**IN THE MATTER** of the Resource Management Act 1991

**AND**

**IN THE MATTER** of the Proposed Canterbury Land and Water Regional Plan

# STATEMENT OF EVIDENCE OF MATHEW CULLEN FOR GROUP 2 HEARING

## 1. INTRODUCTION

1.1 My full name is Mathew John Cullen. I hold the qualifications and experience set out in my statement of evidence for the Group 1 hearing dated 4 February 2013.

## 2. SCOPE OF EVIDENCE

2.1 My evidence will deal with some practical issues associated with provisions in the Plan, including:

(a) Problems for dairy conversions currently converting for milk production in the 2013-2014 season;

(b) The rules dealing with the discharge of animal and vegetative waste and how they might impact upon farming operations;

(c) The rules dealing with use of stockholding areas and discharge of effluent onto land from existing farms;

(d) The definition of 'changed' as proposed by the S.42A report and how this may impact on farming operations;

(e) The practical effect of the wording of rule 5.133, which seeks to exclude livestock from the beds of waterbodies;

(f) The way the Plan should use the OVERSEER model to ensure the best precision or repeatability of outcomes and protocols for use.

(g) How the Supply Fonterra Programme can satisfy the requirements specified at Schedule 7 – Farm Environment Plans

(h) The preference for an Industry system to meet the requirements found in a number of the rules and Schedule 7 – Farm Environment Plans

## 3. DAIRY CONVERSIONS IN 2013/2014 SEASON

3.1 At the notification date of the Plan, a number of farms were in the process of changing land use to dairying for the 2013/2014 season. These farmers demonstrated a commitment to convert to dairy prior to the notification of the Plan. They acted in good faith in accordance with existing regional rules, specifically the (currently operative) NRRP.

3.2 I am aware of specific examples whereby these conversions (to dairy) would be considered to constitute a 'land use change' for the purposes of the Plan. For those located within a 'Red Zone' their conversions would therefore be classified as a non-complying activity (although the staff S 42A Report, which has no statutory weight, recommends a change in status to discretionary). These farmers may currently find it difficult to obtain resource consent for this change, given that water quality outcomes in Table 1 (Policies 4.32-4.34) are considered as not being met[1].

3.3 If a farmer is unable to convert their land use to dairy he or she will have invested considerable time and money as part of the conversion process that will be lost. Mr Griffiths and Mr Butcher address this issue in more detail in their respective statements of evidence.

## 4. DISCHARGES OF ANIMAL AND VEGETATIVE WASTE

4.1 Rules 5.33 & 5.34 address the discharge of solid animal and vegetative waste to land. Condition 1 of the permitted activity Rule 5.33 states that the discharge

1. Environment Canterbury: Advice Note; Proposed Land and Water Regional Plan – nutrient provisions update. 20 November 2012.

of animal and vegetable waste to land must not contain any hazardous waste. The plan defines hazardous waste as:

> *"waste containing:*
>
> 1. *A hazardous substance; or*
>
> 2. *An infectious substance or material known or reasonably expected to contain pathogens, including bacteria, viruses....that are known, or reasonably expected to cause infectious diseases in humans and animals that are exposed to them"*

4.2 Dairy effluent contains pathogens such as E.coli that are known to cause sickness in humans. This clearly excludes disposal of the very material that the rule is designed to authorise. Any activity failing to comply with Rule 5.33 falls to be considered as a discretionary activity under Rule 5.34.

4.3 I am also concerned because of the wording of the commencement of Rule 5.33:

> *"The discharge of solid animal waste, or vegetative material containing animal excrement or vegetative material ... into or onto land, or into or onto land in circumstances where a contaminant may enter water is a permitted activity provided the following conditions are met.."*

4.4 It seems possible to me to read this rule as regulating discharges/excretion from animals directly onto land during normal grazing practices.

4.5 Current practice (as authorised by rule WQL23 of the NRRP) on dairy farms is to store solid effluent (which may also contain vegetative material such as post peelings/wood chips) which has been scraped from feed pads/wintering pads, or removed from stone traps onto a concrete pad, and once moisture content has been reduced, to spread this directly onto land. Alternatively, solid effluent is spread onto land immediately after it has been removed from feed pads and stone traps.

4.6 As these rules stand currently, all farmers would be required to obtain a resource consent to allow discharge of solid effluent removed from on-farm infrastructure as well as that directly discharged/excreted from livestock onto land.

4.7 Fonterra seeks a change to this rule to accommodate both the discharge of solid effluent removed from farm infrastructure or directly discharged/excreted from livestock onto land.

## 5. RULES APPLYING TO EXISTING FARMS - STOCKHOLDING AREAS AND DISCHARGE OF EFFLUENT ONTO LAND

5.1 As set out in my evidence for the Group 1 hearing[2], it is a condition of supplying milk to Fonterra that all suppliers hold (or are in the process of obtaining) resource consents, as well as complying with all attached conditions.

5.2 Rule 5.35 of the notified Plan is a 'catch-all' rule that encompasses both the land use (stock holding areas and storage of effluent) and discharge (of dairy effluent to land) aspects of dairy farming. Whilst these are considered under a single rule, they are addressed under separate sections of the RMA; thus requiring both land use and discharge permits.

5.3 There are four aspects of this rule that I will address:

(a) The activity status generally;

(b) Establishing a controlled activity rule for the discharge of animal effluent onto land,

(c) Permitted activity status for stock holding areas; and

(d) Permitted activity status for farm dairy effluent storage ponds.

**Activity status**

5.4 In my view, based on my experience as a Compliance Monitoring Officer and the Team Leader of the Consents Monitoring team (Rural), the effects of the use of land as a stockholding area, storage of effluent and subsequent discharge of effluent onto land can be adequately addressed through appropriate standards set as a permitted activity (land use activities) and controlled activity rules (discharge activities).

2. Paragraph 37.

5.5 The scientific understanding of how to minimise the environmental impacts of the collection, storage and subsequent discharge of farm dairy effluent has increased significantly in recent years. The basic premise of this understanding is that soil attenuation (of nutrients and microbes) and pasture nutrient uptake is enhanced and risks to the environment are minimised if effluent is applied to soil:

(a) At suitable application depths;

(b) At a rate at which the soil can absorb it;

(c) When soil is not saturated (i.e. storage is available to defer irrigation to avoid these periods); and

(d) With appropriate separation distances from waterways and bores.

5.6 Achieving these outcomes requires a significant investment in effluent storage and disposal systems.

5.7 Fonterra supports this science and has invested significant resource into supporting farmers to install the required infrastructure such as appropriately sized and constructed storage facilities and low application rate/depth irrigation systems.

5.8 Since the NRRP became operative, all existing dairy farms in the Canterbury Region have required resource consent (discharge permit) to discharge dairy effluent onto land. In addition to this (permitted activity) Rule WQL26 of the NRRP permits the use of land for storage of dairy effluent subject to storage capacity, storage facility location and the degree to which it is sealed to prevent seepage.

5.9 Currently rule WQL26 requires that dairy farmers have sufficient capacity to store the maximum volume of waste produced in any consecutive three day period; and the volume of stormwater run-off from any collection area draining into the facility from a rainfall event with an Annual Exceedance Probability of 20 percent. This is significantly less than current good practice. The volume of storage required by the rule is too small to sufficiently reduce the risk of applying effluent onto land during periods where soil moisture levels are above

field capacity. Unfortunately the rule has led to some farmers investing in systems that are unlikely to be fit for purpose in the long term.

5.10 Since its notification in 2004 all dairy conversions have been required to either comply with rule WQL26 or apply for a resource consent. In my experience (both during my previous roles with the Regional Council and currently with Fonterra) farmers see a significant incentive to comply with the permitted activity rule in order to avoid the requirement of entering into the consent process; and the majority of farmers involved in dairy conversions prior to the Plan implemented effluent storage facilities which met or exceeded the requirements of rule WQL26.

5.11 Whilst the effluent storage volumes specified by WQL26 are somewhat misguided, and in most instances significantly less than good practice, it is clear that the basic intention of the rule was successful i.e. the majority of farmers increased effluent storage capacity on farm in accordance with the rule (and therefore avoided the requirement for resource consent).

5.12 Fonterra would like to see a planning framework that incentivises farmers to invest in good practice effluent systems, and which delivers a more consistent and stable set of rules than have existed to date. This could be achieved by providing a permitted and/or controlled (where appropriate) activity status to those farms that have invested in the right infrastructure and can comply with a set of conditions that reflect good practice. Farms that do not satisfy these requirements would still be required to apply for resource consent, which could be subject to consent conditions or declined if appropriate.

5.13 In the notified version of the Plan Rule 5.35 incorporates both the use of land for a stock holding area, the use of land for the collection storage and treatment of animal effluent and its subsequent discharge onto land as a single rule. However the S.42A report recommends the separation of this rule into land use and discharge components (as addressed in the NRRP). I support this approach. I consider that the application of appropriate conditions allows a more focussed approach, providing farmers with an incentive to comply (where this rule is classified as permitted or controlled).

5.14 There are numerous benefits to permitted and controlled activity status, both for the Council and for farmers:

(a) A consistent set of conditions is applied to all farms;

(b) There is no loss of control over the activity as the conditions can reflect the current scientific understanding;

(c) It is easy for the Council to implement change as technology/good practice improves or is updated. Change can be effected through a plan change to alter the rule standards, rather than requiring each individual consent within the Region to be reviewed; and

(d) Additionally, in the case of a permitted activity rule, the status incentivises farmers to invest in effluent systems by removing the cost (and associated time) involved with making a consent application.

5.15 From my experience, it is clear that this approach of setting permitted activity status at good practice provides an incentive to farmers due to the fact that they are not required to negotiate their way through the consent process, and incur associated costs (a large proportion of famers will seek to engage consultants to prepare consent applications). In my experience this approach is likely to deliver environmental outcomes that are the same as those achieved by requiring farmers to go through the consent process.

**Discharge of Animal Effluent**

5.16 The S.42A report (Rule 5.36) recommends that the discharge of Farm Dairy Effluent be considered as a restricted discretionary activity.

5.17 Whilst Rule WQL25 of the NRRP classified the discharge of Farm Dairy Effluent onto land as a controlled activity, this was seldom the case in practice as the majority of farms cannot comply with condition 2 of this rule, which specifies an effluent application rate of 10mm/hour. Scientific understanding now informs us that these low rate systems are only necessary on those soil types where risk of effluent run-off and preferential flow (through the soil profile) is high.

5.18 As discussed at 5.5, recent scientific studies have established clearly defined metrics around effluent application depths (and rates) based on soil types which

limit the scope of direct losses of effluent contaminants from the soil profile via runoff and leaching.[3] In my view the effects of the discharge of farm dairy effluent onto land from stock holding areas or effluent storage facilities (where a contaminant may enter water) can be adequately addressed through appropriate conditions which specify these metrics, set as a controlled activity rule (consistent with the approach utilised in the NRRP). In addition to these metrics his rule would encompass aspects of the discharge components of both the Rule 5.35 (as notified) and WQL25 (specified by the NRRP) in terms of separation distances, and recognised good practice regarding effluent storage and nitrogen application rates. Mr Willis discusses this proposal in detail in his evidence.

**Stock Holding Areas**

5.19 Rule 5.35 (in the notified version of the Plan) also makes the use of land for stock holding a restricted discretionary activity. However the S.42A Report recommends that a permitted rule be adopted. I support that recommendation.

5.20 "Stock holding area" is defined in section 2 of the Plan as:

> *"**Stock holding area** means an area of land in which the construction of the holding area or stocking density precludes maintenance of pasture or vegetative groundcover, and is used for confining livestock for more than 30 days in any 12 month period or for more than 10 consecutive days at any time. For the avoidance of doubt, this definition includes: milking platforms, feedpads, wintering pads, and farm raceways used for stock holding purposes during milking."*

5.21 All dairy farms in the Canterbury Region utilise a milking shed with a hard stand area. The Ministry for Primary Industries requires that all dairy yards must be made of concrete or similar impervious material.[4] Furthermore, NZCP1 requires that the perimeter of all yards and races (which must be concreted under NZCP1) must have a kerb that is a minimum of 150mm above the level of the surface of the yard, and must be made of concrete or another similar material to ensure that all farm dairy effluent is contained on these sealed

3. Houlbrooke, D; Laurenson, S; Carrick, S; Categorising the environmental risk form land application of liquid wastes based on soil properties (2011). Table 4: Recommended maximum application depths for different soil and landscape features using either a high or low rate irrigation system (assumes suitable moisture contents and water holding capacity).
4. Ministry for Primary Industries: NZCP1: Code of Practice for the Design and Operation of Farm Dairies. Version 5. 2009.

areas. Given the requirements of MPI it is not possible for farmers to operate without utilising these hard standing areas. If they are not constructed and maintained to the standards specified by NZCP1: Code of Practice for the Design and Operation of Farm Dairies. Version 5, 2009, Fonterra will no longer collect milk harvested in the dairy shed.

5.22 With the dairy season typically extending for 270-300 days, these dairy yard areas are considered to be 'stockholding areas' for the purpose of the Plan. Rule 5.35 classifies these hard standing areas as restricted discretionary activities. This is the first time these areas of land have needed specific consent. There was no comparable rule under the NRRP, which permitted such areas subject to conditions.[5] As a regional rule, farmers will have existing use rights, but only until six months after the Plan becomes operative. From that date, resource consents will be required to authorise even existing dairy yards. Because Rule 5.35 does not acknowledge existing stock holding areas, it requires all existing dairy farms in the Canterbury Region to obtain a resource consent to allow for their use. Given the restricted discretionary activity status, there is no certainty that consent will be granted to continue to utilise these areas.

5.23 The management of stock over winter months has a significant impact on sediment and nutrient losses from the farming system. A wintering or feed pad is an area that has been constructed (usually of an impervious material) for dairy stock to stand on during periods where soils are saturated. Often stock will be allowed to graze on pasture for restricted periods prior to being moved to the pad area. These areas are utilised as a management tool to prevent damage to pasture and soil structure as well as to reduce unnecessary effects on the receiving environment such as:

(a) Runoff of effluent and sediment to surface water bodies during periods where soils are saturated;

(b) Loss of Nitrogen and faecal coliforms through the soil profile via leaching (during periods where soil drainage is high)

5. Rule WQL24 of the NRRP allowed for the use of land as a stockholding area subject to the location of the stockholding area, the stockholding areas being sealed; and all effluent, washdown water and stormwater being contained and discharged via an authorised effluent management system.

5.24 With suitable management these systems can reduce the losses of nutrients from a farm system as effluent from these areas can be stored during periods of high soil moisture and irrigation (of effluent) can be deferred until such times as soil moisture deficit exists, significantly reducing the potential for those losses to environment identified in the preceding paragraph.

5.25 Wintering or feed pads are also considered to be stock holding areas for the purposes of the Plan, and so will also require resource consent.

5.26 In my view the effects of the use of land as a stock holding area, the use of land for the collection, storage and treatment of animal effluent can be adequately addressed through appropriate standards set as a permitted activity rule as proposed in the S.42A report. I support the adoption of rule 5.35-5.36.

**Effluent Storage**

5.27 As discussed at paragraph 5.13 the notified plan treats the storage of farm dairy effluent as a restricted discretionary activity (Rule 5.35-5.36). However the S.42A report recommends the adoption of a permitted rule (which is consistent with the NRRP) to address the use of land for the storage of animal effluent. I support this recommended approach, however question the rationale for specifying a maximum stored volume of 1500m$^3$. As discussed at paragraphs 5.18-5.19, Having appropriate available storage capacity is essential in ensuring that the discharge of effluent onto land can be deferred until such times as suitable soil moisture levels are available. The risk posed to groundwater from effluent storage ponds is related to the design and construction of effluent storage ponds, to avoid the infiltration of stored effluent to groundwater[6] (rather than effluent pond size). If good practice is followed when determining effluent storage requirements as specified in the proposed controlled activity rule above, there will be instances where larger farms, and those farms located on soil types considered to have 'impeded drainage' will be greater than 1,500m$^3$; and will therefore require a resource consent as specified by rule 5.35B. No rationale is given in the S.42A Report for this requirement.

6. IPENZ Engineers New Zealand. Note 21: Farm Dairy Effluent Pond Design and Construction. Version 2, March 2013.

5.28 There is a risk posed to groundwater from ponds if these are poorly designed and constructed as this may lead to the infiltration of stored effluent to groundwater. As discussed at paragraph 5.19 both the maximum and minimum volumes of effluent storage can be adequately addressed as part of the consent process (discharge permit) for proposed activities and via Farm Environment Plans for those existing farms.

## 6. DEFINITION OF 'CHANGED'

6.1 The S.42A report proposes a change to the definition of 'Changed' for the purposes of the Plan. This proposed definition moves away from the previous approach, which was based on a benchmark of Nitrogen loss (calculated using the OVERSEER model) or volume of water used for irrigation. It is now proposed that a benchmark based on volume of water used for irrigation, area that is irrigated, average stock units or annual horticultural or arable yield be the basis to determine whether a land use has 'changed'

6.2 For properties that are currently irrigated, the fact that this definition no longer focuses on the use of OVERSEER and an effects-based threshold poses a number of issues that may result in significant increases in Nitrogen loss without necessarily being considered a 'change' for the purposes of the plan.

6.3 Take for example a dairy farmer wishing to increase herd size by 11% but also incorporating a wintering pad/cow housing into the farming system, so that cows were housed (and subsequent effluent collected and stored) during periods when there is a high risk of Nitrogen leaching from the soil profile. Alternatively the farmer may wish to apply a nitrogen inhibitor to pasture. If this scenario was modelled using the OVERSEER model, it is probable that the average Nitrogen leaching across the farm would decrease. However by virtue of the fact that stock units had increased by 11%, this would constitute a 'change' for the purposes of the plan. Under the proposed input-derived definition of "change" there is no consideration for innovation, infrastructure or management systems that might actually result in a reduction in Nitrogen loss.

6.4 The proposed definition may actually result in perverse outcomes in terms of effects. If the above farmer decided to only increase herd size by 9%, and instead of wintering those cows on a wintering pad/cow housing decided to

winter cows on pasture (when risk of Nitrogen leaching from the soil profile is significantly increased) then it is most likely that the average Nitrogen leaching across the farm would increase well beyond 10%. However, by virtue of the fact that stock units had increased by less than 10% this would not constitute a 'change' for the purposes of the plan despite the significant increase in loss of Nitrogen.

6.5 The above scenarios clearly demonstrate the shortcomings of the input-focussed proposed definition of 'changed' in terms of how this addresses loss of Nitrogen from farming systems when compared to the output based definition used in the notified version of the Plan (utilising the OVERSEER model).

