



**LANDPRO**

Make the most of your land

22 August 2022

Landpro Reference: 22272

Council Reference: AUTH-302684-V1; AUTH-302685-V2

Environment Southland  
Private Bag 90116  
Invercargill, 9840

To whom it may concern

**Re: Application by Kanadale Limited for expanded dairy activities.**

Please find enclosed the above consent application for your consideration.

The applicant is seeking replacement resource consents for their existing dairy consents, including resource consents for expanded dairy and intensive winter grazing.

We consider that the evidence on adverse effects would justify limited notification to Hokonui Rūnanga and Ngāi Tahu. However, the applicant appreciates there is public interest in applications of this nature and understands that Environment Southland has indicated that such applications (additional dairy platform land and additional cows) should be publicly notified. Therefore, to enhance the efficiency of the process, as the proposal is for expanded dairy activities, including additional land and cows, the applicant requests public notification.

The applicant requests a separate invoice be sent with details for consent deposit.

If you have any questions in relation to this application, please don't hesitate to contact me directly.

Kind Regards

*Christina Bright.*

Christina Bright  
Environmental Consultant

0800 023 318  
13 Pinot Noir Drive  
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Cromwell 9342  
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# PART A

## Application for Resource Consent



This application is made under Section 88 of the Resource Management Act 1991 (Form 9)

The purpose of this Part A form and the relevant Part B form(s) is to provide applications with guidance on information that is required under the Resource Management Act 1991. Please note that these forms are to act as a guide only, and Environment Southland reserves the right to request additional information.

To: Environment Southland  
Private Bag 90116  
**Invercargill 9840**

### 1. Applicant(s) Details

*A resource consent can only be held by a legal organisation or fully named individual(s).*

1.1. Applicant's name (full name of proposed consent holder). Please complete either (a) OR (b) to whom consent is to be issued

	First Name	Middle Name	Surname
--	------------	-------------	---------

(a) Individual(s)

_____	_____	_____	_____
_____	_____	_____	_____

**OR**

(b) Registered company name

Kanadale Ltd

Company number

4789299

1.2. Applicant's address [not consultant's address]

(a) Individual(s)

Postal Address

\_\_\_\_\_

Email

\_\_\_\_\_

Phone

\_\_\_\_\_ Mobile \_\_\_\_\_ Fax \_\_\_\_\_

(b) Company

Contact Person

Ryan Moseby

Postal Address

135 Boundary Road, RD 2, Gore 9772

Email

kanadaleld@gmail.com

Phone

\_\_\_\_\_ Mobile 027 294 9838 Fax \_\_\_\_\_

## 2. Consultant/ Agent details (if applicable)

Contact person Christina Bright

Company Landpro

Postal Address \_\_\_\_\_

Email christina@landpro.co.nz

Phone \_\_\_\_\_ Mobile 027 231 0749 Fax \_\_\_\_\_

**Note:** All correspondence during the consent process will be directed to this contact person, unless instructed otherwise. Final decision documents will be sent to the applicant.

Are you the owner or occupier at the site?

Yes

No

*If not, please complete the following information*

Name of owner or occupier at the site  
(if different from 1.1.) \_\_\_\_\_

Address of the owner or occupier at the site  
(if different from 1.2.) \_\_\_\_\_

## 2 Site Details

Location of activity (including street/road name, number, and locality)

135 Boundary Road, RD 2, Gore 9772

Map Co-ordinates (NZTM 2000)

1282716E E

4875503N N(NZTM 2000)

Legal description of property at site of activity (refer to land title or rates notice)

Section 1-13 Blk XVII TN of Mataura Bridge, Section 22, 23, 34, 35, 37 Block I Tuturau SD, Section 12, 58 Blk III Tuturau SD, Lot 1 DP 979, Lot 1 DP 7031 Lot 2 DP 15385, Lot 1 DP 565316, Section 41-42 Blk I Tuturau SD, Section 46 Blk I Tuturau SD

**Please attach a map or a coloured aerial photograph, showing at a minimum, the location of the proposed activities.**

**3. Consents required in relation to this proposal:**

*Please tick the box for the consent(s) you are applying for and complete the relevant Part B form(s) where available*

**Water**

<input type="checkbox"/>	Take and use surface water
<input checked="" type="checkbox"/>	Take and use groundwater

<input type="checkbox"/>	Divert water
<input type="checkbox"/>	Dam water

**Land Use**

<input type="checkbox"/>	Bore/ Well
<input checked="" type="checkbox"/>	New or expanded dairy farming
<input checked="" type="checkbox"/>	Intensive winter grazing
<input checked="" type="checkbox"/>	Feed-pad, wintering pad, calving pad or silage pad
<input type="checkbox"/>	Bridges and culverts

<input type="checkbox"/>	Effluent storage
<input type="checkbox"/>	Cultivation
<input type="checkbox"/>	Gravel extraction
<input type="checkbox"/>	Riverbed activity
<input type="checkbox"/>	Tree planting

**Discharge**

<input type="checkbox"/>	To air
<input checked="" type="checkbox"/>	To Land

<input type="checkbox"/>	To water
<input type="checkbox"/>	

**Coastal**

<input type="checkbox"/>	Whitebait stand
<input type="checkbox"/>	Removal of natural materials
<input type="checkbox"/>	Discharge/deposit substances
<input type="checkbox"/>	Reclaim/drain foreshore/seabed
<input type="checkbox"/>	Other coastal activities

<input type="checkbox"/>	Structures/occupation of space
<input type="checkbox"/>	Disturb foreshore/seabed
<input type="checkbox"/>	Commercial surface water activity
<input type="checkbox"/>	Marine farming
<input type="checkbox"/>	

**What is the purpose of this application?**

New resource consent

Renew resource consent

Variation of conditions according to S 127 RMA

Certificate of compliance


Are there any **current** or **expired** consents relating to this proposal?

Yes

No

If yes, please provide consent number(s) and description:

Discharge Permit AUTH-302684-V1 authorises the discharge of discharge dairy shed effluent to land from 745 cows.  
Water Permit AUTH-302685-V2 authorises the taking of groundwater at this farm.  
Land Use Consent AUTH-302686 to built an agricultural effluent storage pond  
Land Use Consent AUTH-302721 for bore construction  
Land Use Consent AUTH-302687 authorised the original conversion to dairy farm at this property

Are any other consents required from Environment Southland or **other authorities**?

Yes

No

If yes, please state the relevant authority and the type of consent(s) required:

Replacement consents for discharge dairy shed effluent to land and to take and use groundwater for the propose of dairy operation and stock drinking water, and increase water needed for stock drinking and dairy shed wash winter, including allowances for dairy support and youngstock stock drinking water.  
New consents sought to use land for dairy farming that was not used for that purpose as of June 2016 and to increase milking cow numbers from 745 to 800 (55 additional cows) (Rule 20 pSWLP); to convert land on farm to dairy farmland that was not used as dairy farmland prior to 2 September 2020 (Regulation 19 NES-F) and to use land for a feed pad (x2 calving pads) (Regulation 14 NES-F; wood chip base).

For what **purpose** is this consent(s) required: (e.g. discharge of effluent, gravel extraction etc.)

See above.

Pre application advise- Have you discussed this proposal with a council staff member?

Yes

No

If yes, please provide name of staff member if known Jade McRae, who undertook a site visit on 1 Aug

Any further comments you would like to advise us about this application?

--

## 5 Assessment of effects on the environment (AEE)

Please complete the applicable Part B form(s) for the proposed activities. For those activities where no Part B form is available, please attach a written statement that assesses the effects that your activities may have on the environment. An assessment of effects **must** include the following information:

- (a) *if it likely that the activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity;*
- (b) *an assessment of the actual or potential effect on the environment of the activity;*
- (c) *if the activity includes the use of hazardous substances and installations, an assessment of any risks to the environment that are likely to arise from such use;*
- (d) *if the activity includes the discharge of any contaminant, a description of—*
  - (i) *the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and*
  - (ii) *any possible alternative methods of discharge, including discharge into any other receiving environment;*
- (e) *a description of the mitigation measures (safeguards and contingency plans where relevant) to be undertaken to help or prevent or reduce the actual or potential effect;*
- (f) *identification of the persons affected by the activity, any consultation undertaken, and any response to the views of any persons consulted;*
- (g) *if the scale and significance of the activity's effects are such that monitoring is required, a description of how and by whom the effects will be monitored if the activity is approved;*
- (h) *if the activity will, or is likely to, have adverse effects that are more than minor on the exercise of a protected customary right, a description of possible alternative locations or methods for the exercise of the activity (unless written approval for the activity is given by the protected customary rights group).*

You should also include:

- (a) *an assessment of the activity against any relevant provisions of any relevant objectives, policies, or rules;*
- (b) *any information specified to be included in the application in accordance with the relevant regional plan;*
- (c) *for an application to replace an existing consent, an assessment of the value of the investment of the existing consent holder:*

An assessment of effects **must** address the following matters:

- (a) *any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects;*
- (b) *any physical effect on the locality, including any landscape and visual effects;*
- (c) *any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity;*
- (d) *any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generations;*
- (e) *any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminants;*
- (f) *any risk to the neighbourhood, the wider community, or the environment through natural hazards or the use of hazardous substances or hazardous installations.*

**6 Affected Parties**

Please attach written approval from parties who may be affected by your activity. *Written Approval of an Affected Party* forms are available on the Environment Southland website. During the processing of your application, Council may determine that additional approvals are required.

