

**Before the commissioners appointed by the
Canterbury Regional Council**

In the matter of The Resource Management Act
 1991

and

In the matter of 60 water permit applications to
 take and use water, 29 land use
 consent applications and 21
 discharge permit applications, for
 agricultural and horticultural
 activities

Section 42A Officer's Report of Darren Graham McNae

Report on the audit of individual Overseer® modelling and related
nutrient management plans

Date of hearing: February 2010

INTRODUCTION

Background

1. This report forms part of Environment Canterbury's audit of the assessment of environmental effects (AEE) provided by the applicants in support of resource consent applications to take and use water and to discharge water/contaminants in the upper Waitaki catchment for agricultural and horticultural activities.
2. This report will provide the decision-maker with information and advice related to the actual and potential effects of the proposed activities on cumulative water quality effects. I undertook this audit as an employee of AgFirst Rotorua that has been engaged by Environment Canterbury (ECan) to audit these applications in relation to cumulative water quality effects.

Qualifications

3. I hold the qualification of Bachelor of Applied Science (Valuation and Farm Management) from Massey University.
4. I currently hold a certificate in Sustainable Nutrient Management (Intermediate) from Massey University.
5. I have worked as a farm consultant for the past 9 years dealing in both the drystock and dairy sector.
6. Since January 2000 I have been an employee of AgFirst Central, the Rotorua based office of the national farm consultancy company.

Scope of report

7. This report is prepared under the provisions of section 42A of the Resource Management Act 1991 (RMA). This section allows a Council officer or Council-appointed consultant to provide a report to the decision-makers on a resource consent application made to a Council, and allows the decision-makers to consider the report at the hearing. Section 41(4) of the RMA allows the decision-makers to request and receive from any person who makes a report under section 42A “any information or advice that is relevant and reasonably necessary to determine the application”.
8. This report forms part of a suite of section 42A reports prepared by Environment Canterbury for the above consent applications. All reports should be read together to gain a complete understanding of the audit of the resource consent applications.
9. Any conclusions reached or recommendations made in this report are not binding on the decision-makers.
10. This report addresses matters related to the quality and robustness of the Overseer® nutrient budgets prepared for each of the farming operations in relation to the proposed land use outlined in the prepared Farm Environmental Management Plan (FEMP).
11. The audit specifically focused on ensuring the inputs used in the Overseer® files are within “normal” farming parameters.
12. The outcome of this audit has not been to correct the anomalies identified in the files to provide more accurate outputs nor to provide comment on the impact of making the recommended changes as this is an area for the applicants to undertake.
13. No assessment of comment has been made as to the ability of these systems to meet the overall required nutrient targets.

METHODOLOGY

14. The audit undertaken has been a desktop study and has not physically involved any on farm inspections.
15. All files received have been audited and for clarification the only Overseer® files not received and therefore audited for this project to this point have been **Dunstan Peaks Limited** and **Rosehip Orchards**
16. A number of properties have submitted multiple Overseer® files for their individual consents. It is understood that multiple Overseer® files have been prepared where the consent applicant wishes to keep their future land use options open. For this project all overseer files have been audited (as shown in appendices two and three),
17. The audit process has involved two stages. The first of these was a basic desktop study undertaken by the staff at Environment Canterbury to outline basic “higher level” inputs in the Overseer® and how these relate to the FEMP (Appendices one) and the actual consent application. The second stage involved the auditing of the actual Overseer® files prepared (Appendices two & three).
18. The auditing of the Overseer® files has been undertaken by a team of staff from both AgFirst Rotorua and AgFirst Waikato. Specifically this team has involved Darren McNae (Rotorua), Mark Macintosh (Rotorua), Alison Dewes (Waikato), Nicola Waugh (Waikato). All

staff who have undertaken the auditing are experienced users of Overseer[®] and have completed either the Intermediate or Advanced Sustainable Nutrient Management Course run by Massey University. I am responsible for the integration of information from these individual audits into this report.

