

BEFORE THE CANTERBURY REGIONAL COUNCIL

In the matter of The Resource Management Act 1991

Between

CANTERBURY REGIONAL COUNCIL

Consent Authority

And

IRRICON RESOURCE SOLUTIONS LIMITED

**PYE PARTNERHIP, SOUTH STREAM, GRANTLEA
& CLOVERDENE DAIRIES, AND HIGHFIELD FARM
HOLDINGS**

ME MULLIGAN

I KERSE

TURLEY FARMS LIMITED

Submitters

**EVIDENCE OF KERI JOY JOHNSTON FOR HEARING TWO
(FARMING RULES)**

Introduction

1. My name is Keri Joy Johnston. I have 11 years' experience in the field of natural resources engineering and resource management, primarily in water resources management and irrigation.
2. I hold a Bachelor of Engineering in Natural Resources Engineering from the University of Canterbury. I am a Professional Member of the Institute of Professional Engineers New Zealand (MIPENZ) and a Chartered Professional Engineer (CPEng).
3. Upon completion of my degree, I worked for Meridian Energy Limited as a graduate civil engineer, based in Manapouri and Twizel, specialising in dam safety programmes required under the Building Act (2004) and NZSOLD Guidelines for a high potential impact structures.
4. After twelve months, I accepted a position with Environment Canterbury (ECan) as a Consents Investigating Officer before taking on the role of Environmental Management Systems Engineer with the River Engineering Section of ECan. During my three and a half years with ECan, I was the Consents Investigating Officer for the applications associated with the Canterbury Regional Landfill at Kate Valley, and developed environmental management systems in accordance with ISO 14001 for several units within ECan.
5. I left ECan to join RJ Hall Civil and Environmental Consulting Limited (RJH) as an Environmental Engineering Consultant. I was employed in this position for three and a half years. Work mainly involved the preparation of resource consent applications for all land and water activities, and engineering related works including dams, as well as being a contract Consents Investigating Officer for applications associated with the Central Plains Water Trust and the Ashburton Community Water Trust.
6. I am currently a director of Irricon Resource Solutions Limited (Irricon), a resource management and environmental engineering consultancy.
7. Even though this is a regional council plan hearing, I have complied with the code of conduct for expert witnesses contained in the Environment Court's Practice Note dated 31 March 2005 when preparing this evidence.

Purpose of My Evidence

8. Irricon made substantial submissions on the LWRP, including the farming provisions. As a consultancy, we are dealing with the notified plan on a daily basis, and as time has progressed, we have encountered difficulties with the farming provisions in the notified plan. It is often the implementation of a plan that highlights matters that could not be foreseen whilst writing it, and too what is not stated in a plan rather than what is that leaves matters open to interpretation, and therefore, uncertainty.
9. Since its notification in August 2012, Irricon has had a significant involvement in the consenting of changed farming activities, and using Overseer to assess whether an

activity is in fact a change in land use (as determined by the notified definition of “change”).

10. To date, Irricon has lodged 7 resource consent applications for a land use “consent to farm”, prepared 41 Overseer files for clients and audited an additional 99 files.
11. This evidence focuses on the issues with the implementation of the notified farming definitions, policies and rules, and therefore, why Irricon supports (generally) the recommendations in the S42a Hearing Report in respect of these definitions, policies and rules.
12. In preparing this evidence, I have read:
 - 12.1 The Proposed Land and Water Regional Plan (“the Plan”);
 - 12.2 S42a reports by Environment Canterbury; and
 - 12.3 Submissions made on the Plan.
13. Accompanying this Brief of Evidence is:
 - 13.1 Evidence by Ms Nicole Phillips of Irricon in relation to Overseer;
 - 13.2 Evidence by Mr Glen Smith of Mowata GP Limited in relation to Clause 1 of the definition of “change” and also the issues faced with the use of Overseer;
 - 13.3 Evidence by Mr Bryan Beeston of Berrandale Limited in relation to how effects associated with a change in land use are being determined; and
 - 13.4 Evidence by Mr Mark Cox of Craigmore Sustainables for Pahau Flat Dairy Limited in relation to the issues with the use of Overseer.