**7 Site visit from the Consents Team**

Consents staff are able to meet with you, visit your site and see what you are proposing to do. We find that this is beneficial to everyone involved. The cost of the visit will be included in the total cost of processing your consent. We find that applications that have an on-site visit are processed with less congestion and at a similar or lesser overall cost. We will contact you if we consider a site visit to be advantageous in processing your application.

**8 How much will it cost to process my application?**

Environment Southland’s User Charges and Fees document is available at:

[www.es.govt.nz/fees-and-charges](http://www.es.govt.nz/fees-and-charges)

When the consent has been processed you will receive an invoice for an additional fee, or for a refund.

**User Charges**

Please note that additional Annual User Charges will apply to all consents.

**How to pay**

Environment Southland accepts payment in the forms of cash, Eftpos, or electronic transfer. All electronic transfers must include the applicant’s name and “consent application” as a reference. Please make electronic payments to: Environment Southland, 01-0961-0018998-00 or online at [www.es.govt.nz/online-services/online-payments](http://www.es.govt.nz/online-services/online-payments).

**9 Checklist: Have you included the following?**

<input checked="" type="checkbox"/>	Payment of the required deposit ( <i>see fee schedule</i> )
<input type="checkbox"/>	Written approval from all potentially affected parties ( <i>forms available from the Environment Southland website</i> )
<input checked="" type="checkbox"/>	Site plan/location map/sketch of the proposed activity
<input checked="" type="checkbox"/>	A copy of the Certificate of Incorporation ( <i>where applicant is a company</i> )
<input checked="" type="checkbox"/>	Part B form(s) specific to your activity and/or a separate assessment of environmental effects (AEE)

**Notes:**

- (a) *If your application does not contain the necessary information and the appropriate fee, Environment Southland may return the application.*
- (b) *Under S35 of the Resource Management Act 1991 your application will be publicly available information and subject to the relevant provisions of the Local Government Official Information and Meetings Act 1987.*

**Signature of applicant**

***I hereby certify that to the best of my knowledge and belief, the information given in this application is true and correct.***

***I undertake to pay all actual and reasonable application processing costs incurred by Environment Southland.***

**Name (block capitals)** Christina Bright

**Signed** Christina Bright. **Date** 22/08/2022

***(Signature of applicant or person authorised to sign on behalf of applicant)***



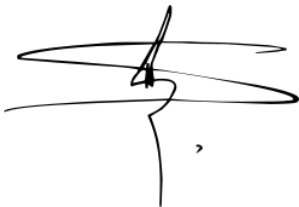
# Certificate of Incorporation

**KANADALE LIMITED**

**4789299**

**NZBN: 9429040984711**

This is to certify that KANADALE LIMITED was incorporated under the Companies Act 1993 on the 29th day of November 2013.



**Registrar of Companies**  
19th day of August 2022





**LANDPRO**

Make the most of your land

**Resource Consent  
Application to Environment  
Southland**

Prepared for Kanadale Ltd

**Prepared For**

Kanadale Ltd

**Prepared By**

Landpro Ltd

13 Pinot Noir Drive

PO Box 302

Cromwell

Tel +64 3 445 9905

## QUALITY INFORMATION

Reference: C:\12dS\data\SERVER2008R2\22272-Kanadale Ltd - Consenting  
Advice\_648\Planning\Kanadale AEE Dairy Expansion.docx  
Date: 22 August 2022  
Prepared by: Christina Bright & Lachlan Bain  
Reviewed by: Mike Freeman  
Client Review: Ryan Moseby  
Version Number: Final

### **Disclaimer:**

*We have prepared this report for our client based on their instructions. They may use it, as agreed between us. Landpro has no duty, and does not make or give any express or implied representation or guarantee, whatsoever to any person other than our client. If you are not our client then, unless this report has been provided to you as a local authority or central government agency as part of a public process:*

- *you have no right to use or to rely on this report or any part of it, and*
- *you may not reproduce any of it.*

*We have done our best to ensure the information is fit for purpose at the date of preparation and meets the specific needs of our client. Sometimes things change or new information comes to light. This can affect our recommendations and findings.*

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# 1. INTRODUCTION

## 1.1 Overview of Proposal

Kanadale Ltd (the applicant) has recently purchased two separate blocks of land adjacent to their existing 352.8 ha dairy farm located generally east of Mataura in Southland. The first, a 58.2 ha block utilised by previous owners as dairy support known as the Murray Block, and the second, a 50.5 ha block utilised by previous owners for sheep and beef grazing, known as the Bastaansian Block. The existing dairy platform is 352.8 ha.

The applicant is proposing to amalgamate these two new blocks into the existing platform, and increase the number of cows by 55, to 800 total.

The applicant's existing dairy farm has the following consents in place:

- Discharge Permit AUTH-302684-V1 authorises the discharge of discharge dairy shed effluent to land from 745 cows. (Expires 27 November 2028).
- Water Permit AUTH-302685-V2 authorises the taking of groundwater at this farm. (Expires 27 November 2028).
- Land Use Consent AUTH-302687 authorised the original conversion to dairy farm at this property. (Granted in perpetuity).

The primary purpose of this proposal is to be more self-contained by wintering cows on farm and growing feed on farm and spread cows over a larger area. The existing milking platform is roughly 1/3 of flat contour with the remaining effective land of rolling contour. Steeper parts of the farm have already been fenced off and retired from milking. By amalgamating the three blocks the Bastaansian and Murray blocks will help to balance the contour of the milking platform.

This application seeks to renew the Discharge Permit and Water Permit that are due to expire 28 November 2028 with changes proposed to reflect system changes. Furthermore, the applicant is seeking new resource consents for the existing calving pad facilities on farm.

The applicant is seeking resource consents that expire on 31 December 2030 to align with the NESF.

Consent is sought for the following:

### **Replacement consents sought:**

- to discharge dairy shed effluent to land, and to discharge effluent via low-rate methods to a new 19 hectares block.
- to take and use groundwater for the propose of dairy operation and stock drinking water, and increase water needed for stock drinking and dairy shed wash winter, including allowances for dairy support and youngstock stock drinking water.

**New consents sought:**

- to use land for dairy farming that was not used for that purpose as of June 2016 and to increase milking cow numbers from 745 to 800 (55 additional cows) (Rule 20 pSWLP)
- to convert land on farm to dairy farmland that was not used as dairy farmland prior to 2 September 2020 (Regulation 19 NES-F)
- to use land for a feed pad (x2 calving pads) (Regulation 14 NES-F; wood chip base).

The following assessment has been guided by pre-application advice from Jade McRae Environment Southland who undertook a site visit on 1 August 2022. The proposal includes the implementation of a wide range of good management practices and mitigation measures which avoid and mitigate adverse effects on the environment. These are described in detail in this proposal and are also included in the landowner's Farm Environmental Management Plan (FEMP) (Appendix A) and Riparian Management Plan (Appendix B).

The report includes nutrient budgets prepared by Miranda Hunter (CNMA) using OverseerFM that shows N and P losses to water would decrease by approximately 0.6% and 6.6% respectively. These reductions are the result of:

- Overall reduction in RSU (4.0% decrease)
- Decrease in peak cows/ha grazed, from 2.7 cows/ha to 2.2 cows/ha.
- Removal of sheep and beef steers
- Decrease in imported feed
- Targeting optimum Olsen P and applying fertiliser to maintenance

The applicant has prepared a mitigation plan that includes the below which are not taken into account in the Overseer estimates:

- Intensive Winter Grazing
  - Less annual forage crop compared to 2014 – 2019 NES-F reference period (52.4 to 37ha proposed over the landholding).
  - During 1 May to 30 September:
    - 10m vegetated (pasture) buffer from all grazing/annual forage crops to freshwater
    - Temporary sediment traps during grazing period using bales in gullies as and when required
    - On slopes >10 degrees a 20 m vegetated (pasture) buffer from grazing/annual forage crops to freshwater
    - On slopes > 15 degrees, direct drill any annual forage crop and use a 20m buffer from the grazing/annual forage crop to freshwater
- A Riparian Management Plan (Appendix B).

