BEFORE INDEPENDENT HEARING COMMISIONERS

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	Proposed Waikato Regional Plan Change 1: Waikato and Waipa River Catchment

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STATEMENT OF REBUTTAL EVIDENCE OF CRAIG DEPREE
FOR DAIRYNZ LIMITED
SUBMITTER 74050

16 MAY 2019

DairyNZ

Cnr Ruakura Road
& SH 26
Newstead
Hamilton 3286

1. INTRODUCTION

1.1 My full name is **Craig Verdun Depree**. I am a Principal Water Quality Scientist at DairyNZ since November 2018. My qualifications and experience are set out in my primary statement of evidence for Block 1.

1.2 I have been involved in the water quality expert conferencing for DairyNZ on Table 3.11-1, attending on 4 April and 15 May 2019. I did not attend the second day of conferencing on 15 April due to a long-standing commitment, but I remained engaged with outcomes and the email commentary between meetings.

Code of Conduct

1.3 I have read the Environment Court's Code of Conduct for Expert Witnesses contained in the Environment Court's Practice Note 2014, and I agree to comply with it. In that regard, I confirm that this evidence is within my area of expertise except where I state that I am relying on the evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this evidence.

2. SCOPE OF EVIDENCE

3. My rebuttal evidence is provided in response to the Evidence in Chief filed by **Dr Tim Cox** on behalf of **Beef and Lamb New Zealand Limited** (BLNZ) on 6 May 2019. I have read the rebuttal evidence of Dr Graeme Doole and Dr Bruce Thorrold for DairyNZ, who comment on Dr Alison Dewes and Ms Corinna Jordan's evidence in chief for BLNZ respectively.

4. In summary, I question Dr Cox's use of the alternative Total Nitrogen (TN) 'targets' in his modelling, because they are not supported by other evidence on behalf of BLNZ, and they have not been discussed or used by the water quality experts in the expert conferencing in the Proposed Waikato Regional Plan Change 1: Waikato and Waipa River Catchment (**PC1**).

5. For some FMUs, BLNZ's alternative 'targets' are likely to be c. 60% higher than options being assessed as part of expert conferencing. The BLNZ alternative 'targets' for TN are such, that compared to current state (5-year period 2014-

2018), the lower mainstem river would be classified as not being over-allocated with respect to nitrogen. The use of these high, and largely unexplained, BLNZ TN 'targets' result in the model yielding markedly higher export coefficients of nitrogen for the allocation scenarios.

6. In summary, although I am not expert in catchment modelling or planning, it appears that the alternative TN 'targets' greatly affects the results of the modelling and therefore the policy inferences drawn about the three allocation approaches covered in Dr Cox's evidence.

Choice of Nitrogen Concentration and implications for modelling results

7. I note that Dr Cox in his primary evidence for Block 2, uses an alternative set of Total Nitrogen 'target' concentrations for the attribute Total Nitrogen (Table 2, p.12). He uses these alternative 'target' values in the allocation scenario modelling presented. Dr Cox's evidence refers to the choice of concentrations (presented in Table 2, paragraph 24) as coming from another BLNZ expert Dr Hannah Mueller, (paragraph 22). Dr Cox states in his paragraph 45 that *"An alternative set of nitrogen concentration targets proposed by BLNZ, are presented and used here as reference. I have no opinion, one way or the other, with respect to their appropriateness for achieving the long-term strategy and vision in this catchment. I merely present them as informative alternative targets. It is my understanding that these will be investigated further through expert conferencing."* (Dr Cox, paragraph 23).

8. Dr Cox has set out in Table 2 (p. 12) alternative TN 'targets' applied to Waikato mainstem FMUs:

- Upper Waikato = 0.25 g/m^3 (same as 250 mg/m^3)
- Middle Waikato = 0.51 g/m^3 (same as 510 mg/m^3)
- Lower Waikato = 0.81 g/m^3 (same as 810 mg/m^3)

9. Dr Mueller's evidence refers to the origin of these values (Block 1 evidence, paragraph 59, footnote 62) as the manuscript of Death, R. G., Canning, A., Magierowski, R. and Tonkin, J., (2018)[1]. Which includes band thresholds for

[1] Death, R. G., Canning, A., Magierowski, R. and Tonkin, J., 2018. Why aren't we managing water quality to protect ecological health?. In: Farm environmental planning – Science, policy and practice. (Eds L. D. Currie and C. L. Christensen). http://flrc.massey.ac.nz/publications.html. Occasional Report No. 31. Fertilizer and Lime Research Centre, Massey University, Palmerston North, New Zealand. 13 pages.

nitrate-N of 0.11 g/m^3 (A/B band), 0.58 g/m^3 (B/C band) and 1.66 g/m^3 (C/D band).