Evidence

The Definition of “Change”

14. As you are aware, the notified definition of “change” has two clauses, in short, being an increase in the volume of irrigation water applied to a property, or an increase in N lost to water or more than 10%, averaged over a two year period.
15. The first clause relating to irrigation fails to recognise irrigation consents held, but not yet exercised.
16. The S42a report proposes to include a clause in the definition of change which states that *“an increase in the consented volume of water available to be used on the property compared with that consented at 11 August 2012”*. This means that provided no more water than is currently authorised (as opposed to being used) is sought, then it is not a change in land use. We wholly support the inclusion of this clause into the definition of change.
17. Therefore, this evidence highlights why it is important to make this acknowledgement in the definition of change.

18. At the time of notification of the LWRP, there are two irrigation schemes under construction, but had not yet delivered water to any shareholders properties (and have still not). These are Rangitata Water Limited (RWL) and Maerewhenua District Water Resources Company Limited (spray scheme) (MDWRC)¹. Both schemes obtained consents to take and use water within their command areas, RWL in 2009 and MDWRC in 2010. It was very clear at the time that these resource consents were granted that at least 7,000 hectares of additional irrigation would occur in the RWL command area and 1,000 hectares in the MDWRC command area.
19. Significant investment, both in terms of the schemes themselves and at a property level had been made prior to the notification of the plan. This definition effectively means that any shareholder within these schemes whose property is not irrigated at all is a change in land use, even though the schemes hold resource consents which authorise the use of water for irrigation purposes on these properties.
20. In order for the change in land use to be permitted (under the notified Rule 5.42) the scheme consents to use water needed to have a condition limiting the amount of N lost to water.
21. It is noted here that both schemes are subject to conditions relating to managing water quality effects, including requirements to fence irrigation races, and prepare and audit management plans setting out methods to manage the discharge of nitrogen to groundwater, but no condition limiting the amount of nitrogen lost to water, nor a condition that limits the use of land (type of farming that could occur), therefore the “change” in land use requires resource consent. The schemes cover a large area, and inevitably, this means different nutrient allocation zones, and therefore, different policy directives and activity status depending on the status of the zone (green, pale blue, orange or red), and the onus therefore falls onto individual property owners to obtain the necessary land use consent.
22. I know that the question here will be “why didn’t the schemes apply to have a condition imposed on the use of water consents that limited the amount of N lost to water”?
23. There are several reasons for this, but the first and most important being that it is very hard to set one limit that suits all farming types, all soil types, all climates, etc. Also, how do you go about determining such a limit when, as already highlighted by several submitters, and which Ms Nicole Phillips and Mr Glen Smiths evidence also shows, is that Overseer is not without its problems.
24. Nearly all provisions relating to farming in the LWRP were also highly contentious, and as seen by the recommendations in the S42a report which delete any need for such a condition, it would have been very reactive of the schemes to do this. However, the need to have to contemplate such a response in the first place arises from the fact the Regional Council, despite the large number of submissions on these definitions, policies and rules, opted to give significant weight to these parts of the plan straight away, therefore, as consultants and farmers, we have been forced to deal with this “head on”.
25. The specific example being used highlight this, and supported by Mr Glen Smith is that of Mowata GP Limited (Mowata), a shareholder in RWL.
26. In summary, Mowata holds full shares in RWL and had completed a dairy conversion on the property in December 2012. RWL was not scheduled to deliver water until

¹ RWL resource consents CRC001229.1 and CRC070924.1, MDWRC resource consent CRC041004.1

March 2013, and construction delays meant that even this date was not likely to be met. Part of Mowata is a green nutrient allocation zone, and part is a red nutrient allocation zone.

27. Therefore, Mowata sought to transfer groundwater from another farm to the Mowata property to begin irrigation until RWL delivered water. Mowata was considered to meet Clause 1 of the notified definition of change, and was asked to use Overseer to calculate a limit for N lost to water as a condition of consent, but to also determine what the effects of irrigating the property would be, despite the fact it had authorisation to be a fully irrigated farm.
28. Mr Smith's evidence details the process that Mowata is still going through (at the time of writing this evidence) and the issues he has faced with consenting process under the notified rules as well as the use of Overseer.
29. The difficulty with the definition of change as it was notified, which then links to policies and rules, is that in a red nutrient allocation zone, the policy directive is to allow no additional increase in nutrient leaching, and the activity status for the land use consent is non-complying. However, at the time that RWL's consents were granted (and it is noted that the RWL consents were notified and granted by independent commissioners), it was acknowledged in the decision that allowing 7,000 hectares of additional land to be irrigated may result in more nutrient leaching to groundwater, but that the positive effects of allowing the irrigation to occur in the first place outweighed this, and that the mitigation measures would offset any adverse effects.²
30. It is also noted that any other application for resource consent to take and use water for irrigation has to consider effects of the use of water on water quality, and the subsequent grant of the application means that this effect has been considered to be less than minor. However, the notified definition of change fails to recognise this and Mowata's example is just one of many in this situation whom have been made to consider effects from an already consented irrigation activity.
31. It is noted that the recommended definition of change removes any reference to Overseer, and replaces this with an increase of more than 10% in the average annual stock units determined over a three year period.

