

Mr S Aromoana
RMO – Monitoring and Compliance
Ashburton Zone Team
4 McNally St
Ashburton 7700

24th November 2016

Dear Sam

CRC121664 Compliance Report

This is the inaugural compliance report for CRC121664.

To achieve the requirements of CRC121664, a nutrient budget for the 2015/16 season has been prepared for all land reported through the RDRML promoted Audited Self-Management Programme (ASM), which includes Farm Environmental Plans (FEP) for all properties supplied by the RDR. The area reported through this programme totals 85,412 ha, although some of this land falls outside the current terms of CRC121664 and largely into the much debated and informally defined “bolt-on” category¹.

The total load of Nitrogen lost to water calculated in accordance with the consent parameters is 6,030t N, which represents 83% of the consented N load of the *Existing Irrigated Areas*. The total load of Nitrogen lost to water from the *New Irrigation Areas* calculated in accordance with the consent parameters is 197t N, which represents 21% of the consented N load of the *New Irrigation Areas*.

It is pleasing to report that the RDR shareholders’ N loss numbers for the *Existing Irrigation Areas* are 17% less than the consented load and reflects the improvements in efficiency made by shareholders on farm and within the Irrigation Schemes. With further infrastructure changes to come in the near future that will impact significantly on water use, I expect this trend to continue. However, I am cognisant that this report is an annual snapshot, using a modelling tool that is designed for long term trending.

The total reported load of Phosphorus (P) for the *Existing Irrigation Areas* is above the consented load by 4%. Also, the P load limit on new irrigation area in zone 2 (Ashburton River) exceeded in this case by approximately 300 kg P. While this is less pleasing to report, I understand that the ability of OVERSEER to model Phosphorus is significantly less accurate than its ability to calculate N loss. This was discussed with Leo Fietje, Richard Purdon and David Just of ECan at a meeting with Reuben Edkins and myself on the 8th of November 2016.

Further there are some particular issues related to border-dyke outwash which appear to be the primary reason for this exceedance. These are explained in Appendix 2.

¹ This ‘bolt on’ category includes both land within the boundaries of a property which receives water from RDRML and is therefore a permitted activity land use, as well as other land that shareholders have included in their FEP’s.

Whilst not a requirement of this annual report, RDRML conducted 28 trial audits of FEPs as pilot for the consent requirement due in the 2017 annual report. The independent auditors graded the FEPs:

- 18 A Grades
- 9 B Grades
- 1 C Grade

Please find attached the compiled report. I would welcome the opportunity to discuss the contents with you prior to a compliance grade decision.

Yours sincerely,

A handwritten signature in black ink, appearing to be 'B R Curry', with a long horizontal line extending to the right.

B R Curry

Chief Executive

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CRC121664 Compliance report - DRAFT

Introduction

To achieve the requirements of CRC121664, a nutrient budget for the 2015/16 season has been prepared for all land reported through the Audited Self-Management Programme (ASM) associated with CRC121664. The total area reported through this programme totals 85,436 ha, although some of this land falls outside the current terms of CRC121664.

RDRML has achieved all the requirements of CRC121664 and is fully compliant with all elements of the conditions except for the Phosphate (P) load on the *existing irrigated area* and the one of the *new irrigated areas*. The P load is exceeded (by 4% and 28% respectively) but given the high level of uncertainty around P loss modelling using OVERSEER™ particularly on light soils, with border-dyke irrigation with no nearby waterways, this exceedance while disappointing is well within the margin of error when conducting OVERSEER™ P loss modelling in Mid-Canterbury.

As presented in the report, RDRML is well within the N load limits, but it is important to understand the many limitations when using OVERSEER™ to report at this scale against a nutrient load limit set using a specific methodology. Approximately twelve organisations have played a part in preparing the nutrient budgets compiled to prepare this report with a much larger number of individuals involved within these organisations. This results in a large range of modelling assumptions used in preparing these nutrient budgets.

The methodology used to estimate the existing irrigated area and new irrigated area loads limits took a long-term system average approach, while the nutrient budgets collated for reporting purposes predominantly took an annual approach which is a further source of uncertainty and variation.

Many farmers have invested considerable capital in on farm improvements to both irrigation systems and system management. Likewise the irrigation schemes at the collective level have invested in modernising the delivery systems. One scheme is now fully piped and the second is well underway. These piped systems support more efficient energy use and greater irrigation efficiency through the use of modern spray irrigation systems. These efforts should be recognised and these improvements are at least some of the reason for the margin between the reported load and the consented load limit.