Existing environmental improvements on the property (post 2 September) include extensive fencing with variable buffer widths and some riparian planting, retirement of some land and planting of forestry, and sediment traps and ponds built in some gullies to filter runoff. This is outlined in the Riparian Management Plan, Appendix B.



## 1.2 The Applicant

**Applicant Address:** Kanadale Ltd  
135 Boundary Road,  
RD 2, Gore 9772

**Address for Service:** C/- Landpro Limited  
PO Box 302  
Cromwell 9342

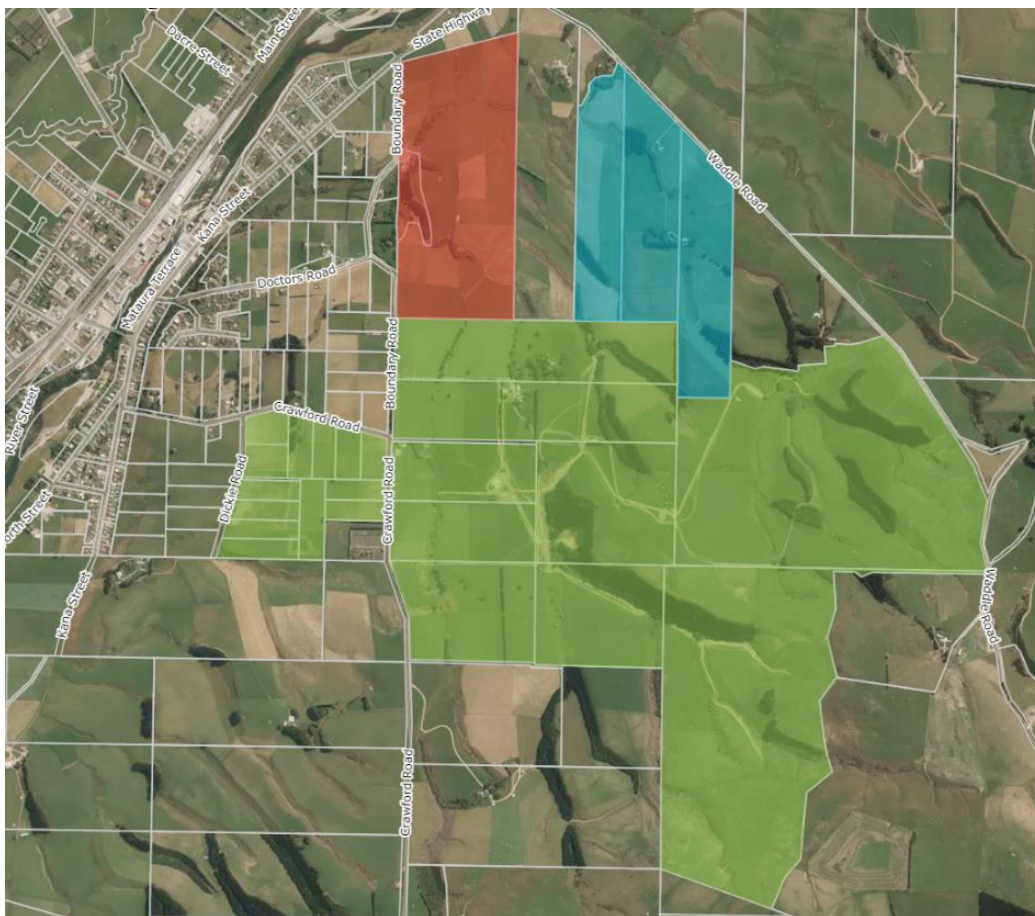
## 1.3 Purpose of Documentation

Under Section 88 of the Resource Management Act 1991 (the RMA), this report provides an assessment of the activities effects on the environment as required by Schedule 4 of the RMA.

# 2. DETAILS OF PROPOSAL

## 2.1 Location

The farm is accessed from Boundary Road, near Mataura (Figure 1). The existing dairy farm (green in Figure 1) as well as the new land to be added are shown in the figure below where red is the Bastaansian Block and blue the Murray Block. The dairy shed is generally located at NZTM 2000 1282716E 4875503N.



**Figure 1: Location of farm in relation to Mataura (left of image), and the two blocks of land proposed to be added to the dairy platform (red is the Bastaansian Block and blue the Murray Block).**

## 2.2 Farm Description and History of Permits

The property operated as a dairy farm in the 1920-30s and was re-converted to dairy in 2013 after being a sheep farm and was granted 15-year consents for 650 cows and to abstract groundwater for a dairy operation. The existing consents (discharge and water) have been varied over time, with both consents transferred from K C and S C Moseby to Kanadale Ltd on 14 May 2014.

The property has been a part of this family for multiple generations. The current landowners, Ryan and Abby Moseby, were the recipients of the regional supreme Ballance Farm Environmental award in 2018.

The original conversion made allowances within the effluent disposal system for up to 850 cows, as further expansion was anticipated. In 2014 an additional 29 ha was purchased and added to the existing platform. At this time, the discharge permit was varied to increase the milking herd from 650 to 745 cows.

The proposed expansion subject to this application has therefore been well considered by the applicants and the existing systems on farm can milk the additional 55 cows as proposed.

The sale and purchase agreement for the Bastaansian Block was completed in October 2020 and was used by previous owners as a sheep and beef block. The sale and purchase agreement for Murray Block was completed in April 2021 and was used by previous owner for dairy support.

Since taking over the blocks several improvements have been made and this forms part of the mitigation plan for the proposed dairy expansion. This is detailed in the Riparian Management Plan, included in Appendix B.

## 2.3 Details of Consents and Proposal

### 2.3.1 Land Use Consent for Farming (Proposed Expanded Dairy Activities)

Table 1 summarises the land to be amalgamated into the existing platform.

**Table 1: Overview of land areas.**

Farm Details		
Address	135 Boundary Road, RD 2, Gore 9772	
NZTM2000	1282716E 4875503N (dairy shed)	
	<b>Current</b>	<b>Proposed</b>
Legal Description	Section 1-13 Blk XVII TN of Mataura Bridge Section 22, 23, 34, 35, 37 Block I Tuturau SD Section 12, 58 Blk III Tuturau SD Lot 1 DP 979 Lot 1 DP 7031 Lot 2 DP 15385	Same as current plus:  <u>Murray Block</u> Lot 1 DP 565316 Section 41-42 Blk I Tuturau SD <u>Bastaansian Block</u> Lot 1 DP 1109 Section 46 Blk I Tuturau SD
Total farm area	352.8 ha	461.5 ha Existing platform, plus Murray block – 58.2 ha total (50.8 ha effective); Bastaansian block – 50.5 ha total (43.0 ha effective)
Dairy platform (effective land area)	277 ha	370.8 ha
Cow numbers	745	800
Cows/ha	2.7	2.2
RSU	8,974	8,609 (4 % reduction)
Winter Crop	2014 – 2019 NES-F <ul style="list-style-type: none"> <li>• Platform 38.9 ha</li> <li>• Murray Block 11.6 ha</li> <li>• Bastaansian 1.9 ha</li> </ul> TOTAL 52.4 ha	37 ha

Summary of matters that relate to the land use consent for farming sought under this proposal:

- The use of 370.8 ha of land for dairy farming.
- Milking up to 800 dairy cows twice per day.
- The use of two calving pads, for no more than 120 cows during period 1 May to 30 September for calving, and during adverse weather conditions.
- Intensive Winter Grazing of 37 ha of winter forage crop.
- The consent holder has a Farm Environment Management Plan that is appended to this application (Appendix A).

### 2.3.1 Intensive Winter Grazing

The applicant proposes to continue intensive winter grazing practices across the new landholding, albeit over a reduced area.

Rule 20(a)(iii)(3) of the PSWLP lists practices that must be implemented to meet the permitted activity Rule 20(a)(iii) where IWG forms part of the farming activity on a landholding.

The proposed 37ha of winter forage crop is <15% (and less than 100ha) of the property area, therefore the area of winter crop complies with Rule 20 of pSWLP.