19. Each Overseer[®] files has been reviewed based the prepared template and has focused on assessing the extent to which information entered into Overseer[®] will provide an accurate estimate of the future nutrient loading.
20. It is recognised that various inputs and values entered into Overseer[®] will have a differing effect on the Nitrogen (N) leached and Phosphorus (P) runoff. While a full audit of the files has been completed the focus has been on those factors or inputs that are accepted as having a high or medium impact on the nutrient outputs. These have been based on the summary from AgResearch trial work conducted in the Taupo region (Power et al, 2006) and is summarised as below:

High Impact	Medium Impact	Low Impact
<ul style="list-style-type: none"> • Nitrogen Fertiliser applied • Winter application of N fertiliser • Stocking Rate • Winter management practices (particularly dairy) • Detailed stock records (sheep and Beef) • Annual Rainfall Pasture development status • Clover Content 	<ul style="list-style-type: none"> • Replacements grazed on or off farm (dairy) • Irrigation • Breed of animal • Milksolids production • Supplements bought on to farm • Percentage of male cattle 	<ul style="list-style-type: none"> • Contour • Pasture species • Type of N fertiliser • P application rates • Drainage class • Supplements removed • Effluent application rate • Effluent disposal system

21. Specifically this has focused on areas where data may have been entered incorrectly into Overseer[®] or appear outside the bounds of “normal” farming practices. While areas such as winter management practices for example will have a significant bearing on the level of nitrogen leached this will vary depending on the system that the applicant is choosing to
22. While a number of factors have been identified that have a low overall impact on the nutrient outcomes these have still been identified to ensure that the audit is comprehensive. As science improves and is incorporated into programs such as Overseer[®], there may be input parameters that become recognised as being of higher priority in affecting nutrient outputs. Therefore if these files are to be used with new versions of Overseer at a later date, it is imperative that these are robust and complete.
23. Particular attention has been given to areas where the settings other than the defaults within Overseer[®] have been used. There needs to be sufficient evidence or reason to use adjusted values. It is recognised that in many cases this is sufficiently justified however the

reasoning for this should be documented by the applicant to ensure this is sound and based on strong evidence.

24. I understand that evidence has been presented on the development status of the land to be used in the Overseer[®] files. I understand that this evidence indicated a preference for the applicants to establish NDA limits using a “highly developed status”, however where the developed or developing status is to be used then they will undertake continued monitoring in the future to ensure this development status is most representative. It is believed that this should be on the irrigated areas only. The relatively young age of most farming districts in New Zealand indicates that “developing” or “developed” would be deemed the most appropriate at present however we must realise that this is constantly changing and this change will be accelerated under “ideal” conditions such as those under irrigation.
25. One of the key outputs from Overseer[®] that has been analysed is the block pasture report. Overseer will produce an estimated pasture production for each block based on the inputs provided. This is driven by animal intake (and performance). Without conducting full farm audits these reports have been used as a guideline based on normal parameters for pasture production.

RESULTS

26. The table attached table in Appendices 1 highlights the discrepancies in the consents applied for and the Overseer filed and FEMP’s prepared. This highlights a number of basic areas of clarification required. Issues of major significance are highlighted in Red on the table The major anomalies include:
 - (a) Differences in irrigation areas applied for in application and modeled in Overseer[®]
 - (b) Differences in irrigation application rates in consents
 - (c) Discrepancies in rainfall data and figures used in Overseer. This has a significant bearing on nutrient flows.
27. Where multiple overseer options have been prepared the summary table below shows issues identified in the key issues that have been identified in the proposal that shows the highest level of nutrient load (based on nitrogen leached). Where applicants have submitted files for two different land uses (dairy / sheep and beef) both of these options have been shown.
28. A full summary is shown in appendix 1 and 2 of all files audited. The file name highlighted in grey corresponds with the file shown below with the highest nitrogen leaching.
29. A summary of the main areas requiring further clarification by each applicant are as below. The “high and medium” impact issues are the most critical with the “low and other” being mainly points of clarification required and comments on other key issues raised:

Dairy Applications				
Applicant				
	High	Medium	Low	Other or comment
Southdown Holdings (Glen Eyrie Downs)	<ul style="list-style-type: none"> • Only used developed setting • Very low clover content • High reliance on herd homes and feed pad to meet targets 	<ul style="list-style-type: none"> • No Cow liveweight specified • 13,000t grass silage DM imported – significant amount Why not cereal silage? • Have used own irrigation nutrient concentrations 	<ul style="list-style-type: none"> • 10% of nutrient removed by wetlands and filter strips – need robust construction of these. • Effluent solids and Sludge exported from system 	<ul style="list-style-type: none"> • Inefficient nutrient system – nutrient is imported in feed and fertiliser and then exported in effluent • Nutrient is exported off this farm but would still be an issue if this is to a location in the catchment.
Southdown Holdings (WHL Killermont)	<ul style="list-style-type: none"> • Only used developed setting • Low and very low clover setting used • High reliance on herd homes and feed pad to meet targets 	<ul style="list-style-type: none"> • No cow liveweight entered • 5,500t grass silage DM imported – significant amount. Why not cereal silage? • Have used own irrigation nutrient concentrations 	Effluent solids and sludge exported from the system	<ul style="list-style-type: none"> • Inefficient nutrient system – nutrient is imported in feed and fertiliser and then exported in effluent • Nutrient is exported off this farm but would still be an issue if this is to a location in the catchment • 12.8t DM / ha pasture production
Five Rivers Limited	<ul style="list-style-type: none"> • Only used developed setting • High reliance on herd homes to meet targets 	<ul style="list-style-type: none"> • High per cow production • No cow weight entered • Friesian x Jersey cows – why not Friesian cows that would be more efficient in an intensive system? • Have used own irrigation 		<ul style="list-style-type: none"> • High Olsen P on dryland pasture • > 13t DM / ha pasture production