CRC121664 – Condition summary:

Condition 1 - Definitions

Existing Command Area: are the three (3) areas indicated on plan CRC121664A on being coloured brown, orange and green, and labelled Mayfield/Hinds, Valetta and Ashburton/Lyndhurst respectively. The Existing Command Area totals 94,486 ha.

Existing Irrigation Areas: are the areas of land within the Existing Command Area that had water supply agreements in place with the consent holder (or its agents) and were being irrigated prior to December 2013.

Expanded Command Area: is the area bounded by the Rakaia River, the Rangitata River, the foothills of Mt Taylor and Mt Hutt and the Pacific Ocean (refer Plan CRC121664A).

New Irrigation Areas: are any area(s) of land within the Expanded Command Area that did not have a water supply agreement in place with the consent holder (or its agents) or were not being irrigated prior to December 2013 but are, or will be, irrigated under this consent.

Water Supply Consents: are any, or all, of the existing water permits held by the consent holder being resource consent numbers: CRC011237, CRC011245, CRC134808 and CRC133962 (or their subsequent respective replacements).

No comment required

Condition 2 – Consent Authorisation

Where the consent holder is supplying water in accordance with the *Water Supply Consents* this resource consent authorises:

a. The use of water for

- i. Irrigation of up to 94,486 hectares of crops and pasture in the *Expanded Command Area*; and
- ii. Stockwater; and
- iii. Hydroelectric power generation

b. The use of land for farming; and

c. The discharge of nutrients to water arising from the use of land for farming authorised in by clause (b) of this condition.

The total area irrigated by RDRML sourced water is 79,028 ha, well within the limit of 96,486 ha. This comprises of:

- 75,000 ha of *Existing irrigated area*, and
- 4,028 ha of *New irrigated area*.
- Another 6,386 ha of land is also reported through the ASM programme associated with CRC121664 including 'Bolt On' land and land irrigated by other irrigation schemes.

Condition 3 – Irrigation water use

The use of water for irrigation, land use and discharge specified in condition 1 of this resource consent shall be limited to a maximum land area of 94,486 hectares located within *Expanded Command Area*.

No comment required

Condition 4 – Irrigation water use

All users of water for irrigation shall take all practicable steps to:

- a. Ensure that the volume of water used for irrigation does not exceed that required for the soil to reach field capacity;
- b. Avoid leakage from pipes and structures; and
- c. Avoid the use of water onto non-productive land such as impermeable surfaces and river or stream riparian strips.

These practices are required as part of the Farm Environment Plans (FEP) completed by all scheme shareholders and monitored through the FEP Auditing programme, as well as by the race men of the individual schemes.

Condition 5 – Farm Environment Plan

- a. A Farm Environment Plan shall be prepared:
 - i. by the 1st of July 2016 for all properties within the *Existing Irrigation Areas* that have water supplied by the consent holder under the *Water Supply Consents*; and
 - ii. in advance of the consent holder supplying water (abstracted under the *Water Supply Consents*) to properties within the *New Irrigation Areas*.
- b. All Farm Environment Plans prepared in accordance with this condition shall:
 - i. utilise the template which is attached to (as Annexure 2) and which forms part of this resource consent; or
 - ii. a subsequent version of the template or alternative template plan where the template has been approved (in writing) by the Canterbury Regional Council RMA Compliance and Enforcement Manager.
- c. The consent holder shall ensure that each water user, that the consent holder supplies water to, maintains detailed records of fertiliser application rates, location and crop type (including winter feed/forage crops), cultivation methods, stock units by reference to type and breed, and all other necessary inputs to the OVERSEER^(TM) nutrient budgeting model. The records shall be made available to the Canterbury Regional Council on request.

438 FEPs have been completed as part of the RDRML ASM programme:

- 363 had an irrigated area greater than 50 ha or more than 20 ha of intensive winter cattle grazing, and therefore completed a full RDRML 15/16 FEP, while
- Five shareholders completed the equivalent BCI FEP template.
- 38 had an irrigated area less than 50 ha and less than 20 ha of intensive winter cattle grazing, and therefore completed a full RDRML 15/16 FEP but did not have to provide a nutrient budget as proxy nutrient loss values have been used.
- 32 had an irrigated area less than 10 ha and therefore completed the RDRML version of the ECan Lifestyle block management plan² and proxy nutrient loss values have been used.