All matters under Rule 20 (a)(iii)(3) are met:

- (A) slope – stock are progressively grazed (break-fed or block-fed) from the top of the slope to the bottom, or a 20 metre 'last-bite' strip is left at the base of the slope
- (B) Stock are back-fenced during break/block fencing;
- (C) transportable water troughs are provided in or near the area being grazed or grazing plan and crop placement considered the location of permanent water troughs;
- (D) Baleage straw or hay are placed in portable feeders;
- (E) Mobs are cattle are no greater than 120 cattle; and
- (F) critical source areas (including swales) within the area being grazed that accumulate runoff from adjacent flats and slopes are grazed last.

The National Environmental Standard for Freshwater includes matters related to IWG. Under the NESF resource consents (land use consent and discharge permit) are required after 1 November 2022 under Subpart 3.

The 37ha of IWG on the applicant's landholding does not exceed the greater of 50 ha or 10% of the farm area, (Regulation 26(4)(a)).

Regardless of 26(4)(a), there are other key provision is Regulation 26 which relate to pugging, ground cover, slope, and critical source areas. The applicant is proposed to graze slopes over 10 degrees, and therefore requires resource consent under the NES-F for the IWG occurring on the landholding.

### 2.3.2 Discharge Permit

Effluent collected at the dairy shed is gravity feed to a stone trap. Effluent then drains to a synthetically lined effluent pond with leak detection system and stirrer (Figure 2). The pond is approximately 45.5 m x 45.5 m x 3 m, with a storage capacity of 4,717 m<sup>3</sup>. The stone trap is cleaned out regularly, with any solids applied to land as a permitted activity. The stone trap is HYNDS, 3 x 4 by 1m depth, at its deepest part, and holds 12 m<sup>3</sup>.

K-line pods are used to apply effluent, and a failsafe device is fitted at the pump (senses pressure and cuts off if the pressure is too high or too low) to minimise the risk of leaks.

There are two calving pads not connected to the effluent system, with a wood-chip base. There is one silage pad, not connected to the effluent system.

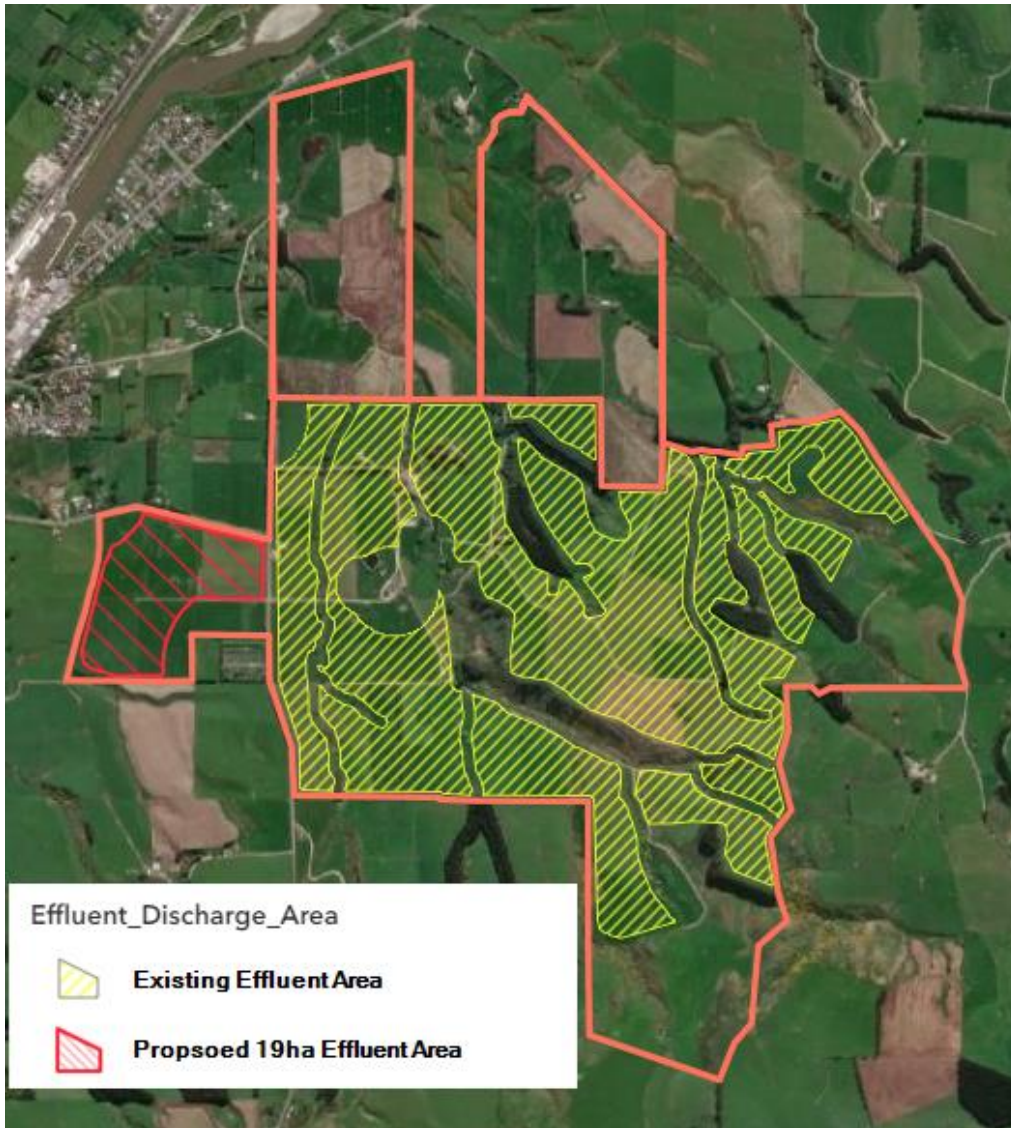
The applicant is proposing to increase the discharge area by 19 ha (estimated with buffers applied) (Figure 3). There is a duct at the underpass which was installed at the time the underpass was to allow future extension of the effluent area.

**Table 2: Effluent and Discharge activities**

Discharge Permit Details	
Permit no.	AUTH-302684-V1
Number of dairy cows	745 (800 proposed)
Winter milking	Nil, expect for early/late milkers and slipped cows.
Wintering barn	Nil
Other sources of effluent	2x calving pads; 1x silage rock pad (neither are connected)
Type of shed	Rotary
Effluent treatment	Stone trap to effluent pond with stirrer.
Storage available	4,717 m <sup>3</sup> (effective 3,725 m <sup>3</sup> )
Storage required (90%) DESC	3,555 m <sup>3</sup> (Appendix D) (for 800 cows)
Disposal area	171.7 ha (Figure 3) Proposed 19 ha once estimated buffers applied – TBC Environment Southland GIS team (Figure 3)
Irrigator	K-line pods Contingencies: Slurry tanker and Umbilical - Proposed
Application rate and depth	10 mm depth; rate not exceeding 10 mm/hour (k-line) 10mm depth – umbilical 5mm depth - slurry



**Figure 2: Effluent system overview.**



**Figure 3: Effluent discharge area, 171.7ha, plus 19ha proposed.**

### 2.3.3 Water Permit for Dairy Operation

Water is abstracted for the stock drinking needs and washdown needs by way of Bores F46/0965 and CF12/5003. These bores are located on the applicant's own property, and Table 3 summarises the relevant details of the water abstraction activity. As part of this proposal the applicant is seeking to increase their peak daily water allowance to 140 L/cow/day, whilst the seasonal use will be based on 120 L/cow/day.

**Table 3: Water take for dairy operation activities.**

Water Permit Details		
Permit no.	AUTH-302685-V2	
Groundwater Zone	Lower Mataura; unclassified.	
Bore	F46/0965 CF12/5003	
Location of point of take NZTM 2000	F46/0965 1282746E 4875509N CF12/5003 1282745E 4875940N	
	Current - 745 cows	Proposed – 800 cows
Rate of take	2 l/s	2 l/s
Daily volume	89,400 L/day	130,900 L/day <i>800 milking herd, plus peak 420 calves/yearlings peak daily drinking water during milking season.</i>
Annual volume	32,631 m <sup>3</sup> /year	38,252 m <sup>3</sup> /year <i>Includes allowance for stock on farm year-round. Made up of 800 dairy cows; 23 breeding bulls; Anywhere from 100 to 420 dairy replacements (calves and yearlings.)</i>
Allocation per cow	120 L/cow/day	<u>Daily</u> 140 L/cow/day – daily peak for dairy cow 45 L/cow/day – daily peak for calves and yearlings. <u>Seasonal</u> 120 L/cow/day – dairy cow, annually on average 45 L/cow/day all other stock types, annually on average

**Table 4: Summary of groundwater zone allocation - Aquifer allocation as at 10/03/2022.**

	RWPS	PSWLP
Discretionary Allocation Limit	24,800,000 m <sup>3</sup> /year	34,980,000 m <sup>3</sup> /year
Currently Allocated	2,245,797 m <sup>3</sup> /year	1,991,329 m <sup>3</sup> /year
Currently Allocated (% of Discretionary Allocation Limit)	9%	5.7%
Proposed 5,494 m <sup>3</sup> /year increase as % of available allocation	<0.0003%	<0.0002%

### 2.3.4 Calving Pads

There are two small calving pads on the property which are used during the calving season to hold cows overnight during periods of wet weather, and for up to 24 hours at a time during calving. No more than 120 adult cattle will be present on either feed pad at any one time. There is 500 mm of woodchip laid over the base of the calving pads. The pads are not connected to the effluent system.

