

Greater Wellington Regional Council Masterton Office 34 Chapel Street PO Box 41 Masterton 5840

Your Reference WAR170229

Our Reference 366441/SJC/EH

20 October 2017

Dear Nicola,

Further to the resource consent applications submitted for the proposed Featherston Wastewater Treatment Plant (WWTP) discharges to land, water and air on 1 March 2017, Greater Wellington Regional Council (GWRC) issued a Section 92 (s92) request for further information on 19 April 2017. Mott MacDonald, on behalf of South Wairarapa District Council (SWDC), subsequently submitted a response to this s92 request on 2 June 2017. Further points of clarification have since been requested by GWRC by e-mail on 28 June 2017 to address matters considered to be outstanding from the original s92 response, with further queries relating specifically to the land application issued by e-mail on 26 September 2017.

Featherston WWTP Resource Consent Applications - Further Points of

Clarification Response to Request for Further Information (s92)

Outstanding matters relating to clarity under Section 107(1)(d) of the Resource Management Act 1991 were provided to GWRC in a response letter dated 11 October 2017.

This letter and appendices has been prepared on behalf of SWDC as a response to the further points of clarification request, to specifically address the outstanding matters relating to the land application scheme. The enclosed responses are presented in a tabular form to capture GWRC's comment, SWDC's response and proposed solutions.

1 Overseer Modelling

Further to our response presented in Section 2 of the letter dated 2 June 2017, our response on OVERSEER[®] modelling is provided below and in the relevant appendices.

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Ref.	GWRC comment	SWDC response	Proposed Solution
1.1	There appears to be a discrepancy between the overseer modelling and the report in Appendix 7. Appendix 7 has a total nitrogen loading rate of 301 kgN/ha/year (Table 4.9) for grazed pasture which indicates fertiliser is added (given what we know about nitrogen loading rates of wastewater irrigation). However, in the Section 92 response it is indicated that no fertiliser is added to the irrigated blocks. Can you please provide an explanation for this discrepancy?	The Assessment of Environmental Effects (AEE) assesses the "worst case scenario" application of nitrogen (e.g. grazing system with application of fertilisers up to 300 kgN/ha/yr) that could be applied to the area. Although it is unlikely that this scenario would arise (as it is not considered good practice), to ensure a conservative effects assessment, our recommendation is for an annual application rate of 300 kgN/ha/yr. The Overseer scenarios are based on good practice i.e. a more realistic farming regime where sufficient nitrogen is applied to grow enough feed for the animals grazed. It is likely that in practice where grazing land use is adopted an annual load of 300 kg N/ha would not be applied as shown in the attached Nitrogen summary (see Appendix A1 , final column "Added N"). However, if a cut and carry system was adopted then 300 kg N/ha would be considered a reasonable rate of application providing a net nitrogen reduction. We note that despite the higher nitrogen load associated with the cut and carry system the OVERSEER© estimated leaching is lower estimated 21 kg N/ha/yr compared to grazed system of 43 kg N/ha/yr and compared to the current permitted dairy farm baseline nitrogen loss of 63 kg N/ha/yr. The method to avoid excess nitrogen being applied (as additional fertiliser) is through the implementation of management plans which are required to be complied with as a condition of consent, and the inclusion of recording requirements and nitrogen limits in the conditions.	No changes are proposed.
1.2	Also, we need some more information regarding the overseer inputs. Given the number of blocks we understand that providing all the inputs may not be practical or necessary, we would however consider the following inputs for each model (on a farm basis rather than block basis) useful for assessing the overseer model – stocking rates/herd numbers, milk solids yield, fodder crop product, overall farm scenario –	Full parameter reports for the three scenarios modelled are provided in Appendix A2 . Please note: the basis for the inputs is actual farm data for the baseline. For changes to farming practice for the two potential "future" scenarios is based on our understanding of farming systems and was "truthed" against the Environment Canterbury reference files.	No changes are proposed.

pasture production.

We believe the above and associated appendices address the matters raised in GWRC's comments.

2 Soil Type

Further to our response provided in Section 3 of the letter dated 2 June 2017, our response on soil type is provided below.

Ref.	GWRC comment	SWDC response	Proposed Solution
2.1	It is our understanding that there are some areas within Site B which have similar soil types to that found in Site A. Can you please provide reasoning for why the irrigation rates on Site B (which includes the similar Site A pockets) will be higher to that at site A?	It is correct that soil types within Site A and Site B are similar or the same. As shown in the Assessment of Environmental Effects, Appendix 7, Table 3.3, the measured soil unsaturated hydraulic conductivity across the two sites was approximately the same. The reason that a different design irrigation rate is adopted for each site was to account for the different land management styles proposed. To re-iterate, the discharge regime for Site A allows for the entire irrigable area of the site (8 ha) to be irrigated in any irrigation event and on any day that sufficient soil moisture deficit exists (i.e. could potentially be irrigated on consecutive days). This regime was adopted to: (1) Maximise the amount of wastewater to be removed from Donald Creek during the early stages of the upgrade programme; (2) Avoid rapid drainage and protect soil health; and (3) Operate as a deficit regime for conservatism due to the proximity to the WWTP infrastructure and accessway.	No changes are proposed.
		To achieve this the application rate is set at 10 % of the daily unsaturated hydraulic conductivity per the Crites and Tchobanoglous (1998) method described in the Site Investigation reports. It is possible to adopt the same application criteria for Site A as proposed for Site B.	
		For Site B, the application rate is 30 % of the daily unsaturated hydraulic conductivity per the Crites and Tchobanoglous (1998) method described in the Site Investigation reports and was adopted since the amount of land available enables an eight day return for any 55 mm of discharge. The effects due to the higher maximum discharge rate are mitigated by the long return period. Note, even at 55 mm/d, the rate of application does not cause rapid drainage in the soil.	
		To summarise, the different design irrigation rates adopted for the similar soils are to reflect the Site management after the soils hydraulic conductivity has been taken into account.	

We believe the above addresses the matters raised in GWRC's comments.

3 Groundwater Mounding

Further to our response presented in Section 1 of the letter dated 2 June 2017, our response on groundwater mounding is provided below and in the relevant appendices.

Ref.	GWRC comment	SWDC response	Proposed Solution	
3.1	The groundwater mounding assessment outlines what is likely to occur – but it appears that the impact of the groundwater mounding on the proposed irrigation regime has not been considered? If it has then what are the outcomes/changes, and if not, why?	The s92 response letter (dated 2 June 2017) included an assessment of potential mounding within the site which conservatively concludes that the groundwater may rise by a maximum of 1.00 m to 1.35 m across the site. During summer, this will not be an issue for the site. During winter (when seasonal groundwater levels increase) it is likely that groundwater break-out could occur in low lying areas of the site. Minimal irrigation is proposed to occur at this time of the year (equivalent to <2 mm/month on average for June, July, August), and sufficient land is available across the site to avoid areas prone to ponding.	Follow recommendations in the GWS (2017) assessment including monitoring (as also set out in Part 1C of the AEE - Proposed Conditions of Consent), during the preceding Stages of the project to develop a detailed understanding of the mounding risk. No additional changes are proposed.	
		 High groundwater levels or potential for high groundwater levels were noted in the early stages of irrigation regime development. As a result, a number of measures have been included in the irrigation regime design to avoid exacerbation of mounding beneath the site. These measures include: (1) Minimal irrigation occurs when winter breakout is predicted to occur due to use of deferred (Site B) and deficit (Site A) irrigation, both of which avoid discharge if soil moisture is high. (2) Elevated areas of the site (e.g. the NE block) can be targeted if winter irrigation occurs. (3) Suitable buffers from areas prone to winter break out can be maintained. Irrigable land available (116 ha at Stage 2B) exceeds the amount land needed to discharge the maximum event volume (4,400 m³). This enables areas at risk of ponding to be avoided and provides for a smaller depth to be applied over a larger area if necessary. For additional information on the rotation refer to the AEE 		

Ref. GWRC comment SWDC response		Proposed Solution	
3.2	Provide model/assessment outputs that display the location, extent and magnitude of the predicted groundwater mounding effects. For example, a plan view and selection of 'cross- section' views through the predictive MODFLOW model would be most useful. It is PDPs understanding that existing figures provided in the GWS Limited report show the current groundwater conditions, not the effect of the assessed groundwater mounding.	Model outputs and further details of the assessment are provided in Appendix A3 (Section 2 and 3) as an attachment to GWS Limited's response letter.	No changes are proposed.
3.3	Provide an updated irrigation regime and storage assessment which incorporates any impacts and/or limitations due to the predicted groundwater mounding effects.	See response to Ref. 3.1 above.	No changes are proposed.
3.4	If groundwater mounding effects are present offsite - provide an appropriately detailed assessment of these effects. This assessment should also include an allowance for potential uncertainty in the assumed hydrogeological system and modelled parameters. Response information should include at least; the location, extent, magnitude, and timing of areas where saturated ground has spatially or temporally increased.	Off site mounding effects are assessed in Appendix A3 (Section 3) as an attachment to GWS Limited's response letter.	No changes are proposed.

Ref.	GWRC comment	SWDC response	Proposed Solution
3.5	Provide a robust assessment of the potential effects of pathogen discharge to all groundwater and surface water users. This should include information on the potential risk to existing and potential future water users, and how any identified risks will be mitigated/ managed.	Pathogen effects on groundwater users are assessed in Appendix A3 (Section 4 and 5) as an attachment to GWS Limited's response letter. All treated effluent discharged to land and surface water under normal operating conditions (excluding an emergency situation such as site flooding, UV plant failure, etc) will be UV disinfected. Therefore the pathogen risk to surface water users is generally low during Stage 2B as discussed in the AEE.	Water quality monitoring will be undertaken to verify surface and groundwater effects of the proposed WWTP scheme. No changes are proposed.

We believe the above and associated appendices address the matters raised in GWRC's comments.

4 Conclusion

In summary, this letter and its attachments forms our response to the Section 92 request for further clarification of outstanding matters relating to the land application scheme, specifically relating to the Overseer modelling, soil type and groundwater mounding.

Should you have any further queries, please do not hesitate to contact the undersigned.

Yours sincerely,

On behalf of Mott MacDonald New Zealand Limited

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A1. Nitrogen Balance

A summary of the nitrogen balances generated for (i) wastewater irrigated and grazed (ii) wastewater irrigated cut and carry provided by Lowe Environmental Impact (LEI).

Wastewater irrigated and grazed: Nitrogen balance 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)
Buf_Rang_18b.1	358	45	7.4	97	28
Irr_Mid_Bram_8a.1	65	14	1.8	60	84
Irr_Mid_Tait_42a.1	260	12	1.6	65	84
Buf_Selw_25a.1	41	22	4.5	87	28
Irr_E_Selw_25a.1	244	41	3.8	84	136
Irr_NE_Darn_17a.1	1106	58	5.2	99	136
Irr_Mid_Darn_17a.1 ##	663	57	5.0	94	136
QE2	11	3	N/A		
Maize	1163	120	17.1	22	0
Irr_Darn_9a.1	206	48	5.7	116	84
Irr_Rang_18b.1	1761	58	6.6	118	84
Irr_E_Darn_17a.1	733	57	6.6	123	84
Buf_Darn_17a.1 ##	1044	43	7.3	103	28
Irr_A_Bram_8a.1	41	5	0.7	-8	72
Buf_Bram_8a.1	82	14	3.2	88	28
Buf_Tait_42a.1	47	12	2.6	97	28
Buf_Darn_9a.1	48	32	5.9	92	28
Other farm sources	36				
~					
Whole farm	7909	43			
Less N removed in wetlands	0				
Farm output	7909	43			

Wastewater irrigated cut and carry: Nitrogen balance

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)
Buf_Rang_18b.1	289	36	5.9	84	83
Irr_Mid_Bram_8a.1	46	10	1.3	59	305
Irr_Mid_Tait_42a.1	181	8	1.1	58	305
Buf_Selw_25a.1	20	11	2.2	74	83
Irr_E_Selw_25a.1	101	17	1.6	48	274
Irr_NE_Darn_17a.1	455	24	2.1	49	274
Irr_Mid_Darn_17a.1 ##	279	24	2.1	49	274
QE2	11	3	N/A		
Maize	1141	118	16.8	19	0
Irr_Darn_9a.1	58	13	1.6	61	305
Irr_Rang_18b.1	386	13	1.4	66	305
Irr_E_Darn_17a.1	189	15	1.7	62	305
Buf_Darn_17a.1 ##	568	23	4.0	85	83
Irr_A_Bram_8a.1	115	14	2.1	72	265
Buf_Bram_8a.1	47	8	1.8	75	83
Buf_Tait_42a.1	29	7	1.6	83	83
Buf_Darn_9a.1	25	17	3.1	75	83
Other farm sources	10				
Whole farm	3949	21			
Less N removed in wetlands	0				
Farm output	3949	21			



A2. OVERSEER[©] Farm Parameters

Outputs from OVERSEER© providing the parameters used to model (i) current dairying (ii) proposed grazing (iii) proposed cut and carry scenarios, provided by LEI.

Farm type

Region

Assessment year

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters



Full range

Wellington

Not entered



Farm details

Type Assessment Region

Farm blocks

Rang_18b.1 Dry Pastoral 25.9 Bram 8a.1 Irrigated Pastoral 2.5 25.2 Tait_42a.1 Irrigated Pastoral Selw_42a.1 Dry Pastoral 7.3 Selw_25a.1 Dry Pastoral 4.8 Selw_25a.1 irrigated Pastoral 5.6 Darn_17a.1 Irrigated Pastoral 11.9 Darn_17a.1 Dry Pastoral 30.8 Kaia_19a.1 Irrigated Pastoral 4.3 Darn_9a.1 Dry Pastoral 4.3 Rang_18b.1 Irrigated Pastoral 16.5 Darn_17a.1 Silage Irrigated 10.4 Pastoral Darn_17a.1 Silage Dry 19.6 Pastoral Trees and Scrub QE2 4.8 Maize Fodder Crop Total farm area declared in blocks ha 173.9 Total farm area ha 180.8 Non-productive area 6.90000000000001 ha

Farm animals

Stock numbers

Stock numbers entered via RSU - Dairy		
Peak number of cows milked		285
Breed		Friesian
Replacements grazed off farm from		Off farm at birth
Replacement grazing	%	Not entered
Production		
Milk solids	kg/yr	128000
Milk volume yield	l/yr	Not entered
Fat yield	kg/yr	Not entered
Lactation length	days	Not entered
Average weight	kg/animal	Not entered
Calving times		
Default calving times used		

Stock management

Animal excreta distribution	
Relative productivity assessment method	Relative yield (from soil, fertiliser inputs)
Relative productivity calculated for each Pastoral block	
Rang_18b.1 Dry	0.843843589901339
Bram_8a.1 Irrigated	0.844972611405511
Tait_42a.1 Irrigated	0.892615414363345
Selw_42a.1 Dry	0.86624922646562
Selw_25a.1 Dry	0.86624922646562
Selw_25a.1 irrigated	0.909677767052455
Darn_17a.1 Irrigated	0.90602637782886
Darn_17a.1 Dry	0.866249233881455
Kaia_19a.1 Irrigated	0.892615419335456
Darn_9a.1 Dry	0.843844007182234
Rang_18b.1 Irrigated	0.959582494488118
Darn_17a.1 Silage Irrigated	0.958431675452551
Darn_17a.1 Silage Dry	0.927181771522285
Patio of stock types on pastoral blocks is the same as the farm st	ock ratios

Ratio of stock types on pastoral blocks is the same as the farm stock ratios

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters

Lowe Environmental Impact

Spray from sump



Farm dairy effluent management system Effluent management method

Animal health supplements

Animal - Dairy No animal supplementation has been entered

Animal - Dairy replacements No animal supplementation has been entered

Left over feeding

No left over feeding specified

Stored supplements

No supplements from storage added to this farm

Imported supplements

No supplements imported onto this farm

Greenhouse gas emission factors

Enteric methane - g methane/kg DMI intake

Dairy Dairy replacements Sheep Beef Deer Goats Camelids Young sheep Horses User defined	kg methane/RSU kg methane/RSU	21.6 21.6 20.9 21.6 21.3 20.9 20.9 16.8 1.8 1.5
Dung methane - g methane/kg dung Dairy Dairy replacements Sheep Beef Deer Goats Other Nitrous oxide		0.982 0.982 0.691 0.982 0.915 0.691 0.691

Use farm specific emission factors

Fuel and electricity

Embodied CO2 emissions		
Diesel	kg CO2 equivalents/litre	2.989
Petrol	kg CO2 equivalents/litre	2.773
Electricity	kg CO2 equivalents/kWh	0.271
Energy emissions		
Diesel	MJ / litre	42.24
Petrol	MJ / litre	42.4
Electricity	MJ / kWh	8.21

GWP

Use NZ national inventory

Allocation

Allocation method

Enter actual allocation figures

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters

Lowe Environmental Impact



Report settings

Greenhouse gas emission report units: Use default Target N application rate as effluent: kg N/ha/yr

Block Information

Block - Rang_18b.1 Dry Block name Block type Area Relative productivity Pasture block type Topography Distance from coast Cultivated in last 5 years Fodder rotates through	ha km	Rang_18b.1 Dry Pastoral 25.9 0 No Flat 37 False No
Climate Annual average rainfall Mean annual temperature Seasonal variation in rainfall Annual potential evapotranspiration Seasonal variation in PET	mm/yr mm	1153 12.8 731-1450 mm, Moderate 866 Moderate
Soil description Soil order (default) Soil group (default) SMaps Sibling Date downloaded Wilting point	0 - 30cm 30 - 60cm	Recent Recent/YGE/BGE Rang_18b.1 2017 May 04 16:57 2 1
Field capacity Saturation	> 60 0 - 30cm 30 - 60cm > 60 0 - 30cm 30 - 60cm	1 8 5 5 23 19
Natural drainage class Depth to impeded layer Maximum rooting depth Top soil horizon chemical and physical parameters ASC/PR Bulk density Clay Sand Sub soil Sub soil clay	> 60 cm cm % kg/m ³ % %	19 Well Not entered 65 19 1180 5 72 2
Soil profile Profile drainage class Top soil texture Maximum rooting depth Depth to impeded drainage layer	m	Use default Unknown 0.65 0
Soil drainage Drainage method Method Hydrophobic condition Occurence of pugging damage Compacted top soil		None Use default Rare False

Soil settings

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters

Lowe Environmental Impact



K leaching N immobilis	potential no sation status	t set			
Soil tests					
Olsen P	QIK	QI Ca	QI Mg	QI Na	
32 Organic S	4	15	20	5	6
	de canacity	or phosphate r	etention		Not entered
TBK reserv	e K test	or phosphate i	ctention		Not entered
K reserve s	tatus				Use default
	latab				
Pasture					
Pasture typ	e				Ryegrass/white clover
Clover leve	IS				Use default
Supplements	removed				
No supplem	nents remov	ed from this bl	ock		
Fortilicar ann	lication				
Fertiliser nr	oducts - Sei	ntember			
Category	oudets se	ptember			Ballance super
Product					Superten
Amount				kg/ha	300
Fertiliser pr	oducts - Se	ptember			
Category					Ravensdown other
Product					Urea
Amount				kg/ha	60
Fertiliser pr	oducts - Oc	tober		5,	
Category					Ravensdown other
Product					Urea
Amount				kg/ha	60
Fertiliser pr	oducts - No	vember			
Category					Ravensdown other
Product					Urea
Amount				kg/ha	60
Fertiliser pr	oducts - De	cember			
Category					Ravensdown other
Product					Urea
Amount				kg/ha	60
Fertiliser pr	oducts - Fel	oruary			Developed a sum of the su
Category					Ravensdown other
Amount				ka /ba	Urea 60
Eortilisor p	oducto - Ap	ril		ку/па	00
Category	ouucis - Ap				Pavensdown other
Product					
Amount				ka/ha	60
-				5,	
Irrigation	n ontorod				
NO II Igatio	n entereu				
Animals on b	lock				
Ratio and t	ype of stock	based on who	le farm values	due to this option	being selected on block set up
Animals gra	azing				
Dairy	_			%	0
Water co	nnectivity				
Direct a	ccess to stre	eams			False
Animal gr	azing				
Dairy gi	raze block al	ll year round			
Effluent appl	ication				
Receives no	o liquid or so	olid effluents			
Block - Bram	8a 1 Trrig	ated			
Block name					Bram 8a.1 Irrigated
Block type					Pastoral
-71					

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters

Lowe Environmental Impact

OVERSEER[®]

Area Relative productivity Pacture block type	ha	2.5 0 No	
Topography		Flat	
Distance from coast	km	37	
Cultivated in last 5 years		False	
Fodder rotates through		No	
Climate			
Annual average raintali Mean annual temperature	mm/	yr 115 12	ე <u>კ</u>
Seasonal variation in rainfall		12. 731	o I-1450 mm Moderate
Annual potential evapotranspiration	mm	866	
Seasonal variation in PET		Moo	derate
<i>Soil description</i> Soil order (default)		Rec	cent
Soil group (default)		Rec	cent/YGE/BGE
SMaps		D	ram 0a 1
Date downloaded		2	017 May 04 16.59
Wilting point	0 -	30cm 1	7
thing point	30	- 60cm 1	, 7
	> 6	50 1	7
Field capacity	0 -	30cm 4	5
	30	- 60cm 3	9
	> 6	50 3 [.]	9
Saturation	0 -	30cm 5	9
	30	- 60cm 4	9
Natural drainago class	> t	00 40 Tr	ð mnorfoct
Depth to impeded layer	cm	N	ot entered
Maximum rooting depth	cm	N	ot entered
Top soil horizon chemical and physical par	ameters		
ASC/PR	%	, 0	33
Bulk density	k	g/m³	1090
Clay	9	0	19
Sand	9	0	5
Sub soil day	0/	2	10
Sub soil clay	7	0	10
Soil profile		Lice	dofault
		USE	nown
Maximum rooting depth	m	0	CHOWIT
Depth to impeded drainage layer		0	
Soil drainage			
Drainage method			
Method		N	one
Hydrophobic condition		Use o	default
Occurence of pugging damage		Kare	
compacted top son		Faise	
Soil settings			
K leaching potential not set N immobilisation status			
Soil tests			
Olsen P QT K QT Ca Q	TMg QTN	а	
20 4 10 2 Organic S	u 4	с.	
Anion storage canacity or phosphate retenti	on	3 Not	entered
TBK reserve K test	011	Not	entered
K reserve status		Use	e default

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

Pacture

FarmParameters

Lowe Environmental Impact



Pasture ty Clover lev	ype vels					Ryegrass/white clover Use default
Supplemen No supple	<i>its removed</i> ements remov	ed from this t	block			
Fertiliser ap Fertiliser	pplication	ntember				
Categor	rv	ptember				Ballance super
Product						Superten
Amount	t			kg/ha		400
Fertiliser	products - Ser	ptember		5,		
Categor	ry .					Ravensdown other
Product						Urea
Amount	t			kg/ha		60
Fertiliser	products - Oct	tober				
Categor	ry					Ravensdown other
Product	:					Urea
Amount	t			kg/ha		60
Fertiliser	products - No	vember				
Categor	ry					Ravensdown other
Product				ka /ha		Urea
Fortilicor	nroducto Do	combor		ку/па		60
Catogor	products - De	Cember				Payonsdown other
Product	y					
Amount	F			ka/ha		60
Fertiliser	products - Fel	oruary		kg/na		00
Categor	rv					Ravensdown other
Product	,					Urea
Amount	t			kg/ha		60
Fertiliser	products - Apr	ril		5,		
Categor	ry .					Ravensdown other
Product	:					Urea
Amount	t			kg/ha		60
Irrigation	avetam tuna					Corovlines
Month: O	system type					Sprayines
Applicatio	n donth (mm)	\		30		
Month N	ovember)		50		
Annlicatio	on denth (mm`)		55		
Month: D	ecember	/		55		
Applicatio	on depth (mm))		70		
Month: Ja	anuary	,				
Applicatio	on depth (mm))		70		
Month: Fe	ebruary	-				
Applicatio	on depth (mm))		65		
Month: M	larch					
Applicatio	on depth (mm))		55		
Month: A	pril					
Applicatio	on depth (mm))		30		
Month: S	eptember					
Applicatio	on depth (mm))		20		
Irrigation c	concentrations					
Source	_		_	_		Overseer default (fixed)
N	Р	K	S	Ca	Mg	Na H
2.5	0.1	1.6	2.5	9.3	2.2	9.5 0

Animals on block

Ratio and type of stock based on whole farm values due to this option being selected on block set up Animals grazing

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters





Dairy Water connectivity	%	0
Direct access to streams Animal grazing Dairy graze block all year round		False
Effluent application Receives no liquid or solid effluents		
Block - Tait 42a.1 Irrigated		
Block name		Tait_42a.1 Irrigated
Block type		Pastoral
Area	ha	25.2
Relative productivity		0
Pasture block type		No
Topography		Flat
Distance from coast	km	37
Cultivated in last 5 years		False
Fodder rotates through		No
Climate		
Annual average rainfall	mm/yr	1153
Mean annual temperature		12.8
Seasonal variation in rainfall		731-1450 mm, Moderate
Annual potential evapotranspiration	mm	866
Seasonal variation in PEI		Moderate
Soil description		
Soil order (default)		Gley
Soil group (default)		Sedimentary
SMaps		
Sibling		Tait_42a.1
Date downloaded		2017 May 04 17:07
Wilting point	0 - 30cm	15
	30 - 60cm	15
	> 60	11
Field capacity	0 - 30cm	44
	30 - 60cm	39
	> 60	38
Saturation	0 - 30cm	56
	30 - 60cm	49
	> 60	47
Natural drainage class		Poor
Depth to impeded layer	cm	Not entered
Maximum rooting depth	cm	Not entered
Top soil norizon chemical and physical parameters	0/	25
ASC/PR Bulls density	% kg/m3	35
Clay	Kg/11°	240
Sand	70 0/a	10
Sub soil	70	10
Sub soil clay	%	24
Coil profile		
Profile drainage class		lise default
Ton soil texture		Unknown
Maximum rooting depth	m	0
Depth to impeded drainage layer		õ
Soil drainage		
Drainage method		
Method		None
Hydrophobic condition		Use default
Occurence of pugging damage		Winter
Compacted top soil		False

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters

Lowe Environmental Impact

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Soil settings K leaching p	potential not	set			
N immobilis	ation status				
<i>Soil tests</i> Olsen P	ОТ К	OT Ca	OT Ma	OT Na	
27	5	10	33	6	
Organic S					3
Anion stora	ge capacity	or phosphate re	etention		Not entered
TBK reserve	e K test				Not entered
K reserve st	tatus				Use default
Pacturo					
Pasture typ	Δ				Pyegrass/white clover
Clover level					Lise default
	5				
Supplements	removed				
No supplem	ients remove	ed from this blo	ock		
Fartilisar ann	lication				
Fertiliser nr	oducts - Ser	otember			
Category	ouuces sep				Ballance super
Product					Superten
Amount				kg/ha	400
Fertiliser pr	oducts - Sep	otember		5,	
Category					Ravensdown other
Product					Urea
Amount				kg/ha	60
Fertiliser pr	oducts - Oct	ober			
Category					Ravensdown other
Product					Urea
Amount	aduata Na	(anala an		kg/na	60
Catogory	oducts - Nov	vember			Rayonsdown other
Product					
Amount				ka/ha	60
Fertiliser pr	oducts - Deo	cember		itg/ita	
Category					Ravensdown other
Product					Urea
Amount				kg/ha	60
Fertiliser pr	oducts - Feb	oruary			
Category					Ravensdown other
Product					Urea
Amount	aduata An	.:1		kg/na	60
Catogory	oducis - Apr	11			Pavonsdown other
Product					
Amount				kg/ha	60
				5,	
Irrigation					
Irrigation sy	ystem type				Spraylines
Month: Sep	tember			20	
Application	deptn (mm)			20	
Application	denth (mm)			30	
Month: Nov	emher			50	
Application	depth (mm)			55	
Month: Dec	ember				
Application	depth (mm)	1		70	
Month: Janu	uary				
Application	depth (mm)	1		70	
Month: Feb	ruary			65	
Application	depth (mm)	1		65	
Month: Mar	CU				

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South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters

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Application Month: Apri Application	depth (mm) I depth (mm)			55 30			
Irrigation con	centrations						
Source						Overseer defau	ılt (fixed)
Ν	Р	K	S	Ca	Mg	Na	H
2.5	0.1	1.6	2.5	9.3	2.2	9.5	0
Animals on bl Ratio and ty Animals gra	<i>ock</i> vpe of stock bas zing	sed on who	le farm values	due to this opt	ion being	selected on blo	ck set up
Dairy Water con Direct ac	nectivity	IS		%		0 False	
Animal gra Dairy gra	azing aze block all ye	ar round					
<i>Effluent applic</i> Receives no	<i>cation</i> liquid or solid	effluents					
Block - Selw	42a.1 Drv						
Block name						Selw 42a.1 Dry	
Block type					1	Pastoral	
Area				ha	-	7.3	
Relative produ	uctivity				(0	
Pasture block	type				,	Yes	
Topography						Flat	
Distance from	i coast			km		3/	
Cultivated in I	last 5 years				l	raise	
Fouder rotate	s through					res	
Climate							
Annual aver	age rainfall			mm/yr		1153	
Mean annua	al temperature					12.8	
Seasonal va	riation in rainfa	all				731-1450 mm,	Moderate
Annual pote	ntial evapotrar	spiration		mm		866	
Seasonal va	riation in PET					Moderate	
Soil description	nn						
Soil order (default)					Recent	
Soil group (default)					Recent/YGE/BO	GE
SMaps	,						
Sibling						Selw_42a.1	
Date dowr	nloaded					2017 May 04	17:08
Wilting po	int			0 - 30cm		12	
				30 - 60cr	n	11	
Field comp	oit .			> 60		11	
гіеїа сара	CILY			0 - 30CM	n	38 21	
						32	
Saturation	n			0 - 30cm		56	
Saturation	•			30 - 60cr	n	48	
				> 60	••	47	
Natural dr	ainage class					Moderately w	rell
Depth to i	mpeded layer			cm		Not entered	
Maximum	rooting depth			cm		Not entered	
Top soil he	orizon chemica	l and physic	cal parameters				
ASC/PR				%		19	
Bulk der	nsity			kg/m³		1090	
Clay				%		17	
Sand				%		1/	
Sub soil	day			0/		16	
SUD SOIL	udy			70		TO	

