June 2020

Nitrogen Leaching Loss Rate Development Guidelines

Version 3.1

Disclaimer

Contents

1. Background information and Overseer training

This guide has been produced to assist Certified Farm Nutrient Advisors in the Waikato region prepare a Nitrogen Leaching Loss Rate (NLLR) for the purposes of *Proposed Waikato Regional Plan Change 1: Waikato and Waipā rivers.* This guide should also be used by practitioners who are conducting future state scenario modelling to accompany any application for resource consent.

1.1   How to use this guide

The *Nitrogen Leaching Loss Rate Development Guidelines* have been constructed to complement the *OverseerFM User Guide.* Until recently the Overseer Best Practice Data Input Standards (BPDIS) have been available to assist in data entry decision making. The BPDIS have now been incorporated into the *OverseerFM User Guide.*

This document is not intended to replace or substitute the advice available from Overseer Ltd, or from the *OverseerFM User Guide.* Rather this guide contains advice pertaining to the development of NLLRs and looks to provide guidance not covered by the *OverseerFM User Guide.*

For all definitions pertaining to proposed plan change 1 please visit:

🌐   waikatoregion.govt.nz/healthyrivers

1.2   Caveats

The use and interpretation of this guide is subject to changes, including:

- changes brought about from the ongoing validation and development of OverseerFM
- changes to the *OverseerFM User Guide*
- changes to the proposed plan change 1 brought about by the appeals process
- changes to methodologies and workarounds as better knowledge is developed.

1.3   Acknowledgements

Waikato Regional Council would like to acknowledge the assistance provided by the following organisations while drafting this guide.

- Overseer Ltd
- Ballance Agri-Nutrients
- Perrin Ag Consultants
- Fonterra Ltd
- Bay of Plenty Regional Council
- Environment Canterbury.
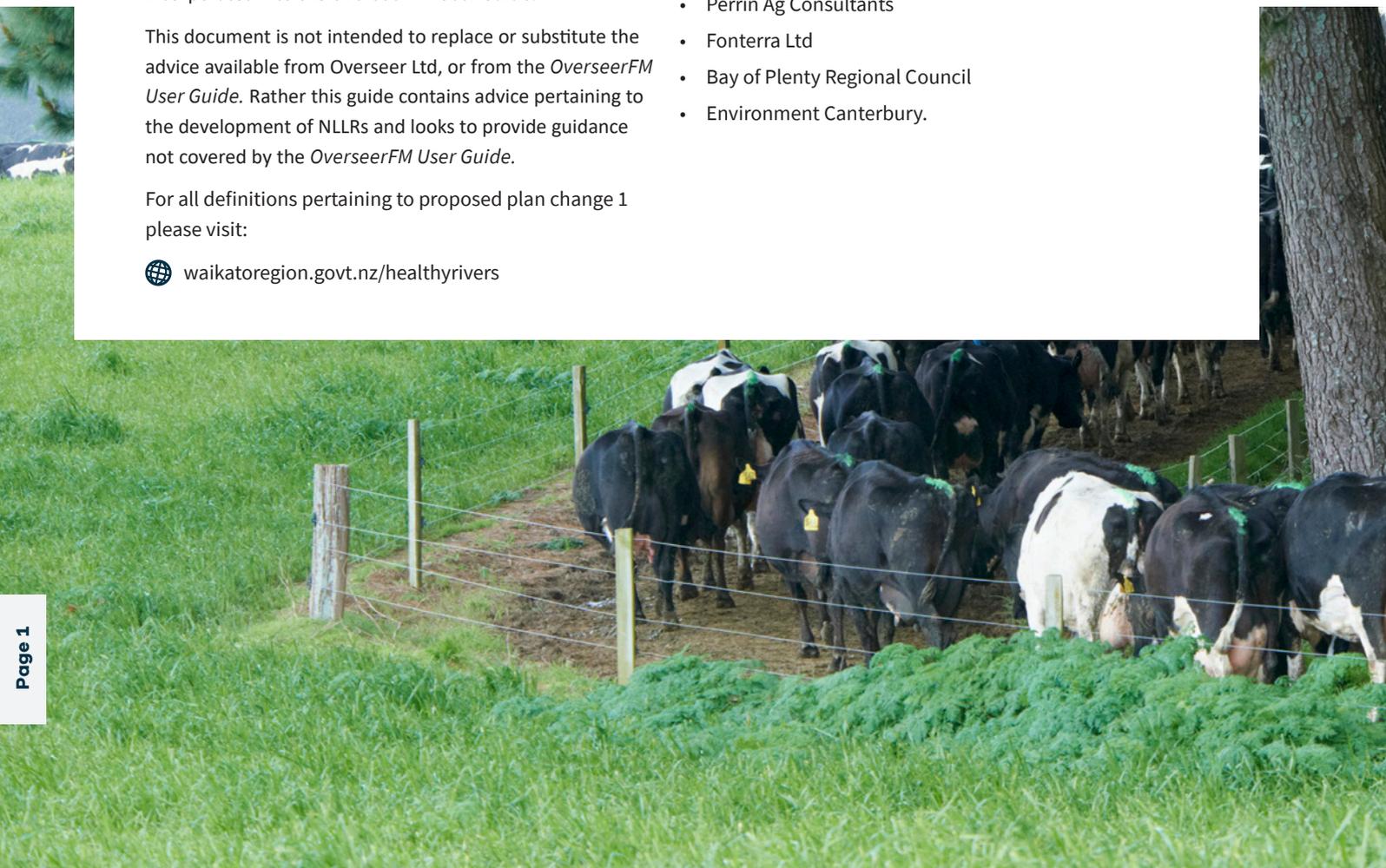
1.4   Training in the use of Overseer

Currently, there is no specific training course for Overseer. There are user guides, tutorials and factsheets provided on the Overseer website, and Overseer Ltd is planning future training.