This means that an approved FEP has been completed for each property receiving water under the terms of CRC121664 and condition 5 is met.

Condition 6 – Environmental Management Plan

The consent holder shall prepare and implement an Environmental Management Plan (EMP) within 12 months of the granting of this resource consent. The EMP shall be detailed and described in a report that is prepared by a suitably qualified and experienced person and that report shall be submitted to the Canterbury Regional Council. Once the Canterbury Regional Council has certified that the EMP is adequate and is consistent with the obligations set out in this resource consent, the consent holder shall implement it.

a. The consent holder shall audit all properties that it supplies water to at least once every three years with at least a third of the total number audited each year. The audits shall assess the:

- i. compliance with conditions 4 and 5 of this resource consent; and
- ii. compliance with the obligations and undertakings given in the Farm Environment Plan that applies to the property being audited.

b. The audits required by this condition shall be undertaken by a suitably qualified and experienced auditor.

c. The consent holder shall prepare an annual report describing the results of the EMP, which includes the audits that have been conducted each year. The report shall include:

- i. A record of the audit compliance grading;
- ii. The average annual loss of nitrogen and phosphorus for the preceding 12-month period (~~being from the 1st of August until the 31st of July~~)³ for:
 - a. The *Existing Irrigation Areas*; and
 - b. The *New Irrigation Areas*.

² <http://ecan.govt.nz/publications/Plans/Lifestyle-block-management-plan-Mar2015.pdf>

³ Based on agreement following discussions involving Sam Beaumont, Leo Fietje and Reuben Edkins, this specific time period has been set aside due to the significant difficulties caused when modelling farm systems in OVERSEER™ and this specific time period. The values presented are the averages for the season covered by these dates.

iii. The number of properties and the total area being irrigated in accordance with the requirements of this resource consent;

iv. Any incidence of non-compliance with the conditions of this resource consent, and/or with the requirements set out within the individual Farm Environment Plans;

v. The actions taken by both the consent holder and (as necessary) the water user(s) supplied by the consent holder to remedy or mitigate a noncompliance that is identified in accordance with (c)(iv) of this condition.

d. A copy of the annual report shall be provided to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager by the 30th of September each year.

e. A copy of each Farm Environment Plan and all associated audits shall be provided to the Canterbury Regional Council, marked for the attention of the RMA Compliance and Enforcement Manager upon request.

Although not a requirement at this early stage, RDRML has had 28 FEP Audits conducted as part of a trial programme. The trial programme is part of refining and developing the RDRML EMP which was approved by ECan in late 2015. The following is a brief summary of the FEP Audit outcomes, the full detail will be included in the next compliance report for CRC121664.

- 28 FEP Audits conducted throughout March and April 2016 by the Agribusiness Group.
 - a. Eighteen A grades
 - b. Nine B grades
 - c. One C grades

Condition 7 – Nutrient Limits

a. The combined average annual amount of Nitrogen ('N') and Phosphorus ('P') lost to water as calculated from the individual Farm Environment Plans prepared in accordance with the conditions of this resource consent, shall not exceed the following totals (derived using version 6.0.3 of the OVERSEER^(TM) modelling software):

i. 6088 tonnes of N and 82.5 tonnes of P from the land within the *Existing Irrigation Areas* as; and

ii. 263 tonnes of N and 6.82 tonnes of P from the land within the *New Irrigation Areas* located within Zone 1 as shown on plan CRC121664B.

iii. 52 tonnes of N and 1.36 tonnes of P from the land within the *New Irrigation Areas* located within Zone 2 as shown on plan CRC121664B.

iv. 211 tonnes of N and 5.46 tonnes of P from the land within the *New Irrigation Areas* located within Zone 3 as shown on plan CRC121664B.

b. The consent holder may derive the N and P limits for the land that is the subject of this resource consent using a subsequent version of the OVERSEER^(TM) modelling software, or an alternative model where the alternative model has been approved in writing by the Canterbury Regional Council RMA Compliance and

