

# NRP Year End 2015/16 Nutrient budget and Report

**A R & D M ALLEN**

Freshwater Management Units: Lower Waikato

Sub Catchment: Waerenga (50.4ha) and

Whangamarino at Jefferies Rd Br sub-catchment (96.3ha)

Prepared by Adrian Brocksopp

Principal Consultant



**A R & D M ALLEN**  
**66 WAIPUNA ROAD**  
**RD1**  
**TE TAUWHATA**  
**3281**

**Date: 15 November 2018**

**Reviewed by: Sarah Sexton (CNMA)**



## Executive Summary

Andrew Allen, of A R & D M Allen, has requested a nutrient budget and accompanying report, for the drystock farm located at 66 Waipuna Road, Te Kauwhata. The farm is in the “Lower Waikato River” Fresh Water Management Unit, within the Waikato Whangamarino at Jefferies Rd Br and Waerenga sub-catchments, under Plan Change 1.

The purpose of the year-end 2015/16 nutrient budget and report, is to determine the nutrient loss for the drystock property, to inform Andrew Allen as to their *potential* Nitrogen Reference Point under the Proposed Waikato Regional Plan Change 1 – Waikato and Waipa River Catchments.

The Proposed Waikato Regional Plan Change 1 requires a Nitrogen Reference Point be submitted to regional council in the period; 1<sup>st</sup> May 2020 to 30<sup>th</sup> November 2020. Given that the Proposed Waikato Regional Plan Change 1 is currently under review, the plan specific rules and requirements may be amended, at which point the calculated “Nitrogen Reference Point”, found in this document, may require future revision. Therefore, the Nitrogen Reference Point referred to in this document is indicative only and should not be submitted to Waikato Regional Council without further review from the author.

	2015/16
Nutrient Budget	Drystock Farm
Total Area (ha)	146.7
Nitrogen leaching loss to water (Total kg N/yr)	2,478
Nitrogen leaching loss to water (kg N/ha/yr)	17
<b><u>Potential NRP</u></b>	<b><u>17</u></b>
Phosphorus runoff to water (Total kg P/yr)	122
Phosphorus runoff to water (kg P/ha/yr)	0.8

### Other points to note

- Full input detail can be found in the OVERSEER® parameter report, available on request.
- Where limited data has been available, assumptions have been documented through the report.
- OVERSEER® nutrient budgets version 6.3.0 has been used to create the nutrient budgets presented in this report.
- Data input methodology as set by Waikato Regional Council has been used in the first instance, followed by OVERSEER® best practice data input standards (BPDIS).

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Adrian Brocksopp  
Principal Consultant  
15 November 2018

## General

OVERSEER® modelling of the system has been undertaken in accordance with the data input methodology (refer Appendix 3), and in accordance with the OVERSEER® 6.3.0 “best practice data input standards” (BPDIS). Full input detail can be found in the OVERSEER® parameter report, available on request. OVERSEER® nutrient budgets version 6.3.0 has been used to create the nutrient budgets presented in this report. The following report summarises the respective OVERSEER® v6.3.0 nutrient budgets and key assumptions made.

All farm system information used in the OVERSEER® model and contained within this report, has been supplied by A R & D M Allen and has been treated as true and accurate. This report and Overseer® model has been reviewed by a certified nutrient management advisor (CNMA).

## Purpose Statement

The purpose of the year-end 2015/16 nutrient budgets and report, is to determine the nutrient loss for the drystock property at 66 Waipuna Road, Te Kauwhata in order to inform Andrew Allen as to their potential Nitrogen Reference Point under the Proposed Waikato Regional Plan Change 1 – Waikato and Waipa River Catchments.

The farm is in the “Lower Waikato River” Fresh Water Management Unit, within the Lower Waikato Whangamarino at Jefferies Rd Br and Waerenga sub-catchments, under Plan Change 1.

The Proposed Waikato Regional Plan Change 1 requires a Nitrogen Reference Point be submitted to regional council in the period; 1<sup>st</sup> May 2020 to 30<sup>th</sup> November 2020. Given that the Proposed Waikato Regional Plan Change 1 is currently under review, the plan specific rules and requirements may be amended, at which point the calculated “Nitrogen Reference Point”, found in this document, may require future revision. Therefore, the Nitrogen Reference Point referred to in this document is indicative only and should not be submitted to Waikato Regional Council without further review from the author.