Massey University's Fertiliser and Lime Research Centre runs two courses in sustainable nutrient management (intermediate and advanced) that involve the use of Overseer. For further information please visit:

🌐   massey.ac.nz/~flrc/shortcourses/SNM_information.html

1.5   Certified Nutrient Management Advisor

The Nutrient Management Advisor Certification Programme (NMACP) has been established by the Fertiliser Association of New Zealand and DairyNZ to certify nutrient management advisors.

The aim of the programme is to build and uphold a transparent set of industry standards for nutrient management advisors to meet, so they provide nationally consistent advice of the highest standard to farmers.

For further information please visit:

🌐   fertiliser.org.nz/Site/certification-programme.

1.6   Certified Farm Nutrient Advisor

All OverseerFM analyses for establishing and managing NLLRs for proposed plan change 1 must be produced and audited by a Certified Farm Nutrient Advisor (CFNA). Advisors working towards certification can complete the analyses and then get them signed off by a CFNA.

In accordance with proposed plan change 1, a CFNA is a person who has been approved by the Chief Executive of Waikato Regional Council to provide nutrient management advice and produce a Nitrogen Leaching Loss Rate in accordance with Schedule B. The person shall:

- Be certified as a Nutrient Management Advisor under a national nutrient advisor certification programme (or an equivalent certification programme approved by the Chief Executive of Waikato Regional Council); and
- Have agreed to Waikato Regional Council's terms of agreement for operating as a Certified Farm Nutrient Advisor.

For clarity, the only national nutrient advisor certification programme approved to date is that of the NMACP described in 1.5.

2. Nitrogen Leaching Loss Rate introduction

An NLLR is the estimated nitrogen leaching loss (kg N/ha/yr and kg N/yr) of a property as modelled in OverseerFM or another approved model in conformance with Schedule B and these guidelines. The NLLR can be derived from the most recent farming year or any full year between 2015/2016 and 2019/2020, except for commercial vegetable production where the NLLR is the highest leaching rate in any year between 1 July 2006 and 30 June 2016.

The NLLR must be determined by a Certified Farm Nutrient Advisor using the current version of the model for the most recent year. If an NLLR is based on a more historical farming year, then the NLLR can be based on the version of the model used when determining that NLLR.

2.1 Nitrogen footprint

A nitrogen footprint is essentially a Nitrogen Leaching Loss Rate prepared for a land use change consent application (Rule 3.11.5.9 of proposed plan change 1). The nitrogen footprint is the highest year of predicted nitrogen leaching using the current version of Overseer from the 2015/2016 year.

The inputs used to model the nitrogen footprint must be validated at the time of the consent application. Because of the non-complying status of these applications, Waikato Regional Council must maintain a high degree of confidence in the reliability of the input data. Validation data includes records listed in Schedule B (Section 2(d)) of proposed plan change 1.

2.2 Data collection and validation

Proposed plan change 1 states that validation data (records) of Overseer inputs must be supplied to the council on request. These records must be retained for the life of the regional plan and/or relevant consent, whichever is longer. Data can be scanned and stored electronically if desired. It is important this data is retained because farmers and CFNAs may be subject to audit.

Records required (including those described in Schedule B) include:

- Records of stock numbers and stock classes, births and deaths, stock movements on and off the property, grazing records and transport records.
- Total annual milk solids as stated in the milk supply statement.
- Records of fertiliser type and amount, including annual accounts, and any records of fertiliser application rates and placement.
- Quantity and type of feed supplements purchased and used on the property.
- Water use records for irrigation (to be averaged over three years or longer) in order to determine irrigation application rates (mm/ha/month per irrigated block) and areas irrigated.
- Crops grown on the property (area and yield), quantities of each crop consumed on the property, and quantities sold off farm.
- Horticulture crop diaries and New Zealand Good Agricultural Practice (NZGAP) records.
- The Nitrogen Leaching Loss Rate data as defined in Clause b.
- Soil test data – including anion storage capacity.
- A map which shows property boundaries, block management areas, retired/non-productive areas and areas used for effluent irrigation.

Advice note: For the avoidance of doubt, financial information contained within the above records may be redacted (blacked out) prior to it being provided to Waikato Regional Council.

3. Entering farm data into OverseerFM

The guidelines below follow the same topic structure as the *OverseerFM User Guide* (OUG) and refers to the guide's respective section numbering for convenience. Additional commentary is only provided where guidance is not consistent with the OUG. Otherwise, refer to the OUG.

3.1   OUG 7.4 Blocks

3.1.1   OUG 7.4.1 Management Blocks

The correct entry of management blocks is essential when using OverseerFM. The climate and soil data used by the model is derived from the spatial positioning of blocks. The OUG provides advice on correct blocking criteria.

The total farm area does not have to be contiguous; blocks may be geographically separated by road, river or utility corridor and included in the same nutrient budget for an NLLR *(see PC1 definition of a property for more detail).*

Farm property area is defined by the legal title as per the Waikato Regional Council rating database.

Farms that span several titles must use individual titles as a primary blocking basis i.e. will not cross title boundaries. Those blocks should be named using property valuation references or addresses (or another unique identifier). The OverseerFM analysis must include the entirety of a farm.

Farm areas could be only part of a title area. For example, one title could have three farming businesses operating within it. In this instance, clear mapping of these businesses is required and shall not overlap.

For farms that span sub-catchment boundaries, Freshwater Management Unit (FMU) boundaries, or the plan change boundary, the whole farm must be blocked and modelled in Overseer. Blocking should clearly be delineated by sub-catchment or FMU and be named accordingly. Those blocks that fall inside the plan change area should be labelled as such, and their nitrogen leaching values can then be derived from the overview page in OverseerFM.

3.1.2   OUG 7.4 SOIL

Once a block has been defined in OverseerFM the model will pull the relevant soils data from the S-Map database and assign it to the block. This default S-Map data should be used in every instance.

Where credible soil test data is available, this should be defined using the methods outlined in the *OverseerFM User Guide.*

3.2   OUG 7.5 Climate and drainage

All entries as per the *OverseerFM User Guide.*

3.3   OUG 7.6 Pasture

The *OverseerFM User Guide* provides information on setting pasture type.

