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# Farm Scenario Plan

## Current and Proposed System Nutrient Budgets for Effluent consent

**Prepared by Mark Crawford**
**Farm Environmental Consultant**
CNMA
Certified Nutrient Management Adviser

**60876935**
**WOLDWIDE FIVE LIMITED**
**C/- A & JJ DE WOLDE**
**104 SHAWS TREES ROAD; RD 3 WINTON 9783**
**22/02/2019**
**Reviewed by Andree Callaghan (CNMA)**

## Executive Summary

Woldwide Five farm Ltd, have requested OVERSEER® Nutrient Budgets to reflect the current and proposed estimated nutrient losses from their consented 262.6 ha dairy farm as a renewal of their effluent discharge consent and an expansion of the dairy farm with an overall addition of land (73.0 ha) from a sheep farm (136.3 ha) purchased and split between Woldwide 4 (Report 163(a)) and Woldwide 5 dairy farms. An additional example is provided for a wintering barn that is to be established later on. The farm is located at 800 Bayswater Road, Heddon Bush, 20 km west North West from Winton Township, 41 km nor-north west from Invercargill city and 34 km from the south west coast (Orepuki). The property is a dryland dairy farm, milking approximately 680 cows (consented numbers 800; modelled at 680 from current 540 average with the additional cows modelled allowed for the 44.3 ha of consented land yet converted).

**Current (combined) Farm System**

Average Nitrogen lost from the root zone, calculated from the combined current farm systems modelled, using OVERSEER® Nutrient Budgets (OVERSEER) 6.3.0 was **15,882 kg N/year** or **47 kg N/ha/year.**

Average Phosphorus lost from the combined current farm systems modelled using OVERSEER® Nutrient Budgets (OVERSEER) 6.3.0 was **237 kg P /year** or **0.7 kg P/ha/year.**

**Proposed Farm System**

Average Nitrogen lost from the root zone, calculated from the proposed farm system modelled, using OVERSEER® Nutrient Budgets (OVERSEER) 6.3.0 was **15,937 kg N/year** or **47 kg N/ha/year.**

Average Phosphorus lost from the proposed farm system modelled using OVERSEER® Nutrient Budgets (OVERSEER) 6.3.0 was **231 kg P /year** or **0.7 kg P/ha/year.**

**Winter Barn Example**

Average Nitrogen lost from the root zone, calculated from the proposed farm system modelled, using OVERSEER® Nutrient Budgets (OVERSEER) 6.3.0 was **15,639 kg N/year** or **47 kg N/ha/year.**

Average Phosphorus lost from the proposed farm system modelled using OVERSEER® Nutrient Budgets (OVERSEER) 6.3.0 was **245 kg P /year** or **0.7 kg P/ha/year**

The productivity and urine patch deposition on gley plus recent soils with a high and low buffering capacity to leaching (high and low PAW and deep to shallow topsoil's) from increased stock intensity, artificial drainage and crops are key risk reducing and increasing factors respectively.

In the proposed farm scenario, the additional land with the increased number (consented) of dairy cows, but with the use of the wintering pads; altered tonnage of supplements imported into the farm system and with the cropping able to be carried out on the more versatile soils, has the effect of reducing the overall risk of P losses, but N losses are similar but slightly higher.

The wintering barn example largely negates the effect of cropping losses and increased stock intensity, but this is less evident on the more vulnerable soils to N leaching (Upukeroroa), and so mitigating this by lowered calving and peak cow numbers (by 70) plus grazing times on these soils enables the farm to reduce the impacts of N loss to below the current combined losses calculated.

The farm is in a zone with a mostly moderate to high risk to nitrate levels and the physiographic zones point to high nitrates in ground water, nitrate accumulation and artificial drains as being risk factors. Both the proposed farm system and winter barn example, as modelled by OVERSEER®, includes strategies to reduce these risks of Nitrogen loss to water. These strategies are summarised in the report, with no cropping (or cropping on less vulnerable soils) and reduced stocking in autumn and spring by use of winter barns or feed pads key mitigations. Riparian strip planting, allowing the capture of sediment from crops and laneways through adequate buffer zones, as well as having soil test phosphate levels within the agronomic optimal range, are all practices which will reduce the risk of P losses. Ensuring the lowest volume applications and depths are applied to the tiled soils, with none applied at the highest risk times plus cropping on the more versatile soils are further mitigations that should be used.

Overseer Nutrient Budget Version 6.3.0 have been used to create the nutrient budgets presented in this report.

## Contents

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Mark Crawford

Farm Environmental Consultant

Dated 22nd February 2019

## General

### Aim and Purpose of Farm Scenario Plan

Woldwide Five Ltd, has requested current and proposed OVERSEER® Nutrient Budgets to reflect the current and proposed estimated nutrient losses from their consented 262.2 ha dairy farm as a renewal of their effluent discharge consent, with the addition of 73.0 ha of a 136.3 ha neighbouring sheep farm (the remaining area is included in Woldwide 4). The farm is located at 800 Bayswater Road, Heddon Bush, 20 km west North West from Winton Township, 41 km nor-north west from Invercargill city and 34 km from the south west coast (Orepuki). The property is a dryland farm, currently milking approximately 560 cows (consented numbers 800; note with additional consented area yet to be converted (44.3 ha) included in actual dairy farm of 218.3 ha, it is now modelled 680 cows calving).

The total titled area of the property is 246.6 ha, and the GIS map with paddock areas calculates to 262.6 ha which is modelled. In this figure there is 12.9 ha of riparian edges and river margin (modelled as a "Riparian" block in Overseer). The effective area is calculated at 241.2 ha, close to the owner stated 240 ha of paddocks. In addition there is an estimated 8.5 ha of non-effective area, comprising of sheds, lanes, feed pads and yards. The property is of flat to gently rolling topography (modelled flat).

Soil types on the farm are (with the addition of the consented 44.3 ha land) mostly Tuatepere_6b.2, Silt Loam, (Orthic Melanic soil, Well drained, PAW (plant available water) to 60 cm of 81.2 mm), 135.5 ha; Braxton_4a.1, Silt Loam over clay, (Orthic Gley soil, Poorly drained, PAW (plant available water) to 60 cm of 147.6 mm), 75.4 ha; plus an area of Upukerora_8a.1 Sandy Loam, (Recent soil, Well drained, PAW (plant available water) to 60 cm of 37.6 mm), 51.7 ha. The Braxton and Tuatapere soils are both deep to moderately deep soils and the Braxton being a heavier silty loam texture meaning a lower risk of nitrogen leaching.

Overseer modelling of the system has been undertaken in accordance with the Overseer 6.3.0 "best practice data input standards" (BPDIS) and has been reviewed by a certified nutrient management advisor.
The following report summarises the respective Overseer 6.3.0 nutrient budgets and key assumptions made.

### Property Details

| Location/address | 800 Bayswater Road, Heddon Bush 9783 RD 3, Winton |
|---|---|
| Legal Description | Lot 1 Deposited Plan 344176,Lot 2 Deposited Plan 344176, Lot 1 Deposited Plan 310140, Part Lot 12 Deposited Plan 238 and Lot 2-3 Deposited Plan 478843, Lot 1 Deposited Plan 12253 plus Lot 1 Deposited Plan 478843 (additional 44.3 ha) |
| Total area (ha) | 246.57 ha titled total farmed land calculated at 262.6 ha including roadside and river margins. Effective area estimated at 241.2 ha, |
| Owners | A & JJ DE WOLDE |
| Contact details | |
| Phone | (03) 2258344 mobile (027) 2272537 |
| Email | abe@woldwide.nz |
| Farm Type | Seasonal supply Dairy farm |

## Current Farm System Analysis

### Climate

Climate data for the property has been sourced from Overseer's Climate Station Tool data and has been entered as rainfall –978 mm/year, PET – 719 mm/year and average temperature – 9.8 $^{0}$C, based on location close to latitude/longitude - 46.09075; 168.08465 (transect 9 co-ordinates). Climate data has been modelled as per Overseer BPDIS.

### Description of Current Farm System

The 262.6 ha property is operated as a seasonal dryland dairy farm including a consented block of 44.3 ha not yet converted but included in the current assessment of environmental effects given it has been consented. Given this, the numbers subsequently used were adjusted using averages from the current farm system of 218.3 ha and 540 cows calved. The current adjusted property is calving 680 cows (800 consented) and peak milking 665 (540 kg LW) Friesian cows. Adjusted milk production averaged over the last two years is 314,081 kg MS/year (465 kg MS/cow). Cow numbers are shown in the table below (page 10). All cows are wintered on-farm for June and July on the developing block crops plus the first calving heifers (170 and at 500 kg LW), which come back from grazing off in May, with all cows brought back to the dairy platform in mobs over the month of August. An additional number of grazers are currently wintered given the additional crop area currently cultivated during the conversion stage and have been included. Mean calving date is the 20$^{th}$ August for the main herd, with the first calvers a week earlier on the 12$^{th}$ of August

The dry-off date is the 1$^{st}$ of June and the 25$^{th}$ of May for the cows and first calving heifers respectively. All replacements (170) are grazed off-the platform from weaning until they return as in calf rising two year old (R2) heifers in May. Cows are milked once a day or 16 hourly occasionally over autumn drying off (modelled never) and all calves are fed colostrum and waste milk.

Friesian Bulls (20) at 700 kg LW are run with the herd over December and January.

The 28.1 ha of developing Upukerora crop block has been used to winter the 540 dairy cows, as well as the 170 in calf heifer replacements, plus additional dairy cows and in calf replacement heifer grazers. With the increase in milking cow numbers for the consented area added in, the number of grazers wintered was reduced to allow for the wintering of these extra cows. It now winters all dairy cows and replacement heifers plus an additional 200 in calf dairy heifer replacements wintered from mid-May till the 25th August.

**Supplements**

Supplementary feed imported onto the property and to be fed during the season is as follows:

- 254 T DM Barley grain and 254 T DM distilled Brewers grain imported and used over the season through the milking shed (averaged amount of 508 T DM grain split in half between grain types).
- 61 T DM of Molasses imported and fed through the shed.
- 203 T DM of Palm Kernel Expeller (PKE); fed through dairy shed.
- 300 T DM of silage purchased on average and fed to dairy cows on blocks.
- 80 T DM of silage purchased and fed to dry stock on pastoral blocks, however, some of this will also be fed on crop, but not modelled as such given the difficulty in reconciling this with the crop blocks and crop yields in the model.

Supplementary feed made and fed during the season is assumed to be minor, and is cut and fed in the same season, thus no areas were modelled as being cut and/or baled for silage/baleage. Given the net importing of silage onto the platform, this would be a reasonable expectation.

| Farm System - Dairy | | | |
|---|---|---|---|
| **Herd Type/Breed** | Friesian | **Total Milk Solids (kg/year)** | 314,081 |
| **Seasonal Supply** | Seasonal | **Winter milk** | No |
| **Number of cows** | 680 (665 peak) | **Milk Solids (kg/cow)** | 465 |
| **Stocking rate (cows/ha)** | 2.8 (3.3/ha grazed)* | **Milk Solids (kg/ha)** | 1302/ha effective (1513/ ha grazed)* |

| Other Information | |
|---|---|
| **Winter off milking platform** | Yes, all cows and in calf heifers on crop blocks and additional replacement heifer grazers |
| **Stock grazed off (%)** | Nil, cows and first calvers, who return in May, in June and July and August |
| **Young stock reared off milking platform** | Yes from weaning until before winter, wintered on crop areas |
| **Imported Feeds** | 508 T DM Grain (50 % each Barley and distilled brewers grain), fed through shed to milking cows, 61 T DM of Molasses to dairy cows through shed; 203 T DM of PKE fed through milking shed; 380 T DM silage purchased, 300 T DM fed on pastoral blocks to dairy cows and 80 T DM silage fed on pastoral to dry stock over winter. Total 1152 T DM |

| | | Current | | | | |
|---|---|---|---|---|---|---|
| **Cows** | Av weight kg LW | 540 kg LW main herd; 500 kg LW for first calving heifers | | | | |
| | Median calving Date | 20th August for main Herd, 12th August for Heifers | | | | |
| | Dry-Off date | 1st June for main herd and 25th May for Heifers | | | | |
| | Peak Milk (1 Dec) | 665 cows | | | | |
| | **Cow Numbers** | | **No cows Dairy Herd & first calvers** | **In calf Heifers** | **Dry cows & Bulls & repl. grazers** | **In shed feeding (Y/N)** |
| | | Jul | 0 & 20 | 150 | 510&0&165 | N |
| | | Aug | 201 & 162 | 8 | 309 | Y |
| | | Sept | 470 & 170 | | 40 | Y |
| | | Oct | 505 & 168 | | 0 | Y |
| | | Nov | 505 & 165 | | 0 | Y |
| | | Dec | 500 & 165 | | 0 & 20 | Y |
| | | Jan | 500 & 165 | | 0 & 20 | Y |
| | | Feb | 490 & 160 | | 0 | Y |
| | | Mar | 470 & 160 | | 0 | Y |
| | | Apr | 470 & 155 | | 0 | Y |
| | | May | 460 & 120 | 170 | 35 &0&100 | Y |
| | | Jun | 0 | 170 | 510&0&200 | N |
| | Production kg/MS | 314,081 | | | | |
| | Lactation length | 287 days used | | | | |
| | Once a day Milking (e.g half season, dry off, never) | Never | | | | |
| | Calves fed milk powder (Y/N) | No | | | | |
| **Supplements Imported** | | **Amount (T/DM)** | **Fed (e.g. paddock, shed, trough, crop)** | | | |
| | Barley & distillers grain and Molasses | 254 & 254 & 61 | Fed to dairy milking cows through shed | | | |
| | Silage/Baleage | 380 | Purchased and fed to dairy cows on pastoral blocks (300) & Dry cattle (80) | | | |
| | Other PKE | 203 | Fed to dairy cows on pastoral blocks | | | |
| **Supplements Made** | | **Amount (T/DM)** | **Ha** | **Fed or stored?** | | |
| | | | | | | |
| | Fodder beet | 25 | 28.1 | Fed to replacements and dry cows in May, June July and August | | |
| **Effluent** | Type/system | Holding Pond system after stone trap and applied via K Line pods. | | | | |
| | Application Depth mm | Application depth at < 10 mm per application (modelled < 12 mm) from August to May (spray irregularly as not modelling June or July to receive effluent). Due to travelling irrigator used, sludge applied in months Nov to February to mimic stir and spray operation, whilst K line used of rest of season. | | | | |
| **Replacements** | On/off farm when & what age | Off farm from weaning, back to support block as in calf heifers in May | | | | |

* Calculated on milking platform area only excluding the crop area and non-effective area.