		<p>nutrient concentrations</p> <ul style="list-style-type: none"> • 7,050t grass silage DM imported – significant amount. Why not cereal silage? 		
Killermont Station	<ul style="list-style-type: none"> • Cows wintered off for 6 months – not likely production target would be achieved • No herd homes or feed pads allowed for. <p>Overall very low stocking rate given cows are grazing on non irrigated area</p>	<ul style="list-style-type: none"> • 400kg MS / cow production is questioned with no supplement • No cow liveweight entered and Friesian x Jersey cows – why not Friesian cows that would be more efficient in an intensive system? 	<ul style="list-style-type: none"> • Insufficient pasture eaten per ha to support this • Significant amount of pasture exported off farm? • All effluent exported to meet targets 	<ul style="list-style-type: none"> • Unknown drainage status of land • No calving or lactation details entered • All effluent is exported but nitrogen is still being imported and applied in the system.
Simons Pass Station		<ul style="list-style-type: none"> • High per cow production – has this been feed modeled? • No cow weight entered • Have used own irrigation nutrient concentrations 	<ul style="list-style-type: none"> • FEMP indicates effluent is exported but file has this spread on farm 	<ul style="list-style-type: none"> • Lactation length or calving details not entered • Pasture production >13t DM/ha
McAurie, Ellis etc	<ul style="list-style-type: none"> • Only used developed status 	<ul style="list-style-type: none"> • No cow liveweight entered and Friesian x Jersey cows – why not Friesian cows that would be more efficient in an intensive system? 	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • Lactation length or calving date not entered • Low Olsen P for pasture production • Pasture production >13t DM/ha

Drystock Applications				
Applicant				
	High	Medium	Low	Other or comment
Five Rivers Ohau Downs	<ul style="list-style-type: none"> • Only used developed setting. • Reliant on feed pad to meet targets 	<ul style="list-style-type: none"> • Used own irrigation nutrient concentrations • No liveweights entered for dairy heifers 	<ul style="list-style-type: none"> • No P or N applied to crops 	<ul style="list-style-type: none"> • No wool production entered • > 13t Dm / ha pasture production • Olsen P high for dryland pasture
Killermont	<ul style="list-style-type: none"> • Only used developed setting • V low clover setting used on hill blocks 	<ul style="list-style-type: none"> • 400kg Breeding hinds – this is very high. 	<ul style="list-style-type: none"> • Unknown drainage class 	<ul style="list-style-type: none"> • > 13t DM / ha pasture production
Simons Hill Station	<ul style="list-style-type: none"> • No Sheep over winter – is this a trading property? 	<ul style="list-style-type: none"> • All female cattle? • Own irrigation nutrient concentrations used 		<ul style="list-style-type: none"> • Wool production very low
Simons Pass Station	<ul style="list-style-type: none"> • Very high stocking rate of 19.6 RSU/ha– appears too high 	<ul style="list-style-type: none"> • Own irrigation nutrient concentrations 		<ul style="list-style-type: none"> • Very high wool production • > 13t DM / ha pasture production
High Country rosehip Orchards	<ul style="list-style-type: none"> • Very high stocking rate of 20.4 RSU/ha – appears too high. 	<ul style="list-style-type: none"> • Own irrigation nutrient concentrations 		<ul style="list-style-type: none"> • > 13t DM / ha pasture production
Lonestar farms Ltd	<ul style="list-style-type: none"> • No advanced stock reconciliation completed 		<ul style="list-style-type: none"> • Olsen P high for dryland pasture and low P applied annually 	<ul style="list-style-type: none"> • Large differences in relative productivity. • Only 132kg DM/ha production on

