

Before Hearing Commissioners at Christchurch

---

*under:* the Resource Management Act 1991

*in the matter of:* Submissions on Proposed Plan Change 5 to the  
Canterbury Land and Water Regional Plan

*between:* **Fonterra Co-operative Group Limited**  
*Submitter*

*and:* **Canterbury Regional Council**  
*Respondent*

Statement of evidence of Mathew John Cullen

---

Dated: 22 July 2016

## **1. INTRODUCTION**

- 1.1. My full name is Mathew John Cullen.
- 1.2. I have been employed by Fonterra Co-operative Group Limited (Fonterra), as a Sustainable Dairying Advisor since 2011, most recently as Environmental Programme Lead since 2013. As part of my role I am responsible for managing Fonterra's Nitrogen Programme. This programme represents the largest use of OVERSEER® (on an annual basis) to model nitrogen use in New Zealand; and entails the collection and collation of farm information for all Fonterra suppliers, its entry into the OVERSEER® model and reporting back to Fonterra farmer shareholders. There is also a support component to this programme to assist farmers in adopting practices to reduce loss of nitrogen from farm systems.

## **2. QUALIFICATION AND EXPERIENCE**

- 2.1. I hold a Bachelors Degree in Resource Management from Lincoln University, which was conferred in 2003. I have also attained a certificate of completion for both Sustainable Nutrient Management in New Zealand Agriculture and Advanced Sustainable Nutrient Management in New Zealand Agriculture from Massey University.
- 2.2. Prior to my employment with Fonterra I worked for the London Borough of Southwark and the London Borough of Haringey (United Kingdom) as a Development Control Officer/Enforcement Officer in their respective Planning sections for a total of 4.5 years. These positions involved the processing of applications for planning permission and making subsequent recommendations to decision makers, as well as pursuing enforcement processes where developments contravened relevant legislation.
- 2.3. Prior to my employment in the United Kingdom, I was employed by Environment Canterbury as a Compliance Monitoring Officer for 3.5 years. This position involved both the processing of, and monitoring compliance with, resource consents within the rural sector.
- 2.4. I am familiar with the provisions of Proposed Plan Change 5 (**PC5**) to the Canterbury Land and Water Regional Plan and am authorised by Fonterra to provide this evidence on its behalf as a Fonterra representative.
- 2.5. I am not offering evidence as an expert witness, although I do have considerable practical experience in the use of the

OVERSEER® model, water quality and related farm management matters given my work for Fonterra and for previous employers.

### **3. SCOPE OF EVIDENCE**

- 3.1. My evidence outlines some of the practical issues associated with the use of OVERSEER® and how these issues could lead to the Portal misrepresenting individual farm good management practice nitrogen losses.
- 3.2. My evidence is structured as follows:
  - a) Background – the relationship between OVERSEER and the Farm Portal
  - b) OVERSEER limitations
  - c) Interface between ‘workarounds’ and portal proxies
  - d) The need for an alternative consenting pathway

### **4. BACKGROUND - THE RELATIONSHIP BETWEEN OVERSEER AND THE FARM PORTAL**

- 4.1. PC5 provides that no consent can be issued for a farming activity to exceed the Farm Portal generated Baseline Good Management Practice Loss Rate.
- 4.2. PC5 requires that farms be registered in the Portal; where information is entered and updated by the property owner (or their representative).
- 4.3. The portal requires the user to upload OVERSEER® input files. It then applies a set of modelling “proxies” (OVERSEER settings, methodologies and rules) to the uploaded files to generate an estimate of what the nitrogen loss should be assuming the farming activity was being carried out in accordance with defined good management practices (in Schedule 28 of the Plan).
- 4.4. The ability of the portal to consistently generate good management practice nitrogen loss rates is reliant on those OVERSEER files being accurate representations of those particular farm systems.

### **5. OVERSEER LIMITATIONS**

- 5.1. It is my experience that there are some (albeit small when modelling dairy farm systems) instances where, after all relevant farm information has been entered, OVERSEER® will report an

error and a reporting file is unable to be generated. There are also instances where OVERSEER® does not accurately represent a particular farm system. Again this will result in the model reporting an error.

- 5.2. While the causes of these errors are often unclear, OVERSEER Ltd acknowledge that they occur (see page 13 of **Appendix 1**) and are working to address them as part of updates to the OVERSEER® model.
- 5.3. Over the past 4 years Fonterra has processed in the order of 20,000 OVERSEER files to represent dairy farm systems. Of these files I estimate that up to 5% have reporting issues.
- 5.4. When these issues occur I typically look for 'workarounds', that is I modify the farm data/OVERSEER® inputs in the most representative way possible to enable a reporting file to be generated. This often involves significant changes to farmer information e.g. yields and/or other feed inputs (imported supplements).
- 5.5. An example of this occurring is where a farm grows a maize silage crop which is grown on farm, harvested and stored prior to feeding out. If this maize crop is fed to animals that were not on the platform at the time of harvesting (e.g. bulls or dairy replacements that may have been off farm during the autumn when this was harvested but were back on the farm post the harvest date) an error message is displayed. **Appendix 2** illustrates this situation.
- 5.6. A potential change to the farm input data to address this issue and generate a reporting file might be to 'export' (treat as leaving the farm as a product) the maize silage that was grown on farm. Then effectively treat the equivalent amount of maize silage as an 'imported' supplement, as if it was purchased from outside the farm system.
- 5.7. Another example of this occurring is a farm system wintering cows on-farm where they are fed a combination of crops and supplements. In some instances where a farmer has specified the months of grazing/feeding of supplements to stock the OVERSEER model will report an error message due to feed supplied exceeding stock demand.
- 5.8. A potential change to this farm input data in order to address this issue is to no longer specify the months/blocks that supplements are fed to stock.

## **6. INTERFACE BETWEEN 'WORKAROUNDS' AND PORTAL PROXIES**

- 6.1. As noted previously, 'workarounds' are sometimes needed to enable OVERSEER to generate a representative report for a farm. Although the process of manipulating the input data may not significantly affect the veracity of the OVERSEER nitrogen loss number, there are unknown implications of running that manipulated input file through the Farm Portal. It is likely that use of workarounds will distort the Portal generated good management practice loss rate.