## 7. EXCLUSION OF LIVESTOCK FROM THE BEDS OF WATERBODIES

7.1 Rule 5.133 prohibits the use and disturbance of the bed of a lake or river by outdoor intensively farmed livestock. Fonterra supports measures to all exclude stock from waterways, which is reflected in the Waterway module of the Supply Fonterra programme.[7] However the current definition of 'bed' would prohibit stock accessing bridge approaches on rivers in some situations. The definition provides:

> *"**Bed** means*
>
> *a) in relation to any river -*
>
> *i. …*
>
> *ii. … the space of land which the waters of the river cover at its fullest flow without overtopping its banks; and*
>
> *b) in relation to any lake, except a lake controlled by artificial means, -*
>
> *i. for the purposes of esplanade reserves, esplanade strips, and subdivision, the space of land which the waters of the lake cover at its annual highest level without exceeding its margin;*
>
> *ii. in all other cases, the space of land which the waters of the lake cover at its highest level without exceeding its margin; and*

7. Refer to paras 42 to 46 of my evidence for the Group 1 hearing.

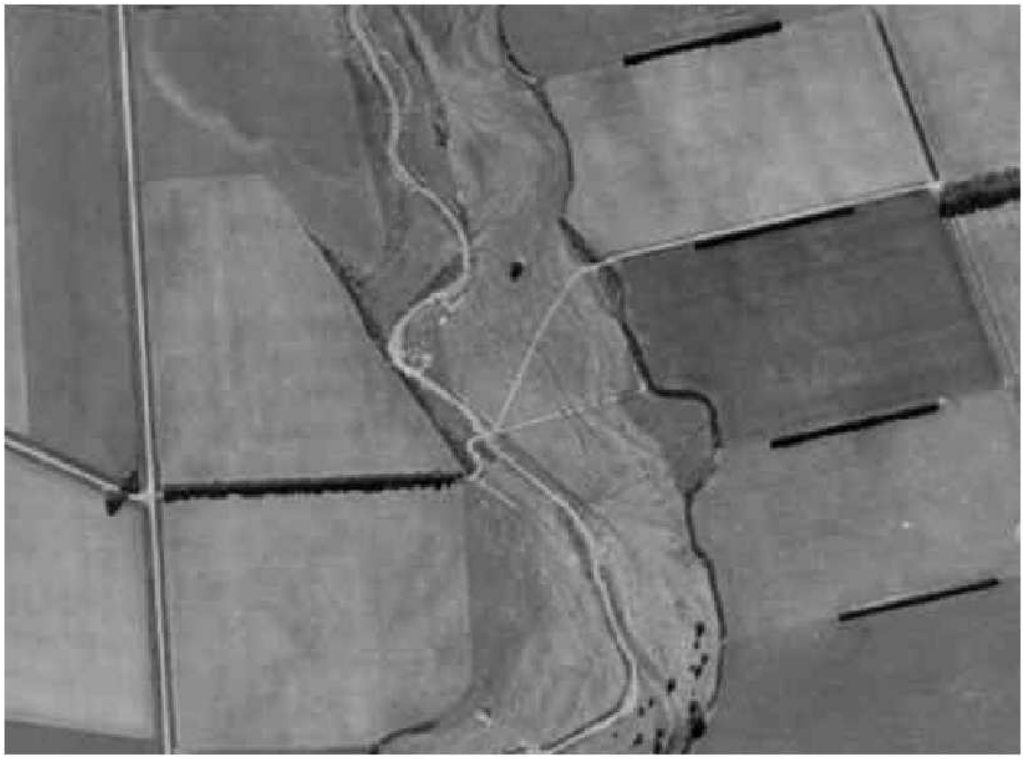
*c) in relation to any take controlled by artificial means, the space of land which the waters of the lake cover at its maximum permitted operating level; and*

*d) …"*

7.2 The difficulty in this definition comes with the reference to the space occupied "*at fullest flow without overtopping its banks*." This is problematic within Canterbury where streams and rivers located on the plains can often have very wide channels and beds - defined by banks and terraces - however water usually only occupies a very small portion of this area.

7.3 Whilst it is advisable that stock bridges extend across the entire bed of the river, there are situations where this is not practicable. The aerial photograph below shows a proposed stock crossing point on the Hawkins River whereby the 'bed' is much wider than the active stream. The 'bed' of the river is approximately 250 metres across and has been and is used extensively for grazing to the extent that shelter belts have been established within it. As the farmer proposes to bridge only the portion of the bed that is wet most of the time, the approaches to the proposed bridge would be within the bed of the river (under the existing definition). In this instance, the bridge would need to span some 250m on order to comply with rule 5.133.

Screenshot from Google Maps showing bed of Hawkins River – Canterbury.


Aerial Photograph 'L35 – Waimakariri, 1998/1999. Land Information New Zealand. http://www.linz.govt.nz/topography/aerial-images/nzmg-non-geo/apl35

7.4 The above photograph shows the same stretch of the Hawkins river circa 1998/1999. It can be clearly seen that the active channel has not altered in terms of its position. Therefore installation of a bridge and permanent stock at the flowing channel (as opposed to from terrace to terrace) would mitigate any damage to the active bed from stock crossing or grazing.

7.5 If the disturbance of the bed of a river or lake by dairy cows is to remain a prohibited activity, an exemption to the rule or new definition of 'active bed' should be included in the definition section of the plan to allow for stock to access the bed (areas between defined terraces) of a river for the purposes of grazing and conveying stock over a bridge or culvert structure

## 8. USE OF OVERSEER

### Background

8.1 In 2011, DairyNZ initiated a project to develop an Audited Nutrient Management system that milk supply companies could use to model nitrogen conversion efficiency[8] and nitrogen loss from their suppliers' farms.[9] The main output of this project would be a protocol on how the OVERSEER model should be used to achieve this.

8.2 The Hurunui catchment was selected as one of three catchments in which the protocol would be piloted (remaining catchments were located in the North Island). This involved the collection of a range of data from 35 farmers in the catchment, and the modelling of those farm systems using OVERSEER.

8.3 The project has established a process that uses a consistent approach to OVERSEER data entry. This consistent approach to set up and annually input data allows for meaningful comparisons between farms and also over time on any one property. This protocol covers those input fields that are important for nitrogen efficiency calculations and nitrogen loss modelling. OVERSEER fields that are not considered in the protocol can either be entered based on actual

8. A definition of "nitrogen conversion efficiency" is provided in footnote 8 of Mr Ryan's evidence.
9. This was discussed in Mr Ryan's evidence for the Group 1 hearing at paragraphs 6.11 to 6.14.

information, left empty (where the model does not require an input) or defaults within the model can be used.

8.4 The protocol was developed utilising AgResearch as the predominant source of advice and feedback. Key stakeholders (including the Canterbury Regional Council) were engaged during the development of the protocol, and draft copies of the protocol were provided to Council staff for feedback. Subsequent to this Fonterra and the Council agreed to use the protocol when benchmarking nitrogen loss from those farms within the Te Waihora/Lake Ellesmere catchment as part of their respective initiatives within the catchment; to ensure that data collected and reported is auditable and comparable. Nitrogen leaching and nitrogen efficiency calculated by Fonterra for those farms within the inner catchment will be provided to farmers and utilised to accelerate adoption of good practice and identify areas to implement change of management practice to reduce losses from the farm system.

8.5 This protocol has been adopted nationally by both Fonterra and the Fertiliser Industry when entering data into the OVERSEER model.

8.6 It is important to recognise that, in my experience there is considerable variation in nitrogen loss (modelled using OVERSEER) when measured across catchments and/or regions due to input variables. The main inputs that have the most significant influence on nutrient loss estimates are:

(a) Those that influence the source of a nutrient e.g. stocking rate and fertiliser inputs; and

(b) Those that influence the transport of a nutrient e.g. soil type and drainage.

8.7 Drainage is a key driver of nitrogen loss and it is important to recognise that this calculation is sensitive to:

(a) Climate inputs – predominantly rainfall and potential evaportranspiration.

(b) Soil characteristics that affect available water capacity; and

(c) Irrigation rate and method.[10]

**Plan Use of OVERSEER**

8.8 The Plan as notified requires the use of OVERSEER to determine nitrogen loss from farming systems to determine compliance with policies and rules that control the diffuse discharge of nitrogen from farming systems. However the reliance on OVERSEER in the S.42A Report is recommended to be significantly reduced, although still required as part of Farm Environment Plans and will also presumably be utilised when addressing policies 4.31-4.33.

8.9 There is significant variation in how OVERSEER is used within the Region by different operators. This will affect the consistency or repeatability (degree to which repeated measurements under unchanged conditions show the same results) of outcomes from the model. The Plan does not address how OVERSEER is to be used to ensure comparative and consistent inputs (and subsequent outputs). The creation of industry agreed user protocols for the use of the OVERSEER model will assist in ensuring consistency of outcomes (across all operators of the model)

8.10 In order to ensure that OVERSEER reports consistent/repeatable nitrogen loss values for individual farms, I recommend that the Plan adopts the existing dairy industry OVERSEER input data to both establish limits and assess compliance. The Plan should also allow for any subsequent amendments to that document to be incorporated as updates to the Plan.

8.11 A copy of the protocol is attached as **Appendix A**.

## 9. USE OF SUPPLY FONTERRA TO SUPPORT THE PLAN

9.1 In my evidence for the Group 1 hearing, I discussed the components of Supply Fonterra (paragraphs 37-48).

9.2 The S.42A report proposes a change in terms of obligations for existing farmers. Under the notified version of the plan (prior to 2017) any existing farming activity was required to record the annual amount of Nitrogen loss from

10. Wheeler D.M & Shepherd M.A; OVERSEER: Answers to commonly asked questions. February 2013.

land using the OVERSEER model. Those existing farms that were located within a Lake Zone were also required to prepare a Farm Environment Plan (and undergo a subsequent audit process).

9.3 In contrast the S.42A report requires that all existing (high nutrient risk) farmers either:

(a) Provide information on the farming activity in accordance with Schedule 7 Part D (if located in an Orange, Green or Pale Blue zone); or

(b) Prepare (and subsequently audit) a Farm Environment Plan in accordance with Schedule 7 if located in a Red zone; or

(c) Prepare (and subsequently audit) a Farm Environment Plan in accordance with Schedule 7 to accompany application for resource consent (Restricted Discretionary Activity) if located within a Lake Zone.

9.4 As discussed at paragraph 8.3 the Waterway module of Supply Fonterra will provide a map that designates all waterways and could form the basis of satisfying parts 1-3 of part D (Schedule 7). An example of the farm maps created as part of the Supply Fonterra programme is attached as **Appendix B**.

9.5 The information requirements under Schedule 7 Part D (for those farmers located in Orange, Green or Pale Blue zone) listed as 4-8 are mandatory inputs when using the OVERSEER model. As discussed at 7.21-7.22 of my Group 1 evidence, the Nitrogen module of the Supply Fonterra programme will model each supplier's nitrogen loss and efficiency at year end using the OVERSEER model. Although the S.42A Report does not make clear the purpose for which this information is sought, I assume that it is to allow the Council to calculate nitrogen loss from a farm system utilising the OVERSEER model (if required). In my opinion, in addition to reducing the costs incurred by the Regional Council, the requirements of this rule would be satisfied by requiring the annual submission of a summary of Nitrogen loss from the farm system (using the OVERSEER model); with the inputs listed at Part D (4-8) being made available upon request, either as an electronic .XML file or OVERSEER parameter reports. A copy of OVERSEER parameter report is attached as **Appendix C**.

9.6 As discussed at paragraphs 8.4-8.5 the reporting dates specified in Schedule 7 do not align with the dairy season, and in my view should be amended to allow flexibility.

## 10. FARM ENVIRONMENT PLANS

10.1 Fonterra supports the production of a Farm Environment Plan (FEP) as a component of managing environmental performance on farm. However the product (a FEP) does not in itself ensure management and appropriate avoidance, remediation or mitigation of environmental risk on farm. The process or methodology that supports creation of these FEPs is the critical factor to ensure the product achieves the relevant objectives and policies within the Plan. Production of a FEP must be supported by key steps both before and after creation of the document itself. Much emphasis in Schedule 7 has been given to the content of FEP and the specific requirements for audit. These alone do not ensure success in terms of the Plan. The schedule has largely ignored the process for identifying risk on individual farms, setting appropriate targets for the environmental effects and risks, or the appropriate guidance that should be given to a landowner to achieve these. These are the components of the process that will allow an implementer of a FEP to have clarity towards achieving the on-farm outcomes required.

10.2 Schedule 7 briefly references methodology in Part A 1 (a)ii as a required component of an Industry prepared FEP. A well structured, consistently applied and auditable Industry scheme will be more effective in achieving targeted positive environmental outcomes then the potentially expensive and overly onerous process described in Part B and C and D of the Schedule. The components of Supply Fonterra as described in my evidence for the Group 1 hearing, (paragraphs 37-48) describe the technical content of the current Supply Fonterra programme. I will now describe the process that supports delivery of these components.

10.3 All farms supplying milk to Fonterra are subject to defined process, minimum standards and associated consequences of the Supply Fonterra programme. These are outlined to farmer suppliers annually in the Terms and Conditions of Supply. Currently all farms are subject to compliance with minimum standards for effluent, surface water management and nitrogen management.

10.4 All farms are annually assessed by an independent contracted service provider to Fonterra. These assessors are trained auditors and are calibrated internally each year. They are additionally subject to annual audit by Fonterra to ensure consistency and quality of assessment.

10.5 The annual assessment is conducted on farm and works through a defined set of criteria developed by Fonterra each year that are nationally or regionally specific depending on the environmental issue being assessed. For effluent this will require a set of 15 points of assessment to be audited by the assessor in relation to that farm's effluent system as well as all components of the system being sighted at the visit. For surface water the assessor is required to use a GIS mapping system to record waterways on the property and the extent of permanent fencing as well as stock access to those waterways. Additionally all stock crossing points and those lacking a culvert or bridge are also mapped. For nitrogen, the assessor is required to remind the supplier of their obligations to record the appropriate information in their Dairy Diary and submit this to Fonterra upon the completion of supplying milk that season.

10.6 This assessment is undertaken in accordance with the Farm Dairy Assessment Protocol. This document (the relevant part of which is attached as **Appendix D**) outlines the exact criteria that identify an issue on a farm that will, or is at risk of, causing an environmental effect. It is a contractual obligation of the contracted service providers to assess and audit to this prescriptive protocol. The protocol is reviewed by Fonterra annually and changes are implemented with assessors via a training programme before assessments begin. This intensive programme ensures all environmental risks are captured and are not subject to the subjectivity of many individuals interpreting individual farms in a different manner. The absence of this step in any process means subjectivity is a likely outcome for development and audit of FEP under the pathway described in Part B, C and D in Schedule 7.

10.7 The results of the Farm Dairy Assessment are recorded electronically and submitted to Fonterra. This assessment would meet the base requirements for a Farm Environment Plan. Suppliers who have failed to meet, or are at high risk of not meeting, the Terms and Conditions of Supply minimum standards are referred to a Fonterra Sustainable Dairy Advisor.

10.8 The Fonterra Sustainable Dairy Advisor is tasked with visiting the referred farmer and preparing an Environmental Improvement Plan that requires compliance with the Term and Condition of Supply minimum standards. This Environmental Improvement Plan currently encompasses the majority of components of Schedule 7, Part B, 1, 2 and 3. Expansion to include the currently absent "location of riparian planting" and "significant indigenous biodiversity" could be achieved in a matter of weeks through an amendment to the Farm Dairy Assessment Protocol.

10.9 Mr Ryan discusses in his evidence the use of Sustainable Milk Plans (SMPs) to satisfy the requirements of Schedule 7. The use of SMPs could be incorporated into the Supply Fonterra model, with these providing the basis or template of Environmental Improvement Plans, with the Supply Fonterra modelling utilised to support the identifying risk on individual farms, setting appropriate targets for the environmental effects and risks, and providing the appropriate guidance that should be given to a landowner to achieve these.

10.10 A Sustainable Dairy Advisor is required to deliver these Environmental Improvement Plans in accordance within a business process approved by the Director of Milk Supply. This business process includes specific timeframes for farm visits after referral, for follow up interaction and closure of plans post implementation of actions. The business process also includes template documents for the Environmental Improvement Plans, record of conversation with the farm owner which is signed by both parties, and the electronic recording of all information within Fonterra information system. Sustainable Dairy Advisors have annual key performance indicators set against this business process and compliance with these will impact their remuneration. This compliance is measured by internal audit undertaken by a separate section of the company outside of the individual's management reporting line.

10.11 The development of an Environmental Improvement Plan by a Sustainable Dairy Advisor with a farmer supplier requires actions, targets and dates to be documented for the minimum standards relating to effluent, surface water and nitrogen management.[11] Failure to undertake the actions by the required dates

11. Refer to paras 7.11-7.22 of my evidence for the Group 1 hearing.

documented in the plan, will incur a consequence as detailed in the Terms and Conditions of Supply. Currently this consequence is non-collection of milk and will extend to user pays visits for targeted non-performers in the 2013/14 season. The Sustainable Dairy Advisor is also charged to deliver additional guidance and advice related to advanced mitigation actions that may extend beyond the minimum standard.

10.12 The Sustainable Dairy Advisor one-to-one interaction with a farmer and provision of advice and appropriate education resource is a critical component to successful delivery of an Environmental Improvement Plan. It is briefly referenced in Schedule 7 as *guidance material* under the Industry prepared Farm Environment Plan but largely ignored in the Part B Farm Environment Plan Default Content. I believe this supports the process of an Industry system as being a more thorough and preferred system for a farmer to undertake. It is a distinct strength of Supply Fonterra.

10.13 Because the Supply Fonterra process is structured and robust, the ability to change minimum standards and to introduce new environmental issues for inclusion in Environmental Improvement Plans is straightforward. Currently a water use component is being developed in consultation with all regional councils for inclusion in the 2013/14 season. There is also flexibility to regionalise the programme for specific issues as is already undertaken for effluent management to align to regional rules. The programme can also be accelerated in sensitive catchments, as is currently being done in the Te Waihora catchment.

10.14 Schedule 7 Part A 1(a) (iii) requires the performance measures in a FEP to be audited as set out in Part C of the Schedule. Although appropriate flexibility has been given to Industry Schemes in terms of content in Schedule 7, this flexibility has not been applied to audit. As I have described, the Supply Fonterra programme could be utilised to deliver a robust process for production of FEP, or in the case of this programme an Environmental Improvement Plan. This process rightly avoids the requirement for the overly prescriptive content of Part B, as it delivers a superior outcome due to the development process of the FEP. The audit process for Supply Fonterra also delivers improved outcomes without meeting all the individual points in Schedule 7 Part C.