## Property Details

Farm Name		A R & D M ALLEN
Land	Physical Address	66 Waipuna Road, Te Kauwhata
	GIS Layer Title	SA31/208 Fee Simple, 1/1, Section 351 Parish of Whangamarino, 819,058 m2
		SA39A/949 Fee Simple, 1/1, Lot 1 Deposited Plan South Auckland 40429, 256,267 m2
		SA52D/841 Fee Simple, 1/1, Part Allotment 189A Parish of Whangamarino, 188,204 m2
		SA7B/145 Fee Simple, 1/1, Part Allotment 189A Parish of Whangamarino, 202,950 m2
		SA976/58 Fee Simple, 1/1, Lot 1 Deposited Plan 36934, 1,816 m2
		SA31/208 Fee Simple, 1/1, Section 351 Parish of Whangamarino, 819,058 m2
	Titled area (ha)	146.7
	Total area Farmed (ha)	148.5
	Effective (ha)	131.3
	Non-productive (ha)	1.2
	Natives trees (ha)	15.0
	Riparian(ha)	1.0
Topography	Flat to Steep	
Latitude/ Longitude		-37.384869, 175.304778
Climate from Overseer®	Rainfall (mm/yr)	1234
	Temp (°C)	13.7
	PET (mm)	853
Distance from the Coast (kms)		53 (from Wool shed)
Freshwater Management Unit		Lower Waikato
Sub-Catchments		Whangamarino at Jefferies Rd Br and Waerenga sub-catchments

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NRP Year End 2015/16 Nutrient Budget & Report;  
15 November 2018; Adrian Brocksopp

## Summary of Whole Farm Nutrient Loss Indicators

### Nutrient Loss Indicators

	2015/16
<b>Nutrient Budget</b>	<b>Drystock Farm</b>
Total Area (ha)	146.7
Nitrogen leaching loss to water (Total kg N/yr)	2,478
Nitrogen leaching loss to water (kg N/ha/yr)	17
<b><i>Potential NRP</i></b>	<b><i>17</i></b>
Phosphorus runoff to water (Total kg P/yr)	122
Phosphorus runoff to water (kg P/ha/yr)	0.8

The key influences on nutrient loss for the 2015/16 year:

- Soil order

The soil order has a large impact on N leached. The soil orders on the property have high profile available water (PAW) values at 0-60cm depth. These range from 103-130mm (Hamilton Brown soils and Kairanga Gley soil). The PAW 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 the lowest PAW will have higher N leaching, as there will be more drainage from the soils, compared to poorly drained 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, or those with a higher PAW.

- Cultivation of soils

Cultivation has an impact on N mineralisation and, therefore, N leached. No Cropping took place in the 2015/16 season, but it is noted that cropping has taken place in subsequent years. When soil is cultivated, nitrogen is mineralised and thus results in a rapid increase in nitrogen levels; and that which is not utilised by the crop, is at risk of leaching. Methods to reduce leaching on cropping paddocks are available and could be assessed through a future Farm Environment Plan.

- Phosphorus Loss

P loss across the pastoral areas of the farm, range from 0.2-5.1 kg P/ha/yr for the 2015/16 season. This results in low to extreme risk of loss from the soil and fertiliser categories and low risk from the effluent category. This is a reflection of the type of soil, with the greatest risk found on the easy to rolling areas of the farm. Mitigations exist to lower this risk, and can be discussed in a Farm Environment Plan, to be completed at a later date, but would include reducing Olsen P levels down to the optimum and reducing risk of losses associated with cropping.

- Tree and Riparian blocks

Modelling tree blocks and riparian areas correctly rather than as non-productive areas of the farm more accurately predicts the true nitrogen loss from the farm system. There is 15.0ha of trees located on farm, with minimal

nitrogen loss within the range of 2 kg N/ha/yr. There is a 1.0ha riparian area on the property. This block represents a very minimal nitrogen loss of 3kg N/ha/yr.

## Farm System

### Farm Description

In the 2015/16 season, the drystock property with a title area of 146.7ha and a total farmed area of 148.6ha, consisted of 129.1ha effective area, 3.5ha of non-productive land (races, building etc.), with the remaining areas of 1.0ha of riparian land and 15.0ha of natives and trees.