## Fertiliser

Fertiliser applications have been modelled from Ravensdown past sale records and farmer information, and are based on average monthly rates. Practices are similar to Woldwide 4, Ammo 36 is applied to the whole farm in August at rates of 120 kg/ha. Urea is then applied in October, November, and February behind the cows at rates of 50 to 60 kg/ha. There are liquid applications of Nitrogen in September and March at 100 L/ha at the equivalence of 18 Kg N/ha made with Express a gibberellic acid. The Effluent blocks receive less nitrogen with no urea applications in January. Maintenance applications of Potash Superphosphate and Flexi N are made in December at the same rate for both effluent and non-effluent.

There is also modelled effluent exported from Woldwide 3 farm and spread on the whole farm. It was modelled as an amount exported from an area on that farm, with that total amount then pro rata applied as organic fertiliser to equate to the total amount of nutrient which is 3660 kg N; 2562 kg P; 2196 kg K; 854 kg S; 5368 kg Ca; 2074 kg Mg and 366 kg Na. The total fertiliser nitrogen applied is 219 and 192 kg N/ha/year for the Non effluent and Effluent farm blocks and 172 kg N/ha across all blocks (whole property) on average, which includes the weighted average in NPKS of 14-10-8-3 from the dairy effluent imported.

Non Effluent block:

| Month | Fertiliser | NPKS nutrient rating (kg/ha) |
|---|---|---|
| August | Ammo 36 | 43-0-0-12 |
| September | Urea | 18-0-0-0 |
| October | Urea | 28-0-0-0 |
| November | Urea | 23-0-0-0 |
| December | Potash Superphosphate and FlexiN | 21-55-30-66 |
| December | Organic dairy effluent (solid) | 18-12-10-4 |
| January | Urea | 28-0-0-0 |
| February | Urea | 23-0-0-0 |
| March | Urea (liquid) | 18-0-0-0 |
| Total Nutrients | | 219-68-40-82* |

Effluent block:

| Month | Fertiliser | NPKS nutrient rating (kg/ha) |
|---|---|---|
| August | Ammo 36 | 43-0-0-12 |
| September | Urea | 18-0-0-0 |
| October | Urea | 28-0-0-0 |
| November | Urea | 23-0-0-0 |
| December | Potash Superphosphate and FlexiN | 21-55-30-66 |
| December | Organic dairy effluent (solid) | 18-12-10-4 |
| February | Urea | 23-0-0-0 |
| March | Urea (liquid) | 18-0-0-0 |
| Total Nutrients | | 192-67-41-82* |

* Please note that variance between actual fertiliser nutrients applied and total nutrients shown is the slurry effluent nutrients applied for the block

## Soil Test Results

Taken from 2016/17 soil tests for the various areas in table below;

| Soil tests | Olsen P | QTK | QT Ca | QT Mg | QT Na | Org S |
|---|---|---|---|---|---|---|
| Brax_4a.1 Non Effluent blocks | 16 | 9 | 14 | 31 | 13 | 13 |
| Brax_4a.1 Effluent blocks | 21 | 9 | 14 | 31 | 13 | 13 |
| Brax_4a.1 Effluent tile blocks | 35 | 12 | 13 | 35 | 13 | 13 |
| Tuap_6b.2 Effluent | 32 | 11 | 18 | 43 | 15 | 12 |
| Tuap_6b.2 Non effluent | 25 | 14 | 16 | 38 | 14 | 10 |
| Upukerora soils | 27 | 23 | 13 | 43 | 14 | 8 |

## Pasture Production

The predominant pasture species on the dairy farm is ryegrass/white clover. Annual pasture production has been weighted by relative productivity as 1 between dairy blocks on Brax_4a.1 and Tuap_6b2. Soil types, and 0.8 for the Upukerora grazing blocks on the stony river flats as they are drier:

| Block | Relative productivity | T DM/ha/year |
|---|---|---|
| Dairy pastoral areas | 1.0 | 15.4 |
| Upuk_8a.1 Non Eff & Dev. | 0.8 | 12.4 |

*It should be noted that this estimated pasture production is based on default South Island pasture ME values and may be different to actual ME values and utilisation values on this farm which in turn would influence estimated pasture production.*

## Structures

There are three wintering pads on the property, left by the previous owner and have not been currently used. They have a rotten rock base, with a knap rock layer on top and topped off with bark chips on top of this. It has the ability to stand off mobs of 100 to150 cows, with ad lib feeding of baleage in ring feeders. Effluent would be the solids from the bark which is scrapped after each season and spread by muck spreader.

**Fodder Cropping**

A fodder cropping cycle of Pasture to Fodder Beet (last two years in beet) before being re sown into pasture in October is practiced for approximately 25 to 30 ha or 10 % of the actual dairy block as a means of development. The area currently being cropped is the stonier land by the river, and so block history is entered as 5 years with crop to crop blocks having fallow as prior land use as they were cropped prior to conversion. Please note that the third crop block (Upuk_8a.1 FBt>YG) is effectively a pastoral block in its reporting year and not included in calculation for crop area Crops are modelled as crop blocks and information entered is;

- Fodder beet are sown in October after full cultivation, with dry cows and replacements grazed over May, June, July, and in August before calving.
- Sown with Cropmaster DAP, Ammonium sulphate, Potassium chloride plus boron and salt mix, NPKS rating (24-23-30-25) and a further application of Urea/potassium chloride made in February (NPKS rating 69-0-25-0).
- Yields are averaged at 25 T DM/ha and grazed in situ. Grazing durations (months grazed and % dairy/beef) were altered so to align animal metabolic intakes with crop yield and availability given the models inability to optimise feed demand and supply. All dry cattle are on crop over June, July and August, with some crop in May plus fodder supplement and pasture, whilst the dairy herd is allocated a small amount of crop in May and August in addition to pasture and supplement.

**Effluent**

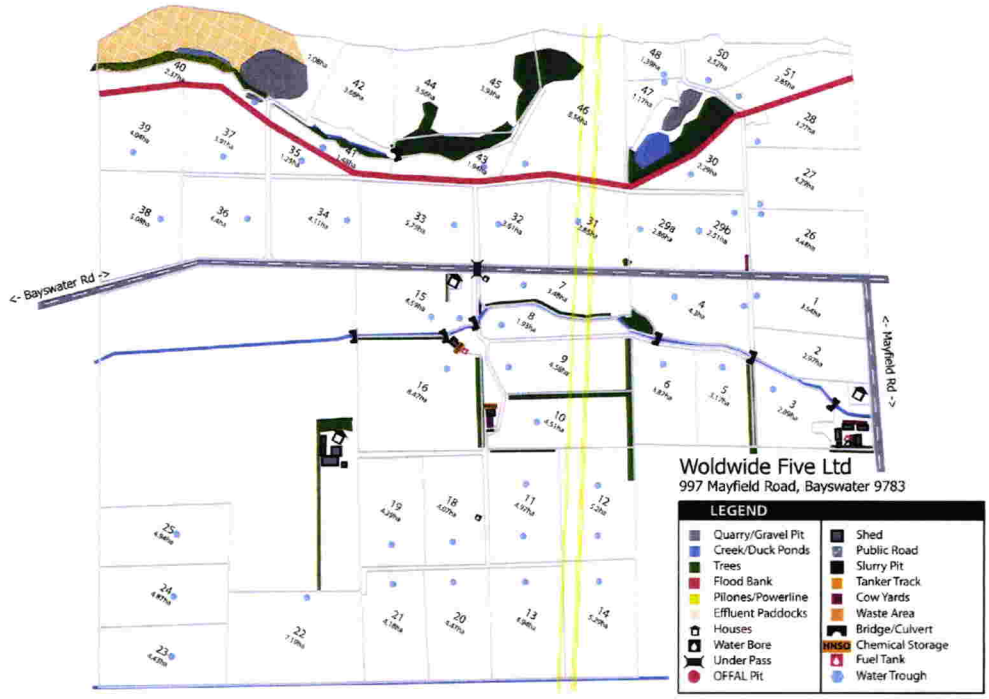
Effluent has been modelled as using Overseer default values, and calculated as applying 43 kg N/ha/year (liquid) plus 10 kg N/ha/year solids over the 112 ha, which is 86 % (adjusted to equal GIS area) of the modelled 130.1 ha (86.1 ha total area plus area consented of 44.3 ha less other area of 0.3 ha); plus 3 kg N/ha/year (solids) applied from pond sludge to the Non effluent areas. Currently, the effluent system has effluent gravity fed into a stone trap and sump then into holding tanks, from which the effluent is pumped through K Line pods applying liquids at depths of 10 mm per application or less by a pulsation system (modelled < 12 mm) or travelling irrigators. The current holding pond is estimated to hold 180 (6 tanks of 30,000 L) cubic metres of effluent (owner stated). Liquid effluent is sprayed during the months of August to May inclusive (modelled infrequently spray so as no effluent is modelled to be applied in June or July), with sludge applied in November to February to mimic the travelling irrigator applications. The rest of the sludge from the pond is modelled to be spread on the non-effluent areas in October every year by a slurry tanker (refer table below).

## Management Unit details and Soil Information: Table 1

| Block Name | Stock | Block Type | Soil Order | Drainage Class | Effluent | PAW (0-60cm) | Effective Area (ha) |
|---|---|---|---|---|---|---|---|
| Brax_4a.1 Effluent | Dairy | Pastoral | Orthic Gley | Poorly drained | Liquid & Sludge | 148.7 | 18.4 |
| Brax_4a.1 Eff Tile | Dairy | Pastoral | Orthic Gley | Poorly drained | Liquid & Sludge | 148.7 | 52.5 |
| Tuap_6b.2 Effluent | Dairy | Pastoral | Orthic Melanic | Well drained | Liquid & Sludge | 81.2 | 59.2 |
| Brax_4a.1 Non Eff | Dairy | Pastoral | Orthic Gley | Poorly drained | Pond Sludge | 148.7 | 2.4 |
| Tuap_6b.2 Non Eff | Dairy | Pastoral | Orthic Melanic | Well drained | Pond Sludge | 81.2 | 69.7 |
| Upuk_8a.1 Non Eff | Dairy | Pastoral | Fluvial Recent | Well drained | Pond Sludge | 37.6 | 4.3 |
| Upuk_8a.1 Non Eff dev | Dry stock | Pastoral | Fluvial Recent | Well drained | | 37.6 | 1.1 |
| Riparian 1 | Riparian | Riparian | Various | Poorly drained | n/a | n/a | 12.9 |
| Upuk_8a.1 FBt>FBt | Dry stock | Crop | Fluvial Recent | Well drained | | 37.6 | 22.3 |
| Upuk_8a.1 Past>FBt | Dry stock | Crop | Fluvial Recent | Well drained | | 37.6 | 5.8 |
| Upuk_8a.1 FBt>YG | Dry stock | Crop | Fluvial Recent | Well drained | | 37.6 | 5.5 |
| Non-Productive area | | | | | | | 8.5 |
| **Total** | | | | | | | **262.6** |

