

BEFORE THE INDEPENDENT COMMISSIONERS

IN THE MATTER OF

the Resource Management Act 1991

AND

IN THE MATTER OF

the Proposed Waikato Regional Plan Change 1

**STATEMENT OF EVIDENCE OF ROBERT VAN DUIVENBODEN ON BEHALF
OF LANDCORP FARMING LIMITED**

Submitter 83313

July 2019

INTRODUCTION

1. My name is Robert van Duivenboden. I am the Environment Manager (Taupō) for Landcorp Farming Limited (Pāmu), a role I have held for 4 years. I presented non-expert evidence on aspects of Pāmu's submission dated 8 March 2017. This evidence relates to the topics of the termed "Block 2" hearing issues.
2. My qualifications and experience are as set out in my Block 1 evidence.
3. I confirm that I have authority to give evidence on behalf of Pāmu.

BACKGROUND

4. As explained in my Block 1 evidence, Pāmu is a State Owned Enterprise (SOE), employing about 700 people on over 100 farms around New Zealand.
5. Pāmu is one of few large scale entities with significant livestock (beef cattle, sheep and deer) (7 farms) and dairy (bovine and ovine) operations (20 farms) in the catchment. This means that Pāmu has a keen interest in the cross-sectoral implications and effects of the Proposed Waikato Regional Plan Change 1 and Variation 1 ("PC1").
6. As expressed in my Block 1 evidence, Pāmu supports the effective and efficient attainment of the Vision and Strategy for the awa and agrees it is crucial that the provisions of PC1 appropriately and sufficiently achieve this. However, in the same way that Pāmu has concerns with the proposed objectives, means and methods (as explored during Block 1) there are also, as I outline in this evidence, significant clarity and workability issues with some of the more detailed Block 2 issues.

SCOPE OF EVIDENCE

7. My evidence for the Block 2 hearings addresses the following issues:
 - (a) Under Topic C1 (Diffuse discharge management):
 - (i) the use of the OverseerTM model in practice and regulation;
 - (ii) the proposed Nitrogen Reference Point (NRP) approach and reductions (75th percentile); and
 - (iii) Land use change;

- (b) Topic C4 (Stock exclusion rules); and
- (c) Topic C6 (Point source discharges).

EXECUTIVE SUMMARY

8. As submitted in Block 1 evidence, Pāmu seeks a plan change which is fair and equitable to all those who live and work in the catchment. On the topics within the scope of Block 2, Pāmu submits that:
- (a) Overseer in its present form is unsuitable for providing the basis for the regulatory approach proposed in PC1. Pāmu sets out some examples showing the challenges with OverseerTM and submits that a greater focus on auditable Farm Environment Plans (FEP) would likely be a more effective and fair means to make progress in achieving PC1's aims, pending the development of improved modelling tools.
 - (b) Given the range of issues with OverseerTM and likely protracted timeframe to resolve these, it follows that establishing a NRP regime on the basis of that tool is problematic. In addition, if the NRP approach is progressed, consideration needs to be given to the appropriate methodology for calculating the NRP percentile framework.
 - (c) Pāmu questions the efficacy of 3.11.5.7 and Policy 6 (land use), and the S42A Block 2 recommendation in meeting the objectives of the RMA, particularly as it does not adequately address phosphorus and other contaminants.
 - (d) The S42A Block 2 report proposal to adopt Southland physiographic descriptors to assist with stock exclusion rules is inappropriate given the geography of the Waikato catchment.
 - (e) The Council's vision and strategy are more likely to be achieved if all point source discharges are considered.

OVERSEER IN REGULATORY APPROACHES

9. As set out in full in my Block 1 evidence, Pāmu considers there are significant challenges and issues in using OverseerTM as the basis for regulation, as is currently proposed under PC1.

