

**BEFORE THE COMMISSIONER APPOINTED BY
ENVIRONMENT SOUTHLAND**

IN THE MATTER

of an application
for resource
consent APP-
20211740

BY

**PLATINUM
DAIRIES LIMITED**

Applicant

**BRIEF OF EVIDENCE OF MIRANDA JANE HUNTER ON BEHALF OF
PLATINUM DAIRIES LIMITED**

DATED 21ST JUNE 2022

BRIEF OF EVIDENCE OF MIRANDA JANE HUNTER

BACKGROUND AND QUALIFICATIONS:

1. My name is Miranda Jane Hunter. I hold a Bachelor of Agricultural Science Degree from Lincoln College. I am member of the New Zealand Institute of Primary Industry Management and have been involved in the dairy industry in consultancy, practical farming and dairy industry leadership roles since 1986.
2. I am qualified to complete farm systems appraisals. I have developed my skills through 30 plus years working in dairy farm systems. This level of experience has been recognised nationally and internationally through judging roles, senior leadership roles and consultancy contracts.
3. I have completed the Sustainable Nutrient Management Courses, (Intermediate and Advanced) and am a Certified Nutrient Management Adviser (certified in 2014). I have also completed a course in Greenhouse Gases and am a certified Greenhouse Gas Advisor (certified in 2019).
4. I am a Director and Shareholder of South Coast Dairies Limited which has a shareholding in a 135 ha dairy platform in Southland. My involvement with this property, with my other business partners, has been to develop a sustainable farming business in all facets, including environmental. The business has been awarded several environmental awards including winner of the 2011 Environment Southland Farming Award.
5. I was previously employed by DairyNZ as Regional Leader for the Southern South Island. In this role I lead the extension team (of Consulting Officers) working with dairy farmers to achieve adoption of new practices and technologies on farm (including environmental).
6. I resigned from DairyNZ in June 2012 and I am now self employed as a Farm Consultant (trading as Roslin Consultancy Limited). I work with dairy farmers throughout Southland and Otago supporting them in analysing the environmental impact of their farm systems and improving their on farm management to meet their environmental goals. I also undertake environmental projects (contracted by Industry and Government Agencies) supporting the development of good practice resources for farmers and Overseer modelling to analyse effectiveness of mitigation practices at farm scale.

7. I have read the Code of Conduct for Expert Witnesses within the Environment Court Consolidated Practice Note 2014 and I agree to comply with that Code. This evidence is within my area of expertise, except where I state I am relying on what I have been told by another person. To the best of my knowledge, I have not omitted to consider any material facts known to me that might alter or detract from the opinions I express.

SCOPE OF EVIDENCE

8. This evidence addresses the following matters raised in the s42a report:
- (a) The impact of the removal of 23 jersey bulls as a mitigation measure
 - (b) Clarification of Overseers ability to model GMP / mitigation
 - (c) Commentary around the use, uncertainty, and accuracy of the Overseer model in light of the Government's Science Advisory Panel's review

BACKGROUND

9. Platinum Dairies Limited operate two adjoining blocks:
- Milking platform – 256.2 ha total (250.5 ha effective)
 - Muir block – 61.5 ha total (59.5 ha effective)
10. It is intended to integrate the current milking platform and the Muir Block
11. Advice from Environment Southland was sought as to the best methodology for budgeting the current system. Their advice was to use the 20/21 season as this is the best representation for what was happening on the farm on 2nd Sept 2020. Prior to 20/21 there was a transitional system (during that period the property was part purchased / leased). The 20/21 is a fair representation of the intended long term average farm system, the only exceptions to this would be the inclusion of 23 jersey that were on the property for 3 months during the 20/21 season. The inclusion of 23 jersey bulls has a minor impact on the nutrient modelling, the 23 jersey bulls represent 0.3% of the RSU (revised stock units) in the current farm system.

12. As the 20/21 is a fair representation of the intended long term farm system (and therefore in equilibrium) it is consistent with the assumptions behind OverseerFM.