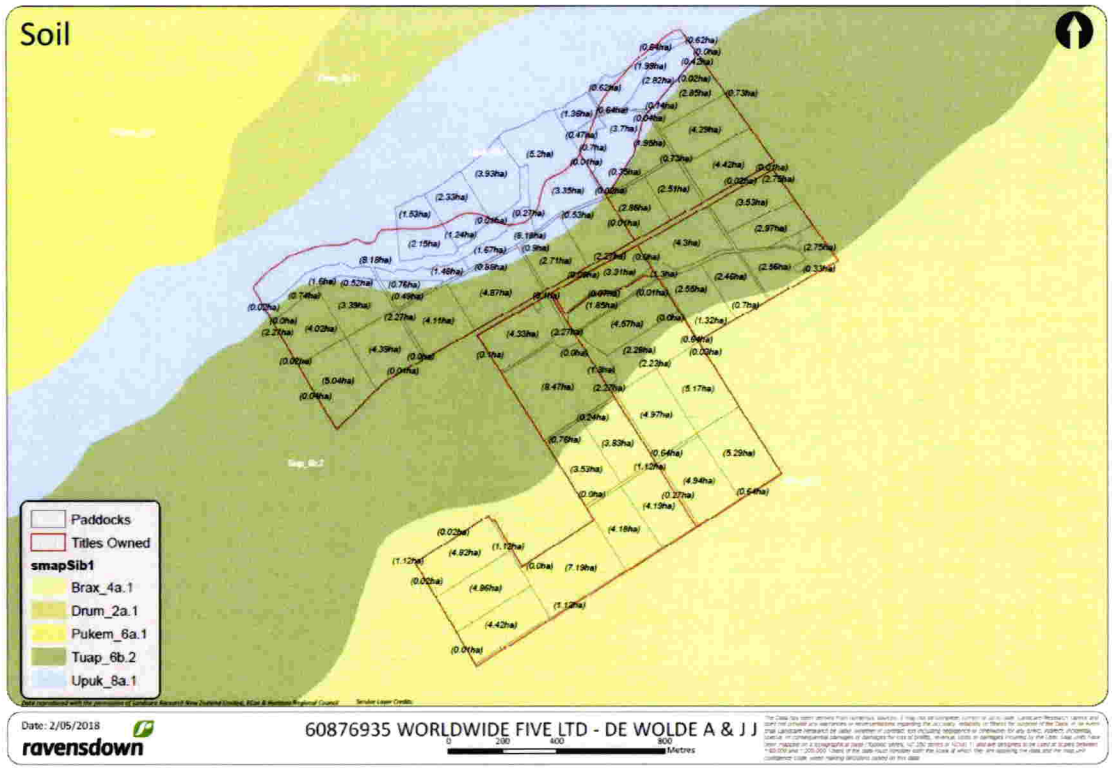
*PAW Landcare S maps calculated

## Land Management Unit Map and Farm Map





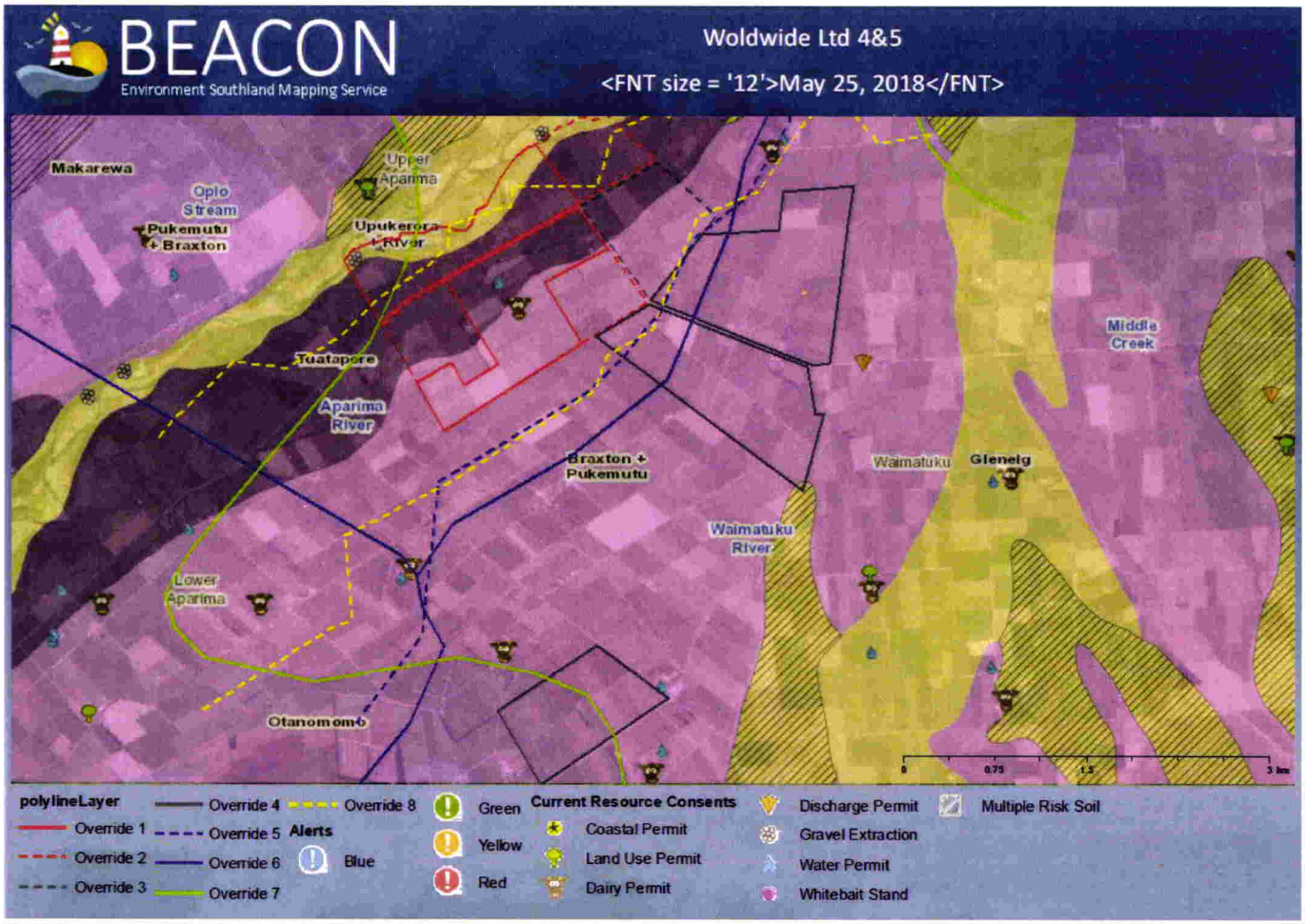
Farm map with area of 216.03 ha , discharge area has additional 44.3 ha included (excludes 30.54 ha title not drawn in top RHS) for current Effluent block indicated being paddocks 18 to 25 & 7 to 16, plus 44.3 ha, 130.1 ha in total less estimated setback areas based on 86 % equates to 111.9 ha. Total titled area is 246.57, GIS calculated area is 262.6 ha, estimated pastoral area of 241.2 ha.





Title area of 202.25 ha and soils, with additional 44.3 ha and soils from additional consented area plus river margin actual farm area included in paddocks calculated to be 262.6 ha GIS assessed.

## Nitrate Levels and Physiographic Zonal Environment Southland Beacon Maps




Physiographic zones are Central plains (Braxton plus Pukemutu soils) brown oxidising (Tuatapere) and Riverine (Upukerora) soils (pink, dark and light yellow along river), with the blue dotted line denoting the two different sub catchments of Waimatuku river and the main Coastal catchment plus the Aparima river and the Aparima major catchment. The solid blue line denotes the three different ground water catchment zones, the lower Aparima and Upper Aparima with subsoils of quaternary gravel on top of tertiary sediment, plus the Waimatuku zone of alluvial gravel. The Green line separates minor to moderate (LHS) and moderate to high (RHS) nitrate levels with a hot spot situated nearby at drinking water threshold (not shown) nitrate levels.

The yellow dotted line is the division between the spring fed and lowland hard bed surface water zones.

The farm dairy effluent (FDE) risks are associated with the soil types, with the Braxton being a risk with artificial drainage and coarse soil structure, and the Tuatapere and Upukerora being well drained flat land and other well drained but very stony flat land.

The farms are Woldwide 4 is in dark green and the red line is the boundary for Woldwide 5. The dotted lines are the additions for the proposals.

## Nutrient related resource Consents held by the Landowner

| Resource Consent No. | Condition No. | Condition Text | Resource consent expiry date |
|---|---|---|---|
| AUTH-20157537-04 | 1. | This consent authorises the conversion of the subject land for use as a dairy farm as described in the application for resource consent dated 24 December 2015, further information dated 4 February 2015 and Conversion Environmental Plan dated 24 December 2014. The scope of the dairy farm activity to be established is described in the application and Conversion Environmental Plan as being;<br>• The milking of up to 800 cows up to twice per day;<br>• The construction and maintenance of:<br>o A dairy milking shed<br>• The discharge of dairy shed effluent to a discharge area of no more than 126 hectares;<br>• The application to land of no more than 202 kilograms of nitrogen per hectare per year as a result of fertiliser application;<br>• The establishment of environmental management practices as detailed in the Conversion Environmental Plan dated 24 December 2014. | Granted for an unlimited term |
| | 2. | This consent shall be exercised in conjunction with Discharge Permit AUTH-20157537-01 and Water Permit AUTH-20157537-02, or any subsequent replacement permits. | |
| | 20157537-01 | The discharge to land of dairy shed effluent generated from milking of up to 800 cows up to twice per day.<br>• The discharge of farm dairy effluent to land via a low rate pod system.<br>• The discharge of dairy shed effluent to a discharge area of no more than 126 hectares as per the plan attached as Appendix 1.<br>The discharge authorised by this consent shall not exceed the following rates at any time:<br>(a) For the pod set irrigation system: A maximum depth of application of 1 millimetre for each individual application, at an instantaneous rate not exceeding 1 millimetre per hour;<br>(b) a minimum return period of 28 days between applications;<br>(c) a maximum combined depth of application of 25 mm per year to any land area; and<br>(d) The maximum loading rate of nitrogen onto any land area as a result of the exercise of this consent shall not exceed 150 kilograms of nitrogen per hectare per year. | |

## Current Sheep Farm System Analysis

### Description of Current Farm System

The farm dairy platform will be increased by 136.3 ha after including 63.26 ha of a purchased sheep block (Woldwide 4) and the additional 73.0 ha added to the Woldwide 5 platform. A conversation was had with the original owner, Mr Cochrane to confirm some figures used in a budget already completed for this property, with the resulting data used and modelled for this sheep farm.

The total titled area of the property is 136.3 ha. In this figure there is 4.2 ha of non-effective area (comprising of sheds, lanes, and yards) and river margin. The effective area is calculated at 132.1 ha. It is of flat to gently rolling topography (modelled flat).

Soil types on the farm are mostly Braxton_4a.1, Silt Loam over clay, (Orthic Gley soil, Poorly drained, PAW (plant available water) to 60 cm of 147.6 mm), 77.0 ha; Tuatepere_6b.2, Silt Loam, (Orthic Melanic soil, Well drained, PAW (plant available water) to 60 cm of 81.2 mm), 55.5 ha plus an area of Upukerora_8a.1 Sandy Loam, (Recent soil, Well drained, PAW (plant available water) to 60 cm of 37.6 mm), 3.8 ha.

The 136.3 ha property was operated as a dryland sheep farm, lambing 1550 mixed age (M.A.) ewes (Romney based) Data entered is as follows;

- Mean lambing date is the 28th August for the main mob, with weaning finished by the 28th of November. Lambing rate is 155 % STS (survival to sale), ewes mating weight is 65 kg LW, with weaning weights at 33 kg LW average.
- 390 ewe lambs kept as replacements (winter weight of 48 kg LW), not mated.
- 20 Romney breeding rams (110 kg LW) and 12,000 kg/year wool shorn and sold on average.
- All remaining lambs sold to works at 19 kg carcass; with 604 left by the end of February (30 %) and 15 % sold off mothers at weaning (301).

| | July | Aug | Sept | Oct | Nov | Dec | Jan | Feb | Mar | April | May | June | LW (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M.A Ewes | 1550 | 1550 | 1520 | 1510 | 1510 | 1510 | 1180 | 1550 | 1550 | 1550 | 1550 | 1550 | 65 |
| Replacement Lambs | 0 | 0 | 0 | 0 | 390 | 390 | 390 | 390 | 390 | 385 | 385 | 385 | 48 |
| Ewe Hoggets | 385 | 385 | 380 | 380 | 380 | 380 | 380 | | | | | | 65 |
| Rams | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 110 |
| Works Lambs | 0 | 0 | 0 | 0 | 2010 | 1709 | 1408 | 1006 | 604 | 303 | | | 19 c/c |

### Supplements

There is no Supplementary feed imported onto the property, however, 15 T DM baleage is used from storage and is as follows:

- 8 T DM Baleage stored and used over the following season on pastoral blocks to sheep.
- 7 T DM Baleage stored and used over the following season on winter fodder crop block

Supplementary feed made and stored during the season is as above and is as follows;

- 15 T DM of grass baleage; made on the Braxton and Tuatapere blocks and stored. None is made on the river flats

**Fodder Cropping**
There is 9 ha of fodder crop (swedes) cultivated and returned to pasture in the following spring (October). Detail is as follows;

- Sown in November, conventionally cultivated with 150 kg/ha of Cropzeal boron boost
- A further urea application of 100 kg/ha is made in January.
- Yield is 14 T DM/ha and it is fed from May to August by sheep, in situ.

**Fertiliser**
All pastoral blocks receive a dressing of 275 kg/ha of 15 % sulphur superphosphate in November with some areas receiving a urea application at varying rates in spring. This was deemed to be 60 kg/ha of Sustain N on average across all pastoral blocks, and modelled so.

**Drainage**
Only the heavier Braxton soils were drained by moles and tile drainage, and so it was deemed by the owner 90 % of these paddocks would be effective drained by tiles and moles.

### Pasture Production

The predominant pasture species on the sheep farm is ryegrass/white clover. Annual pasture production has been weighted by relative productivity as 1 between heavier silt soils and 0.8 for the lighter river sandy loam blocks on the river flats:

| Block | Relative productivity | T DM/ha/year |
|---|---|---|
| Tuap_6b.2 Sheep | 1.0 | 15.6 |
| Brax_4a.1 Sheep | 1.0 | 15.6 |
| Upuk_8a.1 Sheep block | 0.8 | 12.5 |

*It should be noted that this estimated pasture production is based on default South Island pasture ME values and may be different to actual ME values and utilisation values on this farm which in turn would influence estimated pasture production.*

### Management Unit details and Soil Information: Table 1b

| Block Name | Stock | Block Type | Soil Order | Drainage Class | Fodder Crop rotates through | PAW (0-60cm) | Effective Area (ha) |
|---|---|---|---|---|---|---|---|
| Brax_4a.1 Sheep Block | Sheep | Pastoral | Orthic Gley | Poorly drained | Yes | 148.7 | 72.8 |
| Tuap_6b.2 Sheep Block | Sheep | Pastoral | Orthic Melanic | Well drained | Yes | 81.2 | 55.5 |
| Swedes | Sheep | Fodder Crop | Various | Various | (9 ha) | n/a | - |
| Upuk_8a.1 Sheep block | Sheep | Pastoral | Recent | Well drained | No | 36.7 | 3.8 |
| Non-Productive area | | | | | | | 4.2 |
| **Total** | | | | | | | **136.3** |

*PAW Landcare S maps calculated

## Proposed Farm System Analysis

### Description of Proposed Farm System

The farm dairy platform will be increased by 73.0 ha after excluding 63.26 ha of the purchased sheep block (which is added to Woldwide 4), with the effluent area remaining the same, and an increase to consented cow numbers calved (800). A decision regarding if the cropping is to remain on the developing river flats block was made. With the need to renew the sheep pastures, the cropping area has shifted to the Braxton and Tuatapere soils, predominantly of the sheep blocks, with the area reduced as there is no longer need to winter additional; replacement stock. There will be 26 ha of fodder beet grown in the proposed scenario.

The 335.5 ha property will be operated as a dryland dairy farm, calving 800 cows (795 modelled with deaths) and peak milking 785 (540 kg LW) Friesian cows. Milk production aimed for is increased to 360,000 kg MS/year (453 kg MS/cow). Cow numbers are shown in the table below. All cows are wintered on-farm for June and July on the crop

blocks plus the first calving heifers (190 and at 500 kg LW), which come back from grazing off in May. Mean calving date is the 20th August for the main herd, with the first calvers a week earlier on the 12th of August.

The dry-off dates are altered to reflect the increased calving numbers, with the dry-off date now being the 25th of May for the cows and first calving heifers. All replacements (190) are grazed off-the platform until they return as in calf R2 heifers in May. Cows are milked once a day or 16 hourly occasionally over autumn drying off (modelled never) and all calves are fed colostrum and waste milk. The other production factors remain the same as before

Friesian Bulls (20) at 700 kg LW are run with the herd over December and January.

| | July | Aug | Sept | Oct | Nov | Dec | Jan | Feb | Mar | April | May | June | LW (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dairy cows | | 244 | 565 | 605 | 600 | 600 | 590 | 590 | 570 | 565 | 443 | | 540 |
| First calving heifers | 20 | 182 | 190 | 187 | 185 | 185 | 185 | 180 | 180 | 175 | 105 | | 500 |
| Dairy grazers (milking cows) | 610 | 366 | 40 | | | | | | | | 154 | 610 | 540 |
| Dairy grazers (replacements) | 0 | | | | | | | | | | 190 | 190 | 480 |
| Dairy grazers (replacements) | 170 | 8 | | | | | | | | | | | 500 |
| Bulls | | | | | | 20 | 20 | | | | | | 700 |

**Supplements**

Supplementary feed imported onto the property and to be fed during the season has changed and is as follows:

- 215 T DM Barley grain and 215 T DM distilled Brewers grain imported and used over the season through the milking shed (averaged amount of 430 T DM grain split in half between grain types).
- 61 T DM of Molasses imported and fed through the shed.
- 200 T DM of Palm Kernel Expeller (PKE); fed through the shed
- 85 T DM of baleage purchased, 20 T DM fed on crops and the rest on the wintering pads.
- 100 T DM of Cereal silage (lower Nitrogen feed) fed to dairy cows on pasture over spring (August September 25%) and autumn (March April 75%)

Because of the reduced stocking given the larger area, imported supplementary feed has reduced to the above amounts to reconcile the pastoral productivity between the two systems.