Both pads do not meet the permeability thresholds specified in the NES-F for stockholding areas, and consents are required.

- Calving pad 1: NZTM 2000 1282296E 4875867N
- Calving pad 2: NZTM 2000 1282740E 4875875N

The two pads each are permitted activities under Rule 35A of the pSWLP. I note calving pad 1 is located adjacent to the road boundary, however, is >20m from the neighbouring landholding, and >200m from the dwelling on that landholding. Calving pad 2 is located approximately 52-55m from a nearby creek.



**Figure 4: Calving pad 1 located at entrance to tanker track under trees/shelter belt.**



**Figure 5: Calving pad 2 with fresh wood chip prior to calving 2022, located near implement yard.**



## 2.4 Compliance

### Discharge Permit AUTH-302684-V1

The consent holder has been fully compliant. The compliance records note the pond has good freeboard, underpass tidy, pods well set up, and a tidy system on routine inspections.

### Water Permit AUTH-302685-V2

The consent holder has generally been fully compliant, only minor non-compliance relates to late return of water abstraction records.

## 3. ACTIVITY CLASSIFICATION

### 3.1 Consents Required

The following resource Consents are required under the Regional Water Plan for Southland, 2010 (RWPS) and Proposed Southland Water and Land Plan, 2018 (PSWLP).

**Table 5: Consents required and applicable rules.**

Consent	Plan	Rule	Activity Status
Discharge Permit – to discharge agricultural effluent to land	RWPS	50(d)	Restricted Discretionary
	PSWLP	35(b)	Restricted Discretionary
Water Permit – to take and use groundwater for dairy operation	RWPS	23(d ii)	Discretionary
	PSWLP	54(d)	Permitted
Land Use Consent – to use land for calving pad	NES-F	Regulation 14	Discretionary
Land Use Consent and associated Discharge Permit – to use land for expanded dairy farming and intensive winter grazing	RWPS	17A	Not applicable
	PSWLP	20(e)	Restricted Discretionary
	NES-F	Regulation 19, 24, 27	Discretionary
RWPS – Regional Water Plan PSWLP – Proposed Stoutland Water and Land Plan NES-F – National Environmental Standard for Freshwater			

**Effluent Discharge** - The applicant is proposing to discharge agricultural effluent via low-rate methods to Category C soils (relevant under RWP only). The discharge is the replacement of an existing discharge consent and is covered under sections 124-124C of the RMA, and the existing resource consent specifies the maximum number of cows.

The proposed increase in effluent discharge area by 19ha is onto a multiple risk soil classified Category A and C. Discharge will be using the same low-rate pods, and be 10 mm depth; rate not exceeding 10 mm/hour. There is no part of Rule 50(d) that excludes application using low-rate method to Category C soils.

**Groundwater for stock drinking water and dairy operation** - The applicant is proposing to abstract groundwater from the Lower Mataura groundwater zone which is within primary allocation limits with a low

rate of take, 2 l/s.

**Calving pads** – There are two calving pads on farm that do not meet the permeability thresholds specified in Regulation 13 of the NES-F. As the activity can currently not be undertaken in accordance with a certified freshwater farm plan, and the two wood-chip pads do not comply with all conditions under 13(4), the calving pads require resource consent. The two pads each are permitted activities under Rule 35A of the pSWLP. I note calving pad 1 is located adjacent to the road boundary, however, is >20m from the neighbouring landholding, and >200m from the dwelling on that landholding. Calving pad 2 is located approximately 52-55m from a nearby creek.

**Expanded dairy** – the applicant is proposing to include an additional 109 ha within the existing dairy platform, and increase cow number by 55, to a total of 800 milking cows. The land area of the dairy platform and the number of cows will therefore be greater than at 3 June 2016, requiring resource consent under Rule 20. The applicant proposes to cultivate annual forage crop on slopes >10 degrees and graze these crops during the period 1 May to 30 September, and therefore requires resource consent for intensive winter grazing.

The inclusion of 109 ha into the milking platform does not meet the permitted activity conditions under Regulation 18 of the NES-F, and the total area of dairy farmland will be greater than it was at the close of 2 September 2020 by more than 10 ha. The applicant’s proposal to graze slopes of 10 degrees does not meet all of the conditions under Regulation 26 (4) and therefore requires resource consent.

**Discharge permit**– a discharge permit is required for the discharge of contaminants to land associated with the use of land for dairy farming that was not used as dairy farmland prior to 2 September 2020.

### **Bundling**

Overall, the proposal is ‘bundled’ to be treated as a **discretionary activity**.

## **3.2 Consents Not Required**

In accordance with Schedule 4 of the RMA, an application must describe and demonstrate compliance with any permitted activity that is part of the proposal to which the application relates.

**Table 6: Activities for which Consent is Not Required.**

<b>Activity</b>	<b>Plan and Rule</b>	<b>Compliance with the relevant permitted rules of the RWPS and PSWLP</b>
Use of land for the maintenance and use of an existing agricultural effluent storage facility	RWPS	The use of land for the maintenance and use of the existing agricultural storage facility (includes tanks, weeping walls, sumps and stone traps etc) that was authorised before 4 April 2018 is a permitted activity providing the construction of the facility was authorised by a resource consent. Consent number: AUTH-20146342-03.
Incidental discharges from farming	PSWLP Rule 24	The land use associated with this discharge will be authorised under PSWLP Rule 20.

Activity	Plan and Rule	Compliance with the relevant permitted rules of the RWPS and PSWLP
Fertiliser	RWPS Rule 10 PSWLP Rule 14	All practicable measures will be taken to minimise fertiliser drift beyond the target areas. Fertiliser will be applied to selected areas of the farm in accordance with nutrient budget recommendations, and soil tests to avoid excess leaching of nutrients to groundwater. Fertiliser will be applied when a soil water deficit exists, and all waterways will have riparian margins with stock excluded.
Silage storage and silage leachate	RWPS Rule 51 PSWLP Rules 40 & 41	All silage storage facilities are located away from sensitive receiving environments, in accordance with permitted rule setbacks and no direct discharge of silage leachate to any waterbody is proposed.
Sludge	PSWLP Rule 38	Solid sludge effluent collected from the sumps and effluent pond will be laid out to dry before applying to land when conditions are suitable, observing appropriate separation distances, and there will be no disposal of solids to any waterway.
Cleanfill, Farm Landfills and Offal Holes	RWPS Rules 53, 54 & 55  PSWLP Rules 42 & 43	No more than 500 m <sup>3</sup> of material will be discharged within cleanfill sites. Stormwater will be directed away from fill areas and no unauthorised material will be placed into proposed fill areas. No naturally formed limestone rock is known to reside within the property. Excavation of fill holes do not intercept springs and are not below the seasonal mean groundwater level in that location. Sensitive areas can be easily avoided when undertaking these associated activities.
Drainage of Land (Rule 9 RWPS & Rule 13 pSWLP)	RWPS Rule 9 PSWLP Rule 13	It is not anticipated that any discharge from subsurface drains would result in a conspicuous change to the colour and/or clarity of the receiving waters at a distance of 20 metres from the point of discharge. The proposed good management practices will significantly reduce the likelihood of any contaminants reaching the subsurface drains.

### 3.3 National Environmental Standards for Freshwater

The Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (referred to here as the NESF). The NESF regulates activities that pose risks to the health of freshwater and freshwater ecosystems.

Assessment of consent required under the NES-F is provided above. The below covers activities for which no consents are needed.

- There is no irrigation of dairy farm land.
- Application of synthetic nitrogen complies with the 190 kg/ha/year cap.
- Intensive Winter Grazing, see Section 2.3.1.

Regulation 26A and 26B of the NES-F were introduced on 1 May 2022. The applicant proposes to ensure that adverse effects on waterways from pugging is minimised, and groundcover will be re-established were as soon as practicable after livestock have finished grazing. This is further addressed in the GMPs included within the applicant's Farm Environmental Management Plan.