10. That position remains, and Pāmu is particularly concerned with the uncertainties and inconsistencies raised by its use and application as an allocation tool within PC1.
11. Pāmu acknowledges the challenges in nutrient leaching measurement and supports Overseer's use for risk based assessments, however Overseer has limitations (which have not yet been addressed) and therefore should not be used as a basis for such significant planning reform. Pāmu reiterates it would like to see confirmation that the necessary improvements can be made to Overseer™ in a timely manner, to be used as the basis to meet PC1's objectives.
12. Pāmu understands the Panel is aware of national and regional concerns regarding the use of the tool Overseer™ in RMA matters, however to further assist it in its consideration of these matters the following observations are provided as examples of the issues experienced by Pāmu. Issues such as these underpinned Pāmu's submission to the Panel on the Block 1 higher policy matters.

Practice based observations of nutrient emissions on our farms

13. In its Block 1 evidence Pāmu highlighted the likely error ranges associated with any individual result out of Overseer™. To assist the Panel, in this evidence I provide real world examples where true N loss can be estimated and with inferences exemplifying the need to exercise caution around Overseer™-based plan promulgation. This has implications in terms of the way the notified Plan (and the current S.42A position) continue to envisage the concept of the NRP, any percentile derivations and their subsequent regulation mechanism.
14. A multi-regional view of Overseer™ predicted outputs, versus the true water quality values, is possible across Pāmu's national portfolio and serves to inform the Panel of the "overs-and-unders" known to Pāmu and the evolving nature of Overseer™ knowledge and verification. I set out below three examples from different regions across Pāmu farms which, in Pāmu's view, confirm Overseer's limitations as a tool for assessment and regulation.
15. On a Pāmu **Canterbury** complex, Overseer™ predicts a Nitrogen loss concentration of 31 mg/L. For the reasons set out in my Block 1 evidence, that Overseer™ reading should be more realistically interpreted to be a range of ²¹ **31** ^{45.5} mg/L lost from the root zone and stony soils under our

dairy units. The aquifer under the relevant farms reveals **6 to 16** mg/L from bores nearby (refer to Appendix A). In my experience, there should be many-fold significant mixing into relatively clean water available in an aquifer at those moderate bore depths, however, it appears that this is not the case. We are therefore concerned that Overseer™ may underestimate the true losses from farms, as a large dilution should be occurring, but that is not observed.

16. At our **Moutoa** dairy complex near Foxton, Overseer™ estimates around 6 mg/L nitrogen is lost. As above, this should more realistically be interpreted as being a range of: $4.2 - 6 - 9$ mg/L N.

Our field testing of the underdrainage water reveals 12 mg/L average for the year (refer to Appendix B). We therefore believe Overseer™ significantly under-predicts reality in both the Foxton and Canterbury catchments.

17. On one of our irrigated dairy farms in the **Taupo** region Overseer™ predicts $6.3 - 9 - 13.5$ mg/L. Lab testing of the shallowest ground water reveals about 7.5 mg/L measured (year average, n=4). In general terms therefore, Overseer™ over-predicts the potential for the effect on shallow groundwater in that particular location and exact circumstance (refer appendix C).

18. In addition, as Panel members are aware, to be accurate, Overseer™ needs to be calibrated on the relevant soils and this has not occurred to date. Overseer™ has not been calibrated on the relevant soils in the above examples. There are many soil types in the Waikato for which Overseer™ is not calibrated (including all Waikato pumice soils that are so topical to PC1).

19. In light of these variances, we believe that Overseer™, and other models, are currently unsuitable as a basis for the regulatory approach proposed in this Plan. In our opinion, and as asserted in our Block 1 evidence, that view is mirrored by the December 2018 PCE Report.

20. **N loss under Lucerne**

21. In addition to the examples above of Pāmu's experience, Pāmu is concerned about Overseer™ accuracy with respect to certain crops and practices. Lucerne is an increasingly used, long lived, water efficient, leguminous pasture in both our dairy and livestock operations regionally. I note that its use is generally increasing in the upper Waikato.