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Client reference: Farm name: Otawira Dairy Farm

FarmParameters

Lowe Environmental Impact

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Soil profile Profile drainage cla Top soil texture Maximum rooting d Depth to impeded of	ss epth Irainage layer	m	Use default Unknown 0 0	
Soil drainage Drainage method Method Hydrophobic conditio Occurence of pugging Compacted top soil		None Use default Rare False		
Soil settings K leaching potentia N immobilisation st	l not set atus			
Soil tests Olsen P QT K 24 6 Organic S Anion storage capa TBK reserve K test K reserve status	QT Ca 8 city or phosphate ret	QT Mg 26 cention	QT Na 5	3 Not entered Not entered Use default
Pasture Pasture type Clover levels				Ryegrass/white clover Use default
Supplements remove No supplements rem	<i>d</i> noved from this bloc	:k		
Fertiliser application Fertiliser products - Category Product Amount	September		kg/ha	Ballance super Superten 300
Fertiliser products - Category Product Amount Fertiliser products -	September October		kg/ha	Ravensdown other Urea 60
Category Product Amount Fertiliser products -	November		kg/ha	Ravensdown other Urea 60 Ravonsdown othor
Product Amount Fertiliser products -	December		kg/ha	Urea 60 Bayensdown other
Product Amount Fertiliser products -	February		kg/ha	Urea 60 Ravonsdown other
Product Amount Fertiliser products -	April		kg/ha	Urea 60
Category Product Amount			kg/ha	Ravensdown other Urea 60

Irrigation

No irrigation entered

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters

Lowe Environmental Impact



Animals on block Ratio and type of stock based on whole farm values of Animals available	due to this option l	being selected on block set up
Dairy	%	0
Water connectivity		C C
Direct access to streams		False
Animal grazing		
Dairy graze block all year round		
Effluent application Receives no liquid or solid effluents		
Block - Selw 25a 1 Dry		
Block name		Selw 25a.1 Dry
Block type		Pastoral
Area	ha	4.8
Relative productivity		0
Pasture block type		No
Distance from coast	km	F1at 27
Cultivated in last 5 years	КШ	57 False
Fodder rotates through		No
Climate		
Annual average rainfall	mm/yr	1153
Mean annual temperature		12.8
Seasonal variation in rainfall		731-1450 mm, Moderate
Annual potential evapotranspiration	mm	866
Seasonal variation in PEI		Moderate
Soil description		
Soil order (default)		Recent
Soil group (default)		Recent/YGE/BGE
SMaps		
Sibility Data downloaded		SelW_258.1 2017 May 05 10:31
Wilting point	0 - 30cm	10
	30 - 60cm	5
	> 60	2
Field capacity	0 - 30cm	33
	30 - 60cm	20
	> 60	8
Saturation	0 - 30cm	53
	30 - 60cm	49
Natural drainago class	> 60	
Depth to impeded layer	cm	Not entered
Maximum rooting depth	cm	88
Top soil horizon chemical and physical parameters	CITI	
ASC/PR	%	19
Bulk density	kg/m³	1090
Clay	%	11
Sand	%	37
Sub soil	0/	0
Sub soli clay	%	9
Soil profile		lice default
Ton soil texture		Unknown
Maximum rooting depth	m	0.88
Depth to impeded drainage layer		0

Soil drainage

Drainage method

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters

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Method Hydrophobic condition Occurence of pugging damage Compacted top soil		None Use default Rare False
K leaching potential not set N immobilisation status		
Soil tests Olsen P QT K QT Ca 24 6 8 Organic S Anion storage capacity or phosphate TBK reserve K test K reserve status	QT Mg QT Na 26 5 e retention	3 Not entered Not entered Use default
Pasture Pasture type Clover levels		Ryegrass/white clover Use default
Supplements removed No supplements removed from this l	block	
Fertiliser application Fertiliser products - September Category Product Amount Fertiliser products - September Category Product Amount Fertiliser products - October Category Product Amount Fertiliser products - November Category Product Amount Fertiliser products - December Category Product Amount Fertiliser products - December Category Product Amount Fertiliser products - February Category Product Amount Fertiliser products - February Category Product Amount Fertiliser products - April Category Product Amount	kg/ha kg/ha kg/ha kg/ha kg/ha	Ballance super Superten 300 Ravensdown other Urea 60 Ravensdown other Urea 60 Ravensdown other Urea 60 Ravensdown other Urea 60 Ravensdown other Urea 60 Ravensdown other Urea 60
Irrigation No irrigation entered		
Animals on block Ratio and type of stock based on wh Animals grazing Dairy	ole farm values due to this option %	n being selected on block set up 0
Water connectivity Direct access to streams Animal grazing Dairy graze block all year round	-	False

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters

Lowe Environmental Impact



Effluent application Receives no liquid or solid effluents		
Block - Selw_25a.1 irrigated		
Block name		Selw_25a.1 irrigated
Block type		Pastoral
Area	ha	5.6
Relative productivity		U
Pasture block type		NO
Topography		Flat
Distance from coast	кm	37
Fodder rotates through		No
Climate		
Annual average rainfall	mm/yr	1153
Mean annual temperature	.,	12.8
Seasonal variation in rainfall		731-1450 mm, Moderate
Annual potential evapotranspiration	mm	866
Seasonal variation in PET		Moderate
Soil description		. .
Soll order (default)		Recent
Soll group (default)		Recent/YGE/BGE
SMaps		Calue DEa 1
Sibling		Selw_25a.1
Date downloaded	0 20	2017 May 04 17:08
wiiting point	0 - 30Cm	10
		2
Field capacity	> 00 0 20cm	2
Field capacity	30 - 60 cm	20
		20
Saturation	200	53
Saturation	30 - 60cm	10
		45 25
Natural drainage class	> 00	25 Woll
Denth to impeded layer	cm	Not entered
Maximum rooting denth	cm	88
Top soil borizon chemical and physical parameters	CIII	00
	0/0	19
Bulk density	ka/m ³	1090
Clay	0%	11
Sand	%	37
Sub soil	70	5,
Sub soil clay	%	9
Soil profile		
Profile drainage class		Use default
Top soil texture		Unknown
Maximum rooting depth	m	0.88
Depth to impeded drainage layer		0
Soil drainage		
		Nene
Mechou Hydrophobic condition		
Compacted top coil		
		False
Soil settings K leaching potential not set		
N immobilisation status		

Soil tests

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters

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Olsen P 24 Organic S	QT K 6	QT Ca 8	QT Mg 26	QT Na 5	3
Anion storag TBK reserve K reserve sta	le capacity or K test atus	phosphate i		Not entered Not entered Use default	
Pasture Pasture type Clover levels	2				Ryegrass/white clover Use default
Supplements I No suppleme	r <i>emoved</i> ents removed	from this bl	ock		
<i>Fertiliser appli</i> Fertiliser pro	<i>cation</i> ducts - Septe	ember			
Category					Ballance super
Product					Superten
Amount		a ma la a w		кg/na	400
Catagory	aucis - Septe	ember			Bayanadawa athar
Product					
Amount				ka/ha	60
Fertiliser pro	ducts - Octol	ber		kg/na	00
Category	0000				Ravensdown other
Product					Urea
Amount				kg/ha	60
Fertiliser pro	ducts - Nove	mber			
Category					Ravensdown other
Product				ka /ha	Urea
Eartilisor pro	ducts - Doco	mbor		ку/па	60
	ducis - Dece	IIIDEI			Ravensdown other
Product					Urea
Amount				kg/ha	60
Fertiliser pro	ducts - Febru	Jary		5,	
Category					Ravensdown other
Product					Urea
Amount				kg/ha	60
Fertiliser pro	oducts - April				
Category					Ravensdown other
Amount				ka/ba	Urea 60
Amount				Ky/IIa	80
Irrigation					
Irrigation sy	stem type				Spraylines
Application of	lenth (mm)			20	
Month: Octo	ber			20	
Application of	lepth (mm)			30	
Month: Nove	ember				
Application of	lepth (mm)			55	
Month: Dece	ember				
Application c	lepth (mm)			70	
Month: Janu	ary			70	
Application of	ieptn (mm)			70	
Application of	uary Ionth (mm)			65	
Month Marc	h			05	
Application of	lenth (mm)			55	
Month: April					
Application c	lepth (mm)			30	
<i>Irrigation conc</i> Source	centrations				Overseer default (fixed)

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

Fa

Lowe Environmental Impact

irmPara	meters					0	/ER	SEEF
N 2.5	P 0.1	K 1.6	S 2.5	Ca 9.3	Mg 2.2	Na 9.5	H O	
Animals on Ratio and Animals	n <i>block</i> d type of stock grazing	< based on who	le farm values o	due to this opt	tion being se	elected on blo	ck set up	
Water o Direc Animal Dairy	connectivity t access to str grazing graze block a	reams Ill year round		70		False		
<i>Effluent ap</i> Receives	<i>plication</i> no liquid or s	olid effluents						
Block - Dar Block nam	n_17a.1 Irri e	gated			Dar	n_17a.1 Irrig	jated	
Block type Area Relative pr Pasture blo	oductivity ock type			ha	Pas 11. O No	toral 9		
Topograph Distance fr Cultivated Fodder rot	y om coast in last 5 years ates through	5		km	Flat 37 Fals No	se		
<i>Climate</i> Annual a Mean anı Seasonal Annual p	verage rainfal nual temperat variation in r otential evapo	l aure ainfall otranspiration		mm/yr mm	1: 1: 7: 80	153 2.8 31-1450 mm 66	, Moderate	
Seasonal <i>Soil descriț</i> Soil orde	variation in F o <i>tion</i> r (default)	PET			M	oderate allic		
Soil grou SMaps Sibling	p (default)				R	ecent/YGE/Bo	GE	
Date do Wilting	point			0 - 30cm 30 - 60ci > 60	n m	2017 May 05 9 7 3	08:07	
Field ca	apacity			0 - 30cm 30 - 60ci > 60	n m	17 11 5		
Saturat	tion			0 - 30cm 30 - 60ci > 60	n m	26 18 15		
Natural Depth 1 Maximu Top soi	l drainage clas to impeded lay um rooting de l horizon cher	ss yer pth nical and physi	cal parameters	cm cm		Moderately w Not entered Not entered	vell	
ASC/I Bulk Clay Sand	PR density	. ,	·	% kg/m³ %		19 1220 25 20		
Sub soi Sub s	il soil clay			%		27		
Soil profile Profile dr Top soil t Maximun Depth to	ainage class texture n rooting dept impeded drai	h nage layer		m	U U 0 0	se default nknown		

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters

Lowe Environmental Impact



Soil drainage Drainage method Method Hydrophobic condition Occurence of pugging damage Compacted top soil		L F F	None Jse default Rare False
<i>Soil settings</i> K leaching (%s) N immobilisation status			Medium
Soil tests Olsen P QT K QT Ca 24 9 13 Organic S Anion storage capacity or phospha TBK reserve K test K reserve status	QT Mg 38 te retention	QT Na 8	4 Not entered Not entered Use default
Pasture Pasture type Clover levels			Ryegrass/white clover Use default
Supplements removed No supplements removed from thi	s block		
Fertiliser application Fertiliser products - September Category Product Amount		ku/ha	Ballance super Superten 300
Fertiliser products - September Category Product Amount Fertiliser products - October		kg/ha	Ravensdown other Urea 60
Category Product Amount Fertiliser products - November		kg/ha	Ravensdown other Urea 60
Category Product Amount Fertiliser products - December Category		kg/ha	Ravensdown other Urea 60 Ravensdown other
Product Amount Fertiliser products - February Category		kg/ha	Urea 60 Ravensdown other
Product Amount Fertiliser products - April Category		kg/ha	Urea 60 Bavensdown other
Product Amount		kg/ha	Urea 60
Irrigation Irrigation system type Month: Sentember			Spraylines
Application depth (mm) Month: October		20	
Application depth (mm) Month: November		30	
Application depth (mm)		55	

Lowe Environmental Impact

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters



Month: De	cember			70			
Month: la	nuary			70			
Application	n depth (mm)			70			
Month: Fe Applicatior	bruary n depth (mm)			65			
Month: Ma Applicatior	arch n depth (mm)			55			
Month: Ap	ril denth (mm)			30			
Application	rueptir (min)			50			
Irrigation co	oncentrations					0	
Source	Р	K	c	6-	Ma	Overseer defau	lit (fixed)
N 2 5	P 0 1	К 1.6	5		l™lg ⊃⊃		
2.5	0.1	1.0	2.5	9.5	2.2	9.5	0
<i>Animals on I</i> Ratio and Animals gr	<i>block</i> type of stock razing	based on wh	ole farm values o	due to this optic	on being	selected on blo	ck set up
Dairy Water co	nnectivity			%		0	
Direct	access to stre	ams				False	
Animal g	Irazing						
Dairy g	graze block all	year round					
Effluent ann	lication						
Receives r	no liquid or sol	id effluents					
Block - Darn	_17a.1 Dry						
Block name						Darn_17a.1 Dry	
Block type						Pastoral	
Area				ha		30.8	
Relative pro	ductivity					0	
Pasture bloc	ck type				,	Yes	
Topography						Flat	
Distance fro	m coast			km		37	
Cultivated ir	n last 5 years					False	
Fodder rotat	tes through				·	Yes	
Climate							
Annual ave	erage rainfall			mm/yr		1153	
Mean anni	ual temperatu	re				12.8	
Seasonal v	variation in rai	nfall				731-1450 mm,	Moderate
Annual pot	tential evapoti	ranspiration		mm		866	
Seasonal v	variation in PE	Т				Moderate	
Soil descript	tion						
Soil order	(default)					Pallic	
Soil group	(default)					Recent/YGE/BC	θE
SMaps							
Sibling						Darn_17a.1	
Date dov	wnloaded					2017 May 05	08:07
Wilting p	oint			0 - 30cm		9	
				30 - 60cm		7	
				> 60		3	
Field cap	acity			0 - 30cm		17	
				30 - 60cm		11	
				> 60		5	
Saturatio	on			0 - 30cm		26	
				30 - 60cm		18	
				> 60		15	
Natural o	drainage class					Moderately w	ell
Depth to	impeded laye	er		cm		Not entered	
Maximur	n rooting dept	:h		cm		Not entered	
Top soil	horizon chemi	cal and phys	sical parameters				

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters

Lowe Environmental Impact



ASC/PR Bulk density Clay Sand Sub soil Sub soil clay		% kg/m³ % %	19 1220 25 20 27
<i>Soil profile</i> Profile drainage class Top soil texture Maximum rooting depth Depth to impeded drainage layer		m	Use default Unknown 0 0
Soil drainage Drainage method Method Hydrophobic condition Occurence of pugging damage Compacted top soil			None Use default Rare False
Soil settings K leaching potential not set N immobilisation status			
Soil tests Olsen P QT K QT Ca 24 6 8 Organic S Anion storage capacity or phospha TBK reserve K test K reserve status	QT Mg 26 te retention	QT Na 5	3 Not entered Not entered Use default
<i>Pasture</i> Pasture type Clover levels			Ryegrass/white clover Use default
Supplements removed No supplements removed from this	s block		
Fertiliser application Fertiliser products - September Category Product Amount		ka/ha	Ballance super Superten 300
Fertiliser products - September Category Product Amount		kg/ha	Ravensdown other Urea 60
Fertiliser products - October Category Product Amount Fortiliser products - November		kg/ha	Ravensdown other Urea 60
Category Product Amount Fertiliser products - December		kg/ha	Ravensdown other Urea 60
Category Product Amount Fertiliser products - February		kg/ha	Ravensdown other Urea 60
Category Product Amount Fertiliser products - April		kg/ha	Ravensdown other Urea 60

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters

Lowe Environmental Impact

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Category Product Amount	kg/ha	Ravensdown other Urea 60
<i>Irrigation</i> No irrigation entered		
Animals on block Ratio and type of stock based on whole farm values of	due to this option be	ing selected on block set up
Animals grazing Dairy	%	0
Water connectivity Direct access to streams Animal grazing Dairy graze block all year round		False
Effluent application Receives no liquid or solid effluents		
Block - Kaia_19a.1 Irrigated		
Block type		Kaia_19a.1 Irrigated
Area	ha	4 3
Relative productivity		0
Pasture block type		No
Topography		Flat
Distance from coast	km	37
Fodder rotates through		False No
Climate		
Annual average rainfall	mm/yr	1153
Mean annual temperature		12.8
Seasonal variation in rainfall		731-1450 mm, Moderate
Annual potential evapotranspiration Seasonal variation in PET	mm	866 Moderate
Soil description		
Soil order (default)		Recent
Soil group (default)		Recent/YGE/BGE
SMaps		K : 10 1
Sibling Data downloaded		Kala_19a.1
Wilting point	0 - 30 cm	2017 May 05 10:52
Whiting point	30 - 60cm	14
	> 60	7
Field capacity	0 - 30cm	42
	30 - 60cm	35
	> 60	27
Saturation	0 - 30cm	58
		50
Natural drainage class	> 00	Imperfect
Depth to impeded layer	cm	Not entered
Maximum rooting depth	cm	Not entered
Top soil horizon chemical and physical parameters	<i>c</i> :	
ASC/PR	%	33
Buik density	Kg/m ³	20
Sand	70 0/2	20 12
Sub soil	/0	14
Sub soil clay	%	19
Soil profile		
Profile drainage class		Use default

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters

Lowe Environmental Impact

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Top soil texture Maximum rooting depth Depth to impeded drainage	layer		m	Unknown 0 0
Soil drainage Drainage method Method Hydrophobic condition Occurence of pugging damage Compacted top soil	e			None Use default Rare False
Soil settings K leaching (%s) N immobilisation status				Medium
Soil tests Olsen P QT K 27 5 Organic S Anion storage capacity or pl TBK reserve K test K reserve status	QT Ca 10 hosphate rete	QT Mg 33 ention	QT Na 6	3 Not entered Not entered Use default
Pasture Pasture type Clover levels				Ryegrass/white clover Use default
Supplements removed No supplements removed fr	om this block	:		
Fertiliser application Fertiliser products - Septem Category Product Amount	ıber		ko/ha	Ballance super Superten 400
Fertiliser products - Septem Category Product Amount	ıber		kg/ha	Ravensdown other Urea 60
Fertiliser products - October Category Product Amount	r		kg/ha	Ravensdown other Urea 60
Fertiliser products - Novemi Category Product Amount	ber		kg/ha	Ravensdown other Urea 60
Category Product Amount Eactiliear products - Eabruar	Der		kg/ha	Ravensdown other Urea 60
Category Product Amount Eertilieer products - April	y		kg/ha	Ravensdown other Urea 60
Category Product Amount			kg/ha	Ravensdown other Urea 60
Irrigation Irrigation system type Month: September				Spraylines
Application depth (mm) Month: October			20	

Lowe Environmental Impact

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters



Application Month: No	n depth (mm) ovember			30			
Application	n depth (mm)			55			
Application	n depth (mm)			70			
Application	nuary n depth (mm)			70			
Month: Fe Application	bruary 1 depth (mm)			65			
Month: Ma Application	arch n depth (mm)			55			
Month: Ap Application	ril n depth (mm)			30			
Irrigation co	oncentrations						
Source	_		_	_		Overseer defau	lt (fixed)
N 2.5	Р 0.1	K 1.6	S 2.5	Ca 9.3	Мд 2.2	Na 9.5	Н 0
Animals on	block						
Ratio and Animals g	type of stock ba razing	ased on who	le farm value	s due to this opt	ion being	selected on bloc	k set up
Dairy Water co	nnectivity			%		0	
Direct	access to strear	ns				False	
Dairy g	graze block all y	ear round					
Effluent app	lication	offluente					
Receives r		enluents					
Block - Darn Block name	_9a.1 Dry				г	Darn 9a.1 Drv	
Block type					F	Pastoral	
Area				ha	2	1.3	
Relative pro	ductivity				C)	
Pasture bloc	k type				N	lo	
Topography					F	lat	
Distance fro	m coast			km	3	37	
Cultivated in	n last 5 years				F	alse	
Fodder rota	tes through				ľ	lo	
<i>Climate</i> Annual ave	erage rainfall			mm/vr		1153	
Mean annu	ual temperature			, , ,		12.8	
Seasonal	ariation in rain	fall				731-1450 mm,	Moderate
Annual po	tential evapotra	nspiration		mm		866	
Seasonal	variation in PET					Moderate	
Soil descript	tion					Dellis	
Soll order	(default)						-
Soll group	(default)					Recent/YGE/BG	E
SMaps							
Sibiling Data day	uploaded					Darn_9a.1	10.22
Date dov	white			0 20cm		2017 May 05	10:33
wiiting p	Joint			0 - 300m	n	11	
				50 - 000i	11	6	
Field car	acity			2 00 0 - 30cm		23	
i leiu cap	acity			30 - 50011	n	2J 12	
						9	
Saturatio	חר			0 - 30cm		36	
Jacuratio				30 - 60 cm	n	17	
						15	
Natural	drainage class			~ 00		Moderately w	oll
natural	aramage clubb					i loaciatery W	C 11

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters





Depth to impeded layer Maximum rooting depth Top soil horizon chemical and physical parameters	cm cm	Not entered 80
ASC/PR	%	19
Bulk density	kg/m³	1220
Clay	%	20
Sand	%	15
Sub soil day	04	20
Sub soil clay	70	20
Soil profile Profile drainage class Top soil texture Maximum rooting depth	m	Use default Unknown 0.8
Depth to impeded drainage layer		0
Soil drainage Drainage method Method		None
Hydrophobic condition		Use default
Occurence of pugging damage		Rare
Compacted top soil		False
Soil settings		
K leaching (%s) N immobilisation status		Medium
Soil tests Olsen P QT K QT Ca QT Mg 32 4 15 20	QT Na 5	
Organic S	C	6
Anion storage capacity or phosphate retention		Not entered
TBK reserve K test		Not entered
K reserve status		Use default
Pasture Pasture type Clover levels		Ryegrass/white clover Use default
Supplements removed No supplements removed from this block		
Fertiliser application Fertiliser products - September		
Category		Ballance super
Product	l //	Superten
AMOUNT Fertiliser products - September	kg/na	300
Category		Ravensdown other
Product		Urea
Amount	kg/ha	60
Fertiliser products - October		
Category		Ravensdown other
Amount	ka/ha	60
Fertiliser products - November		
Category		Ravensdown other
Product		Urea
Amount Fortiliser products - Decomber	kg/ha	60
Category		Ravensdown other
Product		Urea
Amount	kg/ha	60
Fertiliser products - February		_
Category		Ravensdown other

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Client reference: Farm name: Otawira Dairy Farm

Area

FarmParameters





Clay

Sand

Bulk density

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kg/m³

%

%

%

1180

5

2

72

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Client reference: Farm name: Otawira Dairy Farm

FarmParameters

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Soil profile Profile drainag Top soil textu Maximum roo Depth to impe	ge class re ting depth eded drainage	e layer		m	Use default Unknown 0.65 0
Soil drainage Drainage met Method	hod				None
Occurence of proceed top	ugging dama soil	ge			Rare False
Soil settings K leaching po N immobilisat	tential not se ion status	t			
<i>Soil tests</i> Olsen P	QT K	QT Ca	QT Mg	QT Na	
32	4	15	20	5	
Organic S					6
Anion storage	capacity or	phosphate re	etention		Not entered
IBK reserve K	k test				Not entered
K reserve stat	tus				Use default
Pasture					
Pasture type					Ryegrass/white clover
Clover levels					Use default
Supplements re No supplemen	emoved nts removed i	from this blo	ock		
Fortilicar applic	ation				
Fertiliser applica	<i>auun</i> lucts - Sentei	mher			
Category	lucis Septer	liber			Ballance super
Product					Superten
Amount				kg/ha	400
Fertiliser prod	lucts - Septei	nber			
Category					Ravensdown other
Product					Urea
Amount				kg/ha	60
Fertiliser prod	lucts - Octobe	er			Device a device lather
Category					
Amount				ka/ha	60
Fertiliser prod	lucts - Noven	her		Kg/Tid	00
Category		iber			Ravensdown other
Product					Urea
Amount				kg/ha	60
Fertiliser prod	lucts - Decen	nber			
Category					Ravensdown other
Product				les /ba	Urea
Eortilisor prod	lucte - Fobrus			kg/na	60
Category		агу			Ravensdown other
Product					Urea
Amount				kg/ha	60
Fertiliser prod	lucts - April				
Category					Ravensdown other
Product					Urea
Amount				kg/ha	60
Irrigation					
Irrigation svs	tem type				Travelling irrigator
Month: Septe	mber				

Lowe Environmental Impact

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters



Application	depth (mm)			20		
Application	depth (mm)			30		
Month: Nove Application	ember depth (mm)			55		
Month: Dece Application	ember depth (mm)			70		
Month: Janu Application	iary depth (mm)			70		
Month: Febr	uary depth (mm)			65		
Month: Marc	ch denth (mm)			55		
Month: Apri	l lenth (mm)			30		
Irrigation con	centrations			50		
Source		IZ.	C	6-	Ма	Overseer default (fixed)
N 2.5	Р 0.1	к 1.6	S 2.5	9.3	Mg 2.2	9.5 0
Animals on bl Ratio and ty Animals gra Dairy Water con Direct ac Animal gra Dairy gra	pe of stock b zing nectivity ccess to strea azing aze block all y	ased on whole ms year round	e farm value	es due to this opt %	ion bein	ng selected on block set up 0 False
Effluent applic Liquid efflue Receives f Effluent ap Percentag	cation ints arm dairy eff oplication dep e of block effl	luent th luent applied t	co	%		12-24 mm 100
Block - Darn_	17a.1 Silage	Irrigated				Darn 17a 1 Silage Irrigated
Block type						Pastoral
Area Relative produ	uctivity			ha		10.4 0
Pasture block	type					No Flat
Distance from	coast			km		37
Fodder rotate	s through					No
Climate						1150
Mean annua	l temperature	e		TTTTT/ yr		12.8
Seasonal va Annual pote	riation in rair ntial evapotra	nfall anspiration		mm		731-1450 mm, Moderate 866
Seasonal va	riation in PET	-				Moderate
Soil descriptio	n lofault)					Pallic
Soil group (default)					Recent/YGE/BGE
Smaps Sibling						Darn_17a.1
Date dowr Wilting po	nloaded			0 - 30cm		2017 May 05 08:07 9
witting po				30 - 60cr	n	7
Field capa	city			> 60 0 - 30cm		3 17
				30 - 60cr	n	11

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Client reference: Farm name: Otawira Dairy Farm

FarmParameters

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Saturation Natural drainage class Depth to impeded layer Maximum rooting depth Top soil horizon chemical and physical parameters ASC/PR Bulk density Clay Sand Sub soil	> 60 0 - 30cm 30 - 60cm > 60 cm cm cm kg/m ³ %	5 26 18 15 Moderately well Not entered Not entered 19 1220 25 20
Sub soil clay Soil profile Profile drainage class Top soil texture Maximum rooting depth Depth to impeded drainage layer	% m	27 Use default Unknown 0 0
Soil drainage Drainage method Method Hydrophobic condition Occurence of pugging damage Compacted top soil		None Use default Rare False
Soil settings K leaching (%s) N immobilisation status		Medium
Soil tests Olsen P QT K QT Ca QT Mg 24 9 13 38 Organic S Anion storage capacity or phosphate retention TBK reserve K test K reserve status	QT Na 8	4 Not entered Not entered Use default
Pasture Pasture type Clover levels		Ryegrass/white clover Use default
Supplements removed No supplements removed from this block		
Fertiliser application Fertiliser products - September Category Product Amount Fertiliser products - September Category	kg/ha	Ballance super Superten 500 Ravensdown other
Product Amount Fertiliser products - October Category	kg/ha	Urea 60 Ravensdown other
Product Amount Fertiliser products - November	kg/ha	Urea 60 Rayonsdown other
Product Amount Fertiliser products - December	kg/ha	Urea 60
South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters



Category Product Amount				kg/ha		Ravensdown ot Urea 60	her
Fertiliser p	roducts - Fe	bruary		0.			
Category						Ravensdown ot	her
Product						Urea	
Amount				kg/ha		60	
Fertiliser p	roducts - Ap	oril				.	
Category						Ravensdown of	her
Amount				ka/ba		orea 60	
Amount				ку/па		00	
Irrigation							
Irrigation s	system type					Spraylines	
Month: Sep	ptember						
Application	i depth (mm)		20			
Month: Oct	tober						
Application	i depth (mm)		30			
Month: No	vember	、					
Application	i depth (mm)		55			
Month: De	cember			70			
Application	i depth (mm)		70			
Application	iuaiy donth (mm	.)		70			
Month: Feb	ruepti (iiiii oruary)		70			
Application	depth (mm)		65			
Month: Ma	rch	/					
Application	depth (mm)		55			
Month: Apr	ril						
Application	i depth (mm)		30			
Irrigation co	ncontrations						
Sourco	ncentrations	•				Overseer default	(fixed)
N	P	ĸ	S	Ca	Ма	Na	(IIXEU) H
2.5	0.1	1.6	2.5	9.3	2.2	9.5	0
Animals on E Ratio and t Animals gr Dairy Water co Direct a Animal gr Dairy g	<i>block</i> cype of stock azing nnectivity access to str razing raze block a	k based on wh reams Ill year round	ole farm value	s due to this opt %	tion bein <u>c</u>	g selected on block 0 False	set up
<i>Effluent appl</i> Receives n	<i>lication</i> o liquid or s	olid effluents					
Block - Darn	_17a.1 Sila	ge Dry					
Block name						Darn_17a.1 Silage	Dry
Block type						Pastoral	
Area				ha		19.6	
Relative proc						U Voc	
Topography	ктуре					Flat	
Distance from	m coast			km		37	
Cultivated in	last 5 vears	5				False	
Fodder rotat	es through					Yes	
	-						
Climate						1152	
Annual ave	aye ramal			mm/yr		17.8	
mean annu		uic				12.0	
Seasonal v	ariation in r	ainfall				731-1450 mm M	Ioderate
Seasonal v Annual not	ariation in r	ainfall otranspiration		mm		731-1450 mm, M 866	loderate
Seasonal v Annual pot Seasonal v	ariation in r ential evapo ariation in P	ainfall otranspiration PET		mm		731-1450 mm, M 866 Moderate	loderate

