

**IN THE ENVIRONMENT COURT  
WELLINGTON REGISTRY**

**I TE KŌTI TAIAO O AOTEAROA  
TE WHANGANUI-A-TARA ROHE**

---

|                      |                                                                                                                                                                                                                               |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>UNDER</b>         | the Resource Management Act 1991                                                                                                                                                                                              |
| <b>IN THE MATTER</b> | of appeals under sch 1, cl 14(1) against the decision of<br>Manawatū-Whanganui Regional Council on Plan Change 2<br>to the One Plan                                                                                           |
| <b>BETWEEN</b>       | <b>TE RUNANGA O RAUKAWA</b><br>ENV-2021-WLG-20<br><br><b>NGĀTI TURANGA</b><br>ENV-2021-WLG-21<br><br><b>ANDREW DAY</b><br>ENV-2021-WLG-22<br><br><b>WELLINGTON FISH AND GAME COUNCIL</b><br>ENV-2021-WLG-23<br><br>Appellants |
| <b>AND</b>           | <b>MANAWATŪ-WHANGANUI REGIONAL COUNCIL</b><br><br>Respondent                                                                                                                                                                  |

---

**FIFTH STATEMENT OF EVIDENCE OF DR ANNE-MAREE JOLLY ON BEHALF OF  
MANAWATŪ-WHANGANUI REGIONAL COUNCIL**

**COMMERCIAL VEGETABLE GROWING**

---

Dated: 17 May 2024

  
Cooper Rapley Lawyers  
227-231 Broadway Avenue  
PO Box 1945  
Palmerston North  
DX PP80001

**S Johnston / A J R Sinclair**  
 06 353 5210  
 06 356 4345  
 [sjohnston@crlaw.co.nz](mailto:sjohnston@crlaw.co.nz)

**FIFTH STATEMENT OF EVIDENCE OF ANNE-MAREE JOLLY****A. INTRODUCTION**

- [1] My full name is Anne-Maree Jane Jolly.
- [2] My experience and qualifications are set out in my statement of evidence dated 6 October 2023.
- [3] I repeat the confirmation given in my Evidence that I have read and will comply with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023, and that my evidence has been prepared in compliance with that Code.

**B. SCOPE**

- [4] This statement of evidence addresses a request of the Court for working examples of the nutrient management plans (**NMPs**).
- [5] I have undertaken this work, with reference to the proposed PC2 framework, preparing NMPs for a pastoral farm example. Referring to the CVG NRAT already before the Court,<sup>1</sup> I have also provided some comments on a CVG NMP. I have done so, in consultation with the Horizons farm advisory team.<sup>2</sup>
- [6] In preparing the NMP templates I drew on my 10 years of experience as a Primary Industries Sustainable Land Consultant, my understanding of a range of farm systems, the principles of nutrient management and environmental farm planning, and my qualifications in Freshwater Farm Planning.
- [7] I also provide a response for the Court regarding:
- (a) The reference file approach, proposed by Mrs Foster;
  - (b) Mr Ford's supplementary evidence dated 28 March 2024; and
  - (c) Dr Parlato's supplementary evidence dated 28 March 2024.

---

<sup>1</sup> Statement of Evidence, Anne-Maree Jolly, 6 October 2023 from para 47.

<sup>2</sup> Specifically, Senior Rural Advisor, Mr Ian McNab.

### C. NUTRIENT MANAGEMENT PLANS

- [8] The worked example NMP template for dairy is attached as **Appendix A**. Although no worked example of CVG has been provided (for reasons I explain below), I have created a template, and it is very similar to that of the dairy NMP. Both require farm system information and a risk assessment to be provided. The key difference between the two templates is in Section 3 where the farm system information is different depending on IFLU types. The CVG NMP is discussed in more detail below in Section E.
- [9] It is envisioned that all pastoral IFLU will use the 'dairy' template, while CVG will use the CVG template. However, if a system involves aspects of CVG and intensive pastoral farming and does not fit exclusively within one template, Section 3 can be readily modified to best represent the system.
- [10] While the use of a NMP template is not compulsory (i.e. it is not required by any One Plan rule) it will be a useful guide for an applicant. It will allow an applicant to know what information to include within the NMP by reference to the PC2 framework and generally. It will also assist with a more streamlined approach for Horizons' consenting team as all NMPs will be in the same form.
- [11] There are many different ways a NMP can be created depending on its purpose. In this case the NMP template differs from the previous Horizons NMP template. The main differences involve requiring a more detailed explanation around the risk of contaminant loss (at section 7) and a more detailed summary of the natural resources for the property (at section 4).
- [12] In my view, the new NMP templates are simple and easy to use while containing all the information for a robust NMP. They meet the needs of a Horizons IFLU consent application prepared in accordance with the proposed PC2 framework, while clearly assessing the risk of contaminant loss on farm. The templates provide applicants the opportunity to highlight any environmental improvements previously made on farm, while determining farm management practices that are currently increasing the risk of contaminant loss. These are important factors for PC2.

- [13] Although the focus of contaminant loss is on reducing nitrogen leaching, the NMP template addresses all four key on farm contaminants being nitrogen, phosphorus, sediment and E. coli.
- [14] Each template contains nine sections. The section headings are the following: Summary, Property Overview, Natural Resources, Land Management Units, Summary of Environmental Improvements, Identification of Risk, Reduction of Contaminant Risk, and Environmental Action Plan. These sections address (in various ways) the PC2 framework including the matters reflected in the reserved matters for Rule 14-1 (being the underlying biophysical conditions, land use capability, farm practices, environmental risk factors and farm practice risk factors that influence nitrogen leaching loss from the land and the and proposed actions that will limit nitrogen leaching loss from the land).
- [15] Although all sections are important for completion within a NMP, it is my opinion that the most important section is the Environmental Action Plan. This is because it is within this plan that a farmer or grower make time bound actions for change on farm. These actions are the GMPs and other mitigations that will become conditions of a grower's or farmer's consent.
- [16] As I have noted earlier, Horizons have reviewed the case study NMPs for both dairy and CVG. The view of the Horizons farm system advisors is that the templates are suitable for an Intensive Land Use consent application. Where an IFLU applicant is seeking consent under the Table 14.2 pathway, the necessary Overseer input and output data would need to be attached to the NMP as an appendix. The OverseerFM reports required for attachment to NMP would include:
- (a) Nutrient budgets;
  - (b) Farm details report; and
  - (c) Effluent report (dairy application only).

**D. WORKED EXAMPLE - PASTORAL**

- [17] The worked dairy example (**Dairy NMP**) is based on a currently consented property in the Upper Manawatu (the **Upper Manawatu property**) that applied for and received an Intensive Farming Land Use consent in 2016.
- [18] For the purpose of this exercise only, the NMP has been written retrospectively as if the Council's Reply Provisions were available to the farmer in 2016.
- [19] The Dairy NMP relies on information within the NMP received by Horizons as part of the consent application. This resulted in some assumptions needing to be made when I completed an NRAT for the Upper Manawatu Property. The Overseer output data also came from the NMP submitted with the consent application, and therefore those outputs were the result of the Overseer version in use at the time of the application.

**Overseer pathways**

- [20] The age of the Overseer output data meant there was no way to tell whether the property would meet the re-calibrated Table 14.2. Therefore, the Dairy NMP models (in Overseer) the specified reduction pathway only.
- [21] At the time of the application (2016), several GMPs had already been adopted on farm since the baseline season of 2012/13, but not enough to achieve a 20% reduction from baseline. Additional GMPs were required to be implemented on farm to achieve a 20% reduction (and, as proposed, would achieve a reduction of 24%).
- [22] Section 7 of the Dairy NMP outlines the risk of contaminant loss from the baseline season of 2012/13, with Section 7.1 summarising the modelled Overseer N loss for each land management unit. Commentary on the riskiest practices for N loss is also provided in Section 7 of the NMP.
- [23] The additional measures to achieve a greater than 20% (24%) specified reduction in nitrogen leaching relative to the baseline are detailed in Section 8 of the NMP and summarised in Section 9 with committed timeframes included. The commitment to complete those additional measures within a

period of two years has been made. The measures and the timing are realistic in my opinion.

- [24] It is my view that the use of the specified reduction pathway would be slightly more complex than the NRAT pathway, given that a baseline Overseer file using farm system information from 2012/13 needs to be created. However, most farmers should have enough of this information available within their farm records to create a suitable Overseer file.<sup>3</sup>
- [25] Working alongside a suitably qualified consultant the specified reduction pathway will be the preferred option for many dairy farmers needing to comply with PC2.