22. My understanding is that Overseer™ assumes approximately 20 kg N/ha is lost under Lucerne. However, independent research has demonstrated leaching around 5 kg N/ ha under cut and carry simulation.¹ Whatever the accuracy of the data for this circumstance, the point is simply the wide discrepancy between Overseer™ modelling and actual testing which, as with the farm examples provided above, is further evidence of the challenge of using Overseer™ as the basis for regulation. In our view, it would be problematic in determining a business' NRP or 75th percentile and in subsequent compliance mechanisms.
23. The situation for dairy-grazed (in-situ grazed) lucerne is even less certain than the cut & carry example above. Overseer indicates up to 86 kg N/ ha is lost below in-situ grazed lucerne blocks². Whereas current Landcare Research Ltd applied research on simulated dairy grazed lucerne, indicates 5-7 kg N/ Ha of measured N loss.³
24. Such discrepancies between modelling (using Overseer™) and testing are material with respect to farm system design and financial performance to meet targets. Consequently, unintended outcomes are very likely with the Plan as proposed (and as recommended in the S42A Part2). That is, some farmers may choose to remove recently planted lucerne to meet or maintain a historic 2014-'16 period NRP, whereas in likelihood, the true N loss may be mitigated by lucerne use.
25. In Pāmu's view, the issues with Overseer™ can be avoided and the objectives of PC1 given a greater degree of success and earlier progress by Farm Environment Plans (FEPs) via innovation, system optimisation and often at modest business costs. FEPs, with auditable measures of progress in actioning on-farm mitigation to reduce nutrient and microbial losses to waterways, will be addressed more fully in Block 3 evidence.

NITROGEN REFERENCE POINTS

26. Pāmu previously submitted that erroneous results from imprecise use of Overseer™ are probable where any of the following are present:
- (a) mole-ploughed, under-tiled, or 'Novacoil'-drained farmland exists,
or

¹ (N-leaching under lucerne: Final Report Malcolm McLeod Landcare Research Prepared for: Taupō Lake Care Inc. September 2015).

² (Resolution Dairy Unit Overseer 17/18 Yr) Appendix D

³ (Landcare Research Ltd, in preparation).

- (b) unsealed effluent ponds exist, or
 - (c) direct connectivity between sources and streams.
- 27. The above practices are likely to be commonly occurring across the Waikato region. If all or any of those critical factors are present, then the proposed Overseer™ based NRP would be an underestimate of the true N loss.
- 28. Any use of incorrect individual NRP results as above, will skew the aggregated set of NRP figures, from which the proposed percentiles are to be calculated. The potential wide error band for any proposed 75th percentile, or 50th percentile calculated, would be concerning for businesses, both above and below such constructed thresholds.
- 29. Given the significance of the impositions to business of the proposed percentile ranking system (derived from NRPs within an FMU), then
 - (a) a robust statement of the method of calculation and
 - (b) further justification of the basis for the regulationis required to meet the purposes of the Act
- 30. Notwithstanding the concerns expressed in Pāmu’s Block 1 evidence and here with the proposed NRP construct, if the 75th and 50th percentile risk descriptors are retained, the method of percentile calculation is also important. This is because there are many percentile calculation methods available, of varying quality. Generally, where percentile standards have been imposed, the specific method has been specified for the calculation. The Hazen method is currently used in other New Zealand regulation⁴ and is recognised as a ‘centralist’ and suitable method in regulation⁵. Pāmu is not advocating any one method over another but is raising the importance of appropriate methodology should the NRP system be adopted.
- 31. The NRP concept and detail appears inappropriate for proposed Policy 7 “preparing for allocation” in its current form. Pāmu proposes two alternative options for consideration.

⁴ (MoH, NZ Microbiological water quality guidelines for marine and freshwater recreational areas Publication date: June 2003 Publication reference number: ME 474)

⁵ (National Objectives Framework Statistical considerations for design and assessment Prepared for Ministry for the Environment, September 2016).