3.3.1   Default pasture type

In lieu of verifiable pasture type data, use the following default pasture types.

- Default pasture type for dairy farms and intensive beef operations is ryegrass/white clover.
- Default pasture type for drystock flat, rolling and easy topography is ryegrass/white clover. For steep topography, the default pasture type is browntop.

3.4   OUG 7.7 Animals

The *OverseerFM User Guide* and the BPDIS provide considerable guidance on the entry of stock into the model.

When developing an NLLR, stock weight and weight gains are NOT to be entered. Age at start is entered where available, and other weight fields are left blank so the model assumes default values.

Stock entry must also correctly align with the Overseer year (July to June), even if a farm's validation data is derived from financial years with differing start and end months.

Stock numbers should always be validated.

If validation data is not available for entries associated with animal inputs such as breed, breeding percentages, birth dates, weaning dates, wool production, and stock input of weaned animals, Overseer FM default values should be used.

3.4.1   Weights and age-at-start

Always leave the weight entry box blank – including weaning weight – both when entering in new mobs and also when adding sale or purchase events. This will ensure that default weights are always used.

Where there is the option, fill in the age at start of entry. The age at start is the age of the animal mob in months at the time when animals are brought onto the farm or at the age at the start of the year.

3.4.2   Default weaning weights

Where OverseerFM requires a weight for weaners, the following weights should be used:

- Lambs – 24kg
- Calves (beef on their mothers until weaning) – 150kg
- Fawns
    - Pre-roar (approx. 1 March) – 54kg
    - Post-roar (approx. 1 May) – 62kg
    - Pre-winter (approx. 30 June) – 70kg

3.4.3   Stock entry data for farm financial years that are not July-June

OverseerFM requires data input from July to June for its inbuilt stock reconciliation calculations.

In cases where, for example, a farm financial year starts in April and ends in March, the following information will be required to enter stock number events per stock class.

For the 2014/15 Overseer year stock data entry:

- The 1 April balance and any stock movements or trading for the next 3 months (April, May June 2014) to ascertain starting balance as at 1 July 2014.
- The starting balance (1 July) will then be entered into Overseer for each stock type.
- Livestock events per stock type will be entered as normal until 31 March from the April 2014 to March 2015 records.
- Starting balance (as a check for stock numbers as at 1 April 2015) and data pertaining to livestock trading and movements from April to June 2015 from the April 2015 to March 2016 records will be required to complete the necessary livestock events for the Overseer 2014 to 2015 year.

A similar methodology will be required to manage any other offset financial years, such as 1 June to 31 March.

Calendar year	2014									2015					
Overseer year	1 April	1 May	1 Jun	1 July	1 Aug	1 Sept	1 Oct	1 Nov	1 Dec	1 Jan	1 Feb	1 Mar	1 April	1 May	1 Jun
Account year	April 2014 – March 2015												April 2015 - March 2016		
	Transactions from this period to ascertain 1 July balance		Stock events for the period 1 July to 31 Mar entered into OverseerFM										Transactions for this period for final 3 months of stock entry into OverseerFM		

Table 1: Illustration of calendar year vs Overseer year vs April to March account year

3.4.4 Stock breed defaults

Where stock breed is not evident or cannot be verified (including in cases where previous landowners have only supplied partial data), use the following defaults.

- Sheep – Romney.
- Beef – Angus.
- Deer – Red.
- Dairy goats – Saanen.
- Dairy sheep – East Friesian.
- Dairy cows – Friesian x Jersey cross.

3.4.5 Lambing percentages and dates defaults

Where data is not available regarding lambing percentage and dates, use the following defaults.

- Lambing date, 15 August.
- Weaning date, 15 December.
- Lambing percentage, 130%.
- Breeding ewes replacement rate, 20%.

🌐 beeflambnz.com/data-tools/sheep-beef-farm-survey

3.4.6 Beef calving percentages and dates defaults

In the absence of information pertaining to calving dates and percentages for beef herds, use the following defaults.

- Beef calving date, 1 September.
- Beef weaning date, 1 April.
- Beef calving, 85%.
- Beef replacement rates, 15%.

🌐 beeflambnz.com/data-tools/sheep-beef-farm-survey

3.4.7 Dairy animal default breed and calving

Where dairy breed, calving, and production data is unavailable, use these defaults.

- Breed – FxJ Cross.
- Dairy calving date, 1 August.
- Dairy weaning date, 1 August.
- Dairy calving, 85%.
- Dairy replacement rate, 20%.

3.4.8 Dairy production defaults

Milk solids production is a major driver to predicted nitrogen leaching, because it is closely associated with metabolisable energy uptake and associated nitrogen cycling. Generally, dairy companies will have records of milk production. Advisors should talk to Waikato Regional Council staff if milk production data is unavailable.

The average (default) length of the milking season is 270 days. If milking starts from 1 August (average calving date) this will equate to an average drying off date of 28 April.

The average stocking rate for dairying in the Waikato is 2.8 cows per hectare (for information purposes only – not to be used as a default).

3.4.9 Dairy grazing numbers

If a dairy grazing operation only has invoices pertaining to a monetary figure, the CFNA should research the typical cost per cow per day rate (based on other farms' invoices etc), make an assumption around the average time that cows are grazed off platform (from average drying off dates and average calving dates), to calculate probable number of cows.

3.4.10 Fawning percentages defaults and dates

In the absence of information pertaining to fawning dates and percentages, use the following defaults.

- Deer fawning date, 28 November.
- Deer weaning date, 1 March (for pre roar stock).
- Deer fawning rate, 85%.
- Deer replacement rate, 20%.

🌐 mpi.govt.nz/dmsdocument/3041-deer-industry-new-zealand-estimation-of-deer-population-and-productivity-data-1990-2012-review

3.4.11 Stock Input of weaned animals

Once animals are weaned they are to appear on the stock reconciliation.

Before they are weaned, Overseer accounts for their nutrient cycling via lactation and the associated additional energy requirements of their mothers.