## **7. THE NEED FOR AN ALTERNATIVE CONSENTING PATHWAY**

- 7.1. The definition of the Baseline GMP Loss Rate in PC5 includes the words "...; and where a Baseline GMP loss rate cannot be generated by the Farm Portal it means the nitrogen baseline".
- 7.2. It is unclear whether this clause is intended to recognise the issues identified in this evidence i.e. farm's whose inputs cannot be processed due to OVERSEER® limitations or other anticipated limitations of the Portal. In any event, the definition appears to allow some farms to be limited to their nitrogen baseline.
- 7.3. I support recognition that the portal may not always be a reasonable route for setting nitrogen loss limits. However, I am concerned that the fall back position is meeting the baseline nitrogen limit without necessarily factoring in good management practice.
- 7.4. In my opinion it is prudent to have an alternative pathway to respond to the issues within OVERSEER, and that this pathway should determine the good management practice baseline. Accordingly, I support the proposal set out in Mr Willis's evidence.

Dated: 22<sup>nd</sup> July 2016




---

Mathew Cullen



**Release notes for version 6.2.2**

**May 2016**

**Prepared for OVERSEER Limited**

**by D M Wheeler, N Watkins and M Rollo**

**AgResearch Ltd.**

**DISCLAIMER:** While all reasonable endeavours have been made to ensure the accuracy of the investigations and the information contained in this report, OVERSEER Limited gives no warranties, representations or guarantees, express or implied, in relation to the quality, reliability, accuracy or fitness for any particular purpose, of the information, technologies, functionality, services or processes, described in this report, nor does it make any warranty or representation that this report or any information contained in this report is complete, accurate or not misleading. OVERSEER Limited expressly disclaims and assume no liability contingent or otherwise, that may arise from the use of, or reliance on, this report including as a result of but not limited to, any technical or typographical errors or omissions, or any discrepancies between this report and OVERSEER® Nutrient Budgets. The contents of this report may change from time to time without notice at the discretion of the OVERSEER Limited.

**COPYRIGHT:** You may copy and use this report and the information contained in it so long as your use does not mislead or deceive anyone as to the information contained in the report and you do not use the report or its contents in connection with any promotion, sales or marketing of any goods or services. Any copies of this report must include this disclaimer in full.

Copyright © 2016 OVERSEER Limited

Published by:

OVERSEER Limited

<http://www.overseer.org.nz>

OVERSEER® is a registered trade mark owned by the OVERSEER® owners

The OVERSEER® owners are:

The Ministry for Primary Industries (MPI), the Fertiliser Association of New Zealand Inc. (FANZ) and AgResearch Ltd (AgResearch).

## Table of Contents

<b>1. INTRODUCTION</b>	<b>2</b>
<b>2. BUG FIXES AND MODEL ENGINE IMPROVEMENTS</b>	<b>2</b>
2.1. Calculation errors .....	2
2.2. Balancing errors .....	2
2.3. Object reference not set.....	3
2.4. Crop N model .....	4
2.5. Fodder beet default data .....	5
2.6. Balancing .....	5
2.7. Use of RSU inputs.....	6
2.8. Block pasture RSU report .....	6
2.9. General.....	6
<b>3. USER INTERFACE CHANGES</b>	<b>7</b>
<b>4. S-MAP ONLINE WEB SERVICE</b>	<b>9</b>
<b>5. NEW REPORTS</b>	<b>10</b>
5.1. Animal reports.....	10
5.2. Irrigation input data report.....	11
<b>6. MINOR ENHANCEMENTS</b>	<b>11</b>
6.1. Time grazing for wintering pads/animal shelters.....	11
6.2. Transfer to camp sites .....	11
6.3. Feed allocation .....	12
6.4. Monthly climate .....	12
6.5. Other enhancements .....	12
<b>7. KNOWN ISSUES</b>	<b>13</b>
<b>8. IMPACT OF CHANGES</b>	<b>13</b>
<b>9. REFERENCES</b>	<b>18</b>



# 1. INTRODUCTION

OVERSEER® Nutrient Budgets version 6.2.2 (OVERSEER) includes bugs fixes and minor enhancements to improve functionality and operation.

Version 6.2.2 includes the addition of a webservice to S-map Online. Instructions on using the feature are included in these notes.

Several reports have also been added to version 6.2.2 to support users these include a series of animal reports and an irrigation report. Further information on the animal reports are provided in the User Guide to the Animal Reports, downloadable from the MyOVERSEER User Guides page.

No new modelling functions have been added to the OVERSEER engine in this version upgrade.

The OVERSEER 'Terms and conditions' have been amended. Please read these.

The expiry date of version 6.2.2 is 30<sup>th</sup> November 2016.

## 2. BUG FIXES AND MODEL ENGINE IMPROVEMENTS

### 2.1. Calculation errors

The following conditions that resulted in calculation errors have been fixed:

- When a wintering pad is present but no feed is fed out (feed pad + grazing option).
- When a final harvest is followed by bare ground.
- When all crop and supplements fed throughout the year exceed animal ME requirements, but the animals are on pastoral blocks.
- When using peak cow number input, with wintering pad/animal shelter plus grazing off, an error may occur when distributing effluent.

### 2.2. Balancing errors

An effort has been made to resolve the outstanding balancing errors. Many of these were a result of error conditions, such as animals being fed when they are not present. Hence, the incidence of other error messages occurring may increase.

The following conditions that resulted in balancing errors have been fixed:

- When supplements are fed on specified blocks one of which is a cropping block, the model was not recognizing animals that are on the grazed pasture phase.
- When a crop is defoliated by both grazing animals and cut and carry.