## 4. DESCRIPTION OF EXISTING ENVIRONMENT

### 4.1 Farm Environment Summary

Land Use, Topography and Climate				
<b>Surrounding Land Use</b>		Other dairy farms, agriculture, and rural dwellings.		
<b>Topography and Slope</b>		100 m above mean sea level; Rolling		
Physiographic Zones and Soils				
Soils		Soil vulnerability factors		
		Structural Compaction	Leaching	Waterlogging
	Heretaunga	High	Low	Very Low
	Wyndham	High	Low	High
	Otarua	Low	Low	Low
	Eureka	High	Very Low	High
<b>FDE land classification</b>		C – Sloping Land, multiple risk		
<b>Physiographic Zones</b>		Bedrock/hill country – overland flow variant Oxidising – overland flow variant		
Hydrology and Water Quality				
<b>FDE risk - groundwater</b>		Moderate		
<b>FDE risk - surface water</b>		Moderate		
<b>Surface Water Management Zone</b>		Lower Matura		
<b>Surface Waterways on farm</b>		Unnamed tributaries the Matura River		
<b>Water Quality pSWLP</b>		Matura 3, northern and western property boundary, Lowland hard bed		
<b>Groundwater Management Zone</b>		Lower Matura		
<b>Groundwater Estimated TON</b>		1.0 - 3.5 mg/l at 7 m below ground level		
<b>Estuary</b>		Toetoes Bay		
<b>Swimmability</b>		There are no toxic algae alerts, or popular bath sites (as per Appendix G of the PSWLP) in the Matura River catchment at or downstream of the subject site.		
<b>Drinking water supplies</b>		The emergency Matura Township water take is located on the property. This is a surface water take from one of the waterways on the property, with water treated at the Matura Water Treatment Plant. The applicant has worked with the Gore District Council to ensure the farming activities do not negatively affect the drinking water take. This emergency take is set to be decommissioned in future.		
<b>Instream values</b>		A search of the New Zealand Freshwater Fish Database (NZFFD) revealed no surveys have been completed on the property. The nearest downstream water quality monitoring site is the Matura River 200m downstream of the Matura Bridge.		

## 4.2 Soils and Physiographic Zone

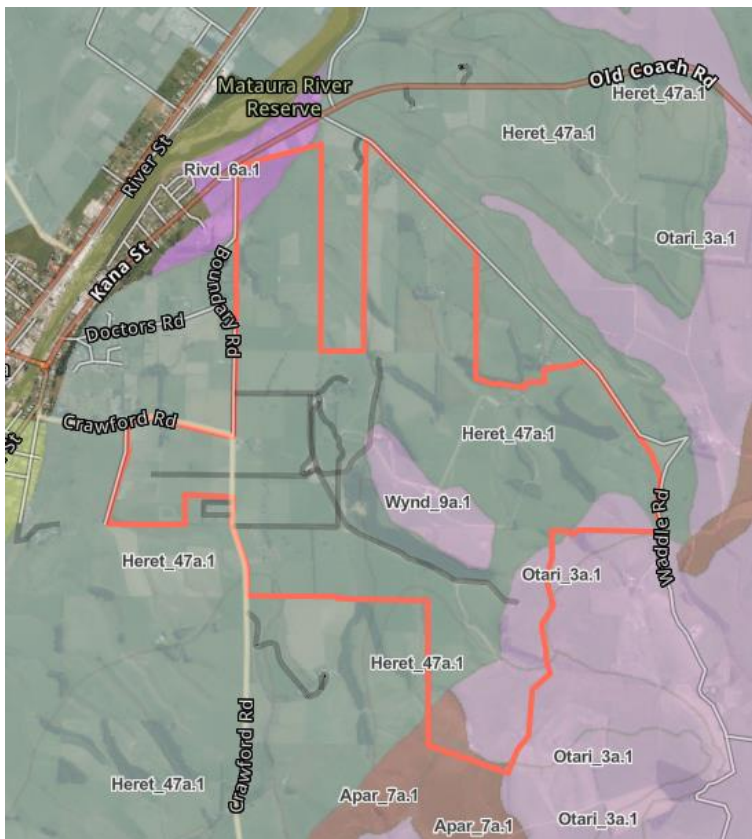


Figure 6: Environment Southland Topoclimate Soils. (Source Data: Beacon).

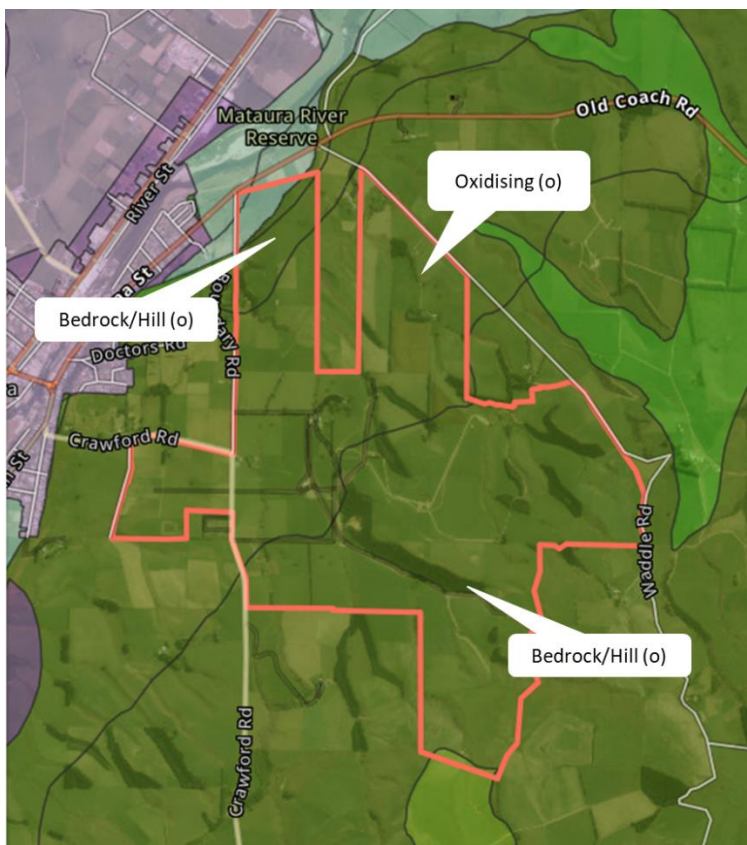


Figure 7: Environment Southland Physiographic Zone (Source Data: Beacon).

## 4.3 Water Quality Receiving Environment

### 4.3.1 Groundwater

The general state and trend of groundwater quality within 5 km of the applicant's farm is summarised in Table 7. There are 151 bores located within a 5 km radius of the applicant's farm bore (E44/0361) that are located within the Lower Mataura Groundwater Management Zone; 34 bores have water quality data, 10 bores have been sampled >10 times. The applicant's bores do not feature in the water quality records.

Within a 5 km radius bore uses vary from dairy operation and stock supply, domestic supply, domestic use, geological research, geotechnical/foundation investigations, and commercial.

**Table 7: Summary of median water quality data for bores within a 5 km radius of the applicant's abstraction bore.**

	Date of data collection	Nitrogen - Nitrate (mg L <sup>-1</sup> )	TON (mg L <sup>-1</sup> )		Total Ammoniacal-N (mg L <sup>-1</sup> )	Dissolved Reactive Phosphorus (mg L <sup>-1</sup> )
			nitrite nitrogen+	nitrate nitrogen		
All bores within 5 km of [E44/0965] (median of all data from all bores)	1998 – 2021	4.4	4.75		0.03	0.01

*Data reported does not include samples below analytical detection limit.*

The results of groundwater monitoring of the bores included within Table 7 suggest that actual TON (nitrite-nitrogen + nitrate-nitrogen) is aligned with the modelled estimates included on Environment Southland's online GIS platform, Beacon. Levels of Nitrate-Nitrogen are less than the drinking water Maximum Acceptable Value (MAV) of 11.4 mg/L.

### 4.3.2 Surface water

The nearest State of the Environment (SOE) monitoring site to the property is the Mataura River 200 metres downstream of Mataura Bridge.