13. The following nutrient budgets have been completed as part of this application:

Nutrient budgets for the current farm system:

- Milking platform 20/21
- Muir block 20/21

Nutrient budget for the proposed farm system:

- Proposed combined

14. The nutrient budgets were prepared using “Overseer Best Practice Data Input Standards, March 2018”. No deviations from these protocols were made during the modelling assumptions. Farm systems information was provided by Jared Collie on behalf of the Platinum Dairies Limited.

15. Soils areas were obtained from soils mapping provided by OverseerFM and soils settings from SMap. Climate settings were obtained from the Overseer climate station tool. This approach has been consistent throughout all of the nutrient budgets completed. All assumptions have been discussed in detail with the applicant. The applicants display a good level of understanding of the inputs and assumptions that have been used.

16. Platinum Dairies Limited – OverseerFM Modelling, 18th of October 2021¹

- (a) Overseer modelling was completed using Overseer version 6.4.1. Summarised results from this modelling are in Table 1 and estimate a decrease in N loss (6.3%) and P loss (5.0%).

¹ *Platinum Dairies Limited – OverseerFM farm system modelling to support a consent application for expanded dairy – 18th October 2021, Miranda Hunter, Roslin Consultancy Limited*

Table 1.

Predicted nitrogen and phosphorus losses in the current and proposed systems under Overseer version 6.4.1

	Current Milking Platform 20/21	Current Muir Block 20/21	Current Total 20/21	Proposed Combined	
Total Farm N Loss (kg)	13802	3514	17316	16232	6.3% decrease
N Loss/ha (kgN/ha/yr)	54	57		51	
Total Farm P Loss (kg)	358	61	419	398	5.0% decrease
P loss/ha (kgP/ha/yr)	1.4	1.0		1.3	
Pasture Grown (tDM/ha)	18.7	17.8		18.0	

- (b) The reductions in Nitrogen and Phosphorus losses estimated above are the combined effect of a number of changes to the farm system. The key drivers to the estimated changes in nutrient loss between the current 20/21 season and the proposed farm system are as follows:
- (i) Increase in milking cow numbers to consented
 - (ii) Reduction in cows wintered
 - (iii) Reduction in area of winter crop
 - (iv) Reduced nitrogen fertiliser use
 - (v) Removal of jersey bulls
 - (vi) Reduced young stock numbers
 - (vii) Reduced average Olsen P to 30

- (c) Council commissioned Irricon to complete a Nutrient Budget Review². The review was completed by Irricon on the 25th January 2022. The review concluded the proposed modelling was completed with **medium-high** level of robustness for the proposed Overseer modelling.
- (d) The Irricon Nutrient Budget Review raised one point for further explanation (refer page 11 of the review):
- Please explain why:*
- The crop rotation final month for the Muir YE model has a final month entered as 'June' and 'September' was entered for the Proposed model.*

My explanation to this point was included in a wider Section 92(1) response which is included below in paragraph 17 (i)

SECTION 92(1) REPORT

17. A request for further information under Section 92(1) of the Resource Management Act 1991 was received dated 9th February 2022. A response to this was provided from Landpro, dated 23rd February 2022. A points raised in that request specifically relating to the nutrient budgets were as follows:

- (i) Address the concerns raised by the Nutrient Budget audit.

Response:

Modelling was completed for the actuals for the 2020/2021 season. The Overseer year runs from 1st of July to end of June – therefore in the Muir year end (YE) model, the crop blocks were modelled to reflect what actually occurred in the 2020/2021 season. This reflects it correctly but is a complex way to model it as it reflects the end of winter 20 and the start of winter 21. In the proposed model, crops are modelled to reflect an average season, showing one winter to simplify modelling. Therefore, month end has been changed to September. The Proposed Combined Overseer file has been rerun with the final month at June, showing two winters. This made minimal difference to the results.

² Overseer Nutrient Budget Review for Environment Southland – Platinum Dairies Ltd, Irricon 25th January 2022

OVERSEER VERSION CHANGE

18. On the 7th of April 2022, after the consent was lodged, Overseer released a new version (6.4.3). As is typical with Overseer version updates, this resulted in changes (shown in red in table 2) to the estimated losses of N and P from the current and proposed systems. No changes were made to modelling inputs.