#### **NRAT**

- [26] Separately, I have also assessed this IFLU using the pastoral NRAT in **Appendix B**. Based on the information available it was a relatively simple task to complete an NRAT. The NRAT result would not have met the controlled activity threshold of 'low' risk if an application was made in 2016. Unless farm practice changes were made before lodgement of the consent application, the NRAT pathway would not be available. However, the IFLU would satisfy the specified reduction pathway, provided the application commits to implementing the additional measures to achieve the 24% reduction within a two-year period.
- [27] I note that the assessment of risk under the NRAT demonstrated that adopting the same GMPs as the specified reduction pathway would have enabled the farmer to reduce risk to below the 'low' risk threshold. While I have not included that aspect of the worked NRAT example given the approach reflected in Council's Reply Provisions, I can do so if helpful.
- [28] It is my view that the use of NRAT would be a straightforward exercise for a farmer to undertake alongside a suitably qualified consultant. The

---

<sup>3</sup> I note that Professor Horne shares this view – Further Supplementary Statement of Evidence, David Horne, 5 February 2024, paras [20]-[21].

information required is no more onerous for a farmer to collate than that required for Overseer inputs.

#### E. **WORKED EXAMPLE – CVG**

##### **NRAT**

- [29] A worked example of the NRAT for Woodhaven Gardens (Woodhaven) has been submitted to be Court by Horticulture New Zealand. Prior to the submission of this NRAT, I reviewed the document. Using my knowledge of Woodhaven and the NRAT, it is my opinion that the NRAT has been used correctly to reflect Woodhaven's operations prior to the adoption of GMP and afterwards. Woodhaven is based in the Horowhenua catchment.
- [30] The NRAT example highlights how Woodhaven made changes to their farming operation. The changes made reduced the N leaching risk from what is classified as very high N under the NRAT to an operation that I would view to have a very low N leaching risk. To reduce the property's level of risk by 241 'points' Woodhaven owners have invested significant time and money into the adoption of farm specific appropriate GMPs.
- [31] Although the NRAT itself is not an NMP, it clearly highlights what GMPs a grower will adopt to reduce the N leaching risk. By way of example:
- (a) The practices within the NRAT become the basis of the Environmental Action Plan within the NMP.
  - (b) The on-farm practices which have been identified as being more at risk to N leaching will be summarised and discussed in the Identification of Risk Section of the NMP.
  - (c) Summarising the change in N risk points through the adoption of GMPs will be placed into the Reduction in Contaminant Loss Section. It is within this section that a grower can highlight and discuss any improvements that reduce N leaching risk which have not been captured in the NRAT. For CVG this could include improved irrigation practices, the retirement of land, the use of wetlands, or changing crops to lowering N leaching crops. The identification of additional N

mitigation measures may not be important for an NRAT consenting pathway but will be taken into consideration when a discretionary consent is applied for. The additional measures can also be relied on if needed for the specified reduction pathway when a grower is trying to achieve a 35% reduction.

### **NMP**

[32] As I did not prepare the NRAT for the Woodhaven Gardens operation I did not have the necessary information to complete a worked example of a NMP for the farm. There was also no suitable data held by Horizons to enable a meaningful example to be prepared (this reflects the absence of consent applications for CVG over the years).

[33] However, I do not consider the absence of a worked CVG NMP example to be problematic. In my view, the Court can be comfortable that the CVG NMP (using the same template) will look the same as the pastoral NMP. As I note above, the exception will be Section 3 (The Farm System Description). It is in this section where an overview of the farming operation is summarised. The sub-headings within Section 3 of the CVG NMP template include:

- (a) Crops and planting;
- (b) Nutrient planning and usage;
- (c) Irrigation; and
- (d) Fallow period management

[34] Rather than the tables presented in Section 3 of the pastoral NMP example, have included examples of the tables which would be required to be populated by the applicant for a CVG IFLU consent in **Appendix C**. The tables have been populated for example purposes only.

[35] Unlike the dairy NMP, a yearly summary of soil test results would not been required to be tableted within Section 3 due to the sheer number of tests some growers complete. However, a summary of the results needs to be provided within this section and laboratory reports must be attached as an

appendix of the NMP. If the grower has a current Farm Environment Plan (FEP) such as the NZGAP FEP this can also be attached as an appendix to the NMP to highlight previous and current environmental improvements being made on farm.

**F. THE REFERENCE FILE APPROACH, PROPOSED BY MRS FOSTER**

- [36] I support the use of a reference file approach as outlined in Mrs Foster's evidence. It is a practical workaround to overcome issues associated with Overseer version changes. I otherwise rely on the evidence of Professor Horne as to the certainty and reliability of the reference file approach.
- [37] It must be noted, however, that the reference file approach may not be necessary for (or accessed by) CVG apart from the potato and onion growers.
- [38] It is my view that the controlled activity pathway using Table 14.2 is not the most suitable consenting pathway for most CVG growers. The starting point is that Table 14.2 relies on absolute numbers as a gateway for consenting (activity status) and enforcement (limits in conditions). Other than Dr Parlato, reliance on Overseer to produce absolute values was not an approach supported by the farm system and Overseer experts in conferencing.<sup>4</sup> The use of Overseer as a decision support tool, including to assess relative change on farms, was more broadly supported by the experts (including me).<sup>5</sup> As outlined in previous evidence, although improvements are being made to Overseer and there are suitable workarounds available, there currently remain several challenges when modelling CVG. In addition, Table 14.2 was developed for dairy farms only, skewing the representativeness of Table 14.2 for all IFLUs.
- [39] It is my view that the NRAT and specified reduction pathways are more suitable options for consenting CVG. I note that Mrs Foster proposes use of both pathways in her evidence. These alternative controlled activity pathways provide options where CVG cannot meet the CNLM within Table

---

<sup>4</sup> Joint Witness Statement, Farm System and Overseer Experts, 2 February 2024, page 9.

<sup>5</sup> Joint Witness Statement, Farm System and Overseer Experts, 2 February 2024, page 9.

14.2 (which is likely to be often) and are more suited to CVG. Therefore, the use of reference files for CVG may not be necessary for most growers.

[40] In regard to the timeframes for adoption for GMP, it is my view that the CVG sector have come a long way in recent years in regard to tools being available to support on farm decision making for N fertiliser usage. The quick N test has been available to growers since 2018, while the N balance developed by the Sustainable Vegetable Systems Program between 2020 and 2024 is now available for growers to use. This makes the adoption of key GMPs within the score card a lot more straight forward than it previously would have been. Because of this, it is my opinion that growers do not need a lengthy period of time to implement GMPs in order to reduce their risk to low.

[41] It is my view that growers should start introducing suitable GMPs into their growing system now. Full adoption is not needed straight away, as time is needed to upskill, to learn and understand the information provided by these tools. However, with the support of the horticulture sector I am of the view that a full implement of suitable GMPs can be adopted within two years.

**G. REPLY TO MR FORD'S SUPPLEMENTARY EVIDENCE (MARCH 2024)**

[42] Mr Ford outlines his views on the use and suitability of the reference file approach in paragraphs 3 to 14 of his March 2024 evidence.<sup>6</sup> I support his view that the reference file approach is suitable for potato and onion crop rotations. However, I do not agree on the suitability of the use of reference files for intensive vegetables and brassica dominant vegetable systems.

[43] In his March 2024 evidence<sup>7</sup> Mr Ford reiterates the limitations of Overseer when modelling intensive vegetable and brassica dominant systems. These limitations are still valid concerns even though there has been an Overseer development programme which updated the crop model. This is because these recent improvements do not address Mr Ford's concerns.

[44] I acknowledge that modelling intensive vegetables and brassica dominant vegetable systems within Overseer has its challenges and the use of

---

<sup>6</sup> Statement of Evidence, Stuart Ford, 28 March 2024, pages 2-4.

<sup>7</sup> Statement of Evidence, Stuart Ford, 28 March 2024, para 12.

modelling workarounds and assumptions are required. However, I have always stated that it is possible to model these systems within Overseer. Therefore, if reference files for intensive vegetables and brassica dominant vegetable systems are required, I remain of the view (albeit with the use of workarounds) it is possible to develop suitable Overseer files.

#### **H. REPLY TO DR PARLATO'S SUPPLEMENTARY EVIDENCE (MARCH 2024)**

[45] In paragraphs 3.14–3.15,<sup>8</sup> Dr Parlato has summarised my previous evidence stating that only 4% of CVG IFLU's can meet their Year 10 CNLMs. This was based off the Bloomer Overseer modelling. This modelling highlighted that only potato and onions growers (4% CVG) would meet their Year 10 CNLMs.

[46] Modelling at a crop rotation level in which I completed for the Council level hearing<sup>9</sup> supports the findings of the Bloomer report.

[47] I note that while I anticipate that there *may* be some more CVG operations that could meet the Year 10 CNLM in Table 14.2,<sup>10</sup> given some of the improvements in Overseer, whether that is the case, and how many, is unknown. This applies equally to the number of growers that could meet Year 20. The best information before the Court remains, in my view, the Bloomer report, supported by my modelling at a crop rotation level.

**17 May 2024**

**Dr Anne-Maree Jolly**

---

<sup>8</sup> Supplementary Evidence, Elizabeth Parlato, 28 March 2024 para 3.14-3.15.

<sup>9</sup> Section 42A Report, Anne-Maree Jolly, 4 September 2020 from para 19.

<sup>10</sup> Supplementary Statement of Evidence, Anne-Maree Jolly, 17 January 2024, from para 10.