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm

FarmParameters

Lowe Environmental Impact



Soil description	C 113				
Soil order (de	fault)				Pallic Becomb///CE/BCE
Soli group (de	elault)				Recent/ FGE/ BGE
Sibling					Darp 17a 1
Date downlo	aded				2017 May 05 08.07
Wilting noin	t			0 - 30cm	9
which go bon	L C			30 - 60cm	7
				> 60	3
Field capacit	tv.			0 - 30cm	17
i loid sapasi	-)			30 - 60cm	11
				> 60	5
Saturation				0 - 30cm	26
				30 - 60cm	18
				> 60	15
Natural drai	nage class				Moderately well
Depth to im	peded layer			cm	Not entered
Maximum ro	oting depth			cm	Not entered
Top soil hor	izon chemical	and physical	parameters		
ASC/PR				%	19
Bulk densi	ty			kg/m³	1220
Clay				%	25
Sand				%	20
Sub soil					
Sub soil cl	ау			%	27
Soil profile					
Profile drainag	ge class				Use default
Top soil textu	re				Unknown
Maximum roo	ting depth			m	0
Depth to impe	eded drainage	e layer			0
Soil drainage					
Drainage met	hod				
Method					None
Hydrophobic co	ndition				Use default
Occurence of pu	ugging damag	je			Rare
compacted top	SOII				Faise
Soil settinas					
K leaching po	tential not se	t			
N immobilisat	ion status				
Soil tests					
Olsen P	ОТ К	OT Ca	QT Mg	OT Na	
24	6	8	26	5	
Organic S					3
Anion storage	capacity or p	phosphate ret	ention		Not entered
TBK reserve k	(test				Not entered
K reserve stat	us				Use default
Pasture					
Pasture type					Ryegrass/white clover
Clover levels					Use default
Supplements re	emoved				
No supplemer	nts removed f	rom this bloc	k		
Fertiliser applica	ation				
Fertiliser prod	ucts - Septer	nber			
Category	-				Ballance super
Product					Superten
Amount				kg/ha	500
Fertiliser prod	ucts - Septer	nber			
Category					Ravensdown other

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Client reference: Farm name: Otawira Dairy Farm

FarmParameters

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Product	ka/ba	Urea
Fertiliser products - October	kg/11a	60
Category		Ravensdown other
Product		Urea
Amount	kg/ha	60
Fertiliser products - November	-	
Category		Ravensdown other
Product		Urea
Amount	kg/ha	60
Fertiliser products - December		
Category		Ravensdown other
Product	ka /ba	Urea
Amount Fortilisor products - Fobruary	kg/na	60
Category		Pavensdown other
Product		lirea
Amount	kg/ba	60
Fertiliser products - April	kg/na	00
Category		Ravensdown other
Product		Urea
Amount	kg/ha	60
- · · · ·	-	
Irrigation		
No irrigation entered		
Animals on block Ratio and type of stock based on whole farm	m values due to this option b	eing selected on block set up
	0/6	0
Water connectivity	70	0
Direct access to streams		False
Animal grazing		i dibe
Dairy graze block all year round		
Effluent application Receives no liquid or solid effluents		
Block - QE2		
Block name		QE2
Block type		Trees and Scrub
Area	ha	4.8
Rainfall	mm/yr	950
Distance from coast	ĸm	37
Bush type		Native
Block - Maize		
Block name		Maize
Block type		Fodder Crop
Rotation area	ha	9.7
Low N mineralisation		False
Final grid month		April
Irrigation system type		No Irrigation
Crop information		
Current assessment year		
May - Grazed nasture		
lune - Grazed pasture		
July - Grazed pasture		
August - Grazed pasture		
September - Maize silage		
Crop management	See details he	low Crop sown
October - Maize silage		
November - Maize silage		

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Client reference: Farm name: Otawira Dairy Farm

FarmParameters

Lowe Environmental Impact



December - Maize silage January - Maize silage February - Maize silage March - Mature - Maize silage April - Grazed Crop management	See details below	Crop sown
Crop sowing information - September of the Current a Crop category Crop type Yield at final defoliation Cultivation practice at sowing	rssessment year T/ha dry matter	Forages Maize silage 19 Minimum till
Crop sowing information - April of the Current assess Crop category Crop type Source of animals No fertiliser application applied on block	nent year	Permanent pasture Grazed Not entered
Effluent application		

Receives no liquid or solid effluents

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Farm details

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Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Type Assessment Degice	Farm type Assessment year Bogion	Full range Not entered
Region	Region	weinington
Farm blocks		
Buf_Rang_18b.1	Pastoral	8
Irr_Mid_Bram_8a.1	Pastoral	4.6
Irr_Mid_Tait_42a.1	Pastoral	21.3
Buf_Selw_25a.1	Pastoral	1.9
Irr_E_Selw_25a.1	Pastoral	6
Irr_NE_Darn_17a.1	Pastoral	19
Irr_Mid_Darn_17a.1	Pastoral	14.9
Irr_Darn_9a.1	Pastoral	4.3
Irr_Rang_18b.1	Pastoral	30.4
Irr_E_Darn_17a.1	Pastoral	12.8
Buf_Darn_17a.1	Pastoral	30.9
Irr_A_Bram_8a.1	Pastoral	8
Buf_Bram_8a.1	Pastoral	5.7
Buf_Tait_42a.1	Pastoral	4
Buf_Darn_9a.1	Pastoral	1.5
QE2	Trees and Scrub	3.6
Maize	Fodder Crop	
Total farm area declared in blocks	ha	176.9
Total farm area	ha	186
Non-productive area	ha	9.099999999999999

Farm animals

Stock numbers

Stock reconciliation	on - Beef / d	airy grazing												
Calving perce	ntage				%			83						
Dercent renlar	range				0/2			15						
Moan calving	dato				70			Not o	ntoro	d				
Mean waaning								Note		u a				
Mean weaning								Note	ntere	a				
weaning weig	nt				кg			80						
Stock numbers														
Class		Breed	Jul	Aug	ı Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
CowsMixedAg	eBreeding	Friesian	120	120) 120	120) 120	120	120	120	120	120	120	120
Max weight (kg)	LW start (kg)	LW end (kg)	CW (kg)	Age (mont	:hs)	Source	Fate		Sex	Mated			
	0	0	0	~	0	~	0	•	~	Female	No ma	ting	10	10
HeifersBreedi	ng	Friesian	0	U U	0	0	0	0	0	0	0	18	18	18
Max weight (kg)	LW start (kg)	LW end (Kg)	CW (1	kg)	Age (mont	ns)	Source	Fate		Sex	Mated No ma	tina		
HeifersBreedi	na	Friesian	18	18	[′] 18	18	18	18	18	18	18	18	18	18
Max weight (kg)	LW start (kg)	LW end (kg)	CW (ka)	Age (mont	ths)	Source	Fate	10	Sex	Mated	10	10	10
300	97	201	0		10		On-farm			Female	No ma	ting		
HeifersBreedi	ng	Friesian	18	18	18	18	18	18	18	18	18	0	0	0
Max weight (kg)	LW start (kg)	LW end (kg)	CW (kg)	Age (mont	:hs)	Source	Fate		Sex	Mated			
300	201	276	0	_	22	_	On-farm	_	_	Female	No ma	ting		
Weaners		Friesian	0	0	0	0	0	0	0	0	0	82	82	82
Max weight (kg)	LW start (kg)	LW end (kg)	CW (I	kg)	Age (mont	:hs)	Source	Fate		Sex	Mated			
325	80	96	0		/		weaneu	farm	11 011-	MixeuSex				
Weaners		Friesian	82	82	82	82	82	82	82	82	82	82	82	82
Max weight (kg)	LW start (kg)	LW end (kg)	CW (kg)	Age (mont	:hs)	Source	Fate		Sex	Mated			
325	98	214	0	57	10	,	On-farm	Remai	n on-	MixedSex				
_								farm						
Steers		Friesian	50	50	50	50	50	50	50	50	50	50	50	50
Max weight (kg)	LW start (kg)	LW end (kg)	CW (I	kg)	Age (mont	:hs)	Source	Fate		Sex	Mated			
541	231	222	0		22		Ull-Idrill	farm	11 011-	Castrated				
Steers		Friesian	50	50	0	0	0	0	0	0	0	0	0	0
Max weight (kg)	LW start (kg)	LW end (kg)	CW (kg)	Age (mont	:hs)	Source	Fate	•	Sex	Mated	0	U U	°,
341	333	486	0	57	34	- /	On-farm	Sold to	с	Castrated				
								works						

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Client reference:

Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



HeifersAndCows Max weight (kg) LW start (kg) 300 201	Friesian LW end (kg) 292	32 32 ^{CW (kg)}	32 32 Age (months) 22	32 Source On-farm	32 32 Fate Remain on-	32 Sex Female	32 Mated	32	32	32
HeifersAndCows Max weight (kg) LW start (kg) 300 292	Friesian LW end (kg) 430	32 32 ^{CW (kg)}	00 Age (months) 34	0 Source On-farm	0 0 Fate Sold to	0 Sex Female	0 Mated	0	0	0
BullsBreeding Max weight (kg) LW start (kg) 427 0	Friesian LW end (kg) 0	2 2 CW (kg) 0	22 Age (months) 0	2 Source	works 2 2 Fate	2 Sex Male	2 Mated	2	2	2

Stock management

Animal excreta distribution	
Relative productivity assessment method	Relative yield (from soil, fertilise
Relative productivity calculated for each Pastoral block	
Buf_Rang_18b.1	0.843843589901339
Irr Mid Bram 8a.1	0.732938896662893
Irr Mid Tait 42a.1	0.779207671477187
Buf_Selw_25a.1	0.86624922646562
Irr_E_Selw_25a.1	0.798661677444725
Irr_NE_Darn_17a.1	0.848541096147982
Irr_Mid_Darn_17a.1	0.798661684281953
Irr_Darn_9a.1	0.807210333695446
Irr_Rang_18b.1	0.807209934529905
Irr_E_Darn_17a.1	0.846900652029663
Buf_Darn_17a.1	0.927181771522285
Irr A Bram 8a.1	0.732191710751621
Buf Bram 8a.1	0.832404538817526
Buf Tait 42a.1	0.88538269396957
Buf Darn 9a.1	0.843844007182234
	and south a

Ratio of stock types on pastoral blocks is the same as the farm stock ratios

Animal health supplements

Animal - Beef / dairy grazing No animal supplementation has been entered

Left over feeding

No left over feeding specified

Stored supplements

No supplements from storage added to this farm

Imported supplements

No supplements imported onto this farm

Greenhouse gas emission factors

Enteric methane - g methane/kg DMI intake

Dairy		21.6
Dairy replacements		21.6
Sheep		20.9
Beef		21.6
Deer		21.3
Goats		20.9
Camelids		20.9
Young sheep		16.8
Horses	kg methane/RSU	1.8
User defined	kg methane/RSU	1.5
Dung methane - g methane/kg dung		
Dairy		0.982
Dairy replacements		0.982
Sheep		0.691
Beef		0.982
Deer		0.915

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Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Goats Other		0.691 0.691
Nitrous oxide Use farm specific emission factors		
Fuel and electricity		
Embodied CO2 emissions Diesel	kg CO2	2.989
Petrol	equivalents/litre kg CO2	2.773
Electricity	kg CO2 equivalents/kWh	0.271
Energy emissions Diesel Petrol Electricity	MJ / litre MJ / litre MJ / kWh	42.24 42.4 8.21
GWP Use NZ national inventory		
Allocation Allocation method		Enter actual allocation figures
Report settings Greenhouse gas emission report units: Use default Target N application rate as effluent: kg N/ha/yr Block Information		
Block - Buf_Rang_18b.1 Block name Block type Area Relative productivity Pasture block type Topography Distance from coast Cultivated in last 5 years Fodder rotates through	ha km	Buf_Rang_18b.1 Pastoral 8 0 No Flat 37 False No
Climate Annual average rainfall Mean annual temperature Seasonal variation in rainfall Annual potential evapotranspiration Seasonal variation in PET	mm/yr mm	1153 12.8 731-1450 mm, Moderate 866 Moderate
Soil description Soil order (default) Soil group (default) SMaps Sibling Date downloaded	0 20cm	Recent Recent/YGE/BGE Rang_18b.1 2017 May 04 16:57
Field capacity	30 - 60cm > 60 0 - 30cm 30 - 60cm > 60	2 1 1 8 5 5
Saturation	0 - 30cm 30 - 60cm	23 19

South Waiarapa District Council

Client reference:

Lowe Environmental Impact

Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Natural drainage class Depth to impeded layer Maximum rooting depth Top soil horizon chemical and physical parameters ASC/PR Bulk density Clay Sand Sub soil Sub soil	> 60 cm cm % kg/m ³ % %	19 Well Not entered 65 19 1180 5 72 2
Soil profile Profile drainage class Top soil texture Maximum rooting depth Depth to impeded drainage layer	m	Use default Unknown 0.65 0
Soil drainage Drainage method Method Hydrophobic condition Occurence of pugging damage Compacted top soil		None Use default Rare False
Soil settings K leaching potential not set N immobilisation status		
Soil tests Olsen P QT K QT Ca QT Mg 32 4 15 20 Organic S Anion storage capacity or phosphate retention TBK reserve K test K reserve status	QT Na 5	6 Not entered Not entered Use default Ryegrass/white clover
Clover levels Supplements removed No supplements removed from this block		Use default
Fertiliser application Fertiliser products - September Category Product Amount Fertiliser products - September Category Product Amount	kg/ha kg/ha	Ballance super Superten 300 Ravensdown other Urea 60
Irrigation No irrigation entered		
Animals on block Ratio and type of stock based on whole farm values of Animals grazing Beef / dairy grazing Block intensity Finishing beef Water connectivity Direct access to streams	due to this option %	being selected on block set up 0 False False

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters

Effluent application



Beef / dairy grazing graze block all year round

Receives no liquid or solid effluents		
Block - Irr_Mid_Bram_8a.1		
Block name		Irr_Mid_Bram_8a.1
Block type		Pastoral
Area	ha	4.6
Relative productivity		0
Pasture block type		No
Topography		Flat
Distance from coast	km	37
Cultivated in last 5 years		False
Fodder rotates through		No
Climate		
Annual average rainfall	mm/yr	1153
Mean annual temperature		12.8
Seasonal variation in rainfall		731-1450 mm, Moderate
Annual potential evapotranspiration	mm	866
Seasonal variation in PET		Moderate
Soil description		
Soil order (default)		Recent
Soil group (default)		Recent/YGE/BGE
SMaps		
Sibling		Bram 8a.1
Date downloaded		2017 May 04 16:59
Wilting point	0 - 30cm	17
	30 - 60cm	17
	> 60	17
Field capacity	0 - 30cm	45
	30 - 60cm	39
	> 60	39
Saturation	0 - 30cm	59
	30 - 60cm	49
	> 60	48
Natural drainage class		Imperfect
Depth to impeded layer	cm	Not entered
Maximum rooting depth	cm	Not entered
Top soil horizon chemical and physical parameters		
ASC/PR	%	33
Bulk density	kg/m³	1090
Clay	%	19
Sand	%	5
Sub soil		
Sub soil clay	%	18
Soil profile		
Profile drainage class		Use default
Top soil texture		Unknown
Maximum rooting depth	m	0
Depth to impeded drainage layer		0
Soil drainage		
Drainage method		
Method		None
Hydrophobic condition		Use default
Occurence of pugging damage		Rare
Compacted top soil		False
Soil settings		
k leaching potential not set		

N immobilisation status

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Soil tests Olsen P 20 Organic S Anion storag	QT K 4 e capacity or p	QT Ca 10 bhosphate ret	QT Mg 20 ention	QT Na 4		3 Not entered
K reserve sta	atus					Use default
<i>Pasture</i> Pasture type Clover levels						Ryegrass/white clover Use default
Supplements r Supplement Conservati	<i>emoved</i> information on type					Baleage
Name Wrapping						Wrapped in plastic
Supplemen Number o	t amount of cuts					1
Supplemen No timing o	ts are distribut	ted evenly ac been specifie	ross all pastora d	al blocks		
Fertiliser appli	cation ducts - Senten	nber				
Category						Ballance super
Amount				kg/ha		200
Soluble fertil	iser inputs (kg	/ha/month) -	January	6.5	Ma	No
4	1	0		0	0	0
Soluble fertil	iser inputs (kg	/ha/month) -	February			
Urea N	Super P	K	Sulphate S	Ca	Mg	Na
Soluble fertil	iser inputs (ka	/ha/month) -	· March	0	0	0
Urea N	Super P	K	Sulphate S	Са	Mg	Na
5	1	0	0	0	0	0
Soluble fertil	iser inputs (kg	/ha/month) -	· April Sulphato S	Ca	Ma	Na
6	2	0		0	0	0
Soluble fertil	iser inputs (kg	/ha/month) -	May	-	-	-
Urea N	Super P	K	Sulphate S	Са	Mg	Na
10 Soluble fortil	3 icon inpute (ka	0 (ha/manth)	0 Santambar	0	0	0
Urea N	Super P	K	Sulphate S	Са	Ма	Na
20	5	0	0	0	0	0
Soluble fertil	iser inputs (kg	/ha/month) -	October			
Urea N	Super P	K	Sulphate S	Ca	Mg	Na
Soluble fertil	iser inputs (ka	/ha/month) -	November	0	0	0
Urea N	Super P	K	Sulphate S	Ca	Mg	Na
12	3	0	0	0	0	0
Soluble fertil	iser inputs (kg	/ha/month) -	· December	Ca	Ma	Na
7	2	0	0	0	0	0
Irrigation						
Month: Janu	stem type arv					Sprayines
Application d	epth (mm)			18		
Month: Febru	Jary					
Application d	epth (mm)			14		
Month: Marc Application d Month: April	n lepth (mm)			24		

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Applicat	tion depth (mm)			32			
Applicat	ion depth (mm)			50			
Month: Applicat	July ion depth (mm)			2			
Month: Applicat	September tion depth (mm)			98			
Month: Applicat	October tion depth (mm)			83			
Month: Applicat	November			58			
Month:	December			36			
Irriaation	concentrations			50			
Source	D	K	C	6-	Ма	Block specific	
0	р 0.1	к 0	0	0	Mg 0	0	0
Animals o Ratio ar Animals Beef /	on block nd type of stock l grazing dairy grazing	based on whol	le farm valu	es due to this opti %	on being	g selected on block s	set up
Block Finis	intensity shing beef					False	
Water Dire	connectivity	ams				False	
Anima Beef	al grazing f / dairy grazing (graze block al	l year round	l			
<i>Effluent a</i> Receive	<i>pplication</i> s no liquid or sol	id effluents					
Block - Irr	_Mid_Tait_42a	.1					
Block han Block type	e					Pastoral	
Area Relative p	productivity			ha		21.3 0	
Pasture b Topograp	lock type hy					No Flat	
Distance Cultivated	from coast d in last 5 years			km		37 False	
Fodder ro	tates through					No	
<i>Climate</i> Annual	average rainfall			mm/yr		1153	
Mean ar Seasona	nnual temperatur	re nfall				12.8 731-1450 mm Mo	oderate
Annual	potential evapoti	ranspiration		mm		866 Modorato	
Soil descr		1				Moderate	
Soil ord Soil aro	er (default)					Gley Sedimentary	
SMaps						Tait 42a 1	
Date o	downloaded					2017 May 04 17	:07
Wilting	g point			0 - 30cm 30 - 60cm	า	15 15	
Field o	capacity			> 60 0 - 30cm		11 44	
				30 - 60cm > 60	า	39 38	
Satura	ation			0 - 30cm 30 - 60cm	า	56 49	

South Waiarapa District Council

Client reference:

Lowe Environmental Impact

Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Natural drainage class Depth to impeded layer Maximum rooting depth Top soil horizon chemical ASC/PR Bulk density Clay Sand Sub soil Sub soil Sub soil clay	and physical	parameters	> 60 cm cm kg/m ³ % %	3	47 Poor Not entered Not entered 35 940 24 10 24
Soil profile Profile drainage class Top soil texture Maximum rooting depth Depth to impeded drainage	layer		m		Use default Unknown 0 0
Soil drainage Drainage method Method Hydrophobic condition Occurence of pugging damage Compacted top soil	e			l Y F	None Jse default Winter False
Soil settings K leaching potential not set N immobilisation status					
Soil tests Olsen P QT K 27 5 Organic S Anion storage capacity or pl TBK reserve K test K reserve status	QT Ca 10 hosphate rete	QT Mg 33 ention	QT Na 6		3 Not entered Not entered Use default
Pasture Pasture type Clover levels					Ryegrass/white clover Use default
Supplements removed Supplement information Conservation type Name Wrapping Supplement amount Number of cuts Supplement is exported from	m the farm				Baleage Wrapped in plastic 1
Fertiliser application Fertiliser products - Septem Category Product Amount Soluble fertiliser inputs (kg/	iber (ha/month) -	Januarv	kg/ha		Ballance super Superten 200
Urea N Super P 4 1 Soluble fertiliser inputs (ka	K 0 (ha/month) -	Sulphate S 0 February	Ca 0	Mg 0	Na O
Urea N Super P 3 1 Soluble fortilizer insute (use	K 0	Sulphate S	Ca 0	Mg 0	Na O
Urea N Super P 5 1 Soluble fertiliser inputs (kg/	K 0 /ha/month) -	Sulphate S 0 April	Ca 0	Mg 0	Na O

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Urea N	Super P	K	Sulphate S	Ca	Mg	Na 0	
Soluble fortilis	zer inputs (ka	(ha/month) -	. Mav	0	0	0	
Urea N	Super P	K	Sulnhate S	Ca	Ма	Na	
10	3	0		0	n	0	
Soluble fortili	or inputs (ka	(ha/month) -	. Sentember	0	0	0	
	Supor D		Sulphato C	62	Ma	No	
	Super P	R O	Sulphate S	Ca	My	Na	
20	5	<u> </u>	0	0	0	0	
Soluble fertilis	ser inputs (kg/	'ha/month) -	October	_			
Urea N	Super P	K	Sulphate S	Ca	Mg	Na	
17	4	0	0	0	0	0	
Soluble fertilis	ser inputs (kg,	'ha/month) -	November				
Urea N	Super P	K	Sulphate S	Ca	Mg	Na	
12	3 '	0	0	0	ວັ	0	
Soluble fertilis	ser inputs (ka	/ha/month) -	December				
Urea N	Super P	k k	Sulnhate S	Ca	Ма	Na	
7	2	0		0	n g	0	
/	Z	0	0	0	0	0	
Irrigation							
Traigation ave					Cours	ulinee	
Marsha July	tem type				Shie	lynnes	
Month: July				-			
Application de	epth (mm)			2			
Month: Septe	mber						
Application de	epth (mm)			98			
Month: Octob	er						
Application de	onth (mm)			83			
Month: Nover	nher						
Application de	onth (mm)			58			
Month: Docon	nhor			50			
Application de	inder			26			
Application de	epui (mm)			30			
Month: Janua	ry						
Application de	epth (mm)			18			
Month: Februa	ary						
Application de	epth (mm)			14			
Month: March							
Application de	epth (mm)			24			
Month April	· · · · · · · · · · · · · · · · · · ·						
Application de	onth (mm)			32			
Month: May				52			
Monitorian de	unth (mama)			50			
Application de	epun (mm)			50			
Turiantian conce	ntuntions						
Irrigation conce	entrations						
Source	_		_	_	BIOC	k specific	
N	Р	K	S	Са	Mg	Na	Н
0	0.1	0	0	0	0	0	0
Animals on bloc	ck .						
Ratio and type	e of stock bas	ed on whole	farm values du	e to this op	tion being seled	ted on block	k set up
Animals grazi	na				-		
Beef / dairy	arazina			%	0		
Block intens	sity			70	Ŭ		
Einiching k	ncy						
					Г	alse	
water conne	ectivity				-		
Direct acc	ess to streams	5			ł	alse	
Animal graz	ing						
Beef / dair	ry grazing gra	ze block all y	ear round				
Effluent applica	tion						
Receives no li	quid or solid e	effluents					
Block - Buf_Sel	w_25a.1						
Block name					Buf S	elw_25a.1	
Block type					Pastor	al	
Area			ł	าล	1 9	-	
Relative produc	tivity		I		0		
					0		

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Pasture block type Topography Distance from coast Cultivated in last 5 years Fodder rotates through		km	No Flat 37 False No
Climate Annual average rainfall Mean annual temperature Seasonal variation in rainfall Annual potential evapotranspira Seasonal variation in PET	ation	mm/yr mm	1153 12.8 731-1450 mm, Moderate 866 Moderate
Soil description Soil order (default) Soil group (default) SMaps Sibling Date downloaded Wilting point		0 - 30cm 30 - 60cm > 60	Recent Recent/YGE/BGE Selw_25a.1 2017 May 05 10:31 10 5 2
Field capacity Saturation		0 - 30cm 30 - 60cm > 60 0 - 30cm 30 - 60cm	33 20 8 53 49 25
Natural drainage class Depth to impeded layer Maximum rooting depth Top soil horizon chemical and ASC/PR Bulk density Clay Sand Sub soil Sub soil clay	physical parameters	> 60 cm cm % kg/m ³ % %	25 Well Not entered 88 19 1090 11 37 9
Soil profile Profile drainage class Top soil texture Maximum rooting depth Depth to impeded drainage laye	er	m	Use default Unknown 0.88 0
Soil drainage Drainage method Method Hydrophobic condition Occurence of pugging damage Compacted top soil			None Use default Rare False
Soil settings K leaching potential not set N immobilisation status			
Soil tests Olsen P QT K QT 24 6 8 Organic S Anion storage capacity or phosy TBK reserve K test K reserve status	Ca QT Mg 26 phate retention	QT Na 5	3 Not entered Not entered Use default

Pasture

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Pasture type		Ryegrass/white clover	
Clover levels		Use default	
Supplements removed			
No supplements removed from this block			
-			
Fertiliser application			
Category		Ballanco supor	
Product		Superten	
Amount	kg/ha	300	
Fertiliser products - September			
Category		Ravensdown other	
Product		Urea	
Amount	kg/ha	60	
Irrigation			
No irrigation entered			
Animals on block			
Ratio and type of stock based on whole farm value	es due to this option t	being selected on block set up	
Allillidis grazing Beef / dairy grazing	0/2	0	
Block intensity	70	0	
Finishing beef		False	
Water connectivity			
Direct access to streams		False	
Animal grazing			
Beef / dairy grazing graze block all year round			
Effluent application			
Receives no liquid or solid effluents			
Block - Irr_E_Selw_25a.1		Imp E Colur DEp 1	
Block type		III_E_SelW_25d.1 Pastoral	
Area	ha	6	
Relative productivity	na	0	
Pasture block type		No	
Topography		Flat	
Distance from coast	km	37	
Cultivated in last 5 years		False	
Fodder rotates through		NO	
Climate			
Annual average rainfall	mm/yr	1153	
Mean annual temperature		12.8	
Seasonal variation in rainfall		731-1450 mm, Moderate	
Annual potential evapotranspiration	mm	866 Madauata	
Seasonal variation in PET		Moderale	
Soil description			
Soil order (default)		Recent	
Soil group (default)		Recent/YGE/BGE	
SMaps			
Sibling Data downloadad		Selw_25a.1	
Wilting point	0 - 30cm	2017 May 04 17:08 10	
Whiting point	30 - 60cm	5	
	> 60	2	
Field capacity	0 - 30cm	33	
	30 - 60cm	20	
- · · ·	> 60	8	
Saturation	0 - 30cm	53	
	30 - 60cm	49 25	
	> 00	Z J	

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Natural drainage class Depth to impeded layer Maximum rooting depth Top soil horizon chemical and physical paramete ASC/PR Bulk density Clay Sand Sub soil Sub soil clay	cm cm ers % kg/m ³ % %	Well Not entered 88 19 1090 11 37 9
Soil profile Profile drainage class Top soil texture Maximum rooting depth Depth to impeded drainage layer	m	Use default Unknown 0.88 0
Soil drainage Drainage method Method Hydrophobic condition Occurence of pugging damage Compacted top soil Soil settings		None Use default Rare False
K leaching potential not set N immobilisation status		
Soil tests Olsen P QT K QT Ca QT Mg 24 6 8 26 Organic S Anion storage capacity or phosphate retention TBK reserve K test K reserve status	QT Na 5	3 Not entered Not entered Use default
Pasture Pasture type Clover levels		Ryegrass/white clove Use default
Supplements removed Supplement information Conservation type Name Wrapping Supplement amount Number of cuts Area cut taken from Supplement is exported from the farm		Baleage Wrapped in plastic 1 6
Fertiliser application Fertiliser products - September Category Product Amount Soluble fortiliser inputs (kg (ba (month)) - January)	kg/ha	Ballance super Superten 200
Urea N Super P K Sulph 3 1 0 0	nate S Ca 0	Mg Na 0 O
Soluble fertiliser inputs (kg/ha/month) - February Urea N Super P K Sulph 1 0 0 0	/ nate S Ca 0	Mg Na O O
Soluble fertiliser inputs (kg/ha/month) - March Urea N Super P K Sulph 2 1 0 0 Soluble fertiliser inputs (kg/ha/month) - April	ate S Ca 0	Mg Na O O

