

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of submissions and further submissions by Ballance Agri-Nutrients Limited to Variation 1 to the proposed Canterbury Land & Water Regional Plan

STATEMENT OF EVIDENCE OF MICHEAL KEANEY

1.0 INTRODUCTION

1.1 My name is Micheal Keaney. I am a Science Extension Officer with Ballance Agri-Nutrients Limited ('Ballance') and I am based in the Canterbury Region. I have been employed by Ballance for approximately 6 years. My responsibilities include providing targeted technical, farm-specific nutrient management advice to Ballance's clients and farm consultants. I am one of five Science Extension Officers employed by BAN who provide on farm support to Ballance's customers and the Company's sales teams. We collectively have expertise in general agronomy, soil science, fertiliser and nutrient management, along with environmental management and best-practice systems. I am also an accredited OVERSEERTM nutrient management advisor.

1.2 This evidence is in support of the submissions lodged by Ballance to Variation 1 (Selwyn Waihora) to the proposed Canterbury Land & Water Regional Plan.¹

1.3 I note, for completeness, that Mr Warwick Catto (Head of Research and Environment at Ballance Agri-Nutrients Limited) will also attend the Hearing and be available to address any questions linked to Ballance's ongoing involvement with nutrient management processes in Canterbury. Mr Catto has more than 25 years' experience following his graduation from Lincoln with a Bachelor of Science in Agricultural Science (Honours). Mr Catto's experience in the fertiliser/nutrient management industry has included ongoing engagement in the development of the OVERSEERTM nutrient model and other nutrient management tools, and the Code of Practice for Nutrient Management (With Emphasis on Fertiliser Use). Mr Catto's experience includes him acting, for the last 13 years, in a national role that encompasses research and development and advocacy across all of Ballance's interests. Prior to that, and for the preceding 12 years, Mr Catto worked in the South Island directing, amongst other things, a series of nutrient management work and research that was conducted in the Canterbury area.

1.4 Mr Catto and I are Ballance representatives at the Regional Council initiated meetings relating to the L&WRP 'nitrogen baseline' implementation process, which many industry stakeholders attend.

2.0 QUALIFICATIONS AND EXPERIENCE

2.1 I graduated from the Sligo Institute of Technology (in Ireland) with a Bachelor of Science in Environmental Science and Technology before moving to New Zealand in 2008. Since 2008, I have worked extensively in the Selwyn area, and have generated a large number of nutrient budgets ('NBs') and Nutrient Management Plans for dairy clients in Canterbury (with this work being focused predominantly in Central-Canterbury).

¹ Hereafter referred to as the 'Variation 1 to the L&WRP' or 'Variation 1'.

- 2.2 I have increasingly been involved, particularly in the last 2 years, in the generation of NBs for arable, sheep and beef operations. Since the start of 2013, I have been assisting a number of clients with the development of NBs for various land use change proposals. This work is a direct consequence of the promulgation of the L&WRP. Equally, over this same period, I have been regularly engaged with staff of the Regional Council, on both protocols that are to be implemented to derive NBs using OVERSEER™, and in the development and implementation of Farm Environmental Plans ('FEPs').
- 2.3 I confirm that I have read, understood and complied with the Code of Conduct for Expert Witnesses, as set out in the Environment Court's Consolidated Practice Note, when preparing this evidence. I confirm that I will comply with the code when I appear before the hearing committee to present this evidence.

3.0 STRUCTURE OF EVIDENCE

- 3.1 This evidence is structured to reflect the submissions lodged by BAN to Variation 1 to the pL&WRP. Ballance made a number of submissions to Variation 1. My evidence will address those submission points that are of particular concern to the BAN. I do this by briefly summarising the response of the Officers to the submission points made by Ballance and offering my opinion on the importance of some of the changes promoted by BAN.
- 3.2 The issues addressed in this statement are grouped into two topics, being:
- The need for methods to assist with and enable appropriate use of OVERSEER™, staged implementation of nitrogen baselines, and development of FEPs; and
 - The need to define what the phrase 'reviewed annually' applies to in Schedule 24(a)(i).