10.15 Supply Fonterra currently has audit programmes in place that are particular to the technical outcome required on farm. In some cases where an action is finite and does not lend itself to further improvement, a verification process is more appropriate then an annual audit. Schedule 7 Part C does not consider this option.

10.16 By way of example, a verification process is appropriate for stock exclusion from waterways via permanent fencing, as is required by Supply Fonterra. Annually auditing this as part of a FEP would add unnecessary cost to a land owner with negligible environmental benefit. Once a permanent fence is in place, there is little else to be done. There would be a requirement to ascertain the fence is still fit for purpose, but this would not be required on an annual basis.

10.17 The Nitrogen module of Supply Fonterra will provide an auditable record of Nitrogen loss and Nitrogen efficiency which may be used to demonstrate achievement of targets. Existing resources will be prioritised where they are most needed and this programme is likely to prioritise providing support to those suppliers whose nitrogen conversion efficiency is significantly lower than their peers. However, where a farmer is part of the Supply Fonterra regime, in my view an additional audit under Plan should not be required. The Nitrogen module includes an internal audit of the process comprising the entry of on-farm data into the OVERSEER model. Also an external 'farm data' audit will be undertaken that will verify all on-farm data provided by the supplier (e.g. this would include provision of documentation confirming amounts of nitrogen fertiliser, supplementary feed imported into the farm system). This external audit will be carried out by a farm consultant who has extensive knowledge of on-farm systems, farm management and nutrient cycling. Whilst it is not anticipated that all farms will be the subject of an annual audit, the range of methods utilised to determine which farms are audited will ensure that results are reflective of the total dataset. This process does not meet the requirements of an annual audit being less than 12 months as specified in Schedule 7 Part C, but in my opinion provides a improved outcome. Auditing change in Nitrogen loss or efficiency in less than a 12 month period is contrary to the measurement period for these variables which in reality will be greater than a 12 month

period. This will mean additional and unnecessary audits will be carried out under Part C for negligible gain.

10.18 Schedule 7 Part C also requires a FEP to be audited against *Compliance with all relevant statutory requirements.* It is unclear why this would be required at the time of audit when a supplier will be subject to annual monitoring (and subsequent monitoring fees) for consented activities. A farmer will be incurring additional cost to have this done at the time of audit with no clarity as to the outcome of this assessment. Allowing an Industry scheme, such as Supply Fonterra, to target audit to the issues not covered by existing monitoring, removes the duplication that would occur under the current requirement in Part C.

10.19 There are approximately 7000[12] farms within the Region that are considered to fit within the 'rule regime' and will therefore require Farm Environment Plans (to varying degrees). Currently Rules 5.41-5.42 require existing farming activities to prepare Farm Environment Plans for the year (commencing 1 July) following the Plan becoming operative. Given the scale of the task of preparing Farm Environment Plans, a reasonable transition period is requested (1 June 2015) to allow for these to be prepared with farmers. However this timeframe may not be achievable for other primary industry groups who do not currently have this support capability.

10.20 Fonterra support the implementation of farm plans for changed farming activities (such as dairy conversions), as these will be required to accompany and support applications for associated resource consents (such as discharge of dairy effluent onto land and/or change of land use – if located within a Red or Lake zone).

10.21 Mr Ryan provides further details with respect to associated costs, industry and time constraints pertaining to the implementation of Farm Environment Plans at a regional scale.

12. Proposed Canterbury Land and Water Regional Plan Section 42A Report –Volume 2 for Hearing Group 2. page 76

**Reporting Period**

10.22 As discussed at 8.4-8.5 Rules 5.39-5.46 of the notified Plan (and subsequently Farm Environment Plans recommended in the S.42A Report) require farmers to record the annual amount of nitrogen lost from land for the period 1 July to 30 June in the subsequent year. This time period conflicts with the reporting year for nitrogen loss that has been established under the Supply Fonterra Nitrogen module.

10.23 The Supply Fonterra Nitrogen module recording period year runs from 1 June to 31 May the subsequent year. This recording period has been scheduled to reflect the dairy season. 1 June is also the 'takeover' date for all farms sold during the preceding season. On this date farms change hands and sharemilkers shift properties. This is a time of the year when the season is completed, final production figures are calculated; and cows are no longer in milk, and can be transported. In my experience the majority (over 90%) of farms change hands on 1 June. It is difficult to maintain continuity when utilising a recording period outside these dates, as farm owners and share-milkers move often resulting in significant challenges in obtaining retrospective records. It is my view that rules 5.39-5.46 should be amended to require reporting for the periods from 1st June to 31st May the subsequent year or to allow flexibility of the recording period (to allow alignment with dairy season); and allow this information to be used to support the preparation of FEPs.

## 11. CONCLUSIONS

11.1 Fonterra has specific concerns about the impact of the Plan on land that is currently in the process of being converted to dairying with a view to supplying Fonterra during the 2013/2014 season. The Plan needs to provide for these dairy farmers who have already invested substantially and are committed to their conversions in the same way as existing farmers or substantial hardships will occur.

11.2 Rules controlling the discharge of solid animal and vegetative waste onto land as they are currently laid out would require all farmers to obtain a resource consent to allow discharge of solid effluent removed from on-farm infrastructure as well as that directly discharged/excreted from livestock onto land. It seems

unlikely that this is the intent of the rule, however this requires changes to ensure clarity.

11.3 Rules controlling stock holding areas, effluent storage and discharge within the Plan currently require all farmers to go through a potentially costly and complex consenting process. I consider that the rule's desired environmental outcomes would be attainable via a permitted activity rule (for land use activities) and a controlled activity rule (for the discharge activities). This rule would be based on a set of standards that are reflective of standard good practices relating to stock holding areas, effluent storage and discharge. This rule structure would provide certainty and would provide an incentive for farmers to implement change. It would also be more efficient as it would avoid the requirement to enter into the consent process.

11.4 The S.42A report recommended definition of 'changed' focuses on inputs to farm systems as the basis to determine whether a land use has 'changed' rather than Nitrogen loss, as was the case in the notified version of the Plan. This approach does not recognise innovation, infrastructure or advanced management systems that may actually reduce Nitrogen loss. Inclusion of a definition that takes into consideration Nitrogen loss using the OVERSEER model acknowledges that where innovation, infrastructure or management systems are utilised, Nitrogen loss is not necessarily directly correlated to one particular input.

11.5 Currently rules controlling stock access to the beds of rivers and lakes prohibit stock grazing in and accessing bridge approaches on rivers in some situations. Whilst it is preferable that stock bridges extend across the entire bed of the river, there are situations where this is not practical and the 'bed' (area between defined terraces) is much wider than the active stream. If the disturbance of the bed of a river or lake by dairy cows is to remain a prohibited activity, an exemption to the rule or new definition of 'active bed' should be included in the definition section of the plan to allow for stock to access the bed of a river for the purposes of grazing and the conveying of stock over a bridge or culvert structure.

11.6 Fonterra is supportive of the use of the OVERSEER model to estimate nitrogen loss from supplier's farms. However the Plan does not address how

OVERSEER is to be utilised to ensure comparative and consistent input parameters (and subsequent outputs) amongst individual operators. The influence of this operator variation can be reduced by installing protocol around its use.

11.7 In order to ensure that OVERSEER reports consistent/repeatable nitrogen loss values for individual farms, I consider that the Plan should adopt the existing dairy industry OVERSEER input data to both establish limits and assess compliance. The Plan should also allow for any subsequent amendments to that document to be incorporated as updates to the Plan.

11.8 Fonterra's Supply Fonterra programme has a number of areas which overlap and satisfy the requirements of Farm Information (as specified in Schedule 7 Part D). Where OVERSEER inputs satisfy criteria 4-8 of Part D, only Nitrogen leaching summary shall be provided annually to the Regional Council with the inputs listed as Part D (4-8) available upon request.

11.9 The components of the Supply Fonterra programme are subject of internal as well as external audit processes. Where components of the Supply Fonterra programme would satisfy those requirements specified by Farm Environment Plans no additional audit should be required.

11.10 Fonterra supports the inclusion of Industry prepared Farm Environment Plans in Schedule 7 part A, as an alternative to the prescriptive requirements of Part B. Supply Fonterra will meet the majority of the requirements of Schedule 7 Part A It is also likely to deliver the relevant objectives and policies of the Plan attributed to FEP production in a more transparent, timely and cost efficient manner. Critical to supporting Supply Fonterra, as a preferred pathway, is the same flexibility being applied to audit requirements in Part A rather than deferring to the requirements of Part C in Schedule 7.

## APPENDIX A

## Copy of the OVERSEER protocol

## APPENDIX B

## Example of the farm maps created as part of the Supply Fonterra programme

# APPENDIX C

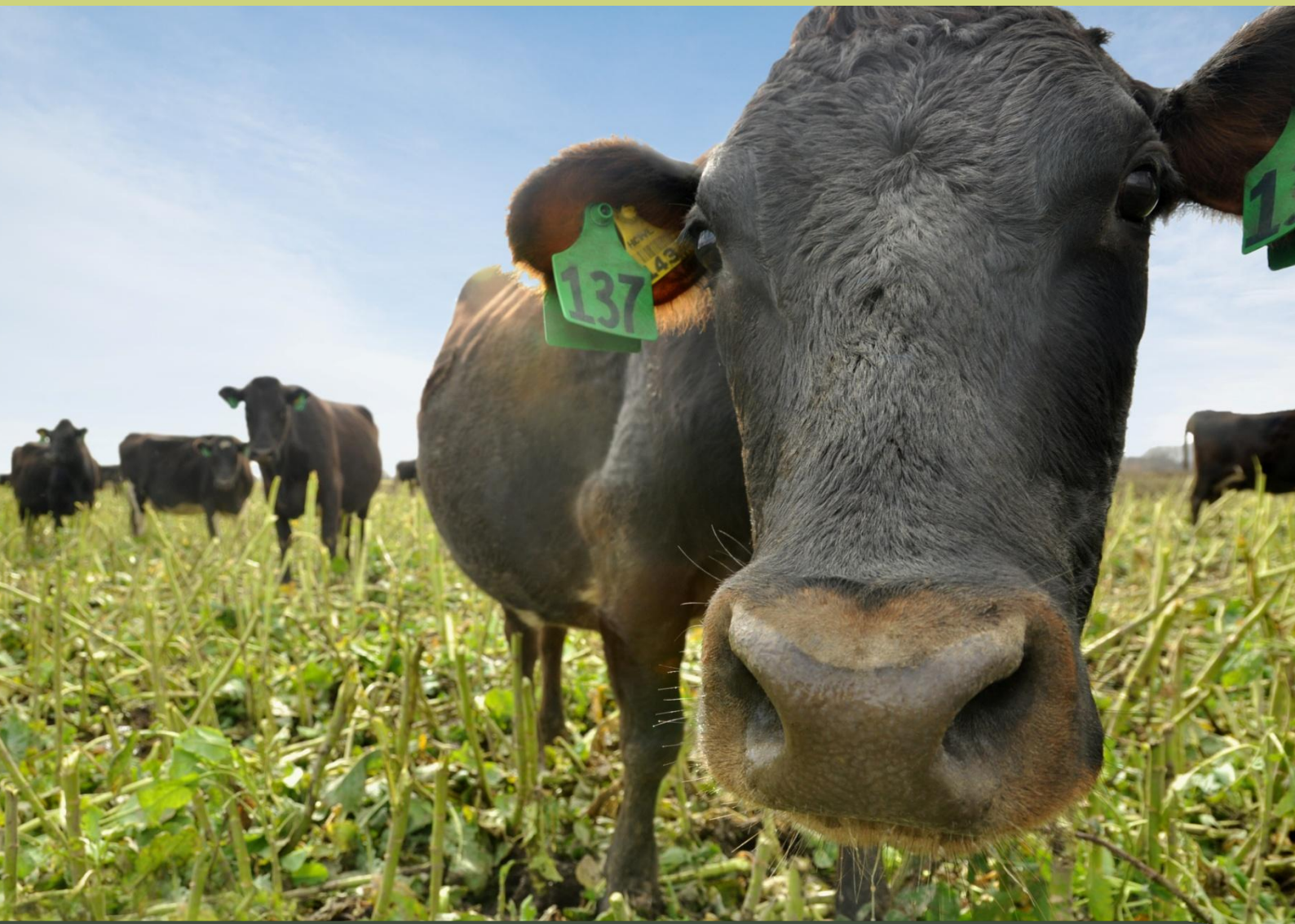
## Copy of OVERSEER parameter report

# APPENDIX D

## Farm Dairy Assessment Protocol

# *New Zealand Dairy Industry*
# *Audited Nutrient Management Scheme*

*A protocol for the use of the Overseer model to measure, model and audit nitrogen information from New Zealand Dairy Farms*

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# Table of Contents

# 1 Introduction

## 1.1 Background

The dairy industry has made significant advances in the management of nutrients over the past 20 years. The development of the Overseer® nutrient management model (hereafter Overseer) in the early 1990s allowed for improved understanding of the nutrient flows in and out of our farming systems.

The signing of the Dairying and Clean Streams Accord in 2003 saw the adoption of a voluntary target to achieve effective nutrient management on all farms by 2007. The fertiliser industry stepped up to meet this challenge and the industry has been working towards having full nutrient management plans in place on the majority of farms by the end of 2012.

The progress made to date has been positive, but it is clear that the industry needs to do more to maintain the continued support of the New Zealand community, regulators and international markets.

In 2010, DairyNZ and Fonterra identified a number of gaps in the existing approach to nutrient management that were constraining the effectiveness of Overseer to deliver on-farm change. As a result, the Audited Nutrient Management (ANM) Project was initiated early in 2011 to address these issues through the development of an industry protocol for the use of Overseer. This protocol would standardise the data input processes, define auditing procedures and provide improved methods for reporting data to farmers.

At the start of the project it was anticipated that the protocol would predominantly be used by milk supply companies to provide their supplier's with an auditable assessment of their nutrient management performance, based on actual data collected at the end of the milking season. However, during the course of the project it became clear that the major fertiliser companies were also interested in adopting the protocol. While the final protocol can still be used in the manner originally envisaged it is likely that the main delivery method will now be via the fertiliser industry.

The protocol is jointly owned by DairyNZ and Fonterra and is freely available to any milk supply company to adopt. While DairyNZ is responsible for the ongoing management of the protocol, any changes or updates to the protocol are first considered by the Dairy/Fertiliser Liaison Group. This group has representatives from the milk supply companies, the major fertiliser companies, Fertiliser Association of New Zealand and DairyNZ.

## 1.2 Metrics

This protocol has been developed to deliver results for:

- Nitrogen loss (kg/N/ha) (N loss)
- Nitrogen conversion efficiency (%) (NCE)

## 1.3 Overseer Version

This protocol has been tested and approved using Version 6.0 of the Overseer model as at 11 August 2012.

# 2 Audited Nutrient Management Process

Each piece of input data that is necessary for the Overseer model to output robust metrics for N loss and NCE will need to be managed in a consistent and logical way. This consistent approach to set up and annually input data will allow for meaningful comparisons between farms and also over time on any one property.

The dairy industry audited nutrient management scheme establishes a protocol for the consistent entry of milking platform data into the Overseer model. This protocol covers those input fields that are important for nitrogen efficiency calculations and nitrogen loss modelling[1].

Overseer fields that are not considered in this protocol can be dealt with in the following way:

- Data is entered based on actual information provided where that has value to the end user; or
- Additional fields can be left empty (where the model does not require an input); or
- The defaults within the model can be used.

Ideally any assumptions / notes form should be created for each farm file developed to record assumptions used in the file setup and to note end of season volumes, etc. This document will make audit (particularly file replication to check process) much easier. The Overseer developers have been asked to look at adding in a "notes" section to the model.

## 2.1 Core Principles

There will be situations when interpretation of data is required due to farming practices which are not common and therefore not catered for within the model, or uncertainty in the information that has been provided. The following principles should be applied in these situations:

- Where the limitation is due to a constraint with the model, enter the data in the manner that is likely to best reflect the farming system.
- Where the limitation is due to missing or unclear information use the protocol defined default values if one has been provided. Otherwise, select the option that will result in the most conservative scenario, i.e. a higher N loss and lower NCE.

## 2.2 Default Values

The protocol provides two types of default values:

- **Optional default:** A value or input setting that **may** be used where either the information available is of poor quality or no information has been provided at all.
- **Compulsory default:** A value or input setting that **must** be used. There is no option to deviate from a compulsory default unless the protocol specifically provides for it.

[1] A sensitivity analysis of OVERSEER to input fields was carried out for DairyNZ by AgResearch in 2011 as part of the development of the protocol.

## 2.3 Data Rating

All data sets processed must have a rating of the quality of the input information applied on a 1 – 5 scale, where a 5 is “excellent” (all data is likely to be accurate and verifiable) through to a 1 “deficient” (where data is absent or seriously deficient and assumptions have had to be used).

For the purposes of applying a data rating the input data is split into critical fields and non-critical fields, depending on the sensitivity of the model to each parameter. The critical fields are those which define: **Farm area, Production, Stock numbers- including non dairy stock, imported supplements, nitrogen fertiliser use.** All other fields are ‘non-critical’.

Table 1 contains the relevant criteria for each of the 5 categories.

| Rating | | Criteria |
|---|---|---|
| 1 | **Deficient** | **Critical fields data not provided or highly likely to be inaccurate.**<br>Where any of these fields are likely to be significantly misstated the file is considered to be of poor quality and should be prioritised for audit. Files with a 1 rating should be excluded from collated data reporting.<br>Where possible the service provider should attempt to access better information to allow the file to be corrected to an acceptable standard |
| 2 | **Marginal** | **Multiple non critical fields no data provided or likely to be inaccurate. Multiple assumptions required.**<br>Where multiple non-critical input fields require assumptions to be made the rating will be 2 and the file should be excluded from collated data reporting and prioritised for audit.<br>Where possible the service provider should attempt to access better information to allow the file to be corrected to an acceptable standard. |
| 3 | **Adequate** | Data is missing or of poor quality for a small number of non critical inputs. Assumptions are required but unlikely to significantly impact on whole farm reported output values. |
| 4 | **Complete** | All necessary data is provided and is credible**.** Pasture model outputs are within normal range for the region. |
| 5 | **Excellent** | All necessary data is provided, is credible and is backed by records that have been sighted by the service provider. |

**Table 1:** Data rating criteria

## 2.4 Audit process

There are two components to the Overseer data audit process, the process audit and the validation of farm data. The number of farms where this is required to be completed for each component will vary depending on the population size and the level of confidence that is required.