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Urea N 4	Super P 1	K 0	Sulphate S 0	Ca 0	Mg 0	Na 0	
Soluble fertilis	er inputs (kg/	ha/month) -	May Sulphate S	Ca	Ma	Na	
9 Soluble fertilis	2 er inputs (ka/	0 ha/month) -	0 June	0	0	0	
Urea N	Super P	K	Sulphate S	Ca	Mg	Na	
Soluble fertilis	er inputs (kg/	ha/month) -	August	0	0	U NI-	
Urea N 1	Super P	к 0	Sulphate S	Ca O	Mg O	Na 0	
Soluble fertilis	er inputs (kg/	ha/month) -	September				
Urea N 47	Super P 12	К 0	Sulphate S 0	Ca 0	Mg 0	Na 0	
Soluble fertilis	er inputs (kg/	ha/month) -	October				
Urea N 37	Super P 9	K 0	Sulphate S 0	Ca 0	Mg 0	Na 0	
Soluble fertilis	er inputs (kg/	ha/month) -	November				
Urea N 20	Super P	K O	Sulphate S 0	Ca 0	Mg 0	Na 0	
Soluble fertilis	er inputs (ka/	ha/month) -	December				
Urea N	Super P	K	Sulphate S	Ca	Mg	Na	
11	3	0	0	0	0	0	
Irrigation Irrigation syst	em type					Spraylines	
Month: Augus	t						
Application de	pth (mm)			4			
Month: Septer	nber						
Application de Month: Octobe	pth (mm) er			233			
Application de Month: Nover	pth (mm) 1ber			186			
Application de Month: Decerr	pth (mm) ber			101			
Application de	pth (mm)			54			
Application de	y pth (mm)			13			
Month: Februa Application de	ary pth (mm)			5			
Month: March Application de	pth (mm)			12			
Month: April	nth (mm)			22			
Month: May	nth (mm)			47			
Month: June				47			
Application de	pth (mm)			4			
Irrigation conce Source	ntrations					Block specific	
N	Р	К	S	Са	Ma	Na	н
0	0.1	0	0	0	0	0	0
Animals on bloc Ratio and type Animals grazir	k e of stock base	d on whole	farm values du	e to this op	tion being s	selected on block	set up
Beef / dairy Block intensi	grazing itv			%		0	
Finishing b	eef					False	
Direct acce Animal grazi	ess to streams					False	

Beef / dairy grazing graze block all year round

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Effluent application Receives no liquid or solid effluents		
Block - Irr_NE_Darn_17a.1		
Block name		Irr_NE_Darn_17a.1
Block type		Pastoral
Area	ha	19
Relative productivity		0
Pasture block type		No
Topography		Flat
Distance from coast	km	37
Cultivated in last 5 years		False
Fodder rotates through		No
Climate		
Annual average rainfall	mm/yr	1153
Mean annual temperature		12.8
Seasonal variation in rainfall		731-1450 mm, Moderate
Annual potential evapotranspiration	mm	866
Seasonal variation in PET		Moderate
Soil description		
Soil order (default)		Pallic
Soil group (default)		Recent/YGE/BGE
SMaps		
Sibling		Darn_17a.1
Date downloaded		2017 May 05 08:07
Wilting point	0 - 30cm	9
	30 - 60cm	7
	> 60	3
Field capacity	0 - 30cm	17
	30 - 60cm	11
	> 60	5
Saturation	0 - 30cm	26
	30 - 60cm	18
	> 60	15
Natural drainage class		Moderately well
Depth to impeded layer	cm	Not entered
Maximum rooting depth	cm	Not entered
Top soil horizon chemical and physical parameters		
ASC/PR	%	19
Bulk density	kg/m³	1220
Clay	%	25
Sand	%	20
Sub soil		
Sub soil clay	%	27
Soil profile		
Profile drainage class		Use default
Top soil texture		Unknown
Maximum rooting depth	m	0
Depth to impeded drainage layer		0
Soil drainage		
Drainage method		
Method		None
Hydrophobic condition		Use default
Occurence of pugging damage		Rare
Compacted top soil		False
Soil settings		
K leaching (%s)		Medium
N immobilisation status		

Soil tests

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters

Olsen P 24 Organia S	QТ К 9	QT Ca 13	QT Mg 38	QT Na 8		4
Anion storage TBK reserve k K reserve stat	e capacity or pl K test tus	nosphate rete	ention			4 Not entered Not entered Use default
<i>Pasture</i> Pasture type Clover levels						Ryegrass/white clover Use default
Supplements re Supplement in Conservatio	emoved nformation n type					Baleage
Wrapping Supplement Number of Area cut to	amount f cuts aken from					Wrapped in plastic 1 19
Supplement is	s exported from	n the farm				
Fertiliser applica Fertiliser prod	<i>ation</i> lucts - Septem	ber				
Product Amount				kg/ha		Superten 200
Soluble fertilis	ser inputs (kg/	ha/month) -	January	Ca	Ma	Na
3	1	0	0	0	0	0
Soluble fertilis	ser inputs (kg/	ha/month) -	February	6	Ma	No
1	0	к 0	0	0	1∾ig 0	0
Soluble fertilis	ser inputs (kg/	ha/month) -	March			
Urea N	Super P	K	Sulphate S	Ca	Mg	Na
Z Soluble fertilis	ser inputs (ka/	ha/month) -	April	0	0	0
Urea N	Super P	K	Sulphate S	Ca	Mg	Na
4	1	0	0	0	0	0
Soluble fertilis	Super P	ha/month) -	May Sulphate S	Ca	Ма	Na
9	2	0	0	0	0	0
Soluble fertilis	ser inputs (kg/	ha/month) -	June	-		
Urea N 1	Super P	K O	Sulphate S	Ca	Mg 0	Na
Soluble fertilis	ser inputs (kg/	ha/month) -	August	0	Ū	0
Urea N	Super P	K	Sulphate S	Ca	Mg	Na
1 Soluble fertilis	0 ser inputs (ka)	() (ha/month) -	() Sentember	0	0	0
Urea N	Super P	K	Sulphate S	Ca	Mg	Na
47	12	0	0	0	0	0
Soluble fertilis	ser inputs (kg/	ha/month) -	October	Ca	Ma	No
37	9	0		0	l™ig 0	0
Soluble fertilis	ser inputs (kg/	ha/month) -	November	-	-	-
Urea N	Super P	K	Sulphate S	Ca	Mg	Na
20 Soluble fertilis	5 ser innuts (ka/	U 'ha/month) -	U December	0	0	0
Urea N	Super P	K	Sulphate S	Ca	Mg	Na
11	3	0	0	0	0	0
Irrigation	tem type					Spravlines
Month: Augus	st					
Application de Month: Septe	epth (mm) mber			4		



South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Applicatio	n depth (mm)			233			
Month: Oc	ctober			100			
Applicatio	n deptn (mm)			186			
Applicatio	n depth (mm)			101			
Month: De	ecember						
Applicatio	n depth (mm)			54			
Month: Ja	nuary n donth (mm)			12			
Month: Fe	bruary			15			
Applicatio	n depth (mm)			5			
Month: Ma	arch						
Applicatio	n depth (mm)			12			
Month: Ap	Dril n donth (mm)			22			
Month: Ma	av			22			
Applicatio	n depth (mm)			47			
Month: Ju	ne						
Applicatio	n depth (mm)			4			
Irrigation co	oncentrations						
Source						Block specific	
N	Р	К	S	Ca	Mg	Na	Н
0	0.1	0	0	0	0	0	0
Animals on Ratio and Animals g	<i>block</i> type of stock ba razing	ased on who	ole farm value	s due to this opt	ion beir	g selected on block	k set up
Block in	airy grazing tensity			90		0	
Finishi	ng beef					False	
Water co	onnectivity						
Direct	access to stream	ms				False	
Animal <u>o</u> Beef /	grazing dairy grazing g	raze block a	ll year round				
Effluent app Receives i	<i>olication</i> no liquid or solic	l effluents					
Block - Trr I	Mid Darn 17a	1					
Block name	nu_Dani_17a					Irr Mid Darn 17a	.1
Block type						Pastoral	
Area				ha		14.9	
Relative pro	oductivity					0	
Topography	ск туре					res Flat	
Distance fro	om coast			km		37	
Cultivated in	n last 5 years					False	
Fodder rota	tes through					Yes	
Climate							
Annual av	erage rainfall			mm/yr		1153	
Mean ann	ual temperature	2				12.8	
Seasonal	variation in rain	fall				731-1450 mm, N	Moderate
Seasonal	variation in PFT	Inspiration		IIIII		800 Moderate	
Scasonal	Variation in L					hoderate	
Soil descrip	tion						
Soil order	(default)					Pallic	-
Son group	(uerauit)					Recent/ I GE/ BGE	-
Sibling						Darn_17a.1	
Date do	wnloaded					2017 May 05 0)8:07
Wilting p	point			0 - 30cm		9	
				30 - 60cr	11	/	

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Field capacit	Ţ			> 6 0 - 30 -	0 30cm - 60cm		3 17 11
Saturation				> 6 0 - 30 · > 6	0 30cm - 60cm 0		5 26 18 15
Natural draiı Depth to imı Maximum ro Top soil hori	nage class peded layer ooting depth zon chemical	and physical	parameters	cm cm			Moderately well Not entered Not entered
ASC/PR Bulk densi Clay Sand	ty			% k <u>c</u> %	9 g/m ³ 9		19 1220 25 20
Sub soil Sub soil cl	ау			%)		27
Soil profile Profile drainag Top soil textur Maximum root Depth to impe	ge class re ting depth eded drainage	e layer		m		L L 0 0	lse default Inknown
Soil drainage Drainage meth Method Hydrophobic con Occurence of pu	hod ndition Igging damag	je				Use Rai	None e default re
Compacted top Soil settings K leaching pot N immobilisati	soil cential not se ion status	t				Fal	se
<i>Soil tests</i> Olsen P 24	QТ К 6	QT Ca 8	QT Mg 26	QT Na 5	a		
Organic S Anion storage TBK reserve K K reserve stat	capacity or p test us	bhosphate rete	ention			3 N N U	lot entered lot entered lse default
<i>Pasture</i> Pasture type Clover levels						R	yegrass/white clover Ise default
Supplements re Supplement in Conservation	<i>moved</i> nformation n type						Baleage
Name Wrapping	amount						Wrapped in plastic
Number of Area cut ta Supplement is	cuts ken from exported fro	om the farm					1 14.9
<i>Fertiliser applica</i> Fertiliser prod Category	ation ucts - Septer	nber					Ballance super
Product Amount	or incut- /l	(hp/manth)	lanuari	kg/	ha		Superten 200
Urea N 3	Super P 1	K 0	Sulphate S	Ca 0		Mg 0	Na 0

South Waiarapa District Council

Lowe Environmental Impact

Client reference:

Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



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Soluble fertilise Urea N	er inputs (kg/ Super P	ha/month) - K	- February Sulphate S	Са	Mg	Na	
1 Soluble fertilise	0 er innuts (ka/	0 'ha/month) -	0 - March	0	0	0	
Urea N	Super P	K	Sulphate S	Са	Mq	Na	
2	1	0	0	0	ວ້	0	
Soluble fertilise	er inputs (kg/	ha/month) -	April	_			
Urea N	Super P	ĸ	Sulphate S	Ca	Mg	Na	
4 Soluble fortilier	L ar inpute (kg/	U (ha/month)	U	0	0	0	
Urea N	Super P	K	Sulnhate S	Ca	Ма	Na	
9	2	0	0	0	0	0	
Soluble fertilise	er inputs (kg/	ha/month) -	June				
Urea N	Super P	K	Sulphate S	Ca	Mg	Na	
1	0	0	0	0	0	0	
Soluble fertilise	er inputs (kg/	ha/month) -	- August	6-	N4	N-	
Urea N	Super P	ĸ	Sulphate S	Ca	Mg	ina o	
Soluble fertilise	o er innuts (ka/	ba/month) -	- Sentember	0	0	0	
Urea N	Super P	K	Sulphate S	Са	Ma	Na	
47	12	0	0	0	0	0	
Soluble fertilise	er inputs (kg/	ha/month) -	- October				
Urea N	Super P	K	Sulphate S	Ca	Mg	Na	
37	9	0	0	0	0	0	
Soluble fertilise	er inputs (kg/	ha/month) -	November	-		•	
Urea N	Super P	ĸ	Sulphate S	Ca	Mg	Na	
20 Soluble fertilise	J er innuts (ka/	U ha/month) -	- December	0	0	0	
Urea N	Super P	K	Sulphate S	Са	Ma	Na	
11	3	0	0	0	0	0	
-							
Irrigation	m tuno					Coroulines	
Irrigation syste	em type					Spraylines	
Application der	oth (mm)			4			
Month: Septen	hber						
Application dep	oth (mm)			233			
Month: Octobe	r						
Application dep	oth (mm)			186			
Month: Novem	ber						
Application dep	oth (mm)			101			
Application der	oth (mm)			54			
Month: Januar	v			54			
Application dep	, oth (mm)			13			
Month: Februa	ry						
Application dep	oth (mm)			5			
Month: March							
Application dep	oth (mm)			12			
Month: April Application dor	th (mm)			22			
				22			
Application der	oth (mm)			47			
Month: June							
Application dep	oth (mm)			4			
Irrigation concor	trations						
Source						Block specific	
)	К	S	Са	Mg	Na	Н
N F					-		0
N F O C).1	0	0	0	0	0	0

Animals grazing Beef / dairy grazing

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Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Block intensity Finishing beef Water connectivity		False
Direct access to streams Animal grazing Beef / dairy grazing graze block all year round		False
Effluent application Receives no liquid or solid effluents		
Block - Irr_Darn_9a.1		Irr Darp 9a 1
Block type		Pastoral
Area	ha	4.3
Relative productivity		0
Pasture block type		No
Distance from coast	km	37
Cultivated in last 5 years		False
Fodder rotates through		No
Climate		
Annual average rainfall	mm/yr	1153
Mean annual temperature		12.8
Seasonal variation in rainfall		731-1450 mm, Moderate
Seasonal variation in PET	mm	800 Moderate
		i louci acc
Soil description		Dallia
Soil group (default)		Recent/YGE/BGE
SMaps		
Sibling		Darn_9a.1
Date downloaded	0 00	2017 May 05 10:33
Wilting point	0 - 30cm	11
	> 60	6
Field capacity	0 - 30cm	23
	30 - 60cm	12
	> 60	9
Saturation	0 - 30cm 30 - 60cm	30 17
	> 60	15
Natural drainage class		Moderately well
Depth to impeded layer	cm	Not entered
Maximum rooting depth	cm	80
ASC/PR	%	19
Bulk density	kg/m³	1220
Clay	%	20
Sand	%	15
Sub soil clay	%	28
Sub Son Clay	,,,	20
Soil profile		
Profile drainage class		Use default
Maximum rooting depth	m	0.8
Depth to impeded drainage layer		0
Soil drainago		
Son urainage Drainage method		
Method		None
Hydrophobic condition		Use default
Occurence of pugging damage		Rare

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1 FarmParameters



Compacted top soil	False
<i>Soil settings</i> K leaching (%s) N immobilisation status	Medium
Soil tests Olsen P QT K QT Ca QT Mg 32 4 15 20 Organic S Anion storage capacity or phosphate retention TBK reserve K test K reserve status	QT Na 5 6 Not entered Not entered Use default
Pasture Pasture type Clover levels	Ryegrass/white clover Use default
Supplements removed No supplements removed from this block	
Fertiliser application Fertiliser products - September Category Product Amount Soluble fortiliser inputs (kg/ba/month) - January	Ballance super Superten kg/ha 200
Urea N Super P K Sulph 4 1 0 0	ate S Ca Mg Na 0 0 0
Soluble fertiliser inputs (kg/ha/month) - February Urea N Super P K Sulph 3 1 0 0 Soluble fertiliser inputs (kg/ha/month) - March	ate S Ca Mg Na 0 0 0
Urea N Super P K Sulph 5 1 0 0 Soluble fertiliser inputs (kg/ha/month) - April	ate S Ca Mg Na 0 0 0
Urea N Super P K Sulph 6 2 0 0 Soluble fertiliser inputs (kg/ha/month) - May	ate S Ca Mg Na 0 0 0
10 3 0 0 Soluble fertiliser inputs (kg/ha/month) - Septemb	er Ca Mg Na 0 0 0 Per
Urea N Super P K Sulph 20 5 0 0 Soluble fertiliser inputs (kg/ha/month) - October	ate S Ca Mg Na 0 0 0
Urea N Super P K Sulph 17 4 0 0 Soluble fertiliser inputs (kg/ha/month) - Novembe	ate S Ca Mg Na 0 0 0 er
Urea N Super P K Sulph 12 3 0 0 Soluble fertiliser inputs (kg/ba/month) - Decembe	ateSCa Mg Na 0 0 0 er
Urea N Super P K Sulph 7 2 0 0	ate S Ca Mg Na 0 0 0
Irrigation Irrigation system type	Spraylines
Month: July Application depth (mm) Month: September	2
Application depth (mm) Month: October	98
Application depth (mm) Month: November Application depth (mm)	83
Month: December	50

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Applicatio	n depth (mm)			36			
Month: Ja Applicatio	nuary n depth (mm)			18			
Month: Fe	bruary			14			
Month: Ma	arch			14			
Applicatio Month: Ap	n depth (mm) oril			24			
Applicatio	n depth (mm)			32			
Applicatio	n depth (mm)			50			
Irrigation co	oncentrations						
Source						Block specific	
N	Р	K	S	Са	Mg	Na	Н
0	0.1	0	0	0	ວັ	0	0
Animals on	block						
Ratio and	type of stock	based on who	ole farm value	es due to this op	tion being	selected on block	set up
Animals g	razing						
Beef / d	airy grazing			%		0	
Finishi	ng beef					False	
Water co Direct	onnectivity access to stre	ams				False	
Animal o	orazing						
Beef /	dairy grazing	graze block a	ll year round				
Effluent app	olication						
Receives r	no liquid or so	lid effluents					
Block - Irr	Rang 18b.1						
Block name	-					Irr Rang 18b.1	
Block type						Pastoral	
Aroa				ha			
Rolativo pro	ductivity			na		50. -	
	ск туре						
Topography						Flat	
Distance fro	om coast			km		37	
Cultivated in	n last 5 years					False	
Fodder rota	tes through					No	
Climate				,		1150	
Annual av	erage rainfall			mm/yr		1153	
Mean ann	uai temperatu	re				12.8	4
Seasonal	variation in ra					731-1450 mm, r	loderate
Annual po	tential evapot	ranspiration		mm		866	
Seasonal	variation in PE	:1				Moderate	
Soil descrip	tion						
Soil order	(default)					Recent	
Soil group	(default)					Recent/YGE/BGE	
SMaps	· · ·						
Siblina						Rang 18b.1	
Date do	wnloaded					2017 May 05 1	0:34
Wilting r	point			0 - 30cm	n	2	
				30 - 600	m	1	
				> 60		1	
Field car	pacity			0 - 30cm	n	- 8	
				30 - 600	m	5	
				> 60		5	
Saturati	on			0 - 30cm	n	23	
Saturati	~~~			30 - 600	m	19	
				50 50C		19	
Natural	drainage class			2 00		Well	
natural	aramaye cidoo					W CII	

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Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Depth to imp Maximum roo Top soil horiz ASC/PR Bulk densit Clay Sand Sub soil Sub soil cla	eded layer oting depth con chemical y y	and physical	parameters	cm cm kg/m³ % %	N 6	lot entered 5 19 1180 5 72 2
Soil profile Profile drainag Top soil textur Maximum root Depth to impe	e class e ing depth ded drainage	layer		m	Us Un 0.6 0	e default known 55
Soil drainage Drainage meth Method Hydrophobic cor Occurence of pu Compacted top s	od Idition gging damag soil	e			N Use Rare False	lone default e
<i>Soil settings</i> K leaching pote N immobilisation	ential not set on status					
Soil tests Olsen P (32 4 Organic S Anion storage TBK reserve K K reserve state	QT K 4 capacity or p test Js	QT Ca 15 hosphate rete	QT Mg 20 ention	QT Na 5	6 No No Use	t entered t entered e default
<i>Pasture</i> Pasture type Clover levels					Ry Use	egrass/white clover e default
Supplements rei No supplement	<i>moved</i> ts removed fr	om this block	:			
Fertiliser applica Fertiliser produ Category Product Amount Soluble fortilise	tion Icts - Septem	iber	lanuary	kg/ha	B S 2	allance super uperten 00
Urea N	Super P	K	Sulphate S	Ca	Mg	Na
4 Soluble fertilis Urea N 3	I er inputs (kg/ Super P 1	0 /ha/month) - K 0	0 February Sulphate S 0	U Ca O	U Mg O	0 Na 0
Urea N 5 Soluble fertilis	Super P 1 2 Super P	K 0 /ha/month) -	Sulphate S 0 April	Ca 0	Mg 0	Na 0
Urea N	Super P	K	Sulphate S	Ca	Mg	Na
6 Soluble fertilis	2 er inputs (kg/	0 /ha/month) -	0 May	0	0	U
Urea N 10	Super P	K O	Sulphate S	Ca 0	Mg 0	Na 0
Soluble fertilise Urea N 20	er inputs (kg/ Super P 5	/ha/month) - K 0	September Sulphate S 0	Ca 0	Mg 0	Na O

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Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Soluble fertilis	er inputs (kg	/ha/month)	- October				
Urea N	Super P	K	Sulphate S	Ca	Mg	Na	
17	4	0	0	0	0	0	
Soluble fertilis	er inputs (kg	/ha/month)	- November	C -	M	N-	
Urea N	Super P	K O	Sulphate S	Ca	Mg	Na O	
Soluble fertilis	er innuts (ka	/ha/month)	- December	0	0	0	
Urea N	Super P	K	Sulphate S	Са	Ma	Na	
7	2	0	0	0	0	0	
Irrigation							
Irrigation syste	em type					Spraylines	
Application do	nth (mm)			1			
Month: Novem	ber			7			
Application de	oth (mm)			58			
Month: Octobe	er						
Application de	pth (mm)			83			
Month: Septer	nber						
Application de	pth (mm)			98			
Month: Decem	iber			26			
Application de	ptn (mm)			36			
	y nth (mm)			18			
Month: Februa	irv			10			
Application de	pth (mm)			14			
Month: March							
Application de	pth (mm)			24			
Month: April							
Application de	pth (mm)			32			
Month: May	oth (mm)			50			
Application de	pui (iiiii)			30			
Irrigation concer	ntrations						
Source						Block specific	
N	P	K	S	Са	Mg	Na	Н
0	0.1	0	0	0	0	0	0
Animals on bloci	k						
Ratio and type	of stock bas	ed on whole	farm values due	e to this option	being	selected on block s	set up
Animals grazin	ig						
Beef / dairy	grazing			%		0	
Block intensi	ty						
Finishing b	eer					False	
Direct acce	clivily	c				Falco	
Animal grazi	na	5				1 0150	
Beef / dair	y grazing gra	ze block all	/ear round				
Effluent applicat	ion	- CC					
Receives no lic	quia or solia e	emuents					
Block - Irr_E_Da	arn_17a.1						
Block name	_				I	rr_E_Darn_17a.1	
Block type					F	Pastoral	
Area			h	a]	12.8	
Relative product	lvity				()	
	no .				r F	NU -1-+	
Innoaranny	ре					lar	
Distance from co	pe		Ŀ	m	1	-lat 37	
Distance from co Cultivated in las	pe past t 5 years		k	m	F	at 37 False	
Distance from co Cultivated in las Fodder rotates t	pe bast t 5 years hrough		k	m	r 3 F N	Tat 37 False No	
Distance from co Cultivated in las Fodder rotates t	pe bast t 5 years hrough		k	m	F	Tat 37 False No	
Distance from co Cultivated in las Fodder rotates t	pe bast t 5 years hrough		k	mm (vr	F	Tat 37 False No	
Distance from co Cultivated in las Fodder rotates t Climate Annual averag	pe bast t 5 years hrough e rainfall		k	mm/yr	F G F N	Tat 37 False No 1153	

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Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Mean annual temperatu Seasonal variation in ra Annual potential evapo Seasonal variation in Pl	ure ainfall transpiration ET		mm	12.8 731-1450 mm, Moderate 866 Moderate
Soil description Soil order (default) Soil group (default) SMaps				Pallic Recent/YGE/BGE
Sibling Date downloaded Wilting point			0 - 30cm	Darn_17a.1 2017 May 05 08:07 9
Field capacity			30 - 60cm > 60 0 - 30cm 30 - 60cm > 60	7 3 17 11 5
Saturation			0 - 30cm 30 - 60cm	26 18
Natural drainage class Depth to impeded lay Maximum rooting dep Top soil horizon chem ASC/PR Bulk density Clay Sand	s er oth nical and physic	cal parameters	> 60 cm cm kg/m ³ %	15 Moderately well Not entered Not entered 19 1220 25 20
Sub soil Sub soil clay			%	27
Soil profile Profile drainage class Top soil texture Maximum rooting depth Depth to impeded drain	n nage layer		m	Use default Unknown 0 0
Soil drainage Drainage method Method Hydrophobic condition Occurence of pugging da Compacted top soil	mage			None Use default Rare False
Soil settings K leaching (%s) N immobilisation status				Medium
Soil tests Olsen P QT K 24 9 Organic S Anion storage capacity TBK reserve K test K reserve status	QT Ca 13 or phosphate r	QT Mg 38 retention	QT Na 8	4 Not entered Not entered Use default
<i>Pasture</i> Pasture type Clover levels				Ryegrass/white clover Use default
Supplements removed No supplements remove	ed from this bl	ock		
Fertiliser application Fertiliser products - Sep Category	ptember			Ballance super

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Product Amount	/ /			kg/ha		Supert 200	en	
Soluble fertilis Urea N 4 Soluble fortilis	Ser inputs (kg/ Super P 1	ha/month) - K 0	January Sulphate S 0	Ca 0	Mg 0		Na 0	
Urea N 3	Super P	K 0	Sulphate S	Ca 0	Mg 0		Na 0	
Urea N	Super P	ha/month) - K 0	March Sulphate S 0	Ca 0	Mg 0		Na 0	
Soluble fertilis Urea N 6	ser inputs (kg/ Super P 2	ha/month) - K 0	April Sulphate S 0	Ca 0	Mg 0		Na 0	
Soluble fertilis Urea N 10	ser inputs (kg/ Super P 3	ha/month) - K 0	May Sulphate S	Ca 0	Mg 0		Na 0	
Soluble fertilis Urea N 20	ser inputs (kg/ Super P 5	ha/month) - K 0	September Sulphate S 0	Ca 0	Mg 0		Na 0	
Soluble fertilis Urea N 17	ser inputs (kg/ Super P 4	ha/month) - K 0	October Sulphate S 0	Ca 0	Mg 0		Na 0	
Soluble fertilis Urea N 12	ser inputs (kg/ Super P 3	ha/month) - K 0	November Sulphate S 0	Ca 0	Mg 0		Na 0	
Soluble fertilis Urea N 7	ser inputs (kg/ Super P 2	ha/month) - K 0	December Sulphate S 0	Ca 0	Mg 0		Na 0	
Irrigation Irrigation syst	em type					Spraylin	es	
Application de	pth (mm)			2				
Month: Septe Application de	mber pth (mm)			98				
Month: Octob Application de Month: Nover	er pth (mm) ober			86				
Application de	pth (mm)			58				
Application de	epth (mm)			36				
Application de	pth (mm)			18				
Application de	epth (mm)			14				
Application de	epth (mm)			24				
Application de	epth (mm)			32				
Application de	epth (mm)			50				
Irrigation conce Source	ntrations	14	6	6		Block sp	ecific	
0	0.1	к 0	0	0	Mg 0	0	la	н 0
Animals on bloc Ratio and typ Animals grazi	k e of stock base ng	ed on whole	farm values du	e to this optio	n being	selected	on block se	t up
Beef / dairy Block intens	grazing itv			%		0		
Finishing t Water conne	peef					False	2	

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters

Lowe Environmental Impact



Direct access to streams False Animal grazing Beef / dairy grazing graze block all year round Effluent application Receives no liquid or solid effluents Block - Buf_Darn_17a.1 Buf_Darn_17a.1 Block name Block type Pastoral Area ha 30.9 Relative productivity 0 Pasture block type Yes Topography Flat Distance from coast km 37 Cultivated in last 5 years False Fodder rotates through Yes Climate Annual average rainfall 1153 mm/yr Mean annual temperature 12.8 Seasonal variation in rainfall 731-1450 mm, Moderate Annual potential evapotranspiration mm 866 Seasonal variation in PET Moderate Soil description Soil order (default) Pallic Soil group (default) Recent/YGE/BGE SMaps Siblina Darn_17a.1 Date downloaded 2017 May 05 08:07 Wilting point 0 - 30cm 9 30 - 60cm 7 > 60 3 Field capacity 0 - 30cm 17 30 - 60cm 11 > 60 5 Saturation 0 - 30cm 26 18 30 - 60cm > 60 15 Natural drainage class Moderately well Depth to impeded layer Not entered cm Maximum rooting depth Not entered cm Top soil horizon chemical and physical parameters ASC/PR 19 % Bulk density kg/m³ 1220 Clav % 25 Sand % 20 Sub soil % Sub soil clay 27 Soil profile Profile drainage class Use default Top soil texture Unknown Maximum rooting depth 0 m Depth to impeded drainage layer 0 Soil drainage Drainage method Method None Use default Hydrophobic condition Occurence of pugging damage Rare False Compacted top soil

Soil settings

16:20:06					
South Waiarapa District Council		Lowe Environmental Impact			
Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - cop	by 1				
FarmParameters			OVER		
K leaching potential not set					
N Immobilisation status					
Soil tests Olsen P QT K QT Ca 24 6 8	QT Mg 26	QT Na 5			
Anion storage capacity or phosphate ret TBK reserve K test K reserve status	ention		3 Not entered Not entered Use default		
Pasture Pasture type Clover levels			Ryegrass/white clover Use default		
Supplements removed No supplements removed from this bloc	k				
Fertiliser application Fertiliser products - September Category Product			Ballance super Superten		
Fertiliser products - September Category Product		ky/lla	Ravensdown other Urea		
Amount Irrigation		kg/na	60		
Animals on block Ratio and type of stock based on whole Animals grazing	farm values	due to this optior	n being selected on block set up		
Beef / dairy grazing		%	0		
Block intensity			F -1		
Water connectivity			False		
Direct access to streams Animal grazing Beef / dairy grazing graze block all y	ear round		False		
Effluent application Receives no liquid or solid effluents					
Block - Irr_A_Bram_8a.1					
Block name			Irr_A_Bram_8a.1		
BIOCK TYPE		ha	Pastoral		
Area Relative productivity		na	8		
Pasture block type			No		
Topography			Flat		
Distance from coast		km	37		
Cultivated in last 5 years			False		
Fodder rotates through			No		
Climate					
Annual average rainfall		mm/yr	1153		
Mean annual temperature			12.8		
Seasonal variation in rainfall			731-1450 mm, Moderate		
Annual potential evapotranspiration		mm	866 Madavata		
Seasonal variation in PET			mouerale		