- When a cut and carry defoliation is distributed to pastoral blocks. Crop fed out was also being distributed to crop blocks.
- When stop uptake is selected and there are two or more defoliations, no crop was being allocated to the second defoliation.
- On sowing, annual ryegrass is cleaned out. It was being removed from the block in error.
- On crop blocks when the prior crop is grazed pasture, and this pasture is grazed in the reporting year by animals specified using the option 'Use farm stock ratio'.
- When supplements are fed on specified blocks that includes a cropping or fodder crop block, but there are no animals on the block, for instance, when supplements are directed to a fodder crop where pasture was cultivated in the first month, and the fodder crop was cut and carry, hence there were no animals on the block.
- On crop blocks when there is a cut and carry defoliation including storage, and this is distributed to blocks where animals are present only some of the time.
- When stored supplements are fed out on blocks, the timing is specified, and one of these blocks has excluded all animals from grazing during one of the months for which feeding out is specified (partially fixed, also see section 5).
- When stored supplements are fed out on crop blocks.
- For fodder crops and forages, when a defoliation event has not been selected before sowing another crop.
- When sheep, beef or deer production is entered by 'Specify using RSU', but animals are excluded from all blocks when not grazed off, for example, they are not selected to be on any blocks or a structure in a given month. This is discussed in more detail in section **Error!**  
**Reference source not found..**

### 2.3. Object reference not set

Known instances of the cause the message 'Object reference not set to an instance of an object' have been fixed. This error has many causes. For example, this error may occur after an enterprise is deleted. When describing grazed permanent pasture sown on a Crop block, the total percentage of crop eaten by all enterprises must be 100%. This is checked when saving the dialog. However, after an enterprise is deleted, the total percentage accounted for may be less than 100%. This was not being reported at the user interface using crosses adjacent to the block name and the Crop rotation page, or by a description of the error on opening the Crop dialog. On requesting reports the model engine reports the error.

## 2.4. Crop N model

Cropping and fodder crop blocks are an integral component of OVERSEER. The crop N sub-model was developed by Cichota *et al.* (2010), and outputs of this model are used to populate the nutrient budget and reports. The cut and carry model has been developed using the same principles as the crop model (Wheeler *et al.* 2010). The underlying assumption was that the principles for N cycling in a cropping and cut and carry block are essentially the same, and just the input parameters vary between the different blocks. Hence, the same model has been used for the, cut and carry, crop and fodder crop block types.

In the pastoral block, the N model is split between the urine patch model, and the background (inter-urine) N models (Wheeler *et al.* 2011).

The background model is assumed to be the same as for the cut and carry model, and the crop model. Fruit crop blocks are split into the main crop area and inter-crop area. The main crop area is where the crop canopy is present, and may include some pasture, depending on the crop type, crop age and whether a sward is present. The inter-crop area is outside the crop area, and pasture may be present depending on whether a sward is present or absent. The crop N model is used for both the main crop and inter-crop area.

The crop sub-model (crop, pastoral background, cut and carry, fruit crop and inter-row) has been standardised. Numerous bug fixes occurred during the standardisation, including:

- N added as stover and roots was overestimated in the pastoral phase on crop and fodder crop blocks.
- Root N content was changed to 'dead' root N content, and the rate of decomposition was based on the dead root content. This aligns with values used in establishing the model.
- Effluent mineralization didn't include factors for temperature and soil moisture, which would result in a tendency to under-estimate release in warm areas, and over-estimate in drier areas.
- Effluent: it was assumed that all liquid effluent was added to the soil as an inorganic fraction. Hence, the organic fraction was accounted for twice.
- For organic fertilisers, inorganic N was not removed from the total to give organic N, resulting in an overestimation of the amount of organic effluent added.
- For supplements fed on a block when timing was not specified, storage loss was removed twice.
- For unutilized supplements, the slow release of N was not working correctly.
- Fertiliser broadcast between crop and inter-row on fruit crops was not fully accounted for.

- For fodder and forage crops, an end crop event or cultivation event resulted in the standing crop being added to product removed, not to residues as intended. In most cases this will have had a minor impact on other outputs in the nutrient budget.

## **2.5. Fodder beet default data**

Changes have been made to the fodder beet default data based on Gibbs (2016), DairyNZ (2016), and Feedipedia (2016). The change includes that the N content of fodder beet has been decreased to 1.8%, and ME decreased to 12.5%, assuming that leaves are also consumed. This change will decrease N uptake by fodder beet, and may result in an increase in background N losses. In contrast, the N intake from fodder beet by animals decreases. However, total intake may increase to balance the lower ME intake from fodder beet if pasture is also fed. Thus, depending on circumstances, N leaching from the urine patch may decrease, or increase.

While research has determined that when leaves are removed, N intake of fodder beet by animals will decrease but stover residues will increase, with the net effect depending on when the stover is added and where the urine is deposited this outcome has yet to be incorporated into OVERSEER.

## **2.6. Balancing**

A nutrient budget is a tabulation of annual inputs and outputs of a block or a farm, assuming that management is constant. To balance the budget, inputs must equal outputs. Changes in farm pools (internal transfers) are a mixture of inputs and outputs. These internal transfers (changes in long-term storage pools due to organic matter accumulation or loss, weathering, adsorption, etc.) are considered as outputs, to balance the budget. Hence, nutrients moving into the long-term storage pool and becoming unavailable (as outputs do) are shown as positive; those leaving the pool are reported as negative, e.g. slow release of K due to weathering of silicates.

The model essentially estimates all block inputs and outputs, and then the difference between inputs and outputs is estimated (balancing error). The balancing error also includes any errors associated with entered data or the estimation of terms in the nutrient budget, or unknown losses. To ensure inputs equal outputs, either N fixation of organic soil pool is adjusted until the balancing error is zero. These two terms have been adjusted because they have the highest uncertainty, and they have no effect on other inputs or outputs such as atmospheric N or N leaching.

The balancing procedure has been changed to address an error where the allocation was working in the wrong direction, resulting in either higher N fixation or changes in the soil organic pool. Although this has no effect on other outputs such as atmospheric N losses or N leaching, the change in N fixation does affect the estimation of N conversion efficiency (NCE) and N surplus.