### Overseer process audit

This component of the audit process involves the replication of the data form entry into Overseer for a percentage of farms by a third party.

The process identifies:

1. How accurately the protocol is applied to the data, including the farm setup information and the season end data, and
2. The consistency with which data that requires interpretation is handled.[2]

The auditor is required to access the final Overseer file and the data form that was used to create it. The auditor will then use either the original input data collection form to repeat the data entry process (overwriting a copy of the initial file and identifying any input variation), or alternatively use the input parameter form (an output of the Overseer exercise) to check off against the data input form.

The base file information (farm description, infrastructure, climate etc) is to be considered against the protocol (i.e. was the information entered in accordance with the protocol direction) and also for general validity (i.e. is the farm description information reasonable).

Where the audit identifies that inputs have been handled incorrectly, this should be fed back to the data entry service provider. The service contract should set out the level of accuracy required with an ability to impose a contractual consequence for poor performance.

For nitrogen loss, the maximum output variance between the original and audit files is ± 2 kg/N/Ha or 5%, whichever is the larger of the two. For nitrogen conversion efficiency the maximum output variance is ± 5% of the audited value.

The audit should also look to ensure that all data is correctly handled, stored, reported on and transferred to the supply company in the agreed form. The contracted service provider should have clear and documented internal processes and the third party audit should track a percentage of supplier data through this system to assess compliance with documented procedure.

The auditor should provide reporting at the completion of the audit that covers:

- The results at an individual file level.
- A record of the Overseer fields where data entry errors are occurring and the frequency of error in each field.
- Collated data on the distribution of variance across all the files audited.
- Corrective actions required for files that exceed the maximum output variance specified.

An outline of the data processing audit is provided in figure 1 below.

[2] Note that it is not the intention to assess the accuracy of the Overseer model itself.

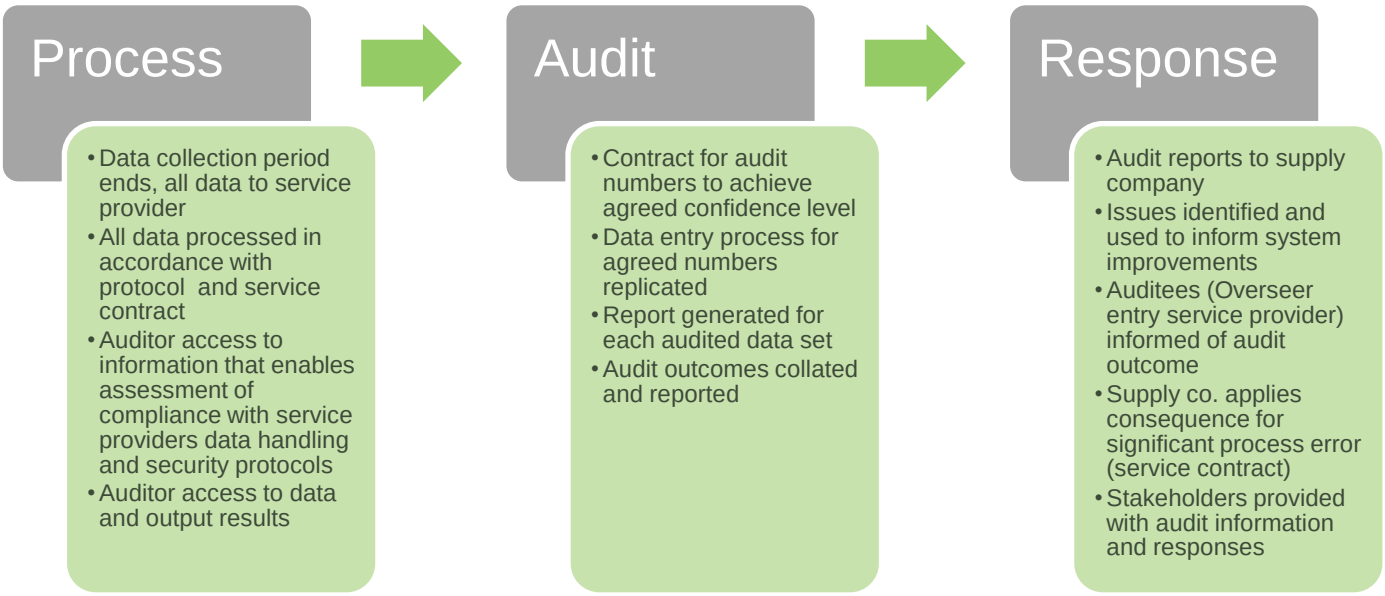


**Figure 1:** Outline of the data processing audit

**Farm data validation**

The farm data validation focuses on the accuracy of the farm data that has been collected. This process should be carried out by a contracted third party with farm systems and farm business knowledge. It is likely the necessary skills would be found within the farm consultancy or agribusiness advice sector.

If the requirement to comply with the proposed nitrogen programme is part of terms and conditions of supplying milk to a supply company, there would be a contract condition that enables the necessary access to farm data to allow the audit to be completed.

Farms will be identified for data validation in four ways:

1. A randomly selected percentage of farms. The number of farms would be calculated based on the confidence level that is required.
2. Farms that are at the extreme ends of the bell curves for nitrogen loss and/or efficiency.
3. Farms where there are apparent anomalies in the output information from Overseer. In particular situations where the pasture report identifies very high pasture growth (may indicate unreported feed inputs) or very low pasture growth (may indicate additional stock and associated productive outputs are not being reported).
4. Farms which have previously failed an audit.

The farm data audit will focus on assessing the accuracy of the information provided for the key input parameters that influence the Overseer model. These key areas include nitrogen fertiliser quantity and timing, imported feed description and quantity, soils (if this information is provided by a third party), stock numbers and cropping practices. Access to some farm financial information and to fertiliser summary information would be essential to allow for credible audit.

The auditors will require access to the complete data set that will be held by the relevant milk supply company, once the data processing has been completed. The auditor will have approved processes for identifying the farms to be audited and time frames to carry out the audit. It is anticipated that all suppliers would receive the interim (pre-audit) report based on the data that has been provided.

As with the data processing audit, the protocol requires that the data provided is accurate and significant variances between actual and recorded data will result in an audit fail. The consequences for failing an audit are up to the individual supply company to implement, however it is recommended that these suppliers are subjected to further audit in the following seasons as a minimum.

The auditor should provide reporting at the completion of the audit that covers:

1. The results at an individual file level.
2. A record of the Overseer fields where data entry errors are occurring and the frequency of error in each field.
3. Details of all farms that have failed audit along with a corrected data file and report.

An outline of the farm data validation is provided in Figure 2 below.

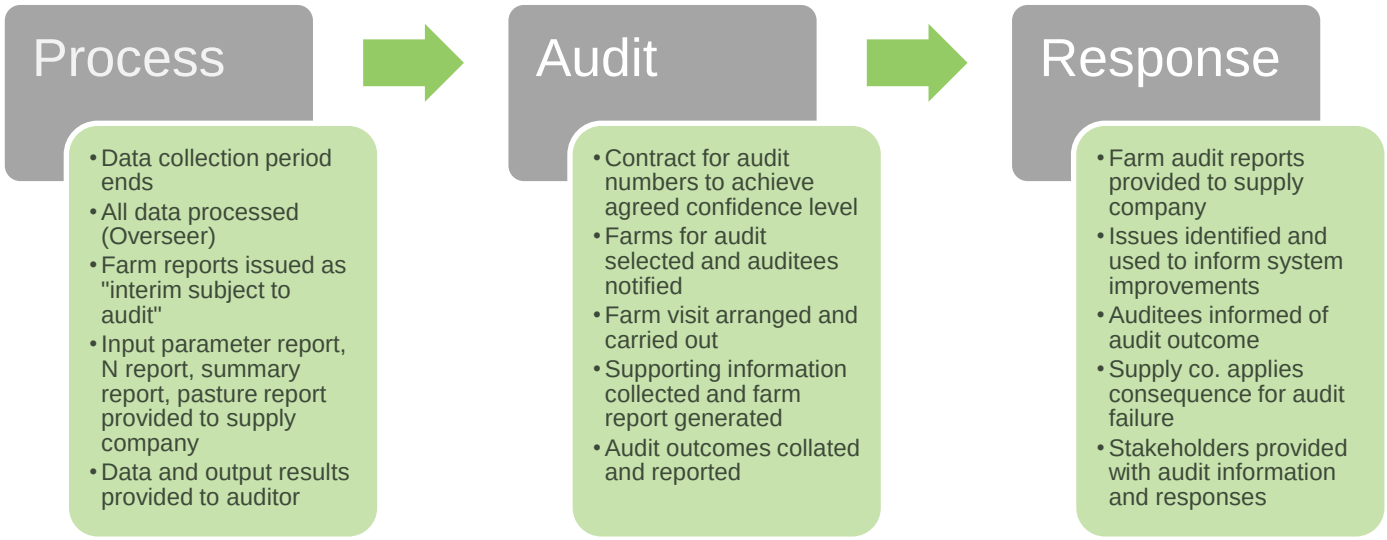


**Figure 2:** Farm data validation outline

# 3 Overseer Data Entry Protocol

## 3.1 Farm Scenario

### 3.1.1 General / Location

For the purposes of the nitrogen measurement system the assessment year follows the dairy production year. Therefore, an assessment year runs from 1 June to 31 May. All activities that fall within that year will be entered as will the productive outputs over the same period.

***Process***

**Create Farm:** Enter supply number, click “create”.

**Farm Scenario:** The supply number will be entered, year of assessment entered as the dairy year e.g. 2012 / 2013 year. (1 June 2012 to 31 May 2013)

**Client details:** As long as the **supply number is always entered in to the “farm name” tab,** the client information can be entered to suit the service provider’s needs.

**Property:** If known, a property location should be entered as road name and rapid number for the farm.

**Consultant details:** Enter the name of the consultant setting up the file and the company providing the service.

**Location:** Click on “by nearest town”, select best option from drop down list.

### 3.1.2 Block setup

The milking platform is to be broken into as few blocks as possible based on significant differences in management and on very significantly different soils characteristics (e.g. large areas of deep peats and pumice soils would not be lumped together as one block because these soils will behave very differently with respect to risk from leaching N).

Lease land that forms part of the milking platform should be included as part of the farm.

For all properties, **the total area of the blocks described MUST equal the total milking platform area.** The total farm area field must be filled in and this will be the total hectares of the milking platform. The milking platform concept is one that farmers are very familiar with and most should readily define the area under consideration.

Support blocks, whether geographically separate or attached to the milking platform, will not be included as a part of the farm for the nitrogen measuring and monitoring system. However, the effects of these blocks will be recognised as feed brought on to the farm, replacements off farm and wintering cows off.

Non dairy animals that are grazed only on support blocks can be ignored in our data collection process. Block setups may vary on some farms over time (particularly fodder crop blocks) however in general the total milking platform area will remain the same. Land area added or removed will require a farm area setup change.

For most farms the block separation will be:

- Stock excluded block

- Effluent block
- Pasture block(s)

**Note:** Whether tracks and races, etc. are linked to the stock excluded block or included in the other block areas will be insignificant in whole farm reported outputs. The preferred approach is to include these utility areas within the given block area.

The pasture block(s) will be further broken down where there are very significant differences in management, soils, drainage or irrigation practices.

Additional pasture blocks must be set up to match border dyke irrigation areas and subsurface drainage areas as the modelled losses for these areas will be significantly different.

All retired or forestry type areas within the milking platform will be lumped together to form a single block that will be labelled as “Stock excluded block”. Following this process will ensure that the block areas equal the “Total farm area” (the milking platform).

The block areas should always add up to the total farm area. Figure 3 below shows a block set-up for a farm with the Overseer blocks shown in blue. The total area of these blocks should always equal the “Total farm area” figure. Note that in many cases a farm will simply consist of a pasture block, and effluent block and a stock excluded block.

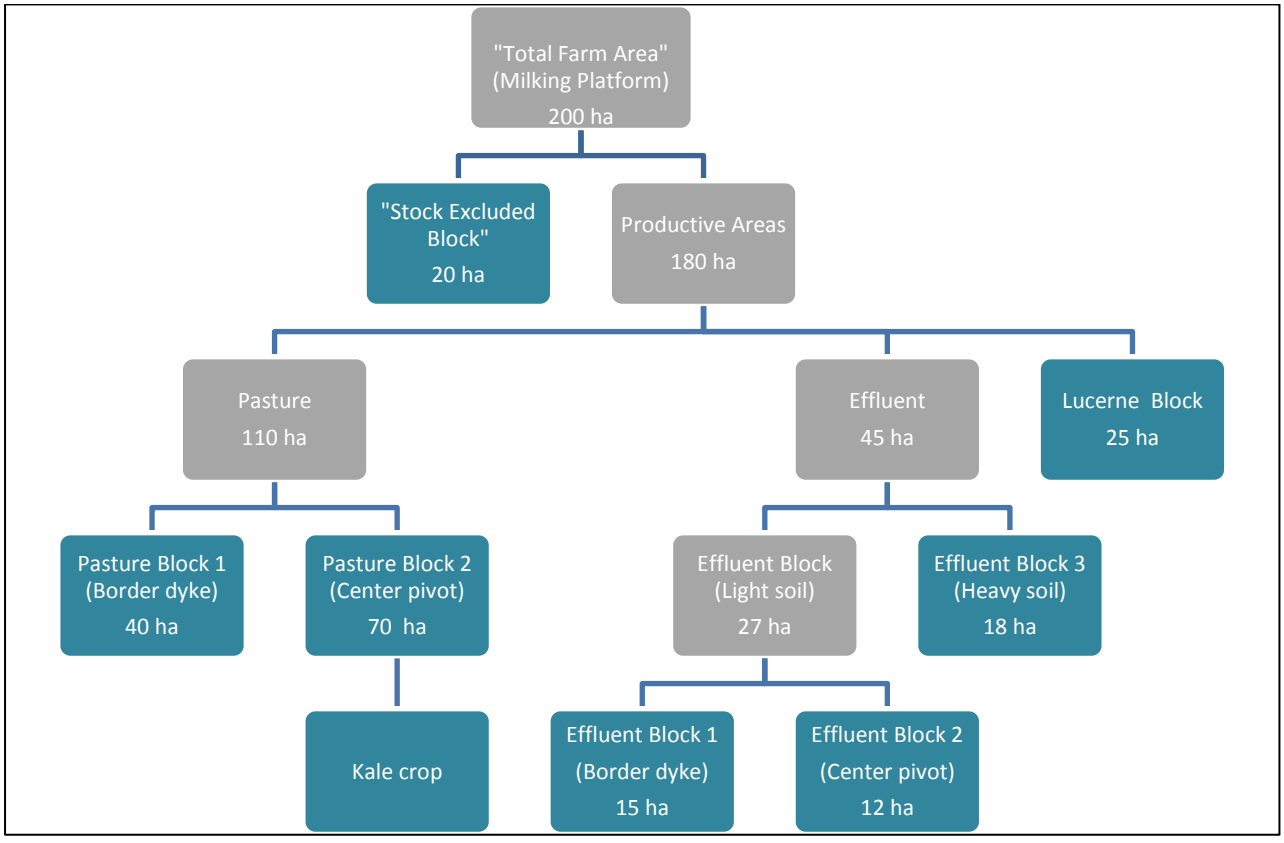


**Figure 3:** An example block set-up for a farm.

***Process***

**Note: This section contains critical inputs.**

**Total Farm Area:** This should be entered first and this area is always the milking platform (including retired / planted out land within or adjacent to the platform).

Once the "Total farm area" has been defined it must then be divided into separate blocks and entered into the model using the following process:

1. Establish the stock excluded / planted / riparian margin areas across the milking platform and enter this as a single block called **"Stock excluded block"**. For the "block type" the compulsory default is **"Trees and scrub"**.

2. The remainder of the "Total farm area" is then divided into three main block types: pasture, effluent or lucerne (if this is grown on the farm). These blocks types should be further broken down where there are very significant differences in management or soils.

   Separate blocks should be set up for subsurface drained areas, irrigated areas, border dyke areas, peat soils / volcanic, stony soils / deep soils, steep land / flats etc.

   - For the '**pasture**' block or blocks enter these into Overseer with the block type set to "Pastoral". These blocks should be called **"Pasture block 1"**, **"Pasture block 2"** etc.
   - For the '**effluent**' block or blocks enter these into Overseer with the block type set to "Pastoral". These blocks should be called **"Effluent block 1"**, **"Effluent block 2"** etc.
   - Where the farm has areas of **lucerne**, enter these into Overseer with the block type set to "Pastoral". These blocks should be called **"Lucerne block 1"**, **"Lucerne block 2"** etc. Do not enter these areas as fodder crops.
   - If a **fodder crop** is grown select a block type as "Fodder crop". These blocks should be named based on the crop grown, **"Kale block 1"**, **"Swede block 1".** Note that in the model the area of the fodder crop is treated as a part of one or more of the pastoral blocks – not as an additional area. Where the block that the fodder crop rotates through has not been specified in the data provided the optional default will be that it rotates through all pasture blocks.

3. Check that the **"Total farm area"** now equals the **"Total area declared as blocks".** If it does not then you should check that all the required blocks have been entered and that any support blocks (extensive grazing land, land used only for young stock, wintering blocks) have not inadvertently been included in the "total farm area".

### *3.1.3 Enterprises (stock)*

***Process***

**Type:** Select the enterprises that are present on the farm. Select "Dairy replacements" only when these animals graze the milking platform during the milking season.

Select other stock as appropriate. There will be very few farms where significant numbers of non-dairy stock are grazed across the **milking platform** during the milking season.

It is not necessary to record pets, home-kill animals, etc. As a rough guide, any enterprise that involves less than 20 stock units in total, will be considered not significant and does not need to be entered.

### 3.1.4 Structures

***Process***

**Type:** Click on the structures that are present, and used by the dairy herd in the assessment year, on the farm.

"Wintering pad, animal shelter" option is only used where cows are withheld from pasture for extended periods (weeks or months) and primarily fed on the wintering pad surface.

### 3.1.5 Animal Distribution

***Process***

There is no option to change this parameter. The compulsory default is **"no difference between blocks"** (Overseer default).

### 3.1.6 Dairy Effluent System

***Process***

**Management System:** Select the best option from the drop down box. The optional default is **"Spray from sump"**. Where an effluent system has more than 3 days storage and effluent is applied to land, the compulsory default is **"Holding pond"**. **Note "**2 pond and discharge" is only to be used for treatment ponds with a resource consent to discharge to water.