Soil description Soil order (default) Soil group (default)

Recent Recent/YGE/BGE



South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



SMaps Sibling				Bram 8a 1
Date downloaded Wilting point			0 - 30cm	2017 May 04 16:59
Field capacity			30 - 60cm > 60 0 - 30cm 30 - 60cm	17 17 45 39
Saturation			> 60 0 - 30cm 30 - 60cm > 60	39 59 49 48
Natural drainage class Depth to impeded layer Maximum rooting depth Top soil horizon chemical	and physica	l parameters	cm cm	Imperfect Not entered Not entered
ASC/PR Bulk density Clay Sand			% kg/m³ % %	33 1090 19 5
Sub soil Sub soil clay			%	18
Soil profile Profile drainage class Top soil texture Maximum rooting depth Depth to impeded drainage	e layer		m	Use default Unknown 0 0
Soil drainage Drainage method Method Hydrophobic condition Occurence of pugging damag Compacted top soil	je			None Use default Rare False
Soil settings K leaching potential not set N immobilisation status	:			
Soil tests Olsen P QT K 20 4	QT Ca 10	QT Mg 20	QT Na 4	
Organic S Anion storage capacity or p TBK reserve K test K reserve status	hosphate re	tention		3 Not entered Not entered Use default
Pasture Pasture type Clover levels				Ryegrass/white clover Use default
Supplements removed Supplement information Conservation type				Baleage
Wrapping Supplement amount Number of cuts				Wrapped in plastic 3
Supplement is exported fro	om the farm			
Fertiliser products - Septer Category Product	nber			Ballance super Superten

South Waiarapa District Council

Lowe Environmental Impact

Client reference:

Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters

Animal grazing June

July

August



Amount				ka/ba	2	00	
Soluble fertilis	er inputs (kg/	ha/month) -	January	ку/па	2	00	
Urea N	Super P	K	Sulphate S	Ca	Mg	Na	
14 Soluble fertilis	4 er innuts (ka/	0 ha/month) -	0 February	0	0	0	
Urea N	Super P	K	Sulphate S	Са	Mg	Na	
13	3	0	0	0	0	0	
Soluble fertilis	er inputs (kg/	ha/month) -	March	6-	Ма	No	
8	2	к 0	0	0	l™g 0	0	
Soluble fertilis	er inputs (kg/	ha/month) -	April	U U	C C	C C	
Urea N	Super P	K	Sulphate S	Ca	Mg	Na	
2 Soluble fertilis	1 er inputs (ka/	U ha/month) -	0 . May	0	0	0	
Urea N	Super P	K	Sulphate S	Са	Mg	Na	
1	0	0	0	0	0	0	
Soluble fertilis	er inputs (kg/	ha/month) -	September	6-	M -	NI-	
Urea N 3	Super P	K O	Sulphate S	Ca 0	Mg 0	ina 0	
Soluble fertilis	er inputs (kg/	ha/month) -	October	U	Ū	0	
Urea N	Super P	K	Sulphate S	Са	Mg	Na	
6 Solublo fortilic	1 or inputs (ka/	0 ha/month) -	0 November	0	0	0	
Urea N	Super P	K	Sulphate S	Са	Mg	Na	
12	3	0	0	0	ວັ	0	
Soluble fertilis	er inputs (kg/	ha/month) -	December	6-	M -	NI-	
Urea N 13	Super P 3	K O	Sulphate S	Ca 0	Mg 0	ina 0	
15	5	U	0	0	Ū	0	
Irrigation	om tuno				Sor	avlines	
Month: Januar	eni type rv				Shi	ayimes	
Application de	, pth (mm)			72			
Month: Februa	ary						
Application de	pth (mm)			64			
Application de	pth (mm)			40			
Month: April	P ()						
Application de	pth (mm)			12			
Month: Septer	nber			1/			
Month: Octobe	er			14			
Application de	pth (mm)			28			
Month: Nover	iber			FO			
Month: Decem	pun (mm) iber			29			
Application de	pth (mm)			65			
Irrigation conco	ntrations						
Source	nuations				Blo	ck specific	
N	Р	К	S	Ca	Mg	Na	Н
0	0.1	0	0	0	0	0	0
Animals on bloc	k						
Ratio and type	e of stock base	ed on whole	farm values du	ie to this op	otion being sele	cted on block	k set up
Animals grazir	ng Grazing			0/-	0		
Block intensi	grazing ity			70	0		
Finishing b	eef					False	
Water conne	ectivity ss to streams					False	

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True

True

True

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Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Effluent application Receives no liquid or solid effluents		
Block - Buf_Bram_8a.1 Block name		Buf_Bram_8a.1
Block type		Pastoral
Area	ha	5.7
Relative productivity		0
Pasture block type		No
Topography		Flat
Distance from coast	km	37
Cultivated in last 5 years		False
Fodder rotates through		No
Climate		
Annual average rainfall	mm/vr	1153
Mean annual temperature	,,,,	12.8
Seasonal variation in rainfall		731-1450 mm, Moderate
Annual potential evapotranspiration	mm	866
Seasonal variation in PET		Moderate
Soil description Soil order (default)		Recent
Soil group (default)		Recent/YGE/BGE
SMans		Recent, rol, bol
Sibling		Bram 8a 1
Date downloaded		2017 May 04 16:59
Wilting point	0 - 30cm	17
Whiting point	30 - 60cm	17
	> 60	17
Field capacity	0 - 30cm	45
	30 - 60cm	39
	> 60	39
Saturation	0 - 30cm	59
	30 - 60cm	49
	> 60	48
Natural drainage class		Imperfect
Depth to impeded laver	cm	Not entered
Maximum rooting depth	cm	Not entered
Top soil horizon chemical and physical parameters		
ÁSC/PR	%	33
Bulk density	kg/m³	1090
Clay	%	19
Sand	%	5
Sub soil		
Sub soil clay	%	18
Soil profile		
Profile drainage class		Use default
Top soil texture		Unknown
Maximum rooting depth	m	0
Depth to impeded drainage layer		0
Coil drainago		
Soli urainage Drainage method		
Method		None
Hydronbobic condition		
		Rare
Compacted top soil		False
compacted top son		
Soil settings		
K leaching potential not set		
N IMMODILISATION STATUS		

Soil tests

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Olsen P 20 Organic S Anion storag TBK reserve K reserve st	QT K 4 ge capacity or k test catus	QT Ca 10 phosphate re	QT Mg 20 etention	QT Na 4	3 Not entered Not entered Use default						
<i>Pasture</i> Pasture type Clover level	e S				Ryegrass/white clover Use default						
Supplements removed No supplements removed from this block											
Fertiliser appl Fertiliser pro Category Product Amount Fertiliser pro Category Product	<i>ication</i> oducts - Septe oducts - Septe	ember ember		kg/ha	Ballance super Superten 400 Ravensdown other Urea						
Amount Irrigation	entered			kg/ha	60						
Animals on bl Ratio and ty Animals gra Beef / dain Block inter Finishing Water con Direct ac Animal gra Beef / dai	ock vpe of stock ba zing ry grazing nsity g beef nectivity ccess to stread azing airy grazing g	ased on whol ms raze block all	e farm values year round	due to this optio %	n being selected on block set up 0 False False						
<i>Effluent appli</i> Receives no	<i>cation</i> liquid or solic	l effluents									
Block - Buf_T: Block name Block type Area Relative produ Pasture block Topography Distance from Cultivated in I Fodder rotate	ait_42a.1 uctivity type n coast last 5 years s through			ha km	Buf_Tait_42a.1 Pastoral 4 0 No Flat 37 False No						
Climate Annual aver Mean annua Seasonal va Annual pote Seasonal va	rage rainfall al temperature iriation in rain intial evapotra iriation in PET	e fall anspiration		mm/yr mm	1153 12.8 731-1450 mm, Moderate 866 Moderate						
Soil description Soil order (or Soil group (SMaps Sibling Date down Wilting po	on default) default) nloaded int			0 - 30cm	Gley Sedimentary Tait_42a.1 2017 May 04 17:07 15						

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Field capac Saturation	ity		30 - 60cm > 60 0 - 30cm 30 - 60cm > 60 0 - 30cm 30 - 60cm > 60	15 11 44 39 38 56 49	
Natural dra Depth to ir Maximum i Top soil ho	ainage class npeded layer rooting depth rizon chemica	l and physica	cm cm	Poor Not entered Not entered	
ASC/PR Bulk dens Clay Sand	sity			% kg/m³ % %	35 940 24 10
Sub soil Sub soil d	clay			%	24
Soil profile Profile draina Top soil text Maximum ro Depth to imp	age class ure oting depth peded drainage	e layer		m	Use default Unknown 0 0
Soil drainage Drainage me Method Hydrophobic c Occurence of p Compacted top	ethod ondition ougging damag p soil	ge		None Use default Winter False	
<i>Soil settings</i> K leaching po N immobilisa	otential not se Ition status	t			
Soil tests Olsen P 27 Organic S Anion storag TBK reserve K reserve sta	QT K 5 e capacity or r K test atus	QT Ca 10 bhosphate ref	QT Mg 33 tention	QT Na 6	3 Not entered Not entered Use default
<i>Pasture</i> Pasture type Clover levels					Ryegrass/white clover Use default
Supplements r No suppleme	removed ents removed f	from this bloc	:k		
Fertiliser appli Fertiliser pro Category Product Amount	<i>cation</i> ducts - Septer	nber		kg/ha	Ballance super Superten 400
Fertiliser pro Category Product Amount	ducts - Septer	nber		kg/ha	Ravensdown other Urea 60
<i>Irrigation</i> No irrigation	entered				

5

Animals on block

Ratio and type of stock based on whole farm values due to this option being selected on block set up
South Waiarapa District Council

FarmParameters

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1 Lowe Environmental Impact

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Animals grazing		
Beef / dairy grazing	%	0
Block intensity		Falsa
Finishing beer Water connectivity		Faise
Direct access to streams		False
Animal grazing		T disc
Beef / dairy grazing graze block all year round		
Effluent application Receives no liquid or solid effluents		
Block - Buf_Darn_9a.1		
Block name		Buf_Darn_9a.1
Block type		Pastoral
Area Balativa nuo duativita	ha	1.5
Relative productivity		U No
Topography		Flat
Distance from coast	km	37
Cultivated in last 5 years		False
Fodder rotates through		No
Climate		
Annual average rainfall	mm/yr	1153
Mean annual temperature		12.8 721 1450 mm Modorato
Appual potential evanotranspiration	mm	866
Seasonal variation in PET		Moderate
Call description		
Soil description Soil order (default)		Pallic
Soil group (default)		Recent/YGE/BGE
SMaps		
Sibling		Darn 9a.1
Date downloaded		2017 May 05 10:33
Wilting point	0 - 30cm	11
	30 - 60cm	7
	> 60	6
Field capacity	0 - 30CM	23
	> 60	9
Saturation	0 - 30cm	36
	30 - 60cm	17
	> 60	15
Natural drainage class		Moderately well
Depth to impeded layer	cm	Not entered
Maximum rooting depth	cm	80
	0/0	19
Bulk density	ka/m ³	1220
Clay	%	20
Sand	%	15
Sub soil		
Sub soil clay	%	28
Soil profile		
Ton soil texture		Use deradit
Maximum rooting depth	m	0.8
Depth to impeded drainage layer		0
Soil drainage		
Drainage method		
Method		None

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Hydrophobic of Occurence of Compacted to	condition pugging dama p soil	ige			Use default Rare False
<i>Soil settings</i> K leaching (N immobilisa	%s) ation status				Medium
Soil tests Olsen P 32 Organic S Anion storag TBK reserve K reserve st	QT K 4 ge capacity or K test atus	QT Ca 15 phosphate re	QT Mg 20 etention	QT Na 5	6 Not entered Not entered Use default
Pasture Pasture type Clover levels	5				Ryegrass/white clover Use default
Supplements No suppleme	<i>removed</i> ents removed	from this blo	ock		
Fertiliser appli Fertiliser pro Category Product Amount Fertiliser pro Category Product Amount	<i>ication</i> oducts - Septe oducts - Septe	mber mber		kg/ha kg/ha	Ballance super Superten 300 Ravensdown other Urea 60
<i>Irrigation</i> No irrigation	entered				
Animals on blo Ratio and ty Animals gra: Beef / dair Block inter Finishing Water con Direct ac Animal gra Beef / da	ock pe of stock ba zing ny grazing sity beef nectivity ccess to strear azing airy grazing gr	ased on whole ns raze block all	e farm values year round	due to this opt %	ion being selected on block set up 0 False False
<i>Effluent applic</i> Receives no	<i>ation</i> liquid or solid	effluents			
Block - QE2 Block name Block type Area Rainfall Distance from Bush type	coast			ha mm/yr km	QE2 Trees and Scrub 3.6 950 37 Native
Block - Maize Block name Block type Rotation area Low N minera Final grid mor Irrigation syst	lisation ith em type			ha	Maize Fodder Crop 9.7 False April No Irrigation

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-grazed - copy 1 - copy 1

FarmParameters



Crop information

Current assessment year May - Grazed pasture		
lune - Grazed pasture		
July - Grazed pasture		
August - Grazed pasture		
September - Maize silage		
Crop management	See details below	Crop sown
October - Maize silage		
November - Maize silage		
December - Maize silage		
January - Maize silage		
February - Maize silage		
March - Mature - Maize silage		
April - Grazed		
Crop management	See details below	Crop sown
Crop sowing information - September of the Currer	nt assessment vear	
Crop category	,	Forages
Crop type		Maize silage
Yield at final defoliation	T/ha dry matter	19
Cultivation practice at sowing		Minimum till
Crop sowing information - April of the Current asse	ssment vear	
Crop category	ssinche year	Permanent pasture
Crop type		Grazed
Source of animals		Not entered
No fertiliser application applied on block		
Effluent application		

Receives no liquid or solid effluents

South Waiarapa District Council

Farm details

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Type Assessment Region	Farm type Assessment year Region	Full range Not entered Wellington
Farm blocks		
Buf Rang 18b.1	Pastoral	8
Irr Mid Bram 8a.1	Pastoral	4.6
Irr Mid Tait 42a.1	Pastoral	21.3
Buf Selw 25a.1	Pastoral	1.9
Irr E Selw 25a.1	Pastoral	6
Irr_NE_Darn_17a.1	Pastoral	19
Irr_Mid_Darn_17a.1	Pastoral	14.9
Irr_Darn_9a.1	Pastoral	4.3
Irr_Rang_18b.1	Pastoral	30.4
Irr_E_Darn_17a.1	Pastoral	12.8
Buf_Darn_17a.1	Pastoral	30.9
Irr_A_Bram_8a.1	Pastoral	8
Buf_Bram_8a.1	Pastoral	5.7
Buf_Tait_42a.1	Pastoral	4
Buf_Darn_9a.1	Pastoral	1.5
QE2	Trees and Scrub	3.6
Maize	Fodder Crop	
Total farm area declared in blocks	ha	176.9
Total farm area	ha	186
Non-productive area	ha	9.099999999999999

Farm animals

Stock numbers

Stock reconciliati	on - Beef / d	airy grazing												
Calving perce	ntage				%			83						
Percent repla	cements				%			15						
Mean calving	date							Not e	ntere	d				
Mean weaning	a date							Not e	ntere	d				
Weaning weig	iht				ka			80						
Stock numbers	-				5									
Class		Breed	Jul	Auc	a Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Mav	Jun
CowsMixedAg	eBreeding	Friesian	80	80	30	30	30	10	10	10	10	10	10	80
Max weight (kg)	LW start (kg)	LW end (kg)	CW (F	(g)	Age (mont	ths)	Source	Fate		Sex	Mated			
0	0	0	0	_	0	_	_	_	_	Female	No ma	iting		
HeifersBreedi	ng	Friesian	0	0	0	0	0	0	0	0	0	12	12	12
Max weight (kg)	LW start (kg)	LW end (kg)	CW (F	<g)< td=""><td>Age (mont</td><td>ths)</td><td>Source</td><td>Fate</td><td></td><td>Sex</td><td>Mated</td><td>ting</td><td></td><td></td></g)<>	Age (mont	ths)	Source	Fate		Sex	Mated	ting		
HaifarsBraadi	00 ng	Friesian	12	12	, 12	12	12	12	12	12	12	17	12	12
Max weight (kg)	IW start (kg)	IW end (ka)	CW ((a)	Age (mont	tz ths)	Source	Fate	12	Sex	Mated	12	12	12
427	106	270	0	-97	10		On-farm	, atc		Female	No ma	iting		
HeifersBreedi	ng	Friesian	12	12	12	12	12	12	12	12	12	0	0	0
Max weight (kg) 427	LW start (kg) 270	LW end (kg) 389	CW (I 0	<g)< td=""><td>Age (mont 22</td><td>ths)</td><td>Source On-farm</td><td>Fate</td><td></td><td>Sex Female</td><td>Mated No ma</td><td>iting</td><td></td><td></td></g)<>	Age (mont 22	ths)	Source On-farm	Fate		Sex Female	Mated No ma	iting		
Weaners		Friesian	0	0	0	0	0	0	0	0	0	54	54	54
Max weight (kg) 461	LW start (kg) 80	LW end (kg) 109	CW (I 0	kg)	Age (mont 7	ths)	Source Weaned	Fate Rema farm	in on-	Sex MixedSex	Mated			
Weaners		Friesian	54	54	54	54	54	54	54	54	54	0	0	0
Max weight (kg) 461	LW start (kg) 109	LW end (kg) 257	CW (I 0	(g)	Age (mont 10	ths)	Source On-farm	Fate Sold t works	o	Sex MixedSex	Mated			

Stock management

Animal excreta distribution

Relative productivity assessment method

Relative productivity calculated for each Pastoral block

Buf_Rang_18b.1

Relative yield (from soil, fertiliser inputs)

0.843843589901339

South Waiarapa District Council

Lowe Environmental Impact

_ . _

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters

Irr_Mid_Bram_8a.1 Irr_Mid_Tait_42a.1 Buf_Selw_25a.1 Irr_E_Selw_25a.1 Irr_NE_Darn_17a.1 Irr_Mid_Darn_17a.1 Irr_Darn_9a.1 Irr_Rang_18b.1 Irr_E_Darn_17a.1 Buf_Darn_17a.1 Buf_Darn_17a.1 Buf_Bram_8a.1 Buf_Bram_8a.1 Buf_Tait_42a.1 Buf_Darn_9a.1 Ratio of stock types on pastoral blocks is the same as the farm stock ratios

Animal health supplements

Animal - Beef / dairy grazing No animal supplementation has been entered

Left over feeding

No left over feeding specified

Stored supplements

No supplements from storage added to this farm

Imported supplements

No supplements imported onto this farm

Greenhouse gas emission factors

Enteric methane - g methane/kg DMI intake

Dairy		21.6
Dairy replacements		21.6
Sheep		20.9
Beef		21.6
Deer		21.3
Goats		20.9
Camelids		20.9
Young sheep		16.8
Horses	kg methane/RSU	1.8
User defined	kg methane/RSU	1.5

Dung methane - g methane/kg dung

Dairy	0.982
Dairy replacements	0.982
Sheep	0.691
Beef	0.982
Deer	0.915
Goats	0.691
Other	0.691

Nitrous oxide

Use farm specific emission factors

Fuel and electricity

Embodied CO2 emissions		
Diesel	kg CO2 equivalents/litre	2.989
Petrol	kg CO2 equivalents/litre	2.773
Electricity	kg CO2 equivalents/kWh	0.271

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0.836697729890761 0.887771936158874 0.86624922646562 0.910253711118774 0.943874118709781 0.910253718911325 0.866133852197388 0.866133423894164 0.942342634029144 0.927181771522285 0.835983005989411 0.832404538817526 0.88538269396957 0.843844007182234

South Waiarapa District Council

Lowe Environmental Impact

Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Enter actual allocation figures

Energy emissions		
Diesel	MJ / litre	42.24
Petrol	MJ / litre	42.4
Electricity	MJ / kWh	8.21

GWP

Client reference:

Use NZ national inventory

Allocation

Allocation method

Report settings

Greenhouse gas emission report units: Use default Target N application rate as effluent: kg N/ha/yr

Block Information

Block - Buf_Rang_18b.1		
Block name		Buf_Rang_18b.1
Block type		Pastoral
Area	ha	8
Relative productivity		0
Pasture block type		No
Topography		Flat
Distance from coast	km	37
Cultivated in last 5 years		False
Fodder rotates through		No
Climate		
Annual average rainfall	mm/yr	1153
Mean annual temperature	.,	12.8
Seasonal variation in rainfall		731-1450 mm, Moderate
Annual potential evapotranspiration	mm	866
Seasonal variation in PET		Moderate
Soil description		
Soil order (default)		Recent
Soil group (default)		Recent/YGE/BGE
SMaps		
Sibling		Rang 18b.1
Date downloaded		2017 May 04 16:57
Wilting point	0 - 30cm	2
	30 - 60cm	1
	> 60	1
Field canacity	0 - 30cm	8
	30 - 60cm	5
	> 60	5
Saturation	0 = 30 cm	23
Saturation	30 - 60cm	10
		10
Natural drainago class	2 00	Woll
Dopth to impeded layer	cm	Not optorod
Maximum reating donth	cm	AE
Top coil berizon chamical and physical parameters	CIII	05
	0/	10
ASC/PR Bulls density	% ka /m 3	19
Buik density	kg/m ³	1180
Clay	% 0/	5
Sand	%	12
Sub soil	0 /	2
Sud soil clay	%	2
Soil profile		
Profile drainage class		Use derault
l op soll texture		Unknown

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Maximum rooti Depth to impeo	ng depth led drainage	e layer		m	0.65 0
Soil drainage Drainage meth Method Hydrophobic con Occurence of pug Compacted top s	od dition gging damag oil	je			None Use default Rare False
<i>Soil settings</i> K leaching pote N immobilisatio	ential not se on status	t			
Soil tests Olsen P C 32 4 Organic S Anion storage o TBK reserve K K reserve statu	QT K L capacity or p test Is	QT Ca 15 hosphate re	QT Mg 20 tention	QT Na 5	6 Not entered Not entered Use default
<i>Pasture</i> Pasture type Clover levels					Ryegrass/white clover Use default
Supplements ren Supplement inf Conservation Name Wrapping Supplement a Supplement is	noved formation type amount cuts exported frc	m the farm			Baleage Wrapped in plastic 1
Fertiliser applicat Fertiliser produ Category Product Amount Fertiliser produ	tion Icts - Septer Icts - Septer	nber		kg/ha	Ballance super Superten 300
Category Product Amount Fertiliser produ	cts - Nover	ber		kg/ha	Ravensdown other Urea 60
Category Product Amount Fertiliser produ	icts - April			kg/ha	Ravensdown other Urea 60
Category Product Amount				kg/ha	Ravensdown other Urea 60
<i>Irrigation</i> No irrigation er	ntered				
Animals on block Ratio and type	of stock bas	ed on whole	farm values d	ue to this optior	n being selected on block set up
Beef / dairy g	y Jrazing			%	0
Block intensit Finishing be	ef				False
Water connec Direct acces	ctivity ss to stream	S			False
Animal grazir Beef / dairy	ng v grazing gra	ze block all	year round		

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Effluent application Receives no liquid or solid effluents		
Block - Irr_Mid_Bram_8a.1 Block name		Irr_Mid_Bram_8a.1
Вюск туре	h -	Pastoral
Area Bolativo productivity	na	4.0
Relative productivity		U
Tanagraphy		NO Elat
Distance from coast	km	
Cultivated in last 5 years	KIII	57 Falco
Enddor rotatos through		Palse
Fodder Totates through		NO
Climate		
Annual average rainfall	mm/yr	1153
Mean annual temperature	.,	12.8
Seasonal variation in rainfall		731-1450 mm, Moderate
Annual potential evapotranspiration	mm	866
Seasonal variation in PET		Moderate
Soil description		
Soil order (default)		Recent
Soil group (default)		Recent/YGE/BGE
SMaps		
Sibling		Bram_8a.1
Date downloaded		2017 May 04 16:59
Wilting point	0 - 30cm	17
	30 - 60cm	17
	> 60	1/
Field capacity	0 - 30cm	45
	30 - 60cm	39
	> 60	39
Saturation	0 - 30cm	59
	30 - 60cm	49
	> 60	48 Trans aufo at
Natural drainage class		Imperiect
Depth to impeded layer	CIII	Not entered
Maximum rooting depth	CIII	Not entered
	0/	22
ASC/PR Bulk donsity	70 kg/m3	1000
Clay	Kg/111°	1090
Clay	-70	19
Sub soil	70	5
Sub soil clay	0/0	18
	70	10
Soil profile		
Profile drainage class		Use default
Top soil texture		Unknown
Maximum rooting depth	m	0
Depth to impeded drainage layer		0
Soil drainage		
Drainage method		
Method		None
Hydrophobic condition		lise default
Occurence of pugging damage		Rare
Compacted top soil		False
		i disc
Soil settings		
K leaching potential not set		
N immobilisation status		

Soil tests

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters

Olsen P 20	QT K 4	QT Ca 10	QT Mg 20	QT Na 4		
Organic S Anion storage TBK reserve I K reserve sta	e capacity or p K test tus	hosphate rete	ention			3 Not entered Not entered Use default
<i>Pasture</i> Pasture type Clover levels						Ryegrass/white clover Use default
Supplements re Supplement i Conservatio	emoved nformation					Baleage
Name	, in cype					Wrapped in plastic
Supplement Number o Supplement i	t amount f cuts s exported fro	m the farm				4
Fertiliser applic	ation					
Fertiliser proc Category Product	lucts - Septen	nber				Ballance super Superten
Amount Soluble fertili	ser inputs (kg	/ha/month) -	January	kg/ha		400
Urea N 4	Super P 1	K 0	Sulphate S	Ca 0	Mg 0	Na O
Urea N	Super P	/na/month) - K	Sulphate S	Ca	Mg	Na
3 Soluble fertili	1 ser inputs (kg	0 /ha/month) -	0 March	0	0	0
Urea N 5	Super P	K	Sulphate S	Ca 0	Mg 0	Na 0
Soluble fertili	ser inputs (kg	/ha/month) -	April		Ū	Ū
Urea N 6	Super P 2	K 0	Sulphate S 0	Ca 0	Mg 0	Na 0
Soluble fertili	ser inputs (kg	/ha/month) -	Мау			
Urea N	Super P	K O	Sulphate S	Ca 0	Mg 0	Na
Soluble fertili	ser inputs (kg	/ha/month) -	September	0	0	0
Urea N	Super P	K	Sulphate S	Ca	Mg	Na
20 Soluble fertili	5 ser inputs (ka	/ha/month) -	0 October	0	0	0
Urea N	Super P	K	Sulphate S	Ca	Mg	Na
17	4	0	0	0	0	0
Urea N	Super P	/na/montn) - K	Sulphate S	Ca	Ма	Na
12	3	0	0	0	0	0
Soluble fertili Urea N	ser inputs (kg Super P	/ha/month) - K	December Sulphate S	Ca	Mg	Na
7 Fertiliser proc	ے ducts - Octobe	U er	0	0	0	U
Category						Ballance other
Amount				ka/ha		N-rich urea
Fertiliser prod	ducts - Decem	ber		kg/na		00
Category						Ballance other
Product Amount				ka/ha		N-rich urea
Fertiliser prod	ducts - March			Ng/ Hu		
Category						Ballance other
Product				ka/ba		N-rich urea
Fertiliser prod	ducts - Septen	nber		Ky/IId		00
		-				

South Waiarapa District Council

Client reference:

Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Category Product Amount	/			ku/ba		Ballance other N-rich urea 80	
Fertiliser p	oroducts - Nove	mber		Kg/ Hu		Dellenes ether	
Product	/					N-rich urea	-
Amount Fertiliser n	products - Febru	larv		kg/ha		80	
Category	/	,				Ballance other	
Product Amount				kg/ha		N-rich urea 80	
Irrigation							
Irrigation s	system type					Spraylines	
Application	n depth (mm)			18			
Month: Fel Application	bruary 1 depth (mm)			14			
Month: Ma	arch			24			
Month: Ap	ril			24			
Application	n depth (mm)			32			
Application	n depth (mm)			50			
Applicatior	n depth (mm)			2			
Month: Se	ptember depth (mm)			98			
Month: Oc	tober						
Application Month: No	vember			83			
Application	n depth (mm)			58			
Application	n depth (mm)			36			
Irrigation co	ncentrations						
Source N	Р	к	S	Ca	Ma	Block specific Na	Н
0	0.1	0	0	0	ວັ	0	0
Animals on I	block		ubala farma value	a dua ta thia i	ntion hoing	a classed on black	
Animals gr	azing	ised on v			priori beirig	Selected off block	k set up
Beef / da Block int	airy grazing ensity			%		0	
Finishi	ng beef					False	
Direct	access to stream	ms				False	
Animal g June	Irazing					True	
July						True	
August						Irue	
<i>Effluent app</i> Receives n	<i>lication</i> no liquid or solic	l effluent	S				
Block - Irr_N	1id_Tait_42a.	1					
Block name Block type]	Irr_Mid_Fait_42a. Pastoral	.1
Area				ha		21.3	
Relative pro Pasture bloc	auctivity k type) 1	J No	
Topography	maaat			lum	I	Flat	
Cultivated in	ni coast 1 last 5 vears			кШ	-	alse	