32. First, Council could make a refined NRP process a candidate for a next plan providing more time to resolve the catchment's rivers' N, P, or N and P sensitivity issues, including by season. That will require significant applied research and investment. This will take time, but in our view, lead to better long-term outcomes for all parties.
33. Second, Council could mitigate N losses via FEPs, until N input options are available, or N output metrics are shown to be appropriate and suitably robust. Much rapid surficial N loss is anticipated to be addressed via FEP, via removing bad practices. As advanced in our Block 1 evidence, bad practice that Overseer™ already assumes is absent and which additionally skews any collective or individual farm modelling. Pāmu submitted in Block 1 that prohibiting bad agricultural practice via Rules and FEPs, is likely to yield greater in-Awa outcomes than the NRP process proposed.
34. The NRP process proposed by PC1 could be used as a broad ranking for FEP timelines. It is presumed that a similar 75th percentile reference point tool has not been provided for the other 3 contaminants due to there being no commonly used, reliable tool to measure those farm emissions? At this time, it is considered that the same problem exists for N regulation.
35. Pāmu supports some ranking technique to identify areas for improvement with respect to nitrogen, but the NRP and a 75th percentile appear weak mechanisms compared to other readily available indicators such as brought in feed, stocking rate and per unit area production. More reliable and verifiable data are likely to exist for those latter metrics. With respect to needed nitrogen mitigation, Pāmu has already submitted that in the interim, it may be better to agree, list and prohibit poor agricultural practices instead of attempting to use the model Overseer™ for NRP generation and percentile calculation.

RESTRICTING LAND USE CHANGE: POLICY 6 AND RULE 3.11.5.7

36. Proposed Policy 6 seeks to restrict land intensification and directly affects the likelihood of attainment of Plan Objectives 1 - 5.
37. In Block 1 Pāmu submitted that the criteria for assessment of 3.11.5.7 was largely atechanical and therefore Policy 6 can only be assessed poorly too. For example, regarding phosphorus, we have previously submitted that P loss assessments for the same farm and same year, under Overseer™ and

MitAgator™ models, varied by 100% between models. How an applicant or regulator could assess the significance of adverse effects of a proposal, to the required degree, is not clear.

38. The S42A Block 2 report now recommends retaining the provision intent and a Policy amalgamation for the remaining 7 years of the planning horizon.
39. From a river water quality perspective (summer only) greater improvements are likely from the diversion of point sources to land and is likely to better meet the purposes of the Act.
40. It is respectfully submitted that the efficacy of 3.11.5.7 and Policy 6, and the S42A Block 2 recommendation, be re-examined to meet the purposes of the Act.

Stock Exclusion Rules

41. Pāmu has submitted in Block 1 on the potentially poor appropriateness and effectiveness of the specified 1 m minimum setback. Alternative setbacks criteria were supplied for consideration.
42. The S42A Block 2 report proposed adopting Southland physiographic descriptors which may be neither helpful nor accurate for Waikato small waterbodies. The term “*active bed*” considered in the S42A Block 2 report lacks technical certainty and in-field clarity for very small Waikato streams.
43. The additional S42A proposed “additional Option” would require “aquatic vegetation” to be clearly defined, to be useful in assessing very small streams, where the environmental wins are reported to be had (McDowell et al. 2017). We question whether CNMA advisors or others formulating FEPs will be adequately skilled in vegetation identification to the extent required.

POINT SOURCE DISCHARGES

44. The plan is geared at addressing cumulative adverse effects, with particular focus on the contribution of Non Point Sources (NPS). The historical and ad-hoc consideration of Point Source discharges at the time of consent application or renewal is problematic.
45. Agricultural discharges are no less regionally significant discharges to the catchment community than piped point source discharges. As stated in detail in our original submission, Point Sources and Non Point Sources

cannot be arbitrarily separated due to their interconnectedness. The Plan attempts to do so artificially and in so doing, may not meet the purposes of the Act.

46. Pāmu adopts the evidence of H. Marr Section 5, (*for Fish & Game*) as it pertains to the inappropriate regulatory content of PC1 with regards to Point Sources.
47. Point Source discharge contributions to river effects over summer (Nov – May), should be an urgent remediation focus of proposed Plan Change 1, but as currently proposed, it is not. As submitted in Block 1, this is believed to stem from a failure of the CSG data analysis processes (no seasonal WQ analysis).