During the 2015/16 season, approximately 400 Friesian X Jersey dry cows are on farm from the 1<sup>st</sup> of July and leave on the 5<sup>th</sup> August (100 owned and 300 other owners). With the following seasons dry cows arriving on the farm on the 15 May

50 Hereford X Friesian weaned Steers arrive at 4 months of age (90kgLWT) and were reared on farm from October, staying on the property for the remainder of the season.). Replacement heifer calves (200) were also reared on the property, arriving at 7 months of age (120kgLWT).

15 month old R2 heifers, already on farm, were mated in Oct-Dec with 8 Jersey bulls and left the property on the 1<sup>st</sup> of May as in-calf heifers.

Silage that is made on the flatter areas of the farm and was all fed out on paddocks to all stock on the property from Jan-July.

Table 1: Stock reconciliation

Stock class	Start age	Start wt (kg)	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Dry Cows	MA	450	400	50	0	0	0	0	0	0	0	0	0	0
Dry cows	MA	450	0	0	0	0	0	0	0	0	0	0	200	400
Steer calves (H*F)	3	90	0	0	0	50	50	49	48	48	48	48	46	46
Heifer calves (J*F)	4	120	0	0	0	0	200	200	200	200	200	200	200	200
R2 heifer (J*F)	12	270	140	140	140	140	140	140	140	140	140	140	0	0
Bulls (Jersey)	18	400	0	0	0	8	8	8	0	0	0	0	0	0

Data provided by the owner

Table 2: Supplements imported

Supplement type	Quantity (TDM)	Fed (e.g. paddock, pad, shed, trough, crop)
Grass silage bales (21@220kgDM)	5	From Storage: Fed in Paddocks in July to all stock

Table 3: Supplements made

Supplement type	Quantity (TDM)	Fed (e.g. paddock, pad, shed, trough, crop)
Grass silage bales (129@220kgDM)	28	Paddock: All stock Jan to June
Grass silage bales (21@220kgDM)	5	To Storage

Silage was made from 38ha of area indicated in LMU table

Table 4: Soil test results

Block	Olsen P	QT K	QT Ca	QT Mg	QT Na	Sulphate Sulphur
Farm Average	33	6	11	18	5	7

Based on soil tests completed in November 2013 by the previous owner

*Pasture Type and Production*

The relative productivity for all pastoral blocks has been set at “no difference between blocks”. This has been set in accordance with Schedule B – Nitrogen Reference Point of the Proposed Waikato Regional Plan Change 1.

Table 5: Soil Information

Series	Area	Soil Order	Drainage	Top Soil	PAW (0-60cm)
Marua	52.6	Brown	Moderately well	unknown	103mm
Hamilton	1.1	Brown	Moderately well	unknown	103mm
Kairanga	13.5	Gley	Moderately well	unknown	130mm
Mangawheau	35.6	Ultic	Moderately well	unknown	104mm
Te Ranga	43.8	Brown	Moderately well	unknown	103mm
<b>Total</b>	<b>146.7</b>				

Soil data has been determined from the Soil map. This was entered, through Overseer, in S-map name to determine the Soil order. See Appendix 1 for the location of the soil types across the property.

<sup>1</sup> PAW is for the Soil order and not the soil sibling.

Table 6: Fertiliser

2015/16	Month	Type	Rate (kg/ha)	N	P	K	S	Mg
Hay Paddocks and flatter area (58.3ha)	Oct	Urea	70	32	-	-	-	-
	Mar	Urea	70	32	-	-	-	-