## APPENDIX C

## SECTION 3 – CVG NMP TEMPLATE EXAMPLE

## Land blocks

| Block                  | Ownership | Area (ha)   |
|------------------------|-----------|-------------|
| Block A                | Owned     | 5           |
| Block B                | Owned     | 10          |
| Block C                | Owned     | 7.5         |
| Block 1                | Leased    | 3           |
| Block 2                | Leased    | 6           |
| <b>Total farm area</b> |           | <b>31.5</b> |

## Crop and areas in base year

| Crop        | Average tonnage (/ha) | Area grown (ha) |
|-------------|-----------------------|-----------------|
| Broccoli    | 16                    | 20              |
| Cabbage     | 100                   | 15              |
| Cauliflower | 50                    | 15              |
| Potatoes    | 64                    | 5               |
| Onions      | 50                    | 5               |
| Lettuce     | 50                    | 20              |
| Silverbeet  | 20                    | 10              |

## Crop N fertiliser application per crop

| Crop                 | N fertiliser (type and rate) kg/ha                           | Total N applied kg N/ha |
|----------------------|--------------------------------------------------------------|-------------------------|
| Broccoli - summer    | 800 kg/ha Nitrophoska Blue TE Extra 12 5 14                  | 96                      |
| Broccoli - winter    | 900 kg/ha Nitrophoska Blue TE Extra m 5 14<br>250 kg/ha CAN  | 175                     |
| Cabbage - summer     | 800 kg/ha Nitrophoska Blue TE Extra 12 5 14                  | 96                      |
| Cabbage - winter     | 900 kg/ha Nitrophoska Blue TE Extra m 5 14<br>250 kg/ha CAN  | 175                     |
| Cauliflower - summer | 800 kg/ha Nitrophoska Blue TE Extra 12 5 14                  | 96                      |
| Cauliflower - winter | 900 kg/ha Nitrophoska Blue TE Extra m 5 14<br>250 kg/ha CAN  | 175                     |
| Potatoes             | 900 kg/ha Nitrophoska Blue TE Extra 12 5 14                  | 108                     |
| Onions               | 250 kg/ha CAN                                                | 67.5                    |
| Lettuce - summer     | 600 kg/ha Nitrophoska Blue TE Extra 12 5 14                  | 72                      |
| Lettuce - winter     | 750 kg/ha Nitrophoska Blue TE Extra 12 5 14<br>250 kg/ha CAN | 157                     |
| Silverbeet           | 900 kg/ha Nitrophoska Blue TE Extra 12 5 14                  | 108                     |

## Appendix A

Horizons Regional Council

Intensive Land Use Consent Application  
Nutrient Management Plan

Completed By:

Date:

### Consultant Declaration

I declare that I have the necessary expertise to prepare this Nutrient Management Plan and associated Overseer modelling and/or NRAT and any associated files and documents.

I confirm the following: ·

I have attained a Certificate of Advanced Sustainable Nutrient Management from Massey University. ·

Overseer modelling has been completed in accordance with the current Overseer Data Input Standards and any Horizons Regional Variations. ·

Name:

Position:

Signed:

Date:

# Table of Contents

|                                              |    |
|----------------------------------------------|----|
| Table of Contents .....                      | 3  |
| 1 Summary.....                               | 4  |
| 2 Property Overview.....                     | 5  |
| 3 Overview of Farm System.....               | 6  |
| 3.1 Property description .....               | 6  |
| 3.1.1 Stock policy .....                     | 6  |
| 3.1.2 Crops .....                            | 6  |
| 3.1.3 Pasture and supplementary feed .....   | 6  |
| 3.1.4 Nutrient status and fertiliser .....   | 7  |
| 3.1.5 Effluent management.....               | 8  |
| 4 Natural Resources .....                    | 9  |
| 4.1 Soils.....                               | 9  |
| 4.2 LUC.....                                 | 10 |
| 4.3 Climate.....                             | 12 |
| 5 Land Management Units.....                 | 13 |
| 6 Summary of Environmental Improvements..... | 14 |
| 7 Identification of Risks .....              | 15 |
| 7.1 Nitrogen .....                           | 15 |
| 7.2 Phosphorus.....                          | 15 |
| 7.3 Sediment .....                           | 16 |
| 7.4 E. coli .....                            | 16 |
| 7.5 Waterways.....                           | 16 |
| 7.6 Stock Crossing .....                     | 16 |
| 8 Reduction of Contaminant Loss.....         | 17 |
| 8.1 Nitrogen .....                           | 17 |
| 8.2 Phosphorus.....                          | 17 |
| 8.3 Sediment .....                           | 18 |
| 8.4 E. coli .....                            | 18 |
| 8.5 Waterways.....                           | 18 |
| 8.6 Stock Crossing .....                     | 18 |
| 9 Environmental Action Plan .....            | 19 |
| Appendix A – Overseer Information.....       | 20 |

# 1 Summary

2     Property Overview

Table 1            Overview of property details

|                                      |  |
|--------------------------------------|--|
| Farm trading name                    |  |
| Full name                            |  |
| Email                                |  |
| Property address                     |  |
| Legal description(s) of land parcels |  |
| Valuation numbers                    |  |
| Total area (ha)                      |  |
| Effective area (ha)                  |  |
| Total owned land (ha)                |  |
| Total leased land (ha)               |  |
| Land use activities                  |  |
| Catchment                            |  |
| Elevation                            |  |
| Rainfall                             |  |

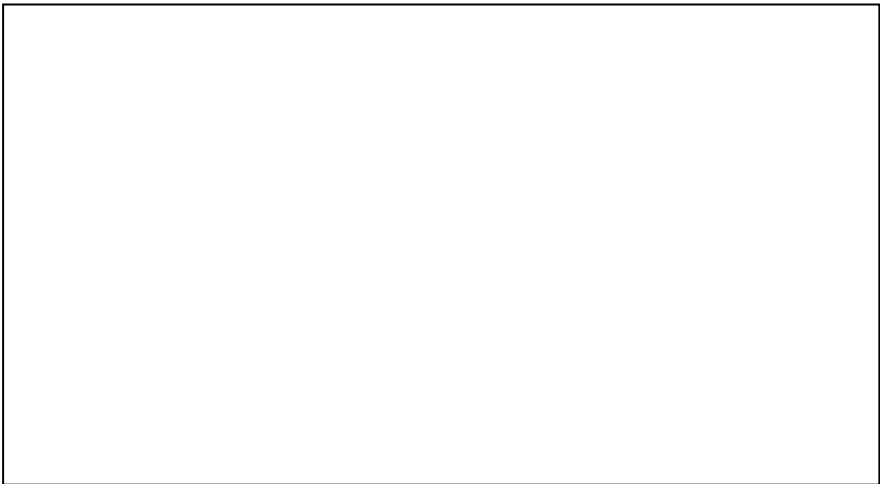


Figure 1            Farm Map

### 3 Overview of Farm System

This farm is a low input farm which has a low stocking rate (1.8 cow/ha). Minimal fertiliser is used, and sprays are not used on farm therefore crops are an important part of the pasture renewal programme. However, due to soil types and the farm's close proximity to the ranges the N leaching losses from this farm are high for the system being run.

The milking platform has an effective area of 130 ha while there is a 63 ha support block within a five minute drive of the milking platform. The total area of the milking platform is 146 ha while the support block is 68 ha.

Significant time and money have been put into fencing off waterways and riparian planting. This has resulted in all waterways on both the milking platform and support block being fenced off prior to 2012/13. The majority of these waterways have been riparian planted.

In summary, this Nutrient Management Plan is supporting for the consent application for the following activities: Existing Intensive Land Use under Rule 14-1 of the One Plan.

#### 3.1 Property description

The property description below summaries the 2012/13 season for this property.

##### 3.1.1 Stock policy

The peak number of cows milked are 340 Friesian x Jersey. All 340 dairy cows are grazed off farm on the support block from 1<sup>st</sup> of June returning 31<sup>st</sup> of July each year. The replacement dairy heifers are also grazed off the milking platform on the support block from weaning until they are 21 months old when they return as in-calf heifers during the month of May. There are 100 R1 heifers, 50 R1 bulls and 73 R2 replacement heifers.

During the 2012/13 season the milk production was 111,430 kg MS/year. The equated to 577 kg MS/ha and 328 kg MS/cow.

##### 3.1.2 Crops

Each year a 6 ha summer crop of turnips is planted on the milking platform. This crop rotates around the entire milking platform and yields 10 t/ha. Effluent is applied a month prior to planting. The crop is sown using conventional cultivation in October and grazed by milking cows for 2 hours per day between December and February. The crop is resown to ryegrass/white clover pasture in March.

On the support block each year 6 ha of oats is planted. This crop rotates around the entire support block and yields 5 t/ha. The crop is sown using conventional cultivation in March and grazed by milking cows during July. The crop is resown to ryegrass/white clover pasture when conditions allow which usually is during October.

