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

Evidence topics: Meeting nutrient loss targets on dairy farms in the Lake Rotorua catchment; Rotorua NDA impact analysis and subsequent update; Methodology for creation of NDA reference files and stocking rate table

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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.

Scope of Evidence and Summary

2 My evidence concerns two main areas of interest. The first is the impact that meeting nutrient loss targets will have on affected farm businesses (Part I). The second is methodology and output behind the creation of the sector reference files proposed in PC10 to manage the basis risk associated with OVERSEER® version change on the nominal nitrogen discharge allowances (NDA) allocated to farm properties within the Lake Rotorua catchment (Part II).

PART I. *Economic impact on farmers of meeting proposed nutrient limits*

3 Following on from earlier work commissioned by the Bay of Plenty Regional Council (BOPRC) and the Lake Rotorua Primary Producers Collective in 2012, Perrin Ag Consultants were engaged by the BOPRC in 2014 to analyse the financial implications, as measured by operating profit (earnings before interest and tax, EBIT) of the draft NDA levels proposed by the BOPRC and the Stakeholder Advisory Group (StAG) at an individual farm level.

4 This analysis was completed using a range of hypothetical and real farm case studies that were deemed to be illustrative of farms within the Lake Rotorua catchment. The case study farms were modelled in Farmax and Overseer® software to determine how operating profitability changed as farmers made realistic decisions to optimise their farm systems in a restrictive N loss environment. This included productivity gains considered realistic in the best professional judgement of the authors. The draft report was externally peer reviewed prior to publication.

5 The analysis from this study was then reviewed in January 2016 (Update of the NDA Impact Analysis, 2016) to ascertain whether or not the extent of mitigations originally considered for "typical" farm systems in the Lake Rotorua catchment were now sufficient to meet the draft "sector range" allocation framework. In addition, in light of the extreme volatility in milk price experienced by the dairy sector since the initial study, as well as cyclically high prices for red meat and wool, it made sense to review the product pricing assumptions that were originally used to assess the economic impact of farmers actively altering farm systems to lower diffuse nutrient losses.

6 In summary, the main findings from this combined body of work were:

(i) Farming under a restricted nitrogen loss regime, like that proposed for the Lake Rotorua catchment, is likely to have differing financial impacts across farms and farm systems.

(ii) The ability to lift 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. As a result, N efficient/highly productive farm systems are more likely to be [negatively] impacted by a reduction in allowable farm gate N losses.

(iii) Dairy farms will likely need to rely on a combination of lower annualised stocking rates, improved per cow milk solids production and replacing high N feed and high N loss feed with low protein alternatives to reduce N losses. Most of the case studies experienced some degree of decline in operating profit (EBIT) in reaching the proposed limits.

(iv) Dry stock farms should firstly eliminate the use of N fertiliser where it is deemed to be unprofitable and then eliminate/reduce winter cropping to lower N losses. After that improving per head productivity or shifting feed used for livestock maintenance into more N efficient livestock classes are key

strategies. However, the extent to which these changes resulted in profit increasing, decreasing or remaining unchanged relied heavily on the relative profitability of the various enterprises and their mix in the system. This is because of the variability in both N losses and annual profitability from the numerous livestock farming systems utilised within non-dairy pastoral farming operations. As a result, the complexity of non-dairy pastoral farming systems makes identifying the definitive financial impact of N limits on the sector extremely difficult.

(v) It is important to recognise how the changes in the prices of inputs and outputs associated with a mitigation strategy can alter the perceived and actual financial impacts of meeting N loss targets. When output prices are low, the financial impact of lowering production reduces. Likewise, when input prices are high, reducing their [inefficient] use improves the cost structure of the business. Of course the converse obviously applies. Therefore, while the requirement to lower N losses is not, in of itself, the sole determinant of a farm business's financial health, it will potentially limit the ability of a farm system to change in response to volatility in market prices or climatic conditions as they occur over time in order to maximise profitability.

(vi) The combination of OVERSEER® version change and the sector range allocation subsequently notified in PC10 is likely to require some dairy and dairy support farms to make system/land use changes beyond the extent originally envisaged by BOPRC and StAG back in 2014. This is consistent with the average dairy farm sector reduction having been set at 35.3% (versus an analysed reduction of only 25% in the 2014 Perrin Ag report.

PART II. Methodology and output of the sector reference files

7 Perrin Ag Consultants Ltd was engaged by the BOPRC in August 2015 to create dairy and drystock sector reference files using Farmax and OVERSEER software for the purposes of managing OVERSEER version change on the PC10 nitrogen discharge allowances.

8 Initially the reference files were designed to represent farm systems with the average per hectare 2032 discharge of the range in N losses associated with each sector as determined by the dual range allocation method. On this basis, the models, whilst utilising a hypothetical block set-up that was representative of the geo-physical characteristics of the Rotorua catchment (see below), were intended to be both physically and financially feasible – to some extent providing a "proof-of-concept" of viable farming enterprises operating within the limits of the relevant sector average 2032 NDA. This was successfully completed and incorporated into the notified plan change.

9 After initial submissions on PC10 were received, new reference files were then designed to be representative of the "average" benchmarked dairy and dry stock farming systems as they would have been during the Rule 11 benchmarking period (2001-2004), both in terms of farm system and average per hectare N discharge. Again, this was successfully achieved.

10 The primary objective of this change was to create reference files that tracked the average benchmarked sector losses through OVERSEER versions as closely as possible. Since completing this latest iteration of the reference files I have had the opportunity to read the evidence of Mr MacCormick dated January 2017 and to discuss the application and outcome of the proposed new reference files with him. As a consequence of this it is my opinion that the revised "sector benchmark average" files will deliver improved relativity with benchmarked N losses through OVERSEER version change, and that they will therefore provide a better option for use in the framework than those originally developed in August 2015.

Conclusion - overall

11 The N loss restrictions placed on farm properties in the Lake Rotorua catchment through the sector range allocation proposed in PC10 will, in my opinion, have a variable impact on the [operating] profitability of farm businesses.

12 Most of the dairy farm systems (based on the case studies), irrespective of their relative productivity, are likely to have their financial performance (EBIT) negatively affected by the proposed N limits

13 However, it is extremely difficult to definitively identify the broad profit impact of these proposed N limits on non-dairy pastoral farms. It would appear that [predominantly] dairy support farms are most likely to experience reduced operating profit as a result of the PC10 allocation. In comparison, mixed sheep, beef and/or deer farm systems will, on average, have a greater capacity to reduce N losses before profitability is negatively affected.

14 Based on the sheep, beef and deer case studies examined, this higher level of financial resilience appears to be due to a greater potential for productivity gains identified within the non-dairy farm systems, a lower required sector reduction (17.2%) and greater flexibility within the mix of livestock production systems available to these farms.

15 However, it is apparent that the N loss limits proposed under PC10 will potentially limit the ability of a farm system to change in response to changes in market prices over time in order to maximise profitability. This includes changing land use to a more intensive and higher value activity.

16 Given the likely economic impacts of the PC10 N loss allocation on farm businesses, delivering certainty around allocation is critical to allow farmers to make medium to long term decisions within their businesses, particularly as regards capital investment and major farm system design.

17 On the basis that such N loss limits are to be allocated using the proposed sector range approach, which is anchored by historic [benchmarked] sector N losses, the use of a "sector benchmark average" reference file appears to provide the best option for maintaining the relativity (and certainty) of allocation both between sectors and within sectors as OVERSEER changes through time.

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