10. It is not evident from either Dr Cox's or Dr Mueller's evidence how the original data source[1] (which enumerates nitrate-nitrogen thresholds, not TN) relate to the values provided in Table 2 of Dr Cox's evidence.

11. Dr Cox had assumed in his evidence that these 'targets' (i.e. 0.25, 0.51 and 0.81 g/m^3) will be investigated further in expert conferencing. Being part of expert conferencing (and part of the nutrient sub-group), I can confirm that these values were not discussed as one of approximately four TN/TP options for the mainstem river.

12. In the case of the the lower FMU, I suspect that the 'target' value used by Dr Cox is at least 60% higher than the options being discussed in expert conferencing. Furthermore, assuming the Table 2 values are from Death et al. (2018), the derived nitrate-nitrogen concentrations do not relate to phytoplankton growth – which is the TN (and TP) response being managed in the mainstem.

13. Dr Cox presents current state TN concentrations for the mainstem Waikato River sites in Table 3 (p.15) and Table 4 (p.16) of his evidence. For reasons that are not clear to me, the TN concentrations presented as 'current state' are markedly greater than those 5-year medians calculated for 2010-14, 2012-16 and 2014-2018 – summarised in Table 1 below. While I accept that TN concentrations are increasing (especially in the lower river), the TN medians from all three 5-year time periods are markedly lower than those presented in Dr Cox's evidence, and importantly, all lower FMU river sites are less than the alternative BLNZ 'target' of 810 mg/m^3 of TN.

14. It is unclear what time period Dr. Cox has used to calculate his current state values of TN.

Table 1 Comparison of current state TN concentrations (all mg/m^3) used in Dr. Cox's evidence with 3 other 5-year median time periods – 2010-14, 2012-16 and 2014-18. Bold text indicates current state median values for lower river sites shown that are below BLNZ's alternative TN 'target' of 810 mg/m^3.

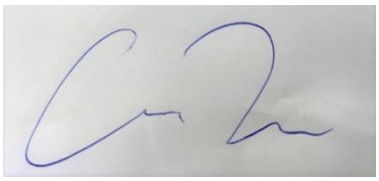
Station	Table 3 - Dr Cox's evidence, p. 15 (TN mg/m^3)	5-year median (2010-2014) [2]	5-year median (2012-2016) [3]	5-year median (2014-2018) [4]
Ohakuri Tailrace Br	280	211	200	216
Whakamaru Tailrace	370	271	250	266
Waipapa Tailrace	410	336	330	350
Narrows Boat Ramp	630	410	430	515
Horotiu Br	680	441	460	535
Huntly-Tainui Br	880	**585**	**600**	**720**
Mercer Br	920	**662**	**620**	**740**
Tuakau Br	830	**595**	**620**	**720**

15. My main issue with the outputs of the modelling presented by Dr. Cox is that they make use of BLNZ's alternative TN 'targets', which for the lower FMU, are likely to be at least 60% greater than the options being considered through expert conferencing. Accordingly, the model results based on BLNZ's alternative TN 'targets' will afford markedly higher export coefficients for the three allocation scenarios presented in his evidence.

16. Although the higher than expected current state estimates presented by Dr. Cox (Table 1) are lower than BLNZ's alternative TN 'targets', for at least lower FMU mainstem sites, these 'targets' are greater than current state calculated as 5-year median values (shown in bold text, Table 1). For example, using the most recent 5-year time period (2014-18) the lower FMU sites ranged from 720-740 mg/m^3, compared to the BLNZ TN 'target' of 810 mg/m^3. This implies the lower FMU is not over-allocated with respect to TN, and that modelling using the BLNZ 'target' of 810 mg/m^3, includes a component of nutrient 'headroom'. The concept of 'headroom' and the general position that the lower FMU is not over-allocated with respect to nitrogen is, in my opinion, not consistent with PC1, which seeks to reduce the amount of contaminants entering the river.

[2] Section 32 report. Part D Objectives. D.4 Appendices – D.4.1. Appendix 1 – Current state and long-term water quality targets for the Waikato and Waipa River Catchment pp. 105-119.
[3] Tulagi (2017). Waikato River water quality monitoring programme: data report 2016. Waikato Regional Council Technical Report 2017/14.
[4] Evidence of Dr Michael Scarsbrook (block 1, Doc#13907871 – Table 3A p. 9)

17. Although I am not expert in catchment modelling or planning, the choice of BLNZ's alternative TN 'targets' for the mainstem have greatly affected the results of the 'alternative' scenario modelling and therefore the policy inferences that can be drawn about the three allocation approaches covered in Dr Cox's evidence, namely i) equal allocation; ii) flexi-cap, and iii) land-use capability.



Craig Verdun Depree **16 May 2019**