BEFORE COMMISSIONERS APPOINTED BY THE WAIKATO REGIONAL COUNCIL

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	of the First Schedule to the Act
AND	
IN THE MATTER	of Waikato Regional Plan Change 1- Waikato and Waipā River Catchments and Variation 1 to Plan Change 1
AND	
IN THE MATTER	of submissions under clause 6 First Schedule
BY	**BEEF + LAMB NEW ZEALAND LIMITED** **Submitter**

MEMORANDUM OF COUNSEL FOR BEEF+LAMB NEW ZEALAND LIMITED PROVIDING ANSWERS TO PANEL'S HEARING STREAM 1 QUESTIONS

30 April 2019

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MAY IT PLEASE THE COMMISSIONERS

1. Beef+Lamb NZ Limited's (B+LNZ) made submissions and called evidence on the hearing stream 1 topics.

2. The Panel had a number of questions for B+LNZ's counsel and witnesses that it undertook to answer. This memorandum and the appendices attached to it answer the questions of the witnesses from the Panel. Further submissions of counsel addressing those matters asked of this counsel will follow.

3. The questions have been answered by the witnesses with whom they have been raised, subject to the questions of Mr McIvor, which Mr Burtt has assisted with. The answers in the memorandum are those communicated to counsel and to some extent are paraphrased.

How many QEII covenants are on sheep and beef farms in the Waikato?

4. Mr Burtt advises that QEII covenants on sheep and beef farms are around 17 per cent of the total covenanted area in Waikato, and 0.1 per cent of the total area of Waikato region (about 2.4m ha).

Table 1: Area of Land that is Protected under QEII National Trust Covenants

District	**Area (ha)**
Waikato	1,414
Waipa	668
South Waikato	305
Sub-total	**2,387**
Matamata-Piako	477
Total	**2,864**
Source: QEII National Trust	

5. In 2016 the Trust undertook an analysis of sheep and beef farm survey farms and covenanted areas using the 2014-15 Sheep and Beef Farm Survey. It concluded that:

   (a) 20% of sheep and beef farm survey farms in Waikato have covenanted areas; and

   (b) Approximately 3% of the total area of Sheep and Beef Farm Survey farms in Waikato were protected by covenants.

Does Figure 3's waterway loadings of E.coli (CFU x 108/ha/pasture year for major sources of faecal matter in the Waikato region, New Zealand (in McDowell and Wilcock 2008) take into account flow? Should low flow conditions be considered in relation to the relative risk of different flow pathways on pathogenic risk for primary contact recreation?

6. Dr Dada has addressed the question in two parts, which is attached as Appendix MC1.

How well is OVERSEER calibrated to actual N losses across pastoral farming systems? Please provide the paper that provides measured N leaching in comparison to OVERSEER modelled N leaching.

7. Dr Chrystal advises that her investigations confirm that the OVERSEER model has been validated and calibrated continuously as new versions come out.

8. Validation is the comparison between modelled and measured results. Calibration is the process of adjusting the model parameter values so that the results of the model more accurately represent the measured data. In other words, following validation against measured results, the model's algorithms are calibrated to address that information and a new version released. This information is sourced from Watkins and Selbie (2014)[1] attached as Appendix MC2.

[1] Watkins, N., & Selbie, D. (2015). *Technical Description of OVERSEER for Regional Councils*. Retrieved from Ruakura, New Zealand: https://www.overseer.org.nz/overseer-explained/technical-description-of-overseer

9. Watkins and Shepherd (2014)[2] describes itself as a compendium of New Zealand experiments conducted at a farmlet scale that measure nitrogen leaching and "*which could be used for comparing with outputs from farm-scale models such as Overseer*". It was this paper that Dr Chrystal was referring to in answers to questions from the Panel and it is attached as Appendix MC3.

10. However, Dr Chrystal advises that her investigations have found that there is no published material that specifies the actual data used for OVERSEER validations and calibrations. She further advises that further calibration is currently being completed.

11. Nonetheless, an example of an independent validation[3] that analyses measured N leaching with OVERSEER predictions is Christensen et al (2012), attached as Appendix MC4[4]. That study compared data from a 3-year field trial where dairy cows were grazed for 8 hours a day and held in off-paddock facilities for the remaining 16 hours a day with a control that had animals on paddock for 24 hours a day. Nitrogen leaching was measured and good agreement was found between measured and modelled N leaching losses for both the control and the 8 hours grazing treatments.

12. Counsel understand that no such comparative analysis can be found for sheep and beef hill country systems.

Reproduce Figure 4 of Dr Cox's evidence so the legend is readable

13. Attached as Appendix MC5 are A3 versions of figure 4. In addition, accompanying this memorandum are .jpg files that can be zoomed and enlarged if required.

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[2] Watkins, N., & Shepherd, M. (2014). *A compendium of New Zealand pasture farmlet experiments measuring nitrogen leaching*. Paper presented at the Fertilizer and Lime Research Centre Workshop, Massey University, Palmerston North, New Zealand. https://www.massey.ac.nz/~flrc/publications.html

[3] That is, not used in a calibration of OVERSEER.