No annual fertiliser was applied in the 2015/16 season

## Table of Land Management Units

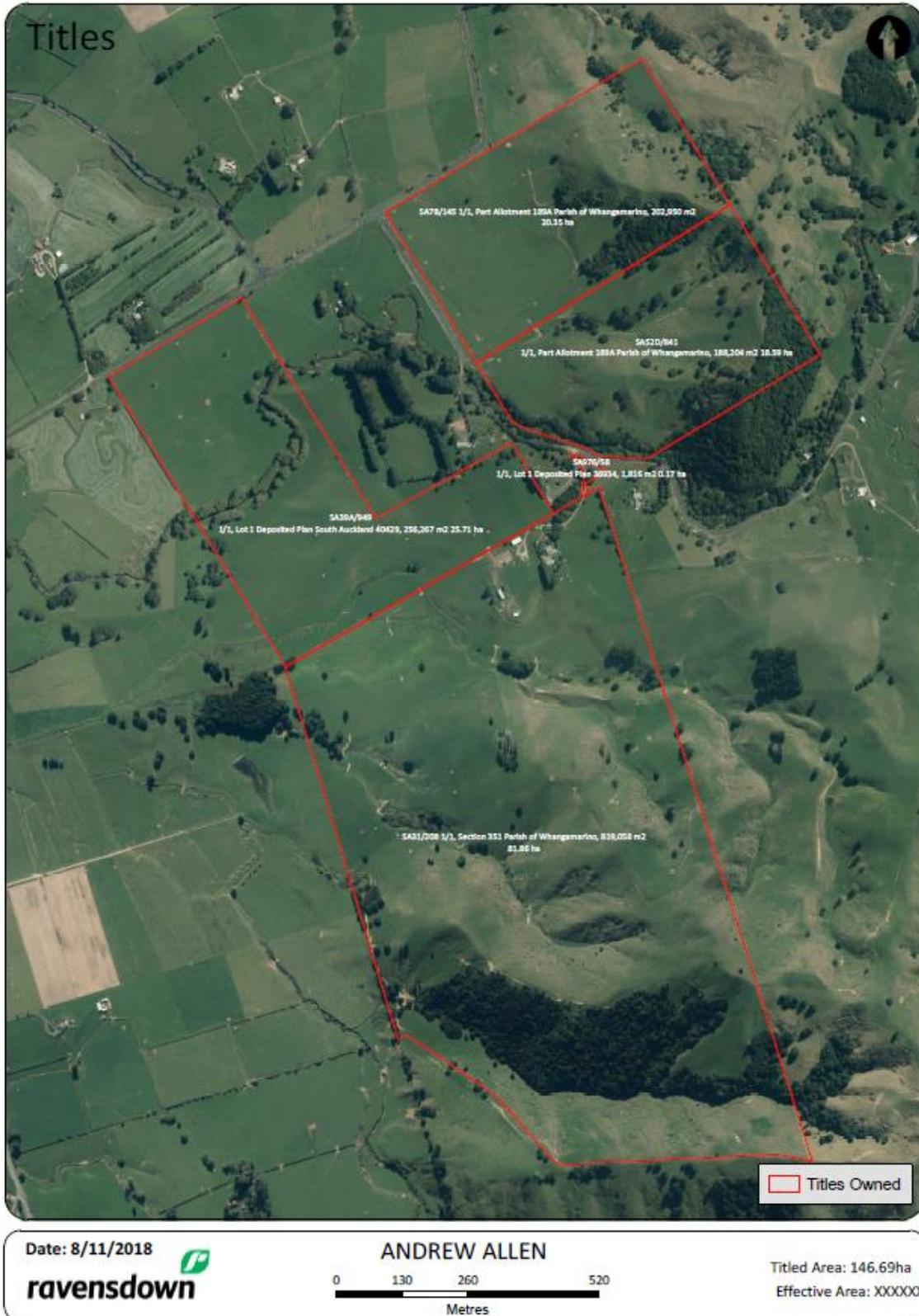
Table 7: LMU 2015/16

Block name	Type	Silage	Fertiliser applied	Effective Area (ha)
LI Mangawheau FL	Pastoral			1.1
LI Mangawheau EA	Pastoral			1.4
LI Mangawheau RL	Pastoral			1.4
LI Marua RL	Pastoral			1.7
LI Te Ranga ST	Pastoral			4.0
LI Te Ranga FL	Pastoral			1.7
LI Te Ranga EA	Pastoral			9.4
LI Te Ranga RL	Pastoral			4.3
LI FNO Marua RL	Pastoral			0.9
Rest of Farm Mangawheau FL	Pastoral		Yes	8.5
Rest of Farm Mangawheau RL	Pastoral			0.9
Rest of Farm Marua ST	Pastoral			2.7
Rest of Farm Marua FL	Pastoral		Yes	11.8
Rest of Farm Marua EA	Pastoral			12.4
Rest of Farm Marua RL	Pastoral			13.9
Rest of Farm Te Ranga FL	Pastoral			1.4
Rest of Farm Te Ranga EA	Pastoral			5.9
Rest of Farm Te Ranga RL	Pastoral			6.9
Rest of Farm FNO Marua RL	Pastoral			0.7
Silage Hamilton FL	Pastoral	Yes	Yes	1.1
Silage Kairanga FL	Pastoral	Yes	Yes	12.6
Silage Mangawheau FL	Pastoral	Yes	Yes	21.0
Silage Marua FL	Pastoral	Yes	Yes	3.3
<b>Total area declared as pastoral blocks</b>				<b>129.1</b>
<b>Non-Productive area</b>				<b>3.5</b>
<b>Riparian</b>				<b>1.0</b>
<b>Native</b>				<b>15.0</b>
<b>Total farm area</b>				<b>148.5</b>

FL=Flat, RL=Rolling, Ea=Easy, ST=Steep, FNO=Farm not owned, ONF=Owned not Farmed, LI=Less Intensive.