BALLANCE SUBMISSIONS

4.0 Policy Framework

- 4.1 Ballance made a submission requesting that Variation 1 be supported by a more detailed, robust and transparent Implementation Plan, that clearly and logically sets out how the nitrogen baseline approach will be implemented within this catchment and, importantly, who is responsible for implementing what parts of the nitrogen baseline approach. This submission was not addressed by the Officer, therefore, I have set out Ballance's requested amendments to Policy Section 11.4 in full below:

- The insertion of a method that establishes the process (with the associated timeframes) for establishing an independent technical advisory panel for the purpose of:*
 - confirming a phased implementation timeline;*
 - appropriate use of OVERSEER within the Selwyn-Waihora catchment and any associated development requirements;*
 - considering any prioritisation of land management practices in relation to not only nitrogen management, but also phosphorus, sediment and E.Coli;*
 - consideration of adaptive management process for reducing nitrogen leaching from affected farming properties where implementation of progressively more stringent on-farm management practices are required; and*
 - reviewing the effectiveness of any mitigation technologies.*

The panel would recognise the difference between tactical farm management decisions that would need to be made in response to phosphorus, sediment and E.Coli management, versus strategic management decisions in response to nitrogen management.
- The insertion of a method that establishes the timeframes and support mechanisms that will be employed to support the development, and auditing requirements, of Nutrient Budgets that accord with Schedule 7 of the L&WRP and Schedule 24 of Variation 1. This shall include the protocols, or detail, necessary to ensure consistency of input data gathering/collation, input data integrity, and the resultant preparation of Nutrient Budgets, irrespective of the service provider.*

The protocols will also need to consider the assumptions that would apply in situations where there is an absence of input data and how such assumptions would be recorded.

- (iii) *The insertion of a method that establishes the process (with the associated timeframes) that will be implemented to approve the 'Farm Environment Plan Auditor'², which is to be developed by the Council and primary sector, but implemented by the Council. The method shall set out the process for those auditors that are ultimately approved by the Council to be listed on the Council's website, with their contact details, so that the auditors are readily accessible by those that are looking to employ their services;*
- (iv) *The insertion of a method that establishes the process (with the associated timeframes) for the development of support mechanisms (such as education forums and services) that the Council will make available to the primary sector/farmers, so that all parties working within the bounds of Variation 1 are adept at identifying issues, management options and 'smart decision-making processes' to inform nutrient budget processes. This would also need to include effective stakeholder engagement methodologies to include, for example, the banking/financing sector in a manner that would likely also assist with any prioritisation/phased implementation programmes. The objective here is to ensure that those who stand to be most affected by Variation 1 are well aware of its provisions, implications and what they need to do (by when) to comply with the obligations that it establishes.*
- (v) *The insertion of a method that establishes the process (with the associated timeframes) for establishing an independent technical advisory panel to advise consent officers on the appropriateness of farm management plans as part of any resource consent applications. The method shall set out the process for the panel to be notified to the public, and will be included, for instance, in any pre-lodgment meetings between the Council and any parties seeking to lodge a resource consent application involving nitrogen and/or phosphorus losses. The objective here is to ensure that the advice provided to the Council is consistent, and that the parties approving it are known and respected and have a good understanding of the issues facing the Selwyn Waihora catchment."*

- 4.2 Ballance, supported the staged introduction of FEPs set out within policies 11.4.12(c), 11.4.13(a), and 11.4.14, and rules 11.5.7(4), 11.5.8(2), 11.5.8(3), 11.5.8(4) and 11.5.9(2) and requested that the phasing of these FEPs be retained without change.

Officer's Report

- 4.3 As I have noted, the Officer does not specifically address those components of Ballance's submission that relates to the use of regulatory and non-regulatory methods to support Policy Section 11.4. This is obviously disappointing.
- 4.4 The Officer, at paragraph 11.218, does, however, address the use of non-regulatory methods in a more general way and states "[a] number of submitters request that the non-regulatory mitigation actions be included within either this Variation or some other form of catchment management plan, such that there are far more specifics around timeframes, implementation methods and costs. Information has been provided elsewhere in this Section 42A Report regarding the CRC's commitment to the non-regulatory mitigations. It is acknowledged that the outcomes will not be met without various other non-regulatory actions being undertaken, as has been explained in the Zone Committee Section of this Section 42A Report. This is anticipated in Policy A2 of the NPSFM, where it states "...implement methods (either or both regulatory and non-regulatory) to assist the improvement of water quality in the water bodies, to meet those targets, and within a defined timeframe."
- 4.5 The Officer does note, at paragraph 11.225, Ballance's support for the staged introduction of FEPs. At paragraph 11.263, they state that "ahead of the hearing process and the evidence to be given by various submitters, both for and against the role of farm environment plans, no

