IN THE MATTER OF	The Resource Management Act 1991
AND	
IN THE MATTER OF	Lake Rotorua Nutrient Management – **PROPOSED PLAN CHANGE 10** to the Bay of Plenty Regional Water and Land Plan

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REBUTTAL EVIDENCE OF LEE ANTONY MATHESON
ON BEHALF OF THE BAY OF PLENTY REGIONAL COUNCIL

Responses to: Carla Muller (Dairy NZ/Fonterra)

Qualifications and experience

1 My full name is **LEE ANTONY MATHESON**. I refer to my full evidence in chief in respect of my qualifications, experience and statement of compliance with the Expert Witness Code of Conduct and confirm those details here via this cross-reference.

Responses to evidence of Carla Frances Muller

2 Since preparing my evidence in chief, I have reviewed the expert evidence of Carla Frances Muller on behalf of DairyNZ Ltd and Fonterra Co-operative Group Ltd. I should note that I do not intend to respond to every point raised in the evidence of Ms Muller, but I have focused more directly on what I consider to be the points that relate most closely to my own field of expertise. Where I have not responded on other issues that does not mean I necessarily agree with Ms Muller's evidence on those issues.

Validity of productivity mitigations in assessing economic impact

3 In paragraph 5.3 Ms Muller states that the inclusion of productivity improvements to offset the economic cost of meeting proposed NDAs [as per the scenario modelling utilised in the 2014 NDA Impact Analysis report] "is likely to understate the actual impact of meeting the nitrogen limits in PC10".

4 I disagree with this statement. In our 2014 study the decision about whether to include an allowance for productivity as a mitigation was extensively covered in both the methodology and conclusion, with the prevailing view being that over a 20 year timeframe assuming some productivity gains primarily reflecting a) lifting below average performance to at least [current] average performance levels within the catchment and (b) incremental improvements was considered reasonable. Of course the inclusion of

productivity increase in the mitigation suite considered didn't necessarily mean they were applied or achieved in all farm systems.

5 We did note that the inclusion of productivity improvements within a mitigation framework potentially confounds estimates of changes in profitability associated with [system change in] achieving N loss reduction, but it gave guidance to stakeholders about the extent of system change and the improvement that might be required to offset financial cost.

6 However, assuming farmers will make no productivity improvement [or make no attempt do so] in the face of a clear economic imperative to do so is, in my opinion, nonsensical. Ignoring the potential for some productivity improvement over a moderate time frame potentially presents a worst case scenario. Of course, assuming everyone can make substantial improvement and approach upper quartile performance is equally unrealistic. Aware of this, our assumptions and treatment of productivity improvement in the 2014 NDA Impact Analysis, which was relevant to those specific terms of reference, strove to strike a balance between these extremes.

7 In the Perrin Ag 2014 NDA Impact study, of the eight dairy farm system models we analysed, the farm system changes employed resulted in an increase in per cow milk production in only four (50%) of the scenarios. As regards the other scenarios, in three per cow production remained unchanged and one actually ended up with lowered per cow production. The potential range in the per cow production increase, where it was "achieved" was 1.3% to 7.8%. The modelled productivity gains in the study don't appear inconsistent with Ms Muller's statement in paragraph 5.5 of "Over time, we can expect such improvements incrementally, but not on all farms to the same extent".

8 Interestingly overall the [arithmetic] average increase in per cow dairy production from the base models to scenario models in the NDA Impact Analysis study was 380kg/cow to 386kg/cow – an increase of 1.57%. This is in line with the compound annual rate of increase in per cow milk production of "less than 1.5%" [1.46%] quoted by Ms Muller from the 2014 Dairy Statistics. I also note that in the summary (Appendix B2) of the DairyNZ modelling approach that Ms Muller refers to in paragraph 5.8 it states that "production per cow was allowed to increase slightly per year to account for genetic gain in line with increases in the last 10 years".

9 In paragraph 5.9(c) and 5.12 Ms Muller refers to the 8%-22% reduction in operating profit observed in three modelled Fonterra/Dairy NZ case studies in meeting their 2032

pNDA target and implies that this greater loss of operating profit in meeting 2032 NDAs (versus the modelled 0% - 10% decline in our 2014 analysis) is due to the inclusion of productivity improvements in our modelling.