## 2.7. Use of RSU inputs

Entering stock numbers by 'Specify using RSU', implies that animals are on the farm the whole year unless they are grazed off. This has been enforced to avoid balancing errors. Hence, you will now get an error if you enter stock numbers by RSU, and select that animals are not on any block using the Animal data pane, unless they are grazed off. The error message will read: <Animal enterprise> numbers indicate that animals are on the farm in <month> but they are not recorded as being grazed off (see "Animal numbers" data pane), on a wintering pad/animal shelter (see "Animal management" data pane), on pasture (see "Animals on block" data pane, including "Monthly grazing" option if used) or on crops or fodder crops.

## 2.8. Block pasture RSU report

Within the block pasture RSU report, the following issues have been fixed:

- The allocation of pasture RSU between months was not taking account of when animals are not on the block (i.e. not selected as present in Grazing management table on the Animals page). This has been fixed, but will result in the allocation between months changing in these circumstances.
- The definition of 'Average Pastoral' on each enterprise tab has been clarified. It is now  $(\text{RSU pastoral} + \text{RSU pasture while on fodder}) / (\text{area pastoral blocks} + \text{area fodder crop blocks})$ . It is intended as a measure of the carrying capacity of pasture of a standard farm consisting of pastoral blocks and fodder crop blocks. Any pasture grazed in a crop rotation or fruit crops is not included.

## 2.9. General

General issues that were fixed included:

- Deer Product was missing from the greenhouse gas (GHG) footprint product report.
- The embodied cost of N and phosphorus (P) added to feed as animal health supplementation was not included in GHG reports.
- Pasture intake from fruit crop blocks was not fully recognised, resulting in a message starting with 'No nutrients ...' being reported when a farm grazed animals only on fruit crop blocks.
- Differences in the rate of effluent applied between the Effluent report, and effluent added in the block Nutrient budget report.
- For grass filter strip, P removed in riparian strips was subtracted from Whole farm P loss to obtain Farm output. P removed from a grass filter strip is accounted for within the block, because by definition, it reduces P runoff from the block. The consequence of this bug was

that P removed from a grass filter strip was also accounted for in the reported Whole farm P loss. This could lead to a negative farm P surplus.

- For wetlands, if catchment area is greater than farm area, the reduction from the non-farm area is included in the farm reduction. This can result in negative farm N losses in the N report.
- Storage loss was accounted for twice when estimating farm grown supplements fed on pasture.
- In the N report, added N was not including organic fertiliser inputs.
- When estimating block surplus, organic fertiliser inputs were not included as an input.
- When estimating block surplus at the block level, transfer out of the block by animals, or crops and/or supplements fed out elsewhere on the farm were not fully included in the estimation of N removed as products. This resulted in block N surplus being over-estimated.
- An error condition reporting that animals were not on the farm when they were on a wintering pad/animal shelter has been resolved.
- When supplements were also being fed in the milking shed, the error message indicates overfeeding when underfeeding was occurring.
- For wintering pad plus grazing, supplements were allocated to months with 100% of animals on winter pad, and in months with <100%, allocation was even, whereas it should be allocated in proportion to the number of animals on the pad. This sometimes resulted in either an under or overfeeding error message.
- In the Effluent report the 'Average effluent applied' is underestimated when two or more effluent blocks are present.
- When soil series data was selected, default values for structural integrity, anion storage capacity (ASC) and TBK were derived using the soil order of the soil series and did not reflect information specific to the soil series.
- An error message "Error on evaluation occurred when using S-map data for pastoral blocks when you have a 'Tree/Scrub' block. There may still be an error when old files are imported.
- When using the Pasture production report a message asking whether you want to save the page is displayed when this is not possible. A similar situation occurred with Animal reports.

### 3. USER INTERFACE CHANGES

A number of changes have been made to the user interface to improve the user experience and fix bugs. These include:

- The irrigation input dialogs have been improved. This includes improving the consistency of labels.
- When leaving the Irrigation management page by clicking “Continue” the General page of the next block was displayed instead of the next page, e.g. Animals of the same block. This has been fixed.
- Three buttons (Replace site, climate and soil block data, Replace all block data and Replace fertiliser from another block) were displayed on the Block General page even when the file was locked. However, when the file is locked, these buttons should not be available because they immediately attempt to alter the analysis itself and the page stops working. These buttons have been hidden when the file is locked.
- Beneath the heading “Area of farm to apply all effluent to achieve rates of” there is a field label which reads “150 kg N/ha/year (ha)”. The target value, in this case, 150, should reflect the value specified by the field “Target N application rate as effluent” on the Farm > Report Settings page. The label was not updating correctly when the target rate setting was changed. This has been fixed so the value associated with the field correctly reflects changes to the value specified for Target N application rate as effluent.
- On the Report Settings page the GHG emissions report units dropdown offers three options. Changing these options updates the units displayed in the on-screen report as expected but had no effect on reported values. This has been fixed.
- The “Total P lost” column heading in the P report while correct when displayed on screen had the word “lost” missing when downloaded and read using the XPS viewer. This has created some confusion because it was interpreted as total P applied to each block.
- The label 'Mineralisation from cultivation' has been changed to 'Mineralisation and decomposition' to better reflect the actual output.
- The option to import databases from versions prior to version 6 has been hidden. It is anticipated that the vast majority of databases have already been imported.
- Several spelling mistakes have been fixed, including the spelling of the soil series name Darnley has been corrected in the soil series name database.
- In the N pools graph of a crop block, the plant N pool was decreasing too early after a cultivation. Also if pasture was cultivated then the plant N pool was not decreasing to zero as intended. These were graphic display errors only and have been fixed.
- The default lactation length for dairy goats is 270 days, not 4 days as was shown.
- An error was not being reported when additional defoliations was less than zero or greater than ten. This has been fixed.

## 4. S-MAP ONLINE WEB SERVICE

The ability to download S-map Online data via a web server hosted by Landcare Research has been added. To download this information, a sibling name reference is required e.g. Otor\_9a.2. Note that this is different from the sibling name, and can be found on the soil S-map factsheets on the S-map Online website.