Enforcement Manager. When deriving N and P limits, the consent holder shall calculate the losses using the following parameters:

i. For the *Existing Irrigation Areas* the mixture of land uses and management practices modelled shall be consistent with the activities described in the report prepared by Stuart Ford, dated October 2013 and entitled "RDRML Land Use Consent Application: Calculation and Explanation of the proposed Nitrogen and Phosphorous Load and Limits", a copy of which is attached to (as Annexure 3) and forms part of this resource consent; and

ii. For the *New Irrigation Areas* the method used to determine the nutrient limit shall be consistent with the approach used in the report prepared by Macfarlane Rural Business dated 14 December 2013 and entitled "Hinds catchment nutrient and on-farm economic modelling, Final report (version 4), Volume 1 - Main report"

c. Where alternative N and P limits have been calculated in accordance with (b) of this condition they (along with the supporting information) shall be submitted to an appropriately qualified independent person for certification. The person shall only issue the certificate if satisfied that the new limits have been derived using the parameters listed in (b)(i) and (b)(ii) of this condition. Once the limits have been certified, they shall apply to all land use and discharge activities authorised by this resource consent and those set out in (a) in this condition shall cease to have effect.

d. A report, setting out any alternative limits that have been derived in accordance with (b) of this condition and certified in accordance with (c), shall be provided to the Canterbury Regional Council (marked for the attention of the RMA Compliance and Enforcement Manager) within five working days of the alternative limits being certified.

- *RDRML Existing irrigated area:*
 - a. Against a limit of 97.2 kg N/ha⁴ (7,293 t N over 75,000 ha), the losses from RDRML existing irrigated area averaged 80.4 kg N/ha equating to a total of 6,030 t N for the 15/16 season.
 - b. Against a limit of 0.73 kg P/ha⁵ (54.9 t P over 75,000 ha), the losses from RDRML existing irrigated area averaged 0.77 kg P/ha equating to a total of 57.06 t P for the 15/16 season.
- *RDRML Existing irrigated area*
 - a. Zone 1 (Ashburton - Rakaia)
 - i. Against a limit of 625.5 t N⁶ losses from RDRML new irrigated area in zone 1 (Ashburton - Rakaia) was 73 t N for the 15/16 season.
 - ii. Against a limit of 5.46 t P⁷ losses from RDRML new irrigated area in zone 1 (Ashburton - Rakaia) was 0.7 t P for the 15/16 season.

⁴ Overseer version 6.2.2

⁵ Overseer version 6.2.2

⁶ Overseer version 6.2.2

⁷ Overseer version 6.2.2

- b. Zone 2 (Ashburton River)
 - i. Against a limit of 125.1 t N⁸ losses from RDRML new irrigated area in zone 2 (Ashburton River) was 104.00 t N for the 15/16 season.
 - ii. Against a limit of 1.09 t P⁹ losses from RDRML new irrigated area in zone 2 (Ashburton River) was 1.40 t P for the 15/16 season¹⁰.
- c. Zone 3 (Hinds Plains)
 - i. Against a limit of 500.4 t N¹¹ losses from RDRML new irrigated area in zone 3 (Hinds Plains) was 85 t N for the 15/16 season.
 - ii. Against a limit of 4.36 t P¹² losses from RDRML new irrigated area in zone 3 (Hinds Plains) was 0.84 t P for the 15/16 season.

Except for the P loading on the *existing irrigated area* and zone 2 in relation to *new irrigation area*, RDRML is complying fully with all aspects of condition 7 of CRC121664.

Given the uncertainty around P loss modelling in the environments where RDRML scheme shareholders operate, with light soils and few waterways, I consider that it is highly unlikely that any actual exceedance is occurring. The changes in OVERSEER™ itself may mean that RDRML would be complying with this condition on the basis of current farm practice, let alone when the ongoing improvement in relevant farm practice driven through the FEP programme is considered.

⁸ Overseer version 6.2.2

⁹ Overseer version 6.2.2

¹⁰ Refer Appendix 2 for further discussion of this issue.