##### 3.1.3 Pasture and supplementary feed

Table 2 highlights all feed that is either made on farm or purchased. During the 2012/13 season additional feed had to be purchased due to the drought. 195 TDM of baleage was purchased and fed out in paddock during spring, summer, and autumn. The baleage was fed out evenly across all pastoral blocks of the milking platform. 15 TDM of hay was also purchased and fed out in paddock during the spring months evenly across all pastoral blocks of the milking platform. An additional 15 TDM of hay was transferred from the support block to the milking platform and fed out in paddock during the spring months evenly across all pastoral blocks of the milking platform.

**Table 2** Supplementary feed harvested or imported and distribution location

| Feed    | Source             | Distributed location |
|---------|--------------------|----------------------|
| Baleage | 195 t/DM Purchased | Feed in paddock      |

|                  |                               |                 |
|------------------|-------------------------------|-----------------|
| Good quality hay | 15 t/DM Purchased             | Feed in paddock |
| Good quality hay | 15 t/DM Made on support block | Feed in paddock |

### 3.1.4 Nutrient status and fertiliser

Soil test results were not available for the 2012/13 seasons. Therefore Table 3 and Table 4 have not been populated.

**Table 3** 2013 soil test results

| Paddock | pH  | Olsen P (mg P/L) | Sulphate Sulphur (ug/g) | K (quick test) | Ca (quick test) | Mg (quick test) |
|---------|-----|------------------|-------------------------|----------------|-----------------|-----------------|
| 2       | 5.8 | 26               | 10                      | 4              | 7               | 15              |
| 6       | 5.9 | 29               | 11                      | 5              | 6               | 17              |
| 8       | 6.2 | 30               | 8                       | 5              | 5               | 16              |
| 18      | 6.3 | 27               | 9                       | 7              | 7               | 15              |
| 24      | 6.2 | 29               | 13                      | 6              | 5               | 15              |
| 36      | 6.1 | 31               | 15                      | 5              | 5               | 16              |
| 48      | 5.8 | 32               | 10                      | 6              | 6               | 17              |
| 50      | 6.2 | 28               | 10                      | 4              | 6               | 15              |

**Table 4** Averaged soil test for each LMU

|            | pH  | Olsen P (mg P/L) | Sulphate Sulphur (ug/g) | K (quick test) | Mg (quick test) |
|------------|-----|------------------|-------------------------|----------------|-----------------|
| Effluent   | 5.8 | 27.5             | 10.5                    | 4.5            | 16              |
| Pastoral 1 | 6.2 | 28.5             | 8.5                     | 6              | 15.5            |
| Pastoral 2 | 6.1 | 30               | 14                      | 5.5            | 15.5            |
| Pastoral 3 | 6.0 | 30               | 10                      | 5              | 16              |

**Table 5** Optimal soil test values for pasture

|                  | Pasture |
|------------------|---------|
| pH               | 5.8-6.2 |
| Olsen P (mg P/L) | 20-30   |
| Sulphur Sulphate | 10-12   |
| K (quick test)   | 5-8     |
| Mg (quick test)  | 8-10    |

**Table 6** Fertiliser product and application rate for all blocks

| Block                   | Fertiliser product (month applied) | Quantity of fertiliser | N:P:K:S      |
|-------------------------|------------------------------------|------------------------|--------------|
| <b>Milking platform</b> |                                    |                        |              |
| Entire milking platform | Urea (July and September)          | 28 kg/ha               | 13:-:-       |
| Entire milking platform | PhaSed N quick start (August)      | 235 kg/ha              | 74:-:-40     |
| Entire milking platform | Special mix (February)             | n/a                    | 4:-:-        |
| Entire milking platform | Special mix (May)                  | n/a                    | -:9:-:18     |
| <b>Support Block</b>    |                                    |                        |              |
| Oats crop               | Special mix                        | n/a                    | 32:36:92:107 |
| Support block A         | PhaSed N (September)               | 147 kg/ha              | 37:-:-42     |

|                 |                   |           |          |
|-----------------|-------------------|-----------|----------|
| Support block B | PhaSed N (April)  | 195 kg/ha | 49:-:-56 |
| Support block B | Lime and dolomite | n/a       | n/a      |

Table 6 highlights all fertiliser applied to the milking platform and the support block during the 2012/13 season. As reported from Overseer, the average kg N/ha across the milking platform has been calculated as 75 kg N/ha/yr. For the support block the kg N/ha has reduced to 49 kg N/ha/yr.

### 3.1.5 Effluent management

**Table 7** Effluent consent information. The following conditions are specified in the existing consent.

|                                                |             |
|------------------------------------------------|-------------|
| Consent number                                 | xxxxxx      |
| Expiry date                                    | 2025        |
| Maximum cows                                   | 340         |
| Minimum area required to be irrigated per year | 23 ha       |
| Maximum allowable effluent nitrogen (kg N/ha)  | 150 kg N/ha |

From the yard effluent goes into a sandtrap then into a two-pond holding system. The second pond is regularly empty being used only as an overflow pond. From the first holding pond effluent is applied to 24 ha of land using a travelling irrigator (Plucks). The performance and flow of the irrigator has not been measured, but it is set to be 15 mm.

Neither of the ponds are lined and the solids are not separated prior to land application. The soil type on the effluent block has been classed a 'low risk' without artificial drainage.

There is no storm water diversion in place nor is shed roof water captured.

## 4 Natural Resources

Table 8 Natural resources summary by LMU

| LMU                     | Soil type            | LUC | Contour | Area |
|-------------------------|----------------------|-----|---------|------|
| <b>Milking platform</b> |                      |     |         |      |
| Effluent                | Kopua silt loam      | 2s1 | Flat    | 24   |
| Pastoral 1              | Manawatu sandy loam  | 2w1 | Flat    | 12.1 |
| Pastoral 2              | Kopua silt loam      | 2s1 | Flat    | 61   |
| Pastoral 3              | Takapau silt loam    | 3s2 | Flat    | 24.6 |
| Leased                  | Dannevirke silt loam | 3e1 | Flat    | 8.3  |
| <b>Support block</b>    |                      |     |         |      |
| Support 1               | Takapau silt loam    | 3s2 | Flat    | 22.1 |
| Support 2               | Takapau silt loam    | 3s2 | Flat    | 29   |
| Support 3               | Matamau silt loam    | 6e1 | Flat    | 11.9 |

### 4.1 Soils

There are five different soil types located across the milking platform and support block. The majority of the soils are brown soils with an alluvium origin. All soils are moderately well or well drained with moderate to high or high profile available water down to 1 m.

Table 9 Summary of key soil characteristic

| Characteristic                | Soil Types              |                           |                           |
|-------------------------------|-------------------------|---------------------------|---------------------------|
|                               | Dannevirke silt loam    | Kopua silt loam           | Manawatu sandy loam       |
| NZ soil order                 | Brown                   | Brown                     | Recent                    |
| S-Map sibling                 | Eketahuna_7a.1          | Oronoko_5a.1              | Awatere_24a.1             |
| Parent material               | Alluvium                | Alluvium                  | Alluvium                  |
| Texture                       | Silt                    | Silt                      | Sand                      |
| Drainage status               | Moderately well drained | Moderately well drained   | Well drained              |
| Profile available water (1m)  | High (202 mm)           | Moderate to high (150 mm) | Moderate to high (122 mm) |
| Potential rooting depth (1 m) | No barrier              | No barrier                | No barrier                |
| Permeability profile          | Moderate                | Moderate                  | Rapid                     |
| Structural vulnerability      | Low                     | High                      | High                      |
| Area on farm                  | 8.3                     | 85                        | 12.1                      |

| Characteristic                | Soil Types                   |                              |
|-------------------------------|------------------------------|------------------------------|
|                               | Takapau silt loam            | Matamau silt loam            |
| NZ soil order                 | Brown                        | Brown                        |
| S-Map sibling                 | Tararu_6a.1                  | Chastelton_2a.1              |
| Parent material               | Alluvium                     | Loess on rock                |
| Texture                       | Silt                         | Silt                         |
| Drainage status               | Well drained                 | Moderately well drained      |
| Profile available water (1m)  | Moderate to high<br>(144 mm) | Moderate to high<br>(145 mm) |
| Potential rooting depth (1 m) | No barrier                   | Fractured rock               |
| Permeability profile          | Rapid                        | Moderate over slow           |
| Structural vulnerability      | Low                          | Moderate                     |
| Area on farm                  | 76.5                         | 11.9                         |

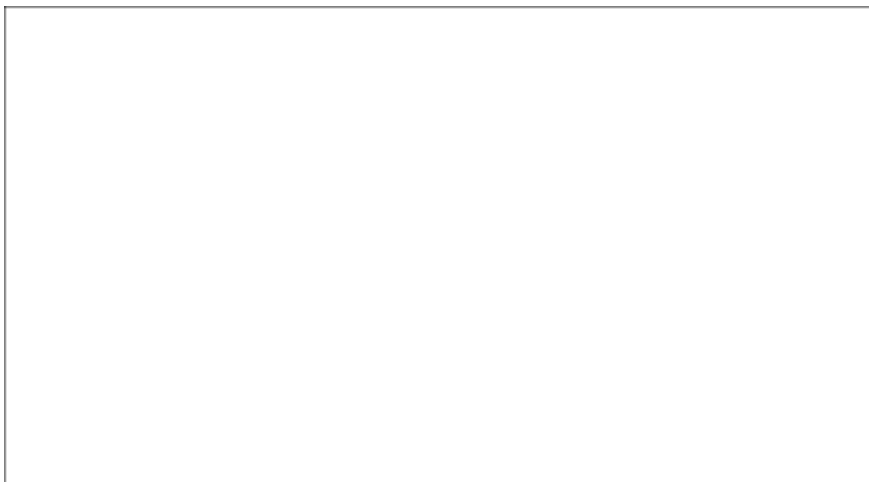


Figure 2 Soil map

## 4.2 LUC

Across the milking platform and support block there are five different LUC classifications that fall within three separate LUC classes. As highlighted in Figure 3, the majority of the property is located on either class 2 or 3 land. On the support block there are small areas of class 6 land which is less desirable for dairy cattle.