Supplementary feed made and fed during the season is the same as the original current scenario, with an assumption that any silage and baleage made is fed out in the same season, made from all the farm blocks.

**Structures**

The three wintering pads on the property, will now be used, as an environmental mitigation tool. They will stand off mobs of 100 cows each (modelled 25 % milking cows in April; 50 % in May; 50% in August and 25 % in September), modelled an uncovered wintering pad, with ad lib feeding of baleage in ring feeders and effluent which is scrapped after each season is spread by muck spreader in October to crop blocks and is not stored.

**Fodder Cropping**

The cropping management remains the same between the two systems modelled, however, the area is reduced by 4 ha as there are less cattle wintered and, and the area cropped is changed to the new additional areas of Tuatapere and Braxton soils (26 ha out of 117.3 ha (73.0 plus 44.3 ha) rotating). Please note that the third crop block is effectively a pastoral block in its reporting year and not included in calculation for crop area. Block history is still 5 years. The following detail was modelled;

- Fodder beet are sown in October after full cultivation, with dry cows and replacements grazed over May, June, July, and in August before calving.
- Sown with Cropmaster DAP, Ammonium sulphate, Potassium chloride plus boron and salt mix, NPKS rating (24-23-30-25) and a further application of Urea/potassium chloride made in February (NPKS rating 69-0-25-0).
- Yields are averaged at 25 T DM/ha and grazed in situ. Grazing durations (months grazed and % dairy/beef) were altered so to align animal metabolic intakes with crop yield and availability given the models inability to optimise feed demand and supply. The smaller blocks of Braxton crop is May to July grazing's, with May being 50/50 dairy/dry cattle, and June and July 100 % dry cattle. For the larger Tuatapere crop blocks, grazing is June to August, with the ratios being 100% dry cattle for June July and 20% dairy and 80 % dry cattle for 4 hours grazing in August. All dry cattle are on crop over June, July and August, with some crop in May plus fodder supplement and pasture, whilst the dairy herd is allocated a small amount of crop in May and August in addition to pasture and supplement.

**Fertiliser**

This has changed between the two systems modelled. The total fertiliser nitrogen applied is now, due to area changes and less urea applied with the greater effluent being spread, 206 and 174 kg N/ha/year for the Non effluent and Effluent farm blocks and 164 kg N/ha across all blocks (whole property) on average which includes the weighted average in NPKS of 14-10-8-3 from the same amount of dairy effluent imported across a greater area (207.7 ha pastoral blocks in current scenario to 268.4 ha of Tuatapere and Braxton pastoral blocks plus crop blocks). The Upukeroroa blocks due to their productivity and risk of N loss, have reduced fertiliser amounts by stopping the January application and no imported dairy effluent, as mitigation steps.

Non Effluent block:

| Month | Fertiliser | NPKS nutrient rating (kg/ha) |
|---|---|---|

| | | |
|---|---|---|
| August | Ammo 36 | 43-0-0-12 |
| September | Urea | 18-0-0-0 |
| October | Urea | 23-0-0-0 |
| November | Urea | 23-0-0-0 |
| December | Potash Superphosphate and FlexiN | 21-55-30-66 |
| December (not applied to Upukeroroa) | Organic dairy effluent (solid) | 14-10-8-3 |
| January (not applied to Upukeroroa) | Urea | 23-0-0-0 |
| February | Urea | 23-0-0-0 |
| March | Urea (liquid) | 18-0-0-0 |
| | | 206-65-38-81 |

Effluent block:

| Month | Fertiliser | NPKS nutrient rating (kg/ha) |
|---|---|---|
| August | Ammo 36 | 43-0-0-12 |
| September | Urea | 18-0-0-0 |
| October | Urea | 23-0-0-0 |
| November | Urea | 18-0-0-0 |
| December | Potash Superphosphate and FlexiN | 21-55-30-66 |
| December | Organic dairy effluent (solid) | 14-10-8-3 |
| February | Urea | 18-0-0-0 |
| March | Urea (liquid) | 18-0-0-0 |
| Total | | 174-65-38-81 |

**Effluent**

Effluent has been modelled as using Overseer default values, and calculated as applying 47 kg N/ha/year (liquid) over the 107 ha (130.1 ha total area less 14 % areas not receiving effluent; calculated to 112 ha less crop area) effluent area, plus 12 kg N/ha/year (solids) applied from pond sludge, as well as 3 kg N/ha/year from pond sludge to the Non effluent areas, except the Upukeroroa blocks, again as a mitigating step, given their vulnerability to N loss. The effluent system remains the same.

## Pasture Production

The predominant pasture species on the dairy farm is ryegrass/white clover. Annual pasture production has been weighted by relative productivity as 1 between dairy blocks, and 0.8 for the stonier Upukerora grazing blocks on the river flats:

| Block | Relative productivity | T DM/ha/year |
|---|---|---|
| Dairy pastoral areas | 1.0 | 15.4 |
| Upuk_8a.1 Non Eff &dev | 0.8 | 12.3 |

*It should be noted that this estimated pasture production is based on default South Island pasture ME values and may be different to actual ME values and utilisation values on this farm which in turn would influence estimated pasture production.*

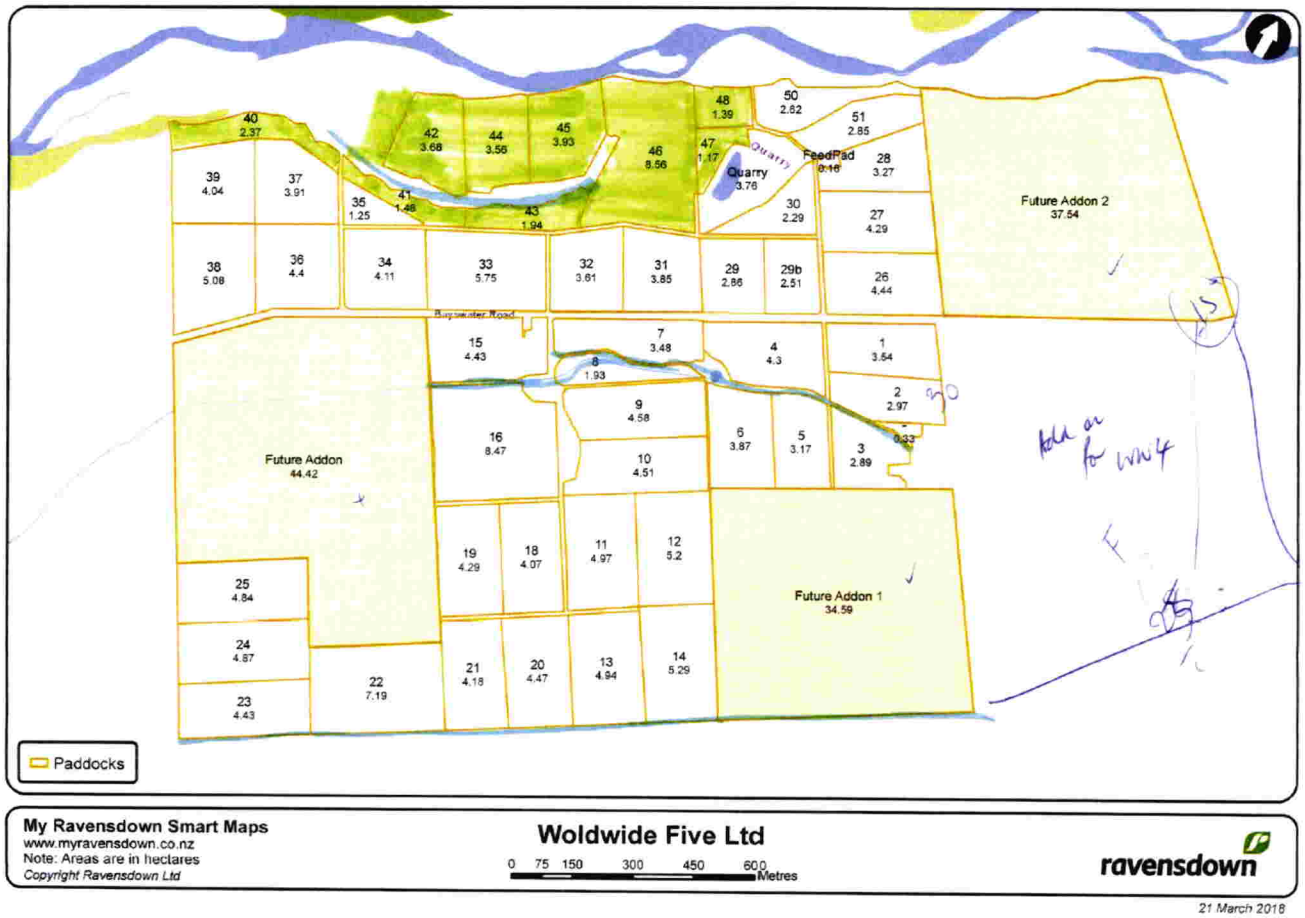
All other factors have remained the same.

## Management Unit details and Soil Information: Table 1b

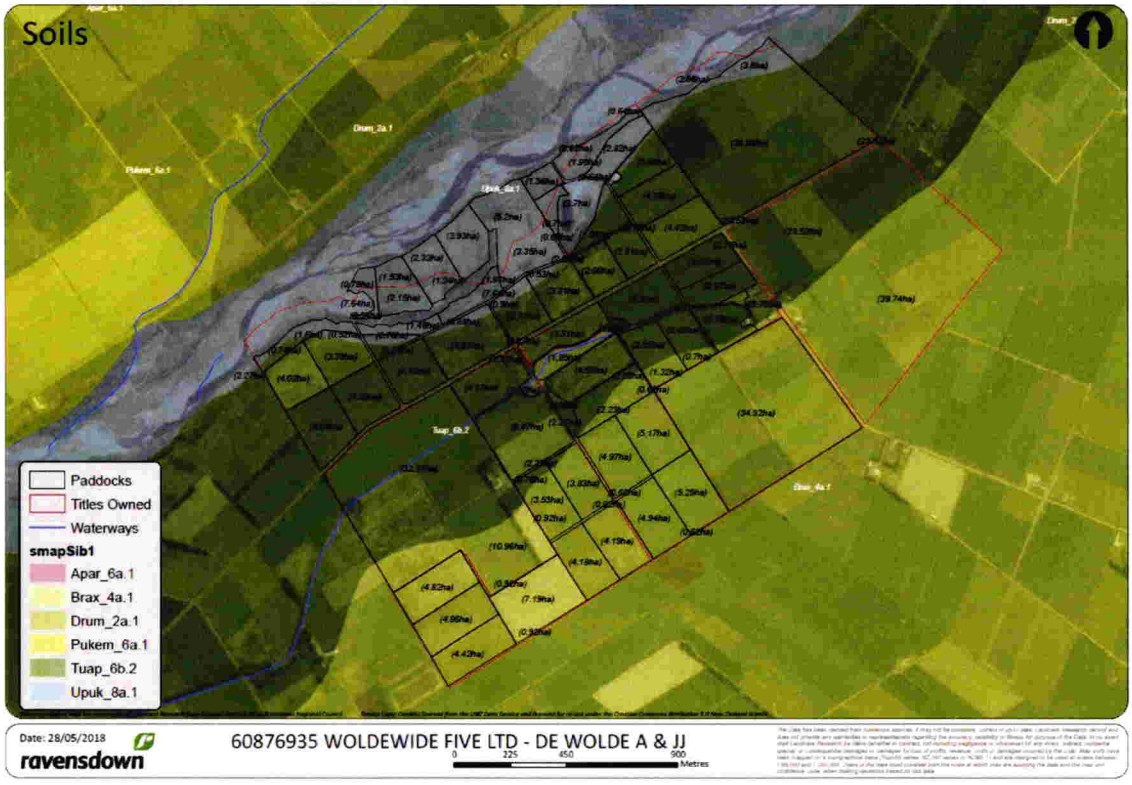
| Block Name | Stock | Block Type | Soil Order | Drainage Class | Effluent | PAW (0-60cm) | Effective Area (ha) | Increased or Reduced Area Sheep |
|---|---|---|---|---|---|---|---|---|
| Brax_4a.1 Effluent | Dairy | Pastoral | Orthic Gley | Poorly drained | Liquid & Sludge | 148.7 | 18.4 | |
| Brax_4a.1 Eff Tile | Dairy | Pastoral | Orthic Gley | Poorly drained | Liquid & Sludge | 148.7 | 47.2 | |
| Tuap_6b.2 Effluent | Dairy | Pastoral | Orthic Melanic | Well drained | Liquid & Sludge | 81.2 | 59.2 | |
| Brax_4a.1 Non Eff | Dairy | Pastoral | Orthic Gley | Poorly drained | Pond Sludge | 148.7 | 33.0 | + 30.6 ha (sheep) |
| Tuap_6b.2 Non Eff | Dairy | Pastoral | Orthic Melanic | Well drained | Pond Sludge | 81.2 | 71.7 | + 2.0 ha (sheep) |
| Upuk_8a.1 Non Eff | Dairy | Pastoral | Fluvial Recent | Well drained | | 37.6 | 13.6 | + 3.6 ha (sheep) |
| Upuk_8a.1 Non Eff dev | Dairy | Pastoral | Fluvial Recent | Well drained | | 37.6 | 29.2 | |
| Riparian 1 | n/a | Riparian | | | n/a | 148.7 | 12.9 | |
| Tuap_6b.2 FBt>FBt | Diary & Dry stock | Crop | Orthic Melanic | Well drained | Winter pad solids | 81.2 | 10 | + 10.0 ha (sheep) |
| Tuap_6b.2 Past>FBt | Diary & Dry stock | Crop | Orthic Melanic | Well drained | Winter pad solids | 81.2 | 10 | + 10.0 ha (sheep) |
| Tuap_6b.2 FBt>YG | Diary & Dry stock | Crop | Orthic Melanic | Well drained | | 81.2 | 10 | + 10.0 ha (sheep) |
| Brax_4a.1 Past>FBt | Diary & Dry stock | Crop | Orthic Gley | Poorly drained | Winter pad solids | 148.7 | 3 | + 1.23 ha (sheep) |
| Brax_4a.1 FBt>FBt | Diary & Dry stock | Crop | Orthic Gley | Poorly drained | Winter pad solids | 148.7 | 3 | + 1.23 ha (sheep) |
| Brax_4a.1 FBt>YG | Diary & Dry stock | Crop | Orthic Gley | Poorly drained | | 148.7 | 3 | + 1.23 ha (sheep) |
| Non-Productive area | | | | | | | 11.4 | + 2.9 ha (sheep) |
| **Total** | | | | | | | **335.6 (262.6+73.0)** | **+73.0 (sheep)** |

*PAW Landcare S maps calculated

## Land Management Unit Map and Farm Map




Farm map with additional blocks outlined, 117.6 ha in total according to title (117.3 plus 63.3 ha added in Woldwide 4 less consented 44.3 ha equals 136.3 ha sheep unit), and added to 218.3 ha assessed by GIS. Total area now 335.5 ha, 12.9 ha of riparian and river margin and 11.4 ha of non-productive, estimated pastoral area of 311.2 ha.