Regarding dairy calves, once they are removed from their mothers and fed powdered milk mix, they should appear on the stock reconciliation. However, if they are fed milk from the farm dairy, they should not appear on the stock reconciliation until they are sold or the feed type is changed, or when they are weaned off milk.

3.4.12 Wool production defaults

In the absence of verifiable data, use the default figure of 5kg wool/sheep.

🌐 beeflambnz.com/data-tools/sheep-beef-farm-survey

3.4.13 OUG 7.7.3 Animal distribution

Set Relative Productivity to "no difference between blocks".

Set How do you define the % of pasture eaten by each animal enterprise on each block to "Based on animals present on block".

3.4.14 Stock entry of dairy sheep

OverseerFM does not currently have the ability to input or model dairy sheep milking operations.

An acceptable workaround is to input the dairy sheep system in the goat milking module, noting the following:

- Always input ewe weights into the goat weight entry pane. Use a default weight of 75kg for MA ewes or 60kg for Hoggets.
- Enter breed as 'other'.
- Do not use default kidding or weaning dates as these relate to goats. Override these values with actual sheep lambing and weaning dates.
- Do not use default lactation dates (these will be average for goat systems) – enter in the actual values.

Note: Because this module of Overseer was built around goat animals, the nutrient budget predictions will not be accurate and should only be used as an indication for scenario modelling. Future changes to OverseerFM (whether these are improvements to the goat module or the inclusion of a sheep milking module) are very likely to change nitrogen loss predictions.

3.4.15 Stock entry of dairy goats

Dairy goats should be entered as per guidance in the *OverseerFM User Guide.*

3.4.16 Horses

Horses have to be entered using the *'Other Animal'* stock entry. This allows only the entry of the total number of stock for a given year.

If horse numbers vary throughout the year, an average figure will have to be used. This is calculated by ascertaining monthly horse numbers and averaging the sum of those over 12 months.

3.4.17 Chickens

Chicken farming can be modelled in OverseerFM by working out how much they excrete, subtracting any manure that is sold off farm (if any), and applying the remainder to the block that they are present as an organic fertiliser.

To set up the organic fertiliser, CFNAs will also need to know the DM content percentage, percentage of N in organic form, and the nutrient data as per the screen shot below.

In the absence of nutrient test data, suitable referenced literature regarding chicken manure OM N and DM percentage may be used to justify inputs.

CUSTOM FERTILISER NAME

Chicken Manure

*
ORGANIC TYPE

Other organic material ▾

*
DM CONTENT PERCENTAGE

Enter the fertilisers dry matter content as a percentage

PERCENTAGE OF N IN INORGANIC FORM

Percentage of N in inorganic form

*
NUTRIENT DATA

N	P	K	S	CA	MG	NA	UNITS
N	P	K	S	Ca	Mg	Na	%

3.5 OUG 7.8 Structures and effluent systems

In most cases the entry of effluent management is straight forward and should easily follow the *OverseerFM User Guide*. The majority of effluent systems will fit into the types and systems described in those documents.

On occasion there will be irregularities in effluent management, and appropriate entry into OverseerFM will have to be assessed on a case-by-case basis.

3.5.1 Effluent solids applied through liquid irrigator

In the situation where a dairy effluent pond has an efficient stirring system and large irrigator nozzle that results in minimal solids having to be removed (because the solids are irrigated onto the block through the gun with the liquids), users need to represent in OverseerFM the transfer of nutrients in the effluent onto the blocks.

When entering data into OverseerFM, you have to select (in the pond solids data entry pane) either *'Spread on selected blocks'* or *'Exported'*.

The most appropriate workaround in OverseerFM is to select in the pond solids data entry pane *'Spread on selected blocks'* and enter in that *'Ponds are emptied every 1 year'*. Also, ensure that the pond solids are "spread" on all the blocks receiving liquid effluent applications (i.e. every effluent block will have a liquid application and solids application).

If this occurs over multiple months (such as when a contractor comes on farm to spread the stirred effluent), enter each month that this occurs under the solids application pane.

3.5.2 Piggery effluent

Piggery effluent should be entered under organic fertilisers as *'Piggery effluent'*. Interpretation of the effluent form choices are as follows:

- Untreated – effluent flushed to sumps and irrigated direct to land
- Liquid after separation – the liquid fraction after solids have been removed by solid separation
- Solids from separator or ponds – solids from a solid separation unit, or pond solids/sludge.

Users will require nutrient loading data (kg/month applied).

If piggery effluent is mixed with dairy effluent, all effluent should be exported and then imported as an imported dairy effluent and applied (solids and liquids).

Again, users will require nutrient loading data (kg/month applied).

3.6 OUG 7.9 Crops

Crops and fodder crops can be difficult to manage in Overseer. It is expected that this section of the *OverseerFM User Guide* will continue to be updated over time as the model advances.

Crops and Fodder Crops should be entered in accordance with the *OverseerFM User Guide*.

Definitions of Overseer terminology pertaining to the ending of crop rotations are:

- Final harvest: The Final harvest check box is displayed on Crop defoliation dialog accessible from the Crop rotation table. This can be ticked to indicate the last defoliation event of the crop at which time regrowth ceases.
- End crop: The month the crop ends can be selected from the *'Modify growth curve and harvesting'* panel of the Crop dialog accessible from the Crop rotation table. The crop is pulled or sprayed out at the end of the specified month.
- End rotation: *'Month re-sown in pasture'* must be selected. It is the last month of a fodder crop's crop rotation. At the beginning of this month the block is sown back into permanent grazed pasture. *'Crop rotation final month'* must also be selected. This is the final month of a crop block's crop rotation.

A Fodder Crop should be entered as a Crop (crop block) when:

- a fodder crop covers more than 25% of the farm area
- the same paddock/s of the farm are used continuously for fodder cropping
- the fodder crop's cycle (i.e. duration between sowing and harvest), is greater than a single assessment year
- a fodder crop is not re-sown back into pasture.