The data downloaded includes either the soil water properties at wilting point, field capacity and saturation at three depths (level 2 data), or if this information is not available, soil order and profile descriptors (level 1 data). For both sets of data, natural drainage class, depth to impeded layer, and maximum rooting depth are downloaded. For level 2 data, anion storage capacity, bulk density, clay, sand and subsoil clay are also downloaded.

The downloaded values are displayed on screen. For pastoral blocks these values can be overwritten using user-defined values. For the other block types user-defined values can only be entered by selecting the soil using the Soil Series, Soil Order or Soil Group options.

Please note:

- if user-defined values are entered, they will **not** be cleared when a user changes the S-map sibling, and will override the S-map data.
- if level 1 S-map data, soil series, order or group is used, the Soil profile page is displayed and should be filled in as appropriate.

As part of the implementation, the following changes have been made:

- The Link to S-map tab has been added to the Soil description page. It has been placed first because it is the preferred option when describing soils. See the Best Practice Data Input Standards for further detail.
- The order of pages has been changed to Soil description, Soil profile, Soil properties Soil tests, Drainage/runoff.
- Depth to impeded layer and maximum rooting depth can be overridden using the soil profile page if level 1 inputs are used. This is not possible for level 2 inputs.
- On the Soil properties page, the order that panels are displayed has been changed. 'Specify soil water content' inputs have been changed to match the S-map downloaded inputs. The downloaded S-map soil properties; i.e. bulk density, clay, sand and subsoil clay, can be overridden in the 'Specify soil chemical and physical parameters' section.
- The default values for anion storage capacity, slow release K and natural profile drainage class are initially based on the selected soil description. These can be changed.
- The input 'Is compacted' has been moved to the Drainage/runoff page.



Additional work is being considered to improve consistency between blocks, and to improve the layout of webpages describing soils.

## 5. NEW REPORTS

### 5.1. Animal reports

The existing animal reports have been updated and the layout significantly improved, and additional reports added to show where the animals are on a farm, and what they eat and excrete. The seven reports available are:

- Location - shows the presence and location of animals on farm.
- Stocking rate - shows the estimated RSU (per ha) on a grazed area and total farm basis for all animal enterprises present on farm.
- Block pasture RSU - the RSU due to pasture intake of each animal enterprise on each block per month.
- Diet (ME source) - shows for each enterprise present on farm, the proportion of the diet as metabolisable energy (ME) intake derived monthly from a given source. These are reported either as a percentage (ME intake from a given source for that month divided by the ME intake supplied by all sources for that month), energy per RSU, or on an energy basis (MJ ME). Animal ME requirements are also reported. If percentage requirements is selected this is animal intake from all sources as a percentage of animal requirements.
- Diet (ME place) - shows for each enterprise present on farm, the proportion of the diet as ME intake derived monthly from a given source and consumed at a particular place on farm. These are reported either as a percentage (% on an energy basis of total animal ME requirements) or an energy basis (MJ ME).
- Diet (DM source) - shows the approximate monthly dry matter (DM) intake (kg DM/month) of each animal enterprises present on the farm on a per milking cow basis (dairy only), per RSU basis, or DM intake basis.
- Additional - three reports have been combined into one report; 1) monthly metabolic energy (ME) requirements (MJ ME), 2) monthly dry matter (DM) intake (kg DM) and 3) monthly excreta nitrogen (N) (urine + dung, kg N/month) of animal enterprises. This is to allow quick comparisons between the reports.

Animal reports may be shown before a complete nutrient budget is obtained. A Guide to the use of the Animal Reports is available to download from the MyOVERSEER User Guide page. [www.overseer.org.nz/user-guides](http://www.overseer.org.nz/user-guides).

## **5.2. Irrigation input data report**

The 'Irrigation input data' report has been added to the Block report section. This shows:

- Months when irrigation is applied.
- Depth (mm/month) of irrigation supplied – this is the depth supplied to the block.
- Depth (mm/month) of irrigation applied – this is the depth supplied less 'system losses' to give the depth crops/pasture actually receive.
- Definition – this shows whether specified management settings are user defined or default.
- Management settings – this shows the default or user defined management settings that describe how irrigation was applied each month.

Currently, for crop blocks, irrigation supplied and applied in year 1 is not shown.

## **6. MINOR ENHANCEMENTS**

Minor enhancements are changes made to the software to support data input that have been identified in association with fixing bugs or through feedback from users.

### **6.1. Time grazing for wintering pads/animal shelters**

Wintering pads/animal shelters that have animals grazing some of the time have been enhanced so that some months can have zero grazing time (that is, animals are on the pad all month). The restrictions are that animals are grazing pasture for two or more hours, or zero hours, and that at least two months must have some time grazing. This change has been implemented to increase flexibility in the use of wintering pads/animal shelters.

### **6.2. Transfer to camp sites**

On the 'Maintenance nutrients' report for pastoral blocks, the amount of nutrients transferred to camp sites has been added. This shows the internal transfer of nutrients from the main part of the block to camp sites that is included in maintenance fertiliser nutrient requirements. Fertiliser is applied to non-camp areas, and any transfer to camp sites needs to be balanced with fertiliser nutrient applications to maintain soil test values. This report will show that a significant amount of fertiliser nutrient requirements for easy and steep hill country is due to transfer to camp sites.

### **6.3. Feed allocation**

In OVERSEER, supplements and crops are allocated to animals each month using a default procedure. At times, this default procedure has predicted over-feeding of animals in a particular month generating an over-feeding error message. Changes have been made to the default procedure to reduce the occurrences of over-feeding error messages. The instigation of the animal reports has already allowed a significant number of enhancements to be identified and made, and it is expected that more will be identified after release. The enhancements made include:

- Adjusting the allocation of farm grown supplements to take account of other supplements animals may be fed.
- Adjusting the distribution of crops to take account of the animal ME requirements of a given enterprise in the months of feeding when a defoliated crop was fed out on other blocks.
- Adjusting the distribution of crops that are cut and carried and then stored to better account for the proportion of animals on pads, and animal requirements.