**Disposal method (Pond solids):** Select the most appropriate option from drop down list (spread or exported). The optional default for "storage method" is "**Spread on selected blocks"** and for the **"**Ponds emptied every" field enter **"2"** years. Where required the optional defaults for storage are **"Open"**, with a time in storage of **"3"** months.

**Disposal method (Liquid effluent):** Select the best option from the drop down box. The optional default is **"Spray regularly"**.

### 3.1.7 Supplements Imported

This includes feed brought on to the milking platform, including feed grown on support blocks and brought on to the milking platform. It also includes any feed that was stored from the previous year and then fed on the milking platform during the assessment year. Feeds that were purchased or imported in the year of assessment but in storage at the end of the year (May 31) should **NOT** be included.

Effectively this process is a reconciliation of feed brought on, feed on hand season start and feed saved at season end.

**It is important to capture all imported feeds that are fed to animals on the milking platform and to also capture feeds that are harvested from the milking platform and either fed to animals during the assessment year or stored beyond the end of the assessment year.**

**Note:** There is an existing food safety requirement around record keeping for imported feeds. Imported feed can increase N inputs significantly and this will be a key input to gather for accuracy of output. Overseer has a pasture modelling capability that may be used as a flag for audit where supplements are underreported.

This is a key input area and there will be some requirement to interpret some of the information to best fit with Overseer input options. Enter data given in line with the table below. Where totals are unclear the worst case option should be entered i.e. the input that would result in a higher N input.

| *Feed Input* | *Data Entry Process* |
|---|---|
| Fodder Crops grown on farm. | Data is entered through the fodder crop block(s) that are set up at the start of the data entry process. **Fodder crops grown on the milking platform are NOT entered in to the "supplements imported" section.** For fodder crop entry process see page 30 of the protocol. |
| Hay / Silage **grown on the milking platform** and used on the milking platform in the same year. | These **feeds grown on the milking platform and fed out on the milking platform are NOT entered in to the "supplements imported" section.** They are covered under the "supplements made" input section under blocks (see page 15 of the protocol). |
| Hay / silage **brought on to the farm.** (Includes hay and silage harvested on support land attached or separate to the milking platform). | Hay / silage brought on from anywhere that is not covered as a milking platform block in the block setup – is an imported supplement. Enter the amount of each that is imported MINUS the quantity left on hand at season end. The stored quantity should be noted for audit reference.<br>**Note: any assumptions / notes form should be created for each farm file to record assumptions in the file setup and to note end of season volumes etc.** |
| Other supplements **brought on to farm** and Hay / Silage on farm at season start. | Enter the amount of each that is imported minus the quantity left on hand at season end. The stored quantity should be noted for audit reference. Hay / silage on hand at season start will be entered as coming "from storage".<br>(This input should match the quantity entered for the previous season as saved hay / silage). Enter amount in tonnes taking care to enter as wet weight or dry weight as appropriate. (If really unclear default to "dry weight basis")<br>For products not in Overseer, use an option that is best fit and note the product for future additions to model. |
| Supplements **grown on the dairy platform and then exported** (to be fed anywhere but the dairy platform). | Entered in the individual block section under "supplements made" (see page 27 of the protocol) |

**Table 2:** Process for entry of different feed types

***Process:***

**Note: This section contains critical inputs.**

**Supplement Source:** Identify the source of each supplement (purchased / brought on to the milking platform or from storage.)

**Category:** Under the "category" heading identify the best fit from the drop down list.

**Supplementary Feed:** identify the feed type from the list. Where the feed type is a hay or silage there is an ability to select the method of estimating feed quantity. Select the best method based on the information provided. For baled feeds preferred approach is to click "standard bale sizing" and then

input a bale equivalent. The optional default for bale equivalents where no information has been provided will be **"12"**.

**Weight:** Enter the quantity of product in tonnes and where applicable tick the "weight on dry weight basis" check box. The optional default is to click on **"Weight on dry weight basis"**; i.e. check box is selected. **Note that this will make a significant difference for silage, etc. so wherever possible ensure DM or Wwt is entered accurately.**

**Storage Conditions:** Optional default value is **"Average"** unless there is strong reason for different input. For silages, optional default is to click on **"Silage stack used''** and **"Effluent from the stack is contained"**; i.e. check box is selected, unless there is information that is contrary to this.

**Destination:** Identify where the imported feed is fed to stock. Where detail is available identify the blocks where feeding out occurs. The optional defaults are **"paddocks"** and **"evenly spread across blocks"**.

**Specify timing of feeding**: This field is not an input option – i.e. the compulsory default is to leave the box **unchecked**.

**Note: To use the "In shed feeding" option it needs to first be set up in Dairy > Enterprises > Milking shed feeding before inputting supplements. Otherwise the "in shed feeding" option will not be available in the supplements table.**

**Utilisation:** Unless there is good evidence to suggest otherwise the following defaults are to be used:

- Where fed in paddock the default value is **"average"**
- Where fed on feedpad the default value is **"very good"**
- Where fed through an in-shed feeding system default value is **"very good"**.

### *3.1.8 DCD (Nitrification Inhibitor)*

This whole farm DCD field is only used where DCD is applied at 10kg per hectare or more per application, within 7 days of grazing for a full rotation of the milking platform.

***Process***

**DCD is applied at the farm level:** If use meets the description provided, then tick the check box. The optional default is **unchecked**.

**All enterprises on the farm:** The compulsory default if the option above has been selected is **"All enterprises on the farm".**

Enter the DCD application information. **There are no default inputs here for application and date**, if the information provided does not allow for the practice to be accurately recorded the field will not be entered.

**Rotation length:** Optional default is 30 days if other information is good.

**N fertiliser applied within 7 days:** Optional default is to leave the checkbox **unchecked**. Tick the checkbox if nitrogen fertiliser is applied within 7 days of the DCD application.

**DCD long term factor:** Compulsory default is **"100"** i.e. leave as per the Overseer default.

### 3.1.9 Wetlands

***Process***

The wetlands page is not an input option; the compulsory default is to not use this field.

### 3.1.10 GHG Footprint

No process required.

### 3.1.11 Report Settings

No process required.

## 3.2 Enterprises

### 3.2.1 Dairy Enterprise - Numbers

***Process***

**Note: This section contains critical inputs.**

**Dairy Stock Numbers:** Use “specify using peak cow numbers”.

**Breed:** Use best fit from drop down list.

**Peak number of cows milked:** Enter the peak number of cows that are milked during the season.

**Breeding numbers are constant:** The compulsory default is that this option remains **unchecked**, i.e. leave as per the Overseer default.

**Mature cow weight:** The compulsory default is to leave as per **Overseer default**. Do not override this default.

**Breeding cow replacement rate:** Enter the actual percentage if it is known. If the figure is not known with certainty then the optional default is **“23%”**. (This is the Overseer default).

**Winter grazing off:** Enter as a percentage of breeding stock based on the information given about when cows go off the farm in autumn, and when they return in the spring. **Note** that animals grazed over winter on support blocks, including attached support land (i.e. not included in the total milking platform figure) will be entered here.

The information entered here must relate to the assessment year (e.g. cows still off farm in July, beyond end of assessment year would be data to be entered in the following years file, while cows that were off in July at start of the assessment year would be included).

**This does require that wintering off both at start of assessment year and end of assessment year is considered.**

While the data collection provides the number of cows off farm, the Overseer entry is as a percentage of the herd. Therefore, the numbers given need to be changed to a percentage of the total cows. For example, for a herd of 250 cows that has 80 cows wintered off for May, June and half of July will be entered as 32% May, 32% June, 16% July.

**Grazed out most of farm:** The compulsory default is that this option remains **unchecked**, i.e. leave as per the Overseer default.

**Specify dairy calving times:** Where there is more than one herd (different calving dates not just run separately), tick the “specify dairy calving times” box. The median calving date will be entered as 3 weeks after the start of calving unless better information is available. Enter the drying-off date and percentage of the total cow numbers in this herd. Enter additional herds as required.

## 3.3 Dairy Production

***Process***

**Note: This section contains critical inputs.**

**Milk solids:** Enter production for the assessment year (1 June – 31 May).

**Once a day milking:** Enter best option from the drop down list. The optional default is **"Never"** (the Overseer default) and this should only be changed from the default setting where the selected practice applies to the majority of the herd.

**Lactation length: Leave as the Overseer default** unless there is good information that shows a significant difference from the figure provided.

**Milk volume yield –** Not an input option, the compulsory default is to leave this box empty.

**Fat yield –** Not an input option, the compulsory default is to leave this box empty.

### 3.3.1 Health Supplements

No process required.

### 3.3.2 Milking Shed Feeding

***Process***

Enter percentage of cows fed in the shed by month.

***NOTE: Have to set up this option before inputting supplements on farms that use in shed systems otherwise feeding location option in supplements field is not available.***

### 3.3.3 Beef Enterprise / Other stock enterprise

***Process***

**Note: This section contains critical inputs.**

Other stock on the farm are to be entered through either the "specify using RSU" (recommended) or "specify based on specific stock numbers". For RSU use the table below as a guide

| Stock | RSU |
|---|---|
| Breeding hind and fawn to weaning | 2 |
| Breeding / velvet stag | 2 |
| Rising yearling deer M / F | 1.5 |
| Breeding ewe and lamb to weaning | 1 |
| Adult wether | 1 |
| Rising yearling M / F sheep | 1 |
| Ram | 1.5 |
| Beef breeding cow and calf to weaning | 6 |
| Breeding or more than 1 year beef bull | 5 |
| Rising yearling M / F: (includes grazing dairy heifers other than own replacements) | 4 |

## 3.4 Structures

All input parameters should be entered in a manner that best reflects the practices that are used on farm. The model allows for the following structures to be modelled:

- ***Feed pads***

  A feed pad is a hard surface area (usually concrete) normally sited adjacent to the farm dairy where stock can be held for some time (1-2 hours), either prior to or after milking, and provided with supplementary feed. Note: feed pads can only be used during the milking season.

- ***Winter stand-off or loafing pad***

  A stand-off or loafing pad is a specially built area where stock can be withheld from grazing during wet periods to minimise damage to pasture. There is no provision for stock feeding while the animals are on the pad.

- ***Wintering pad/animal shelter/barn/housing***

  A wintering pad, animal shelter, barn or housing are specially built areas constructed where animals are withheld from pasture for extended periods and supplementary feeds can be brought to them.

  This protocol deals with these structures as either 'covered' or 'uncovered'.

### 3.4.1 Feed pads

***Process***

**Manure removal method:** Select manure removal method from drop down list. The optional default is **"Scraping no water"**. If it is known that solids are separated mechanically or through weeping wall tick the "Solids separated" checkbox or leave unchecked if solids are simply stockpiled and occasionally spread to land. The optional defaults are **"Scraped material added to farm dairy effluent system"**.

**Solids disposal method:** Select "Spread on selected blocks" unless the effluent is exported off the milking platform.

**Storage method before solids are disposed of:** Unless good information is available, the optional default values are **"Open to rain"** and for the "Time in storage" field enter **"3"**.

**Time animals are on the feed pad:** Enter percentage of cows that are using the feedpad by month. Enter hours per day on average that those cows are on the feedpad.

### 3.4.2 Winter standoff pads

**Note:** For winter standoff pads the model does not reflect the on farm situation well. In many situations these pads are only used for a few days per month during bad weather. The model sets out the percentage of cows that use the pad each month and then allows for number of hours per day that the percentage given spends on the pad.

For that reason if 100% of the herd are identified as using the pad in June, and the cows are on the pad for up to 10 hours at a time, the model assumes that this is the practice for all 30 days in the month. Clearly this entry process will overstate the impact of the use of the standoff when it is in fact only used for say 3 days in June.

For the example above: enter 100% for June, alter the hours per day across that month – in this example enter 1 hour per day for June (1 hour x 30 days = 30 hours which better reflects the actual use of 10 hours per day for 3 hours) If this approach is not applied the model will be greatly overstating the effect of standoff pad use.

***Process***

**Pad surface:** Select the best option from the dropdown list. The optional default is **"Inert"**.

**Lined, concrete floor or subsurface drained and effluent captured:** If effluent is effectively captured in to the effluent system then tick box. The optional default is to leave the box **unchecked**.

**Surface scraped regularly:** If the surface is scraped annually or more frequently then tick box. The optional default for this input is to leave the box **unchecked**.

**Concrete feeding apron**: Tick the box if appropriate and complete the relevant details. The optional default for this input is to leave the box **unchecked**.

**Scraped surface solids disposal method:** Select "Spread on selected blocks" unless the effluent is exported off the milking platform.

**Storage method before solids are disposed of:** Unless good information is available, the optional default values are **"Open to rain"** and for the "Time in storage" field enter, **"3"**.

**Percentage of milking cows and hours per day on standoff pad:** Enter the data that best reflects the operation of the farm. Note that there are no default values for these parameters; if the information is not available the structure should not be modelled.

### *3.4.3 Wintering pad, animal shelter or housing (Covered)*

***Process***

**Pad type:** Select "Covered wintering pad or animal shelter".

**Bunker lining material:** Select the best option from the dropdown list. The optional default is **"No lining material"**.

Where "No lining material" is selected, the optional defaults are:

**Unlined surface cleaning method: "Scraping (no water)"**

**Solids are separated and scraped material stored in stack: Unchecked**

Where "Carbon rich" or "Soil" is selected the optional defaults are:

**Time between first adding animals and cleaning out of bunker: "12"** months

**Liquids drained away (added to liquid effluent): Unchecked**

**Concrete feeding apron**: Tick the box if appropriate and complete the relevant details. The optional default for this input is to leave the box **unchecked**.

**Solids disposal method:** The optional default is "Spread on selected blocks" unless the effluent is exported off the milking platform.

**Storage method before solids are disposed of:** Unless good information is available, the optional default values are **"Open to rain"** and for the Time in storage field enter, **"3"**.

**Feeding Regime:** Select the most appropriate option. Note that there is no default value for this parameter; if the information is not available the structure should not be modelled**.**

**Grazed out most of farm before moving animals onto the pad:** The optional default is to leave this **unchecked**.

**Percentage of milking cows and hours per day on standoff pad:** Enter the data that best reflects the operation of the farm. Note that there are no default values for these parameters; if the information is not available the structure should not be modelled**.**

### *3.4.4 Wintering pad, animal shelter or housing (Uncovered)*

***Process***

**Pad type:** Select **"Uncovered wintering pad"**.

**Pad surface:** Select the best option from the dropdown list. The optional default is **"Inert"**.

**Lined, or subsurface drained and effluent captured:** If effluent is effectively captured in to the effluent system then tick box. The optional default for this input is to leave the box **unchecked**.

**Surface scraped regularly:** If the surface is scraped annually or more frequently then tick box. The optional default for this input is to leave the box **unchecked**.

**Concrete feeding apron**: Tick the box if appropriate and complete the relevant details. The optional default for this input is to leave the box **unchecked**.

**Solids disposal method:** Select "Spread on selected blocks" unless the effluent is exported off the milking platform.

**Storage method before solids are disposed of:** Unless good information is available, the optional default values are **"Open to rain"** and for the "Time in storage" field enter, **"3"**.

**Feeding Regime:** Select the most appropriate option. Note that there is no default value for this parameter; if the information is not available the structure should not be modelled**.**

**Grazed out most of farm before moving animals onto the pad:** The optional default is to leave this **unchecked.**

**Percentage of milking cows and hours per day on standoff pad:** Enter the data that best reflects the operation of the farm. Note that there are no default values for these parameters; if the information is not available the structure should not be modelled**.**

## 3.5 Stock Excluded Block

The first block should be named “Stock excluded block” where that has been inputted at the block setup stage of the file setup.

***Process***

**Distance from coast:** Optional default is **“30”**.

**Average annual rainfall:** The compulsory default is to enter the **NIWA 500 metre grid rainfall data** to best fit the farm location.

**Bush type**: The compulsory default is **“Native”**.

## 3.6 Pasture Blocks

Follow this process for all pasture blocks, including those receiving effluent applications.

### 3.6.1 General

***Process***

**Fodder crop rotates through this block:** If there is a fodder crop block grown on the farm, the optional default is **checked**, i.e. the fodder crop rotates through all pasture blocks unless there is good evidence to the contrary.

**Cultivated in the last 5 years:** Not an input option – the compulsory default is **unchecked**.

**Topography:** Enter the best fit from drop down list.

**Distance from coast:** Use best information available. The optional default is **“30”**.

### 3.6.2 Climate

***Process***

**Mean annual rainfall:** The compulsory default is to enter the **NIWA 500 metre grid rainfall data** to best fit the farm location.

**Rainfall seasonal variation:** Use map in Overseer to identify best fit.

**Snowfall:** Not an input option – The compulsory default is to leave this field **empty**.

**Temperature:** The compulsory default is to select **“Specify actual temperature”** and enter the **NIWA 500 metre grid temperature data** to best fit the farm location.

**PET:** The compulsory default is to select **“Enter known annual PET”** and enter the **NIWA 500 metre grid PET data** to best fit the farm location.

**PET seasonal variation:** Select from Overseer map.

### 3.6.3 Soil description

The input to the soils description section of the model will be based on information from regional scale soil maps (unless better verifiable information is available). This revised approach has been approved by both fertiliser companies as consistent with the way they approach soil identification.

If the farmer wishes to use more detailed soils information in the nutrient budgeting exercise it will be required that there is evidence that the information has been provided by someone with appropriate soils expertise.

As per the block setup discussion (3.1.2), where farms have very clear boundaries with two or more significantly different soils these should be divided into separate blocks. Regional soil mapping will not identify small areas of inter-phase soils and so may not accurately represent what is actually underlying each block. However this approach provides for a consistent and defensible system across a very large number of farms.

***Process***

Assign a soil based on the information in regional scale soils maps (as used by fertiliser companies to set up current Overseer files). If there is better information available that has been verified in the field by someone with appropriate soils expertise, this may be used in place of the soil map data.

Where very significant soil boundaries occur within a block additional block divisions should be set up to reflect this.

### 3.6.4 Soil profile

***Process***

**Top soil texture:** If topsoil texture is known, enter it using the dropdown list. If the top soil texture is unknown or only poor quality information is available, the optional default value is **"Unknown"**.

**Is stony:** The optional default is that this option remains **unchecked**. This option should only be selected where there is a known high topsoil stone content. **This option should be used with caution as it is a somewhat subjective and variable classification that might have significant impacts on Overseer nitrogen loss figures.**

**Is compacted:** Not an input option – the compulsory default is to leave this box **unchecked**.

**Soil texture group:** Compulsory default is **"Medium"** and there is no option to change this.

**Non-standard layer**: The optional default is to leave this field **empty**. The protocol would advise to always leave as per the Overseer default of no entry to this field, unless the operator running the model has very good information that means this field can be used with confidence the default can be overridden.