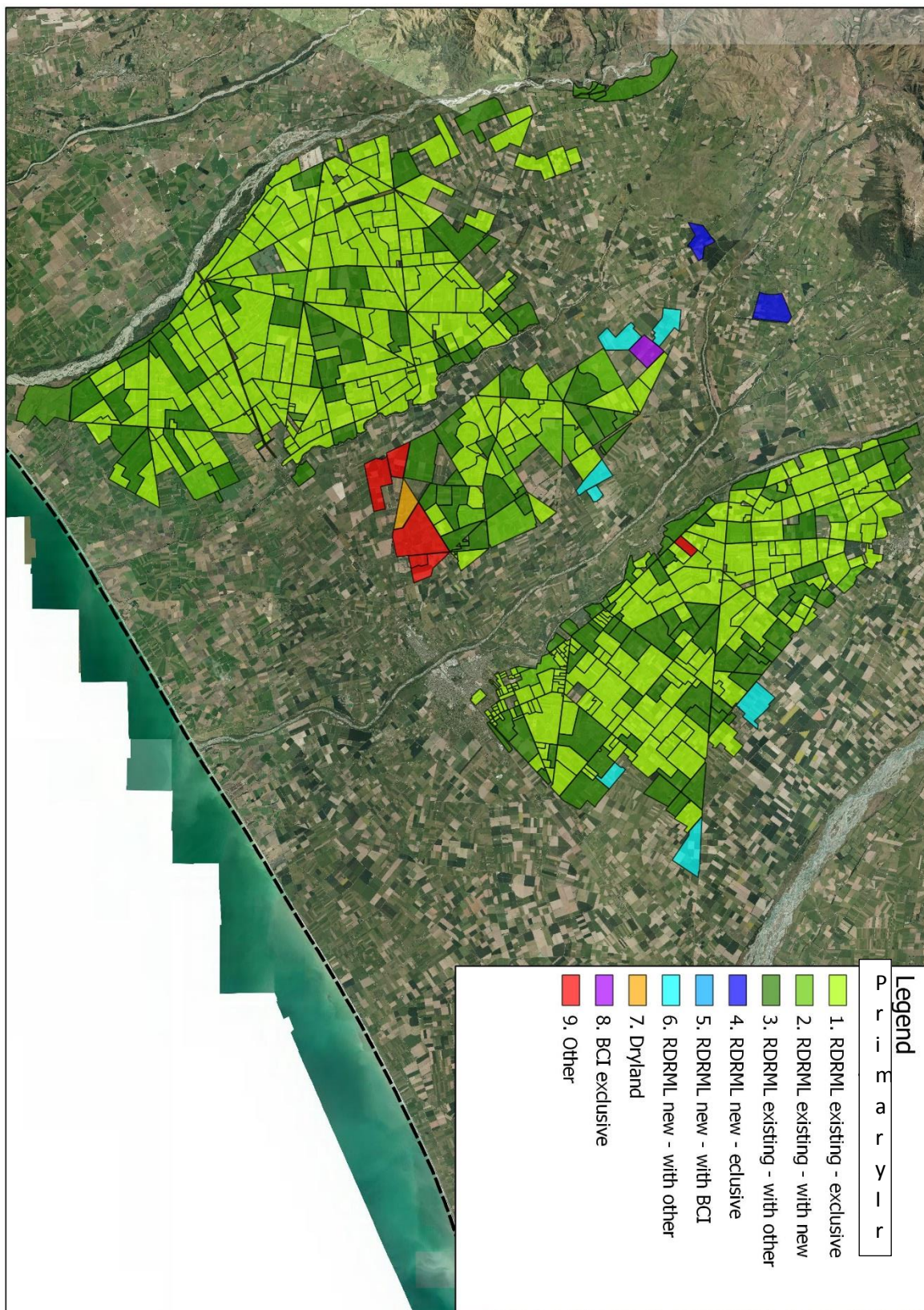
¹¹ Overseer version 6.2.2

¹² Overseer version 6.2.2

Table 1: 15/16 season N and P loads against limits in CRC121664

	Total			Limits as per CRC121664 (%'s)		
	Existing	Area (ha)	75,000.00	75,000.00	ha	0.00%
	Existing	Load (t N)	6,030.00	7,293.00		-17.32%
	Existing	Load (Av kg N/ha)	80.40	97.20		-17.28%
	Existing	Load (t P)	57.06	54.90		3.94%
	Existing	Load (Av kg P/ha)	0.76	0.73		3.94%
Ashburton - Rakaia	New Area (Zone 1)	Area (ha)	1,193.00	5,004.60	ha	-76.16%
	New Area (Zone 1)	Load (t N)	73.00	625.50		-88.33%
	New Area (Zone 1)	Load (Av kg N/ha)	61.19			
	New Area (Zone 1)	Load (kg P)	0.70	5.46		-87.17%
	New Area (Zone 1)	Load (Av kg P/ha)	0.59			
Ashburton River	New Area (Zone 2)	Area (ha)	1,399.00	3,336.40	ha	-58.07%
	New Area (Zone 2)	Load (t N)	104.00	125.10		-16.87%
	New Area (Zone 2)	Load (Av kg N/ha)	74.34			
	New Area (Zone 2)	Load (kg P)	1.40	1.09		28.32%
	New Area (Zone 2)	Load (Av kg P/ha)	1.00			
Hinds Plains	New Area (Zone 3)	Area (ha)	1,436.00	11,145.00		-87.12%
	New Area (Zone 3)	Load (t N)	85.00	500.40		-83.01%
	New Area (Zone 3)	Load (Av kg N/ha)	59.19			
	New Area (Zone 3)	Load (t P)	0.84	4.36		-80.85%
	New Area (Zone 3)	Load (Av kg P/ha)	0.58			