### **6.4. Monthly climate**

The ability to add monthly rainfall, PET, and temperature has been added to enable:

- Analysis and testing of research trials by a wider range of researchers, and
- Modelling where the climate profile does not conform to the default average annual profiles described in the Climate Technical Manual chapter.

NOTE: The monthly data input facility has been included for research purposes and is not yet suitable for use on-farm, therefore do not enter monthly climate data at this point to generate nutrient budgets.

### **6.5. Other enhancements**

Other minor enhancements made to the model were:

- Raw soil order has been added. This order occurs in some S-map fact sheets. The default properties are the same as the Recent soil order.
- Added urea (total N as urea) as an Animal health supplement. On some dairy systems, urea is added to supplementary feed. The input is the amount of N in urea that is applied.
- Included the water content at saturation (mm to 60 cm) in the 'Other values' block report.
- For crop blocks, water properties (wilting point, field capacity and saturation) to 60 cm and 150 cm are shown. Note that irrigation and drainage are based on a depth of 60 cm while water uptake is based on the crop's rooting depth, up to 150 cm.

## 7. KNOWN ISSUES

The following list of issues have been identified but fixes for them were not able to be included in version 6.2.2. Work continues to identify the appropriate fixes. All items on this list are also listed in the MyOVERSEER Support page under Known Bugs. It is recommended that the MyOVERSEER Support page (<http://support.overseer.org.nz/>) be checked regularly because new issues will be added as they are identified.

- Crop intake from cut and carry crops is not being reported in the Animal reports.
- When allocating imported supplements, the allocation procedure is not taking into account that animals may only be on a block for part of the year. This changes the allocation between animal enterprises and may result in feeding error messages. In the meantime, these can be addressed by splitting supplement entries so that each entry is fed to only one animal enterprise.
- When calculations generating reports are not completed, for example, due to an error, then the animal reports may show but are blank.
- Animal reports, display values less than the display error (e.g. an RSU of 0.4 when only integers are shown) as zero. Hence, for example, a low stocking rate and the absence of animals are both reported as zero.
- Sometimes when an error is reported, this prevents the estimation of DM intake and only zero values are reported. Do not read this to mean that an enterprise had no intake throughout the year.
- The block nutrient budget does not currently report any N loss directly to drains when fodder crops are mole/tile drained.
- When entering irrigation be aware that limits for trigger and target values have not been fully set. Please be careful when entering these numbers to avoid misleading outputs being reported because 'typos' entered may not generate error messages.
- A balancing error can occur when supplements timing is specified and are fed on a block at a time when animals are not present due to selections on the 'Animals' page. The error condition to capture this is currently too encompassing without some structural changes, and additional work is being considered.

## 8. IMPACT OF CHANGES

To provide users with an indication of the impact on outputs of the version change we have analysed the results from a range of farm files (total 19,344 files). The farms used in this analysis were largely

dairy farms. The analysis was undertaken to compare the difference in N and P losses to water, GHG emissions and NUE, between version 6.2.1 and version 6.2.2.

Results are from the 18,830 files that successfully ran and produced outputs. Two files produced GHG emission values that clearly are in error (extremely large negative values), and aren't included in the GHG emissions results.

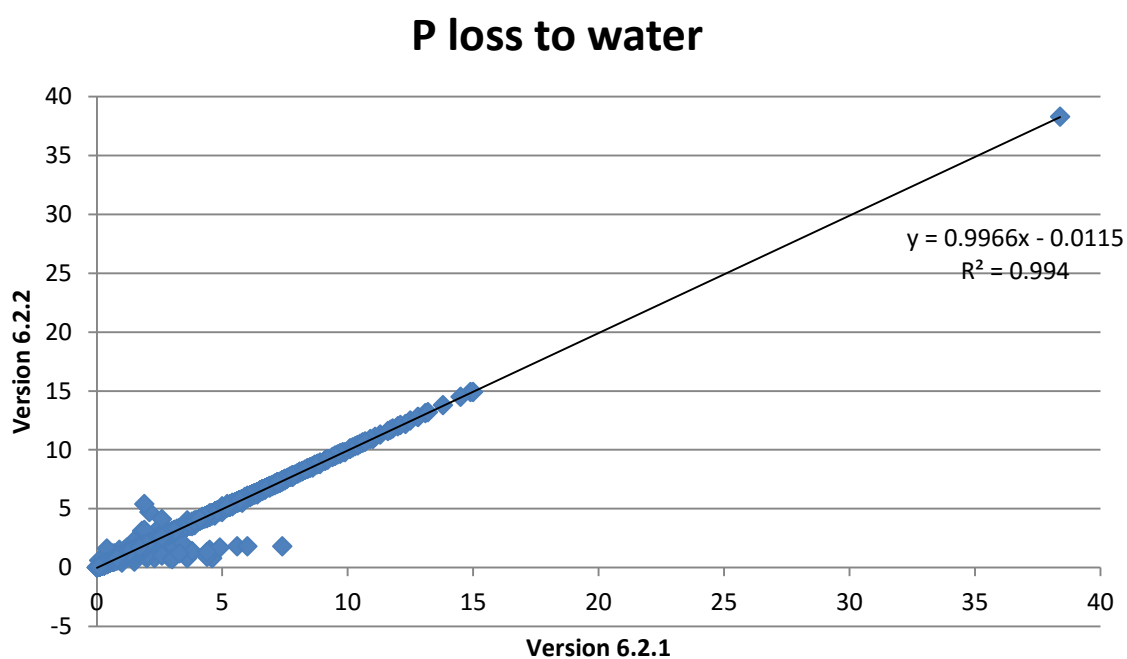
Differences are tabulated in Table 1 (absolute difference) and Table 2 (percentage difference). These highlight that in many cases the impact of the changes are small, but occasionally, a large change can occur on an individual farm (Figure 1 to 4). Some files result in large changes between versions 6.2.1 and 6.2.2.