² The pLWRP defines 'Farm Environment Plan Auditor' to mean a person who can provide evidence of at least 5 years' professional experience in the management of pastoral, horticulture or arable farm systems and holds either:

1. a Certificate of Completion in Advanced Sustainable Nutrient Management in New Zealand Agriculture from Massey University; or
2. a Certificate of Completion in Sustainable Nutrient Management in New Zealand Agriculture from Massey University
3. such other qualification that has been approved by the Chief Executive of the Canterbury Regional Council as containing adequate instruction and assessment on agricultural sciences and nutrient management.

recommendation is made on the most appropriate rule framework for farm environment plans.”

Comments

Implementation of ‘Support Package’

- 4.6 Ballance’s key concern relating to Variation 1 is that it is not underpinned with a robust, transparent and practicable Implementation Plan and that there appears to be no formal methods supporting Variation 1 that will guide the implementation of the nitrogen baseline approach under Variation 1. Ballance noted within its submission that Appendix 9 to the section 32 report supporting Variation 1 includes the Working Group’s recommended framework for managing water quality that was adopted by the Selwyn Waihora Zone Committee. Importantly, Action 7 of this Framework sets out the need for a comprehensive ‘support package’ to be developed, for both the Council (consents and compliance) and farmers. I have attached Action 7 in **Figure 1** (on page 4 of this statement), because it reinforces some of the implementation steps for delivering this comprehensive ‘support package’.
- 4.7 Unfortunately, the implementation component of the ‘support package’ is not incorporated within Variation 1 and any initiatives advanced to give effect to the ‘support package’ would sit outside of Variation 1 policy and rule framework. I understand Ballance’s submission to be that this ‘support package’ should be clearly articulated within Variation 1 through methods, which enable a more transparent approach to the implementation of Variation 1, and to better demonstrate how effectively and efficiently it is to be implemented. I support that submission. Indeed, I regard it as being fundamental if the FEPs, and their associated work streams are to be both understood and implemented. Without this kind of detail, it is also difficult to determine if the approach being advanced by the variation is practicable and achievable, two considerations that I understand are key requirement of regional plans.

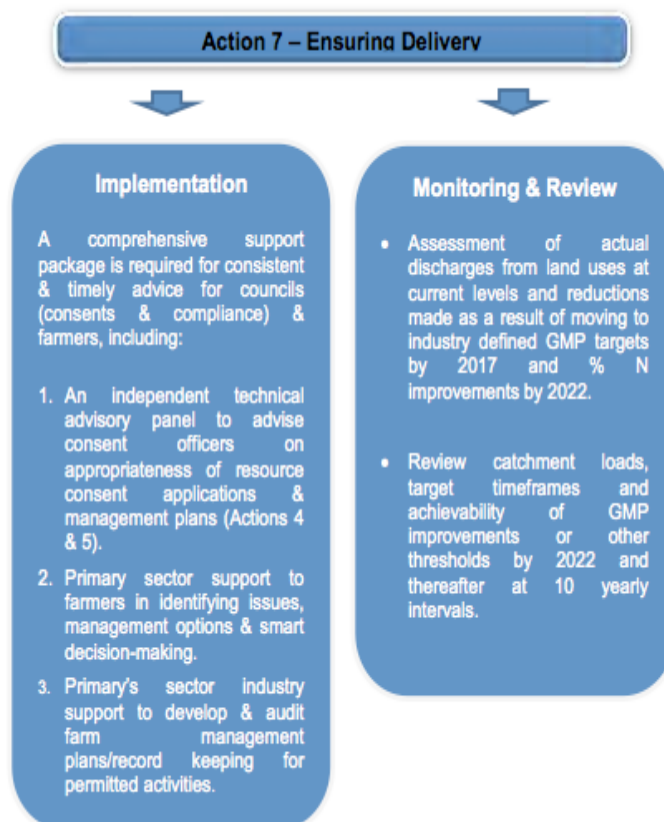


Figure 1 - Appendix 9 to the section 32 report supporting Variation 1 includes the Working Group's recommended framework for managing water quality that was adopted by the Selwyn Waihora Zone Committee.