	<ul style="list-style-type: none"> • High variation in rainfall 			extensive country
Glenmore station	<ul style="list-style-type: none"> • Only used developed status 	<ul style="list-style-type: none"> • High irrigation rate 	<ul style="list-style-type: none"> • Unknown drainage status on HC 	<ul style="list-style-type: none"> • No wool production entered
Anderson	<ul style="list-style-type: none"> • Only used developed setting • No advanced livestock reconciliation completed • No N applied to irrigation blocks? 		<ul style="list-style-type: none"> • Low P applied to irrigated area 	
Marae Horo	<ul style="list-style-type: none"> • Only used developed setting • V low clover setting used 	<ul style="list-style-type: none"> • No irrigation applied 	<ul style="list-style-type: none"> • Unknown drainage class used • Low or no P applied to some areas 	<ul style="list-style-type: none"> • Low pasture production for non irrigated blocks will be based on no major difference in relative productivity
Classic Properties	<ul style="list-style-type: none"> • Only used developed setting • No advanced stock reconciliation completed 		<ul style="list-style-type: none"> • No P applied to swamp 	<ul style="list-style-type: none"> • Region needs changing to high country • Relative productivity too low for centre pivot • Relative productivity for dry paddocks / rye seems too high
Hope	<ul style="list-style-type: none"> • Only used developed setting 	<ul style="list-style-type: none"> • No irrigation rate entered for Pivots B&C – 275ha. Only 110ha in Overseer (385ha applied for in FEMP) 	<ul style="list-style-type: none"> • Drainage on blocks unknown • Olsen P does not correspond with Relative production 	<ul style="list-style-type: none"> • Relative productivity for irrigated blocks too low. • Pasture grown on irrigated blocks too low. • No wool weight entered

McAurie	<ul style="list-style-type: none"> • Only used developed setting • High ewe liveweight 65kg • No weaner cattle shown in stock trading sheet 			<ul style="list-style-type: none"> • High variation in relative productivity • Low pasture production on improved hill country • Region needs changing • No wool weight entered
Haldon Station	<ul style="list-style-type: none"> • Only used developed setting • V low clover setting used for most blocks 		<ul style="list-style-type: none"> • Drainage unknown for most blocks 	<ul style="list-style-type: none"> • Kirk Hill relative productivity seems low • Large variation in relative productivity
Irishman Creek	<ul style="list-style-type: none"> • Only used developed setting • No advanced stock reconciliations 	<ul style="list-style-type: none"> • High irrigation rate 	<ul style="list-style-type: none"> • High Olsen P on native and Oversown country does not correlate 	<ul style="list-style-type: none"> • Region needs changing to high country • Check if native area is developed as very low relative productivity
Bellfield Land Co	<ul style="list-style-type: none"> • Only used developed setting • Low clover setting used for three blocks 			<ul style="list-style-type: none"> • Region needs changing to high country
Lilybank Land co	<ul style="list-style-type: none"> • Only used developed setting • No N applied on Godley or home irrigation blocks 		<ul style="list-style-type: none"> • Drainage unknown for all blocks • High Olsen P relative to P applied for some blocks – need to check • Low P applied to irrigation blocks 	<ul style="list-style-type: none"> • No wool weight entered • Low relative productivity and pasture production on Run
Otamatapaio Station	<ul style="list-style-type: none"> • Only used developed setting 		<ul style="list-style-type: none"> • Soil drainage unknown 	<ul style="list-style-type: none"> • High Olsen P on dryland paddocks

			on 3 blocks	<ul style="list-style-type: none"> • No wool weight entered • Pasture intake low on irrigated areas
Twin Peaks Station	<ul style="list-style-type: none"> • Only used developed setting • No N applied to irrigated areas? 			<ul style="list-style-type: none"> • Region needs changing • No wool weight entered • Supplement entered on a wet weight – is quantity correct
Glentanner Station	<ul style="list-style-type: none"> • Only used developed setting • No advanced stock reconciliation completed 	<ul style="list-style-type: none"> • All cattle female - is this correct? 		<ul style="list-style-type: none"> • No wool weight entered
Waitangi Station	<ul style="list-style-type: none"> • Only used developed setting • No advanced livestock production 			<ul style="list-style-type: none"> • Region needs changing • High Olsen P for unimproved low block • Low pasture production for unimproved hill block
Gray Hills	<ul style="list-style-type: none"> • Only used developed setting • No advanced livestock production • V low clover setting for two blocks 		<ul style="list-style-type: none"> • Drainage unknown for two blocks 	<ul style="list-style-type: none"> • Pasture production for hill and unimproved blocks low
Aviemore Ltd - Awakino	<ul style="list-style-type: none"> • Only used developed setting • No N applied to irrigated block 		<ul style="list-style-type: none"> • Drainage unknown for most classes 	<ul style="list-style-type: none"> • Region needs changing • Relative productivity of irrigated blocks too low. Pasture production too low