Policies and Rules

32. My next example is Berrandale Limited (Berrandale). Mr Bryan Beeston of Berrandale has prepared evidence to support this.
33. Berrandale is not a question of whether they were or were not a "change" – this was never the point of contention. Berrandale occurred purely out of need to quantify the effects associated with the change (if any) - was there actually a "net increase" in N being lost to water?
34. Mr Beeston explains that the farm in March 2012 for a dry land dairy conversion. Dairy discharge consents were applied for immediately and granted in June 2012. The process of conversion was in full swing.
35. In June 2012, bores were drilled for dairy shed water, but also with the hope that perhaps sufficient water for irrigation may be found. An application to take and

² Paragraphs 180 to 200 of the Rangitata Water Hearing Decision prepared by Commissioners B Cowie and RC Nixon, dated 28 January 2009.

use water for irrigation was lodged on 31 August 2012 following completion of an aquifer test, but also post notification of the LWRP.

36. Because this application was a change under Clause one of the definition of change (being irrigation of previously unirrigated land), conditions were proposed, including a nitrogen leaching condition, to ensure that the change of land use was permitted under Rule 5.42 of the notified LWRP. The nitrogen leaching condition proposed was as follows:

Until 30 June 2017 (Nutrient Management):

For each 12 month period ending 30 June, either, it is demonstrated that the average total nitrogen (fertiliser and effluent) application has been less than 200 kgN/ha/yr; or

approved methods are used to undertake calculations or measurements of the average annual concentration of nitrate nitrogen in the soil drainage below the plant root zone and the actions in (iii), (iv) or (v) below are implemented depending on the calculated or measured nitrate concentration. For the purposes of this rule, approved methods shall be:

- *Calculations using either the most recent version of the OVERSEER® model version 6.*

Where the average annual concentration of nitrate nitrogen in the soil drainage water below the plant root zone as calculated in accordance with clause (ii) or measured, for the property exceeds 8 grams per cubic metre, management practices are implemented to reduce the loss of nitrate nitrogen to soil drainage water. These may include but not be limited to:

- *Split applications of nitrogen fertiliser*
- *Timing of nitrogen fertiliser application to plant growth*
- *Avoiding application of nitrogen fertiliser to saturated soil*
- *Avoiding applying nitrogen fertiliser when the soil temperature at 10 cm depth is less than 10°C*

Where the average annual concentration of nitrate nitrogen in the soil drainage water below the plant root zone calculated in accordance with clause (ii), exceeds 12 grams per cubic metre of nitrate nitrogen:

- *Nitrification inhibitors, winter cover crops, or appropriate technology or management practice, implemented to reduce the loss of nitrate nitrogen to soil drainage water.*

Where the average annual concentration of nitrate nitrogen in the soil drainage water below the plant root zone calculated in accordance with clause (ii) or measured, exceeds 16 grams per cubic metre of nitrate nitrogen:

- *The average total nitrogen (fertiliser and effluent) application to that property is limited to 200 kgN/ha/yr.*

The following records are kept for each property and made available to the consent holder, in a form that is suitable to be made available to Canterbury Regional Council on request:

- *Timing and rate of inorganic fertiliser applications*
- *Timing and rate of nitrification inhibitor applications;*
- *Stocking rates (number and type of animals) on an annual basis; and*
- *Land uses, including timing and type of cultivation activities.*

A Farm Environment Plan is prepared and implemented in accordance with Schedule 7 of the Land and Water Regional Plan;

The Farm Environment Plan is externally audited each year for the first three years by an Farm Environment Plan Auditor following three consecutive years of full compliance, the audit shall occur once every three years; and

A record of the audit compliance grading and the average annual loss of nitrogen for the property will be provided to the CRC by 31 August of that year.

From 1 July 2017, the consent holder shall comply with Schedule 8 and Rule 5.46 of the Land and Water Regional Plan.