- 4.8 As noted at paragraph 1.1, Ballance's Science Extension Team, which I am a part of, provides nutrient budgeting expertise to Ballance's existing clients and farm consultants. I am, therefore, acutely aware of the types of expertise and resources that are needed to effectively and appropriately prepare robust FEPs and farm budgets. Having considered the provisions supporting Variation 1, I am surprised at the lack of detailed guidance surrounding the implementation of the 'nitrogen baseline' approach advanced under Variation 1 and as a consequence, I share Ballance's concern that without a clear implementation strategy or plan, there may be difficulty in effectively and efficiently delivering the proposed outcomes envisaged under Variation 1. Such concerns are amplified when I consider the sheer volume of work needed to implement the 'nitrogen baseline' approach advanced under Variation 1, which I discuss in more detail below.
- 4.9 At a catchment level, I understand that Variation 1 requires 'nitrogen baselines' to be established for all farms.³ As noted by Lilburne (2014), there are 1,393 'farms' located within the Selwyn Waihora catchment, which equates to 5,572 nutrient budgets. Ballance, set out within its submission, that at an average of 4 hours each⁴ (straight dairy through complex arable) this equals 22,288 hours, or 2,786 (8 hour) working days. This means 20 people are required to be employed full-time doing only nutrient budgets in the Selwyn-Waihora catchment alone.
- 4.10 On a region wide basis, I understand that Ballance representatives have had discussions with Regional Council staff who have confirmed that across Canterbury the number of farms affected by the 'nitrogen baseline' requirements introduced under the L&WRP is in the order of 8,500 farms. Ballance has estimated that across the Canterbury region that 74 full time equivalent staff will be required to implement the 'nitrogen baseline' requirements under the L&WRP.⁵ My understanding is that the Regional Council has an expectation that fertiliser companies will primarily be responsible for the production of nutrient budgets,⁶ and while it is likely that the market will also input into this area of work, there is likely to be some lag time involved in sufficiently resourcing and up-skilling staff (this may include the need for new staff to be employed and the up skilling existing staff to ensure that they are aware of the new obligations that flow out of Variation 1). Given the size of Ballance's Canterbury Sales Team, which has 12 Canterbury Sales staff of which NB generation is but one of the service expectations that they provide for shareholders, the Company does not currently have the capacity to resource the preparation of nutrient budgets and FEPs to the extent set out above. As a consequence, there is a very real industry concern that the 'nitrogen baseline' requirements under Variation 1, coupled with the wider L&WRP provisions are not aligned with the resources available to conduct such tasks.
- 4.11 Given my role as part of the nutrient budgeting service that Ballance provides to its customers, I can confirm that the preparation of robust FEPs can also be a time consuming

³ I understand that Variation 1 requires all farming activities to demonstrate compliance with their nitrogen baseline and (under Rule 11.5.7(3)) requires each property to be assessed in accordance with Schedule 24 supporting Variation 1, in the short term, and for the implementation of Farm Environment Plans beyond 2017.

⁴ The dairy industry and the fertiliser industry has been preparing nutrient budgets using OVERSEER™ for some time. Ballance staff experience suggests that preparing a nutrient budget (using OVERSEER™) takes at least 1 hour for a 'straight' dairy unit where a base nutrient budget already exists. However, it is Ballance's experience that for many other sectors who have not placed emphasis on nutrient budgeting, there is a lack of base files, and as such these need to be created. Ballance's experience suggests this can take around 4 hours for a Sheep/Beef/Deer unit, 4 hours for a dairy unit, and 8 hours for an arable unit. Arable systems tend to take the longest currently due to the dynamic nature of these systems with various stages of different crop rotations. Over and above this, it can take 2 hours or more collecting all the data needed to generate the NBs on each farm visit.