Table 10 Summary of LUC classification key characteristics

| Characteristics            | LUC                                                                                                        |                                          |                                                        |
|----------------------------|------------------------------------------------------------------------------------------------------------|------------------------------------------|--------------------------------------------------------|
|                            | 2s1                                                                                                        | 2w1                                      | 3e1                                                    |
| Limitation                 | Soil                                                                                                       | Wetness                                  | Erosion                                                |
| Slope                      | Flat                                                                                                       | Flat                                     | Flay                                                   |
| Soil type                  | Kopua silt loam                                                                                            | Manawatu sandy loam                      | Dannevirke silt loam                                   |
| Implications of limitation | Gravels maybe present in the subsoil<br><br>Susceptible to summer drought<br><br>Soil loss when cultivated | Subsoils continuously moist              | Loss of soil through wind erosion                      |
| Management                 | Irrigation in low rainfall areas                                                                           | Install artificial drainage              | The use of shelter belts if cultivating soil regularly |
| Recommended land use       | Intensive grazing and intensive cropping                                                                   | Intensive grazing and intensive cropping | Intensive grazing and cropping                         |
| Is land use suitable?      | Yes                                                                                                        | Yes                                      | Yes                                                    |

| Characteristics            | LUC                                                                                                   |                                                             |
|----------------------------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
|                            | 3s2                                                                                                   | 6e1                                                         |
| Limitation                 | Soil                                                                                                  | Erosion                                                     |
| Slope                      | Flat                                                                                                  | Strong rolling to moderately steep                          |
| Soil type                  | Takapau silt loam                                                                                     | Matamau silt loam                                           |
| Implications of limitation | Summer drought<br><br>Gravels and stones throughout the soil profile<br><br>Soil loss when cultivated | Susceptible to soil slips<br><br>Unsuitable for cultivation |
| Management                 | Irrigation in low rainfall areas                                                                      | Do not cultivate                                            |
| Recommended land use       | Intensive grazing and cropping                                                                        | Intensive grazing                                           |
| Is land use suitable?      | Yes                                                                                                   | Yes                                                         |



Figure 3 LUC map

### 4.3 Climate

The milking platform for this property has a rainfall of 1550 mm. The support block has an even higher rainfall of 1850 mm. This level of rain increases the risk of nitrogen leaching across this farm significantly. Especially when coupled with the moderately well to well drained soils located on the property.

5 Land Management Units

A land management unit (LMU) can be defined as a block of land that responds in a similar way under similar management. The area may have the same soil type present, LUC classification, and they will have the same land management practice. Each LMU will respond differently to external pressures and therefore need to be separated out for planning purposes.

Table 11 Land management units and associated areas

| Overseer block            | Area (ha)  |
|---------------------------|------------|
| <b>Milking Platform</b>   |            |
| Pastoral 1                | 12.1       |
| Pastoral 2                | 61         |
| Pastoral 3                | 24.6       |
| Leased                    | 8.3        |
| Leased effluent           | 15.7       |
| Effluent                  | 8.3        |
| Turnips (fodder crop)     | 6          |
| Non-productive            | 16         |
| <b>Support Block</b>      |            |
| Support 1                 | 22.1       |
| Support 2                 | 29         |
| Support 3                 | 11.9       |
| Winter oats (fodder crop) | 6          |
| Non-productive            | 5.7        |
| <b>Total</b>              | <b>214</b> |

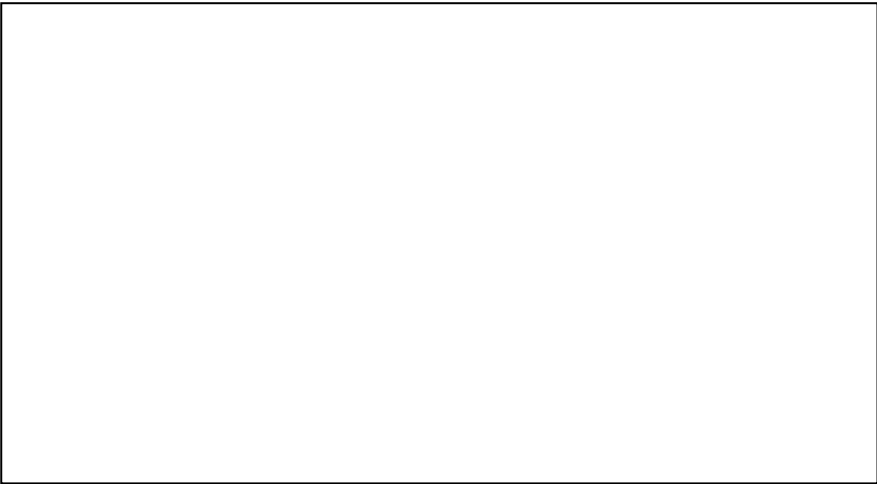


Figure 4 Map of Land management units

## 6 Summary of Environmental Improvements

Prior to the baseline year of 2012/13 several good management practices had already been implemented on farm.

- Effluent pond has sufficient storage.
- The use of supplementary feeds low in crude protein such as hay.
- The fencing off of all waterways on milking platform and a riparian planting programme put in place. Planting started prior to the 2012/13 season but not completed before the end of season.
- The fencing off of all waterways on support block and a riparian planting programme put in place. Planting started prior to the 2012/13 season but not completed before the end of season.
- All waterways bridged or culverted

## 7 Identification of Risks

### 7.1 Nitrogen

Baseline nitrogen loss from the 2012/13 season has been modelled as 50 kg N/ha. For a low input system with a low stocking rate this is a high nitrogen loss. Rather than the management practices driving nitrogen loss on farm, for this individual property its location near the ranges (increasing rainfall) and on free draining soils is highly influencing nitrogen loss.

Although this property is a low input system, there is one key area of concern for nitrogen loss. This is the use of summer and winter crops. As highlighted in Table 12 the winter crop of oats has a modelled nitrogen loss of 195 kg N/ha across the 6 ha in which oats are grown on. Although not as severe, the summer turnips are also a very high leaching crop of 120 kg N/ha. The cropping areas within this system irrespective of grazing season are the practices with the greatest risk of nitrogen loss to water.

When considering nitrogen loss to water, the baseline 50 kg N/ha/yr equates to 10,700 kg N lost from the property. When considering the nitrogen loss to water from the two fodder crops, the turnips lose 720 kg N and the winter oats 1,170 N kg equalling 1,890 kg N of the total 10,700 kg N. Fodder crops equate to 18% of the total N loss from the property. The cropping management practices are contributing to a large amount of total nitrogen loss, given it is a single practice.

**Table 12 Nitrogen loss across the property**

| Overseer block            | N loss to water (kg N/ha) |
|---------------------------|---------------------------|
| <b>Milking Platform</b>   |                           |
| Pastoral 1                | 49                        |
| Pastoral 2                | 47                        |
| Pastoral 3                | 48                        |
| Leased                    | 44                        |
| Leased effluent           | 54                        |
| Effluent                  | 55                        |
| Turnips (fodder crop)     | 120                       |
| <b>Support Block</b>      |                           |
| Support 1                 | 37                        |
| Support 2                 | 47                        |
| Support 3                 | 43                        |
| Winter oats (fodder crop) | 193                       |
| <b>Total</b>              | <b>50</b>                 |

On reviewing the farm system information, it has been noted that although this property is a low input system, there is also an increased risk in nitrogen leached due to the management of nitrogen fertiliser. Three winter nitrogen fertiliser applications occur each year. In addition, one of the winter nitrogen applications is high being 74 kg N/ha. Being applied during winter has an increased risk of leaching due to water moving through the soil profile more rapidly and lower plant growth rates.

### 7.2 Phosphorus

Overseer modelled a phosphorus loss to water of 0.7 kg P/ha/yr which is in the acceptable range. The highest phosphorus loss to water on farm comes from the Pastoral 1 block with a loss of 1.6 kg P/ha/yr.

