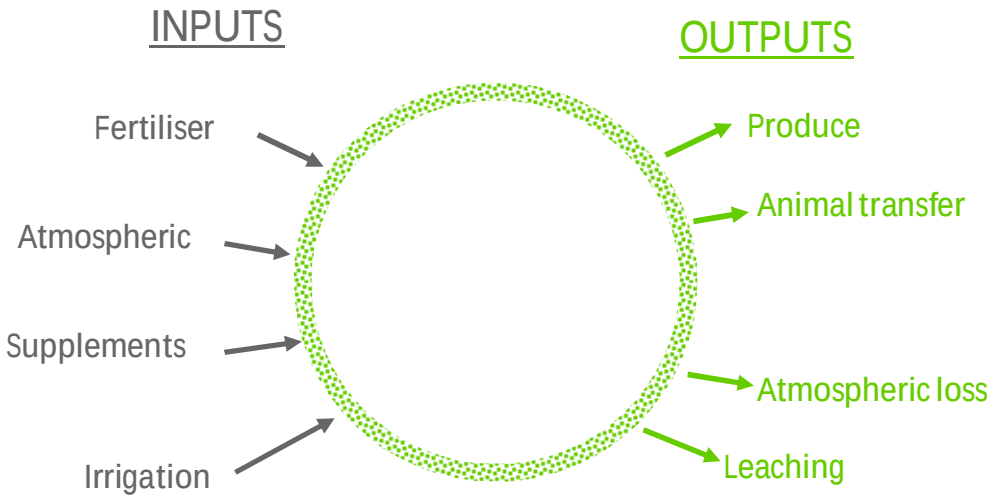
13. I have now checked the OVERSEER® models and my suggestion under questioning can be confirmed. The wool export value was entered correctly.

[2] Evidence of John Kyle. On behalf of Mackenzie Water Research Limited. (2 September 2009)

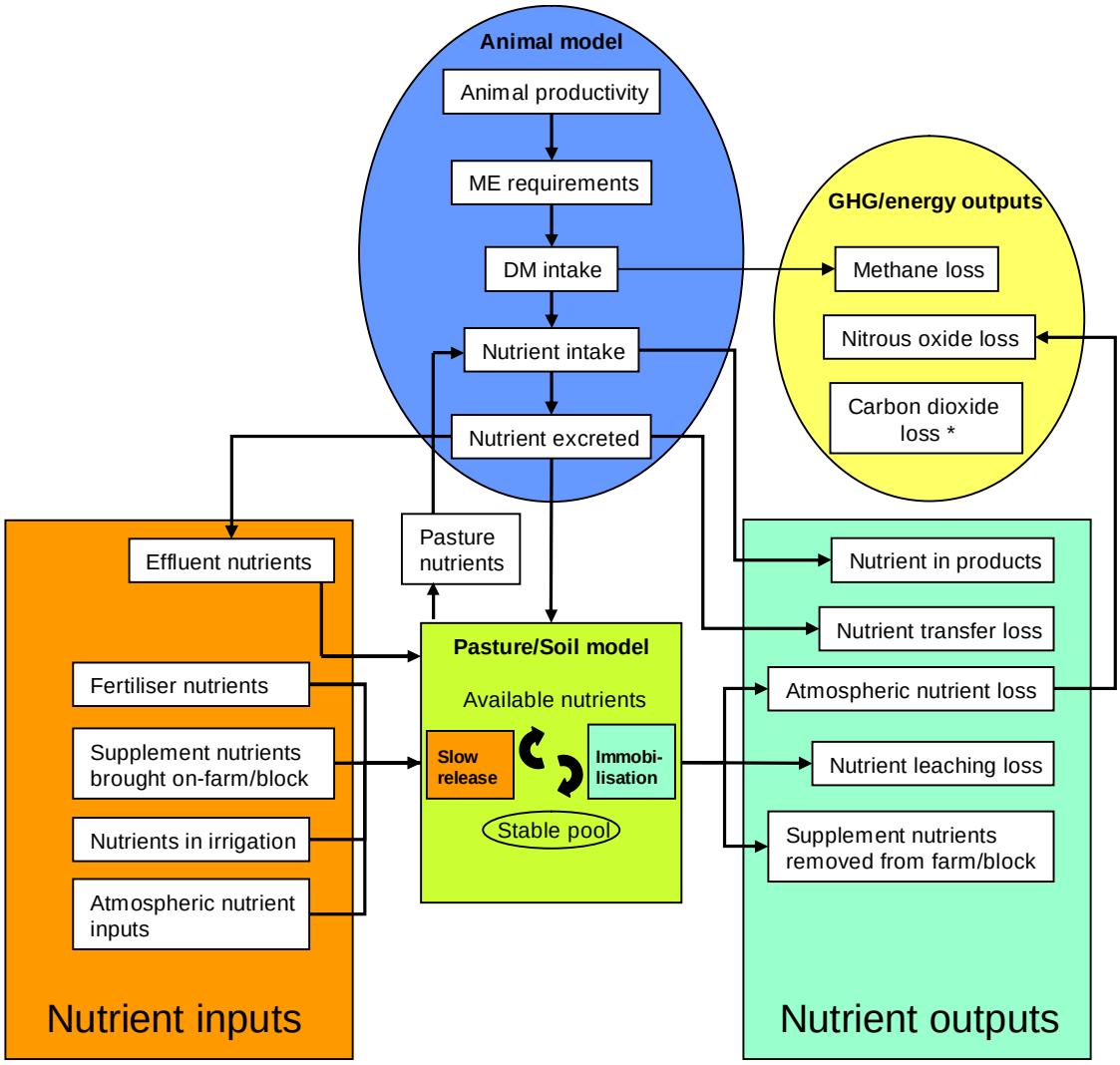
OVERSEER® Nutrient Flow Diagram

14. The Commissioners requested that a diagram showing the flow of nutrients as calculated by OVERSEER® be presented. Below I have inserted two diagrams prepared by Dr Ross Monaghan detailing these flows.

15.



16. The figure above shows the major inputs and outputs from the farm system.



17. The more detailed diagram above shows the internal flows between the farm system inputs and outputs. The user inputs to OVERSEER® include all the amounts in the orange box (with the exception of effluent which is internally calculated), the animal productivity in the blue oval, and the amount of supplements removed in the aqua box.

Val Snow, 12 November 2009