3.6.1 Crop default settings

3.6.1.1 Default areas from seed invoices

For the purposes of implementing proposed plan change 1 where there is incomplete data, the maximum default percentage of the effective area that can be used as cropping area in any one year (both summer and winter crop areas combined) is 5 per cent (this means 5 per cent of the effective farmed area of a farm or enterprise that was actually sown into a crop). For this default to be used, at least partial evidence must be available (such as a seed invoice).

It is also possible to work back from invoices e.g. seed or fertiliser invoices:

kg of seed purchased/typical sowing rate/ha = area (ha)

kg of crop specific fertiliser/recommended application rate/ha = area (ha)

3.6.2   Default crop types

Default Summer Fodder Crop Turnips.

Default Winter Fodder Crop Brassica (Rape, Kale), Swede.

Default Summer Forage Crop Maize.

Default Winter Forage Crop Oats.

3.7   Crop end date

Crop end dates should be the month when either pasture is re-established or a new crop is planted that will be present in the following reporting year.

3.8   OUG 7.10 Supplements

The import and export of supplements on farm can change predicted nitrogen leaching because of changes to energy cycling in the farm system. If feed is imported or exported, Overseer will change predicted pasture growth to match animal supply with demand. Pasture growth effects nutrient uptake and in-soil nutrient cycling, including losses.

Whether supplements are carbohydrate or protein rich also effects overall nitrogen losses.

Generally, supplements imported should not be included without verification. For cases where partial verification is available, the following defaults may be used.

3.8.1   Calculating supplements imported with no data

If stock data is verifiable and an obvious feed shortage is identified from farm system data, or if OverseerFM has predicted unusually high pasture growth, run FARMAX to identify any seasonal feed surplus or deficits and assume that any feed deficit was purchased (and surplus has been sold) as supplement. This method will also be validated by typical pasture growth prediction from OverseerFM.

3.8.2   Supplement type

In the absence of verifiable information, the default supplement type (either made on farm or imported) is *'Pasture silage; Average quality'*.

3.8.3   Supplement utilisation

Default setting is average.

3.8.4   Bale size

The default is 12 BE (bale equivalent).

3.8.5   Horse pellets supplementary feed

Horse feed supplementary pellets imported as a feed for equine systems is not available in Overseer. Instead, input the same weight of maize grain.

3.9   OUG 7.11 Irrigation

Irrigation inputs are to follow the *OverseerFM User Guide* and the Overseer Best Practice Data Input Standards.

3.10 OUG 7.12 Fertiliser

In some cases, there will be a paucity of information available pertaining to fertiliser application. Either invoices may not be available or there may not be any proof of placement.

If actual invoices are not available, a summary of total fertiliser purchases is usually available from the fertiliser company. If the fertiliser company is not known, Ravensdown and Ballance may be able to search their databases by address or business name.

Both co-ops provide an annual statement of fertiliser purchases to align with rebate payments. The statements include purchase and uplift date.

To ensure consistency in these situations, the following methodologies should be used.

3.10.1 Manufactured synthetic fertilisers NOT containing nitrogen

Using a fertiliser company summary, without proof of placement or proof of purchase date, the quantity of nutrient purchased should be applied evenly across the entire effective area of the farm.

For example, if 23 tonnes of superphosphate was purchased between July 2014 and June 2015 and the effective farm area was 320ha, then the application rate is 71kg superphosphate/ha.

23,000kg superphosphate / 320ha = 71.875kg/ha (71kg/ha rounded down)

As a default, non-nitrogenous fertilisers should be applied in October.

Note: In the absence of application verification, use dispatch date if available.

3.10.2 Manufactured synthetic fertilisers containing nitrogen

Nitrogen fertilisers, using a fertiliser company summary without proof of placement or proof of purchase date, may be entered into OverseerFM.

If any crop specific fertilisers are indicated, these should be applied to the crop only. If the recommended application rates are factored, the crop area can also be proven and calculated given any lack of verification pertaining to this. Crop fertiliser default application method is surface applied. Crop fertiliser should be applied during the month of sowing as a default.

For pasture blocks, if the farm is a dairy platform and has an effluent application area, this area should be excluded from any averaging calculations.

For example, if 21.5 tonnes of urea was purchased, the farm size was 320ha, and had 20ha of crop and a 40ha effluent application block, the urea should be applied to the remaining 260ha.

21,500kg urea / 260ha = 82.69kg/ha (82kg urea/ha rounded down)

As a default, nitrogenous fertilisers should be applied in split dressings (not exceeding the minimum standards in Schedule C), using as many months in the following sequence as necessary:

- October.
- November.
- December.
- March.
- April.

Note: In the absence of application verification, use dispatch date if available.

3.10.3 Chicken manure

Chicken manure should be entered under organic fertilisers as an *'Other organic material'*. Users will require the following information:

- Weight (tonnes/month) wet weight.
- DM content percentage.
- Nutrient loading percentage data.
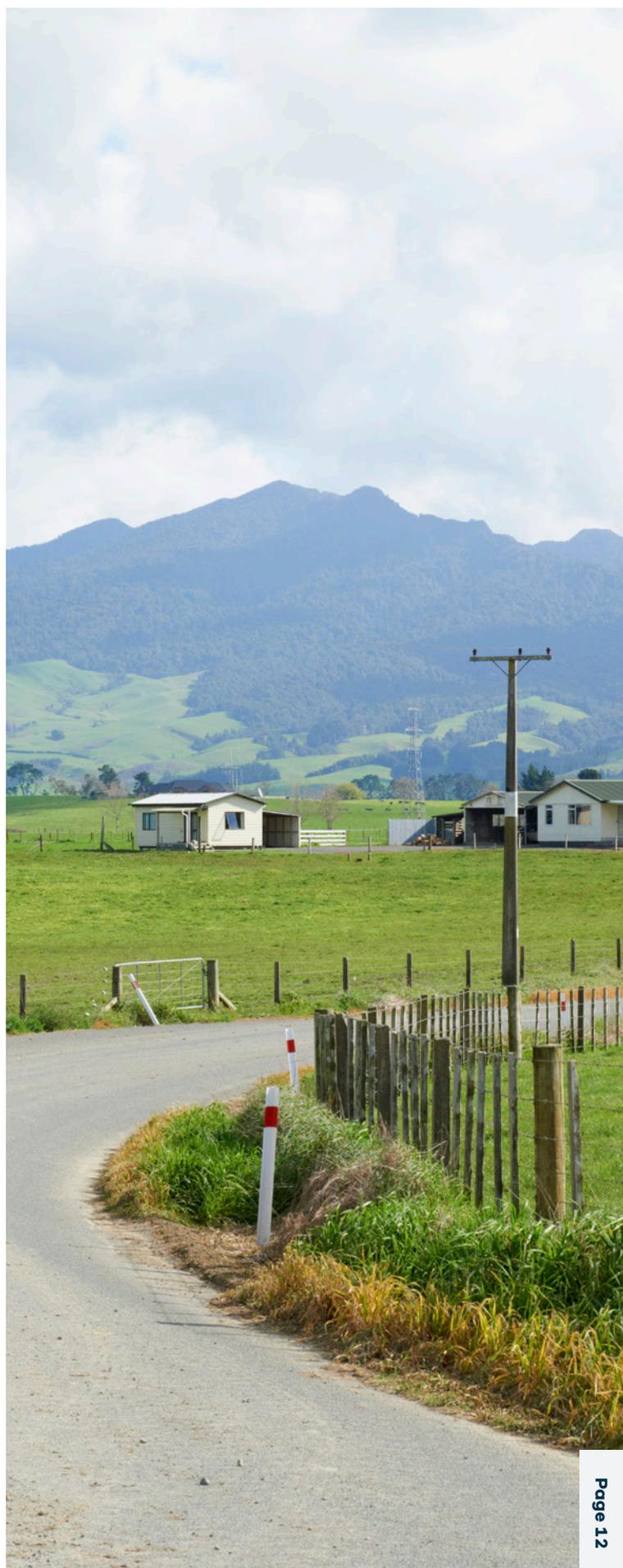
4. Dairy factory wastewater

Occasionally, farms will apply dairy factory wastewater. The nutrient loading, and sometimes the hydraulic loading, has to be accounted for in Overseer.

Dairy factory wastewater falls into two main categories: high strength and low strength.

4.1 High strength dairy factory wastewater

High strength dairy factory wastewater includes those that are high in fats, have a high biological oxygen demand and a high solids content including tank bottom cleanings, dissolved air floatation unit treatment solids, or the dewatered treatment bio solids. Only a few of this category would be classed as whey. Their nutrient loading can vary considerably, but the source dairy factory should be able to provide an indication of nutrient content.

The whey should be entered into OverseerFM as an Organic fertiliser – Dairy factory.

Users can then either select the appropriate type of whey or, if it is not a whey-based product, choose to either enter nutrient amounts or nutrient concentrations and then amount applied. Users should have nutrient reports to justify their data entry into OverseerFM.

It is preferred that users input the nutrient content based on verified data.

ADD ORGANIC FERTILISER

ⓘ Create a new or select an existing fertiliser and add applications to blocks. Each application may be defined for mul

* CUSTOM FERTILISER NAME

Dairy Factory Wastewater

* ORGANIC TYPE

Dairy factory ▾

* FACTORY EFFLUENT

Select a factory effluent
Enter nutrient amounts
Lactic acid whey
Sulphuric acid whey
Cheese whey
Enter nutrient concentrations

4.2 Low strength dairy factory wastewater

Low strength dairy factory wastewater includes washdown water and condensate from driers. These are typically low in nutrient concentration.

For small volumes of these wastes, data can be entered as *'soluble fertiliser'*, and the nutrient content can be entered once the *'click to apply'* has been activated.

Again, verifiable data from the dairy factory is necessary to justify any inputs.

4.3 Low strength dairy factory wastewater hydraulic loading

Volumes of low strength dairy factory wastewater can be high.

To fully account for the variations in volume, concentrations and loadings that occur each month, the *'soluble fertiliser'* option is most appropriate. Due to cleaning cycles and different manufacturing plants coming on/off production, there is typically no fixed relationship between wastewater volume and its nutrient concentration.

Often more volume can mean lower actual nutrient loadings being irrigated due to greater volumes of cleaning water coming through the system. To combat this, most factories now use daily composite samples and measured irrigation volumes to calculate daily nutrients applied to each paddock and block. These are then summed for a month to input into OverseerFM. Using these protocols allows sufficient flexibility to take account of this complexity.

The danger with volume x a generic concentration is that it may misrepresent the actual rate of nutrients applied. In addition, when nutrients are applied in the irrigation water and the rate of irrigation exceeds field capacity, Overseer automatically assumes drainage which then carries nutrients below the root zone. The mineral nitrogen content in most of our wastewaters is very low i.e. it is mainly nitrogen as residual fats or proteins which will adsorb to the soil to await mineralisation before it is available for leaching.

To account for the irrigation effect, high volumes should be entered as a custom irrigation. Nutrient contents and volumes can be entered – based again on verifiable data.

ADD IRRIGATOR

ⓘ   Enter the irrigation system details and nutrient concentration or use defaults. Add irrigation activities for the blocks and mont

* **IRRIGATION SYSTEM TYPE**

Spraylines ▼

* **NAME**

wastewater

* **NUTRIENT SOURCE**

Block specific ▼

N	P	K	S	CA	MG	NA	UNITS
N	0	0	0	0	0	0	mg/l
							µg/ml
							g/m3
Required							ppm

5. Reporting of Inputs

5.1 Summary of decision making

When developing an NLLR or modelling to accompany a resource consent application, there will be occasions where a CFNA will need to apply their better judgement in order to complete an assessment. Such instances may include:

- defining Overseer input data using absent or incomplete verification data
- using filled in knowledge gaps where a farmer could not confidently recall the full details of a reference year
- using a workaround of some sort to sufficiently represent the farm system in Overseer.

To capture the detail and context of these decisions, CFNAs are required to submit a summary of decision making (SDM) alongside each Overseer assessment submitted to Waikato Regional Council.