Practices that increase phosphorus loss to water on this farm include the grazing of young stock on the hill side areas (sidlings) of the support block due to the increased risk of soil loss from erosion. Soil loss can also occur when soil is bare during high winds leading to wind erosion. Phosphorus is lost during the loss of soil because phosphorus is bound to the soil.

### 7.3 Sediment

The flat nature across the milking platform reduces the risk of sediment loss on farm. Although the support block is mainly flat there is an area of hill side (sidling) on the support block including the risk of sediment loss.

Practices that increase sediment loss to water on this farm are the same to that of phosphorus loss. These include the grazing of young stock of the hill side areas (sidling) of the support block. Soil loss can also occur when soil is bare during high winds leading to wind erosion.

### 7.4 E. coli

Risk of E coli loss of farm is low. The area where any risk is present is within the effluent system. By operating the effluent system within the conditions of consent. The risk of E. coli loss is minimised.

### 7.5 Waterways

All permanent waterways have been fenced off and culverts put in place. Horizons definitions of waterways required to be fenced off is wider than permanent waterways. There are no additional waterways under that definition on farm.



Figure 5 map out the waterways locations and whether they have been fenced

### 7.6 Stock Crossing

There are no stock waterway crossings on farm.

## 8 Reduction of Contaminant Loss

### 8.1 Nitrogen

Table 13 Nitrogen reduction from good management practices

| Good management practices                                                          | Nitrogen reduction* |               |
|------------------------------------------------------------------------------------|---------------------|---------------|
|                                                                                    | Kg N/ha             | Kg N          |
| Remove all purchased supplements and make more supplements on farm                 | -3                  | -638          |
| Remove winter N applications and reduce total N application per year by 22 kg N/ha | -9                  | -2,033        |
| Keep proportion of dry milking herd at support block for longer over winter        | -1                  | -262          |
| <b>Reduction in N loss</b>                                                         | <b>-12</b>          | <b>-2,933</b> |

\*As modelled in Overseer

In addition to the good management practices highlighted above a change in pastoral species has proposed to be implemented on farm. Rather than renewing pastures with a white clover rye grass sward, a mixed sward of plantain, chicory, rye grass, red clover and white clover will be introduced. Each year 12 ha across the milking platform and support block is to be renewed using this mix. The use of both plantain and chicory are known to be beneficial in reducing nitrogen leaching. The use of plantain within the sward has been classified as a good management practice. This new practice started in 2017. The potential nitrogen loss reduction is unknown at this time as at the time of Overseer modelling plantain was not part of the model at the time.

As highlighted in Section 6 the use of fodder crops both winter and summer has been identified as the greatest risk for nitrogen loss on farm. The property owners have acknowledged that these risks have not been addressed during the selection of good management practices, however, the use of crops on farm plays an important part of the pasture renewal programme due to the policy of no spraying of weeds on farm. Weeds are removed through the cultivation of the soil.

Table 14 Summary of nitrogen reductions

|                      | Kg N/ha | Percentage reduction |
|----------------------|---------|----------------------|
| Baseline N loss      | 50      |                      |
| GMP reduction N loss | 12      |                      |
| Future N loss        | 38      | 24%                  |

### 8.2 Phosphorus

Several improvements have been made already or have been proposed to reduce the risk of phosphorus loss from the property. Riparian planting was started prior to the 2012/13 and continues to occur. In addition, shelter belt planting around the perimeter of several paddocks on both the support block and the milking platform. Riparian planting captures any potential runoff particularly from the fodder crops. While shelter belts reduce wind erosion.

As of 2016 90% of riparian planting was completed and 70% of shelter belts were completed. A side of environmental improvements, to use of shelter belts creates shade on farm, which is an important animal welfare consideration.

In 2018 young stock were removed from the hill side areas located on the support block. To manage pasture growth 15 sheep with lambs now graze this area.

### 8.3 Sediment

The improvements associated with phosphorus as highlighted in Section 8.2. This is because phosphorus and sediment travel together. Therefore, any management practice or on farm improvement that reduces phosphorus loss will automatically reduce the loss of sediment.

### 8.4 E. coli

No additional risk reduction to be undertaken.

### 8.5 Waterways

No additional risk reduction to be undertaken.

### 8.6 Stock Crossing

No additional risk reduction to be undertaken.

## 9 Environmental Action Plan

| Environmental risk      | Mitigation                                                                   | Location on farm                        | Priority | Timing                             | Comment (cost/additional advice)                                                     |
|-------------------------|------------------------------------------------------------------------------|-----------------------------------------|----------|------------------------------------|--------------------------------------------------------------------------------------|
| Nitrogen                | Remove all purchased supplements and make more supplements on farm           | Supplements to be made on support block | High     | Introduced spring 2015             | n/a                                                                                  |
| Nitrogen                | Remove winter N applications and Reduce N application per year by 22 kg N/ha | Across entire farm                      | High     | Introduced winter 2018             | n/a                                                                                  |
| Nitrogen                | Keep proportion of dry milking herd at support block for longer over winter  | Support block                           | High     | Introduced winter 2018             | n/a                                                                                  |
| Nitrogen                | Mixed sward pastures including plantain                                      | Across entire farm                      | High     | Introduced winter 2017             | The cost of a mixed sward pasture is higher than your standard ryegrass white clover |
| Phosphorus and sediment | Riparian planted                                                             | Across all fenced waterways             | High     | Winter 2013 through to winter 2020 | n/a                                                                                  |
| Phosphorus and sediment | Shelter belts                                                                | Across entire farm                      | High     | Winter 2014 through to winter 2020 | n/a                                                                                  |
| Phosphorus and sediment | Young stock removed from hill sides (sildings)                               | Support block                           | High     | Spring 2018                        | n/a                                                                                  |

## Appendix A – Overseer Information

## Schedule [X]: How to determine the *nitrogen leaching risk\** of existing *intensive farming land uses\** (Pastoral farming)

### Applying the Nitrogen Leaching Risk Scorecard

A pastoral farm's *nitrogen leaching risk\** shall be determined by:

1. Using the Nitrogen Leaching Risk Scorecard set out below, and in accordance with the explanations and definitions provided, assigning points for the sub practices under the each of the six topics listed, to the extent they are relevant to the farming system; and
2. In the case of Topic 1 Stock Management, adjusting the Sub practice (a) points by the applicable percentage in Sub practice (c);
3. Summing the total number of Sub practice positive points and deducting the sub practice negative points for each Topic to generate 6 Topic scores; and
4. Summing all 5 Topic scores to provide a Part A aggregate Topics score; and
5. Determining what, if any, mitigations under Part B are applicable and applying the points and/or percentage adjustments applicable to the Part A aggregate Topic Score to generate the score that is *nitrogen leaching risk\**.

### NRAT assessment for pastoral dairy farm example 2016

#### PART A: Nitrogen Leaching Risk Scorecard - Pastoral land management practices

#### Topic 1: Stock Management

| (a) Stock Management: Stocking Rate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Points |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| This sub practice addresses the number of grazed animals on the land, recognising that a high stocking rate is a key driver for increased nitrogen leaching on farm. The area (hectares) used in the calculation of the stocking rate is the <b>effective area</b> of the dairy farm.<br><br>For the purpose of this Scorecard the <b>effective area</b> is the area of land used for grazing livestock (including the <b>milking platform</b> ), cropping or as sacrifice paddocks. <b>Dairy farm</b> is the area of land used for <i>dairy farming*</i> . The stocking rate used for the calculation shall be the <b>peak stocking rate</b> . The peak stocking rate is the highest stocking rate on the farm over the 12-month period. The <b>stock unit</b> (su) values for farmed animals are as listed in Part C of this Schedule. |        |
| ≤ 16 su/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0      |
| >16 - ≤20 su/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 20     |
| >20 - ≤28 su/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 30     |
| >28 - ≤32 su/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 40     |
| >32 su/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 50     |
| (b) Stock Management: Pasture Eaten                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Points |
| The Scorecard moderates the stocking rate risk by assessing the total amount of dry matter eaten. It is acknowledged that stocking rate alone as                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| <p>a method of assessing nitrogen loss risk does not account for differences in size and age of animals, both of which will contribute to differences in total dry matter eaten. This sub practice accounts for differences in amount of dry matter eaten and therefore the amount of nitrogen ingested and returned to pasture as urinary N and N in excreta.</p> <p>The expression T DM/ha used below refers to tonnes of dry matter per hectare.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                               |
| ≤ 10 T DM/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 5                                             |
| >10 – ≤12 T DM/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 10                                            |
| >12 – ≤14 T DM/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 20                                            |
| >14 – ≤16 T DM/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 40                                            |
| >16 – ≤18 T DM/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 60                                            |
| >18 T DM/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 80                                            |
| <p><b>(c) Stock Management: Wintering Off the Milking Platform</b></p> <p>This sub practice moderates the stocking rate risk (sub practice (a)) by reducing the points attributed to that Sub practice. This is calculated using the percentage of time animals spend off farm between the months of May – August.</p> <p>For the purpose of this Scorecard, <b>milking platform</b> (MP) means that part of any dairy farm that is used for grazing lactating dairy cows during the milking season and includes the animal effluent disposal area. For the avoidance of doubt, it excludes land used for grazing heifers or the wintering-off of dairy cows.</p>                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Reduction of peak stocking rate points</b> |
| >80 - ≤100% animals off MP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | -50%                                          |
| >60 - ≤ 80% animals off MP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | -40%                                          |
| >40 - ≤60% animals off MP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | -30%                                          |
| > 20 - ≤40% animals off MP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | -20%                                          |
| > 0 - ≤ 20% animals off MP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | -10%                                          |
| <p><b>(d) Stock Management: Wintering Practices:</b></p> <p>This sub practice considers that extent of time stock are fed using different winter grazing practices. The risk is determined by allocating points on a pro rata basis according to the percentage of time (total hours) animals are kept on, and/or fed, using the listed systems.</p> <p>For the purpose of this Scorecard <b>break feed fodder crop</b> means feeding of stock within an area of pasture or crop-</p> <p>(a) within a paddock in which the fence is moved regularly to allow the stock to graze another area of pasture or crop within the paddock; or</p> <p>(b) within a paddock that is subdivided into cells or grid using temporary fencing; and where the stock as moved regularly.</p> <p>An <b>extensive fodder crop</b> means a form of grazing on crop that is not break feed fodder crop.</p> <p><b>Barn or wintering pad</b> means any hard structure used for feeding livestock from which effluent is captured and directed to an authorised effluent management system.</p> | <b>Points</b>                                 |
| Off pasture (barn or wintering pad)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -40                                           |