[4] Christensen, C. L., Hedley, M. J., Hanly, J. A., & Horne, D. J. (2012). Nitrogen loss mitigation using duration-controlled grazing: field observations compared to modelled outputs. *Proceedings of the New Zealand Grassland Association, 74*, 115-120. Retrieved from https://www.grassland.org.nz/viewpublication.php?pubID=357

At paragraph 71 of Dr Cox's evidence, where are the point sources referred to located?

14. The point sources are:

    (a) Pueto Geothermal

    (b) Wairakei Power Station

    (c) Ohaaki Power Station

    (d) Torepatutahi Geothermal

    (e) Waiotapu Geothermal.

15. Dr Cox advises that the largest N contributor is the Wairakei Power Station. The load information relied on comes from the NIWA Catchment Model and its report.

Reproduce Figures 2 and 8 (Nitrogen Source Pie Charts) for:

    (a) 2012 Agribase land use and updated N export co-efficients (emissions); and

    (b) 2018 Agribase land use and updated N export co-efficients.

16. Attached as Appendix MC6 are the new figures.

Does provision of 30kg N/ha/yr for LUC class 1 land provide for dairy farming?

17. Counsel understands and is instructed that 30kg N/ha/yr for LUC class 1 provides for dairy systems that are farming to their grass curve; for instance, with low input systems. Here, farming to the grass curve requires legume based pasture fixing atmospheric nitrogen under no irrigation and with maintenance fertiliser such as lime and superphosphate.

18. An example of systems that farm beyond their grass curve can include where there is reliance on bought in feed, irrigation, or/and high levels of fertiliser application, or/and winter crops. These systems may exceed

30kgN/ha/yr. Some extensive farming systems where they occur in areas of high rainfall and/or on course soils, such as gravel, may also exceed 30kgN/ha/yr.

Please provide a copy of the Snelder Paper Cited in Mr Parkes' Evidence

19. Counsel has not been able to obtain a copy of the Snelder Paper, but will provide a copy once it is to hand.

Please provide updated graphs of change in stock units per sector, including a short narrative under each graph i.e. summary number of stock units by species for the first and last year and percentage change over time

20. Mr Burtt has provided new versions of the graphs, along with narratives, attached as Appendix MC7.

What was the fertiliser application for the farm(s) based on entire area (c.f. effective)?

21. Attached as Appendix MC8 are a series of charts provided by Mr Burtt, that show the volume of the elemental components of fertiliser (N, P, K and S) applied per hectare according to three measures:

    (a) Per hectare fertilised area;

    (b) Per hectare effective area (i.e. the black line, which is as presented in the MR Burtt's evidence); and

    (c) Per hectare total area.

22. All three, particularly the volume applied per ha effective area and per hectare total area, show the same trend.

What is the difference between sheep and beef fertiliser use and dairy fertiliser use now (see Beetham's [67] and Table 3 at page 21)? Provide an updated table which includes sheep and beef fertiliser use for each time series.

23. Mt Burtt advises that the data are presented for each farm class, and the weighted average, for Waikato-BOP in figures 27 to 30 of his brief of evidence. The figures show the average amount of N applied per ha of effective area.

24. The N applied per ha to pasture on dairy farms in Waikato is about 10 times that applied to sheep and beef farms, on the face of the figures presented in Table 3, i.e. ~140 compared with ~14.

Has sheep and beef fertiliser use changed over time and, if so, by how much?

25. Mr Burtt confirms that fertiliser use has changed over time and is always evolving.

26. It is difficult to precisely identify how much that use has changed but figures 27 – 32 of Mr Burtt's brief of evidence show general trends on different farm classes.

In relation to the nitrogen reference point years, were 2015/16 and 2016/17 typical farming years? If not, why not?

27. Mr Burtt advises that 2014/15 was dry, though not technically a drought. However there would have been some lingering effects of the drought that occurred in 2012/13 and 2013/14. Further evidence on the representativeness, or lack of, in the NRP years is being provided by Dr Chrystal as part of Hearing Stream 2.

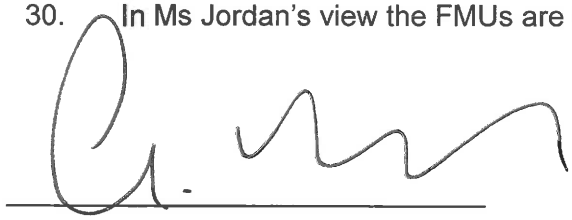
28. Attached as Appendix MC9 is a chart from B+LNZ resources, which uses NIWA data. It shows that the 2015/16 and 2016/17 seasons were dry on average, but not extremely so. As the previous two seasons were very dry and that would have had an impact on how some farmers farmed – in those seasons and in those immediately afterwards, depending on their individual circumstances. It is likely to have impacted how farmers timed the sale (and purchase) of stock and thus the number of stock on hand at balance date.

In relation to swimability, can numerical attributes be replaced with a narrative fresh water objective?

29. Yes. Narrative attributes are appropriate for those attributes that do not lend themselves to a numerical expression.

What are the freshwater management units in PC1?

30. In Ms Jordan's view the FMUs are at the sub catchment level.



CP Thomsen

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30 April 2019