**Table 1: Absolute changes in N loss to water, P loss to water, greenhouse gas emissions and N use efficiency between version 6.2.1 and version 6.2.2.**

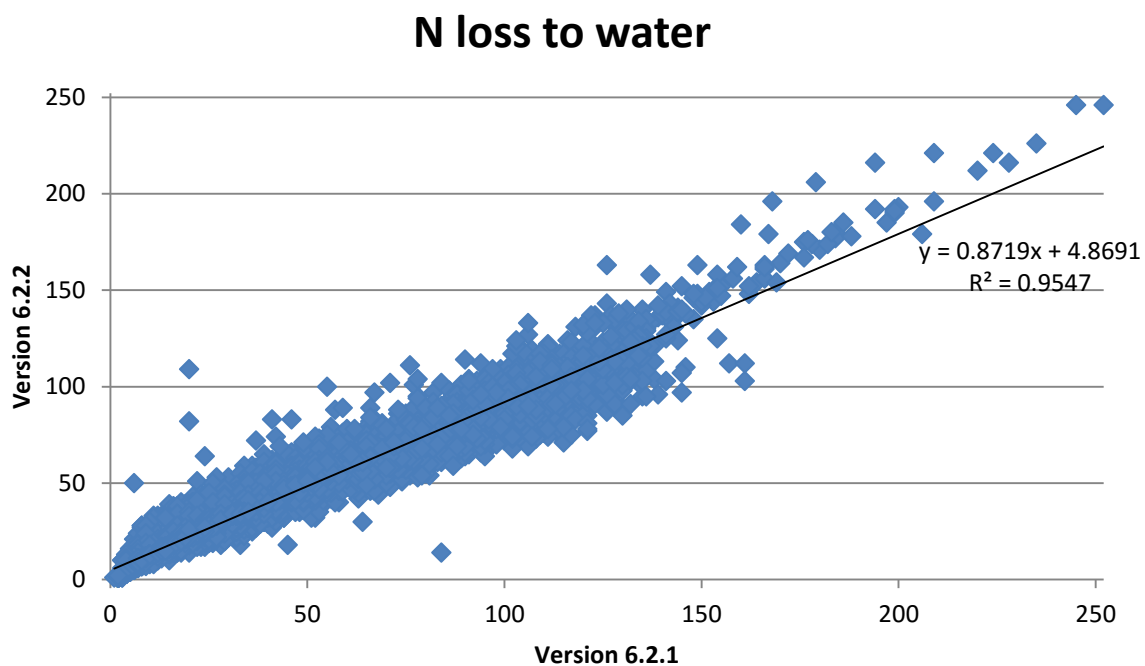
	<b>P loss to water</b>	<b>N loss to water</b>	<b>Greenhouse gas emissions</b>	<b>N use efficiency</b>
Average change	0.0	-0.5	-116.4	1.6
Minimum change	-5.6	-70.0	-76162.0	-168.0
Maximum change	3.5	89.0	27854.0	58.0
25th percentile	0.0	-2.0	-108.0	1.0
75th percentile	0.0	2.0	68.0	3.0
% with no change	85.9	12.7	0.9	12.1

**Table 2: Percentage changes in N loss to water, P loss to water, greenhouse gas emissions and N use efficiency between version 6.2.1 and version 6.2.2.**

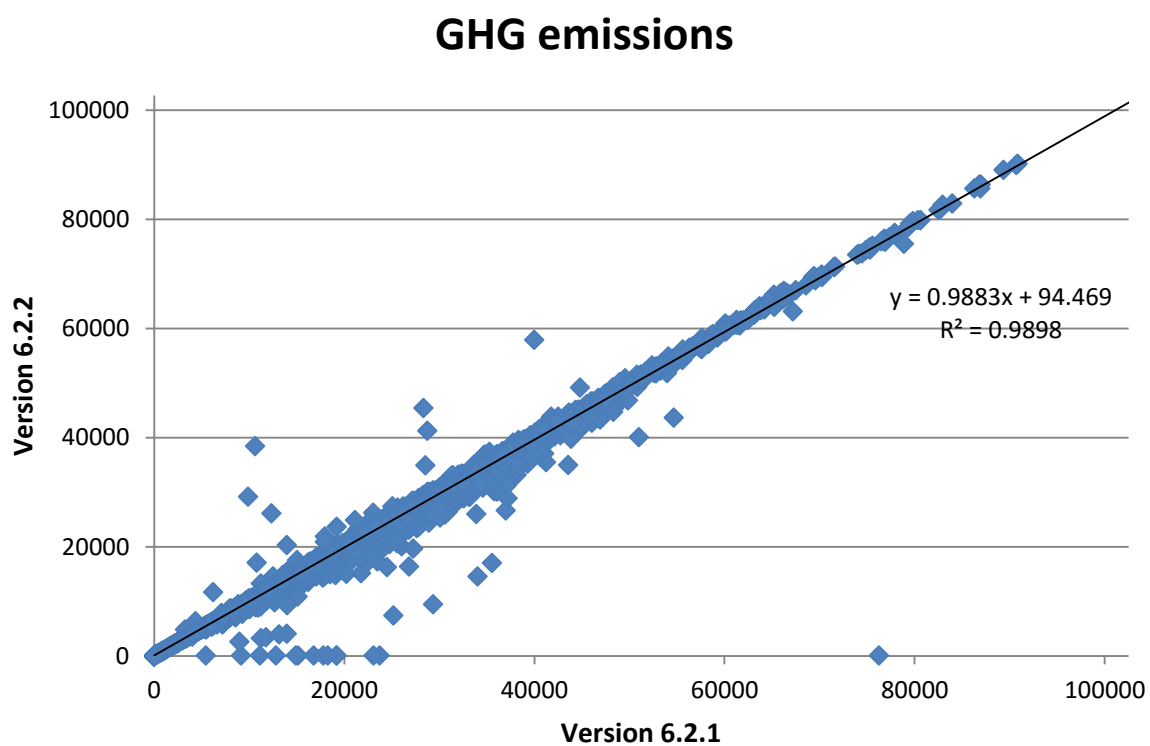
	<b>P loss to water</b>	<b>N loss to water</b>	<b>Greenhouse gas emissions</b>	<b>N use efficiency</b>
Average change	-1.3	3.8	-0.5	5.8
25th percentile	0.0	-5.0	-0.7	2.8
75th percentile	0.0	8.3	0.5	9.7
% with no change	85.9	80.1	0.2	11.6