⁵ 8,500 farms x 16 hours (average time to produce four nutrient budgets for each farm) = 136,000 hours, 136,000 hours divided by 8 hours (working days) = 17,000 working days, 17,000 working days divided by approximately 229 working days (being completion within timeframes of Land and Water Plan becoming operative) = 74 full time equivalent staff

⁶ per comms between Warwick Cato and Nigel Sadlier of Ballance and Regional Council staff.

process and one that requires specialist technical skills. As with the Company's concerns relating to lack of an implementation plan guiding the development of nutrient budgets, I also share, Ballance's concerns relating to implementing FEPs in the Selwyn-Waihora catchment.

- 4.12 For the reasons that I have set out in this statement, it is important to ensure that Variation 1 is supported by a framework that reflects the capacity and capability of those industries and individual organisations that are to input into the 'nitrogen baseline' approach under Variation 1. Central to this, in my opinion, is the need to clearly articulate the Council's expectations for delivering each step in this process through a clearly articulated implementation plan, which includes a phased implementation timeline.
- 4.13 BAN within its submission provided reference to methods established within the Canterbury Natural Resources Regional Plan ('NRRP'), as examples of how the implementation plan outcomes could be articulated within Variation 1. Examples of the guidance provided by the NRRP are attached as **Annexure A** to this evidence. While it is beyond my expertise to comment on the appropriateness of such methods in guiding the future implementation of Variation 1 plan outcomes, I do consider that they clearly articulate the direction that could be taken by the Council in giving effect to the NRRP provisions. For this reason, I support Ballance's proposed methods, which I consider clearly express how the Regional Council and industry stakeholders are to achieve the implementation phase of Variation 1. I would, however, recommend that a number of these methods are also supported with a 'prioritisation tree', which when combined with the other direction provided, will offer a higher level of transparency and guidance than presently exists in Variation 1 (as notified). From my own experience, 'decision trees' or 'flow diagrams' can better articulate processes such as those embodied within Variation 1. I set out an example of a 'prioritisation tree' as **Annexure B** to this statement, which I consider should be embodied within Variation 1, in conjunction with Ballance's proposed methods to assist guide the future implementation outcomes envisaged for this catchment.
- 4.14 Within Ballance's submission, the Company requested that a method be included that provides for any prioritisation of land management practices in relation to not only nitrogen management, but also phosphorus, sediment and E.Coli. The 'prioritisation tree' that I have attached as **Annexure B** to this statement is an example of the relief sought by Ballance, and reflects the need to prioritise resources on those areas and farming operations likely to generate the greatest potential N and P loss rates. The numbers that I have included within the 'prioritisation tree' are based on my experience having developed, assisted, audited approximately 600 NBs over the past 6 years in Canterbury (of which approximately 400 have been prepared in the past 2 years), which involved modelling all the Canterbury farming sectors.
- 4.15 As the Commissioners will appreciate, the intensity of a farm's stocking rate dictates the risk factor for that stock's urine patch N leaching. For example, research and experience has proven that dairy herds create higher N losses than flocks of sheep. Similarly, the water holding capacity of a soil dictates how often it will 'drain' to the underlying groundwater annually. Given my concerns regarding the ability for industry to resource the 'nitrogen baseline' approach, any implementation of the approach advanced by Variation 1 should be prioritised such that there is a focus on those farming operations that leach N at higher rates, particularly where they occur on quick draining, light soils.
- 4.16 While I appreciate that my 'prioritisation tree' could be viewed as a relatively simple response to what is a complex issue, the key point that I am trying to convey, and which is not clearly articulated within Variation 1, is that the NB and FEP workload should be prioritised. By advancing the 'nitrogen baseline' setting approach in a manner that focuses, initially at least, on the high-risk farms is, in my opinion, an appropriate response to the nutrient loss issue that is raised by Variation 1. In this regard, I am of the opinion that it will ensure that the activities that pose the greatest risk are addressed first, while enabling the

support industry to manage its resourcing at sustainable levels. I note that this approach will have an added benefit of enabling the properties that need more time to make these changes. Lastly, I anticipate that the MGM approach that is being advanced by the Regional Council and industry stakeholders will, in time, identify a clear pathway for prioritising and focusing on high-risk farming operations. The 'prioritisation tree' set out in Annexure B of this statement is simply a 'placeholder' to assist with advancing Variation 1 until the MGM process is complete.