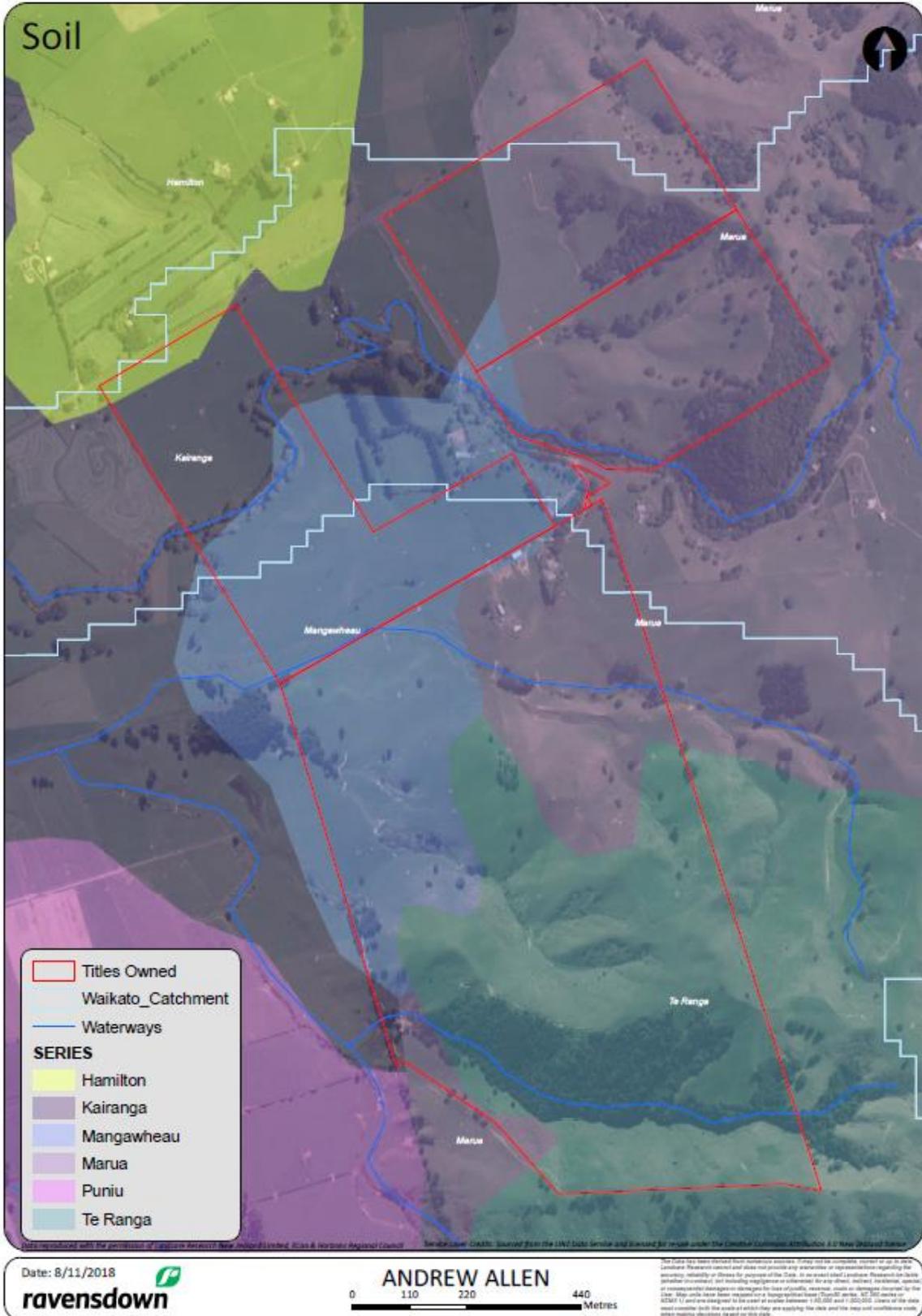
Appendix 1 MAPS

Title Map



60862000; YOUNG P & S;  
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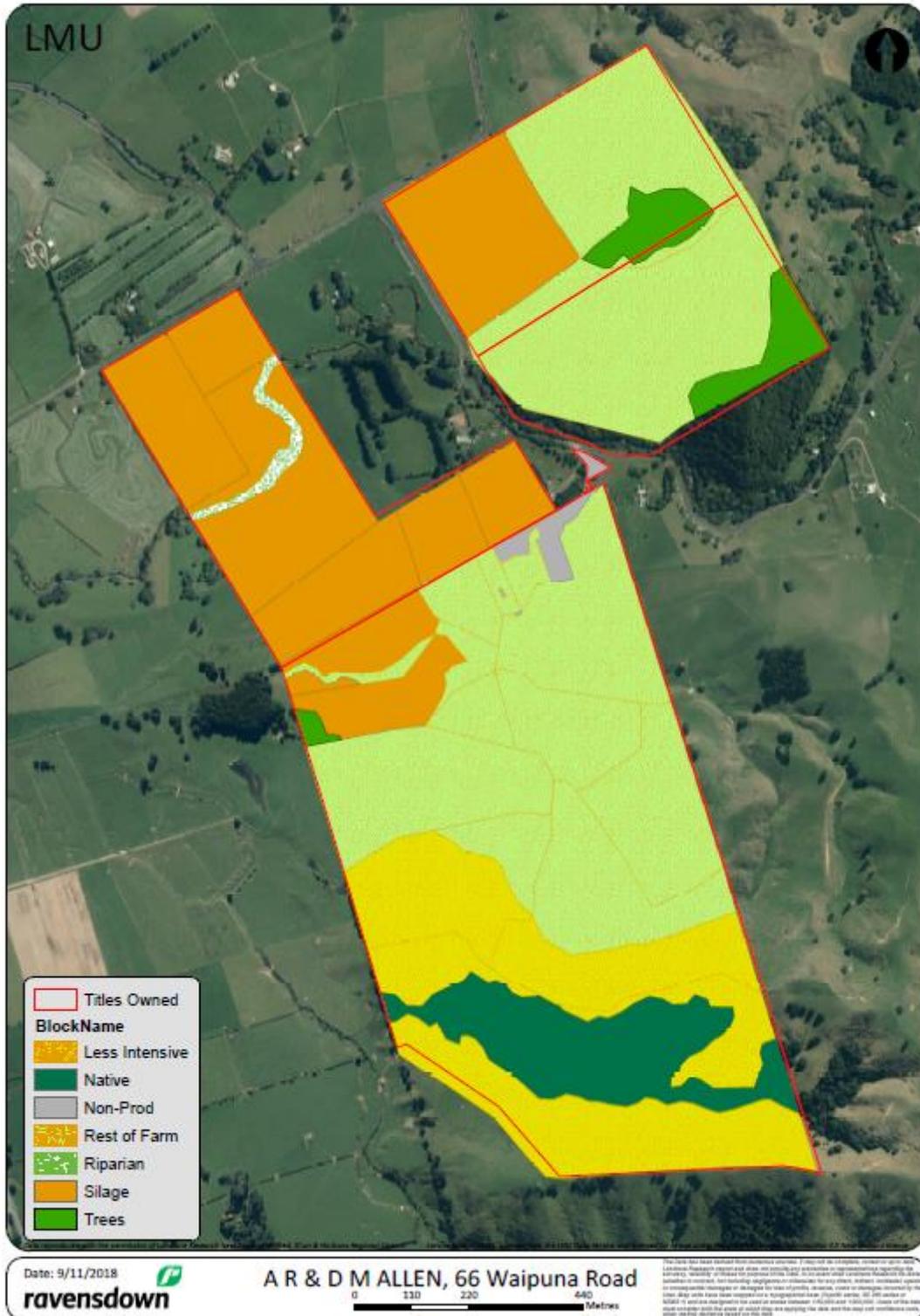
Soil Map



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Land Management Units



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## Appendix 2 NUTRIENT BUDGET REPORTS 2015/16

### Farm Scenario

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A R & D M ALLEN

Anna McJorow

A R & D M ALLEN

RAVENSDOWN ENVIRONMENTAL

Client reference: NA

Farm name: A R & D M ALLEN YE 2015/16 v6.3.0 (2015/16)