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



No Fodder rotates through Climate Annual average rainfall mm/yr 1153 Mean annual temperature 12.8 Seasonal variation in rainfall 731-1450 mm, Moderate Annual potential evapotranspiration 866 mm Seasonal variation in PET Moderate Soil description Soil order (default) Gley Soil group (default) Sedimentary SMaps Sibling Tait 42a.1 Date downloaded 2017 May 04 17:07 Wilting point 0 - 30cm 15 30 - 60cm 15 > 60 11 Field capacity 0 - 30cm 44 30 - 60cm 39 > 60 38 Saturation 0 - 30cm 56 30 - 60cm 49 > 60 47 Natural drainage class Poor Depth to impeded layer cm Not entered Maximum rooting depth Not entered cm Top soil horizon chemical and physical parameters ASC/PR % 35 940 Bulk density kg/m³ 24 Clay % Sand % 10 Sub soil % Sub soil clay 24 Soil profile Profile drainage class Use default Top soil texture Unknown Maximum rooting depth 0 m Depth to impeded drainage layer 0 Soil drainage Drainage method Method None Hydrophobic condition Use default Occurence of pugging damage Winter Compacted top soil False Soil settings K leaching potential not set N immobilisation status Soil tests QT K QT Mg QT Na Olsen P QT Ca 27 5 10 33 6 3 Organic S Anion storage capacity or phosphate retention Not entered TBK reserve K test Not entered Use default K reserve status Pasture Pasture type Ryegrass/white clover Clover levels Use default Supplements removed

Supplement information

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Conservation type Baleage Name Wrapping Wrapped in plastic Supplement amount Number of cuts 4 Supplement is exported from the farm Fertiliser application Fertiliser products - September Category Ballance super Product Superten Amount kg/ha 400 Soluble fertiliser inputs (kg/ha/month) - January Urea N Super P Κ Sulphate S Ca Mg Na 0 0 0 0 0 4 1 Soluble fertiliser inputs (kg/ha/month) - February Urea N Super P Sulphate S Ca Mg Na Κ 3 1 Ω Λ 0 0 0 Soluble fertiliser inputs (kg/ha/month) - March Super P Urea N κ Sulphate S Ca Mg Na 0 0 0 0 0 1 Soluble fertiliser inputs (kg/ha/month) - April Urea N Super P Κ Sulphate S Ca Mg Na 0 6 2 0 0 0 0 Soluble fertiliser inputs (kg/ha/month) - May Urea N Super P Κ Sulphate S Ca Ma Na 10 0 0 0 0 0 3 Soluble fertiliser inputs (kg/ha/month) - September Urea N Super P Κ Sulphate S Ca Mg Na 20 5 0 0 0 0 0 Soluble fertiliser inputs (kg/ha/month) - October Urea N Super P Sulphate S Ca Mg Na Κ 0 17 Δ 0 0 0 0 Soluble fertiliser inputs (kg/ha/month) - November Super P Sulphate S Urea N Κ Ca Mg Na 12 0 0 0 0 0 Soluble fertiliser inputs (kg/ha/month) - December Super P Sulphate S Urea N Κ Ca Mg Na 0 0 0 7 2 0 0 Fertiliser products - October Ballance other Category Product N-rich urea kg/ha 80 Amount Fertiliser products - December Ballance other Category Product N-rich urea 80 Amount kg/ha Fertiliser products - March Ballance other Category Product N-rich urea 80 Amount kg/ha Fertiliser products - September Ballance other Category N-rich urea Product Amount kg/ha 80 Fertiliser products - November Category Ballance other Product N-rich urea Amount kg/ha 80 Fertiliser products - February Ballance other Category N-rich urea Product kg/ha 80 Amount

Irrigation

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Irrigation	system type					Spraylines	
Application	n depth (mm)			2			
Application	n depth (mm)			98			
Application	n depth (mm)			83			
Application	n depth (mm)			58			
Application	n depth (mm)			36			
Month: Jai Application	nuary n depth (mm)			18			
Application	n depth (mm)			14			
Month: Ma Application	arch n depth (mm)			24			
Month: Ap Application	n depth (mm)			32			
Month: Ma Application	ay n depth (mm)			50			
Irrigation co	oncentrations						
Source	р	K	c	Ca	Ма	BIOCK SPECIFIC	ц
0	P 0.1	к 0	0	0	ing 0	0	п 0
Animals gu Beef / da Block int Finishiu Water co Direct Animal g June July August	razing airy grazing censity ng beef onnectivity access to strea grazing	ıms		%		0 False False True True True True	
<i>Effluent app</i> Receives r	<i>lication</i> no liquid or soli	d effluents					
Block - Buf_	Selw_25a.1						
Block name						Buf_Selw_25a.1	
				ha			
Rolativo pro	ductivity			lla		1.9	
Pasturo bloc	k type					No	
Topography	k type					Flat	
Distance fro	m coast			km		37	
Cultivated in	n last 5 vears			KIII		False	
Fodder rotal	tes through					No	
Climate							
Annual av	erage rainfall			mm/yr		1153	
Mean ann	ual temperatur	е		.,		12.8	
Seasonal v	variation in rair	nfall				731-1450 mm,	Moderate
Annual po	tential evapotr	anspiration		mm		866	
Seasonal	variation in PET	Г				Moderate	
Soil descript	tion						
Soil order	(default)					Recent	
Soil group	(default)					Recent/YGE/BG	θE
SMaps							

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Sibling	1				Selw_25a.1
Wilting poi	loaded nt			0 - 30cm	2017 May 05 10:31 10
Whiting por				30 - 60cm	5
				> 60	2
Field capac	city			0 - 30cm	33
				30 - 60cm	20
Saturation				0 - 30cm	53
				30 - 60cm	49
				> 60	25
Natural dra	ainage clas	S			Well
Maximum i	npeueu iay rootina dei	ver hth		cm	88
Top soil ho	rizon chen	nical and physica	al parameters	citi	
ÁSC/PR		. ,		%	19
Bulk den	sity			kg/m³	1090
Clay				%	11
Sub soil				90	57
Sub soil o	clay			%	9
Soil profile	ano class				lice default
Top soil text	ure				Unknown
Maximum ro	oting dept	h		m	0.88
Depth to imp	beded drain	nage layer			0
Soil drainage					
Drainage me	ethod				
Method					None
Hydrophobic c	ondition				Use default
Occurence of p	bugging da	image			Rare
Compacted to	p son				False
Soil settings					
K leaching p	otential no	t set			
N IMMODIIISa	ation status	5			
Soil tests					
Olsen P	QT K	QT Ca	QT Mg	QT Na	
24 Organic S	6	8	26	5	2
Anion storag	e canacity	or phosphate re	tention		Not entered
TBK reserve	K test				Not entered
K reserve sta	atus				Use default
Pasture					
Pasture type					Ryegrass/white clover
Clover levels	;				Use default
Supplements	removed				
Supplement	informatio	n			
Conservati	on type				Baleage
Name					-
Wrapping					Wrapped in plastic
Number	of cuts				1
Supplement	is exporte	d from the farm			-
Fortilizer "	entice				
Fertiliser appli	<i>cauun</i> ducte - Sa	ntember			
Category	Judits Je	premoer			Ballance super
Product					Superten
Amount				kg/ha	300

South Waiarapa District Council

Client reference:

Lowe Environmental Impact

Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Fertiliser products - September Category Product Amount Fertiliser products - November Category Product Amount Fertiliser products - April Category Product Amount	kg/ha kg/ha kg/ha	Ravensdown other Urea 60 Ravensdown other Urea 60 Ravensdown other Urea 60
No irrigation entered		
Animals on block Ratio and type of stock based on whole farm v Animals grazing	values due to this option b	eing selected on block set up
Beef / dairy grazing Block intensity	%	0
Finishing beef Water connectivity		False
Direct access to streams		False
Animal grazing		True
February		True
March		True
April		True
May Soptombor		Irue
October		True
November		True
December		True
<i>Effluent application</i> Receives no liquid or solid effluents		
Block - Irr_E_Selw_25a.1		
Block name Block type		Irr_E_Selw_25a.1
Area	ha	6
Relative productivity		0
Pasture block type		No
lopography Distance from coast	km	Flat
Cultivated in last 5 years	KIII	False
Fodder rotates through		No
Climate Annual average rainfall	mm/yr	1153
Mean annual temperature		12.8
Seasonal variation in rainfall	mm	731-1450 mm, Moderate
Seasonal variation in PET	11111	Moderate
Soil description Soil order (default) Soil group (default) SMaps Sibling		Recent Recent/YGE/BGE
Date downloaded Wilting point	0 - 30cm 30 - 60cm	2017 May 04 17:08 10 5
	> 60	2

South Waiarapa District Council

Client reference:

Lowe Environmental Impact

Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Field capacity Saturation	0 - 30cm 30 - 60cm > 60 0 - 30cm 30 - 60cm > 60	33 20 8 53 49 25
Natural drainage class Depth to impeded layer Maximum rooting depth Top soil horizon chemical and physical parameters	cm cm	Well Not entered 88
ASC/PR Bulk density Clay Sand	% kg/m³ % %	19 1090 11 37
Sub soil Sub soil clay	%	9
Soil profile Profile drainage class Top soil texture Maximum rooting depth Depth to impeded drainage layer	m	Use default Unknown 0.88 0
Soil drainage Drainage method Method Hydrophobic condition Occurence of pugging damage Compacted top soil		None Use default Rare False
Soil settings K leaching potential not set N immobilisation status		
Soil tests Olsen P QT K QT Ca QT Mg 24 6 8 26 Organic S Anion storage capacity or phosphate retention TBK reserve K test K reserve status	QT Na 5	3 Not entered Not entered Use default
Pasture Pasture type Clover levels		Ryegrass/white clover Use default
Supplements removed Supplement information Conservation type Name		Baleage
Wrapping Supplement amount		Wrapped in plastic
Number of cuts Supplement is exported from the farm		4
Fertiliser application Fertiliser products - September Category Product Amount Soluble fortiliser inputs (kg/bg/month) - January	kg/ha	Ballance super Superten 400
Urea N Super P K Sulphate	eSCa 0	Mg Na 0 0
Soluble fertiliser inputs (kg/ha/month) - February	č	

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Urea N 1	Super P 0	K 0	Sulphate S 0	Ca 0	Mg 0	Na 0
Soluble fertilise	er inputs (ka/h	a/month)	- March	C C	Ū	C C
Urea N	Super P	K	Sulphate S	Са	Ма	Na
2	1	0	0	0	0	0
Soluble fertilise	er inputs (ka/h	a/month)	- April	U U	Ū	C C
Urea N	Super P	К	Sulphate S	Са	Ма	Na
4	1	0	0	0	0	0
Soluble fertilise	r inputs (ka/h	a/month)	- Mav	0	U	0
Uroa N	Super D	k	Sulnhato S	Ca	Ма	Na
	ouper i	0		0	ng	0
Solublo fortilico	z vr.inputs (ka/b	o (month)		0	0	0
Uroa N	Super D		Sulphato S	Ca	Ma	Na
1		0		0	n ng	Na O
L Coluble fortilies	U minnuta (ka/h	U (month)	0 August	0	0	0
Soluble tertilise	er inputs (kg/n	a/monun) ·	- August	6-	M	N
Urea N	Super P	ĸ	Sulphate S	Ca	мg	ina
	0	0		0	0	0
Soluble fertilise	er inputs (kg/n	a/montn)	- September			
Urea N	Super P	К	Sulphate S	Ca	Mg	Na
4/	12	0	0	0	0	0
Soluble fertilise	er inputs (kg/h	a/month)	- October	-		
Urea N	Super P	K	Sulphate S	Ca	Mg	Na
37	9	0	0	0	0	0
Soluble fertilise	er inputs (kg/h	a/month)	- November			
Urea N	Super P	К	Sulphate S	Са	Mg	Na
20	5	0	0	0	0	0
Soluble fertilise	er inputs (kg/h	a/month)	- December			
Urea N	Super P	К	Sulphate S	Ca	Mg	Na
11	3	0	0	0	0	0
Fertiliser produ	cts - October					
Category						Ballance other
Product						N-rich urea
Amount				kg/ha		60
Fertiliser produ	cts - Novembe	er		5.		
Category						Ballance other
Product						N-rich urea
Amount				kg/ha		80
Fertiliser produ	cts - Januarv			5,		
Category	,					Ballance other
Product						N-rich urea
Amount				ka/ha		80
Fertiliser produ	cts - March					
Category						Ballance other
Product						N-rich urea
Amount				ka/ha		80
Amount				Kg/Hu		00
Irrigation						
Irrigation syste	m type					Spravlines
Month: August						
Application den	th (mm)			4		
Month: Senter	ber			•		
Application der	th (mm)			233		
Month: Octobe	r			200		
Application der	th (mm)			186		
Month: Novem	her			100		
Application den	th (mm)			101		
Month: Decem	har (min)			101		
Application den	th (mm)			54		
Month: Januar	//////////////////////////////////////			57		
Application day	th (mm)			12		
Month: Entrus				10		
	y th (mm)			F		
Application dep				J		
	the (mane)			10		
Application dep	ui (mm)			12		

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Da	airy Farm - WWirr-c	utandcarry					
FarmParan	neters					OV	ERSEE
Month: Apr	ril						
Application	depth (mm)			22			
Application	y depth (mm)			47			
Application	depth (mm)			4			
Irrigation con Source	ncentrations					Block specific	
N O	Р 0.1	К 0	S 0	Ca 0	Mg 0	Na 0	H 0
Animals on b Ratio and t Animals ar	<i>block</i> type of stock b	ased on whole	e farm values o	due to this opti	on bein <u>c</u>	g selected on block	< set up
Beef / da Block inte	iry grazing ensity			%		0	
Finishin Water co	ng beef					False	
Direct a	access to strea	ms				False	
June	lazing					True	
August						True	
Effluent appl	lication						
Receives n	o liquia or solia	i emuents					
Block - IFF_N Block name	ic_Darn_17a.	1				Irr_NE_Darn_17a	.1
Block type						Pastoral	
Area				ha		19	
Relative proc	JUCTIVITY					U	
Pasture block	к туре					NO Flat	
Topography Distance from	m const			km		rial 27	
Cultivated in	lact 5 years			КШ		57 Falco	
Fodder rotat	es through					No	
Climate						1150	
Annual ave	erage rainiali			mm/yr		1155	
Seasonal v	ariation in rain	- Ifall				731-1450 mm	Moderate
Annual not	ential evanotra	anspiration		mm		866	louerate
Seasonal v	ariation in PET					Moderate	
Soil descripti	ion (dofault)					Pallic	
Soil aroun	(default)					Recent/YGE/BGE	=
SMans	(delddic)						_
Sibling						Darn 17a.1	
Date dow	vnloaded					2017 May 05 0	08:07
Wilting p	oint			0 - 30cm		9	
				30 - 60cn	า	7	
				> 60		3	
Field cap	acity			0 - 30cm		17	
				30 - 60cn	า	11	
C -1 ···	-			> 60		5	
Saturatio	11			0 - 30CM	•	20 19	
					I	10 15	
Natural d	Irainade class			~ 00		10 Moderately we	
Denth to	impeded laver			cm		Not entered	
Maximum	n rootina depth	ı		cm		Not entered	
Top soil h	norizon chemic	al and physic	al parameters	-			

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry **FarmParameters**

armParameters					OVI	ERSE	ER®
ASC/PR Bulk density Clay Sand Sub soil Sub soil clay			% kg/m³ % %		19 1220 25 20 27		
Soil profile Profile drainage class Top soil texture Maximum rooting depth Depth to impeded draina	ige layer		m	Use Unk 0 0	e default known		
Soil drainage Drainage method Method Hydrophobic condition Occurence of pugging dam Compacted top soil	age			N Use c Rare False	one lefault		
<i>Soil settings</i> K leaching (%s) N immobilisation status				Med	dium		
Soil tests Olsen P QT K 24 9 Organic S Anion storage capacity o TBK reserve K test K reserve status	QT Ca 13 r phosphate ret	QT Mg 38 cention	QT Na 8	4 Not Not Use	entered entered default		
Pasture Pasture type Clover levels				Rye Use	egrass/white clov e default	ver	
Supplements removed Supplement information Conservation type Name Wrapping Supplement amount Number of cuts Supplement is exported	from the farm			Ba	aleage /rapped in plasti 4	ic	
Fertiliser application Fertiliser products - Sept Category Product Amount Soluble fertiliser inputs (ember kg/ha/month) - لا	- January Sulphate S	kg/ha	Bi Si 4(allance super uperten 00 Na		
3 1 Soluble fertiliser inputs (Urea N Super P	0 kg/ha/month) - K	0 - February Sulphate S	0 Ca	0 Mg	0 Na		
Soluble fertiliser inputs (Urea N Super P 2 1 Soluble fertiliser instation	kg/ha/month) - K 0 kg/ha/month)	- March Sulphate S 0	Ca 0	Mg O	Na O		
Urea N Super P 4 1 Soluble fertiliser inputs (kg/na/month) - K 0 kg/ha/month) -	- Aprii Sulphate S 0 - May	Ca 0	Mg O	Na O		
Urea N Super P 9 2	К 0	Sulphate S 0	Ca 0	Mg 0	Na 0		

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Soluble	fertiliser	inputs (kg/h	na/month) -	June						
Urea N	۷ ۹	Super P	K	Sulphate S	Ca		Mg	I	Na	
1	() 	0	0	0		0	(0	
Soluble	tertiliser	nputs (kg/r Super P	ia/month) -	August Sulphate S	Ca		Ма	ſ	Na	
1		0	0	0	0		0		0	
Soluble	fertiliser	inputs (kg/h	na/month) -	September						
Urea N	N 9	Super P	К	Sulphate S	Ca		Mg	I	Na	
47 Calubla		12 January (kay)	0 (manth)	0 October	0		0	(0	
Soluble	iertiliser	Super P	K	Sulphate S	Ca		Ма	1	Na	
37		9	0	0	0		0	(0	
Soluble	fertiliser	inputs (kg/h	na/month) -	November						
Urea N	N 9	Super P	К	Sulphate S	Ca		Mg	I	Na	
20 Calubla	fortilioor	5 Januta (ka/k	0 (manth)	0 December	0		0	(0	
Soluble	ierunser a	Super P	k	Sulphate S	Ca		Ма	1	Na	
11	N .	3	0	0	0		0		0	
Fertilise	r produc	ts - October	C C	C C	•		C			
Catego	ory							Ballance	e other	
Produc	ct				1	//		N-rich ι	urea	
Amoui	nt r produc	ta Novomb	or		kg,	/ha		60		
Cateo	r produc orv	ts - Novemb	er					Ballanc	e other	
Produc	ct							N-rich ı	Jrea	
Amoui	nt				kg/	/ha		80		
Fertilise	r produc	ts - January			0.					
Catego	ory							Ballanc	e other	
Produc	ct					/1		N-rich u	urea	
Amoui	nt r produc	te - March			кg,	/na		80		
Cateo	nrv							Ballanc	e other	
Produc	ct							N-rich ı	urea	
Amoui	nt				kg,	/ha		80		
Irrigation										
Irrigation	n systen	n tyne					c	oravline	S	
Month:	Auaust	i type						,pruyime	.5	
Applicat	ion dept	h (mm)			4					
Month:	Septemb	ber								
Applicat	ion dept	h (mm)			233					
Month:	October	h (mm)			106					
Month	Novemb	n (mm) er			100					
Applicat	ion dept	h (mm)			101					
Month:	Decemb	er								
Applicat	ion dept	h (mm)			54					
Month:	January	h. (10					
Applicat Month:	ion dept	n (mm)			13					
Applicat	ion dent	, h (mm)			5					
Month:	March				5					
Applicat	ion dept	h (mm)			12					
Month:	April									
Applicat	ion dept	h (mm)			22					
Month:	May	h(mm)			47					
Month	ion dept lune	()			4/					
Applicat	ion dept	h (mm)			4					
Irrigation	concenti	rations								
Source	_		,	-	~	-	. E	lock spe	ecific	
N	P	1 /	ና ገ	5	Ca	N	/ig	Na	3	H
U	0.	1 (J	0	U	Ĺ	,	0		U

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Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Animals on block Ratio and type of stock based on whole farm values	due to this option t	peing selected on block set up
Beef / dairy grazing	%	0
Finishing beef Water connectivity		False
Direct access to streams		False
June		True
July August		True True
Effluent application Receives no liquid or solid effluents		
Block - Irr Mid Darp 17a 1		
Block name		Irr_Mid_Darn_17a.1
Block type		Pastoral
Area Balativa productivity	ha	14.9
Relative productivity Pasture block type		U Yes
Topography		Flat
Distance from coast	km	37
Cultivated in last 5 years Fodder rotates through		False Yes
Climate		
Annual average rainfall	mm/yr	1153
Mean annual temperature		12.8 721 1450 mm Modorata
Annual potential evapotranspiration Seasonal variation in PET	mm	866 Moderate
Soil description		
Soil order (default)		Pallic
Soil group (default)		Recent/YGE/BGE
SMaps		Darp 17a 1
Date downloaded		2017 May 05 08:07
Wilting point	0 - 30cm	9
	30 - 60cm	7
Field capacity	> 60 0 - 30cm	3
Field capacity	30 - 60cm	11
	> 60	5
Saturation	0 - 30cm	26
	30 - 60cm	18
Natural drainago class	> 60	15 Modoratoly woll
Depth to impeded layer	cm	Not entered
Maximum rooting depth	cm	Not entered
Top soil horizon chemical and physical parameters	0/	
ASC/PR Bulk donsity	% kg/m3	19
Clay	ку/ш [°]	25
Sand	%	20
Sub soil		
Sub soil clay	%	27
Soil profile Profile drainage class		lise default
Top soil texture		Unknown
Maximum rooting depth	m	0

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Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



eded drainag	e layer			0		
thod ondition ougging dama o soil	ge			N Use c Rare False	one default	
otential not se tion status	ŀt					
QT K 6 e capacity or j K test itus	QT Ca 8 phosphate re	QT Mg 26 tention	QT Na 5	3 Not Use	entered entered e default	
				Rye Use	egrass/white clover e default	-
<i>emoved</i> information on type				В	aleage	
				W	/rapped in plastic	
t amount of cuts is exported fro	om the farm				4	
<i>cation</i> ducts - Septer	mber			B	allance super uperten	
iser inputs (ko	n/ha/month)	- lanuary	kg/ha	4	00	
Super P 1 iser inputs (kg	K 0 1/ha/month)	Sulphate S 0 - February	Ca 0	Mg O	Na O	
Super P	K	Sulphate S	Ca	Mg	Na	
u iser inputs (ko	u g/ha/month)	- March	0	0	0	
Super P	K	Sulphate S	Ca	Mg	Na	
iser inputs (ko	0 a/ha/month)	0 - April	0	0	0	
Super P	K	Sulphate S	Ca	Mg	Na	
1 iser inputs (ko	0 1/ha/month)	0 - Mav	0	0	0	
Super P	K	Sulphate S	Са	Mg	Na	
2	0	0	0	0	0	
ser inputs (kg	g/ha/month)	- June Sulphate S	Ca	Ма	Na	
0	0	0	0	0	0	
ser inputs (ko	g/ha/month)	- August				
Super P	K	Sulphate S	Ca	Mg	Na	
U ser inputs (kr	U 1/ha/month)	U - Sentembor	U	U	U	
Super P	K	Sulphate S	Са	Μα	Na	
12	0	0	0	0	0	
	eded drainage thod ondition ugging dama o soil otential not set tion status QT K 6 e capacity or K test itus emoved information on type t amount of cuts is exported fre- cation ducts - Septer iser inputs (kg Super P 1 iser inputs (kg Super P) iser inp	eded drainage layer thod ondition ugging damage o soil otential not set tion status QT K QT Ca 6 8 e capacity or phosphate rei K test itus emoved information on type t amount of cuts is exported from the farm cation ducts - September iser inputs (kg/ha/month) Super P K 1 0 iser inputs (kg/ha/month) Super P K 0 0 iser inputs (kg/ha/month) Super P K 0 0 iser inputs (kg/ha/month) Super P K 12 0	eded drainage layer thod ondition ugging damage o soil otential not set tion status QT K QT Ca QT Mg 6 8 26 e capacity or phosphate retention K test itus emoved information on type t amount of cuts is exported from the farm cation ducts - September tiser inputs (kg/ha/month) - January Super P K Sulphate S 1 0 0 iser inputs (kg/ha/month) - February Super P K Sulphate S 1 0 0 iser inputs (kg/ha/month) - March Super P K Sulphate S 1 0 0 iser inputs (kg/ha/month) - April Super P K Sulphate S 1 0 0 iser inputs (kg/ha/month) - April Super P K Sulphate S 1 0 0 iser inputs (kg/ha/month) - April Super P K Sulphate S 1 0 0 iser inputs (kg/ha/month) - April Super P K Sulphate S 1 0 0 iser inputs (kg/ha/month) - April Super P K Sulphate S 0 0 iser inputs (kg/ha/month) - June Sulphate S 0 0 iser inputs (kg/ha/month) - June Sulphate S 2 0 0 iser inputs (kg/ha/month) - June Sulphate S 0 0 iser inputs (kg/ha/month) - June Sulphate S 0 0 iser inputs (kg/ha/month) - June Sulphate S 0 0 iser inputs (kg/ha/month) - June Sulphate S 0 0 0 iser inputs (kg/ha/month) - September Sulphate S 0 0 0 iser inputs (kg/ha/month) - Sulphate S 0 0 0 iser inputs (kg/ha/month) - Sulphate S 0 0 0 iser inputs (kg/ha/month) - Sulphate S 0 0 0 12 0 0 12 0 0 12 0 12 0 12 0 12 12 12 12 12 12 12 12 12 12	eded drainage layer thod ondition ugging damage o soil tential not set tion status QT K QT Ca QT Mg QT Na 6 8 26 5 a capacity or phosphate retention K test itus emoved information on type t amount of cuts is exported from the farm cation ducts - September t amount of cuts is exported from the farm cation ducts - September kg/ha ser inputs (kg/ha/month) - January Super P K Sulphate S Ca 1 0 0 0 iser inputs (kg/ha/month) - February Super P K Sulphate S Ca 0 0 0 iser inputs (kg/ha/month) - February Super P K Sulphate S Ca 1 0 0 iser inputs (kg/ha/month) - April Super P K Sulphate S Ca 1 0 0 iser inputs (kg/ha/month) - April Super P K Sulphate S Ca 1 0 0 iser inputs (kg/ha/month) - March Super P K Sulphate S Ca 1 0 0 iser inputs (kg/ha/month) - April Super P K Sulphate S Ca 1 0 0 iser inputs (kg/ha/month) - June Super P K Sulphate S Ca 1 0 0 iser inputs (kg/ha/month) - June Super P K Sulphate S Ca 1 0 0 iser inputs (kg/ha/month) - June Super P K Sulphate S Ca 1 0 0 iser inputs (kg/ha/month) - June Super P K Sulphate S Ca 1 0 0 iser inputs (kg/ha/month) - June Super P K Sulphate S Ca 0 0 iser inputs (kg/ha/month) - June Super P K Sulphate S Ca 0 0 iser inputs (kg/ha/month) - September Super P K Sulphate S Ca 0 0 0 iser inputs (kg/ha/month) - September Super P K Sulphate S Ca 0 0 0 iser inputs (kg/ha/month) - September Super P K Sulphate S Ca 0 0 12 0 0 0 0 0 0 0 0 0 0 0 0 0	eded drainage layer 0 thod nudition Usec ugging damage soll tential not set tion status QT K QT Ca QT Mg QT Na 6 8 26 5 a capacity or phosphate retention K test tus QT K QT Ca QT Mg QT Na 6 8 26 5 a capacity or phosphate retention K test tus Rege emoved information on type B t amount of cuts is exported from the farm ration ducts - September B t amount Super P K Sulphate S Ca Mg 1 0 0 0 ser inputs (kg/ha/month) - February Super P K Sulphate S Ca Mg 1 0 0 Sup	eded drainage layer 0 thod ndition ugging damage soll Attend Attendd Attendd A

Soluble fertiliser inputs (kg/ha/month) - October

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Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters

June



Urea N 37	Super P 9	К 0	Sulphate S 0	Ca 0	Mg 0	Na 0	
Soluble fertilis	er inputs (kg	/ha/month) -	November				
Urea N	Super P	К	Sulphate S	Ca	Mg	Na	
20	5	0	0	0	0	0	
Soluble fertilis	er inputs (kg	/ha/month) -	December				
Urea N	Super P	K	Sulphate S	Ca	Mg	Na	
11	3	0	0	0	0	0	
Fertiliser prod	ucts - Octobe	er					
Category						Ballance other	
Product						N-rich urea	
Amount				kg/ha		60	
Fertiliser prod	ucts - Novem	iber					
Category						Ballance other	
Product				lig /ha		N-rich urea	
Amount Fartiliaan anad	unto lonuou			ку/па		80	
	ucis - Januar	у				Pallance other	
Droduct							
Amount				ka/ba			
AITIOUITE Fortilicor prod	ucto March			ку/па		80	
						Ballanco othor	
Broduct						N-rich uroa	
Amount				ka/ba			
Amount				ky/na		00	
Irrigation							
Irrigation syst	em type					Spravlines	
Month: Augus	t						
Application de	pth (mm)			4			
Month: Septer	mber						
Application de	pth (mm)			233			
Month: Octob	er						
Application de	pth (mm)			186			
Month: Noven	nber						
Application de	pth (mm)			101			
Month: Decen	nber						
Application de	pth (mm)			54			
Month: Janua	ry						
Application de	pth (mm)			13			
Month: Februa	ary						
Application de	pth (mm)			5			
Month: March							
Application de	pth (mm)			12			
Month: April							
Application de	pth (mm)			22			
Month: May							
Application de	pth (mm)			47			
Month: June							
Application de	pth (mm)			4			
Irrigation conce	ntrations						
Source	nations					Block specific	
N	P	к	S	Ca	Ма	Na	н
0	01	0	0	0	0	0	0
0	0.1	0	0	0	0	0	0
Animals on bloc	k						
Ratio and type	e of stock bas	ed on whole	farm values due	e to this optic	on being	selected on block	set up
Animals grazi	ng			•			
Beef / dairy	grazing			%		0	
Block intens	ity						
Finishing b	eef					False	
Water conne	ectivity						
Direct acce	ess to stream	S				False	
Animal graz	ing						