**Table 8: Summary of State and Trend at the Mataura River 200 metres downstream of Mataura Bridge LAWA SOE monitoring site.**

LAWA WQ Indicators	State	NOF Band	5-year Median	LAWA 10-year Trend
<i>E.Coli</i>	In the worst 25% of all sites	E – For more than 30% of the time, the estimated risk is $\geq 50$ in 1000 ( $>5\%$ risk). The predicted average infection risk is $>7\%$	1,150 (n/100ml)	Likely Improving
Clarity	In the worse 50% of all sites	N/A	1.07 (m)	Indeterminate
Nitrate-nitrogen	In the worst 25% of all sites	B – Some growth effect on up to 5% of species.	0.9 (g/m <sup>3</sup> )	Not assessed
Ammoniacal N	In the worst 25% of all sites	B – 95% species protection level: Starts impacting occasionally on the 5% most sensitive species.	0.0415 (g/m <sup>3</sup> )	Very likely degrading
Dissolved Reactive P (DRP)	In the best 50% of all sites	B - Ecological communities are slightly impacted by minor DRP elevation above natural reference conditions.	0.01 (g/m <sup>3</sup> )	Very likely improving

### 4.3.3 Estuary

The farm is bordered by the Mataura River in the southwest, with several unnamed tributaries of the Mataura River also originating on the farm. The small tributaries converge with the Mataura River, which flows south draining to the Awarua Plain and into Fortrose (or Toetoes) Harbour. The Fortrose/Toetoes Harbour as well as the lower Mataura River are determined regionally significant/sensitive in Appendix A of the PSWLP.

Section 3.11 in the Regional Coastal Plan describes the key values for the Toetoes Estuary. The tidal flats are an important component of the Awarua Wetland complex which has been nominated for designation as a Wetland of International Importance. The estuary provides significant habitat for juvenile and adult flatfish and is a breeding ground for the collective whitebait species. Recreation is important in the harbour with approximately 250 whitebait stands, with most whitebaiting in the area being non-commercial<sup>1</sup>.

Toetoes estuary is a medium-sized (~500 ha) tidal river estuary with a short residence time. It has a large

<sup>1</sup> Environment Southland. (2013). Regional Council Plan for Southland.

[https://www.es.govt.nz/repository/libraries/id:26gi9ayo517q9stt81sd/hierarchy/about-us/plans-and-strategies/regionalplans/coastal-plan/documents/coastal\\_plan\\_december\\_2013.pdf](https://www.es.govt.nz/repository/libraries/id:26gi9ayo517q9stt81sd/hierarchy/about-us/plans-and-strategies/regionalplans/coastal-plan/documents/coastal_plan_december_2013.pdf)

freshwater influence due to the relatively large flows from both the Mataura River and the Titiroa Stream compared to the estuary size. Water quality within the estuary is poor, with faecal coliform levels for shellfish gathering frequently being exceeded, and levels for contact recreation sometimes being exceeded<sup>1</sup>.

A broad scale habitat mapping survey was carried out by Stevens (2018)<sup>2</sup> indicating that since 2003 the estuary has been in a moderate but declining condition with an increased muddiness, persistent high density macroalgal beds and an increase in gross eutrophic zones (from 0 to 9 ha, or 3.7 % of the estuary). The Regional Coastal Plan<sup>2</sup> has identified the principal issue within the estuary to be '*The level of faecal coliforms and nutrients within the estuary waters is too high due to contamination from domestic, industrial and rural point and non-point sources entering the rivers.*'

The proposed dairy effluent discharges are about 45 km north of the Toetoes Estuary.

#### 4.3.4 Cultural Values

Ngai Tahu has a strong association with the Mataura River and Schedule 42 of the Ngāi Tahu Claims Settlement Act 1998 details the Statutory Acknowledgement Area for the Mataura River. The Mataura River was an important mahinga kai, noted for its indigenous fishery. The Mataura Falls were particularly associated with the taking of kanakana (lamprey). The tūpuna had considerable knowledge of whakapapa, traditional trails and tauranga waka, places for gathering kai and other taonga, ways in which to use the resources of Mataura, the relationship of people with the river and their dependence on it, and tikanga for the proper and sustainable utilisation of resources. All of these values remain important to Ngāi Tahu today.

Te Tangi a Tauira is the Natural Resource and Environmental Iwi Management Plan developed by Ngāi Tahu ki Murihiku for the Southland region and discussed further in later sections of this report.

Hokonui Rūnanga are one of the 18 Papatipu Rūnanga that make up Te Rūnanga o Ngāi Tahu, the Iwi Authority that represents Ngāi Tahu whānui. The area that Hokonui Rūnanga hold mana whenua status for centres on Māruawai – the floodplains of the Mataura River, encompassing the modern-day township of Gore – and includes shared interests in the lakes and mountains between Whakatipu-Waitai (near Martins Bay) and Tawhitarere with other Murihiku Rūnanga, and those located from Waihemo southwards.

The subject site is located within this area, near Mataura, and therefore the applicant has provided details of the application to Hokonui Rūnanga and Ngāi Tahu and has expressed interest in discussing the application with them and has sought feedback.

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<sup>2</sup> Stevens, L. M. 2018. *Fortrose (Toetoes) Estuary 2018: Broad Scale Habitat Mapping*. Report prepared by Wriggle Coastal Management for Environment Southland. 50p.



## 5. NON-NOTIFICATION & CONSULTATION

A consent authority has the discretion whether to publicly notify an application unless a rule or National Environmental Standard (NES) precludes public notification (in which case the consent authority must not publicly notify) or section 95A(2) applies.

The AEE included within this report demonstrates that the effects of the activities will be no more than minor.

There are no rules or NES' which require the public notification of the application. In addition, there are no special circumstances relating to the application.

Clause 6(1)(f) of Schedule 4 of the RMA requires the identification of, and any consultation undertaken with, persons affected by the activity. We consider that the evidence on adverse effects would justify non-notification or limited notification to Hokonui Rūnanga and Ngāi Tahu. However, the applicant appreciates there is public interest in applications of this nature and understands that Environment Southland has indicated that such applications (additional dairy platform land and additional cows) should be publicly notified. **Therefore, to enhance the efficiency of the process, as the proposal is for expanded dairy activities, including additional land and cows, the applicant requests public notification.**

Prior to submitting the application, the applicant advised Hokonui Runanga and Ngāi Tahu and is in the processes of endeavouring to obtain feedback on any concerns that might exist for the current proposal.

We anticipate that the mitigations proposed as part of this proposal will address concerns in relation to managing critical source areas and minor land use intensification.

## 6. ASSESSMENT OF ENVIRONMENTAL EFFECTS

In addition to the application being made in the prescribed forms and manner, Section 88 of the RMA also requires that every application for consent includes an assessment of the effects of the activity on the environment as set out in Schedule 4 of the RMA.

**For ease of assessment, common assessment matters across activities for which consent is sought, and those related to water quality are discussed under Section 6.6 – Assessment of Effects that relates to the dairy expansion. The purpose of doing this has been to avoid duplication across multiple sections.**

### 6.1 Assessment of Alternatives

Schedule 4 of the RMA requires that an assessment of environmental effects must include a description of any possible alternative locations or methods for undertaking the activity if it is likely that the activity will result in any significant adverse effect on the environment and/or if the activity includes the discharge of contaminants. None of the activities described in this report would result in significant adverse effects on the environment and so this assessment of alternatives considers the proposed discharge of FDE only.

### **Method of Discharge**

Deferred effluent application methods will be utilised on the property to ensure that effluent is only applied when conditions are suitable. The applicant has intentionally sized the treatment and storage system larger than required to ensure capacity for deferred irrigation. This decision was made at time of conversion in 2014. There are no other practicable environmentally acceptable alternatives to applying FDE to land.

### **Receiving Environment**

Discharging effluent to land, if conducted appropriately, enables the reuse of a waste product as a soil conditioner and provides nutrients for plant growth. Attenuation of contaminants cannot occur if effluent is discharged directly to water and is therefore considered unsuitable. Direct discharge to water would almost certainly be more detrimental to the receiving environment than discharging to land.

Overall, the proposed discharge methods and receiving environment are the most suitable for managing the FDE generated at the farm.

### **Intensive Winter Grazing**

The alternatives to winter grazing animals on crops over winter include the use of 'stand-off' structures, or pasture-based grazing. However, these options require significant investment, and are heavily reliant on supplementary feed.

## **6.2 Discharge of Agricultural Effluent**

### **6.2.1 Effluent Application Area, Rate and Timing**

The applicant intends to use the existing land disposal system (low-rate pods) and proposes to use a slurry tanker and/or umbilical system as contingency measures.

The applicant does not propose to change the current maximum application rate, 10mm/hr or maximum 10mm depth for low-rate irrigator.