**Note that this field will be very difficult to verify and accurately assign values to for a whole block and that the use of this field may significantly increase the modelled losses from the farm system.**

### 3.6.5 Drainage / runoff

***Process***

**Profile drainage class:** The compulsory default is **"Use default"** (This is the Overseer default ).

**Hydrophobic condition:** The compulsory default is **"Use default"** (This is the Overseer default ).

**Occurrence of pugging:** The compulsory default is **"Occasional"**.

**Artificial drainage system:** The optional default is **"None"**. Only change from the Overseer default where there is subsurface drainage over most of the block, including slotted novaflow type drains, clay tiles and mole drained– these are to be entered as "Mole / Tile Systems".

**Grass filter interception:** Not an input option – the compulsory default is to leave this box **unchecked**.

### *3.6.6 Soil tests*

The audited nitrogen programme does not require actual soil test results, however the model will not run without them. Actual soil test values may be used if they are available and the model is being used for analysing nutrients levels in addition to nitrogen.

***Process***

**Soil test values**: The optional default is to select **"Replace missing soil test data with typical values"**.

**ASC or PR:** Leave as per the Overseer default unless better soil test information is available.

**Slow release K:** Leave as per the Overseer default unless better soil test information is available.

**Soil properties detail:** Leave as per the Overseer defaults (all fields unchecked) – do not change.

### *3.6.7 Soil Settings*

It is not an option to change the settings on this page, always leave as per the defaults. N immobilisation remains as "standard" on all farms for the N measurement process to show steady state position.

For fertiliser recommendations, it may be necessary to set up a parallel file where a dairy farm is a recent conversion from pines or an extensive drystock farm is converted to intensive dairying.

***Process***

Not an input option – the compulsory default is leave as per the **Overseer default values**.

### *3.6.8 Pasture*

***Process***

**Pasture Type:** The optional default value is **"Ryegrass / white clover"**. This should only be changed if there is very good evidence that another pasture option dominates this block. **Note:** Areas planted in lucerne should be set up as a separate pasture block.

**Specify clover levels, pasture utilisation or pasture N concentrations:** Not an input option – the compulsory default is **unchecked**.

**Specify pasture quality by month:** Not an input option – the compulsory default is **unchecked**.

### 3.6.9 Supplements made

This input field is only used where **supplements are harvested on blocks within the milking platform.** Do not enter fodder crops or other imported feeds into this section. If data provided does not identify which block supplement is made on the assumption will be that is was made on the main pasture block.

***Process***

Where applicable, click on “add supplement”.

**Category:** Identify the appropriate feed type from the list.

Select the best method of estimating feed quantity based on the information provided. For baled feeds the preferred approach is to click on “use bale size” and then input a bale equivalent. The default bale size where no information is provided is **“12”** standard bale equivalents.

For silages the difference between wet and DM weights will be very significantly different – take care to enter this information accurately. Where the only information given is hectares cut for supplements use 4.5 tonne DM /ha.

**Silage cutting method:** Only applies when entering by actual weight. Optional default is **“wilted”**.

**Supplements wrapped or covered with plastic:** Click on this option if it is applicable. The optional default value is **unchecked**.

**Silage stack used:** Click on this option if it is applicable. The optional default value is **checked**.

**Effluent from stack contained:** Click on this option if it is applicable. The optional default value is **checked**.

**Destination:** Select the option that is most applicable. The optional default destination is **“Paddocks”** and **“Evenly across pastoral blocks”**. The optional default for “Specify timing of feeding” is **unchecked** unless very detailed feed information has been made available.

**Storage conditions:** Only applies when supplements are made but not used within the season and entered as “to storage”. The compulsory default is **“Average”**.

**Utilisation:** When fed in paddocks us the compulsory default of **“Average”** (this is the Overseer default). If fed on a feedpad, use the optional default of **“Very good”** unless there is good reason to select “Poor”.

### 3.6.10 Fertiliser

All fertilisers containing nitrogen must be entered by month of application. This will create some difficulties when the fertiliser data provided only sets out a total volume of product. Dividing a total given over the months when the product was applied will give a reasonable approximation of fertiliser impacts.

For the purposes of this protocol, it will not be necessary to add any non-nitrogen fertilisers. For Overseer files that are for a wider use than nitrogen modelling all fertiliser can be inputted. Nitrogen fertiliser use will be a key driver of the modelled / calculated nitrogen losses and it is critical that total nitrogen fertiliser applied in the year is accounted for. Distribution through months will be less important than getting totals applied and identifying when N has been applied in the winter months.

***Process***

**Note: This section contains critical inputs.**

For each product, identify the total volume applied to the block being entered and the months that product has been applied. Share the total across the application months evenly unless more detailed information is available.

**Month:** Enter the month the fertiliser was applied.

**Material:** The preference is to use the "fertiliser product" option.

**Manufacturer:** Select from drop down list.

**Product:** Select the exact product used.

**Amount:** Enter as kg/ha or total tonnes/kg applied to this block in this month. Errors in this entry can create very large output errors.

***Note:*** If quantity is given as kg N/ ha, estimate the kg of product applied and use the NPKS applied numbers on right of the table to check the total entered matches with the kgN applied data provided.

For organic forms of fertilisers, identify the type from the dropdown list, describe the product being applied, enter the tonnes applied (wet weight), estimate the DM content (eg for chicken manure 70 – 80% might be the normal range for fresh product). Enter the N content as a percentage if known – if not given may need to research the product and use "normal" value.

For chicken manure, shed cleanings; enter as 3% nitrogen if no better information is available.

### *3.6.11 Irrigation*

***Process***

Select "Add month of irrigation" and complete the table for each month that irrigation generally occurs during the season.

**Month**: Enter the first month that irrigation begins in during the season. The optional default months of irrigation are between **"October"** and "**April"** inclusive. These are only used where irrigation is known to occur but the months have not been provided.

**Method:** Select the method from drop down list. The optional default for spray systems that have not been specified is **"Big gun / roto-rainer"** (i.e. pods / K line / laterals).

Where there is more than one type of spray irrigation within a block, enter the predominant method. **Areas of border dyke or flood irrigation should be split into separate blocks from areas of spray irrigation.**

**Rate:** The compulsory default for all irrigation entries is to leave this box **empty** – the model then estimates an irrigation rate from the calculated soil water deficit. **DO NOT** override this default and enter actual annual irrigation data.

**Nutrient concentrations in irrigation water:** Optional default is **"Overseer default (fixed)"** unless there is detailed irrigation water nutrient information available.

***Note:*** Where fertiliser is being applied through the irrigation system this information should be entered via the fertiliser input section not through this field.

### 3.6.12 Animals

**Animals on block:** Not an input option – compulsory default is to leave both "grazing management" and "other information" fields **unchanged**.

### 3.6.13 DCD applications (block)

To enter DCD by block, the farm scenario fields DCD applied "at the farm level" option must be left unchecked. If this is checked the DCD by block option is not available.

***Process***

**DCD is applied at the block level:** Check the box if DCD is applied to the block in line with the description in the Overseer help pane.

Enter the DCD application information. **There are no optional default inputs** here for application and date, if the information provided does not allow for the practice to be accurately recorded the field will not be entered.

**N Fertiliser applied in the same month as DCD is applied within 7 days if the DCD application:** The optional default is unchecked**.** If records are available that show N fertiliser is applied within 7 days of the DCD application, the box can be checked.

**DCD long term factor:** Compulsory default is to leave as per the Overseer default of **"100"**.

### 3.6.14 Effluent

Information should only be entered to this page where liquid or solid effluent from the farm dairy, or feedpads etc., is spread on the block.

***Process***

**Liquid effluent from farm dairy:** If liquid effluent is applied to the block, the box must be checked.

**Application depth:** Select the best option from drop down box. Unless reliable information has been provided, the optional defaults are:

- Low rate type systems (i.e. k-line): **"Low application method"**
- Travelling irrigators and muck wagons: **"12 -24mm"**
- Stationary irrigators / canons / contractor pumping to **"> 24mm"**.

**Applications are actively managed:** Not an input option, the compulsory default is to leave this box **unchecked**.

**Percentage of block area receiving effluent:** If the block setup process has been properly followed then the Overseer default of 100% should be used.

**Solid effluent applications:** Where applicable enter effluent source and the month it was applied to the block. If no month of application is provided the optional default is **"January"**.

## 3.7 Fodder crop block setup

Where a fodder crop block has been entered into the block setup the fodder crop management practices must be added.

There are three scenarios for cropping that will require different data entry processes in order to capture as accurately as possible the impacts within the year.

1. **All actions for a crop fall between 1 June and 31 May of the assessment year:** Enter the final grid month as the month that the cropped area is resown. Enter all the management practices in the crop rotation table. If the area is returned straight in to another crop within the assessment year, then input this information under the crop sown options.

2. **A consistent area and type of crop is grown / harvested across more than one assessment year:** (e.g. 5ha of turnips planted March of the assessment year to be grazed August / September, resown to pasture in October). Where the same practice* had occurred in the **previous season** all the crop input information can be entered as within the one year in the crop rotation table. Ensure the entry information is not doubled up where the data identifies two areas that had crops on them within the one year. If the two areas reflect a rotation across seasons this is entered as one representative block.

   *(This approach can be applied where the area does not change by more than 20% and the crop is the same or has similar growth and management characteristics)

3. **Cropping practice changes significantly (different crop type and / or more than 20% change in area) in a cropping rotation that crosses assessment years:**

   For example, 5 ha of turnips planted prior to 1 the start of the assessment year (say March) and grazed during the assessment year. In the assessment year the cropping regime changes to 10ha of forage oats sown.

   With the fodder crop model input limitations, it is very difficult to consistently allocate the actual impacts of cultivation and harvest under the scenario described above. In the absence of any ability to attribute part of a cropping rotation to a defined assessment year, the protocol will set a standard approach even though it is recognised this will create some level of output error.

   **All the impacts of any crop that is harvested / grazed within the assessment year will be entered as if all activities associated with producing that crop fell in the assessment year. Crops that are sown in the assessment year but are not harvested until the next year will not be entered (they will be picked up in the following assessment year).**

   Any report produced using option (3) should have a disclaimer identifying the fodder crop assumption and potential impact on output validity.

### *3.7.2 General*

***Process***

**Rotation area:** Enter the area cropped in the assessment year.

**Low N mineralisation:** Not an input option, the compulsory default is to leave this box **unchecked**.

**Month resown in pasture:** Enter this as the month that the cropped area is resown back in to pasture.

### *3.7.3 Fodder crop rotation*

Enter the details of the crop into the table in a manner that best reflects the practices used.

Where chicory (or similar) is planted as a single species crop within the assessment year using cultivation enter as a fodder crop under rape. If the chicory has been sown prior to the assessment year, or is sown in a pasture mix, leave out of fodder crop model and allow the model to treat as pasture.

Where sorghum is grown enter in the model as maize, default yield at 75% of the model maize yield default.

***Process***

**Management:** Enter management practices by month. This will normally consist of crop sown, defoliation over at least one month followed by crop sown to re-establish pasture in the final month.

**Product yield:** Optional default is to use the **"Typical yield"** information suggested by Overseer.

**Cultivation practices at sowing:** Optional default is **"Conventional"**.

**Fertiliser:** Where fertiliser has been applied to the crop area additional to the pastoral block fertiliser this must be entered by month. The optional default for method is "**Incorporated"** if applied in the month of sowing and **"Surface applied"** at other times.

**Irrigation:** Enter the irrigation practices applied to the crop where applicable.

**Months:** The optional default is all months that are within the irrigation season from **"Crop sown"** to **"Defoliation"**.

**Method of irrigation:** Select the appropriate method. The optional default is **"big gun/roto-rainer"**.

**Amount:** Not an input option – the compulsory default is to leave this **empty**.

**Specify soil tests:** There is no need to enter soil test information for the purposes of this protocol, but it may be entered if available.

### *3.7.4 Effluent*

**Liquid effluent application from farm dairy:** Optional default is **unchecked**. Check the box if there is information that supports effluent being applied to the block during the season.

**Application depth:** Select the best option from drop down box. Unless reliable information has been provided, the optional defaults are:

- Low rate type systems (i.e. k-line): **"Low application method"**
- Travelling irrigators and muck wagons: **"12 -24mm"**
- Stationary irrigators / canons / contractor pumping to **"> 24mm"**.

**Applications are actively managed:** Not an input option, the compulsory default is to leave this box **unchecked**.

**Months effluent are applied:** The optional default is all months from **"Crop sown"** to **"Defoliation"**.

**Solid effluent applications:** Where applicable enter effluent source and the month it was applied to the block. If no month of application is provided the optional default is **"January"**.

# 4 Reporting

The results of the analysis should be reported to farmers in a manner that is meaningful and able to be interpreted with ease. The suggested method utilises a graphical representation of the individual farm's results against the distribution of results from the region or area where the farm is located. An example of this is shown in figure 3 below.

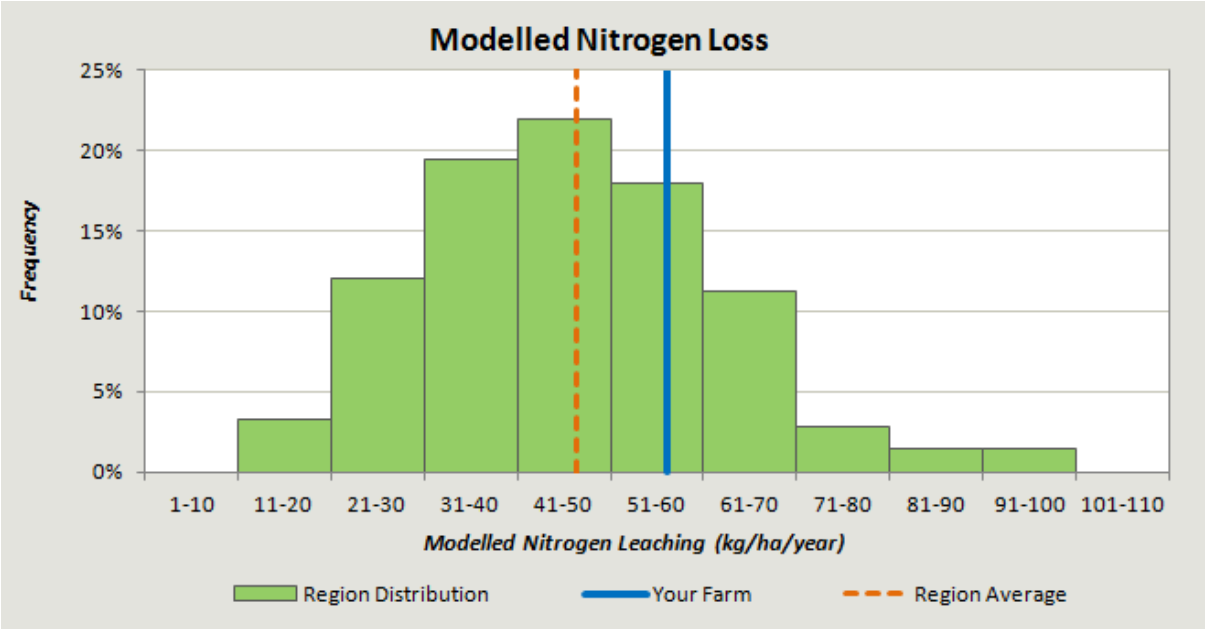


**Figure 4:** Example nitrogen loss results chart

The graphical results should also be supported with the numeric results obtained along with the data quality rating and an explanation of the rating.

The data set used to create the distribution can be based on the relevant region or catchment, or parameters that are likely to significantly influence the results, such as rainfall or soil type.

Care should be taken to ensure the sample size is large enough to provide an accurate representation of the farming systems in use.