|                        |    |
|------------------------|----|
| On pasture             | 0  |
| Extensive fodder crop  | 20 |
| Break feed fodder crop | 40 |

## Topic 2: Nitrogen Fertiliser:

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>(a) Nitrogen Fertiliser: Total N</b><br><p>This sub practice assesses the level of risk associated with nitrogen fertiliser application. The total amount of nitrogen used per annum is the main driver for the nitrogen management risk factor. This is calculated by summing the total amount of nitrogen fertiliser applied annually (kg / ha) across the <b>effective area</b>.</p>                                                                                                                          | <b>Points</b> |
| N Fertiliser applied $\leq 50$ kg/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0             |
| N Fertiliser applied $>50 - \leq 100$ kg/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 10            |
| N Fertiliser applied $>100 - \leq 150$ kg/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 30            |
| N Fertiliser applied $>150 - \leq 175$ kg/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 50            |
| N Fertiliser applied $>175 - \leq 200$ kg/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 60            |
| N Fertiliser applied $>200 - \leq 225$ kg/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 70            |
| N Fertiliser applied $>225 - \leq 250$ kg/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 90            |
| N Fertiliser applied $>250 - \leq 300$ kg/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 150           |
| N Fertiliser applied $>300$ kg/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 200           |
| <b>(b) Nitrogen Fertiliser: Conversion Efficiency</b><br><p>The conversion efficiency calculates how many kilograms of milk solids are produced per kilogram of nitrogen (N) applied. This sub factor is calculated by simply dividing the total amount of milk solids (kg MS) produced by the total kilograms of nitrogen applied via fertiliser.</p>                                                                                                                                                              | <b>Points</b> |
| kgMS/kgN Fertiliser $>25$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | -40           |
| kgMS/kgN Fertiliser $>13 - \leq 25$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | -20           |
| kgMS/kgN Fertiliser $>9 - \leq 13$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0             |
| kgMS/kgN Fertiliser $>5 - \leq 9$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 20            |
| kgMS/kgN Fertiliser $\leq 5$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 40            |
| <b>(c) Nitrogen Fertiliser: Timing of Application:</b><br><p>This sub practice assesses the timing of application of nitrogen fertilisers (which influences nitrogen leaching). The scoring of this sub practice works by grouping each of the farm's nitrogen (N) fertiliser applications into one of the three time periods and recording the highest score of those time periods. (That is, if fertiliser is applied in May -June and in September to April, then this sub practice will attract 40 points).</p> | <b>Points</b> |
| N Fertiliser applied September – April                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -10           |
| N Fertiliser applied July - August                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 20            |
| N Fertiliser applied May - June                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 40            |

|                                                                   |               |
|-------------------------------------------------------------------|---------------|
| <b>(d) Nitrogen Fertiliser: Average Monthly Application Rates</b> | <b>Points</b> |
|-------------------------------------------------------------------|---------------|

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| This sub practice calculates the average amount of N applied in any given month to a block by summing all monthly fertiliser applications. Total nitrogen applied is then divided across the block(s) it was applied to. For example, where an N fertiliser application is applied to multiple blocks in a month, the application is to be pro-rata across the blocks it was applied to. This is necessary because Product A (20% Nitrogen) could be applied every month across Block 1 and Block 2 but Product B (46% Nitrogen) was applied every month across Block 1 only. |     |
| Highest N fertiliser applied is $\leq 25$ kg/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -20 |
| Highest N fertiliser applied is $> 25$ kg/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0   |

### Topic 3: Effluent Management

| (a) Effluent Management: Storage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Points |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| <p>This sub practice is scored according to the extent to which the recommend effluent storage capacity is installed. It is expressed as percentage of the storage calculated using the Dairy Effluent Storage Calculator (DESC).</p> <p>Although the scoring scale provided below in increments 10%, scores should be allocated in accordance with a sliding scale from 0 to 100 based on the percentage of required storage that is provided. That is, if a farm has 95% of the required storage it will attract 5 risk points.</p> <p>The DESC may be accessed at: <a href="https://www.dairynzdesc.co.nz">https://www.dairynzdesc.co.nz</a></p> |        |
| 100% storage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0      |
| 90% storage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 10     |
| 80% storage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 20     |
| 70% storage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 30     |
| 60% storage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 40     |
| 50% storage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 50     |
| 40% storage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 60     |
| 30% storage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 70     |
| 20% storage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 80     |
| 10% storage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 90     |
| No storage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 100    |
| (b) Effluent Management: Discharge Application Depth:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Points |
| <p>The application depth is the volume of effluent discharged to soil. It is measured as the depth following a single effluent irrigation cycle.</p> <p>For the purpose of this scorecard <b>High risk soils</b> and <b>Low risk soils</b> are as described at: <a href="https://www.horizons.govt.nz/HRC/media/Media/Soil-Risk-list.pdf">https://www.horizons.govt.nz/HRC/media/Media/Soil-Risk-list.pdf</a></p>                                                                                                                                                                                                                                   |        |
| High risk soils + $\leq 10$ mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0      |
| High risk soils + $>10$ mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 20     |
| Low risk soils + $\leq 24$ mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0      |
| Low risk soils + $>24$ mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 20     |

| <b>(c) Effluent Management: Disposal Area Without a Feed Pad</b>                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Points</b> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <p>The sub practice is scored according to the sufficiency of the effluent disposal area for the farm system. It is calculated simply as the area (hectares) of effluent disposal area per hundred cows, or part thereof.</p> <p>For the purpose of this Scorecard, a <b>feed pad</b> is an area of hard surface used for the regular supplementary feeding and loafing of cattle where the animal effluent is collected for disposal to land in accordance with the rules of this regional plan.</p> |               |
| Disposal area > 4 ha/100 cows (no feed pad)                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0             |
| Disposal area >3 – ≤4 ha/100 cows (no feed pad)                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 10            |
| Disposal area >2 – ≤3 ha/100 cows (no feed pad)                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 20            |
| Disposal area ≥1 – ≤2 ha/100 cows (no feed pad)                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 30            |
| Disposal area <1 ha/100 cows (no feed pad)                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 40            |
| <b>(d) Effluent Management: Disposal Area With a Feed Pad</b>                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>Points</b> |
| Disposal area >7ha/100 cows (with feed pad)                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0             |
| Disposal area >5 – ≤7 ha/100 cows (with feed pad)                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 10            |
| Disposal area >3 – ≤5 ha/100 cows (with feed pad)                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 20            |
| Disposal area ≥1 – ≤3 ha/100 cows (with feed pad)                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 30            |
| Disposal area <1 ha/100 cows (with feed pad)                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 40            |