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True

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True

True

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



August

Effluent application Receives no liquid or solid effluents

Block - Irr_Darn_9a.1 Block name		Irr Darn 9a 1
Block type		Pastoral
Area	ha	4 3
Relative productivity	na	0
Pasture block type		No
Topography		Flat
Distance from coast	km	37
Cultivated in last 5 years	N.I.I	False
Fodder rotates through		No
Climate		
Annual average rainfall	mm/yr	1153
Mean annual temperature		12.8
Seasonal variation in rainfall		731-1450 mm, Moderate
Annual potential evapotranspiration	mm	866
Seasonal variation in PET		Moderate
Soil description		
Soil order (default)		Pallic
Soil group (default)		Recent/YGE/BGE
SMaps		
Sibling		Darn 9a.1
Date downloaded		2017 May 05 10:33
Wilting point	0 - 30cm	11
	30 - 60cm	7
	> 60	6
Field capacity	0 - 30cm	23
	30 - 60cm	12
	> 60	9
Saturation	0 - 30cm	36
	30 - 60cm	17
	> 60	15
Natural drainage class		Moderately well
Depth to impeded layer	cm	Not entered
Maximum rooting depth	cm	80
Top soil horizon chemical and physical parameters		
ASC/PR	%	19
Bulk density	kg/m³	1220
Clay	%	20
Sand	%	15
	0/	20
Sub soil clay	%	28
Soil profile		
Profile drainage class		Use default
Top soil texture		Unknown
Maximum rooting depth	m	0.8
Depth to impeded drainage layer		0
Sail drainaga		
Soli ulainage Drainago mothod		
Mothod		Nono
Hydrophobic condition		
Occurrence of pugging damage		Rare
Compacted top soil		False
Soil settings		
K leaching (%s)		Medium



South Waiarapa District Council

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Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Olsen P 32	QТ К 4	QT Ca 15	QT Mg 20	QT Na 5		c
Anion storag TBK reserve K reserve st	ge capacity or K test atus	phosphate ret	ention			o Not entered Not entered Use default
Pasture Pasture type Clover levels	5					Ryegrass/white clover Use default
Supplements Supplement Conservat	<i>removed</i> information ion type					Baleage
Name Wrapping Suppleme	nt amount					Wrapped in plastic
Number Supplement	of cuts is exported f	rom the farm				4
<i>Fertiliser appl</i> Fertiliser pro	<i>ication</i> oducts - Sept	ember				
Category Product Amount				kg/ha		Ballance super Superten 400
Soluble ferti Urea N	liser inputs (I Super P	kg/ha/month) · K	- January Sulphate S	Ca	Ma	Na
4	1	0	0	0	ວັ	0
Soluble ferti Urea N 3	liser inputs (I Super P 1	kg/ha/month) K 0	- February Sulphate S 0	Ca 0	Mg 0	Na 0
Soluble ferti	liser inputs (I	<g ha="" month)="" ·<br="">س</g>	- March	Ca	Ma	Na
5	1	0		0	0	0
Soluble ferti	liser inputs (I	kg/ha/month) ·	- April	-		
Urea N 6	Super P	K O	Sulphate S	Ca 0	Mg 0	Na 0
Soluble ferti	liser inputs (I	kg/ha/month) ·	- May	0	Ū	Ū
Urea N	Super P	К	Sulphate S	Ca	Mg	Na
10 Solublo forti	3 licor inpute (l	() (a/ba/month)	0 Sontombor	0	0	0
Urea N	Super P	K	Sulphate S	Са	Ma	Na
20	5	0	0	0	ວັ	0
Soluble ferti	liser inputs (I	kg/ha/month) ·	- October	6		
Urea N 17	Super P	K O	Sulphate S	Ca 0	i≌ig ∩	Na O
Soluble ferti	, liser inputs (l	kg/ha/month) ·	- November	0	Ū	Ŭ
Urea N	Super P	K	Sulphate S	Са	Mg	Na
12	3	0	0	0	0	0
Soluble ferti	liser inputs (I	<g month)="" na="" ·<br="">لا</g>	- December Sulphate S	Ca	Ma	Na
7	2	0	0	0	0	0
Fertiliser pro Category Product Amount	oducts - Octo	ber		kg/ha		Ballance other N-rich urea 80
Fertiliser pro Category Product Amount	oducts - Dece	mber		kg/ha		Ballance other N-rich urea 80
Fertiliser pro Category	oducts - Marc	n				Ballance other

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Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Product							
Amount					N-rich urea		
Amount			kg/ha		80		
Fertiliser products - Se	ptember		_				
Category					Ballance other		
Product					N-rich urea		
Amount			kg/ha		80		
Fertiliser products - No	vember						
Category					Ballance other		
Product					N-rich urea		
Amount			kg/ha		80		
Fertiliser products - Fet	oruary						
Category					Ballance other		
Product					N-rich urea		
Amount			kg/na		80		
Irrigation							
Irrigation system type					Spravlines		
Month: July					oprayines		
Application depth (mm))		2				
Month: September	/		-				
Application depth (mm))		98				
Month: October							
Application depth (mm))		83				
Month: November							
Application depth (mm))		58				
Month: December							
Application depth (mm))		36				
Month: January							
Application depth (mm))		18				
Month: February							
Application depth (mm))		14				
Month: March							
Application depth (mm))		24				
Month: April							
Application depth (mm))		32				
Month: May	`		50				
Month: May Application depth (mm))		50				
Month: May Application depth (mm))		50				
Month: May Application depth (mm) <i>Irrigation concentrations</i> Source)		50		Block specific		
Month: May Application depth (mm) <i>Irrigation concentrations</i> Source N P) К	S	50 Ca	Mg	Block specific Na	н	
Month: May Application depth (mm) <i>Irrigation concentrations</i> Source N P 0 0.1) K 0	S 0	50 Ca 0	Mg 0	Block specific Na 0	H O	
Month: May Application depth (mm) <i>Irrigation concentrations</i> Source N P 0 0.1) K 0	S 0	50 Ca 0	Mg 0	Block specific Na 0	H O	
Month: May Application depth (mm) <i>Irrigation concentrations</i> Source N P 0 0.1 <i>Animals on block</i>) K O	S 0	50 Ca 0	Mg O	Block specific Na 0	H O	
Month: May Application depth (mm) <i>Irrigation concentrations</i> Source N P 0 0.1 <i>Animals on block</i> Ratio and type of stock) K O based on wh	S 0 ole farm valu	50 Ca 0 ues due to this op	Mg 0 Dtion being	Block specific Na 0 selected on block	H O set up	
Month: May Application depth (mm) <i>Irrigation concentrations</i> Source N P 0 0.1 <i>Animals on block</i> Ratio and type of stock Animals grazing) K O based on wh	S 0 ole farm valu	50 Ca 0 ues due to this op	Mg O Dtion being	Block specific Na 0 selected on block	H O set up	
Month: May Application depth (mm) <i>Irrigation concentrations</i> Source N P 0 0.1 <i>Animals on block</i> Ratio and type of stock Animals grazing Beef / dairy grazing) 0 based on wh	S 0 ole farm valu	50 Ca 0 ues due to this op %	Mg O Dtion being	Block specific Na 0 selected on block 0	H O set up	
Month: May Application depth (mm) <i>Irrigation concentrations</i> Source N P 0 0.1 <i>Animals on block</i> Ratio and type of stock Animals grazing Beef / dairy grazing Block intensity) 0 based on wh	S 0 ole farm valu	50 Ca 0 ues due to this op %	Mg O Dtion being	Block specific Na 0 selected on block 0	H O set up	
Month: May Application depth (mm) <i>Irrigation concentrations</i> Source N P 0 0.1 <i>Animals on block</i> Ratio and type of stock Animals grazing Beef / dairy grazing Block intensity Finishing beef) 0 based on wh	S 0 ole farm valu	50 Ca 0 ues due to this op %	Mg O Dtion being	Block specific Na 0 selected on block 0 False	H O set up	
Month: May Application depth (mm) <i>Irrigation concentrations</i> Source N P 0 0.1 <i>Animals on block</i> Ratio and type of stock Animals grazing Beef / dairy grazing Block intensity Finishing beef Water connectivity) G based on wh	S 0 ole farm valu	50 Ca 0 ues due to this op %	Mg O Dtion being	Block specific Na 0 selected on block 0 False	H O set up	
Month: May Application depth (mm) <i>Irrigation concentrations</i> Source N P 0 0.1 <i>Animals on block</i> Ratio and type of stock Animals grazing Beef / dairy grazing Block intensity Finishing beef Water connectivity Direct access to stre) K O based on wh	S 0 ole farm valu	50 Ca 0 ues due to this op %	Mg O Dtion being	Block specific Na 0 selected on block 0 False False	H O set up	
Month: May Application depth (mm) <i>Irrigation concentrations</i> Source N P 0 0.1 <i>Animals on block</i> Ratio and type of stock Animals grazing Beef / dairy grazing Block intensity Finishing beef Water connectivity Direct access to stree Animal grazing) G based on wh	S 0 ole farm valu	50 Ca 0 ues due to this op %	Mg O Dtion being	Block specific Na 0 selected on block 0 False False True	H O set up	
Month: May Application depth (mm) <i>Irrigation concentrations</i> Source N P 0 0.1 <i>Animals on block</i> Ratio and type of stock Animals grazing Beef / dairy grazing Block intensity Finishing beef Water connectivity Direct access to stree Animal grazing June) G based on wh	S 0 ole farm valu	50 Ca 0 ues due to this op %	Mg O Dtion being	Block specific Na 0 selected on block 0 False False True True	H O set up	
Month: May Application depth (mm) Irrigation concentrations Source N P 0 0.1 Animals on block Ratio and type of stock Animals grazing Beef / dairy grazing Block intensity Finishing beef Water connectivity Direct access to stree Animal grazing June Juny August) G based on wh	S 0 ole farm valu	50 Ca 0 ues due to this op %	Mg O Dtion being	Block specific Na 0 selected on block 0 False False True True True	H O set up	
Month: May Application depth (mm) Irrigation concentrations Source N P 0 0.1 Animals on block Ratio and type of stock Animals grazing Beef / dairy grazing Block intensity Finishing beef Water connectivity Direct access to stree Animal grazing June July August) G based on wh	S 0 ole farm valu	50 Ca 0 ues due to this op %	Mg O Dtion being	Block specific Na 0 selected on block 0 False False True True True True	H O set up	
Month: May Application depth (mm) Irrigation concentrations Source N P 0 0.1 Animals on block Ratio and type of stock Animals grazing Beef / dairy grazing Block intensity Finishing beef Water connectivity Direct access to stree Animal grazing June July August Effluent application) G based on wh	S 0 ole farm valu	50 Ca 0 ues due to this op %	Mg O Dtion being	Block specific Na 0 selected on block 0 False False True True True True	H O set up	
Month: May Application depth (mm) Irrigation concentrations Source N P 0 0.1 Animals on block Ratio and type of stock Animals grazing Beef / dairy grazing Block intensity Finishing beef Water connectivity Direct access to stree Animal grazing June July August Effluent application Receives no liquid or so) K O based on wh eams	S 0 ole farm valu	50 Ca 0 ues due to this op %	Mg O	Block specific Na 0 selected on block 0 False False True True True True	H O set up	
Month: May Application depth (mm) Irrigation concentrations Source N P 0 0.1 Animals on block Ratio and type of stock Animals grazing Beef / dairy grazing Block intensity Finishing beef Water connectivity Direct access to stree Animal grazing June July August Effluent application Receives no liquid or so) K O based on wh eams plid effluents	S 0 ole farm valu	50 Ca 0 ues due to this op %	Mg O	Block specific Na 0 selected on block 0 False False True True True True	H O set up	
Month: May Application depth (mm) Irrigation concentrations Source N P 0 0.1 Animals on block Ratio and type of stock Animals grazing Beef / dairy grazing Block intensity Finishing beef Water connectivity Direct access to stree Animal grazing June July August Effluent application Receives no liquid or sce) K O based on wh eams plid effluents	S 0 ole farm valu	50 Ca 0 ues due to this op %	Mg O	Block specific Na 0 selected on block 0 False False True True True	H O set up	
Month: May Application depth (mm) Irrigation concentrations Source N P 0 0.1 Animals on block Ratio and type of stock Animals grazing Beef / dairy grazing Block intensity Finishing beef Water connectivity Direct access to stree Animal grazing June July August Effluent application Receives no liquid or so Block - Irr_Rang_18b.1 Block name) K O based on wh eams	S 0 ole farm valu	50 Ca 0 ues due to this op %	Mg O	Block specific Na 0 selected on block 0 False False True True True True	H O set up	
Month: May Application depth (mm) Irrigation concentrations Source N P 0 0.1 Animals on block Ratio and type of stock Animals grazing Beef / dairy grazing Block intensity Finishing beef Water connectivity Direct access to stree Animal grazing June July August Effluent application Receives no liquid or so Block - Irr_Rang_18b.1 Block name Block type) K O based on wh eams	S 0 ole farm valu	50 Ca 0 ues due to this op %	Mg O	Block specific Na 0 selected on block 0 False False True True True True	H O set up	
Month: May Application depth (mm) Irrigation concentrations Source N P 0 0.1 Animals on block Ratio and type of stock Animals grazing Beef / dairy grazing Block intensity Finishing beef Water connectivity Direct access to stree Animal grazing June July August Effluent application Receives no liquid or so Block - Irr_Rang_18b.1 Block name Block type Area) K O based on wh eams	S 0 ole farm valu	50 Ca 0 ues due to this op %	Mg O	Block specific Na 0 selected on block 0 False False True True True True Irr_Rang_18b.1 Pastoral 30.4	H O set up	
Month: May Application depth (mm) Irrigation concentrations Source N P 0 0.1 Animals on block Ratio and type of stock Animals grazing Beef / dairy grazing Block intensity Finishing beef Water connectivity Direct access to stree Animal grazing June July August Effluent application Receives no liquid or so Block - Irr_Rang_18b.1 Block name Block type Area Relative productivity) K O based on wh eams	S O	50 Ca 0 ues due to this op %	Mg O	Block specific Na 0 selected on block 0 False False True True True True Irr_Rang_18b.1 Pastoral 30.4	H O set up	
Month: May Application depth (mm) Irrigation concentrations Source N P 0 0.1 Animals on block Ratio and type of stock Animals grazing Beef / dairy grazing Block intensity Finishing beef Water connectivity Direct access to stree Animal grazing June July August Effluent application Receives no liquid or so Block - Irr_Rang_18b.1 Block name Block type Area Relative productivity Pasture block type) K 0 based on wh eams	S O	50 Ca 0 ues due to this op %	Mg O	Block specific Na 0 selected on block 0 False False True True True True True 30.4 0 No	H O set up	

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Topography Distance from coast Cultivated in last 5 years Fodder rotates through			km	Flat 37 False No
Climate Annual average rainfall Mean annual temperature Seasonal variation in rainfa Annual potential evapotran Seasonal variation in PET	III spiration		mm/yr mm	1153 12.8 731-1450 mm, Moderate 866 Moderate
Soil description Soil order (default) Soil group (default) SMaps Sibling Date downloaded Wilting point			0 - 30cm	Recent Recent/YGE/BGE Rang_18b.1 2017 May 05 10:34 2
Field capacity Saturation			30 - 60cm > 60 0 - 30cm 30 - 60cm > 60 0 - 30cm 30 - 60cm > 60	1 1 8 5 5 23 19
Natural drainage class Depth to impeded layer Maximum rooting depth Top soil horizon chemical ASC/PR Bulk density Clay Sand Sub soil Sub soil	and physical	parameters	> 00 cm cm % kg/m ³ % %	Well Not entered 65 19 1180 5 72 2
Soil profile Profile drainage class Top soil texture Maximum rooting depth Depth to impeded drainage	alayer		m	Use default Unknown 0.65 0
Soil drainage Drainage method Method Hydrophobic condition Occurence of pugging damag Compacted top soil	je			None Use default Rare False
Soil settings K leaching potential not set N immobilisation status	c .			
Soil tests Olsen P QT K 32 4 Organic S Anion storage capacity or p TBK reserve K test K reserve status	QT Ca 15 hosphate rete	QT Mg 20 ention	QT Na 5	6 Not entered Not entered Use default
Pasture Pasture type				Ryegrass/white clover

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters

Lowe Environmental Impact



Clover levels						Use default	
Supplements re Supplement ir Conservation	<i>moved</i> nformation n type					Baleage	
Name Wrapping						Wrapped in plas	tic
Number of Supplement is	amount cuts exported fror	n the farm				4	
Fertiliser applica Fertiliser prod Category Product Amount	ation ucts - Septem	ber		kg/ha		Ballance super Superten 400	
Soluble fertilis	er inputs (kg/	ha/month)	- January				
Urea N	Super P	K	Sulphate S	Ca	Mg	Na	
4	1	0	0	0	0	0	
Soluble fertilis	er inputs (kg/	ha/month)	- February	-			
Urea N	Super P	ĸ	Sulphate S	Ca	Mg	Na	
3	1	0	0	0	0	0	
Soluble fertilis	er inputs (kg/	na/month)	- March	6-	M	NI-	
Urea N	Super P	ĸ	Sulphate S	Ca	i≊ig	Na	
5 Calubla fautilia	L Innutra (lug)	U (ha (na a mth)	U Amuil	0	0	0	
Soluble fertilis	er inputs (kg/	na/month)	- April	6-	Ma	Na	
Orea N	Super P	ĸ	Sulphate S	Ca	i≊ig	Na O	
0 Colublo fortilio	Z	U (ha/manth)	U May	0	0	0	
	Super D		- May Sulphoto S	Ca	Ма	No	
	Super P	K O	Sulphate S	Ca	i•ig ∩	Nd O	
10 Solublo fortilio	or inpute (kg/	U (ha/month)	Contombor	0	0	0	
			- September Sulphato S	Ca	Ма	Na	
	5 Super P	N O			i•iy ∩	Na O	
Soluble fertilis	er innuts (ka/	ba/month)	- October	0	0	0	
Urea N	Super P	K	Sulphate S	Ca	Ма	Na	
17	4	0	0	0	0	0	
Soluble fertilis	er innuts (ka/	ha/month)	- November	0	U	Ū	
Urea N	Super P	K	Sulphate S	Са	Ма	Na	
12	3	0	0	0	0	0	
Soluble fertilis	er inputs (ka/	ha/month)	- December				
Urea N	Super P	K	Sulphate S	Са	Ма	Na	
7	2	0	0	0	ວັ	0	
Fertiliser prod	ucts - October	-					
Category						Ballance other	
Product						N-rich urea	
Amount				kg/ha		80	
Fertiliser prod	ucts - Decemb	ber		-			
Category						Ballance other	
Product						N-rich urea	
Amount				kg/ha		80	
Fertiliser prod	ucts - March						
Category						Ballance other	
Product						N-rich urea	
Amount				kg/ha		80	
Fertiliser prod	ucts - Septem	ber					
Category						Ballance other	
Product						N-rich urea	
Amount				kg/ha		80	
Fertiliser prod	ucts - Novemł	ber					
Category						Ballance other	
Product						N-rich urea	
Amount				kg/ha		80	
Fertiliser prod	ucts - Februar	У					
Category						Ballance other	

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Product			ka /ba		N-rich urea	
Amount			Ky/IIa		80	
Irrigation						
Irrigation system	type				Spraylines	
Month: August	(mm)		1			
Month: November	(11111)		4			
Application depth	(mm)		58			
Month: October	()					
Application depth	(mm)		83			
Month: Septembe	r					
Application depth	(mm)		98			
Month: December	(mm)		26			
Month: January	(1111)		30			
Application depth	(mm)		18			
Month: February	()					
Application depth	(mm)		14			
Month: March						
Application depth	(mm)		24			
Month: April	(22			
Month: May	(mm)		32			
Application depth	(mm)		50			
	()		50			
Irrigation concentra	tions					
Source		-	-		Block specific	
N P	K	S	Ca	Mg	Na	Н
Animals grazing Beef / dairy graz Block intensity Finishing beef Water connectiv Direct access t Animal grazing June July August	ity o streams		%		0 False False True True True True	, set up
Effluent application Receives no liquid	or solid effluents					
Block - Irr_E_Darn_	_17a.1					
Block name					Irr_E_Darn_17a.1	
Block type			h -		Pastoral	
Area Rolativo productivity	,		na		12.8	
Pasture block type	ý				No	
Topography					Flat	
Distance from coast			km		37	
Cultivated in last 5	years				False	
Fodder rotates throu	ugh				No	
Climate						
Annual average ra	infall		mm/vr		1153	
Mean annual tem	perature				12.8	
Seasonal variation	n in rainfall				731-1450 mm, N	4oderate
Annual potential e	vapotranspiration		mm		866	
Seasonal variation	n in PET				Moderate	

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Soil description Soil order (default) Soil group (default)				Pallic Recent/YGE/BGE
Sibling Date downloaded Wilting point			0 - 30cm 30 - 60cm	Darn_17a.1 2017 May 05 08:07 9 7
Field capacity			> 60 0 - 30cm 30 - 60cm	3 17 11
Saturation			> 60 0 - 30cm 30 - 60cm	5 26 18
Natural drainage class Depth to impeded layer Maximum rooting depth			> 60 cm cm	Moderately well Not entered Not entered
Top soil horizon chemica ASC/PR Bulk density Clay	al and physic	al parameters	% kg/m³ %	19 1220 25
Sand Sub soil Sub soil clay			% %	20 27
Soil profile Profile drainage class Top soil texture Maximum rooting depth Depth to impeded drainag	je layer		m	Use default Unknown 0 0
Soil drainage Drainage method Method Hydrophobic condition Occurence of pugging dama Compacted top soil	age			None Use default Rare False
<i>Soil settings</i> K leaching (%s) N immobilisation status				Medium
Soil tests Olsen P QT K 24 9 Organic S Anion storage capacity or TBK reserve K test K reserve status	QT Ca 13 phosphate re	QT Mg 38 etention	QT Na 8	4 Not entered Not entered Use default
Pasture Pasture type Clover levels				Ryegrass/white clover Use default
Supplements removed Supplement information Conservation type				Baleage
Name Wrapping Supplement amount				Wrapped in plastic
Number of cuts Supplement is exported fr	om the farm			4

Fertiliser application

South Waiarapa District Council

Lowe Environmental Impact

Client reference:

Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



		er				
Category						Ballance super
Product						Superten
Amount				kg/ha		400
Soluble fertilis	er inputs (kg/h	ia/month)	January			
Urea N	Super P	К	Sulphate S	Ca	Mg	Na
4	1	0	0	0	0	0
Soluble fertilis	er inputs (kg/h	ia/month) - I	February			
Urea N	Super P	К	Sulphate S	Ca	Mg	Na
3	1	0	0	0	0	0
Soluble fertilis	er inputs (kg/h	ia/month) - I	March			
Urea N	Super P	К	Sulphate S	Ca	Mg	Na
5	1	0	0	0	0	0
Soluble fertilis	er inputs (kg/h	ia/month) - i	April			
Urea N	Super P	К	Sulphate S	Са	Mg	Na
6	2	0	0	0	0	0
Soluble fertilis	er inputs (kg/h	ia/month) - I	May			
Urea N	Super P	К	Sulphate S	Са	Mg	Na
10	3	0	0	0	0	0
Soluble fertilis	er inputs (kg/h	ia/month) - 🗄	September			
Urea N	Super P	К	Sulphate S	Са	Mg	Na
20	5	0	0	0	0	0
Soluble fertilis	er inputs (kg/h	ia/month) - (October			
Urea N	Super P	К	Sulphate S	Са	Mg	Na
17	4	0	0	0	0	0
Soluble fertilis	er inputs (kg/h	ia/month) - I	November			
Urea N	Super P	К	Sulphate S	Са	Mg	Na
12	3	0	0	0	0	0
Soluble fertilis	er inputs (kg/h	ia/month) - I	December			
Urea N	Super P	К	Sulphate S	Са	Mg	Na
7	2	0	0	0	0	0
Fertiliser prod	ucts - October					
Category						Ballance other
Product						N-rich urea
Amount				kg/ha		80
Fertiliser prod	ucts - Decembe	er				
Category						B 11 11
Product						Ballance other
A 1						Ballance other N-rich urea
Amount				kg/ha		Ballance other N-rich urea 80
Amount Fertiliser produ	ucts - March			kg/ha		Ballance other N-rich urea 80
Amount Fertiliser produ Category	ucts - March			kg/ha		Ballance other N-rich urea 80 Ballance other
Amount Fertiliser produ Category Product	ucts - March			kg/ha		Ballance other N-rich urea 80 Ballance other N-rich urea
Amount Fertiliser produ Category Product Amount	ucts - March			kg/ha kg/ha		Ballance other N-rich urea 80 Ballance other N-rich urea 80
Amount Fertiliser produ Category Product Amount Fertiliser produ	ucts - March ucts - Septemb	er		kg/ha kg/ha		Ballance other N-rich urea 80 Ballance other N-rich urea 80
Amount Fertiliser produ Category Product Amount Fertiliser produ Category	ucts - March ucts - Septemb	er		kg/ha kg/ha		Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other
Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product	ucts - March ucts - Septemb	er		kg/ha kg/ha		Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea
Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount	ucts - March ucts - Septemb	er		kg/ha kg/ha kg/ha		Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80
Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ	ucts - March ucts - Septemb ucts - Novembo	er		kg/ha kg/ha kg/ha		Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80
Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category	ucts - March ucts - Septemb ucts - Novembo	er		kg/ha kg/ha kg/ha		Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80
Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product	ucts - March ucts - Septemb ucts - Novembo	er er		kg/ha kg/ha kg/ha		Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea
Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount	ucts - March ucts - Septemb ucts - Novembo	er er		kg/ha kg/ha kg/ha kg/ha		Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80
Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ	ucts - March ucts - Septemb ucts - Novembo ucts - February	er er		kg/ha kg/ha kg/ha kg/ha		Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80
Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category	ucts - March ucts - Septemb ucts - Novembo ucts - February	er er		kg/ha kg/ha kg/ha kg/ha		Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other
Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product	ucts - March ucts - Septemb ucts - Novembo ucts - February	er er		kg/ha kg/ha kg/ha kg/ha		Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea
Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Amount	ucts - March ucts - Septemb ucts - Novembo ucts - February	er er		kg/ha kg/ha kg/ha kg/ha		Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80
Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount	ucts - March ucts - Septemb ucts - Novembo ucts - February	er er		kg/ha kg/ha kg/ha kg/ha		Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80
Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Irrigation	ucts - March ucts - Septemb ucts - Novembo ucts - February	er Pr		kg/ha kg/ha kg/ha kg/ha		Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80
Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Irrigation syste Month	ucts - March ucts - Septemb ucts - Novembo ucts - February em type	er Pr		kg/ha kg/ha kg/ha kg/ha		Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80
Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Irrigation Irrigation systu Month: July	ucts - March ucts - Septemb ucts - Novembo ucts - February em type	er er		kg/ha kg/ha kg/ha kg/ha	2	Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80
Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Irrigation Irrigation systu Month: July Application de Month: Senter	ucts - March ucts - Septemb ucts - Novembo ucts - February em type pth (mm)	er er		kg/ha kg/ha kg/ha kg/ha	2	Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80
Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Irrigation Irrigation systu Month: July Application de Month: Septer	ucts - March ucts - Septemb ucts - Novembo ucts - February em type pth (mm) nber oth (mm)	er er		kg/ha kg/ha kg/ha kg/ha kg/ha	5	Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80
Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Irrigation system Month: July Application de Month: October	ucts - March ucts - Septemb ucts - Novembo ucts - February em type pth (mm) nber pth (mm)	er er		kg/ha kg/ha kg/ha kg/ha 2 98		Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80
Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Fertiliser produ Category Product Amount Irrigation syste Month: July Application de Month: Octobed	ucts - March ucts - Septemb ucts - Novembo ucts - February em type pth (mm) nber pth (mm) er oth (mm)	er er		kg/ha kg/ha kg/ha kg/ha kg/ha 2 98		Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80 Ballance other N-rich urea 80

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Month: Nov Application Month: Dec	ember depth (mm) ember			58			
Application Month: Janu	depth (mm) uary			36			
Application Month: Feb	deptn (mm) ruary			18			
Application Month: Mar	depth (mm)			14			
Application	depth (mm)			24			
Application	depth (mm)			32			
Application	depth (mm)			50			
Irrigation con	centrations						
Source	D	K	c	Ca	Ma	BIOCK SPECIFIC	ц
0	0.1	0	0	0	0	0	0
Animals on bi Ratio and ty Animals gra	<i>lock</i> ype of stock ba izing	sed on whole	e farm values	due to this optio	on being	g selected on block	set up
Beer / dai Block inte	ry grazing nsity			%		0	
Finishing Water cor	g beef Inectivity					False	
Direct a Animal gr	ccess to strean azing	าร				False	
June	5					True	
July August						True True	
<i>Effluent appli</i> Receives no	<i>cation</i> liquid or solid	effluents					
Block - Buf_D	arn_17a.1						
Block hame						Buf_Darn_1/a.1	
Area				ha		30.9	
Relative prod	uctivity					0	
Pasture block	type					Yes	
Topography						Flat	
Distance from	i coast			km		37	
Cultivated in	last 5 years					False	
	es through					res	
Climate	rago rainfall			mmhur		1152	
Annual aver	aye raman			mm/yr		1153	
	ariation in rainf	الد				$731_{-1}1/50 \text{ mm}$ M	Indorato
Annual note	ntial evanotra	nspiration		mm		866	louerate
Seasonal va	ariation in PET					Moderate	
Soil descriptio	on					D-11:-	
Soll order (default)						
Soli group (delault)					Recent/ FGE/BGE	
Sihlina						Darn 17a 1	
Date dow	nloaded					2017 May 05 0	8:07
Wilting po	oint			0 - 30cm		9	
511				30 - 60cm		7	
				> 60		3	
Field capa	icity			0 - 30cm		17	
				30 - 60cm		11	

South Waiarapa District Council

Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



> 60 0 - 30cm 30 - 60cm	5 26 18
> 60 cm cm % kg/m ³ % %	15 Moderately well Not entered Not entered 19 1220 25 20 27
m	Use default Unknown 0 0
	None Use default Rare False
QT Na 5	3 Not entered Not entered Use default
	Ryegrass/white clover Use default
	Baleage Wrapped in plastic 1
kg/ha kg/ha	Ballance super Superten 500 Ravensdown other Urea 60 Ravensdown other
	> 60 0 - 30cm 30 - 60cm > 60 cm %kg/m ³ % % % % % % % % % % % % % % % % % % %