- 4.17 For the reasons that I have set out above, I support the relief sought by Ballance and as set out in paragraph 4.1 of this evidence and consider that this should be adopted into Variation 1, in conjunction with the 'prioritisation tree' set out in Annexure B of this statement.

Phasing of Farm Environment Plan Requirements

- 4.18 As I have set out within this statement, Ballance, supported the staged introduction of FEPs set out within policies 11.4.12(c), 11.4.13(a), and 11.4.14, and rules 11.5.7(4), 11.5.8(2), 11.5.8(3), 11.5.8(4) and 11.5.9(2) and requested that the phasing of these FEPs be retained without change. As noted at paragraph 4.5 of this statement, the Officer makes no recommendation on the most appropriate rule framework for farm environment plans, however, at paragraph 11.228 acknowledges that FEPs are a key concept in both the pLWRP region-wide provisions and in this sub-regional section.

- 4.19 Given the concerns raised above relating to the ability to adequately resource the 'nitrogen baseline' requirements, in my opinion, Variation 1 must advance a framework that reflects the capacity and capability of those industries and individual organisations that will be required to give effect to the 'nitrogen baseline' approach.

- 4.20 Ballance, within its submission, supported the staged progressive production of FEPs and associated Nutrient Budgets between the 1st of July 2015 and the 1st of January 2022.⁷ I support Ballance's submission regarding retention of this phased approach and indeed, question if the 'nitrogen baseline' approach could be advanced in Canterbury without the adoption of this phased approach.

- 4.21 I am of the opinion that a phased implementation of the FEP and Nutrient Budget obligations are critical and any watering down of this phased approach could have significant implications for its successful implementation. Given the prominence of the FEP and nutrient budget mechanisms in Variation 1 (and the LWRP), and the broad acceptance that they are an appropriate means for arresting nutrient management issues in the Canterbury Region,⁸ it is crucial, in my opinion, that adequate time be given for their preparation. The adoption of shorter timeframes could, in my opinion, seriously compromise the implementation of the 'nitrogen baseline' approach in Variation 1, as it will likely lead to FEPs that are not as robust as they could and, in my opinion, should be.

- 4.22 For the reasons I have set out in this statement, the phasing of these FEPs and nutrient budgets should be retained (as notified) without change (with the exception of the changes that I discuss in section 5.0 of this evidence and as this relates to Schedule 24).

5.0 'Reviewed Annually'

- 5.1 Ballance submitted that there is a need to define what the term 'reviewed annually' (as employed in Schedule 24(a)(i)) means in practice. BAN set out in its submission that it

⁷ within policies 11.4.12(c), 11.4.13(a), and 11.4.14, and rules 11.5.7(4), 11.5.8(2), 11.5.8(3), 11.5.8(4) and 11.5.9(2).

⁸ Policy 4.40 of the L&WRP for example states "Farm Environment Plans are used as a primary means of identifying and delivering good environmental practice across a range of farm activities, including nutrient loss management, efficient and effective use of water for irrigation, riparian management, stock movements across waterways, offal and farm rubbish pits, the storage and application of effluent and fertiliser use."

assumed that the term 'reviewed annually' was intended to (i) involve checking the integrity of the input data, which is necessary to generate a nutrient budget for the property in question and (ii) where the input data did not accurately reflect what is conducted on farm. The Company also assumed that the review will require nutrient budgets to be refreshed and updated.

- 5.2 BAN requested that the phrase 'reviewed annually' be defined to encapsulate three key processes:
- (i) Firstly, that it be confined to an assessment of the input data necessary to run OVERSEER™ for the property in question; and
 - (ii) Secondly, where the review of input data does not accurately reflect what is happening on farm then the definition should require that the nutrient budget be updated using OVERSEER™ or an 'approved equivalent model';
 - (iii) Where the input data is assessed as being accurate (as per (i) above), the definition should enable a nutrient budget to stay in place for at least three years, at the end of which it would be formally revisited, updated and remodelled using the most appropriate model available. Ballance sought that all updating of the nutrient budgets be conducted by an appropriately qualified and experienced person.