10 I disagree with this assertion. There are a number of potential sources of variance between the two studies modelled outcomes. This makes direct comparison between the specific "costs" of abatement in the two analyses problematic and makes it impossible to highlight a single assumption as the difference for variation. These include the impact that the evolution of OVERSEER in the time between the studies will have had on individual farm systems (5.4.11 versus 6.2.1), the extent of the N loss reduction modelled (35.5% in the DairyNZ work versus 28% in our 2014 study), the specific choice of mitigations chosen, the relative economic assumptions used and the limited data sets. In addition, as per paragraph 8 above, the DairyNZ modelling potentially allowed for gains in per cow productivity derived from genetic gain, although it isn't clear from their appended analysis the extent of modelled increase in per cow production that arose from this assumption.

11 There was certainly a difference in the approaches of the two analyses; the DairyNZ modelling referred to by Ms Muller assumed farmer skill stayed constant, whereas the Perrin Ag 2014 study allowed for system changes, if considered appropriate, that would require, in our view, an improvement in on-farm management skill from that in the base modelling. How much this contributed to the differences in the cost of abatement between the two studies is extremely difficult to determine.

12 What is more relevant, as outlined in paragraph 21(ii) in my evidence-in-chief, is that lifting on-farm productivity in response to the need to mitigate N losses is a key factor in the extent of any [negative] financial impact on farm systems.

Extent of farm system change

13 In paragraph 5.6 of her evidence, Ms Muller refers to my statement in paragraph 21(vi) in my evidence-in-chief that some dairy and dairy support farms are likely to have to make system/land use changes beyond that extent originally envisaged by BOPRC and StAG back in 2014. In her evidence she appears to infer that the NDA impact report recommended a dairy farm sector reduction of only 25%. I disagree with this inference. Our 2014 report made no recommendations on the extent of any N loss limits for the farming sector(s). We simply analysed the economic impact on farms meeting N loss limits as prescribed in our Terms of Reference.

14 Further to this, my evidence-in-chief clearly states that it is a combination of OVERSEER version change and the notified allocation framework that might require some farmers to have to deliver N losses greater those tested in the NDA impact study. This conclusion was reached after the 2016 update to the study which migrated the original OVERSEER 5.4.11 N losses to OVERSEER 6.2.0, had the BOPRC assign pNDA targets to the farm systems based on base N losses and assessed the N loss outputs from "maximum N loss scenarios" against these hypothetical pNDAs. It probably is important to note that the "Single" NDA scenario models in this study did examine greater potential reduction than 25%, with dairy farms having to achieve N losses of 35kg N/ha/year as expressed in OVERSEER 5.4.11, which for two of the case study farm systems was significantly in excess of 25%.

Catchment extrapolation

15 In paragraph 5.12 Ms Muller suggests that Professor Doole extrapolated the 2014 NDA Impact case study analysis to a catchment level [in Parsons et al 2015].

16 I disagree with this statement. The modelling work that was utilised by Parsons et al was a specific and completely separate piece of work from our 2014 NDA Impact Analysis study and its subsequent 2016 update.

17 The farm system scenario modelling required by the Economic Impacts of Rotorua N Reduction project was a two stage process that firstly (a) established a modelling protocol for pastoral farming prioritising mitigation actions that would determine how hypothetical farmers would respond to required reductions in N leaching and then (b) utilising the prescribed modelling protocol in OVERSEER and FARMAX to identify cost and leaching implications of the different mitigation scenarios for each representative farm system type, in order to provide a set of relationships between profit and leaching.

18 I was involved both in the initial development of the [step-wise] mitigation protocols for the farm sectors, along with DairyNZ staff and other local farm consultants, and then subsequently engaged to undertake the modelling work, which was completed in November 2014.

19 The key differences in the modelling process between my earlier 2014 work and the Economic Impacts project was that the modelling protocol utilised for this latter analysis mandated that production per cow had to remain static. This prevented modelling any improvement in calving spread, genetic merit or pasture utilisation (i.e. grazing management) to deliver an improvement in kg MS/cow. This approach would appear to

have much closer alignment with the DairyNZ modelling approach referred to by Ms Muller than the approach we were required to take for the 2014 NDA Impact Analysis study.

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Date: 5 March 2017

References

Parsons, O.J.; Doole, G.J.; Romera, A.J. 2015. On-Farm effects of diverse allocation mechanisms in the Lake Rotorua catchment. Report for the Rotorua Stakeholder Advisory Group, August 2015. 71 pages.

Perrin Ag Consultants Ltd. 2014: Rotorua NDA Impact Analysis. Final report to Bay of Plenty Regional Council. 147 pages.