South Waiarapa District Council

Lowe Environmental Impact

ient reference: ırm name: Otawira Dairy Farm - WWirr-cutandcarry		
armParameters		OVERSEEF
Amount	ka/ba	60
Fortilisor products - April	Kg/Hd	80
Cohonemy		Devenedarum ether
Category		Ravensdown other
Product		Urea
Amount	kg/ha	60
Irrigation No irrigation entered		
Animals on block Ratio and type of stock based on whole farm values	due to this optior	n being selected on block set up
Animals grazing		
Beef / dairy grazing	%	0
Block intensity		
Finishing beef		False
Water connectivity		
Direct access to streams		False
Animal grazing		
lanuary		True
February		True
March		
March		True
April		Irue
November		Irue
December		True
Effluent application Receives no liquid or solid effluents Block - Irr A Bram 8a.1		
Block name		Irr A Bram 8a.1
Block type		Pastoral
Area	ha	Q
Alea Delative productivity	Па	0
Relative productivity		U
Topography		Flat
Distance from coast	km	37
Cultivated in last 5 years		False
Fodder rotates through		No
Climate		
Annual average rainfall	mm/yr	1153
Mean annual temperature		12.8
Seasonal variation in rainfall		731-1450 mm, Moderate
Annual potential evapotranspiration	mm	866
Seasonal variation in PET		Moderate
Soil description		
Soil order (default)		Recent
Soil group (default)		Recent/YGE/BGE
SMans		
Sibling		Bram 8a 1
Dato downloaded		2017 May 04 16 E0
	0 20	2017 May 04 10:39
wiiting point	0 - 30cm	17
	30 - 60cm	1/
	> 60	17
Field capacity	0 - 30cm	45
	30 - 60cm	39
	> 60	39
Saturation	0 - 30cm	59
	30 - 60cm	49
		48
Natural drainage class	~ 00	Importact
Natural uranaye class		Inperiect Not entored
Depth to impeded layer	CITI	Not entered
Maximum rooting depth	cm	NOT ENTERED
lop soil norizon chemical and physical parameters		

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Lowe Environmental Impact

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry **FarmParameters**

rmDarameters			
n nir al aniciel 3		UVER	JEER
ASC/PR Bulk density Clay Sand Sub soil Sub soil clay	% kg/m³ % %	33 1090 19 5 18	
Soil profile Profile drainage class Top soil texture Maximum rooting depth Depth to impeded drainage layer	m	Use default Unknown 0 0	
Soil drainage Drainage method Method Hydrophobic condition Occurence of pugging damage Compacted top soil		None Use default Rare False	
Soil settings K leaching potential not set N immobilisation status			
Soil tests Olsen P QT K QT Ca QT Mg 20 4 10 20 Organic S Anion storage capacity or phosphate retention TBK reserve K test K reserve status	QT Na 4	3 Not entered Not entered Use default	
Pasture Pasture type Clover levels		Ryegrass/white clover Use default	
Supplements removed Supplement information Conservation type Name Wrapping Supplement amount Number of cuts Area cut taken from Supplement is exported from the farm		Baleage Wrapped in plastic 3 8	
Fertiliser application Fertiliser products - September Category Product Amount Soluble fertiliser inputs (kg/ha/month) - January	kg/ha	Ballance super Superten 400	
Urea N Super P K Sulphat 14 4 0 0 Soluble fertiliser inputs (kg/ba/month) - February	e S Ca 0	Mg Na O O	
Urea N Super P K Sulphat 13 3 0 0 Soluble fortiliser inputs (kg/ha/month) March	e S Ca 0	Mg Na O O	
Urea N Super P K Sulphat 8 2 0 0 Soluble fertiliser inputs (kg/ha/month) - March	e S Ca 0	Mg Na O O	
Urea N Super P K Sulphat 2 1 0 0 Soluble fertiliser inputs (kg/ha/month) - May	e S Ca 0	Mg Na O O	

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Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Н 0

up

Urea N	Super P	K	Sulphate S	Ca	Mg	Na
L Coluble fortilie	U or inpute (kg/	U (ha/manth)	U	0	0	0
	er inputs (kg/	na/monun)	- September	6-	Ma	Na
Urea N	Super P	ĸ	Sulphate S	Ca	Mg	Na
نائلات میں امار کر ا	L Innutra (lug)	U (ha (maa mata)	U	0	0	0
Soluble fertilis	er inputs (kg/	na/month)	- October	6		
Urea N	Super P	ĸ	Sulphate S	Ca	мg	Na
6	1	0	0	0	0	0
Soluble fertilis	ser inputs (kg/	ha/month)	- November			
Urea N	Super P	K	Sulphate S	Ca	Mg	Na
12	3	0	0	0	0	0
Soluble fertilis	er inputs (kg/	ha/month)	- December			
Urea N	Super P	К	Sulphate S	Ca	Mg	Na
13	3	0	0	0	0	0
Fertiliser prod	ucts - Septem	ber				
Category	•					Ballance other
Product						N-rich urea
Amount				ka/ha		80
Fortiliser prod	ucts - October	-		Kg/Hd		80
Catagory	ucis Octobel					Ballance other
Droduct						N rich urop
Amount				lia /ha		
Amount				ку/па		80
Fertiliser prod	ucts - January	·				
Category						Ballance other
Product						N-rich urea
Amount				kg/ha		80
Fertiliser prod	ucts - March					
Category						Ballance other
Product						N-rich urea
Amount				kg/ha		80
Fertiliser prod	ucts - Februar	'V		-		
Category						Ballance other
Product						N-rich urea
Amount				kg/ha		100
Irrigation						
Irrigation syst	em type					Spraylines
Month: Janua	ry					
Application de	pth (mm)			72		
Month: Februa	ary					
Application de	pth (mm)			64		
Month: March						
Application de	oth (mm)			40		
Month: April	P ()					
Application de	oth (mm)			12		
Month: Septer	mber					
Application de	oth (mm)			14		
Month: Octob	er					
Application de	onth (mm)			28		
Month: Noven	hor			20		
Application do	nth (mm)			50		
Month: Docon	pur (min)			39		
Application do	ibei nth (mm)			65		
Application de	pui (iiiii)			05		
Irrigation conce	ntrations					
Source	nations					Block specific
N	P	к	S	Ca	Ma	Na
0	Г О 1		0		n ing	
U	0.1	U	U	0	U	U
Animals on bloc	ĸ					
Ratio and type of stock based on whole farm values due to this option being selected on block set						
Animals grazi	10					
Beef / dairy	arazina			%		0
Block intens	itv					-
Finishina h	beef					False
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Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Water connectivity Direct access to streams		False
Animal grazing		T disc
June		True
July		True
August		True
<i>Effluent application</i> Receives no liquid or solid effluents		
Block - Buf_Bram_8a.1		Buf Brom 90 1
Block type		Pastoral
Area	ha	5.7
Relative productivity		0
Pasture block type		No
Topography		Flat
Distance from coast	km	37 Falco
Fodder rotates through		No
Climate		
Annual average rainfall	mm/yr	1153
Mean annual temperature		12.8
Seasonal variation in rainfall		731-1450 mm, Moderate
Seasonal variation in PET	mm	866 Moderate
Soil description		
Soil order (default)		Recent
Soil group (default)		Recent/YGE/BGE
SMaps		
Sibling		Bram_8a.1
Date downloaded Wilting point	0 20cm	2017 May 04 16:59
witting point	30 - 60cm	17
	> 60	17
Field capacity	0 - 30cm	45
	30 - 60cm	39
	> 60	39
Saturation	0 - 30cm	59
	30 - 60cm	49
Natural drainage class	> 00	40 Imperfect
Depth to impeded layer	cm	Not entered
Maximum rooting depth	cm	Not entered
Top soil horizon chemical and physical parameters		
ASC/PR	%	33
Bulk density	kg/m³	1090
Clay	%	19 F
Sdflu Sub soil	%	5
Sub soil clay	%	18
Soil profile		
Profile drainage class		Use default
Top soil texture		Unknown
Maximum rooting depth	m	0
Depth to impeded drainage layer		U
Soil drainage		
Drainage method Method		None
Hydrophobic condition		Use default
Occurence of pugging damage		Rare

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Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Compacted top	soil				False
<i>Soil settings</i> K leaching po N immobilisa	otential not se tion status	t			
Soil tests Olsen P 20 Organic S Anion storage TBK reserve ta	QT K 4 e capacity or j K test fus	QT Ca 10 phosphate re	QT Mg 20 etention	QT Na 4	3 Not entered Not entered Use default
Pasture Pasture type Clover levels					Ryegrass/white clover Use default
Supplements re Supplement i Conservatio Name Wrapping Supplement Number o Supplement i	emoved information on type t amount of cuts is exported fro	om the farm			Baleage Wrapped in plastic 1
Fertiliser applic Fertiliser proc Category Product Amount Fertiliser proc Category Product Amount Fertiliser proc Category Product Amount Fertiliser proc Category Product Amount Fertiliser proc Category Product Amount	tation ducts - Septer ducts - Septer ducts - Noven ducts - April	nber nber		kg/ha kg/ha kg/ha kg/ha	Ballance super Superten 400 Ravensdown other Urea 60 Ravensdown other Urea 60 Ravensdown other Urea 60
<i>Irrigation</i> No irrigation	entered				
Animals on blo Ratio and typ Animals grazi Beef / dairy Block intens	<i>ck</i> be of stock bas ing v grazing sity	sed on whole	e farm values o	due to this optio %	n being selected on block set up 0
Finishing Water conn Direct acc Animal graz January February March	beef ectivity cess to stream zing	15			False False True True True
April May Septembe October Novembe	er r				True True True True True True

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Client reference:

Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters

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December		True
Effluent application		
Receives no liquid or solid effluents		
Block - Buf_Tait_42a.1		Ruf Tait 42a 1
Block type		Dul_Idil_42d.1 Pastoral
	ha	
Alea Bolativo productivity	lid	4
Pasture block type		No
Topography		NO Elat
Distance from coast	km	71dL 27
Cultivated in last 5 years	KIII	57 Falco
Fodder rotates through		No
Climata		
Clinidle Appual average minfall	mmhur	1152
Annual average rainiali	mm/yr	1153
Mean annual temperature		12.8 721 1450 mm Madamata
		731-1450 mm, Moderale
	mm	866
Seasonal variation in PEI		Moderate
Soil description		
Soil order (default)		Gley
Soil group (default)		Sedimentary
SMaps		
Sibling		Tait_42a.1
Date downloaded		2017 May 04 17:07
Wilting point	0 - 30cm	15
	30 - 60cm	15
	> 60	11
Field capacity	0 - 30cm	44
	30 - 60cm	39
	> 60	38
Saturation	0 - 30cm	56
	30 - 60cm	49
	> 60	47
Natural drainage class		Poor
Depth to impeded layer	cm	Not entered
Maximum rooting depth	cm	Not entered
Top soil horizon chemical and physical parameters		
ASC/PR	%	35
Bulk density	kg/m³	940
Clay	%	24
Sand	%	10
Sub soil		
Sub soil clay	%	24
Soil profile		
Profile drainage class		Use default
Top soil texture		Unknown
Maximum rooting depth	m	0
Depth to impeded drainage layer		0
Soil drainage		
Drainage method		
Method		None
Hydrophobic condition		Use default
Occurence of pugging damage		Winter
Compacted top soil		False
Soil settings		
R leaching potential not set		

N immobilisation status

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Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters



Soil tests Olsen P 27 Organic S Anion storag TBK reserve K reserve sta	QT K 5 e capacity of K test atus	QT Ca 10 r phosphate re	QT Mg 33 tention	QT Na 6	3 Not entered Not entered Use default
<i>Pasture</i> Pasture type Clover levels	5				Ryegrass/white clover Use default
Supplements of Supplement Conservati Name Wrapping	<i>removed</i> information on type				Baleage Wrapped in plastic
Supplement	nt amount of cuts is exported f	rom the farm			1
Fertiliser appli Fertiliser pro Category Product Amount	<i>cation</i> ducts - Sept	ember		kg/ha	Ballance super Superten 400
Category Product Amount Fertiliser pro	oducts - Sept	mber		kg/ha	Ravensdown other Urea 60
Category Product Amount Fertiliser pro Category	oducts - April			kg/ha	Ravensdown other Urea 60 Ravensdown other
Product Amount				kg/ha	Urea 60
<i>Irrigation</i> No irrigation	entered				
Animals on blo Ratio and ty Animals grad	ock pe of stock b	ased on whole	farm values	due to this option	being selected on block set up

Beef / dairy grazing	%	0
Block intensity		
Finishing beef		False
Water connectivity		
Direct access to streams		False
Animal grazing		
January		True
February		True
March		True
April		True
Мау		True
September		True
October		True
November		True
December		True

Effluent application

Receives no liquid or solid effluents

Block - Buf_Darn_9a.1

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Client reference:

Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters

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Block name Block type Area Relative produc Pasture block t	ctivity ype			ha	Buf_Darn_9a.1 Pastoral 1.5 O No Flat
Distance from o Cultivated in la Fodder rotates	coast st 5 years through			km	37 False No
Climate Annual avera Mean annual Seasonal vari Annual poten Seasonal vari	ge rainfall temperature lation in rainfa tial evapotrar lation in PET	all spiration		mm/yr mm	1153 12.8 731-1450 mm, Moderate 866 Moderate
Soil description Soil order (de Soil group (de SMaps Sibling Date downle	efault) efault) oaded				Pallic Recent/YGE/BGE Darn_9a.1 2017 May 05 10:33
Wilting poin	it			0 - 30cm 30 - 60cm > 60 0 - 30cm 30 - 60cm > 60	11 7 6 23 12 9
Saturation Natural dra	inage class			0 - 30cm 30 - 60cm > 60	36 17 15 Moderately well
Depth to im Maximum n Top soil hor ASC/PR Bulk dens Clay Sand Sub soil Sub soil c	npeded layer ooting depth izon chemica ity lay	and physica	al parameters	cm cm kg/m ³ % %	Not entered 80 19 1220 20 15 28
Soil profile Profile draina Top soil textu Maximum roo Depth to imp	ge class ire oting depth eded drainage	e layer		m	Use default Unknown 0.8 0
Soil drainage Drainage met Method Hydrophobic cc Occurence of p Compacted top	thod ondition ugging damag soil	je			None Use default Rare False
Soil settings K leaching (% N immobilisat	%s) tion status				Medium
Soil tests Olsen P 32 Organic S Anion storage	QT K 4 e capacity or I	QT Ca 15 phosphate re	QT Mg 20 etention	QT Na 5	6 Not entered

South Waiarapa District Council

Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters

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Not entered TBK reserve K test K reserve status Use default Pasture Ryegrass/white clover Pasture type Clover levels Use default Supplements removed Supplement information Conservation type Baleage Name Wrapping Wrapped in plastic Supplement amount Number of cuts 1 Supplement is exported from the farm Fertiliser application Fertiliser products - September Category Ballance super Product Superten Amount kg/ha 300 Fertiliser products - September Ravensdown other Category Product Urea 60 Amount kg/ha Fertiliser products - November Ravensdown other Category Urea Product 60 Amount kg/ha Fertiliser products - April Category Ravensdown other Product Urea 60 Amount kg/ha Irrigation No irrigation entered Animals on block Ratio and type of stock based on whole farm values due to this option being selected on block set up Animals grazing Beef / dairy grazing % 0 Block intensity False Finishing beef Water connectivity False Direct access to streams Animal grazing True January February True March True True April May True September True October True November True December True Effluent application Receives no liquid or solid effluents Block - QE2 Block name QE2 Trees and Scrub Block type Area 3.6 ha 950 Rainfall mm/yr Distance from coast 37 km

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Client reference: Farm name: Otawira Dairy Farm - WWirr-cutandcarry

FarmParameters

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Bush type Native Block - Maize Block name Maize Block type Fodder Crop Rotation area ha 9.7 Low N mineralisation False Final grid month April Irrigation system type No Irrigation **Crop information** Current assessment year May - Grazed pasture June - Grazed pasture July - Grazed pasture August - Grazed pasture September - Maize silage Crop management See details below Crop sown October - Maize silage November - Maize silage December - Maize silage January - Maize silage February - Maize silage March - Mature - Maize silage April - Grazed See details below Crop sown Crop management Crop sowing information - September of the Current assessment year Crop category Forages Crop type Maize silage Yield at final defoliation T/ha dry matter 19 Minimum till Cultivation practice at sowing Crop sowing information - April of the Current assessment year Crop category Permanent pasture Crop type Grazed Source of animals Not entered No fertiliser application applied on block Effluent application

Receives no liquid or solid effluents



A3. Groundwater Effects

A letter addressing the further points of clarification related to groundwater effects of the proposed WWTP, produced by GWS Limited.



18th October 2017

South Wairarapa District Council PO Box 6 Martinborough 5741 New Zealand

Attention: Bill Sloan

Subject: Response to Request for Further Points of Clarification Related to Proposed Land Discharge Area for the South Featherston WWTP - DRAFT

Dear Bill,

1. Background

We understand that an application for a land discharge consent associated with the operation of the Featherston WWTP was lodged with the GWRC and that this is currently being processed. A S92 request for further information has since been issued requesting the following information

1. Provide model/assessment outputs that display the location, extent and magnitude of the predicted groundwater mounding effects.

2. Provide an updated irrigation regime and storage assessment which incorporates any impacts and/or limitations due to the predicted groundwater mounding effects.

3. If groundwater mounding effects are present offsite - provide an appropriately detailed assessment of these effects. This assessment should also include an allowance for potential uncertainty in the assumed hydrogeological system and modelled parameters. Response information should include at least; the location, extent, magnitude, and timing of areas where saturated ground has spatially or temporally increased.

4. Provide a robust assessment of the potential effects of pathogen discharge to all groundwater and surface water users. This should include information on the potential risk to existing and potential future water users, and how any identified risks will be mitigated/managed.

This letter is intended to address items 1, 3 and 4 of the request for further information.

2. Model Outputs

A selection of MODFLOW model outputs are included in Attachment A.

3. Off Site Mounding Effects

As can be seen from the model outputs provided, the main change to the piezometric surface associated with mounding effects due to irrigation are largely constrained to the south eastern corner of the irrigation block nearest observation point A. This block is susceptible to saturation conditions due to the thinning vadose zone that naturally reduces as the water table and the land surface converge. Near-saturated conditions are noted to occur in this area in any case and stream gauging has shown the lower reaches of the Mangatarere Stream and Donald's creek are

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4 Katote Close, The Gardens	Phone: 09 576 0093



gaining due to groundwater inputs. The network of channels at this location have, therefore, been constructed to drain the land due to its high water table throughout the area.

Figure 1 below provides a schematic derived from the model outputs provided and shows the depth to the water table under existing conditions and under condition of peak irrigation loading.



Figure 1 Off Site Areas of Near Saturation

Model results indicate an increase in off-site groundwater levels of up to 0.7 m at the site boundary, reducing to 0.5 m off site which is expected to result in a higher groundwater levels down gradient of the irrigation areas as depicted in Figure 1. This effect is expected to be temporary and will exist under peak loading conditions only, after which dissipation of the mounding effects is expected.

It should be noted that the Modflow model does not include the effects of the drainage network or ephemeral discharge to streams and creeks. In reality, the drainage channels and natural surface waters is expected to continue to drain the land such that fully saturated conditions at the surface are not expected to occur.

Further, it is noted that the model results provided are indicative only as no detailed surface elevation model has been included in the analysis and a planar land surface is assumed. In

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addition, the model results are considered representative of conservative hydrogeologic conditions where fully saturated conditions can exist within the irrigation areas. In reality we understand that the application of wastewater will be controlled such that irrigation will not take place under fully saturated conditions.

4. Pathogen Discharge

The fate and survival of pathogens during the wastewater treatment and land disposal process will be governed by three principal factors:

- Reduction of pathogens due to the level of treatment prior to disposal.
- Reduction of pathogens in the vadose zone during percolation.
- Reduction of pathogens in the aquifer.

Each of these processes is described further below.

Tertiary Disinfection

The primary means of protecting groundwater from pathogens is the low loading due to UV treatment. The proposed wastewater discharge will be treated to a high standard prior to land application through sedimentation, oxidation and UV disinfection. The wastewater is presently UV treated to reduce pathogen concentration, and has a median E.coli concentration of 18 cfu/100 mL. The proposed conditions of consent require that the E.coli concentration will not exceed 100 cfu/100 mL for more than 3 out of 12 consecutive samples. A compliance limit of 100 cfu/100 mL (1,000 bacteria per litre) for E.coli represents a 3-4 Log reduction in bacteria from the raw effluent and this is consistent with what can be expected for a treatment process of this kind.

While no specific details have been provided in relation to the reduction in viruses, it is expected that a similar level of reduction can be achieved through UV disinfection. On average, a base population on the order of 10 viruses per litre can be expected in raw effluent. This population will likely grow to 1,000s per litre for 70% of the time and reach a maximum of 100,000 per litre once every few years during a viral outbreak (Lewis, pers. comm., 2004). For the purpose of this assessment a total viral population of 10^4 - 10^5 per litre in untreated wastewater has been assumed. Table 1 below provides the level of reduction in viruses as a function of the wastewater treatment process.

	Pow Effluort	Primary / Secondary	Tertiary UV
		Treatment	Disinfection Outlet *
90 Percentile Virus Count (per litre)	10 ⁴ - 10 ⁵	$10^2 - 10^3$	0-10 ¹
Median Virus Count (per litre)	10 ³	10 ¹	1
* Obtained reduction is dependant on	applying appropriate do	sage	
Data sourced from Leonard (2003)			

Table 1 Reduction in Viral Count Due to Treatment

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For the purpose of the following assessment a bacterial population of 1,000 bacteria per litre and 10 viruses per litre has been assumed as starting populations.

Soil Filtration

Soil passage is the next method of minimising pathogen concentrations entering groundwater. The soil mechanisms that reduce microbe movement include filtration, adsorption, predation and competition (die-off). The efficiency of these processes are mostly controlled by soil texture, degree of saturation and temporal effects.

There are a number of studies which look at travel of bacteria and viruses in a wide range of NZ soils. Key conclusions from these studies have informed the proposed discharge regime. Notably this is achieved through maximising the contact with the unsaturated zone of the soil, achieved by:

- Applying wastewater at a rate less than the soil unsaturated hydraulic conductivity i.e. a thin film of water moves through the soil under tension rather than gravity drainage which occurs in saturated conditions. This also avoids bypass flow;
- Minimising the amount of wastewater applied when the groundwater table rises i.e. avoiding winter discharge. This results in a greater depth of unsaturated soil to pass through;
- Not applying wastewater if the soil moisture content is above field capacity;
- Not applying wastewater following high rainfall events;
- Avoiding discharge in conditions which favour pathogen survival. Specifically, it has been found that pathogen survival is greater in cold and wet conditions. The proposed discharge includes minimal wastewater application during the cold and often wet winter months.

Under these conditions it is possible to achieve upwards of 99% reduction in bacteria in the first few cm of soil, and 62 to 99% removal of viruses in around 0.5 m of unsaturated soil. In the context of the applied treated wastewater, this would then result in a population of 10 bacteria per litre and <5 virus per litre after travel through the vadose zone.

ESR (2010) provides guidance on the removal rate of pathogen based on soil type in New Zealand. These data indicate a 2 log/m reduction for brown soils that are present on the site, which would equate to 1 log reduction for a 0.5 m vadose thickness. Adopting this reduction would result in a population of 100 bacteria per litre and 1 virus per litre after travel through the vadose zone before entering groundwater.

Aquifer Transport

Two methods have been used to assess the likely reduction of pathogens in the aquifer during transport; pathogen die-off rate and soil removal rate. Pathogen die-off rate adopts decay factors based on published parameters for various pathogen species and simulates reduction over time due to natural die-off. This method uses calculated groundwater velocities to determine travel time. Pathogen removal rate adopts decay factors based on published parameters for various pathogen species based on published parameters for various pathogen removal rate adopts decay factors based on published parameters for various pathogen species given certain soil types over a given distance. Both methods have been used for comparative purposes.

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- Pathogen Die-Off

For the purpose of this assessment E. Coli has been selected as the archetype bacteria as these bacteria can have the longest die off rates. Rotavirus has been selected as the archetype virus, again due to its long die off rates, but also due to its highly infectious nature and high counts in faecal matter. Die off rates for these pathogens have been adopted from Sinton (2001).

In order to calculate die-off rates it is necessary to calculate the groundwater velocities leaving the discharge area. Table 2 below provides the parameters and results of these calculations.

Parameter	Value	Units
Permeability (K)	12	m/d
Hydraulic Gradient (I = 0.7 m/25 m)	0.03	
Effective Porosity (ne)	0.15	
Groundwater Velocity	2.4	m/d
Buffer Distance	25	m
Travel Time	10	days

Table 2 Travel Time Calculations

These calculations indicate that under worst case conditions the travel times through the disposal field buffer zones would be 10 days.

Calculating die off in the aquifer for E.Coli (die-off rate of 0.31 Log 10 day⁻¹) with an initial concentration of 100 bacteria per litre indicates there would be complete die-off (<1 viable E.Coli) within 7 days. In other words, no viable E.Coli would be expected to be present in the groundwater discharge beyond the 25 m irrigation site buffer zone. A conservative assessment adopting an initial concentration of 1,000 bacteria per litre indicates there would be complete die-off within 10 days. Again, no viable E.Coli would be expected to be present in the groundwater discharge beyond the 25 m irrigation site buffer zone.

Calculating die off in the aquifer for Rotavirus (die-off rate of 0.36 Log 10 day⁻¹) with an initial concentration of 10 viruses per litre indicates there would be complete die-off (<1 viable Rotavirus) within 4 days. In other words, no viable Rotavirus would be expected to be present in the groundwater discharge beyond the 25 m irrigation site buffer zone. A conservative assessment adopting an initial concentration of 100 viruses per litre indicates there would be expected to be present in the groundwater discharge beyond the 25 m irrigation site buffer zone. A conservative assessment adopting an initial concentration of 100 viruses per litre indicates there would be complete die-off within 7 days. Again, no viable Rotavirus would be expected to be present in the groundwater discharge beyond the 25 m irrigation site buffer zone.

- Pathogen Removal

Pathogen removal in the aquifer can be calculated by adopting removal rates for pathogens as provided by Pang et al (2008). Calculating removal in the aquifer for E.Coli (removal rate of 0.32 Log /m) with an initial concentration of 100 bacteria per litre indicates there would be complete die-off after travelling 6 m. A conservative assessment adopting an initial concentration of 1,000 bacteria per litre indicates there would be complete die-off after travelling 9.5 m. These calculations, therefore, indicate no viable E.Coli would be expected to be present in the groundwater discharge beyond the 25 m irrigation site buffer zone.

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Similarly, calculating removal in the aquifer for viruses using Salmonella Bacteriophage (removal rate of 0.12 Log /m) with an initial concentration of 10 viruses per litre indicates there would be complete die-off after travelling 8.5 m. A conservative assessment adopting an initial concentration of 100 viruses per litre indicates there would be complete die-off after travelling 16.5 m. These calculations, therefore, indicate no viable viruses would be expected to be present in the groundwater discharge beyond the 25 m irrigation site buffer zone.

In summary, these calculations indicate the potential for viable pathogens to enter the environment through groundwater discharges resulting from the application of treated wastewater is very low given the treatment standard prior to irrigation. Further, the effective processes of soil filtration, pathogen die-off and removal within the aquifer all assist to reduce pathogen loads such that viable counts beyond the site buffer zones are not expected.

5. Effects of Groundwater Discharge

The results of this assessment indicate the off-site mounding effects are localised and are expected to be largely mitigated by the existing natural drainage network.

The discharge of groundwater leaving the irrigation areas and entering surface water is not expected to have viable pathogens remaining provided a high level of treatment is achieved prior to land application and that adequate buffer distances are in place. Overall, the effects to surface waters from pathogen discharge is expected to be less than minor and will provide a nett positive benefit over the existing direct discharge to Donalds Creek.

There are a number of domestic groundwater users surrounding the irrigation areas which are used for domestic potable supply, stock use and irrigation. Many of these water bores are tapping the deeper confined aquifer system and no effects are expected from the discharge due to vertical separation assuming they are appropriately designed and constructed. There are, however, 11 groundwater users within 550 m of the irrigation sites that take water from the shallow groundwater system and therefore have the potential to be impacted by the land discharge. These takes are expected to be of limited volume and pumping duration and, therefore, the radial extent of drawdown will be limited. Applying a Theis (1935) algorithm (where T=60 m²/d, S=0.1 and Q=20 m³/d) indicates the drawdown effects from these bores would be indiscernible beyond approximately 25-30 m distance from the bore. There are no bores within this proximity to the irrigation areas, with the closes being 50 m distance away (ID S27/0019) that is used for irrigation. The drawdown from a domestic bore is, therefore, insufficient to affect the rate at which pathogens travel in groundwater. As there will be no pumping effects that will extend to within the buffer zones and pathogen removal has been demonstrated within the buffer zones, it is considered unlikely that shallow bores will be affected by the discharge. One bore (ID S27/0044 used for irrigation) is located within the irrigation area and this is proposed to have a 50 m radius buffer distance.

In summary, the effects to groundwater users from pathogens in the discharge are expected to be minor. Ongoing groundwater quality monitoring is proposed to verify this conclusion.

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6. Assessment Limitations and Uncertainty

This assessment includes models and calculations that are based on limited information in regard to the site topography, geologic conditions, groundwater levels and aquifer parameters. As a result, the accuracy and reliability of the predictions made here are affected by these assumptions. In reality, it is expected that these parameters will vary over the irrigation areas resulting in differences from those effects predicted in this report. Preferential flow paths, for example, may exist that cannot be considered at this time.

This level of uncertainty cannot be resolved without detailed and extensive site investigations which are not proposed at this time. As an alternative to undertaking this work, a precautionary approach to development of the irrigation fields is proposed through staging of the irrigation areas. This will be undertaken in parallel with monitoring of the discharge quality, surface and groundwater quality, and groundwater levels. This information can then be used to verify the assumptions within this assessment which can be revised, if necessary, prior to developing other irrigation areas.

7. References

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8. Closure

Should you have any further questions please contact the undersigned.

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Director - Hydrogeologist For and on behalf of GWS Limited

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