Officers' Report

- 5.3 Ballance's submission was acknowledged at paragraph 11.244 where the Officer notes that Ballance seeks clarification on the meaning of 'reviewed annually' and to what it applies and that the Company seeks a definition that is constrained to an assessment of input data necessary to run OVERSEER. While the Officer does not specifically address the requested relief sought by Ballance, the Officer still concludes, at paragraph 11.236, that the amendments sought to Schedule 24 by submitters "*are not considered to substantially improve environmental outcomes in a cost effective way.*" As such, Ballance's submission was not accepted by the Officer.

Comments

- 5.4 I note that Ravensdown and the Fertiliser Association of New Zealand ('FANZ') also raised similar concerns with the phrase 'reviewed annually' in Schedule 24, with FANZ also (i) questioning the need to review nutrient budgets annually, and (ii) seeking that nutrient budgets be reviewed triennially under Schedule 24 requirements.
- 5.5 It is my understanding that Variation 1 requires all farming activities to demonstrate compliance with their nitrogen baseline (under Rule 11.5.7(3)) and requires each property to be assessed in accordance with Schedule 24 supporting Variation 1, in the short term, and for the implementation of FEPs beyond 2017.
- 5.6 From a scientific perspective, there is a clear lack of transparency about what the Council means by the phrase 'reviewed annually' in Schedule 24 and what this review is seeking to achieve. If the review is simply reviewing input data for the purposes of ensuring that it accurately reflects what is conducted on the farm, this should, in my opinion, be clearly articulated. Further, Schedule 24 ought to also define a process, which avoids ongoing reviews, where the farm system and supporting input data is not changing. While land managers may introduce relatively minor changes to their farming operations as a consequence of environmental, climatic or financial influences, where these changes are not significant, in my experience, there is unlikely to be any significant changes to farm input data. This, in my opinion, calls into question the need for an ongoing review of nutrient budgets under Schedule 24.
- 5.7 Based on my experience, user selection of the input parameters into OVERSEER can have a major effect on the estimates of nutrient cycling for specified farm systems and hence the ultimate budget reports. As such, I agree that land managers need to collate and gather farm input data as part of the preparation of a farm budget for a property and that this is undertaken on an annual basis and held by the landowner. However, in the absence of any

farm system changes (which I would define as there being no material change to farm operations or farm input data, that is, no more than 10% N leaching increase over a three year period), I do not consider that an annual review is necessary. Put another way, once a nutrient budget has been reviewed and input data confirmed as being correct for the farm system in question, there is no need, from a scientific perspective, to conduct a further review, unless there has been a material change to farm system(s) employed on the site. Indeed, to require ongoing annual reviews where there has been no change in input data is, in my opinion would simply introduce inefficiencies and additional costs into this process. This is especially the case given the significant amount of staff resourcing that will be required to implement the nutrient budget and FEP processes. I believe that a better, more efficient approach, would to have all land managers simply confirm (in writing) that there has been no change to farm systems from the previous review period.

5.8 As a consequence, I agree with Ballance's submission that where the input data is assessed as being accurate, the definition should enable a nutrient budget to stay in place without the need for an ongoing annual review. Ballance's submission highlights that under this situation there should be no requirement for a review or an update to the nutrient budget for at least three years. This accords with the submission by FANZ on this point. While the timeframe for review will ultimately be subject to changes to input data and farm systems, in my opinion, this three year period is appropriate. Importantly, I note that Schedule 24(a)(iii) requires records of soil nutrient tests, nutrient budgets and fertiliser applications to be kept by land managers and which are to be provided to the Regional Council upon request. As such, where the Regional Council has any concerns that farm systems may have changed over this three year period, it has the ability to request this information at any stage.

5.9 In my opinion, and as I have set out above, it is important to differentiate between the 'annual review' of the various inputs, and to better define the process that is to be followed where input data does not reflect current farm system(s). In such situations I concur with Ballance's submission that that the entire nutrient budget needs to be 'updated' and remodelled. Again, Schedule 24 should clearly articulate this outcome.