Map 1: Map of all area covered by CRC121664



Condition 8 – Review

The Canterbury Regional Council may, once per year, on any of the last five working days of May or November, serve notice of its intention to review the conditions of this consent for the purposes of:

- i. Dealing with any adverse effect on the environment which may arise from the exercise of this consent; or
- ii. Reviewing the effectiveness of the conditions in avoiding, remedying or mitigating adverse effects on the environment from the exercise of this consent; or
- iii. Reviewing the need to monitor the activities that are authorised by this resource consent (including the type and frequency of the monitoring that is undertaken by the consent holder); or
- iv. Reviewing the N and P limits that apply to the discharge, in order to provide for sustainable management of the watercourses and water bodies including groundwater) within the New Irrigation Areas and/or the Existing Irrigation Areas.

No comment required

Appendices:

Appendix 1 - Proxy nutrient budgets:

In the case of properties with an irrigated area greater than 50 ha or with more than 20 ha of intensive winter grazing, a nutrient budget was sought from each land owner. For the properties with an irrigated area less than 50 ha and with less than 20 ha of intensive winter grazing, proxy nutrient loss values have been used to estimate the nutrient losses from this land.

Just one proxy nutrient budget was created, this was deemed sufficient given the relatively narrow range of land uses on these small blocks as well as the limited geographic spread.

A single location was used for the climate inputs (171.77259 / -43.86087), which is the corner of Hepburn's Road and Mitcham Road).

The properties of dominant Lismore soil type (Lism_1a.1) sibling was used as this was the most common soil type on these small blocks.

A dairy support rotation was assumed as this was the most common land use scenario.

A large proportion (20%) of these properties is dryland and assumed to be unused, because many of these properties have large houses, sections and hedge rows on relatively small properties. I classified this land as native tress in my OVERSEER™ analysis as well as putting in a house block.

Appendix 2 – The Border-dyke outwash and associated P loss issue

People preparing nutrient budgets by-in-large seem to apply a logical test as to whether outwash occurs, based on whether a farmer endeavours to get water to the end of all border- dykes or not. If the farmers does try to get water to the end of all border-dykes then some ponding will logically occur and so “outwash occurs” is ticked when describing the management of border-dyke systems within the OVERSEER™ file. This is a sensible irrigation management or farm management approach to the issue of outwash.

However, upon undertaking some investigation I have found that this functional definition of outwash differs from the assumptions which underpin the OVERSEER™ modelling. Having read the Hydrology (June 2016) section of the OVERSEER™ Technical Manual (pg 33) and the papers referenced in this section, I believe that the outwash question is being misinterpreted. To assume that because some ponding occurs at the end of border-dykes that this water then runs off of or out of the property and into a nearby waterway is not a logical assumption, at least not in most of Mid-Canterbury where the soils are free draining and the waterways scarce.

The research described in the papers on which the OVERSEER™ modelling assumptions are based was undertaken in environments quite different from where the RDR supplied irrigation schemes exist. The research was largely undertaken on much heavier soils and there were surface water bodies that outwash water could flow into. On the light soils of Mid-Canterbury this runoff is far less likely. Also there are few if any surface water bodies for any outwash to flow into. Further, given the design of most border-dyke irrigation systems, it is extremely unlikely that outwash water would leave a property even if outwash from the target irrigation areas did occur.

In my opinion, the question asked of farmers should be changed to some like “Does outwash from border-dyke irrigation leave your property and/or enter waterways?” to better align with the underlying OVERSEER™ modelling assumptions.

The effect of changing just the unticking ‘outwash occurs’ for the relevant blocks in the relevant OVERSEER™ files has a drastic effect on P losses, sometimes reducing whole property losses by a factor of 5 to 8. That it some of the highest reported losses are in the order of 4.3 kg P/ha/annum and these drop back to well under 1 kg when outwash occurring is unticked.