Client reference:

Farm name: Example Farm (2012/2013)

# Parameters

## Farm details

| | | |
|---|---|---|
| Type | Farm type | Full range |
| Assessment | Assessment year | Not entered |
| Region | Region | Christchurch |

## Farm blocks

| | | |
|---|---|---|
| Effluent block | Pastoral | 80 |
| Non Effluent | Pastoral | 40 |
| Total farm area declared in blocks | ha | 120 |

## Farm animals

### Stock numbers

Stock numbers entered via RSU - Dairy

| | | |
|---|---|---|
| Peak number of cows milked | | 777 |
| Breed | | Ayrshire |
| Replacements grazed off farm from | | Off farm from weaning |
| Replacement grazing | % | Not entered |

Production

| | | |
|---|---|---|
| Milk solids | kg/yr | 310800 |
| Milk volume yield | l/yr | Not entered |
| Fat yield | kg/yr | Not entered |
| Lactation length | days | Not entered |
| Average weight | kg/animal | Not entered |

Calving times

Default calving times used

Stock management

Time spent on structure

| | | |
|---|---|---|
| January | 100 | 0 |
| February | 100 | 0 |
| March | 100 | 0 |
| April | 100 | 0 |
| September | 100 | 0 |
| October | 100 | 0 |
| November | 100 | 0 |
| December | 100 | 0 |

### Animal excreta distribution

Relative productivity assessment method: No difference between blocks

All blocks have a relative productivity value of 1

Ratio of stock on blocks can differ from the farm stock ratios

Farm dairy effluent disposal system

| | | |
|---|---|---|
| Effluent disposal method | | Holding pond |
| Pond sludge disposal method | | Spread on selected blocks |
| Solid separation and disposal | False | Spread on selected blocks |

# Parameters

| | | |
|---|---|---|
| Solid separation and disposal | False | Spread on selected blocks |
| Liquid disposal method | | Spray regularly |

Animal health supplements

Animal - Dairy

Nutrients used for drenching

Nutrients used for pasture dusting or adding to supplements

| | | |
|---|---|---|
| Mg (using dusting grade MgO) | kg MgO/year | 11 |
| Salt (using dusting grade salt) | kg salt/year | 0 |
| Lime flour (using dusting grade lime flour | kg lime flour/year | 0 |

Animal - DairyReplacement

No animal supplementation has been entered

## Left over feeding

No left over feeding specified

No supplements from storage added to this farm

Imported supplements

Supplement information

| | | |
|---|---|---|
| Conservation type | | Silage |
| Name | | Baleage |
| Pasture type | | |

Supplement amount

| | | |
|---|---|---|
| Dry weight basis | T | 267 |
| Silage cutting method | | |

Fed to animal: Dairy

No feeding destinations found

Supplement information

| | | |
|---|---|---|
| Conservation type | | Process byproducts |
| Name | | Molasses |
| Pasture type | | |

Supplement amount

| | | |
|---|---|---|
| Fresh weight basis | T | 88 |
| Utilisation | | Very good |
| Destination | | Milking shed feeding |
| Animal | | Dairy |

Supplement information

| | | |
|---|---|---|
| Conservation type | | Process byproducts |
| Name | | Palm kernel meal |
| Pasture type | | |

Supplement amount

Client reference:

Farm name: Example Farm (2012/2013)

# Parameters

Supplement amount

| | | |
|---|---|---|
| Fresh weight basis | T | 167 |

Fed to animal: Dairy

No feeding destinations found

## Block Information

### Block - Effluent block

| | | |
|---|---|---|
| Block name | | Effluent block |
| Block type | | Pastoral |
| Area | ha | 80 |
| Relative productivity | | 1 |
| Pasture block type | | No |
| Topography | | Flat |
| Distance from coast | km | 15 |
| Cultivated in last 5 years | | False |

Climate

| | | |
|---|---|---|
| Annual average rainfall | mm/yr | 591 |
| Mean annual temperature | | 12.2 |
| Seasonal variation in rainfall | | Low |
| Annual potential evapotranspiration | | 801-950 mm/yr |
| Seasonal variation in PET | | Moderate |

Soil description

| | |
|---|---|
| Soil type | WATERTON |
| Soil order (default) | Sedimentary |
| Soil group (default) | Gley |

Top soil texture

| | |
|---|---|
| Stony top soil | False |
| Compacted top soil | False |
| Sub-soil textural group | Medium |

Soil drainage

| | |
|---|---|
| Profile drainage class | Use default |
| Hydrophobic condition | Use default |

Drainage method

| | |
|---|---|
| Method | None |

Soil settings

K leaching potential not set

| | |
|---|---|
| N immobilisation status | Standard |

Soil tests

| Olsen P | QT K | QT Ca | QT Mg | QT Na |
|---|---|---|---|---|
| 30.7 | 7.5 | 12.1 | 48.1 | 10.7 |

| | |
|---|---|
| Organic S | 8.8 |
| Anion storage capacity or phosphate retention | Not entered |

Example Farm Qualified Person

Client reference:

Farm name: Example Farm (2012/2013)

# Parameters

| | | |
|---|---|---|
| TBK reserve K test | | Not entered |
| K reserve status | | Use default |
| Avanced soil settings | | |
| Use default rate of change | | |
| Bulk density | kg/m³ | Not entered |
| Bulk density | kg/m³ | Not entered |
| Structural integrity | | Not entered |
| Structural integrity | | Not entered |
| Carbon | % | Not entered |
| Carbon | % | Not entered |
| Clay | % | Not entered |
| Clay | % | Not entered |
| pH | | 6.09999990463257 |
| pH | | 6.09999990463257 |
| Sub soil clay | % | Not entered |
| Sub soil clay | % | Not entered |
| Soil moisture at wilting point | mm/1000 mm soil | Not entered |
| Soil moisture at wilting point | mm/1000 mm soil | Not entered |
| Soil moisture at field capacity | mm/1000 mm soil | Not entered |
| Soil moisture at field capacity | mm/1000 mm soil | Not entered |
| Soil moisture at saturation | mm/1000 mm soil | Not entered |
| Soil moisture at saturation | mm/1000 mm soil | Not entered |
| **Pasture** | | |
| Pasture type | | Ryegrass/white clover |
| Supplements removed | | |
| No supplements removed from this block | | |
| Fertiliser application | | |
| Fertiliser products - September | | |
| Category | | Ravensdown other |
| Product | | Urea |
| Amount | | 100 |
| Fertiliser products - March | | |
| Category | | Ravensdown other |
| Product | | Urea |
| Amount | | 100 |
| Fertiliser products - November | | |
| Category | | Ravensdown other |
| Product | | Urea |
| Amount | | 100 |
| Irrigation | | |
| January | Centre pivot/lateral | |
| February | Centre pivot/lateral | |
| March | Centre pivot/lateral | |

# Parameters

| | |
|---|---|
| November | Centre pivot/lateral |
| December | Centre pivot/lateral |

Irrigation concentrations

| N | P | K | S | Ca | Mg | Na | H |
|---|---|---|---|---|---|---|---|
| 2.5 | 0.1 | 1.6 | 2.5 | 9.3 | 2.2 | 9.5 | 0 |

## Animals on block

| | | |
|---|---|---|
| Animals grazing | | |
| Dairy | % | 0 |
| Water connectivity | | |
| Direct access to streams | | False |
| Animal grazing | | |
| Dairy graze block all year round | | |

## Effluent application

| | | |
|---|---|---|
| Liquid effluents | | |
| Receives farm dairy effluent | | |
| Effluent application depth | | < 12 mm |
| Percentage of block effluent applied to | % | 100 |

## Block - Non Effluent

| | | |
|---|---|---|
| Block name | | Non Effluent |
| Block type | | Pastoral |
| Area | ha | 40 |
| Relative productivity | | 1 |
| Pasture block type | | No |
| Topography | | Flat |
| Distance from coast | km | 15 |
| Cultivated in last 5 years | | False |
| Climate | | |
| Annual average rainfall | mm/yr | 591 |
| Mean annual temperature | | 12.2 |
| Seasonal variation in rainfall | | Low |
| Annual potential evapotranspiration | | 801-950 mm/yr |
| Seasonal variation in PET | | Moderate |
| Soil description | | |
| Soil type | | WATERTON |
| Soil order (default) | | Sedimentary |
| Soil group (default) | | Gley |
| Top soil texture | | |
| Stony top soil | | False |
| Compacted top soil | | False |

Client reference:

Farm name: Example Farm (2012/2013)

# Parameters

| | | |
|---|---|---|
| Sub-soil textural group | | Medium |
| **Soil drainage** | | |
| Profile drainage class | | Use default |
| Hydrophobic condition | | Use default |
| **Drainage method** | | |
| Method | | None |
| **Soil settings** | | |
| K leaching potential not set | | |
| N immobilisation status | | Standard |

**Soil tests**

| Olsen P | QT K | QT Ca | QT Mg | QT Na |
|---|---|---|---|---|
| 30.7 | 7.5 | 12.1 | 48.1 | 10.7 |

| | | |
|---|---|---|
| Organic S | | 8.8 |
| Anion storage capacity or phosphate retention | | Not entered |
| TBK reserve K test | | Not entered |
| K reserve status | | Use default |
| **Avanced soil settings** | | |
| Use default rate of change | | |
| Bulk density | kg/m³ | Not entered |
| Bulk density | kg/m³ | Not entered |
| Structural integrity | | Not entered |
| Structural integrity | | Not entered |
| Carbon | % | Not entered |
| Carbon | % | Not entered |
| Clay | % | Not entered |
| Clay | % | Not entered |
| pH | | 6.09999990463257 |
| pH | | 6.09999990463257 |
| Sub soil clay | % | Not entered |
| Sub soil clay | % | Not entered |
| Soil moisture at wilting point | mm/1000 mm soil | Not entered |
| Soil moisture at wilting point | mm/1000 mm soil | Not entered |
| Soil moisture at field capacity | mm/1000 mm soil | Not entered |
| Soil moisture at field capacity | mm/1000 mm soil | Not entered |
| Soil moisture at saturation | mm/1000 mm soil | Not entered |
| Soil moisture at saturation | mm/1000 mm soil | Not entered |

## Pasture

| | |
|---|---|
| Pasture type | Ryegrass/white clover |

**Supplements removed**

No supplements removed from this block

**Fertiliser application**

Client reference:

Farm name: Example Farm (2012/2013)

# Parameters

Fertiliser products - September

| | |
|---|---|
| Category | Ravensdown other |
| Product | Urea |
| Amount | 75 |

Fertiliser products - March

| | |
|---|---|
| Category | Ravensdown other |
| Product | Urea |
| Amount | 75 |

Fertiliser products - October

| | |
|---|---|
| Category | Ravensdown other |
| Product | Urea |
| Amount | 75 |

Fertiliser products - November

| | |
|---|---|
| Category | Ravensdown other |
| Product | Urea |
| Amount | 75 |

Fertiliser products - April

| | |
|---|---|
| Category | Ravensdown other |
| Product | Urea |
| Amount | 75 |

Fertiliser products - November

| | |
|---|---|
| Category | Ravensdown other |
| Product | Urea |
| Amount | 75 |

Irrigation

| | |
|---|---|
| January | Centre pivot/lateral |
| February | Centre pivot/lateral |
| March | Centre pivot/lateral |
| November | Centre pivot/lateral |
| December | Centre pivot/lateral |

Irrigation concentrations

| N | P | K | S | Ca | Mg | Na | H |
|---|---|---|---|---|---|---|---|
| 2.5 | 0.1 | 1.6 | 2.5 | 9.3 | 2.2 | 9.5 | 0 |

## Animals on block

Animals grazing

| | | |
|---|---|---|
| Dairy | % | 0 |

Water connectivity

| | |
|---|---|
| Direct access to streams | False |

Animal grazing

Client reference:

Farm name: Example Farm (2012/2013)

# Parameters

Animal grazing

Dairy graze block all year round

## Effluent application

Solid effluents

| Effluent type added | January | Pond solids/sludge |
|---|---|---|

**Report settings**

Greenhouse gas emission report units: CO2 equivalents (kg/ha)

Target N application rate as effluent: kg N/ha/yr

## Fertiliser costs $/kg nutrient

| N | P | K | S | Ca | Mg | Na |
|---|---|---|---|---|---|---|
| 1.45 | 3.5 | 2.4 | 0.35 | 0.2 | 1.4 | 0.8 |

Client reference:

Farm name: Example Farm (2012/2013)

# Other values for block - Effluent block

| | |
|---|---|
| Relative yield (from soil tests & fertiliser) | 80 |
| Pasture utilisation (%) | 85 |
| Total estimated irrigation (mm/yr) | 394 |
| Total AET (mm/yr) | 859 |
| Total drainage (mm/yr) | 126 |
| Total runoff (mm/yr) | 0 |
| Field capacity (mm to 60cm) | 188 |
| Wilting point (mm to 60 cm) | 88 |
| AWC (mm to 60 cm) | 100 |
| $ on fertiliser per ha | $200.10 |
| $ on fertiliser equivalent of effluent per ha | $306.11 |
| Artifical wetland: Efficiency (%) | 0 |
| Artifical wetland: N removed (kg N/ha/yr) | 0 |

Example Farm Qualified Person

Client reference:

Farm name: Example Farm (2012/2013)

# Effluent Report

| | Units | Current farm |
|---|---|---|
| **Current effluent area** | | |
| Area of effluent blocks | ha | 80 |
| % of pastoral farm area | % | 67 |
| **Area of farm to apply effluent to achieve rates of:** | | |
| 150 kg N/ha/yr | ha | 38 |
| Maintenance K | ha | 0 |
| 100 kg K/ha/yr | ha | 66 |
| **Source of N applied to effluent blocks** | | |
| Average of N applied to effluent blocks | kg N/ha/yr | 62 |
| Effluent from farm dairy | % | 100 |
| Effluent from wintering pad | % | 0 |
| Effluent from feed pad | % | 0 |
| Average fertiliser N | kg N/ha/yr | 138 |
| Average other elements | kg N/ha/yr | 0 |

Calf Milk Storage
Assess the facilities and structures for non supply milk ensuring they are being maintained correctly.

### 8.48 Amenities / store rooms / rubbish

It is important that the amenities, store rooms and rubbish disposal areas are all well maintained.

Assess the structures and facilities including the structural condition of amenities and store room and the location/construction of the rubbish bins.
If a toilet is plumbed to the Farm Dairy effluent system, and is in use, then this will be identified as a critical hazard. If the Supplier agrees not to use this toilet then this may be downgraded to a major hazard. Within 2 weeks of assessment the toilet must be disconnected from the farm dairy effluent system and only in use if it fully complies with the requirements of NZCP-1. A revisit will be required to confirm this, unless satisfactory corrective action is taken during the assessment.

# 9 Assessment of Environmental Sustainability

The environmental appraisal is an important component of the annual assessment. The information gathered allows us to target information and, where necessary, further support to suppliers. Information gathered from the appraisal also allows Fonterra to report on improving environmental performance to both the regulatory authorities and to our customers.

The information farmers give us is only reported on a collective basis at a regional and national level. No individual's information will be distributed, outside of Fonterra, without their permission.

Farmers should be aware that the environment appraisal processes are to allow for the identification of those who might need additional support and advice. There will be minimum standards that will be expected from all suppliers and also good practice advice available where that is requested.

### 9.36 Effluent Appraisal

Effluent management is an issue that generates considerable public concern. Fonterra wants to support its farmers in implementing management practices that will reduce the risk of non compliance with regional council rules. Decreasing non compliance rates will assist in protecting our licence to operate and our ability to market our products globally under an environmentally sustainable banner.
The purpose of the Fonterra Effluent Appraisal is to identify risk of non-compliance with regional council rules and consent conditions 365 days a year.

Regional councils are responsible for monitoring, reporting and enforcing the regional plan effluent rules. Each region has different rules and processes for monitoring and enforcing them.

Fonterra has a team of Sustainable Dairy Advisors that are available to offer advice to suppliers who are found to be at risk and move them towards best management practise.

At the time of the Farm Dairy Assessment in the 2012/13 season Farm Dairy Assessors will be continuing to undertake the appraisal of the effluent system to identify suppliers requiring advice from a Sustainable Dairy Advisor.

Suppliers identified as having an effluent management issue will be rated critical, major, risk or minor by the assessor. Each rating will be referred to a Sustainable Dairy Advisor for follow up action. A "risk" category will be included in the effluent appraisal that will apply to the storage questions and the treatment ponds with discharge to

water sections, only. “Risk” will be listed against any property where there is less than 2 milkings effluent storage available and will be applied to all systems that have resource consent to discharge treated farm dairy effluent to water.

One legible copy of the appraisal form should be left with the supplier.

The Appraisal Form (questions set out below) has been modified for the 2012 / 2013 season and will now be identified as the **Environmental Appraisal Form**. There are some minor changes to the effluent system questions and questions around stock exclusion and wintering practices have been added.

There will be a small number of suppliers in some regions that operate a system that allows for both irrigation to land and treated discharge to a waterway, (often referred to as “dual systems”) in those instances the entire form will be required to be completed.

The irrigator shall be sighted as a key part of the effluent assessment – if the irrigator is not sighted there **MUST** be a reason recorded in the comments section.

In the 2012 / 2013 season there will be a much stronger focus on treatment pond systems that discharge to water. Assessors will be expected to identify poor performing or high risk treatment pond systems. All treatment ponds systems that discharge to water will be given a Risk rating at a minimum. Assessors will offer SDA advice to these suppliers and advise that SDAs can provide a one off discharge test at no cost.

## 9.37 Waterway Management Appraisal

Fonterra has widely communicated the intention to ensure that all dairy stock will be excluded from defined waterways on Fonterra supply farms. The Farm Dairy Assessment will now include a section that will look to assess compliance with this requirement.

**Stock Exclusion Standards and Definitions:** From 1 June 2012 Fonterra suppliers must meet the following minimum standards:

1. **Stock must be excluded from all waterways that permanently contain water and that are, at any time of the year, wider than 1 metre and deeper than 30cm at any point within or immediately adjacent to the boundary of the farm.**

2. **Farm races must include bridges or culverts where stock regularly cross a waterway. A “regular crossing” is defined as any crossing point over a waterway that is used more than twice per week, averaged over the year. One “crossing” is the herd going across the waterway for milking, and then returning following milking.**

3. **Sediment and/or effluent shall not be discharged into any waterway where it is likely to result in a significant adverse effect on the environment.**

Note that requirements for the last two minimum standards apply to all waterways except those that rarely flow or are largely ephemeral, whereas the stock exclusion requirements only apply to those that are wider than 1 metre, deeper than 30 cm and permanently containing water.

It is a requirement of the terms and conditions of supply that Suppliers provide **accurate** information on the location of fencing and regular crossings during the Farm Dairy and Environmental Assessment.

* Note that suppliers have until 1 December 2013 to complete the stock exclusion requirements as long as there is an Environmental Improvement Plan in place.

An appraisal will be completed during the Farm Dairy Assessment to identify waterways, areas of stock exclusion, crossings and other risk areas that exist on the farm. This will be done using a combination of electronic mapping, farmer reporting and on-the-ground auditing.

The **Waterway Management** appraisal will involve 4 assessment areas:

1. **Identification of waterways from which stock must be excluded and recording of where exclusion fencing is already in place.**

   All dairy stock must be excluded from waterways that are wider than a stride (1 m), deeper than a redband (30cm) and permanently contain water.

   The Assessor will have access to aerial photography (electronic or hardcopy) at the farm visit that will be overlaid with the property title information, and waterway information. The assessor will discuss the farm photography with the farmer or representative.

   **Appraisal Process:**

   (a) Is the property boundary accurately identified? (milking platform and attached support blocks including lease land). Where the farmer identifies farm boundaries that do not match with information overlaid on to the aerial photograph the assessor will record this in the appropriate way as set out by the GIS service provider protocol.

   (b) With the farmer identify waterways that are likely to be Fonterra defined waterways (see above). Record this in the appropriate way as set out by the GIS service provider protocol.

   (c) With the farmer identify where permanent fences effectively exclude stock from entering the waterways identified in (b). Record this in the appropriate way as set out by the GIS service provider protocol.

   (d) From the aerial photography the assessor will be able to identify where any waterways within 200m of the farm dairy are located. The assessor will conduct a full visual assessment of all waterways visible on the aerial photography within a 200m radius of the farm dairy. It is also advisable that waterways outside this area are actively observed should the assessor be required to access other parts of the farm during the assessment. The farmer will also be advised that validation of all waterway information gathered at the assessment will be undertaken over time.

   **Rating:** Where the above process identifies that defined waterways do not have full stock exclusion with permanent fencing the assessor will rate the non compliance as a major (see environmental Appraisal Form below) and a referral to the SDA team will follow. Additionally, the assessor will leave the Fonterra provided information form on farm at the time of the appraisal. This form will set out Fonterra requirements and the process to apply for dispensation. Assessors will not consider merits of dispensation issues. Suppliers seeking further information will be referred to the Service Team in the first instance.

   Note: For farms in the Taranaki Regional Council area the assessor will only need to question whether the farm has a Council issued “certificate of compliance” or an agreed Riparian Plan from the TRC. If yes this will be noted, if no will be identified as a major and referred to the SDA for follow up.