### Farm Nutrient Budget - Whole farm

	N	P	K	S	Ca	Mg	Na
	(kg/ha/yr)						
<b>Nutrients added</b>							
Fertiliser, lime & other	25	0	0	0	0	0	0
Rain/clover N fixation	48	0	2	4	2	5	16
Irrigation	0	0	0	0	0	0	0
Supplements imported	1	0	1	0	0	0	0
<b>Nutrients removed</b>							
As products	-1	0	0	0	0	0	0
Exported effluent	0	0	0	0	0	0	0
As supplements	0	0	0	0	0	0	0
To atmospheric	24	0	0	0	0	0	0
To water	17	0.8	8	12	44	8	19
<b>Change in internal pools</b>							
Plant material	1	0	0	0	0	0	0
Organic pool	34	10	1	-9	0	0	0
Inorganic mineral	0	3	-20	0	-4	-6	-7
Inorganic soil pool	0	-14	14	0	-38	3	4

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## Nitrogen Report

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A R & D M ALLEN

Anna McJorror

A R & D M ALLEN

RAVENSDOWN ENVIRONMENTAL

Client reference: NA

Farm name: A R & D M ALLEN YE 2015/16 v6.3.0 (2015/16)

### 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)
LI Mangawheau FL	17	16	3.2	71	0
LI Mangawheau EA	20	15	N/A	70	0
LI Mangawheau RL	21	15	3.4	71	0
LI Marua RL	31	18	4.1	68	0
LI Te Ranga ST	66	16	N/A	67	0
LI Te Ranga FL	34	20	4.0	69	0
LI Te Ranga EA	166	18	N/A	67	0
LI Te Ranga RL	78	18	4.1	68	0
LI FNO Marua RL	16	18	4.1	68	0
Rest of Farm Mangawheau FL	152	18	3.6	108	64
Rest of Farm Mangawheau RL	14	16	3.7	74	0
Rest of Farm Marua ST	49	18	N/A	70	0
Rest of Farm Marua FL	269	23	4.6	106	64
Rest of Farm Marua EA	242	19	N/A	71	0
Rest of Farm Marua RL	277	20	4.5	71	0
Rest of Farm Te Ranga FL	31	22	4.5	72	0
Rest of Farm Te Ranga EA	115	19	N/A	71	0
Rest of Farm Te Ranga RL	137	20	4.5	71	0
Rest of Farm FNO Marua RL	14	20	4.5	71	0
Silage Hamilton FL	23	21	4.2	92	64
Silage Kairanga FL	205	16	3.4	94	64
Silage Mangawheau FL	347	17	3.3	94	64
Silage Marua FL	66	20	4.0	87	64
Riparian	3	3	N/A		
Natives	45	3	N/A		

### Block Nitrogen

Other farm sources	41	
Whole farm	2478	17
Less N removed in wetlands	0	
Farm output	2478	17

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## Phosphorus Report

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Anna McJorow

A R & D M ALLEN

RAVENSDOWN ENVIRONMENTAL

Client reference: NA

Farm name: A R & D M ALLEN YE 2015/16 v6.3.0 (2015/16)

## Block Phosphorus

Block name	Total P lost (kg P/yr)	P lost (kg P/ha/yr)	P loss categories		
			Soil	Fertiliser	Effluent
LI Mangawheau FL	1	1	Medium	n/a	n/a
LI Mangawheau EA	7	5.1	Extreme	n/a	n/a
LI Mangawheau RL	5	3.4	Extreme	n/a	n/a
LI Marua RL	1	0.6	Low	n/a	n/a
LI Te Ranga ST	5	1.2	Medium	n/a	n/a
LI Te Ranga FL	0	0.2	Low	n/a	n/a
LI Te Ranga EA	9	0.9	Medium	n/a	n/a
LI Te Ranga RL	3	0.6	Low	n/a	n/a
LI FNO Marua RL	1	0.6	Low	n/a	n/a
Rest of Farm Mangawheau FL	9	1	Medium	n/a	n/a
Rest of Farm Mangawheau RL	3	3.4	Extreme	n/a	n/a
Rest of Farm Marua ST	3	1.2	Medium	n/a	n/a
Rest of Farm Marua FL	2	0.2	Low	n/a	n/a
Rest of Farm Marua EA	11	0.9	Medium	n/a	n/a
Rest of Farm Marua RL	9	0.6	Low	n/a	n/a
Rest of Farm Te Ranga FL	0	0.2	Low	n/a	n/a
Rest of Farm Te Ranga EA	5	0.9	Medium	n/a	n/a
Rest of Farm Te Ranga RL	4	0.6	Low	n/a	n/a
Rest of Farm FNO Marua RL	0	0.6	Low	n/a	n/a
Silage Hamilton FL	0	0.2	Low	n/a	n/a
Silage Kairanga FL	6	0.5	Low	n/a	n/a
Silage Mangawheau FL	21	1	Medium	n/a	n/a
Silage Marua FL	1	0.2	Low	n/a	n/a
Riparian	0	0.1	n/a	n/a	n/a
Natives	2	0.1	n/a	n/a	n/a
Other farm sources	14				