Title area of 319.83 ha and soils above excludes highlighted area which is part of Woldwide 4, actual farm area included in paddocks calculated to be 335.5 ha

## Proposed Farm System Analysis: Winter Barn Example

### Description of winter barn Farm System example

To provide an example of a wintering barn, it is easier to use the existing Woldwide 5 platform as the basis for the dairy platform example, with the dairy cows no longer wintered on this block, nor do the additional 200 cows in the current scenario (see pages 8 & 9 for full explanation). The effluent area will remain the same. With wintering all mixed age cows inside in the barn, there will no longer be any of fodder beet grown (33.6 ha for current scenario or 39 ha for original proposal), but to pay for the barn, additional cows are milked with a longer lactation given they can keep milking cows indoors towards the end of the season.

The 335.6 ha property will be operated as a dryland dairy farm, calving 960 cows and peak milking 930 (540 & 500 kg LW) Friesian cows. Milk production aimed for is at 535,000 kg MS/year (575 kg MS/cow peak). Cow numbers are shown in the table below. All mixed age cows are wintered in the barn, with in calf first calving heifers not coming back from grazing off until they are calving towards the end of July and August. Mean calving date is still the 20th August for the main herd, with the first calvers a week earlier on the 12th of August.

The dry-off date is now the 15th of June and the 31st of May for the cows and first calving heifers. All replacements (245) are grazed off-the platform until they return as in calf R2 heifers in late July/August as mentioned. Cows are never milked once a day over autumn drying off (modelled never) and all calves are fed colostrum and waste milk.

Friesian Bulls (20) at 700 kg LW are run with the herd over December and January.

| | July | Aug | Sept | Oct | Nov | Dec | Jan | Feb | Mar | April | May | June | LW (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dairy cows | | 265 | 715 | 705 | 695 | 695 | 675 | 665 | 655 | 645 | 600 | 260 | 540 |
| First calving heifers | 30 | 220 | 245 | 240 | 235 | 235 | 235 | 225 | 225 | 225 | 195 | | 500 |
| Dairy grazers (milking cows) | 715 | 450 | | | | | | | | | 0 | 455 | 540 |
| Bulls | | | | | | 20 | 20 | | | | | | 700 |

### Supplements

Supplementary feed imported onto the property and to be fed during the season has changed and is as follows:

- 350 T DM Barley grain and 250 T DM distilled Brewers grain imported and used over the season through the milking shed. A further 35 T DM is fed to milking cows in the wintering barn
- 99 T DM of Molasses imported and fed through the shed.
- 500 T DM of Palm Kernel Expeller (PKE); 350 T DM fed through the shed, with the remainder fed on pastoral blocks. A further 40 T DM is fed to milking cows in the wintering barn
- Approximately 700 T DM of grass silage; made on the support block and fed ***evenly across pastoral blocks*** to dairy cows.
- 410 T DM of silage made on the support block and fed to ***dry cattle*** in the wintering barn
- 140 T DM silage made on the support block and fed to the ***milking cows*** in the wintering barn

Because of the increased stocking and longer lactation, imported supplementary feed has increased to the above amounts to mostly reconcile the pastoral productivity between the two systems. However, additional fertiliser and barn slurry is also been used to reconcile the increased pastoral productivity also. In addition, it is noted the two barn examples for both Woldwide 4 & 5 are also similar in pasture productivity.

Supplementary feed made and fed during the season remains as before and is less likely given the increased stocking rates over the milking season will mean all pasture is more likely utilised by milking animals within the platform.

### Fodder Cropping

This is now no longer required compared to the other two systems modelled. The losses are likely lower on blocks which in the past wintered the mixed age cows on crop. Pasture renewal is now by grass to grass renewal.

### Fertiliser

This changes again between the two systems modelled. This is given the increased need given the higher pastoral productivity (an increase of 0.35 T DM/ha over the current system), however more nitrogen is supplied by effluent and barn slurry, so the additional nitrogen required equates to roughly a ***decrease*** for the effluent block and ***a nil increase*** for the non-effluent blocks, with in effect ***a reduction in fertiliser N***; 28 kg of N/ha decrease for effluent block (but only a 3 kg N/ha decrease for the tiled effluent areas receiving no barn slurry; Brax_4a.1 effluent tiled) and a 10 to 23 kg of N/ha decrease for non-effluent blocks, depending on which receives the solid effluent from Woldwide 3. The total fertiliser nitrogen applied is now 192 and 179 for the non-effluent blocks(160 for the Upukeroroa block) plus 171 and 146 kg N/ha/year for the Effluent farm blocks depending on which receives barn slurry, with 156 kg N/ha across all blocks (whole property) on average, which includes the weighted average in NPKS of 14-10-8-3 and 13-10-8-3 from the same amount of dairy effluent imported across a greater

area (207.7 ha pastoral blocks in current scenario to 231.8 ha of Tuatapere and Braxton pastoral blocks ). See fertiliser reconciliation summary page 39.

Note also maintenance fertiliser was also adjusted to account for the Phosphate in the barn slurry

Non Effluent block:

| Month | Fertiliser | NPKS nutrient rating (kg/ha) | NPKS nutrient rating (kg/ha)* |
|---|---|---|---|
| August | Ammo 36 | 43-0-0-12 | 43-0-0-12 |
| September | Urea | 23-0-0-0 | 23-0-0-0 |
| October | Urea | 30-0-0-0 | 23-0-0-0 |
| November | Organic dairy barn slurry | 25-6-34-3 | 23-0-0-0 |
| December | Organic Dairy Barn Slurry | 24-6-33-3 | 23-26-50-28 |
| January | Potash Superphosphate and FlexiN (and Organic effluent pad solids WW3) | 32-14-19-17 (19-4-11-14 & 13-10-8-3)** | |
| February | Urea | 23-0-0-0 | |
| March | Urea | 23-0-0-0 | 23-0-0-0 |
| April | Urea (liquid) | 18-0-0-0 | |
| Totals | | 241-26-86-35 | 158-26-50-40 |

* Upukeroroa blocks ** Tuatapere Non effluent block

Effluent block:

| Month | Fertiliser | NPKS nutrient rating (kg/ha) |
|---|---|---|
| August | Ammo 36 | 43-0-0-12 |
| September | Urea | 23-0-0-0 |
| October | Urea | 23-0-0-0 |
| November | Organic dairy barn slurry | 24-6-33-3**(25-6-0-8) |
| December | Superphosphate and FlexiN | 25-13-0-16 |
| January | Organic effluent pad solids WW3 | 18-12-11-4 |
| March | Urea | 23-0-0-0 |
| April | Urea (liquid) | 9-0-0-0 |
| Total | | 188-31-44-35**189-31-11-40 |

**Soluble fertiliser and no slurry on tiled effluent block

**Effluent**

Effluent has been modelled as using Overseer default values, and calculated as applying 66 kg N/ha/year (liquid) over the 112.0 ha (130.1 ha total area less 14 % areas not receiving effluent; calculated to 112 ha, increased area due to no cropping) effluent area, plus 11 kg N/ha/year (solids) applied from pond sludge to the Non effluent areas. The effluent system remains the same as what was detailed in the "current" farm system analysis. Wintering barn effluent is as detailed in the consent for Woldwide 1&2 and is a slurry which is exported and re imported as a dairy organic fertiliser. Solids applied to the Non effluent areas equates to 6 kg N/ha/year

**Farm dairy feeding structure: Wintering Barn.**

There is one housing barn on farm that has been modelled as two structures so as to contain the milking herd (winter barn plus grazing) and dry cows (winter pad only) at the times specified in table below. In addition, due to a modelling error, the dry cows are required to be grazing a pastoral block for the model to run, however in reality these animals will be all in the barn. To work around this, 99 % of the dry cattle are in the barn in August, with the Braxton and Tuatapere effluent and non-effluent blocks grazing these dry cattle for only 1% of the time in August.

*The nutrient concentration of wintering barn effluent is higher than dairy shed effluent due to lack of dilution and the housing of cows in the barns for up 24 hours per day.*

*The nutrient content of pond effluent (slurry) was tested as part of a 2011 AgResearch study "Characterising dairy manures and slurries – Case study 15." The nutrient content of slurry at the applicant's pond was measured at: 3,200 g/m$^3$ N; 800 g/m$^3$ P; 4,400 g/m$^3$ K; 400 g/m$^3$ S*
*Applying 15.2 m$^3$/hectare applies slurry effluent at a depth of 1.5 mm. Discharging slurry effluent at 15.2 m$^3$/hectare applies:*
*49 kg of N; 12 kg of P; 69 kg of K; and 6 kg of S.*

Table: Winter barn management:

| | |
|---|---|
| Pad type | Covered animal shelter |
| Bunker lining material | No lining material |
| Bunker cleaning method | Scraped |
| Concrete feeding apron | Scraped |
| Solids separated | No |
| Solids storage | N/A |
| Time in storage | N/A |
| Liquid effluent | All exported as a slurry, as effluent composition different to dairy shed effluent |
| Solids management | Re imported as slurry, spread on all blocks bar the tiled effluent and Upukeroroa blocks. The Non effluent blocks receive a full application and effluent blocks half an application of barn slurry. |
| Months applied | November and December for non-effluent blocks |
| Separated solids from pond and housing barn on pasture N application rate, Kg N/ha/year | 24 for effluent blocks, 49 for non-effluent blocks |

Table: Feeding management in winter barn:

| Herd | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Milking herd | % of cows | | | | | 100 | 100 | 100 | 100 | | | | |
| | Hours/ day grazing | | | | | 10 | 0 | 0 | 10 | | | | |
| Dry cows | % of cows | | | | | | 100 | 100 | 99 | | | | |
| | Hours/ day grazing | | | | | | 0 | 0 | 0 | | | | |

## Pasture Production

The predominant pasture species on the dairy farm is ryegrass/white clover. Annual pasture production has been weighted by relative productivity as 1 between dairy blocks, and 0.8 and 0.5 for the rougher grazing blocks on the platform and support block respectively:

| Block | Relative productivity | T DM/ha/year |
|---|---|---|
| Dairy pastoral areas | 1.0 | 15.8 |
| Upukeroroa river soils | 0.8 | 12.6 |

*It should be noted that this estimated pasture production is based on default South Island pasture ME values and may be different to actual ME values and utilisation values on this farm which in turn would influence estimated pasture production.*

All other factors have remained the same.

## Management Unit details and Soil Information: Table 1b

| Block Name | Stock | Block Type | Soil Order | Drainage Class | Effluent | PAW (0-60cm) | Effective Area (ha) | Increased or Reduced Area Sheep |
|---|---|---|---|---|---|---|---|---|
| Brax_4a.1 Effluent | Dairy | Pastoral | Orthic Gley | Poorly drained | Liquid & Sludge & Barn slurry *0.5 | 148.7 | 18.4 | |
| Brax_4a.1 Eff Tile | Dairy | Pastoral | Orthic Gley | Poorly drained | Liquid & Sludge | 148.7 | 52.5 | |
| Tuap_6b.2 Effluent | Dairy | Pastoral | Orthic Melanic | Well drained | Liquid & Sludge & Barn slurry *0.5 | 81.2 | 59.2 | |
| Brax_4a.1 Non Eff | Dairy | Pastoral | Orthic Gley | Poorly drained | Pond Sludge & Barn slurry * 1.0 | 148.7 | 36.7 | + 34.3 ha (sheep) |
| Tuap_6b.2 Non Eff | Dairy | Pastoral | Orthic Melanic | Well drained | Pond Sludge & Barn slurry * 1.0 | 81.2 | 101.7 | +32.0 ha (sheep) |
| Upuk_8a.1 Non Eff | Dairy | Pastoral | Fluvial Recent | Well drained | | 37.6 | 13.6 | + 3.6 ha (sheep) |
| Upuk_8a.1 Non Eff dev | Dairy | Pastoral | Fluvial Recent | Well drained | | 37.6 | 29.2 | |
| Riparian 1 | n/a | Riparian | | | n/a | 148.7 | 12.9 | |
| Non-Productive area | | | | | | | 11.4 | + 2.9 ha (sheep) |
| **Total** | | | | | | | **335.6 (262.6+73.0)** | **+73.0 (sheep)** |

*PAW Landcare S maps calculated

## Summary of Current and Proposed Farm System Scenario: Table 2

| | Current scenario | Current Sheep Farm | Proposed scenario | Winter Barn Example |
|---|---|---|---|---|
| System Type | Seasonal dairy supply block | Sheep breeding and finishing | Seasonal dairy supply block | Seasonal dairy supply |
| Total Area (ha) | 262.6 | 136.3 (only 73.0 ha transferred to WW5) | 335.6 | 335.6 |
| Effluent area (ha) | 112 ha (86 % of 130.1) receiving liquids & sludge from dairy shed plus 76.4 ha non-effluent having pond sludge from the holding pond applied | n/a | 107 ha (86 % of 130.1 less crop) receiving liquids & sludge from dairy shed plus 147.4 ha non-effluent having pond sludge from the holding pond applied | 112 ha (86 % of 130.1) receiving liquids & sludge from dairy shed plus 138.4 ha non-effluent having pond sludge from the holding pond applied. All wintering barn effluent re imported as fertiliser and applied to non-tiled effluent and non-effluent areas |
| Stocking rate (s.u/ha) | 7,686 s.u* or 31.9 s.u/ha effective or 2.8 cows/ha platform (3.3 cows/ha grazed) | 2,642 s.u* or 19.4 s.u/ha effective or 20.0/ha grazed | 8,591 s.u* or 27.6 s.u/ha effective or 2.6 cows/ha platform (2.9 cows/ha grazed) | 11,318 s.u* or 34.9 s.u/ha effective or 3.1 cows/ha platform (33.7 s.u/ha total or 2.9 cows/ha total) |
| N use (kg N/ha/year) | 172 across the whole farm (158 fertiliser) | 30 across the whole farm | 164 across the whole farm (153 fertiliser) | 194 across the whole farm |
| Production (kg MS/ha grazed) | 1,302/ha effective platform (1,513/ha total grazed) | 1,117 kg LW sold/ha grazed | 1,157/ha effective platform (1,323/ha total grazed) | 1,719/ha effective platform (1,594/ha total farm) |
| Supplements Imported (kg DM/ha/year) | 1,152 T DM in total or 4,776 per effective platform. | n/a | 876 T DM in total or 2,815 per effective platform. | 2,524 T DM in total or 8,108 effective platform. |
| Wintering system | On farm on crop plus in calf heifers wintered on plus additional 200 in calf dairy replacements | On farm on crop and pasture | On farm on crop plus in calf heifers wintered on with no additional in calf heifers | In wintering barn on platform plus in calf heifers wintered off |
| Pasture production(kg DM/ha/year)<br>- Platform Pastures<br>- Upukerora paddocks | <br>15,456**<br>12,365 | <br>15,614<br>12,491 | <br>15,354**<br>12,283 | <br>15,795**<br>12,636 |

*As calculated by OVERSEER and including and dry cows**As calculated by OVERSEER with standard default and ME values likely to be lower than Southland values.