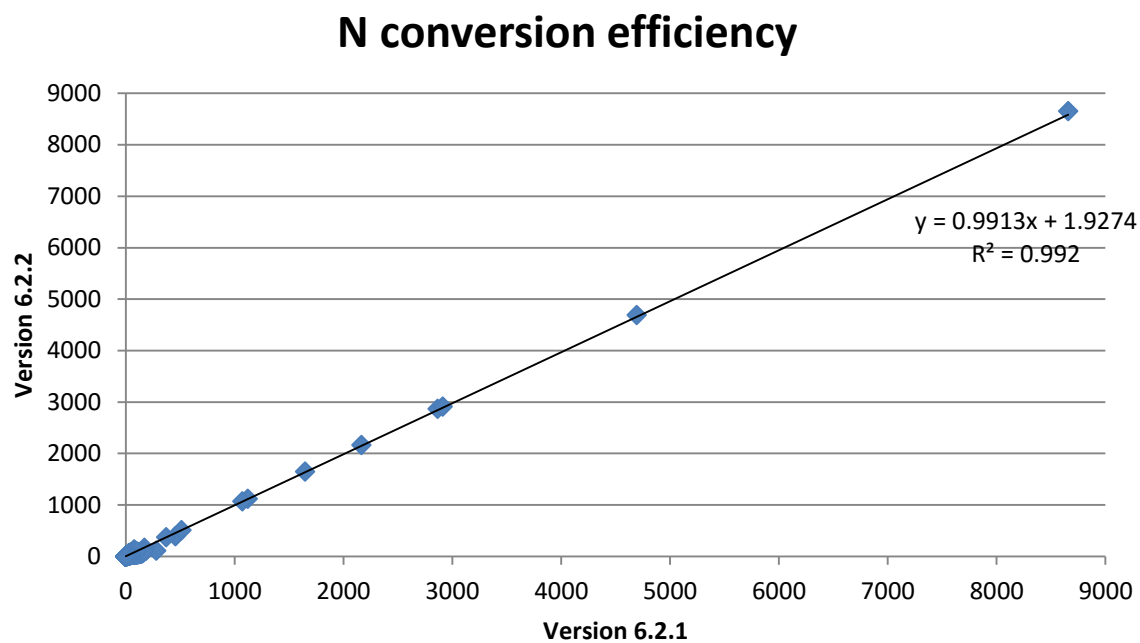
**Figure 1. Phosphorus loss to water, comparison between Version 6.2.1 and 6.2.2.**



**Figure 2. Nitrogen loss to water, comparison between Version 6.2.1 and 6.2.2.**



**Figure 3. Total Greenhouse gas emissions, comparison between Version 6.2.1 and 6.2.2.**



**Figure 4. Nitrogen use efficiency, comparison between Version 6.2.1 and 6.2.2.**



## 9. REFERENCES

Cichota R, Brown H, Snow V O, Wheeler D M, Hedderley D, Zyskowski R and Thomas S 2010. A nitrogen balance model for environmental accountability in cropping systems. New Zealand Journal of Crop and Horticultural Science 38: 189-207.

DairyNZ (2016). Dairy NZ factsheet Fodder beet – feeding to dairy cows (1-73). [http://www.dairynz.co.nz/media/253800/1-73\\_Fodder-beet\\_feeding\\_to\\_dairy\\_cows.pdf](http://www.dairynz.co.nz/media/253800/1-73_Fodder-beet_feeding_to_dairy_cows.pdf)

Feedipedia (2016). <http://www.feedipedia.org/node/534>

Gibb J (2016). Fodder Beet in the New Zealand Dairy Industry: Lincoln University. <http://side.org.nz/wp-content/uploads/2014/05/4.3-Fodder-Beet-GIBBS.pdf>

Wheeler, D., van der Weerden, T. and Shepherd, M.A. (2010). Description of a cut and carry model within OVERSEER® Nutrient Budgets. In: Currie, L.D. & Lindsay, C.L. eds. Farming's future – minimising footprints and maximising margins. Occasional Report No. 23. Palmerston North, New Zealand, Fertiliser and Lime Research Centre, Massey University 203-211.

Wheeler, D., Cichota, R., Snow, V. & Shepherd, M. (2011). A revised leaching model for OVERSEER® Nutrient Budgets. In L.D. Currie & C.L. Christensen (Eds), Adding to the knowledge base for the nutrient manager, Occasional Report No. 24. Paper presented at the annual FLRC workshop, Fertilizer and Lime Research Centre, Massey University, Palmerston North, February 2011 (6 pages). <http://flrc.massey.ac.nz/publications.html>.


[Submit a request](#)

[Overseer Helpdesk](#) > [User Information](#) > [Known Bugs](#)


## Crop storage

When a crop defoliation is cut and carried with the “Crop stored prior to feeding out” check box ticked, and fed to animals that are not on the farm in the month of defoliation but are present from other months, an error message is produced. This should not happen.

Was this article helpful?   0 out of 0 found this helpful



Have more questions? [Submit a request](#)

## Recently viewed articles

[How do I enter a ploughing that occurs in the same month as sowing?](#)

[Why is contour not requested for cropping blocks when it can be a big driver of loss?](#)

[Crop grazing timing](#)

[Not balancing](#)

[OVERSEER Helpdesk](#)



OVERSEER® Nutrient Budgets is a strategic management tool that supports optimal nutrient use on farm for increased profitability and managing within environmental limits.

## Useful links

[MY OVERSEER](#)



## Latest Info

[OVERSEER Media Releases](#)