#### Topic 4: Imported Feed

| <b>(a) Imported N: Total Imported N</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Points</b> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <p>This sub practice is scored according to the total amount of nitrogen (N) introduced to the farm via all imported supplementary feed divided by the <b>effective area</b> of the farm.</p> <p>The N content of feed can be found at:<br/> <a href="https://www.dairynz.co.nz/feed/supplements/feed-values/">https://www.dairynz.co.nz/feed/supplements/feed-values/</a></p> <p>For the purpose of this Scorecard, <b>imported supplementary feed</b> means any animal feed supplied to animals on a dairy farm that is not grown on that dairy farm.</p> |               |
| Total imported N from feed ≤ 40 kg/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0             |
| Total imported N from feed >40 – ≤80 kg/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 20            |
| Total imported N from feed >80 – ≤120 kg/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 40            |
| Total imported N from feed >120 – ≤160 kg/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 60            |
| Total imported N from feed > 160 kg/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 80            |
| <b>(b) Imported N: Average N Content of Imported Supplements</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Points</b> |
| <p>This sub practice is scored according to the average N content of the imported supplementary feed. The average % of nitrogen in the total amount of imported supplementary feed is calculated on a pro rata basis.</p>                                                                                                                                                                                                                                                                                                                                   |               |
| Imported Feed with average N % ≤ 1.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0             |
| Imported Feed with average N % >1.0 - ≤ 1.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 3             |
| Imported Feed with average N % >1.5 - ≤ 1.75                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 6             |
| Imported Feed with average N % >1.75- ≤ 2.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 9             |

|                                                                                                                                                                                                                                                                                                              |               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Imported Feed with average N % >2.0 - ≤ 2.25                                                                                                                                                                                                                                                                 | 12            |
| Imported Feed with average N % >2.25 - ≤ 2.5                                                                                                                                                                                                                                                                 | 15            |
| Imported Feed with average N % >2.5 - ≤ 3.0                                                                                                                                                                                                                                                                  | 18            |
| Imported Feed with average N % > 3.0                                                                                                                                                                                                                                                                         | 20            |
| <b>(c) Imported N: Conversion Efficiency</b><br><br>This sub practice calculates the conversion efficiency of nitrogen (N) introduced via imported supplementary feed to product. This measures the efficiency of nitrogen from imported supplementary feed converted into kilograms of milk solids (kg MS). | <b>Points</b> |
| Kg MS / Kg N from supplements: >50                                                                                                                                                                                                                                                                           | -40           |
| Kg MS / Kg N from supplements: >30 – ≤50                                                                                                                                                                                                                                                                     | -20           |
| Kg MS / Kg N from supplements: >20 – ≤30                                                                                                                                                                                                                                                                     | 0             |
| Kg MS / Kg N from supplements: >10 – ≤20                                                                                                                                                                                                                                                                     | 20            |
| Kg MS / Kg N from supplements: ≤10                                                                                                                                                                                                                                                                           | 40            |

### Topic 5: Cropping and Cultivation

|                                                                                                                                                                                                                                                                                                                                                                |               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>(a) Cropping and Cultivation: Minimum Tillage</b><br><br>This sub practice assesses the risk of release of mineral nitrogen resulting from cultivation. The total percentage of the farm cultivated using minimum tillage is calculated as the area of minimum tillage divided by the total <b>effective area</b> of the farm.                              | <b>Points</b> |
| ≤2% of farm cultivated annually                                                                                                                                                                                                                                                                                                                                | 0             |
| >2% – ≤4% of farm cultivated annually                                                                                                                                                                                                                                                                                                                          | 5             |
| >4% – ≤6% of farm cultivated annually                                                                                                                                                                                                                                                                                                                          | 10            |
| >6% – ≤8% of farm cultivated annually                                                                                                                                                                                                                                                                                                                          | 15            |
| >8% – ≤10% of farm cultivated annually                                                                                                                                                                                                                                                                                                                         | 20            |
| >10% – ≤15% of farm cultivated annually                                                                                                                                                                                                                                                                                                                        | 30            |
| >15% – ≤20% of farm cultivated annually                                                                                                                                                                                                                                                                                                                        | 40            |
| >20% of farm cultivated annually                                                                                                                                                                                                                                                                                                                               | 50            |
| <b>(b) Cropping and Cultivation: Conventional Cultivation</b><br><br>This sub practice assesses the risk of nitrogen leaching associated with conventional cultivation. The total percentage of the farm cultivated using conventional cultivation is calculated as the conventionally cultivated area divided by the total <b>effective area</b> of the farm. | <b>Points</b> |
| >0 - 2% of farm cultivated annually                                                                                                                                                                                                                                                                                                                            | 10            |
| >2% – ≤4% of farm cultivated annually                                                                                                                                                                                                                                                                                                                          | 20            |
| >4% – ≤6% of farm cultivated annually                                                                                                                                                                                                                                                                                                                          | 30            |
| >6% – ≤8% of farm cultivated annually                                                                                                                                                                                                                                                                                                                          | 40            |
| >8% – ≤10% of farm cultivated annually                                                                                                                                                                                                                                                                                                                         | 50            |
| >10% – ≤15% of farm cultivated annually                                                                                                                                                                                                                                                                                                                        | 70            |
| >15% – ≤20% of farm cultivated annually                                                                                                                                                                                                                                                                                                                        | 90            |
| >20% of farm cultivated annually                                                                                                                                                                                                                                                                                                                               | 120           |

|                                                                                                                                                                                  |               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>(c) Cropping and Cultivation: Season of Forage Crop Grazing</b>                                                                                                               | <b>Points</b> |
| This sub practice considers the higher risk of leaching associated with winter harvesting. The season of grazing is taken directly from the harvest date recorded for each crop. |               |
| Crop grazing (summer) 1 October – 31 March                                                                                                                                       | 0             |
| Crop grazing (winter) 1 April – 30 September                                                                                                                                     | 30            |
| <b>(d) Cropping and Cultivation: Fertiliser Applied in Winter</b>                                                                                                                | <b>Points</b> |
| This sub practice considers whether nitrogen fertiliser is applied to crops during high-risk winter months.                                                                      |               |
| No fertiliser applied during 1 May to 31 August                                                                                                                                  | 0             |
| Fertiliser applied during 1 May to 31 August                                                                                                                                     | 30            |

## PART B - Pastoral Farming Mitigations

|                                                                                                                                                                                                                                                           |                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| <b>(a) Constructed Wetlands</b>                                                                                                                                                                                                                           | <b>Reduction in overall risk score</b> |
| Points are deducted based on the catchment area that drains to any <b>constructed wetland</b> on a dairy farm. A <b>constructed wetland</b> is a wetland that has been deliberately constructed to intercept surface and/or subsurface contaminant flows. |                                        |
| The reference to 'catchment area' below is to the area of the farm that drains to the constructed wetland                                                                                                                                                 |                                        |
| 0.5% of the catchment area                                                                                                                                                                                                                                | -5                                     |
| 1% of the catchment area                                                                                                                                                                                                                                  | -12.5                                  |
| 2% of the catchment area                                                                                                                                                                                                                                  | -18                                    |
| 3% of the catchment area                                                                                                                                                                                                                                  | -21                                    |
| 4% of the catchment area                                                                                                                                                                                                                                  | -24.5                                  |
| 5% of the catchment area                                                                                                                                                                                                                                  | -26                                    |
| <b>(b) Plantain: % of dry matter in diet (by mass over summer and autumn)</b>                                                                                                                                                                             | <b>Reduction in overall risk score</b> |
| ≤10% of feed                                                                                                                                                                                                                                              | 0                                      |
| >10 – ≤20% of feed                                                                                                                                                                                                                                        | -10%                                   |
| >20 – ≤30% of feed                                                                                                                                                                                                                                        | -20%                                   |
| >30% of feed                                                                                                                                                                                                                                              | -30%                                   |

## PART C: Stock unit equivalents

|         | <b>Breed</b>          | <b>Stock Unit Equivalent (SU)</b> |
|---------|-----------------------|-----------------------------------|
| Milking | Friesian/Jersey Cross | 8                                 |
| Milking | Ayrshire              | 6.7                               |
| Milking | Friesian              | 8.5                               |
| Milking | Jersey                | 6.5                               |

|                   | <b>Breed</b>          | <b>Stock Unit Equivalent (SU)</b> |
|-------------------|-----------------------|-----------------------------------|
| Milking           | Other                 | 8                                 |
| Replacements      | Friesian/Jersey Cross | 4.2                               |
| Replacements      | Ayrshire              | 3.6                               |
| Replacements      | Friesian              | 4.5                               |
| Replacements      | Jersey                | 3.5                               |
| Replacements      | Other                 | 4.3                               |
| Calves_to_Weaning |                       | 2                                 |
| Breeding_Bulls    |                       | 5.5                               |
| Sheep - Ewe       |                       | 1                                 |
| Sheep - Ram       |                       | 0.8                               |
| Sheep - Lamb      |                       | 0.7                               |
| Deer - Fawn       |                       | 1.2                               |
| Deer - Yearling   |                       | 1.8                               |
| Deer - Stag       |                       | 2.2                               |
| Deer - Hind       |                       | 2                                 |
| Dairy - Carryover |                       | 5.5                               |
| Beef - Bull       |                       | 5.5                               |
| Beef - Cow        |                       | 5.5                               |
| Beef - Calf       |                       | 3.5                               |
| Beef - Yearling   |                       | 3.5                               |
| Goat - Kids       |                       | 0.6                               |
| Goat - Adult      |                       | 0.8                               |
| Horse             |                       | 11                                |
| Pony              |                       | 7                                 |
| Alpaca - Adult    |                       | 0.7                               |
| Alpaca - Cria     |                       | 0.4                               |
| Llama - Adult     |                       | 1.8                               |
| Llama - Cria      |                       | 1                                 |
| Pig               |                       | 1.6                               |