Table 2.

Predicted nitrogen and phosphorus losses in the current and proposed systems under Overseer version 6.4.3

	Current Milking Platform 20/21	Current Muir Block 20/21	Current Total 20/21	Proposed Combined	
Total Farm N Loss (kg)	13802 14125	3514 3510	17316 17635	16232 16541	6.3% 6.2% decrease
N Loss/ha (kgN/ha/yr)	54 55	57		51 52	
Total Farm P Loss (kg)	358	61	419	398 399	5.0% 4.8% decrease
P loss/ha (kgP/ha/yr)	1.4	1.0		1.3	
Pasture Grown (tDM/ha)	18.7 18.8	17.8		18.0	

19. I note that in the s42A report, section 3.3.2.1 that Ms McRae has not raised any further concerns regarding the appropriateness and robustness of the Overseer modelling completed. Furthermore, I note that no further audits of more recent nutrient budgets have been requested by Ms McRae.

GOOD MANAGEMENT PRACTICES AND MITIGATIONS

20. Section 3.3.2.1 in the s42A report provides table 6, detailing good management practices (GMPs) and mitigation measures which have either occurred or are proposed to be undertaken on farm.
21. The allocation of one of the practices as a GMP (table 6 of the s42A report) is in my opinion is incorrect. Specifically, this practice (referenced from table 6 of the s42A report) is:

Mitigation / GMP	Implementation timeframe	Mitigation measure or GMP?
Reducing Olsen P levels from 35 to 30	From first exercise of consent	Good management practice

22. With regard to reducing the Olsen P levels to 30, Phosphorus is an essential macro nutrient for the successful growth of pasture and crops and Olsen P is a measure of the plant available phosphorus in the soil. In simple terms Overseer estimates a higher loss of phosphorus as the Olsen P increases.
23. Target Olsen P links to pasture production. Overseer estimates that the pasture grown on this property is between 17.8 and 18 t DM (depending on the block). This property is performing at a high level of pasture production as is evidenced by it being well above district average milk production (20/21 milk production was 1747 kg ms / ha compared with the Southland average for 20/21³ of 1164 kg ms / ha). It can be concluded that some of this higher milk production is a result of higher than average pasture production which in part is due to good soil fertility.
24. The target Olsen P ranges for a dairy farm on sedimentary soils is 20 to 40, with the target Olsen P for a high performing dairy farm at 35 to 40 .
25. It should be noted that soil tests were taken in 2020 had an average Olsen P of 35 (milking platform) and 29 (Muir Block).

³ New Zealand Dairy Statistics 2020-21, LIC and DairyNZ

26. Constraining Olsen P to 30 (and thereby reducing phosphorus loss from soil) is likely to have an impact on pasture growth on a high performing farm and therefore in my opinion should be considered a mitigation.

OVERSEER UNCERTAINTY, LIMITATIONS AND ASSUMPTIONS

27. Section 3.3.2.1 in the s42A report states the following;

“In light of the Government’s Science Advisory Panel’s review of the effectiveness of Overseer in assessing and predicting farm-scale nitrogen losses, and the conclusion that the current Overseer model is not fully fit for purpose in the way it is being currently used in the consenting process, mitigation measures are of the utmost importance when assessing this application.”

28. It is my opinion it is appropriate that Ms McRae has sought further mitigation measures outside of Overseer. However, Overseer used in the correct way does provide relativity in comparing between two scenarios.