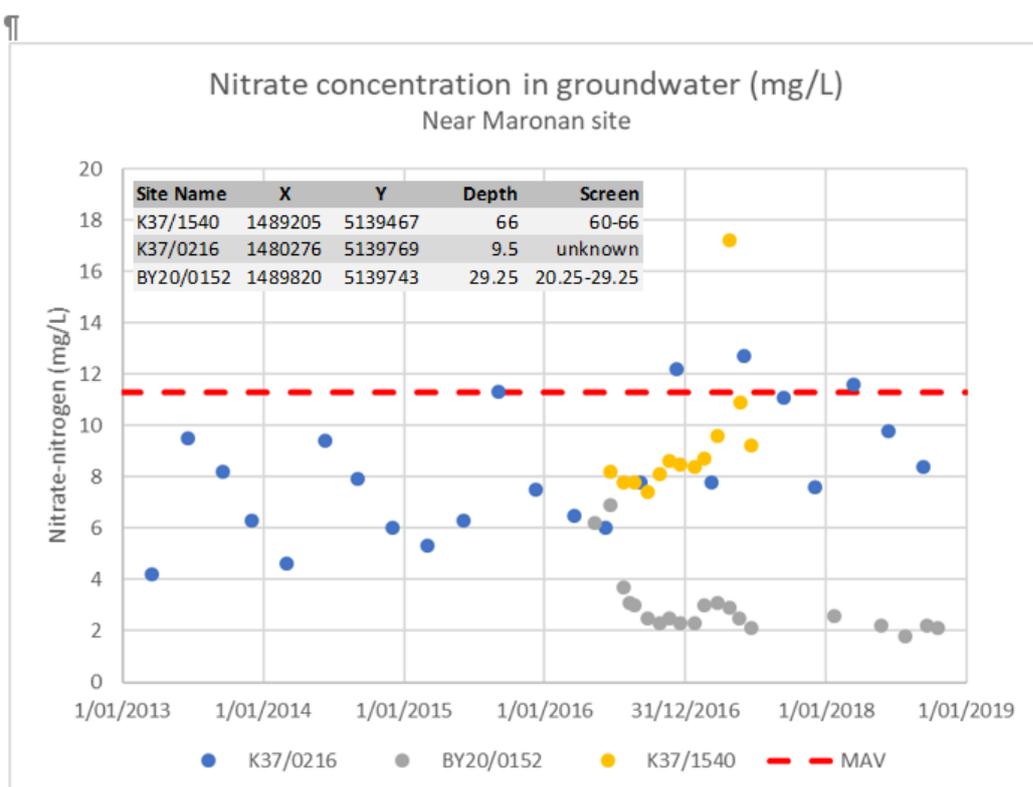
END.

Appendix A: Canterbury

Memo

Date	08/11/2018
To	Robert van Duivenboden (Landcorp Farming Ltd)
CC	Zeb Etheridge
From	Amber Kreleger

Nitrate concentrations in groundwater near Landcorp farms at Eyrewell Forest and Maronan



Appendix B: Moutoa Complex, Foxton, underdrainage tests vs Overseer™.

**RUAPEHU -PREVIOUS YEAR
15/16 YR V6.2.2.**

NON EFFLUENT Paddock.

OVERSEER PREDICTED 5.6 mg/l

MEASURED = year average 12
year median 7 (but n=low)

Here, Overseer is significantly under predicting

Farm name: Moutoa Ruapehu Nutrient Budget (2016)

Block Nitrogen 

Block name	Total N lost (kg N/yr)	N lost to water (kg N/ha/yr)	N in drainage * (ppm)	N out (kg N/ha)
Non-Effluent #1	2485	15	5.6	14
Effluent	1828	23	5.6	13
Tunip's	449	56	20.6	31
Stock excluded	57	3	N/A	
Maize	405	23	8.2	13
Rape	300	37	13.7	10
Other farm sources	547			
Whole farm	6032	20		



PAMU
PARTNERSHIP OF
NEW ZEALAND

Appendix C

Taupo irrigated dairy measured shallow groundwater concentrations.