The SDM will capture the methods a CFNA has used when developing an Overseer assessment and summarise the rationale related to key input decisions.

5.2 Content of the SDM

SDMs should summarise rationale used by CFNAs in the development of an NLLR (or compliance assessment) that would not be obvious to an external party. Emphasis should be given to the management of missing data and deviations from this document, or the *OverseerFM User Guide*. Some examples include:

- Management of missing data
- See section 5.4.
- Overseer blocking
- CFNAs may wish to explain the rationale behind how the farm has been divided into blocks within the Overseer assessment.
- Use of other models
- CFNAs may need to use other modelling software (Farmax, Irricalc, etc) to inform some of the Overseer inputs. The methods and rationale driving these inputs should be captured.
- Use of proxies

- If a CFNA has chosen to use a proxy within Overseer, the rationale driving this must be captured in the SDM.
- Deviating from defaults
- If a CFNA inputs data that deviates from required default values, they must provide justification for this in the SDM.

A template will be provided to CFNAs to be filled in and submitted with each NLLR assessment.

The amount of information provided within the SDM will vary across assessments. It is not expected that CFNAs describe decisions and/or actions that have no impact on N loss (e.g. Olsen P levels).

5.3 How will the SDM be used?

The SDM will be used primarily during the auditing of NLLRs and consent applications. Auditors will use the SDM to fill in decision making gaps that would otherwise not be obvious to a third party. In doing so, the potential for minor queries will be minimised, providing for a more streamlined and generally less burdensome auditing process.

The SDM will provide Waikato Regional Council with an overview of the various situations and challenges experienced by CFNAs and farmers. This information will help Waikato Regional Council to develop improved NLLR and Overseer guidance to CFNAs over time.

The SDM may also provide CFNAs with a means of capturing decisions made during the NLLR process that can be referred back to at a later date. It will also provide a vector for CFNAs to communicate with other CFNAs that may take on the responsibility of future N assessments.

5.4 Managing missing data

When developing an Overseer assessment, it is expected the input data (fertiliser, supplement, stock numbers, etc) will be supported by credible evidence (receipts, supply company data, etc) where feasible. This is so Waikato Regional Council (and by association the community) can have confidence that a property's NLLR or compliance assessment is the most accurate reflection of the farm system.

However, it is acknowledged there will be instances where supporting evidence is either missing or incomplete. To manage missing NLLR data, Waikato Regional Council requires CFNAs to follow the protocol outlined below.

5.4.1 Inputs where NO verification data is available

There may be instances where no evidence is available to support an Overseer input. In this instance, the CFNA will work with the farmer to define an input that is rational and credible within the farm system. The use of other farm modelling tools may assist in defining the input.

It is important that CFNAs provide a summary of the rationale used to define such inputs. This should be captured within the SDM.

### 5.4.2 Defining inputs where SOME data is available

In some instances, farmers will lack primary evidence to support an Overseer input, yet they will hold some form of indicative evidence that provides enough justifiable direction for the CFNA.

In this situation, Waikato Regional Council expects that CFNAs will define the input using a combination of the evidence available, the farmer's knowledge and their better judgement. It is expected these inputs will be rational, reasonable and informed, at least in part, by supplementary evidence.

For example, a farmer may have fertiliser records for the reference years, but no evidence supporting proof of placement. If proof of placement was available for the previous year(s), then it would be reasonable for the CFNA to input a similar regime to the NLLR assessment.

It is important that CFNAs provide a summary of the rationale used to define such inputs. This should be captured within the SDM.

Default data prescribed in this document or the *OverseerFM User Guide* will take precedence where applicable.
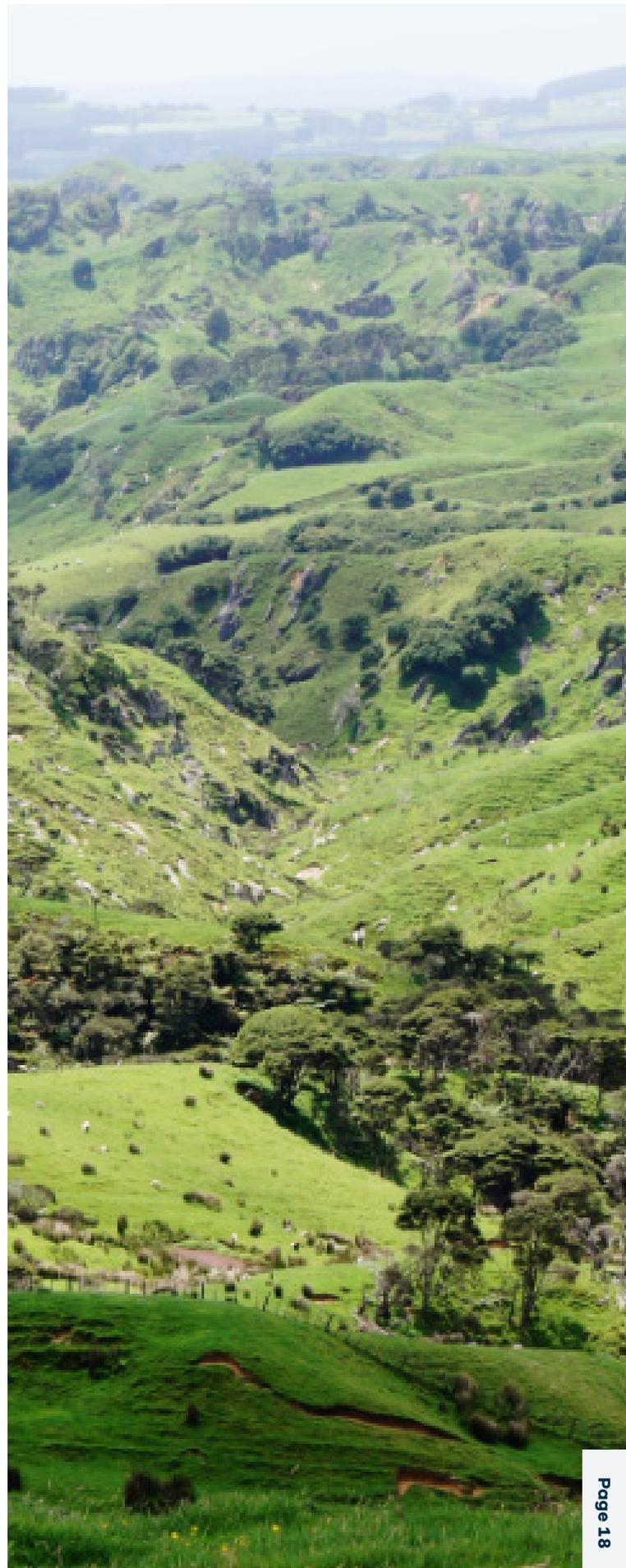
5.5 Rating data reliability