				<ul style="list-style-type: none"> • No wool weight entered
Aviemoire Ltd - Proposed	<ul style="list-style-type: none"> • Only used developed setting • V low stocking rate and pasture grown 		<ul style="list-style-type: none"> • Drainage unknown for all blocks 	<ul style="list-style-type: none"> • Region needs changing • Relative productivity of irrigation blocks too low – entered incorrectly • No wool weight entered
Birchwood Run	<ul style="list-style-type: none"> • Only used developed setting 	<ul style="list-style-type: none"> • High irrigation rate 	<ul style="list-style-type: none"> • Drainage unknown for all blocks • Supplement as wet weight – is this right? • No P applied to dry flat 	<ul style="list-style-type: none"> • Region needs changing to high country • All Olsen P levels the same? • No wool weight entered
Totara Peak	<ul style="list-style-type: none"> • Only used developed setting 		<ul style="list-style-type: none"> • Drainage unknown • Supplement as wet weight – is this right? • Very high Olsen P for dryland – should this be 20? 	<ul style="list-style-type: none"> • Region needs changing to high country • Wool weight low.
Graham or Te Akatarawa	<ul style="list-style-type: none"> • Only used developed setting • No advance livestock reconciliation 	<ul style="list-style-type: none"> • Very high irrigation rate 		<ul style="list-style-type: none"> • Region needs changing to high country • >13t DM / ha under irrigation
Falconer or Peak Valley	<ul style="list-style-type: none"> • No advanced livestock reconciliation 		<ul style="list-style-type: none"> • No variation in Olsen P between blocks 	<ul style="list-style-type: none"> • Low wool production • Pasture production for irrigated block low

30. Key common issues or areas of major concern identified were:
- (a) Large differences in relative productivity. Users need to be sure they understand how to use this function as it will implicate on the nitrogen leached from individual blocks. i.e. if a given block of land is given a high relative productivity this will relate to higher levels of production and therefore nitrogen leaching from this block.
 - (b) Only used developed setting for irrigated land.
 - (c) No advanced livestock reconciliation completed – stock numbers have been entered in the “Revised Stock Unit” screen. The applicants need to be sure they understand this term if this option is to be used. This is not winter stocking rate. Ideally the full calculator should be used to get an accurate stocking rate. Simply using the “Revised Stock Unit” input screen can only be used with confidence if another feed budget programme (i.e. Farmax ®) has been used to calculate these figures. AS Overseer® is an animal driven model this has a significant bearing on the accuracy of the model.
 - (d) Very high or very low levels of pasture growth – where the outputs show extremes in estimated pasture growth it is questioned as to what other feed modeling has been undertaken to determine stocking rates. This will result in the Overseer® outputs over or underestimating the nutrient loading. High levels of pasture growth in particular are questioned as to whether these levels of growth could be achieved on a consistent basis.
 - (e) Own irrigation nutrient concentrations used – it needs to be clearly stated by the applicant why this has been altered. It needs to be clarified why these changes have been made an importantly whether these changes have been made on actual monitored data. This will implicate on the amount of nutrient being imported into the system and conversely affect nutrient outputs.

CONCLUSIONS

- 31. Where discrepancies have been identified between consent applications and the Overseer® files prepared the applicants need to provide clarification as to which is the correct information. The alternative then needs to be resubmitted in its correct form.
- 32. It is recommended that for each of the significant issues identified in the audit process for each property, the relevant consultant for the applicant consider the issues raised and consider where appropriate re-running the model with modified inputs.
- 33. There is a significant level of variation in the quality and accuracy of the overseer modeling. The errors found throughout ranged from simple (minor) issues through to major issues that could have a large bearing on the nutrient outputs.
- 34. In some cases large variations in pasture production are shown. In a number of cases irrigated land is still only producing 4,000 DM / ha. This seems conservative and could indicate that potential stock carrying capacity could in fact be higher on these blocks once developed. With a capped nutrient allowance there would be no ability to further increase stock numbers should the actual pasture grown be higher than this.
- 35. A large portion of the differences in pasture production can be put down to the use of the “relative productivity” function within overseer. This is a means of showing the variations in performance between blocks of land which is important particularly when irrigation is used. The manner in which this facility has been used varied greatly.
- 36. Currently Overseer® does not allow more than 50% of the pasture grown on any particular block to be exported (something which is planned to be rectified in coming updates in February 2010). In files where the level of feed exported (cut and carried) is at 50% it is questioned whether the “planned” quantity based on feed budget (if undertaken) has relied

on levels higher than 50%. If so this will be affecting the nutrient flows and outputs. For blocks where this is the planned land use these files should be correctly completed in the new version