## Summary of Current Whole Farm Nutrient Loss Indicators: Table 3

| | Current average | Sheep Farm (136.3 ha) | Combined current (less 63.3 ha) | Proposed scenario | Winter Barn Example |
|---|---|---|---|---|---|
| Nitrogen leaching loss to water (Total kg N) | 14,493 | 2,509 (less 1,120) | 15,882 | 15,937 | 15,639 |
| Nitrogen leaching loss to water (kg N/ha) | 55 | 18 (19 ) | 47 | 47 | 47 |
| Phosphorus runoff to water (Total kg P) | 207 | 56 (less 26) | 237 | 231 | 245 |
| Phosphorus runoff to water (kg P/ha) | 0.8 | 0.4 (0.4) | 0.7 | 0.7 | 0.7 |

* Losses split apportionately with riparian, trees and other losses. Note Sheep Block apportioned in the following table:

| | | | | |
|---|---|---|---|---|
| Sheep Block (Brax_4a.1) | Pastoral | 72.80 | 38.50 | 34.30 |
| Sheep Block (Tuap_6b.2) | Pastoral | 55.50 | 23.50 | 32.00 |
| Sheep Block (Upuk_8a.1) | Pastoral | 3.80 | | 3.80 |
| Swedes | Fodder Crop | - | ***4.65*** | ***4.35*** |
| Non prod | | 4.20 | 1.30 | 2.90 |
| Totals | | 136.3 | WW4 (63.3) | WW5 (73.0) |

## Discussion on Whole Farm Nutrient Loss Indicators

From the information provided by Woldwide Five, farm records, and the assumptions listed above, the N loss from the root zone and P loss to second order streams for the farm system is outlined below.

**Current scenario Farm System**

- The N loss from the root zone from the farm system modelled was calculated using OVERSEER® (v6.3.0) to be **55 kg N/ha/year or 14,493 kg N/year.**
- The P loss risk from the farm system modelled was calculated using OVERSEER® (v6.3.0) to be **0.8 kg P/ha/year or 207 kg P/year.**

**Combined Current Farm System**

- The N loss from the root zone from the combined farm system (less the 63.3 ha included in Woldwide 4) modelled was calculated using OVERSEER® (v6.3.0) to be **47 kg N/ha/year or 15,882 kg N/year.**
- The P loss risk from the farm system (less the 63.3 ha included in Woldwide 4) modelled was calculated using OVERSEER® (v6.3.0) to be **0.7 kg P/ha/year or 237 kg P/year.**

**Proposed Farm System**

- The N loss from the root zone from the farm system modelled was calculated using OVERSEER® (v6.3.0) to be **47 kg N/ha/year or 15,937 kg N/year.**
- The P loss risk from the farm system modelled was calculated using OVERSEER® (v6.3.0) to be **0.7 kg P/ha/year or 231 kg P/year.**

**Winter barn example Farm System**

- The N loss from the root zone from the farm system modelled was calculated using OVERSEER® (v6.3.0) to be **47 kg N/ha/year or 15,639 kg N/year.**
- The P loss risk from the farm system modelled was calculated using OVERSEER® (v6.3.0) to be **0.7 kg P/ha/year or 245 kg P/year.**

Key factors influencing Nutrient Loss include:

- Soil type and Profile Available Water (PAW) plus drainage.

  The soil type has a large impact on N leached. The soils on the property are mainly well drained silt loams, with poorly drained silt loams over clay and well drained stony sandy loams on the river flat. Plant Available Water (PAW) values range between (and would be considered) 'high' at 148.7 mm (0-60cm) to 'low' at 37.6 mm (0-60 cm). The Plant Available Water is described as "the amount of water potentially available to plant growth that can be stored in the soil to specific soil depths". It therefore makes sense that the soils with high PAW will have lower N leaching as there will be less drainage from these soils. Soils with lower PAW are less able to buffer against changes in nitrogen losses to the bottom of the root zone (from stocking rates, crop yields, irrigation volumes) as the soils have larger pores and are flushed frequently as compared to a poorer draining soil with a higher PAW and are less versatile (see N report in Appendix where the Tuatapere soil in the proposal loses 50 kg N/ha/year compared to the Braxton soils, losing 28 kg N/ha/year respectively on the Effluent pastoral blocks under the current system). The Upukerora soils lose on average 88 kg N/ha/year, twice as much as the Tuatapere non-effluent soil (42 kg N/ha/year), with a PAW approximately twice (2.16) as much.

  These heavier soils are often tile drained (artificially drained, and are here) to remove water from the profile and enable higher productivity. The risk is that these drains also provide a conduit to nutrient flows and effluent discharges direct to water ways. Ensuring the nutrients are captured by plant growth and minimising effluent applications when soil PAW are near capacity will reduce this. This is evident with the tiled effluent area which has loses 1 kg N/ha/year higher than the non-tiled effluent block.

- Pastoral productivity

  The higher the pastoral productivity from dairy land and the associated higher stocking, the higher the risk of N losses on dairy farms, especially under the climatic, rainfall and evapotranspiration rates for Southland. The current system has a higher production per ha (1,513 kg MS/ha grazed) at a high stocking rate of 3.3 cows/ha platform grazed; (cf. to 2.73 cows/ha & 1056 kg MS/ha, NZ Southland Dairy statistics 2015-16) with a high amount (4,776 kg DM/ha) of supplement imported which supports the stocking and consequently the pasture production required at 15,456 kg DM/ha/year as seen in table 2, page 28. This leads to the high amount of urine deposition on pastures from the resulting cow intakes, resulting in increased risk from N leaching. The results point to a similar influence from urinary deposition in the proposal, with the amount of N loss attributed to urine similar as a percentage 70 % (for both), the rest due to N losses from cropping and effluent applications (other sources) plus direct losses (tiles). It is noted the sheep unit is also at a similar pastoral productivity (15,614 kg DM/ha), and higher per ha productivity

than district averages also. Losses here are at 33 % from urinary deposition given the lower risk from urine leaching with sheep.

- Cropping

  The crop blocks for the current system contribute 3,742 kg N/ha or 111 kg N/ha/year on average (26.2 % of total N losses and yet accounts for 12.8 % of the total land area). (Figures as in Block Nitrogen reports, pages 34, 35 & 39). It is the higher concentration of stock in a smaller area and thus the greater urine deposition which leads to this increased risk of losses. This is also exacerbated by these crops being grazed at a time when drainage events are most likely to occur, and that the crops are on the lightest soils of this farm. The losses are lower between the current and proposed scenarios, with the proposed crop losses being 63 kg N/ha/year on average or 2499 kg N/year total (15.7 % of total losses and 11.6 % of area), due to the crop blocks now being on soils with lower risk of N losses from leaching. As well, it is the crop losses on the sheep block which on a proportionate basis contributes 33 % of total losses from 6.4 % of the total 73.0 ha which lifts the sheep losses to the overall N loss of 19 kg N/ha/year.

The non-productive areas offset these N losses to an extent.

The other environmental risk indices are the current P losses to surface water at 0.8 kg P/ha/year as seen in the Phosphate reports pages 33 & 38, which are low to moderate risk in their impact. The P risk is mostly influenced by losses from other sources (123 kg or 59.4 % of total of 207 kg, refer Phosphorous block reports, pages 34 39) which is run off from tracks and yards into drains and ditches from the farm. Riparian strip planting and vegetation buffer zones for crops and lane ways can reduce this and have been implemented on this farm. Olsen P levels are mostly within or below the optimum agronomic ranges, with the current fertiliser rates receiving above maintenance rates due to the recent conversion process. This will reduce in future. As well, the topography where the all of the fertiliser is applied is flat, which also helps to minimise P losses. Any new Effluent storage plus low volume applications will help to mitigate this risk and allow applications to be reduced on tiled soils at "at risk" times also. The proposed P losses are only 231 kg P/year, 6 kg P/year lower than the combined P losses and due mostly to the reduced losses on the cropping blocks, being mitigated by shifting to deeper less vulnerable soils.

The current scenario is rated 13.9, the lower side of category 2 under the Soil versatility rating system (Landcare Research, 2002), as calculated in the table 4 below. The proposal reduces this score (13.4), as there is a greater percentage of less vulnerable soils (Braxton and Tuatapere). The farm already uses a number of effective Nitrogen mitigation strategies to minimise losses for the proposal and allowing the proposal to crop less on these vulnerable soils culminating in the results above.

## Soil Vulnerability Land Management Rating: Table 4

| Soil Type (Proposed) | Soil Vulnerability | Vulnerability rating | % Farm | Rating score |
|---|---|---|---|---|
| Braxt_4a.1 | Moderate | 10 | 28.7 (33.6) | 2.87 (3.36) |
| Tuap_6b.2 | Moderate | 10 | 51.6 (49.9) | 5.16 (4.99) |
| Upuk_8a.1 | Limited | 30 | 19.7 (16.5) | 5.91 (4.95) |
| **Total** | | | **100.0** | **13.94 (13.30)** |

The property is situated in the Aparima River sub catchment, and the Aparima catchment of the proposed Environment Southland Regional Water and Land Plan. It is 29 % on a Central plain physiographic zone, with no variants, 50 % on the oxidising physiographic with no variants and 16.5 % on the riverine physiographic. (See map, page 17 and table above), meaning the farm must attach significance to these zones in its environmental management. The farm is within zones having influence in the high nitrate levels in ground water and is at risk from summer shrinking of soils and nitrogen losses from leaching. Water quality is characterised by lowland hard bed and spring fed, with quaternary gravel upon tertiary sediment in the Upper Aparima groundwater management zone. Implications of this information are unknown at present but some catchment areas will be required to reduce their impacts. The zonal information would point to the presence of nitrate leaching; and nitrogen accumulation as key risk factors for the zone. An additional key risk factor for the Braxton soil is the losses of nitrogen through tiles which is the case here. No effluent applications to the highest risk soil during the highest risk periods would be helpful. This plus the use of the wintering pads at the riskier shoulder seasons and the reduction of wintering on the Upukerora would be mitigations to be used to reduce the risk of N loss over the autumn winter period. In addition, created Riparian strips and wetlands would be activities which would be required to mitigate any overland flows.

**Summary of Mitigations re winter barn:**

| | Mitigations modelled: | Reason/Rationale: | Effect: |
|---|---|---|---|
| Winter Barn Farm System | 1. Effluent mitigations (area maintained and targeted fertiliser applications) | Ensure effluent only applied to appropriate areas, with Nitrogen applications taking into account the additional effluent nutrients from barn slurry. | Effluent area maintained. Decrease Nitrogen applications to account for the application of the imported slurry to Non effluent areas (1 x apply) and effluent areas (0.5 x apply), not applying to Upukeroroa and tiled effluent areas. Adjust fertiliser applications to account for this and required pastoral productivity. Other blocks have additional fertiliser applied. Adjust effluent solids too |
| | 2. Alter cropping regime with the Winter Barn | With the winter barn, no crop area is required. | No crop area over winter reduces Nitrogen losses in Upukeroroa blocks in current scenario from 4,404 to 3,388 kg N/ha, plus the risk of P losses is also reduced. Note the interim stage showed cropping on the Braxton would lower losses to 2,448 kg N/year, but these losses can be used to counter the increase in urine patch losses from pastures on the more vulnerable Upukeroroa soils |
| | 3. Winter Barn | With the additional milking cows, the use of the barn over May and August gives the farm system an ability to reduce risk of pugging to pastures over spring and at autumn as required. | The risk of pugging reduces infiltration of soils and increases overland flow of nutrients. Also nutrients are held and spread onto soil by effluent applications when pastures more able to receive the nutrients and thus lowers risk of losses. |
| | 4. Supplementary feed | Additional feed is able to be used for the extended lactation and for the wintering of cattle, with an ability to lower losses and ensure higher utilisation | Higher amounts of grain and PKE can mean one can reduce the pastoral productivity further, and so with a lower pastoral productivity and higher supplement use overall N losses will reduce. It was decided to use more N fertiliser to equate pastoral productivity and the example still shows an equal amount of losses for the system when compared to the interim stage of more cows and added area. |
| | 5. Mitigate stocking on more vulnerable Upukeroroa soils | Higher stocking on the dairy platform could lead to increased urine patch losses on the free draining river soils | Mitigate this by not grazing milking cows on these soils over autumn, and the lower productivity will mean reduced fertiliser applications on these soils. In addition the numbers wintered, calved and peak milked are lowered to account for this as well. |

*The sum effect from the wintering barn is to maintain the level of environmental losses from the increased farming system intensity (more cows and longer lactation with higher milk production) required to provide an added return on the additional capital invested. These effects are less able to be buffered by the freer draining and high vulnerability to leaching Upukeroroa soils, but more so by less vulnerable Braxton soils.*

Fertiliser Reconciliation Summary:

| | | Non Effluent | | | Effluent | |
|---|---|---|---|---|---|---|
| | Fert reconciliation | Braxton | Tuatapere | Upukeroroa | Non tiled | Tiled |
| | | | | | | |
| Current | Pasture production | 15.5 | 15.5 | 12.4 | 15.5 | 15.5 |
| | N fert | 202 | 202 | 202 | 174 | 174 |
| | Dairy slurry(barn) | | | | | |
| | Dairy solid | 18 | 18 | 18 | 18 | 18 |
| | Effluent dairy | 3 | 3 | 3 | 53 | 53 |
| | **Total** | **223** | **223** | **223** | **245** | **245** |
| | N fix | 56 | 56 | 18 | 60 | 60 |
| | | | | | | |
| Proposal | Pasture production | 15.4 | 15.4 | 12.3 | 15.4 | 15.4 |
| | N fert | 192 | 192 | 169 | 160 | 160 |
| | Dairy slurry(barn) | | | | | |
| | Dairy solid | 14 | 14 | | 14 | 14 |
| | Effluent dairy | 3 | 3 | | 64 | 64 |
| | **Total** | **209** | **209** | **169** | **238** | **238** |
| | N fix | 76 | 78 | 73 | 78 | 78 |
| | | | | | | |
| Barn Ex | Pasture production | 15.8 | 15.8 | 12.6 | 15.8 | 15.8 |
| | N fert | 192 | 179 | 160 | 146 | 171 |
| | Dairy slurry(barn) | 49 | 49 | | 24 | 0 |
| | Dairy solid | 0 | 13 | | 18 | 18 |
| | Effluent dairy | 6 | 6 | | 77 | 70 |
| | **Total** | **247** | **247** | **160** | **265** | **259** |
| | N fix | 62 | 71 | 77 | 81 | 73 |
| | | | | | | |

Please see information contained in the Appendices for detail relating to nutrient budgets, nitrogen block reports, phosphorus block reports and estimated pasture production for the current situation and scenario modelled.