## Block Phosphorus

Whole farm	122	0.8			
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## Pasture Production

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RAVENSDOWN ENVIRONMENTAL

Client reference: NA

Farm name: A R & D M ALLEN YE 2015/16 v6.3.0 (2015/16)

## 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)
LI Mangawheau FL	5458	70	0	7796
LI Mangawheau EA	5458	70	0	7796
LI Mangawheau RL	5458	70	0	7796
LI Marua RL	5458	70	0	7796
LI Te Ranga ST	5458	70	0	7796
LI Te Ranga FL	5458	70	0	7796
LI Te Ranga EA	5458	70	0	7796
LI Te Ranga RL	5458	70	0	7796
LI FNO Marua RL	5458	70	0	7796
Rest of Farm Mangawheau FL	6276	80	0	7796
Rest of Farm Mangawheau RL	6276	80	0	7796
Rest of Farm Marua ST	6276	80	0	7796
Rest of Farm Marua FL	6276	80	0	7796
Rest of Farm Marua EA	6276	80	0	7796
Rest of Farm Marua RL	6276	80	0	7796
Rest of Farm Te Ranga FL	6276	80	0	7796
Rest of Farm Te Ranga EA	6276	80	0	7796
Rest of Farm Te Ranga RL	6276	80	0	7796
Rest of Farm FNO Marua RL	6276	80	0	7796
Silage Hamilton FL	5544	80	909	7796
Silage Kairanga FL	5637	80	794	7796
Silage Mangawheau FL	5586	80	857	7796
Silage Marua FL	5300	80	1212	7796
Riparian	0	0	0	0
Natives	0	0	0	0

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15 November 2018; Adrian Brocksopp

## Appendix 3 DATA INPUT METHODOLOGY

### for ensuring consistency of Nitrogen Reference Point data using OVERSEER® Model

OVERSEER® Parameter	Setting that must be used	Explanatory note
Farm Model Pastoral and horticulture	To cover the entire enterprise including riparian, retired, forestry and yards and races. The Model is to include non-contiguous properties that are part of the enterprise that are in the same sub-catchment. If the farm (for example where dairy animals are grazed or wintered) is part of another farming business such as a drystock farm, the losses from those animals will be represented in the drystock farm's Overseer® model.	To capture the 'whole farm' in one Overseer® file, where possible, to truly represent nitrogen losses from farm in the catchment area.
Location Pastoral and horticulture	Select Waikato Region	This setting has an effect on climate settings and some animal characteristics and is required to ensure consistency.
Animal distribution – relative productivity pastoral only	Use “no difference between blocks” with the following exceptions: <ul style="list-style-type: none"> <li>• Grazed pines or other wood vegetation. In this case use “Relative yield” and set the grazed pine blocks to 0.4 (40%).</li> <li>• Where the farm has a mixture of irrigated and non-irrigated areas. IN this case use “Relative Yield” and set the irrigated area to 1 (100%), and the non-irrigated areas to 0.75 (75%).</li> </ul>	
Wetlands	Entered as Riparian Blocks	As per the 2016 OVERSEER® Best Practice Data Input Standards.
Stock number entry	Based on specific stock numbers only	To ensure consistency and accuracy of stock number inputs.
Animal weights	Only use OVERSEER defaults – do not enter in weights and use the age at start setting where available (national averages).	Accurate animal weights are difficult to obtain and prove.
Block climate data	Only use the Climate Station tool. For contiguous blocks use the coordinates from the location of the dairy shed or the middle of the farm area (for non-dairy).	
Soil description	Use Soil Order – obtained from S-Map or where S-Map is unavailable from LRI 1:50,000 data or a soil map of the farm.	To ensure consistency between areas of the region that have S-Map data and those that don't.

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