NLLR input data supported by primary evidence (milk supply receipts, etc) will have a high degree of reliability, whereas input data supported by secondary (or lesser) evidence will have a lower level of reliability.

For example:

1. *If a farmer had proof of placement records for fertiliser applications (GPS tracking, etc) in the 2013/2014 year but not for the NLLR reference years, the CFNA may be justified in using the 2013/14 proof of placement records to inform fertiliser placement for the reference years.*

2. *If a farmer has purchased supplementary feed in a reference year, but only had verification evidence (receipts, etc) for a portion of the supplement fed, then the total reported supplementary feed inputs will be of low reliability. In this instance, the CFNA will have to rely on their knowledge of the farm system and the farmer's word to justify the feed inputs if they deviated from the evidence available.*

As part of the SDM, CFNAs will need to provide a reliability rating for each data input related to N loss. The reliability rating will be informed by the credibility of the evidence used to inform the input and the level of input required by the CFNA and farmer.

The list of inputs that must be rated for data reliability will be limited to those in proposed plan change 1, Schedule B (2(d) i-viii).

The table below provides guidance as to how CFNAs should rate the credibility of each NLLR Overseer input within the SDM template.

Rating	Description
A	Primary supporting data with high degree of reliability (e.g. milk receipts from supply companies, supplementary feed invoices, GPS tracked fertiliser applications, digitally logged irrigation records).
B	Supporting data that has a high degree of reliability and minor level of interpretation (e.g. fertiliser records without proof of placement).
C	Supporting data that provides some level of support to an input (e.g. diary entries) but cannot be confidently verified.
D	No evidence available to support an input. The input has been defined based on the farmer's word and the CFNA's better judgement. These inputs will be "provisionally accepted" and may be replaced by default values.

5.6 Data rating guidance

The following section provides guidance to CFNAs when deciding which reliability rating to assign to an input.

5.6.1 A Grade Data

Validation data rated an "A" grade should be based on primary evidence that provides for a high level of certainty. This evidence must provide the CFNA (and therefore the council) with absolute confidence that these inputs are true and correct.

This type of evidence includes (but is not limited to):

- stock number verification, including annual accounts together with stock sale and purchase invoices, grazing invoices and transport records
- dairy production data from a supply company
- invoices for fertiliser applied to the land, and fertiliser placement records, including nitrogen used
- invoices for feed supplements sold or purchased, and records of supplements grown and fed on farm
- water use records for irrigation (to be averaged over 3 years or longer) in order to determine irrigation application rates, and proof of areas irrigated (for Overseer block setup)
- records of crops grown and grazed, including cultivation and sowing invoices where available
- horticulture crop diaries and NZGAP records
- soil test data.
- certificate of title and legal description.

5.6.2 B Grade Data

Validation data rated a "B" grade will generally be informed by A grade data, yet require an element of computation or better judgement by the CFNA.

Some examples include:

- A CFNA has been provided by a farmer complete nitrogen fertiliser records for the relevant reference year without proof of placement. If available, the CFNA could use proof of placement records from previous years to inform the NLLR assessment.
- A maize grower is able to provide accurate yield tonnages for 70 per cent of the farm but has lost the data for the remaining 30 per cent. The CFNA could use the available yield data to define crop yield for the rest of the property.

5.6.3 C Grade Data

A "C" grade should be assigned to inputs where validation data is based on secondary evidence (i.e. cannot be verified) and/or the CFNA has a low level of confidence in the data. Examples might include handwritten diary records, emails, historical aerial maps, and so on.

Some further examples include:

- A dairy farmer can provide evidence of opening and closing stock numbers, but is unable to verify the movement of cows on and off farm during winter. The CFNA and farmer would need to agree on the cow numbers to be used in the NLLR assessment based on the farmer's knowledge and CFNA's better judgement. If all cows were removed from the farm during winter in the NLLR assessment, then a C grade may not be required. If cows were left on the property during winter, then a C grade would be warranted.
- A farmer is certain they bought in 500t of supplementary feed during the NLLR assessment year, yet they only have receipts for 300t. If the farmer was happy to accept 300t as the input, the CFNA could rate the reliability as an A grade. If 500t was used it, the CFNA would need to justify this decision, and rate the reliability as a C grade.

5.6.4 D Grade Data

A "D" grade should be given to inputs which are unable to be verified or supported by any verification evidence. The CFNA will need to work with the farmer to define reasonable inputs for the NLLR assessment and these inputs may be replaced by Waikato Regional Council with default input data post the NLLR lodgement window.

Some examples may include:

- A farmer has recently purchased a property and did not secure any of the previous owner's farm records. The CFNA would need to estimate reasonable inputs for the farm in order to complete the NLLR assessment. These may be replaced with default values by Waikato Regional Council.
- A farmer has not kept any records of stock numbers for the reference years. The CFNA would need to estimate reasonable stock number inputs for the farm in order to complete the NLLR assessment. These may be replaced with default values by Waikato Regional Council.
- A vegetable grower is unable to provide evidence of planting or harvest dates. The CFNA would need to estimate reasonable planting and harvest dates for the farm in order to complete the NLLR assessment. These may be replaced with default values by Waikato Regional Council.

He taiao mauriora   Healthy environment

He ōhanga pakari   Strong economy

He hapori hihiri   Vibrant communities