OVERSEER v6.3.0 onwards has a new irrigation module to better reflect the management practices of irrigators. The Best Practice Data Input Standards give some guidance on what is now required. The model requires more information from users about their irrigation system and how water application decisions are made on farm. The extra data needed includes depth of water per application; return time and depending on how soil water is monitored what are the trigger points and targets (mm deficit). Ideally, this data needs to be actual long term average data as OVERSEER uses 30 year average climate data. Best estimates of these data will generally generate more drainage, and hence N loss to water, than has been the case with previous OVERSEER versions.

OVERSEER is a continually developing model with several aspects currently being investigated. In particular there are on-going issues in relation to the modelled nitrogen leaching from grazed crop blocks (and possibly forage blocks also) being less than expected. (Please see www.overseer.org.nz/OVERSEERModel/bugs.aspx for more detail).

When future versions of OVERSEER are stipulated for use associated with Regional Council rules both the current and the proposed farm systems will need to be re-modelled for consistency as the base N lost from the root zone may alter with updated OVERSEER versions.

# Appendices

## Current farm System Whole Farm Nutrient Budget

Abe and Anita De Wolde
WoldWide 5
Client reference: 60876935
Farm name: WoldWide 5 Current Scenario-effintxtra (16/17)

Mark Crawford
Ravensdown
Dunedin

### Farm Nutrient Budget - Whole farm

| | N | P | K | S | Ca | Mg | Na |
|---|---|---|---|---|---|---|---|
| | (kg/ha/yr) | | | | | | |
| **Nutrients added** | | | | | | | |
| Fertiliser, lime & other | 172 | 57 | 39 | 69 | 24 | 8 | 2 |
| Rain/clover N fixation | 48 | 0 | 2 | 4 | 2 | 5 | 23 |
| Irrigation | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Supplements imported | 107 | 17 | 48 | 12 | 13 | 8 | 6 |
| **Nutrients removed** | | | | | | | |
| As products | 86 | 14 | 22 | 4 | 18 | 2 | 6 |
| Exported effluent | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| As supplements | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| To atmospheric | 74 | 0 | 0 | 0 | 0 | 0 | 0 |
| To water | 55 | 0.8 | 20 | 92 | 102 | 4 | 15 |
| **Change in internal pools** | | | | | | | |
| Plant material | 9 | 1 | 4 | 2 | 0 | 0 | 1 |
| Organic pool | 98 | 9 | 5 | -13 | 1 | 1 | 0 |
| Inorganic mineral | 0 | 2 | -12 | 0 | -3 | -4 | -5 |
| Inorganic soil pool | 4 | 48 | 51 | 0 | -79 | 18 | 13 |

### Sheep Farm


Version 6.3.0, on 2018-06-08 11:35:37

Abe and Anita De Wolde
WoldWide 4 plus Gladfiled Run Off
Client reference: 60877676
Farm name: Woldwide 4 Current (16/17)

Mark Crawford
Ravensdown
Dunedin

### Farm Nutrient Budget - Whole farm

| | N | P | K | S | Ca | Mg | Na |
|---|---|---|---|---|---|---|---|
| | (kg/ha/yr) | | | | | | |
| **Nutrients added** | | | | | | | |
| Fertiliser, lime & other | 195 | 26 | 49 | 37 | 0 | 0 | 1 |
| Rain/clover N fixation | 41 | 0 | 2 | 4 | 2 | 5 | 21 |
| Irrigation | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Supplements imported | 83 | 15 | 37 | 11 | 8 | 7 | 4 |
| **Nutrients removed** | | | | | | | |
| As products | 87 | 15 | 21 | 5 | 19 | 2 | 6 |
| Exported effluent | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| As supplements | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| To atmospheric | 78 | 0 | 0 | 0 | 0 | 0 | 0 |
| To water | 30 | 0.9 | 17 | 59 | 74 | 2 | 9 |
| **Change in internal pools** | | | | | | | |
| Plant material | 23 | 2 | 11 | 2 | 2 | 1 | 1 |
| Organic pool | 96 | 12 | 3 | -13 | 1 | 0 | 0 |
| Inorganic mineral | 0 | 4 | -13 | 0 | -2 | -3 | -4 |
| Inorganic soil pool | 4 | 8 | 49 | 0 | -82 | 11 | 15 |

## Current Farm System Nutrient Loss Indicators

***P report***

Block P

Client reference: 60876935
Farm name: WoldWide 5 Current Scenario-efflntxtra (16/17)

Dunedin

## Block Phosphorus

| Block name | Total P lost (kg P/yr) | P lost (kg P/ha/yr) | P loss categories | | |
|---|---|---|---|---|---|
| | | | Soil | Fertiliser | Effluent |
| Brax_4a.1 Effluent | 5 | 0.3 | Low | Low | Low |
| Brax_4a.1 Eff Tile | 32 | 0.6 | Low | Low | Low |
| Tuap_6b.2 Effluent | 9 | 0.2 | Low | Low | Low |
| Brax_4a.1 Non Eff | 1 | 0.2 | Low | Low | n/a |
| Tuap_6b.2 Non Eff | 9 | 0.1 | Low | Low | n/a |
| Upuk_8a.1 Non Eff | 2 | 0.4 | Low | Low | n/a |
| Upuk_8a.1 Non Eff dev | 0 | 0.4 | Low | Low | n/a |
| Riparian 1 | 1 | 0.1 | n/a | n/a | n/a |
| Upuk_8a.1 FBt>FBt | 17 | 0.8 | n/a | n/a | n/a |
| Upuk_8a.1 Past>FBt | 4 | 0.7 | n/a | n/a | n/a |
| Upuk_8a.1 FBt>YG | 3 | 0.5 | n/a | n/a | n/a |
| Other farm sources | 123 | | | | |
| Whole farm | 207 | 0.8 | | | |

## Sheep Farm

Abe and Anita De Wolde
New Sheep Farm
Client reference:
Farm name: Purchased Sheep Farm Current - copy 1 (17/18)

Mark Crawford
Ravensdown
Ravensbourne

## Block Phosphorus

| Block name | Total P lost (kg P/yr) | P lost (kg P/ha/yr) | P loss categories | | |
|---|---|---|---|---|---|
| | | | Soil | Fertiliser | Effluent |
| Sheep Block (Brax_4a.1) ## | 30 | 0.4 | Low | Low | n/a |
| Sheep Block (Tuap_6b.2) ## | 6 | 0.1 | Low | Low | n/a |
| Swedes | 2 | 0.2 | n/a | n/a | n/a |
| Sheep Block (Upuk_8a.1) | 1 | 0.3 | Low | Low | n/a |
| Other farm sources | 18 | | | | |
| Whole farm | 56 | 0.4 | | | |

## Has a fodder crop rotating though, results for pastoral block component only

## *N report*

### Farm N

Abe and Anita De Wolde
WoldWide 5
Client reference: 60876935
Farm name: WoldWide 5 Current Scenario-effintxtra (16/17)

Mark Crawford
Ravensdown
Dunedin

### Farm Nitrogen

| | Units | Benchmark farm | Current farm |
|---|---|---|---|
| **Inputs (farm average)** | | | |
| Clover N | kg N/ha/yr | | 46 |
| Fertiliser N | kg N/ha/yr | | 158 |
| Other N added | kg N/ha/yr | | 123 |
| **Indices** | | | |
| Average N loss to water | kg N/ha/yr | | 55 |
| includes N lost as effluent | kg N/ha/yr | | 0 |
| $N_2O$ emissions | kg N/ha/yr | | 17.9 |
| For pastoral area of farm: | | | |
| Farm N surplus | kg N/ha/yr | | 240 |
| N conversion efficiency | % | | 26 |

### Sheep Farm

Abe and Anita De Wolde
New Sheep Farm
Client reference:
Farm name: Purchased Sheep Farm Current - copy 1 (17/18)

Mark Crawford
Ravensdown
Ravensbourne

### Farm Nitrogen

| | Units | Benchmark farm | Current farm |
|---|---|---|---|
| **Inputs (farm average)** | | | |
| Clover N | kg N/ha/yr | | 104 |
| Fertiliser N | kg N/ha/yr | | 30 |
| Other N added | kg N/ha/yr | | 2 |
| **Indices** | | | |
| Average N loss to water | kg N/ha/yr | | 18 |
| includes N lost as effluent | kg N/ha/yr | | 0 |
| $N_2O$ emissions | kg N/ha/yr | | 14.2 |
| For pastoral area of farm: | | | |
| Farm N surplus | kg N/ha/yr | | 113 |
| N conversion efficiency | % | | 17 |

## Block N

Client reference: 60876935 Dunedin

Farm name: WoldWide 5 Current Scenario-efflntxtra (16/17)

### Block Nitrogen

| Block name | Total N lost (kg N/yr) | N lost to water (kg N/ha/yr) | N in drainage * (ppm) | N surplus (kg N/ha/yr) | Added N ** (kg N/ha/yr) |
|---|---|---|---|---|---|
| Brax_4a.1 Effluent | 593 | 32 | 10.1 | 246 | 245 |
| Brax_4a.1 Eff Tile | 1743 | 33 | 10.1 | 246 | 245 |
| Tuap_6b.2 Effluent | 3415 | 58 | **16.1** | 254 | 245 |
| Brax_4a.1 Non Eff | 73 | 30 | 9.6 | 219 | 222 |
| Tuap_6b.2 Non Eff | 3877 | 56 | **15.6** | 232 | 222 |
| Upuk_8a.1 Non Eff | 527 | 123 | **29.9** | 298 | 222 |
| Upuk_8a.1 Non Eff dev | 135 | 122 | **29.8** | 295 | 219 |
| Riparian 1 | 39 | 3 | N/A | | |
| Upuk_8a.1 FBt>FBt | 2458 | 110 | **25.3** | 113 | 93 |
| Upuk_8a.1 Past>FBt | 720 | 124 | **29.3** | 94 | 93 |
| Upuk_8a.1 FBt>YG | 564 | 102 | **24.0** | 48 | 113 |
| Other farm sources | 350 | | | | |
| Whole farm | 14493 | 55 | | | |
| Less N removed in wetlands | 0 | | | | |
| Farm output | 14493 | 55 | | | |

* Estimated N concentration in drainage water at the bottom of the root zone. Maximum recommeded level for drinking water is 11.3 ppm (note that this is not an environmental water quality standard).

** Sum of fertiliser and external factory effluent inputs.

N/A: N in drainage not calculated for easy and steep pastoral blocks, or for tree and shrubs, riparian, wetland or house blocks.

## Sheep Farm

Farm name: Purchased Sheep Farm Current - copy 1 (17/18)

### Block Nitrogen

| Block name | Total N lost (kg N/yr) | N lost to water (kg N/ha/yr) | N in drainage * (ppm) | N surplus (kg N/ha/yr) | Added N ** (kg N/ha/yr) |
|---|---|---|---|---|---|
| Sheep Block (Brax_4a.1) ## | 669 | 10 | 3.1 | 120 | 28 |
| Sheep Block (Tuap_6b.2) ## | 761 | 15 | 4.1 | 118 | 28 |
| Swedes | 891 | 99 | **23.9** | 59 | 71 |
| Sheep Block (Upuk_8a.1) | 143 | 38 | 9.2 | 115 | 28 |
| Other farm sources | 45 | | | | |
| Whole farm | 2509 | 18 | | | |
| Less N removed in wetlands | 0 | | | | |
| Farm output | 2509 | 18 | | | |

* Estimated N concentration in drainage water at the bottom of the root zone. Maximum recommended level for drinking water is 11.3 ppm (note that this is not an environmental water quality standard).

** Sum of fertiliser and external factory effluent inputs.

N/A: N in drainage not calculated for easy and steep pastoral blocks, or for tree and shrubs, riparian, wetland or house blocks.

## Has a fodder crop rotating though, results for pastoral block component only

# Current System Pasture Production, Other Values and Effluent Report

Abe and Anita De Wolde
WoldWide 5
Client reference: 60876935
Farm name: WoldWide 5 Current Scenario-effintxtra (16/17)

Mark Crawford
Ravensdown
Dunedin

## Block Pasture

| Block name | On-farm fresh pasture intake (kg DM/ha/yr) | Estimated utilisation (%) | Supplements removed (kg DM/ha/yr) | Pasture growth (kg DM/ha/yr) |
|---|---|---|---|---|
| Brax_4a.1 Effluent | 13138 | 85 | 0 | 15456 |
| Brax_4a.1 Eff Tile | 13138 | 85 | 0 | 15456 |
| Tuap_6b.2 Effluent | 13138 | 85 | 0 | 15456 |
| Brax_4a.1 Non Eff | 13138 | 85 | 0 | 15456 |
| Tuap_6b.2 Non Eff | 12790 | 83 | 0 | 15456 |
| Upuk_8a.1 Non Eff | 8841 | 72 | 0 | 12365 |
| Upuk_8a.1 Non Eff dev | 8841 | 72 | 0 | 12365 |
| Riparian 1 | 0 | 0 | 0 | 0 |
| Upuk_8a.1 FBt>FBt | 0 | 0 | 0 | 0 |
| Upuk_8a.1 Past>FBt | 511 | 83 | 0 | 615 |
| Upuk_8a.1 FBt>YG | 10947 | 85 | 0 | 12879 |

This report gives an estimated animal intake for each block based on animal production and supplements brought on to farm information supplied. Estimated annual pasture growth is shown for the animal utilisation value shown. Note: the model is not sensitive to changes in utilisation.