37. It appears in some cases that the modeling (primarily dairy) has not been based on optimum nutrient efficiency which would effectively increased the proposed nutrient loading i.e., importing high protein feeds rather than cereal silages to balance the diet.
38. There are also some questionable practices outlined in some dairy files such as exporting effluent (and nutrient) yet continuing to apply "bought in" nitrogen to the farm. This needs to be clarified by the applicant(s) as to the full reasoning behind this practice as from both a nutrient and an economic point of view this lacks sound reasoning.
39. Full confidence can only be gained in the models once the significant issues raised are fully addressed by the applicants.
40. Overall the quality of the files prepared is deemed to be fair however the addressed issues need to be rectified to ensure a higher level of accuracy and complete confidence in the outputs.



Signed _____

Dated 11 January 2010

Darren Graham McNae

Consultant, AgFirst Central

References

Power I, Judge A, Ledgard S. A simple sensitivity analysis of nitrogen leaching for three Taupo farming systems, using Overseer nutrient budget model: March 2006

Appendix One

Green - inputs ok, or more conservative; Orange - input does not match up but not close to threshold, potentially low risk; Red - inputs do not match up and close to thresholds, potentially high risk

		Irrigation area & checked against Overseer input	FEMP/NMP in?	Annual irrigation amount (mm) - checked against Overseer	Land use - checked	Dairy Effluent included -	Dairy cow numbers - checked	Mean annual rainfall - checked	Additional Notes
	Christian Whata's clients								
1	• Southdown Holdings - Glen Eyrie	2068ha spray - ok	Yes	600mm - ok	Dairy - ok	Yes - but unsure about why solids from ponding system "exported" and not spread on farm	7,000 - ok	700mm - ok - have selected mid point between 650-750mm isohyets	3 different reports included in FEMP - all need to be audited
	• Southdown Holdings - Ahuriri (WHL Killermont)	FEMP= 1049 ha, Application = 1100ha.	Yes	600mm - ok	Dairy	yes	3850 - ok	Overseer = 500mm - ok - have selected mid point between 450-550mm isohyets	3 different reports included in FEMP - all need to be audited
2	• Five Rivers	2000ha spray in OVERSEER but only 1,493ha applied for	Yes	600mm - ok	Dairy + sheep - different to notification but ok for application as heard	Yes	7,000 - ok	700mm - ok - have selected mid point between 650-750mm isohyets	3 different reports included in FEMP - all need to be audited
3	• Killermont Station	Red flats pebbly irrigated 216 ha (applied for this area under CRC041331) These have been applied for but do not appear to be covered by OVERSEER inputs (may be missing?): CRC041777 - 300 ha CRC041798 - 75 ha CRC040180 - 28 ha (replacement)	Yes	600 mm - ok	Pastoral All other applications are for pastoral land-use but noted in parameter report that dairy cows have been assumed (300) effluent disposal off-site	n/a see notes in previous column on land-use	n/a see notes in previous column on land-use	500 mm - Pebbly block. Isohyets show 450 - 650 mm	
	Kelvin Reid's clients								
4	• Pukaki Irrigation Company	No irrigation							
5	• Simons Hill Station	Overseer = 440 ha Simons Hill = 491 ha (based on spreadsheet tabled by applicant at the hearing) or 472 ha (based on Graeme Ogle's evidence) Pukaki Flat South = 1735 ha (based on spreadsheet tabled by applicant at the hearing & Ogle)	Yes	Overseer = 500 - 600 mm 600 mm assumed in McIndoe evidence arguing for annual volume	SBHC only proposed on this block Dairy - wintering off on Pukaki Flats South (most intensive scenario favoured)	n/a Propose to truck effluent off the property so no discharge consent applied for on the property	n/a 3 cows per ha, so approx 5,205	Overseer = 510 mm (600mm in McIndoe evidence Appendix A, based on Twizel mean annual)	Only 1 scenario for Simons Hill block 3 possible scenarios for Pukaki Flats South block
6	• Simons Pass Station	Overseer (DOFF) = 1133 ha	Yes	Overseer = 550 - 575				Overseer = 589 mm	

[Type text]