37. There is no requirement under Rule 5.42 for the nitrogen limit on a water permit to be determined using Overseer, and this condition reflected the fact that Schedule 8 (being the look up tables) would, in five years' time, override any limit set now. It also incorporated "best practise" and set out a process for mitigation depending on modelling undertaken using Overseer.
38. The application was processed to the point of the S42a report being reviewed by senior Regional Council staff, and at that point (November 2012), a S91 letter was written to Berrandale advising that a further consent (being a land use consent) may be needed, and that Overseer should be used to determine this whether this consent is needed. As already stated, Berrandale was a change under Clause One of the definition of change and this had never been contended, yet, this request read as if this point was still to be determined.
39. Overseer was used to model a dry land dairy farm (as the current farming system) and then an irrigated dairy farm (the proposed farming system). Overseer modelling showed that the N lost to water under both scenarios was 61kg/ha/year and therefore no increase in nutrient leaching, and therefore this limit was proposed to be that imposed on the water permit.
40. Because there was no increase, it was consistent with the relevant policies³ of the LWRP the Regional Council's interpretation for red nutrient allocation zones which was that there should be no increase in the amount of N lost to water between the current farming system and the proposed farming system.
41. The Regional Council refused to accept that the baseline was a dry land dairy farm, despite the fact that the conversion was well advanced and all necessary consents were held in order for the property to undertake that activity, because at 11 August 2012, no cows had actually been milked on the property.

³ Policy 4.34 Prior to 1 July 2017, to minimise the loss of nitrogen to water from any change in farming activities in an area coloured red or within a Lake Zone as shown on the Planning Maps, an applicant for resource consent must demonstrate that the nitrogen loss from the proposed activity, when assessed in combination with the effects of other land uses or discharges, will not prevent the water quality outcomes of Policy 4.1 being achieved and show that the nitrogen discharges from the property are a significant and enduring reduction from existing levels.

42. The baseline period in the clause 2 of the current definition of change is from 1 July 2011 to 30 June 2013, and it was requested that Berrandale re-model their baseline going back to 1 July 2011. There are two issues with this:
- 42.1 Berrandale did not purchase the property until March 2012. Therefore, to model any time before this date required a large amount of assumption about what would have been happening on farm at that time.
- 42.2 Berrandale were a dairy conversion in process. Therefore, this meant that from 1 March 2012 to 1 June 2013 (when milking is to commence), the property is an earthworks site, with the property being laned, re-grassed, fenced, cow shed, calf sheds and houses being built... but very few head of stock, and well less than it would have as an operational dairy farm. Overseer does not model a conversion in process.
43. However, the Regional Council whilst acknowledging the difficulties with modelling the baseline, still required that it was done.
44. The baseline model was completed as requested, but I must note that it was done under protest as neither myself, the nutrient management adviser from Ravensdown nor Ms Phillips of Irricon were comfortable with being asked to effectively “make up” the inputs in order the model the farm prior to Berrandale’s ownership of the property.
45. Under duress, the model was completed, and at the same time, Berrandale sought legal advice on the matter of what the baseline should be. The legal opinion obtained supported our original premise that the baseline was in fact a dry land dairy farm, as consented, and well on the way to becoming.
46. The irony of this is that Berrandale was granted their consent to take and use water for irrigation in March 2013 with no condition limiting N lost to water because acknowledging the fact that the property was consented to be a dry land dairy farm meant no increase in N lost to water despite irrigation being sought, however, it took 6 months and significant cost to Berrandale as shown in Mr Beeston’s evidence to reach this outcome.
47. Recommended policies 4.31 and 4.32 in the S42a report both contain the following statement (emphasis added):
- ... a changed or new farming activity will be required to show that there is **no net increase** in nutrients discharged from the property **or** that advanced mitigation farming practices are applied such that the property operates in the top... of nutrient discharge minimisation practices when measured against practices in the relevant farming industry.*
48. In my view, there is still the potential for the Berrandale situation to happen again. In order for Policy 4.32 to be satisfied, Berrandale would still be required to show no net increase in the nutrient discharged from the property or that advanced mitigation measures are in place that mean the property operates in the top range of nutrient discharge minimisation practices when measured against practices in the relevant farming industry. Therefore, the question of whether or not there is any net increase is still very much at the forefront.
49. To determine whether there is a net increase in nutrients or not still inevitably requires some form of modelling to be done, and therefore, the questions and

concerns about inputs for the current farming system, and to the same extent, the need to forecast inputs for the proposed farming system are still valid.