5.10 Overall, when considering the significant staff resources that will be required to give effect to the 'nitrogen baseline' requirements under Variation 1, I support the approach advanced by Ballance within its submission to better articulate and define 'annual review' set out in Schedule 24.

6.0 SUMMARY

6.1 In summary, I have reviewed Ballance's submissions to Variation 1 to the L&WRP and consider that the relief sought within the Company's submission and as set out in sections 4 and 5 of this evidence are appropriate.

6.2 I thank the Panel for affording the time to consider this statement.

Micheal Keaney

29th of August 2014

Annexure A – Examples of Methods Supporting Diffuse Discharges under the Natural Resources Regional Plan

Methods

The methods used or to be used to implement Policy WQL10 are:

Method WQL10(a) Information and promotion

Environment Canterbury will work with landowners and other parties, to develop, publicise and disseminate information on the use of:

- (a) best management practices to minimise the amount of leaching of contaminants through the soil profile.
- (b) whole farm nutrient planning to manage nutrient inputs and outputs under different land uses to minimise nutrient losses to groundwater.
- (c) codes of practice, including the *Code of Practice for Nutrient Management (2007)*, the *Code of Practice for Placement of Fertiliser in New Zealand: the Spreadmark Code of Practice, Part 1 Groundspread Application (2001)*, or subsequent versions or additions to these codes.
- (d) *New Zealand Standard 8409: 2004 Management of Agrichemicals*, or subsequent versions.

Methods of information transfer will include on-farm assessments, field days, workshops, demonstration sites, media items, Environment Canterbury's website, fact sheets, community water monitoring programmes.

Method WQL10(b) Investigations

Environment Canterbury, in consultation with Ministry for the Environment and other organisations, will support, and where appropriate, undertake investigations on the impact of non-point source discharges from land use activities on the groundwater quality of unconfined and semi-confined aquifers. The topics for these investigations include the following:

- (a) the linkages between nitrogen transformations and transporting processes within and beyond the root zone, and the concentrations expected to be found in the underlying groundwater.
- (b) the total nitrogen inputs to groundwater under different land uses in order to determine the implications for groundwater quality of different land use changes, at paddock, farm and catchment scales.
- (c) the concentrations of micro-organisms that are of human health significance in the upper unconfined aquifers under different agricultural and residential land uses, the pathways by which they reach groundwater, and measures to minimise the entry of micro-organisms into groundwater.
- (d) the awareness, acceptance and implementation by landholders of land management practices to reduce the effects of non-point source contamination on groundwater quality.
- (e) the use and effectiveness of nutrient management tools for farm nutrient budgeting and catchment scale nutrient management.
- (f) the validity of the "piston effect" model of groundwater movement, and the implications for future groundwater quality if there is a delay of several decades between contaminants leaching from the soil and being detected in groundwater.

Upon completion of these investigations, Environment Canterbury will review the results of this work to determine whether changes are required to the provisions of the Canterbury Natural Resources Regional Plan.

Annexure B – Proposed Prioritisation Tree for N & P Loss to Support Proposed Methods set out in Ballance’s Submission.

Example table ranking farm system nutrient loss by key soil characteristic

	Nitrogen loss (low ('L'), medium ('M'), high ('H'))			Phosphate loss (low ('L'), medium ('M'), high ('H'))		
	Farm Predominant Soil Type Available Water Holding Capacity (mm)			Farm Predominant Soil Type Available Water Holding Capacity (mm)		
Farm System	20-60mm	60-90mm	90+mm	20-60mm	60-90mm	90+mm
Dairy	H	M	L	L	L	L
Dairy Grazing	H	M	L	M	M	M
Arable	M	L	L	M	M	M
Sheep and Beef	L	L	L	L	L	L
Horticulture	H	M	L	M	M	M

	N loss (kg N/ha)	P loss (kg P/ha)
Low	<20	<1
Medium	20-40	1-2
High	>40	>2

So the implementation policy informed by Methods supporting Variation 1 includes:

1. Firstly, prioritising baseline generation for High N loss properties as part of the phased implementation of FEPs.
2. Secondly, all farms under 50 hectares only do FEPs and benchmark if they fall within High classification.