2. **Identification of waterway crossing points that are “regular crossings” and recording whether these crossings are bridged or culverted.**

   Farm Races must have bridges or culverts where stock regularly (more than twice a week on average through the year) cross a waterway.

   Note this rule applies to all waterways not just those defined for stock exclusion fencing.

   The Assessor will have access to aerial photography (electronic or hardcopy) at the farm visit that will be overlaid with the property title information, and waterway information. The assessor will discuss the farm photography with the farmer or representative.

   **Appraisal Process:**

   (a) Identify and mark on to the aerial photograph all points where races cross waterways. Record this in the appropriate way as set out by the GIS service provider protocol.

(b) Crossing points used more than twice a week on average through the year will noted and identified on the photograph. Record this in the appropriate way as set out by the GIS service provider protocol.

(c) Regular crossing points not bridged or culverted will be noted on the photograph. Record this in the appropriate way as set out by the GIS service provider protocol.

(d) The assessor will carry out a full visual assessment of all points where races cross waterways visible on the aerial photography within a 200m radius of the farm dairy. It is also advisable that waterways outside this area are actively observed should the assessor be required to access other parts of the farm during the assessment. The farmer will also be advised that validation of all waterway information gathered at the assessment will be undertaken over time.

**Rating:** Where the above process identifies that regular crossing points do not have effective bridges or culverts the assessor will rate the non compliance as a major and a referral to the SDA team will follow. Additionally, the assessor will leave the Fonterra provided information form on farm at the time of the appraisal. This form will set out Fonterra requirements and the process to apply for dispensation. Assessors will not consider merits of dispensation issues. Suppliers seeking further information will be referred to the Service Team in the first instance.

Note: For farms in the Taranaki Regional Council area the assessor will only need to question whether the farm has a Council issued "certificate of compliance" or an agreed Riparian Plan from the TRC. If yes this will be noted, if no will be identified as a major and referred to the SDA for follow up.

### 3. Winter Fodder Crops

Strip grazing of winter fodder crops is a common winter management practice that can create a high risk of sediment, phosphorus and faecal coliforms entering surface waters. The practice can also have significant impacts on soil structure.

**Appraisal Process:**

(a) Assessor will ask the question if winter fodder crops are used as part of the wintering system – including for cows or heifers grazed off farm. If Yes see below.

(b) Wherever winter fodder crops are used the assessor will leave education material with the supplier that sets out the environmental risks and best practice that will minimise that risk. Fonterra will provide the material to be left on farm.

### 4. Winter Grazing Off Farm

Winter grazing management can create significant environmental risks. Off farm grazing may create additional risks when cows are strip grazed on steeper land that might have less waterway exclusion fencing than the milking platform. Transporting stock also creates some additional risks that should be considered and managed.

**Appraisal Process:**

(a) Assessor will ask the question if winter grazing off farm is a management practice that is used. If Yes see below.

(b) Wherever winter grazing off farm is practiced the assessor will leave education material with the supplier that sets out the environmental risks and best practice that will minimise that risk. Fonterra will provide the material to be left on farm.

## 9.38 Environmental Appraisal Questions

Explanations for each question are provided after the table below.

| Environmental Appraisal | | | |
|---|---|---|---|
| **Supply Number:** | | **Herd Size:** | **RATING** |
| **Winter Milk:** | | | **mRMC N/A** |
| **Effluent System Appraisal** | | | |
| **1** | Is all effluent at the dairy including pit effluent and concreted entry/exit races, collected into an effluent management system? | | |
| **2** | Is there any effluent being discharged through the storm water diversion? | | |
| **3** | Is all effluent from feed pads, standoffs, wintering barns etc, collected into an effluent management system? | | |
| **4** | Are there any indications that feedpads or standoffs are not adequately sealed to prevent groundwater contamination? | | |
| **5** | Are all sand trap cleanings, solids scraped from feedpads and pond cleanings stored on a sealed surface or appropriately spread to land? | | |
| **Farms where effluent is applied to land** | | | |
| **6** | Are there any unauthorised discharges from the collection system or storage system, to water or to land? | | |
| **7** | Is there any indication that holding facilities are not adequately sealed, or that they might be structurally unsound? (includes storage ponds and sump) | | |
| **8** | Is there appropriate contingency storage to allow for prolonged wet weather or breakdowns, **(NB: less than 2 milkings storage always rated as "Risk")** | | |
| **9** | Estimated number of days storage potential. | | |
| **10** | Is there any indication or ponding or runoff from the irrigator? | | |
| **Farms where treated effluent is discharged to water** | | | |
| **11** | **Is there a current regional council resource consent? (NB: Yes – always rated as "Risk", no – major / critical)** | | |
| **12** | Are the treatment ponds well maintained, with sound embankments, adequate freeboard, effective baffles, pond surfaces clear of vegetation? | | |
| **13** | **Is the pond discharge resulting in discolouration of receiving water, or other significant effects? Any significant effects on the waterway that the pond discharges to MUST be recorded as a Major.** | | |
| **Waterway Management Appraisal (to be carried out in conjunction with mapping exercise)** | | | |
| **14** | Are there any waterways on this property that are wider than 1m, deeper than 30cm and permanently contain water? Yes / No | | |
| **15** | Where the answer to (14) is Yes, are **all** waterways as described in (14) permanently fenced to exclude stock access? Yes / No | | |

| | | |
|---|---|---|
| **16** | Do tracks or races that are used on average twice weekly or more, cross **any** waterway (not just larger waterways as described in (14))? Yes / No | |
| **17** | Where the answer to (16) is yes, are there bridges or culverts over **all** waterway crossing points as described in (16)? Yes / No | |
| **18** | Are there any areas of winter forage crops grown on this property? Yes / No | |
| **19** | Are any cows wintered off farm? Yes / No | |
| **20** | Are records for nitrogen fertiliser use and supplementary feeds being kept as required for the nitrogen efficiency measurement programme? Yes / No | |
| **Other Risk Areas** | | |
| **21** | Are there any other significant risk areas for effluent or sediment loss that are not effectively managed, e.g. underpass effluent, bridges, severe pugging, race runoff direct to water etc? | |

**Further Direction on Environmental Appraisal Questions**

*Question 1*
*Is all effluent at the dairy including pit effluent and concreted entry/exit races, collected into an effluent management system?*
*Check pit effluent is directed in to the effluent system, all drainage points from the yard are directed to the effluent system, all entry and exit races have effective nib walls, no leaking pipes or overflows.*

*Question 2*
*Is there any effluent being discharged through the storm water diversion?*
*Ask if there is stormwater diversion, inspect the discharge point for the stormwater diversion, check for stormwater diversion risks such as being located after a sandtrap.*

*Question 3*

Is all effluent from feed pads, standoffs, wintering barns etc, collected into an effluent management system?
*Feedpad, standoff and wintering barn effluent should be collected in to an effective effluent management system, cleanings (solid material) from these areas should be stored on a sealed surface or spread to land as they are removed. Uncontained effluent from these areas should be identified as a Major.*

*Question 4*
Are there any indications that feedpads or standoffs are not adequately sealed to prevent groundwater contamination?
*Pads should be sealed to prevent risks of groundwater contamination. Pads that are not likely to have an impermeable layer should be identified as Major.*

Question 5
Are all sand trap cleanings, solids scraped from feedpads and pond cleanings stored on a sealed surface or appropriately spread to land?
Check where solids from the effluent management system are stored; ask about practice for spreading solids. If there are significant volumes of uncontained solids rate as Major.

Question 6

Are there any unauthorised discharges from the collection system or storage system, to water or to land?
Any discharge of treated effluent to water must have a current resource consent. Some regions also require consent to discharge effluent to land ie effluent irrigation systems. If necessary consents are not current refer to SDA. Also use this question for unauthorised discharges of effluent that have not been picked up through other effluent questions.

Question 7
Is there any indication that holding facilities are not adequately sealed, or that they might be structurally unsound? (includes storage ponds and sump)
A visual inspection of condition of the ponds is required. Does the pond appear sound? Any large cracks or slumping of pond walls? Any evidence of seepage from pond walls? Also ask farmer if ponds are sealed or if the pond level drops without pumping.

*Question 8*
Is there appropriate contingency storage to allow for prolonged wet weather or breakdowns, (NB: less than 2 milkings storage always rated as "Risk")
Is there an effluent storage facility or just a sump? If sump only and there is likely to be effluent storage for less than two milkings this will always be rated as Risk. If a pump breaks down is there a contingency plan that will prevent overflows occurring? Note that if there have been overflows this will be rated as Major either in this question or under Q 1 or Q 6.

*Question 9*
Estimated number of days storage potential.
Asking how many days of effluent storage are provided for. A reasonable approximation can be made based on observation and farmer provided information.

*Question 10*
Is there any indication or ponding or runoff from the irrigator?
Anything other than minor localised ponding under an irrigator that has just been running should be rated as Malor. Runoff from an irrigator that creates a risk of effluent entering water should also be rated as Major. Refer to the region specific factsheet if not familiar with the relevant regional council rules. The assessor MUST inspect the irrigator or provide a clear reason for not doing so.

*Question 11*
***For farms that discharge treated effluent to water - Is there a current regional council resource consent? (NB: Yes – always rated as "Risk", no – major / critical)***
***All treatment pond discharge points MUST be inspected. All treatment ponds will at a minimum be identified as Risk. Treatment ponds that are in poor condition, do not meet all resource consent conditions or where the discharge is resulting in visual effects on the receiving water will be rated as Major. Note that this is to be an area of additional focus for assessors in those regions where there are treatment ponds.***

*Question 12*
*Are the treatment ponds well maintained, with sound embankments, adequate freeboard, effective baffles, pond surfaces clear of vegetation?*
*If treatment ponds do not appear to be in really good condition they will be rated as Major.*

*Question 13*
*Is the pond discharge resulting in discolouration of receiving water, or other significant effects? .*
*Any significant effects on the waterway that the pond discharges to MUST be recorded as a Major. Assessors will look at the discharge point and if the waterway is being affected to any degree beyond a 5m mixing zone this assessment will be rated as Major.*

**Further direction on waterway questions. (new questions 2012 / 2013 season).**

*Question 14*

*Are there any waterways on this property that are wider than 1m, deeper than 30cm and permanently contain water? Yes / No*
*A response is required for every property. The mapping exercise that will be carried out for every property will identify the extent of the waterways of interest. The assessor will be required to look at the farm aerial photograph for likely waterways of interest, to discuss with the supplier (or representative) and to carry out a full visual validation of waterway fencing within 200m of the farm dairy. The accuracy of this part of the assessment will be subject to third party validation over time. Fonterra will be reporting on waterway exclusion progress based on FDA information and therefore accuracy is particularly important. (see 9.36 para 3 of the protocol for definitions)*

*Question 15*
*Where the answer to (14) is Yes, it is necessary that we can identify if **all** waterways as described in (14) are permanently fenced to exclude stock access.*
*This question will be answered with N/A for farms where there are no waterways as defined in (15). Where there are defined waterways and they are not fully fenced the rating is always **Major**. The farm mapping exercise will identify the extent of fenced / non fenced waterways and this question will just be used to trigger an SDA response to farms where stock exclusion as required is not complete.*

*Question 16*
*Do tracks or races that are used on average twice weekly or more, cross any waterway (not just larger waterways as described in (14))? Yes / No*
*A response is required for every property. The assessor will be required to look at the farm aerial photograph for likely regular crossing points. Assessor will discuss with the supplier (or representative) and carry out a full visual validation of stock crossing points within 200m of the farm dairy. The accuracy of this part of the assessment will be subject to third party validation over time. Fonterra will be reporting on stock crossing points based on FDA information and therefore accuracy is particularly important.*

*Question 17.*
*Where the answer to (16) is Yes, it is then necessary to identify if there are there bridges or culverts over all waterway crossing points as described in (16).*
*This question will be answered with N/A for farms where there are no regular crossings as set out in (16). Where there are regular crossing points that are not bridged or culverted the rating is always **Major**. The farm mapping exercise will identify the number of crossing points and this question will just be used to trigger an SDA response to farms where stock crossing requirements are fully compliant.*

*Question 18.*
*Are there any areas of winter forage crops grown on this property?*
*Yes / No question and where response is Yes assessor will leave appropriate educational material on farm.*

*Question 19*
*Are any cows wintered off farm?*
*Yes / No question and where response is Yes assessor will leave appropriate educational material on farm.*

*Question 20*
*Are records for nitrogen fertiliser use and supplementary feeds being kept as required for the nitrogen efficiency measurement programme? Yes / No*
*Assessor will ask this question to provide a prompt for farmer awareness around the need to keep feed and fertiliser records to allow for the nitrogen efficiency and nitrogen loss measurement processes that will be in place in the 2012 / 2013 season.*

*Question 21*
*Are there any other significant risk areas for effluent or sediment loss that are not effectively managed, e.g. underpass effluent, bridges, severe pugging, race runoff direct to water etc?*
*This question can be used for any area of the environmental appraisal where the assessor identifies an environmental risk that has not been picked up elsewhere in the appraisal.*

*Comments section:*

*We require that assessors make notes that will provide clarity around the issues they have identified. Subjective statements or opinions are not required but information that will assist the SDA in understanding the issues will be noted here.*

## 9.39 Assigning Ratings to Environmental Issues.

| **Critical – Any unauthorised discharge of solid or liquid effluent on the day of inspection to surface water, or onto land in a manner that it is likely to enter surface or groundwater** | |
|---|---|
| **Issue** | **Example** |
| Any discharge of dairy farm effluent that is not authorised by the governing regional council plan, to a surface water body (rivers, streams, lakes, wetlands, drains) or other water body that ultimately discharges to a natural waterway. | Overflow of sump, pond, or stone trap to surface or ground water.<br>Unconsented discharge from storage or treatment ponds.<br>Effluent runoff from ponding that is reaching a waterway |
| Any discharge to a soak hole that drains to groundwater | |
| Evidence of systematic infrastructural or management failure of the effluent irrigation system resulting in effluent saturation ponding or sludge to a level deemed unacceptable by the governing regional council rules. | Severe surface ponding or sludge |
| Evidence of imminent effluent storage facility structural failure. | Cracks, evidence of seepage, indications that facility is about to collapse |
| NB: Until 1 December 2013 there will be no critical rating for stock access to water – however stock in water or clear evidence of this, will be rated as major but given a priority response and SDA will be contacted directly. | |
| **Major – Any discharge of solid or liquid effluent on the day of inspection where there is a risk of it reaching surface water, or onto land in a manner that creates a risk of it entering surface or groundwater. Any length of waterway requiring stock exclusion that is not fenced.** | |
| **Issue** | **Example** |
| Sump / pond / diversion discharges with no immediate risk of discharge to surface water. | Evidence of past overflows e.g. matting on grass around sump, bright green strips or very weedy areas around sumps |

| | |
|---|---|
| Evidence that a lack of storage is leading to over irrigation resulting in saturation ponding. | Ponding around irrigator – e.g. when tapped with boot, splash is apparent. Depends on how long after irrigator has stopped.<br>Matting or sludge around irrigator.<br>Evidence of irrigation during extended wet weather events |
| Discharges as a result of inadequate containment and transfer around the farm dairy, stone trap and storage facility. | Any failure of the system around the shed to contain all effluent within the system, (other than very minor leaks) Examples such as broken pipework, cracked or absent bunding, no collection for concrete areas that are washed down regularly. |
| Inadequate effluent solids management. | Tailings from stone traps and storage facilities are stored on an unsealed surface or without appropriate drainage back to the effluent system. |
| Evidence of past overflows or failures of system infrastructure or management where remedial action has been insufficient in removing risk of future overflows or failures. | |
| **Risk – Situations that increase risk of significant environmental effects over time.** | |
| Less than 2 milkings storage is always identified as “Risk”<br><br>Any situation where resource consent is held to discharge treated effluent to water will be identified as “Risk”– unless the appraisal identifies critical or major non compliance in the treatment pond section of the appraisal. | |
| **Minor – Any system or management issues that create a risk of effluent reaching surface or groundwater 365 days a year.** | |

If the Assessor is in doubt as to what to rate an issue the higher rating should be assigned. All ratings will be verified by the Sustainable Dairy Advisor

## 9.40 Referral Process.

All issues identified should be referred to the Sustainable Dairying Team via the following processes:

**CRITICAL ISSUE**
A critical issue should be recorded on the Effluent Appraisal form and the issue clearly defined in the comments section. In the 2012 / 2013 season stock in a defined waterway will be rated as major however the assessor will follow the critical response process (as below).

Any critical issue must be escalated via a phone call to the Fonterra Service Centre immediately following the assessment. The Service Centre will refer the supplier to the assigned Sustainable Dairy Advisor (or an alternative if the assigned is unavailable) to ensure a visit is completed as soon as possible.

A copy of the Effluent Appraisal form should be faxed or emailed to the SDA within 24 hours of the assessment.

The SDA will verify the hazard and its rating and prepare an Environmental Improvement Plan.

All critical issues must be rectified within 24hours or milk will not be collected. The SDA will follow up all corrective actions.

**MAJOR and MINOR ISSUES**
All major and minor issues should be recorded on the Effluent Appraisal form and **the issue clearly defined in the comments section. Comment such as "Issue identified" is not adequate information.**

All major and minor issues will be escalated to the assigned Sustainable Dairy Specialist via submission of the form to DARSY using the CSP internal procedure that supports this process.

For all majors the SDA will verify the hazard and its rating and prepare an Effluent Improvement Plan (EIP).

All major issues must be rectified in accordance with the timeframes outlined in the EIP or milk will not be collected at the beginning of the following season. The SDA will follow up all corrective actions.

# 10 Animal Welfare Section

During the farm dairy assessment if there are any animal welfare issues of concern noted please bring this to the attention of the Fonterra Milk Supply Food Safety Manager.

## 10.41 Inductions

The assessor must check how many inductions are carried out on the farm. The assessor will do this by answering the questions for inductions on the bottom of the assessment form. If the farmer is not inducing record the inductions percentage as 0%. If the farmer is inducing then record the number of cows induced. Then ask the farmer how many total cows are milked and record this in the space provided.

The percentage of cows induced can then be calculated as shown below:

20 Induced / 200 total cows = 0.10 x 100 = **10%**

If the farmer has carried out inductions this season then the assessor needs to sight the vet induction plan. If the plan is not available at the assessment then the assessor must rate as an Immediate "C" and confirm a return visit date to site the induction plan. The farmer must be advised that they can fax, email or post a copy of the induction plan to the assessor prior to the return visit date to avoid a return visit.

The induction plan is extremely important to ensure the farmer / vet is following the Induction Code of Practice.

The Assessor will check to ensure:

- Induction COP records (induction plan) are available at assessment