50. In the end, it was determined that for Berrandale, there was no net increase, but look at the process that eventuated for that conclusion to be reached.
51. In general, the S42a report has veered away from the use of Overseer, recognising its limitations, and focused on Farm Environmental Plans and advanced mitigation measures. This, in my view, is more in line with what had actually been proposed as a condition for Berrandale in the first instance.⁴
52. Therefore, I suggest that any reference to “no net increase” is removed from recommended policies 4.31 and 4.32 and the emphasis on mitigation measures is endorsed fully.

Overseer

53. Ms Nicole Phillips of Irricon has prepared a Brief of Evidence that highlights a number of issues that we have encountered with the use of Overseer. Ms Phillips evidence refers to modelling carried out for Pahau Flats Dairy Limited.
54. Pahau Flats Dairy Ltd are purchasing ‘Landsend’ a 380ha irrigated property on Pahau Reserve Road, in the Hurunui catchment. Takeover of the property is 30 January 2013. They propose to convert the property to dairy, milking up to 1300 cows. The property is currently run as a beef and sheep operation, irrigated from the Amuri Irrigation scheme, and from surface water takes from the Hurunui River, Pahau Creek and Hurunui Drain. The property is primarily irrigated using border dyke irrigation (approximately 200ha), has one centre pivot, and the remainder is irrigated with hard hose guns.
55. It is proposed that the entire property will be changed to spray irrigation under centre pivots, with seven centre pivot irrigators, ensuring excellent efficiency of water use, and nutrient management.
56. Irricon concluded that the conversion to dairy did not meet the definition of ‘change’ as defined in the notified LWRP for the following reasons:
 - 56.1 The property is irrigated from Amuri Scheme water, and resource consents CRC020786 (Hurunui Drain and Pahau Creek) and CRC951130.1 (Hurunui River). No additional water is required. Centre pivot irrigators will be installed so that the property is irrigated more efficiently and effectively.
 - 56.2 Two hundred hectares of land is being converted from borderdyke irrigation to centre pivot irrigators, and 60ha from hard hosed guns to centre pivots. Approximately 40ha of land will be irrigated that is not currently due to the configuration of the existing systems, leaving missed areas.

⁴ Page 73 of the S42a Report for Hearing Two – “In this transitional phase, before the introduction of a “lookup table” in Schedule 8, there is an opportunity to step back from Overseer in the interim period to enable it to be developed more fully and gain the required confidence. On this basis, thresholds in the recommended definitions and rules are based on measures other than modelled outputs from Overseer.”

- 56.3 Whilst the definition of 'change' refers to Overseer calculations, Overseer is unable to quantify the difference between borderdyking and spray irrigation systems. However, ECan report R10/127 'Estimating nitrate-nitrogen leaching rates under rural land uses in Canterbury' is useful in that it clearly shows that the nitrate mass under borderdyked land is significantly more (at least three times as much) as under spray irrigation.
- 56.4 Appendix 1 of the ECan report shows the likely nitrate mass in drainage under different soil types and different land use scenarios and it was calculated that there would be a net decrease of 7800kg of N.
57. This is a significant reduction in nitrate mass in drainage for the property. Therefore, it is concluded that the conversion should not be classified as a change in land use as it will definitely not be a 10% increase in nutrient loss, rather it will be a marked reduction.
58. The Regional Council did not accept this requesting that Overseer be used to determine percentage of change. Ms Phillips completed the modelling which showed that the current N lost to water was 24kg/ha/year and the proposed was 35kg/ha/year, and it was again reiterated that Overseer was not capable of accurately modelling the effects of a conversion from border dyke to spray irrigation. Ms Phillips evidence provides further details on this point.
59. This example, along with the others in Ms Phillips evidence, reiterates the S42a reports recommendations to veer away the use of Overseer. It is noted that use of a more efficient irrigation system is one of the advanced mitigation measures detailed in the S42a report, but because of the emphasis in the notified plan is on Overseer, this was not considered relevant in the processing of the Pahau resource consents and the benefits of converting from border dyke to spray irrigation were effectively ignored, and all because Overseer could not show this.
60. Therefore, Irricon fully supports the shift towards the use of advanced mitigation measures as recommended in the S42a report, and the removal of requirement to use Overseer to determine whether an activity is a change in land use or not or as a limit setting tool.

Keri Johnston

(BE (hons) Natural Resources, MIPENZ, CPEng)



Dated: 2 April 2013