Due to time constraints and the issues caused by the updating of OVERSEER™ to version 6.2.3 in November 2016, it has not been possible to have the original authors amend all the affected files. However, attached to this compliance reports is correspondence from the key organisations involved in the preparation of the nutrient budgets collected to support this compliance report, which outlines their views about the border-dyke outwash issue and the associated P losses.

I have included the reference papers that I could access as well as a reply from David Wheeler to a question about outwash and the associated P losses, which confirms the difference between how those constructing OVERSEER™ files are framing the outwash question when compared with the underlying modelling assumptions.

It is extremely unlikely that P losses of the level described in this compliance report are actually occurring given the significance of the discrepancy described above. Further the only scheme with any significant area of border-dyke irrigation left is in the process of converting to a piped delivery system which will mean that all that border-dyke irrigation will end within about 12 months.

Email from David Wheeler regarding Outwash issue

From: Wheeler, David <david.wheeler@agresearch.co.nz>

Sent: Tuesday, 8 November 2016 9:24 p.m.

To: Leo Fietje

Subject: RE: Border Dyke "Outwash Occurs"

Outwash is the water that comes from the back of a border dyke. It goes under varying terms.

In most border dyke system, outwash occurs, and can be up to 25% of the applied water. The model uses an average rate as in the TM (in other words I think I know what it is but not sure enough to quote it). The model assumes it leaves the property unless it is recycled, but not how. It is shown as the 'Border dyke outwash' item under to water in the nutrient budget.

However under some of the better management techniques and newer designed borders, there is little outwash (the second option)

Yes there is a lot of P in outwash water – not surprising given that it is water moving over the surface. There are basically two ways to control it – either change management so there is no outwash, or to recycle outwash onto the next block.

David

References from OVERSEER™ Hydrology technical Manual

McDowell R W and Rowley D 2008 The fate of phosphorus under contrasting border-check irrigation regimes. Australian Journal of Soil Research: 46: 309–314

Monaghan R M, Carey P L, Wilcock R J, Drewry J J, Houlbrooke D J, Quinn J M, and Thorrold B S 2009 Linkages between land management activities and stream water quality in a borderdyke-irrigated pastoral catchment. Agriculture, Ecosystems and Environment 129: 201-211.

P.L. CAREY , J.J. DREWRY , R.W. MUIRHEAD and R.M. MONAGHAN: Potential for nutrient and faecal bacteria losses from a dairy pasture under border-dyke irrigation: a case study. (http://www.grassland.org.nz/publications/nzgrassland_publication_429.pdf)



24 November 2016

RDRML
Kermode Street
Ashburton

Hornby Office
312 Main South Road
PO Box 16-081
Christchurch, 8042
New Zealand

Dear Reuben

RE – The modelling of ‘Outwash’ in Overseer® for farms within the RDRML discharge area

Ravensdown Environmental modelled a number of farms with borderdykes within your scheme. The modelling of the occurrence ‘Outwash’ was based on the individual’s description of their farm system. The main driver of the modelling was the response to the question as to whether they irrigated to runoff and does ponding occur or water leave the property.

Following the inquiry into the high P losses, we have undertaken further research into the modelling of ‘Outwash’. Following this it appears that the science behind ‘Outwash’ in Overseer is based on the direct loss of nutrients to surface water.

In the Mid Canterbury situation, with the majority of border dyke farms not being near any waterways of note it is unlikely that despite irrigation occurring to runoff (sometimes significant volumes) it would not be consistent with the occurrence of ‘Outwash’ in Overseer.

I believe that in a Mid Canterbury context the modelling approach taken to date, has likely resulted in higher modelled P losses, than would have occurred if modelling ‘No Outwash’ on the properties involved.

Although it would appear rationale exists to change the modelling of ‘Outwash’, we don’t currently have the on farm information to conclusively support this. To enable us to change the existing modelling we would need the location of any waterways on farm (or neighbouring farm if down gradient) including water races etc and their relative location to direction of flow (gradient) to the borderdykes.

The true risk posed by ‘Outwash’ may well be best assessed via the on farm audit process and we look forward to being able to incorporate this data into future Year End modelling.

Yours sincerely

A handwritten signature in dark ink, appearing to be "Arron Hutton".

Arron Hutton
Principle Environmental Consultant