It is recommended that a consultant or software such as StockPol is used to estimate farm pasture production.

Abe and Anita De Wolde
WoldWide 5
Client reference: 60876935
Farm name: WoldWide 5 Current Scenario- copy 1 (16/17)

Mark Crawford
Ravensdown
Dunedin

## Other values for farm - WoldWide 5 Current

| | |
|---|---|
| Milking herd size (peak cows/ha grazed) | 3.3 |
| Milk solids (kg/ha grazed) | 1513 |
| Milk production per cow (kg milk solids / cow) | 465.3 |
| Default calving data | 06 August |
| Total liveweight brought (kg/ha grazed) | 3871 |
| Total liveweight reared (kg/ha grazed) | 101 |
| Total liveweight sold (kg/ha grazed) | 3808 |
| No fertiliser costs entered | |
| GHG: Allocation to milk | 0.82 |
| Dairy stock rate (RSU) | 6712 |
| Dairy replacements stock rate (RSU) | 0 |
| Beef / dairy grazing stock rate (RSU) | 974 |
| Sows per ha | NaN |

Abe and Anita De Wolde
WoldWide 5
Client reference: 60876935
Farm name: WoldWide 5 Current Scenario-effintxtra (16/17)

Mark Crawford
Ravensdown
Dunedin

## Effluent Report

| | Units | Current farm |
|---|---|---|
| **Current effluent area** | | |
| Area of effluent blocks | ha | 112 |
| % of pastoral farm area | % | 54 |
| **Area of farm to apply effluent to achieve rates of:** | | |
| 150 kg N/ha/yr | ha | 47 |
| Maintenance K | ha | 5110 |
| 100 kg K/ha/yr | ha | 74 |
| **Source of N applied to effluent blocks** | | |
| Average of N applied to effluent blocks | kg N/ha/yr | 50 |
| Effluent from farm dairy | % | 84 |
| Effluent from wintering pad | % | 0 |
| Effluent from feed pad | % | 0 |
| Average fertiliser N | kg N/ha/yr | 174 |
| Average other elements | kg N/ha/yr | 10 |

## The Sheep Farm

Abe and Anita De Wolde
New Sheep Farm
Client reference:
Farm name: Purchased Sheep Farm Current - copy 1 (17/18)

Mark Crawford
Ravensdown
Ravensbourne

## Block Pasture

| Block name | On-farm fresh pasture intake (kg DM/ha/yr) | Estimated utilisation (%) | Supplements removed (kg DM/ha/yr) | Pasture growth (kg DM/ha/yr) |
|---|---|---|---|---|
| Sheep Block (Brax_4a.1) | 10848 | 70 | 117 | 15614 |
| Sheep Block (Tuap_6b.2) | 10832 | 70 | 140 | 15614 |
| Swedes | 0 | 0 | 0 | 0 |
| Sheep Block (Upuk_8a.1) | 8744 | 70 | 0 | 12491 |

This report gives an estimated animal intake for each block based on animal production and supplements brought on to farm information supplied. Estimated annual pasture growth is shown for the animal utilisation value shown. Note: the model is not sensitive to changes in utilisation.

It is recommended that a consultant or software such as StockPol is used to estimate farm pasture production.

Abe and Anita De Wolde
New Sheep Farm
Client reference:
Farm name: Purchased Sheep Farm Current - copy 1 (17/18)

Mark Crawford
Ravensdown
Ravensbourne

## Other values for farm - Purchased Sheep Farı

| | |
|---|---|
| Total liveweight brought (kg/ha grazed) | 831 |
| Total liveweight reared (kg/ha grazed) | 424 |
| Total liveweight sold (kg/ha grazed) | 1117 |
| No fertiliser costs entered | |
| GHG: Allocation to wool - breeding mob | 0.25 |
| GHG: Allocation to wool - trading mob | 0.02 |
| Sheep stock rate (RSU) | 2642 |
| Sows per ha | NaN |

**Current System Parameter Report**
Available on request.

## Proposed farm System Whole Farm Nutrient Budget

Abe and Anita De Wolde
WoldWide 5
Client reference: 60876935
Farm name: WoldWide 5 Proposed - consnt# - xtraeff copy 1 (16/17)

Mark Crawford
Ravensdown
Dunedin

### Farm Nutrient Budget - Whole farm

| | N | P | K | S | Ca | Mg | Na |
|---|---|---|---|---|---|---|---|
| | | | | (kg/ha/yr) | | | |
| Nutrients added | | | | | | | |
| Fertiliser: lime & other | 164 | 56 | 36 | 70 | 19 | 6 | 2 |
| Rain/clover N fixation | 64 | 0 | 2 | 4 | 2 | 5 | 23 |
| Irrigation | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Supplements imported | 61 | 11 | 27 | 8 | 6 | 5 | 3 |
| Nutrients removed | | | | | | | |
| As products | 79 | 13 | 19 | 4 | 17 | 2 | 6 |
| Exported effluent | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| As supplements | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| To atmospheric | 71 | 0 | 0 | 0 | 0 | 0 | 0 |
| To water | 47 | 0.7 | 24 | 89 | 94 | 4 | 16 |
| Change in internal pools | | | | | | | |
| Plant material | 7 | 1 | 3 | 1 | 0 | 0 | 0 |
| Organic pool | 81 | 9 | 2 | -13 | 1 | 0 | 0 |
| Inorganic mineral | 0 | 2 | -18 | 0 | -3 | -4 | -5 |
| Inorganic soil pool | 3 | 42 | 35 | 0 | -82 | 14 | 10 |

## Proposed Farm System Nutrient Loss Indicators

### *P report*

### Block P

Client reference: 60876935
Farm name: WoldWide 5 Proposed - consnt# - xtraeff copy 1 (16/17)

Dunedin

### Block Phosphorus

| Block name | Total P lost (kg P/yr) | P lost (kg P/ha/yr) | P loss categories | | |
|---|---|---|---|---|---|
| | | | Soil | Fertiliser | Effluent |
| Brax_4a.1 Effluent | 6 | 0.3 | Low | Low | Low |
| Brax_4a.1 Eff Tile | 29 | 0.6 | Low | Low | Low |
| Tuap_6b.2 Effluent | 9 | 0.2 | Low | Low | Low |
| Brax_4a.1 Non Eff | 8 | 0.2 | Low | Low | n/a |
| Tuap_6b.2 Non Eff | 9 | 0.1 | Low | Low | n/a |
| Upuk_8a.1 Non Eff | 5 | 0.4 | Low | Low | n/a |
| Upuk_8a.1 Non Eff dev | 12 | 0.4 | Low | Low | n/a |
| Riparian 1 | 1 | 0.1 | n/a | n/a | n/a |
| Tuap_6b.2 FBt>FBt | 3 | 0.3 | n/a | n/a | n/a |
| Tuap_6b.2 Past>FBt | 3 | 0.3 | n/a | n/a | n/a |
| Tuap_6b.2 FBt>YG | 2 | 0.2 | n/a | n/a | n/a |
| Brax_4a.1 Past>FBt | 2 | 0.7 | n/a | n/a | n/a |
| Brax_4a.1 FBt>FBt | 2 | 0.8 | n/a | n/a | n/a |
| Brax_4a.1 FBt>YG | 2 | 0.5 | n/a | n/a | n/a |
| Other farm sources | 138 | | | | |
| Whole farm | 231 | 0.7 | | | |

## *N report*

### Farm N

Abe and Anita De Wolde
WoldWide 5
Client reference: 60876935
Farm name: WoldWide 5 Proposed - consnt# - xtraeff copy 1 (16/17)

Mark Crawford
Ravensdown
Dunedin

### Farm Nitrogen

| | Units | Benchmark farm | Current farm |
|---|---|---|---|
| **Inputs (farm average)** | | | |
| Clover N | kg N/ha/yr | | 62 |
| Fertiliser N | kg N/ha/yr | | 153 |
| Other N added | kg N/ha/yr | | 74 |
| **Indices** | | | |
| Average N loss to water | kg N/ha/yr | | 47 |
| includes N lost as effluent | kg N/ha/yr | | 0 |
| $N_2O$ emissions | kg N/ha/yr | | 16.6 |
| For pastoral area of farm: | | | |
| Farm N surplus | kg N/ha/yr | | 209 |
| N conversion efficiency | % | | 28 |

### Block N

Abe and Anita De Wolde
WoldWide 5
Client reference: 60876935
Farm name: WoldWide 5 Proposed - consnt# - xtraeff copy 1_2 (16/17)

Mark Crawford
Ravensdown
Dunedin

### Block Nitrogen

| Block name | Total N lost (kg N/yr) | N lost to water (kg N/ha/yr) | N in drainage * (ppm) | N surplus (kg N/ha/yr) | Added N ** (kg N/ha/yr) |
|---|---|---|---|---|---|
| Brax_4a.1 Effluent | 518 | 28 | 8.8 | 219 | 238 |
| Brax_4a.1 Eff Tile | 1384 | 29 | 8.8 | 219 | 238 |
| Tuap_6b.2 Effluent | 2947 | 50 | **13.9** | 222 | 233 |
| Brax_4a.1 Non Eff | 860 | 26 | 8.2 | 187 | 209 |
| Tuap_6b.2 Non Eff | 3306 | 46 | **12.9** | 192 | 209 |
| Upuk_8a.1 Non Eff | 1134 | 83 | **20.3** | 174 | 169 |
| Upuk_8a.1 Non Eff dev | 2631 | 90 | **21.9** | 184 | 169 |
| Riparian 1 | 39 | 3 | N/A | | |
| Tuap_6b.2 FBt>FBt | 837 | 84 | **20.9** | 129 | 118 |
| Tuap_6b.2 Past>FBt | 719 | 72 | **18.2** | 141 | 118 |
| Tuap_6b.2 FBt>YG | 510 | 51 | **12.9** | 53 | 127 |
| Brax_4a.1 Past>FBt | 130 | 43 | **12.1** | 126 | 118 |
| Brax_4a.1 FBt>FBt | 158 | 53 | **14.3** | 113 | 118 |
| Brax_4a.1 FBt>YG | 94 | 31 | 8.9 | 52 | 127 |
| Other farm sources | 669 | | | | |
| Whole farm | 15937 | 47 | | | |
| Less N removed in wetlands | 0 | | | | |
| Farm output | 15937 | 47 | | | |

* Estimated N concentration in drainage water at the bottom of the root zone. Maximum recommeded level for drinking water is 11.3 ppm (note that this is not an environmental water quality standard).

** Sum of fertiliser and external factory effluent inputs.

N/A: N in drainage not calculated for easy and steep pastoral blocks, or for tree and shrubs, riparian, wetland or house blocks.

# Proposed System Pasture Production, Other Values and Effluent Report

Abe and Anita De Wolde
WoldWide 5
Client reference: 60876935
Farm name: WoldWide 5 Proposed - consnt# - xtraeff copy 1_2 (16/17)

Mark Crawford
Ravensdown
Dunedin

## Block Pasture

| Block name | On-farm fresh pasture intake (kg DM/ha/yr) | Estimated utilisation (%) | Supplements removed (kg DM/ha/yr) | Pasture growth (kg DM/ha/yr) |
|---|---|---|---|---|
| Brax_4a.1 Effluent | 13051 | 85 | 0 | 15354 |
| Brax_4a.1 Eff Tile | 13051 | 85 | 0 | 15354 |
| Tuap_6b.2 Effluent | 13051 | 85 | 0 | 15354 |
| Brax_4a.1 Non Eff | 13051 | 85 | 0 | 15354 |
| Tuap_6b.2 Non Eff | 12705 | 83 | 0 | 15354 |
| Upuk_8a.1 Non Eff | 9519 | 77 | 0 | 12283 |
| Upuk_8a.1 Non Eff dev | 8782 | 72 | 0 | 12283 |
| Riparian 1 | 0 | 0 | 0 | 0 |
| Tuap_6b.2 FBt>FBt | 0 | 0 | 0 | 0 |
| Tuap_6b.2 Past>FBt | 496 | 83 | 0 | 595 |
| Tuap_6b.2 FBt>YG | 10338 | 85 | 0 | 12163 |
| Brax_4a.1 Past>FBt | 496 | 83 | 0 | 595 |
| Brax_4a.1 FBt>FBt | 0 | 0 | 0 | 0 |
| Brax_4a.1 FBt>YG | 10418 | 85 | 0 | 12257 |

This report gives an estimated animal intake for each block based on animal production and supplements brought on to farm information supplied. Estimated annual pasture growth is shown for the animal utilisation value shown. Note: the model is not sensitive to changes in utilisation.

It is recommended that a consultant or software such as StockPol is used to estimate farm pasture production.

Abe and Anita De Wolde
WoldWide 5
Client reference: 60876935
Farm name: WoldWide 5 Proposed - consnt# - xtraeff copy 1 (16/17)

Mark Crawford
Ravensdown
Dunedin

## Other values for farm - WoldWide 5 Propose

| | |
|---|---|
| Milking herd size (peak cows/ha grazed) | 2.9 |
| Milk solids (kg/ha grazed) | 1323 |
| Milk production per cow (kg milk solids / cow) | 452.8 |
| Default calving data | 06 August |
| Total liveweight brought (kg/ha grazed) | 3073 |
| Total liveweight reared (kg/ha grazed) | 76 |
| Total liveweight sold (kg/ha grazed) | 3089 |
| No fertiliser costs entered | |
| GHG: Allocation to milk | 0.82 |
| Dairy stock rate (RSU) | 7652 |
| Dairy replacements stock rate (RSU) | 0 |
| Beef / dairy grazing stock rate (RSU) | 939 |
| Sows per ha | NaN |

Client reference: 60876935
Farm name: WoldWide 5 Proposed - consnt# - xtraeff copy 1 (16/17)

Dunedin

## Effluent Report

| | Units | Current farm |
|---|---|---|
| **Current effluent area** | | |
| Area of effluent blocks | ha | 107 |
| % of pastoral farm area | % | 39 |
| **Area of farm to apply effluent to achieve rates of:** | | |
| 150 kg N/ha/yr | ha | 55 |
| Maintenance K | ha | 342 |
| 100 kg K/ha/yr | ha | 89 |
| **Source of N applied to effluent blocks** | | |
| Average of N applied to effluent blocks | kg N/ha/yr | 58 |
| Effluent from farm dairy | % | 83 |
| Effluent from wintering pad | % | 0 |
| Effluent from feed pad | % | 0 |
| Average fertiliser N | kg N/ha/yr | 160 |
| Average other elements | kg N/ha/yr | 12 |

# Proposed System Parameter Report

Available on request.