		Irrigation area & checked against Overseer input	FEMP/NMP in?	Annual irrigation amount (mm) - checked against Overseer	Land use - checked	Dairy Effluent included -	Dairy cow numbers - checked	Mean annual rainfall - checked	Additional Notes
		Overseer (SBFIN) = 1063 ha Mary Range = 287 ha (based on spreadsheet tabled by applicant at the hearing & Ogle) Pukaki Flats North = 2287 ha (based on spreadsheet tabled by applicant at the hearing & Ogle - some of this must be over Simons Hill boundary, since they only have 2400ha proposed each)		mm 600 mm assumed in McIndoe evidence arguing for annual volume	SBFIN or SBIFIN on Mary Range Applicant indicated favoured DOFF, Overseer appears to split Pukaki Flats South into combination of two scenarios	n/a Propose to truck effluent off the property so no discharge consent applied for on the property	n/a 3 cows per ha, so approx 6,861	(600mm in McIndoe evidence Appendix A, based on Twizel mean annual)	2 scenarios for Mary Range block 3 possible scenarios for Pukaki Flats North block
7	• Rosehip Orchards	Asked for replacement for corrupt files 22/12/09	Yes						
8	• High Country Rosehip Orchards	Overseer = 500 ha ok	Yes	Overseer = 575 - 600 mm 600 mm applied for.	ok	n/a	n/a	Overseer = 589 mm 510 mm on rainfall isohyets map	
9	• Lonestar Farms	Overseer = 570 ha Applying for 447 ha and 113ha existing, so modelling total farm??	Yes	Overseer = 600 mm ok	ok	n/a	n/a	Overseer = 600 mm Rob Glover says 643mm ave for last 7 years	Over-estimated irrigation area, so overall 'green'
	Ewan Chapman's clients								
10	• Glenmore Station	180ha (assumes all is pivot irrigation, but expect hard hose guns or K-line around 2 pivots)	Yes	600mm (ok)	ok	n/a	n/a	600mm assumed in Overseer, but lower than 650-850mm band isohyets would suggest	Uncertainty about soil profile across irrigated area
11	• Anderson	228ha spray for "Bog Roy" but only 165ha under these applications. "Otematata" portion under their station. 28ha spray for "Rostriever" but applied for 60ha in consent	Yes	Rostriever 660mm but 696mm volume applied for. Anderson 600mm but 728mm volume applied for.	ok	n/a	n/a	Rostriever - 325mm in OVERSEER Bog Roy - 520mm in OVERSEER Ok for Bog Roy; Rostriever should be between 450-550mm isohyets	
12	• Maree Horo	950ha in OVERSEER "irrigated blocks" but only 532ha under these applications	Yes	Actually states "no irrigation applied" (600mm in application)	Ok	n/a	n/a	500mm all blocks - appears to be based on applicant's knowledge of rainfall on property; isohyets should be 850-1000mm for East Ahuriri block, & 750-850mm on other blocks	

[Type text]

		Irrigation area & checked against Overseer input	FEMP/NMP in?	Annual irrigation amount (mm) - checked against Overseer	Land use - checked	Dairy Effluent included -	Dairy cow numbers - checked	Mean annual rainfall - checked	Additional Notes
13	• Classic Properties	416ha adjacent to highway 234ha on homestead block (all pivots - ok) For 'Irrigation Block' 40ha in BD assumed but applicant proposes 35ha to remain in BD	Yes	Overseer assumes 600mm but applicant proposes, based on WQN9v2, 570mm for 416ha block(CRC063106) and 510mm for 234ha block (CRC070406)	Ok	n/a	n/a	500mm assumed in Overseer (GHD rainfall map indicates higher), applicant has accepted effective seasonal rainfall indicated in GIS	Overseer treats both blocks the same, although different soil profiles for each application
14	• Hope	385 ha (238 + 147) AEE. Overseer input 110 ha pivot A, 275 Pivots B and C	Yes	550mm - pivot A = overseer, applicant based AV on MIC share 600mm	ok	n/a	n/a	Pivot A = 300, Pivots B + C = 300. Should be in 325-450mm (GHD rainfall map)	Pivots B + C say no irrigation applied!
15	• McAughtrie, Ellis-Lea Farms (The Glens), Greenfield Rural Opportunities, etc.	Greenfield - unsure; McAughtrie (see below); Ellis-Lea 306ha + 94ha effluent (only 85ha under this application, remainder under BIC shares). Should be 255ha total under this consent(85ha each property)	Yes - Ellis-Lea & McAughtrie No parameter report for Greenfield Rural Opportunities	Ellis-Lea - 500mm ok	Ellis Lea - dairy - ok; Other two - ok	Ellis Lea - Maybe but unclear to me from OVERSEER parameter sheet	Ellis Lea - 1200, no numbers specified in application	500mm should be between 550-650mm isohyets	No info for Greenfield Rural Opportunities part of application. Refer to McAughtrie for his entire property OVERSEER
16	• McAughtrie	316ha in OVERSEER - only 170ha under these applications but remainder BIS shares	Yes	600mm - only 485mm applied for one block of 85ha, and 511mm applied for other block of 85ha. May be supplementing with BIS water?	ok	n/a	n/a	549mm - should be between 550-650mm isohyets - but some cross-over to 450-550mm so ok	
17	• Haldon Station	3 blocks. Overseer = 400ha border, 100ha spray and 200 spray. Application = 380ha, 90ha spray and 190ha spray	Yes	Overseer = 554mm for border and 200ha spray, 500mm for 100 spray. Evidence says AV equates to application of 673mm/year	ok	n/a	n/a	600mm for 100ha block, 500mm for border and 200ha block. Ok - isohyets show 325-550mm	
18	• Irishman Creek Station	48ha for border-dyke under this application - ok; also have additional 164ha under spray from other existing consents	Yes	1500mm - ok	ok	n/a	n/a	Only 6mm in print out for border-dyke block, think it should be 685mm as per other blocks - if 685mm then ok as 650-750mm isohyets, need to check OVERSEER not run with only 6mm for irrigated block	
19	• Bellfield Land Co	242ha spray irrigation - ok	Yes	750mm Quailburn block - but 820mm	ok	n/a	n/a	525mm Quailburn; 575mm Henburn. -	