29. The following steps were taken during the modelling process to minimise the impact of uncertainties:

(a) Adherence to Best Practice Data Input Standards (BPDIS)

(No deviations to BPDIS were made, no work arounds required)

(b) Use of Overseer is within the model’s parameters (for soils, climate and farm system)

(Standard approach)

(c) Method and consistent methodology between scenarios

(Standard approach)

(d) Site visit to cross check information

(Standard approach - Understanding the property and the management blocks is critical to blocking in Overseer)

(e) Blocking completed taking into account land use, management systems, soils, topography and enterprise

(Standard approach – consistent with BPDIS)

- (f) Consistency in modelling between the current and proposed files (Standard approach - “apples with apples”)
 - (g) Expertise, experience and qualifications of the user

(Standard approach - Certified Nutrient Management Adviser and Dairy Farm Systems Expertise)
 - (h) Outputs are reviewed against expected results relative to soils, climate, land use and inputs

(Standard approach – reviewed against previous modelling results and research trials)
 - (i) Overseer files are internally peer reviewed (for adherence to BPDIS, feasible farm systems and data entry)

(Standard approach - Certified Nutrient Management Adviser and Dairy Farm Systems Expertise)
30. The use of Overseer as a modelling tool is recognised in the Proposed Southland Water and Land Plan (PSWLP). Appendix N (of PSWLP) indicates that the latest version of the Overseer model (or an approved alternative model) should be used on properties over 20ha or when a material change in land use occurs. As far as I am aware no alternative to Overseer has been approved by Environment Southland to date.
31. Uncertainty around Overseer model estimates tends to be lower within the range of the calibration data set i.e. where we have the most information. Most of the calibration data used to date is focused on flat, pastoral, dairy enterprises, with primarily free-draining soils and moderate rainfall. Pastoral farms in the Waikato, Southland (four sites), Canterbury and Manawatu, form the OVERSEER calibration data set. Consistency in modelling when developing scenarios is a key to creating equivalence in uncertainty. When scenarios are compared focus should be on the difference in estimated outputs, rather than absolute numbers.
32. In July 2021, a report “Overseer whole model review – assessment of the model approach” was released by³ the Science Advisory Panel for the Ministry for the environment. The report raised concerns that Overseer:

- (a) Assumes a steady state system when farm systems are in reality dynamic
 - (b) Assumes average climate data and therefore cannot model episodic events
 - (c) Uses monthly time steps
 - (d) Does not balance mass
 - (e) Does not account for variation in water and nutrient distribution through the soil profile
 - (f) Does not adequately accommodate deep rooting plants
 - (g) Focuses on nitrates (and omits ammoniacal N and organic matter)
 - (h) Is not spatially explicit with regards to surface water, nutrient transport and critical landscape factors
33. The government responded to the Science Advisory Panel report described in the previous paragraph in August 2021. The government identified four options to address the concerns raised in the report including the creation of a *new risk index tool*, development of a next generation Overseer, to have greater use of *controls on practices and inputs* to manage nitrogen loss or a completely new approach to managing and understanding diffuse nutrient loss risk. I note that, of the options given by the government, only the option of *greater use of controls on practices and inputs* is available to regulators currently.
34. The recommended consent conditions proffered by Environment Southland in the s42A report include both Overseer output figures and farm system input parameters. The farm system input parameters that have been recommended as conditions of consent include those identified as key reasons for a nutrient loss reduction in the proposed system, that is
- (i) Stock numbers (for all ages / classes of stock)
 - (ii) Area of land to be winter cropped
 - (iii) Olsen P to 30 (range of 26 to 32 due to testing variance)
 - (iv) Use of calving pad
 - (v) Effluent area and method of application

35. Applying Overseer output figures and farm system input parameters, combined with mitigations outside of Overseer are well established methods to reduce contaminant loss to water.

CONCLUSION

36. The 20/21 is a fair representation of the intended long term average farm system. The inclusion of 23 jersey bulls has a minor impact on the nutrient modelling, the 23 jersey bulls represent 0.3% of the RSU (revised stock units) in the current farm system.
37. Reduction in the Olsen P should be considered a mitigation
38. Overseer modelling uncertainties, assumptions and limitations are acknowledged, and steps have been taken to minimise the impact of these factors.
39. Research undertaken by AgResearch shows that nitrate leaching measurements have a higher degree of certainty where farm systems are modelled that are similar to those farm research sites used in the development of Overseer. The data used by Overseer includes four dairy farmlet sites in Southland.
40. Modelling using Overseer version 6.4.3 estimate that losses of Nitrogen and Phosphorus would decrease by 6.2 and 4.8% respectively.

Miranda Hunter

21st June 2022