Document LAL Report 1266-1-R21)

NNN concentration changes during the reporting period October 2018 to January 2019 were predominantly small; only sites D1 and D3 showed noteworthy changes (up 5.0 and down 0.9 mg L⁻¹, respectively).

It is evident from Fig. 5 and Fig. 6 that the concentration time series differ substantially between the monitoring sites, not only with regard to the absolute level of the concentrations measured, but also their temporal dynamics.

Concerning the concentration dynamics, we can broadly differentiate between four patterns:

- 1) highly dynamic concentration patterns (L1, D5),
- 2) fairly steadily increasing concentration (D2, D3),
- 3) nearly constant concentration over time (F1, DS2, SM1, SM2), and
- 4) dynamic concentration following a period of constant concentration (D1, DS1, D4).

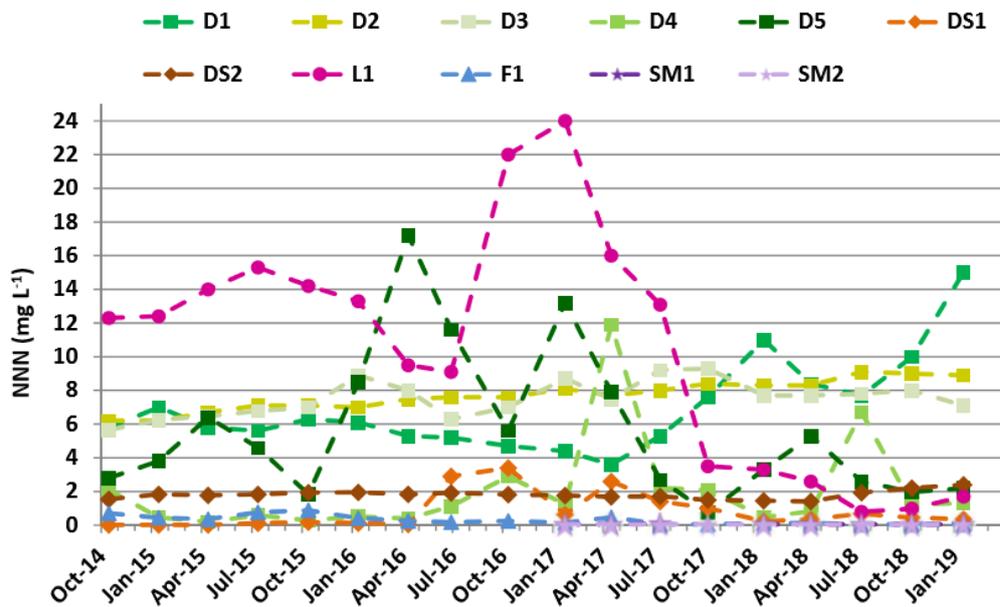


Fig. 5: Time series of groundwater nitrate + nitrite nitrogen (NNN) concentrations measured at all 11 sites.

Appendix D

Lucerne block (grazed) n loss from Overseer.

Report from OVERSEER® Nutrient budgets, Copyright© 2018 MPI, AgResearch and Fertiliser Association of New Zealand. All rights Reserved.
Version 6.3.0, on 2018-10-30 11:01:09

Resolution

M Keltie

Landcorp Pastoral Ltd - 79388

Client reference: Supply number 79388

Farm name: Resolution 2017 2018x (2017 2018)

Block Nitrogen

Block name	Total N lost (kg N/yr)	N lost to water (kg N/ha/yr)	N in drainage* (ppm)	N surplus (kg N/ha/yr)	Added N** (kg N/ha/yr)
Non effluent ##	9968	42	7.8	215	273
Effluent ##	4141	49	9.1	221	216
Lucerne	4661	86	17.1	245	0
Whey non effluent ##	2529	42	7.8	183	180
Lucerne & Effluent	1087	99	19.5	293	94
Swedes to Lucerne	1254	125	39.5	-59	126
Other farm sources	775				
Whole farm	24416	53			
Less N removed in wetlands	0				
Farm output	24416	53			