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		Irrigation area & checked against Overseer input	FEMP/NMP in?	Annual irrigation amount (mm) - checked against Overseer	Land use - checked	Dairy Effluent included -	Dairy cow numbers - checked	Mean annual rainfall - checked	Additional Notes
				applied for; 600mm Henburn block - ok				isohyets between 550-650mm so may be ok	
20	<ul style="list-style-type: none"> Lilybank Station Holdings 	172ha within 407ha command area (70ha Godley block, 66ha Macaulay block and 36ha homestead block, but applicant is arguing use of 600mm over a season which will enable irrigation of additional 70ha at least	Yes	425mm assumed based on WQN9v2 (ok), but applicant arguing for 600mm which will enable greater area of irrigation in a season	ok	n/a	n/a	1000mm assumed (ok), data is patchy and ranges 1100-2600mm but lower range expected on Lilybank flats so 1000mm conservative	Overseer needs to be re-run if Lilybank argument for 600mm is accepted because greater area of irrigation
21	<ul style="list-style-type: none"> Otamatapaio station 	446ha spray and border-dyke in OVERSEER, only 166ha for Otamatapaio blocks - but 200ha applied for	Yes	600mm (pivot) + 600mm (borders) - but 748mm applied for over 200ha	ok	n/a	n/a	450mm - between 450-550mm isohyets so may be ok, but at low end	
22	<ul style="list-style-type: none"> Twin Peaks Station 	70 ha of new irrigation in OVERSEER, 72 ha applied for.	Yes	600 mm - ok	ok	n/a	n/a	500 mm Isohyets range from 450 - 650mm	
23	<ul style="list-style-type: none"> Glentanner Station 	Overseer = 180 ha Applied for 200ha	Yes	Overseer = 600 mm - ok (note that WQN9v2 results in 545mm requirement once 20% light soils accounted for)	ok	n/a	n/a	Overseer = 600 mm ok	Close to P threshold, underestimated irrigation area, should re-run Overseer or amend application to 180ha - now proposing around 20% irrigation on Mackenzie soils with 25mm PAW (range 10-30mm) and may be shallow GW presence
24	<ul style="list-style-type: none"> Waitangi Station 	128ha ok	Yes	600mm	ok	n/a	n/a	400mm. Not on GHD rainfall map (Lake Aviemore)	Note all irrigation lumped together as one block...
25	<ul style="list-style-type: none"> Grays Hills Station 	Overseer = 480 ha; existing of 290ha plus proposed of 190ha - ok	Yes	OVERSEER = 600 mm - ok	OK	n/a	n/a	400 mm used in OVERSEER, but falls within 550-650mm isohyets	
26	<ul style="list-style-type: none"> Aviemore 	Lake Aviemore take - applied for a replacement consent = 35 ha, however only 2 ha was irrigated under their previous consents. Lake Waitaki - 119 ha applied for. OVERSEER says 156 of new irrigation (incl Awakino block below) and 23ha of already irrigated pasture. Areas	Yes (under Otamatata Station)	600 mm for both in OVERSEER. ok	Lake Aviemore - pasture - ok. Lake Waitaki take - pasture and viticulture. Both in OVERSEER as	n/a	n/a	400 mm used in OVERSEER. Isohyets between 325-550mm - but hard to tell as no map provided in FEMP for Lake Waitaki rainfall	Lake Aviermore take is for mixed of old irrigated pasture (2 ha) and new irrigation (33 ha). Lake Waitaki land-use for