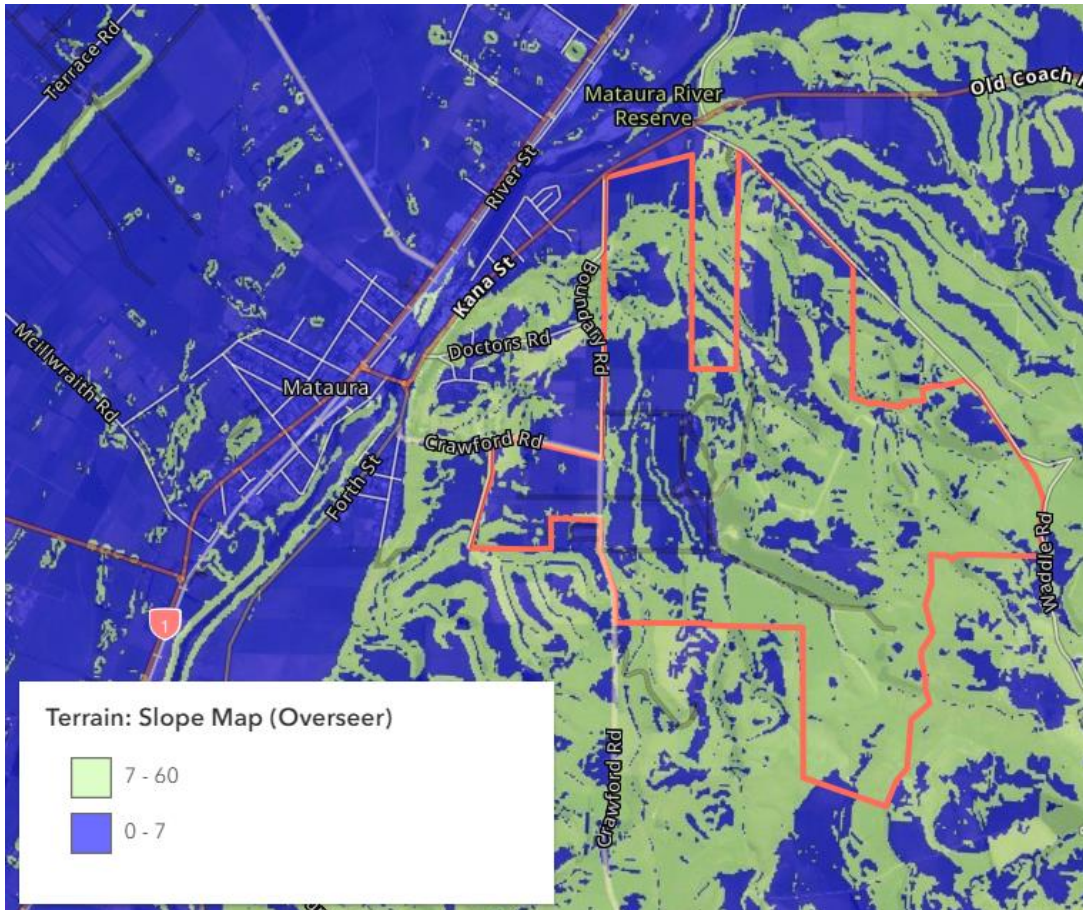
The application proposes to increase the effluent disposal area by 19ha and utilise the land west of the existing underpass.

The DairyNZ "Pocket guide to determine soil risk for farm dairy effluent application" indicates that for FDE classification Type C, sloping land, applications of this nature are appropriate and meet the requirements of the existing discharge permit.

There are pockets of land on the property where slopes are <7 degrees, see Figure 8.

The applicant's Farm Environmental Management Plan details the GMPs used to manage effluent storage and application.

The depth of application and assimilation in the topsoil will ensure that an appropriate separation distance to subsurface drains is maintained.



**Figure 8: Slope map for Kanadale Ltd that shows areas within the farm boundary less than 7 degrees in slope (blue) (Source: Esri Terrain: Slope Map).**

### 6.2.2 Storage

Effluent storage at the farm consists of a synthetically lined pond with pumpable volume of 3,725 m<sup>3</sup> and a stone trap. The existing effluent storage facilities will remain in use on farm to allow for continued deferred storage of FDE generated.

The Dairy Effluent Storage Calculation (DESC) calculation included in Appendix D shows the 90%ile liquid effluent storage is required to enable effective deferred irrigation of effluent generated from up to 800 cows is 3,555 m<sup>3</sup>.

The existing pumpable storage volume 3,725 m<sup>3</sup> (total storage 4,717 m<sup>3</sup>) is therefore adequate to store the 90%ile storage volume required, although good management is essential for liquid effluent of this quantity.

A pond drop test was not considered necessary as the pond was constructed with resource consent and has a leak detection system, and the stone trap is <35 m<sup>3</sup> in capacity. The applicant is happy for a pond drop test condition to be imposed.

### 6.2.3 Nutrient Loading

Effluent calculations for the current system have been carried out using DESC (Appendix D) and indicates that the current farm system will produce around 14,500 m<sup>3</sup> of FDE per year. This equates to 76 m<sup>3</sup>/ha/yr based

on an irrigation area of 190.7 ha (171.7 ha + 19ha proposed). Using DairyNZ (2010) guideline N concentration of FDE of 0.45 kg/m<sup>3</sup>, this equates to an areal loading of 34 kg N/ha/yr and equates to 23% of Environment Southland's (ES) recommended maximum areal rate of 150 kg N/ha/yr and is significantly less than the limit imposed by current consent conditions.

Under the current scenario, for 745 cows, 14,000 m<sup>3</sup> of per year is produced or 38.3 m<sup>3</sup>/day. This has a loading rate of 36.8 kg N/ha/year or 25% of Environment Southland's (ES) recommended maximum areal rate of 150 kg N/ha/yr. Therefore, the use of 19 ha has a positive effect of nitrogen loading from effluent on the landholding.

ES's recommended maximum areal rate of 150 kg N/ha/yr is supported by the 2009 report for Environment Southland by AgResearch<sup>3</sup> that recommended the maximum N load as a management criterion to avoid direct losses of land-applied FDE. Given that the proposed areal loading is a fraction of the limit recommended by AgResearch, land-applied FDE nitrogen leaching will be within acceptable limits.

FDE can be used as an organic fertiliser and nutrients are released more slowly than they are from inorganic fertilisers and this slow-release method reduces the risk of nutrient leaching. Overall, the effluent disposal system of the proposed system, as described above allows the effluent to be used as both a fertiliser and soil conditioner with a lower risk of nutrient leaching than inorganic fertilisers.

#### 6.2.4 Disposal Area

A total proposed disposal area of 190 ha provides a disposal area to stock ratio of 23.8 ha/100cows. The increase in the disposal area retains the same ha/100 cows as the current scenario. Furthermore, this is significantly greater than the recommendation of 4 ha/100 cows. The available disposal area is also greater than the minimum required in ES's Best Practice Guidelines, which is 8 ha/100 cows.

Effluent will not be applied within the following buffer zones:

- 20 m of any surface watercourse
- 100 m of any authorised water abstraction point
- 20 m to any landholding boundary; and
- 200 m of any residential dwelling on a neighbouring property

There are no other sensitive receptors that require separation measures to be implemented. Provided that these buffers zones are maintained, there would be no significant adverse effects resulting from effluent disposal.

#### 6.2.5 Effects on Water Quality from FDE Disposal

As the applicant will adhere to the buffer zones, the disposal of effluent would very likely result in a reduction

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<sup>3</sup> Houlbrooke, D J, Monaghan R M, *The influence of soil drainage characteristics on cgoontaminant leakage risk associated with the land application of farm dairy effluent*, 2009, AgResearch Ltd

of adverse effects on groundwater quality in the vicinity of the property. The buffer zones ensure that any overland movement of contaminants is minimised.

There is a surface water take from one of the waterways on the property, with water treated at the Mataura Water Treatment Plant. The applicant has worked with the Gore District Council to ensure the farming activities do not negatively affect the drinking water take. This emergency take is set to be decommissioned in future and the applicant had discussed this with the Gore District Council. The effects of this proposal on water quality in the creek would be less than minor given the buffers in place to minimise overland flow.

Effluent is not applied on land immediately surrounding the water take, including excluding some of the area that is shown as authorised area in the below map. The areas where effluent is applied do not flow towards the GDC water take.

The pipe that connects the take point with the pump shed is completely below ground.



**Figure 9: Location of GDC water abstraction point/pipe (blue) and pump shed (orange). Yellow is authorised discharge area.**

The water take point is located more than 80-90m from anywhere where effluent is applied to land. The implement yard is near the GDC pump shed and separates the area where effluent is applied, and so would be an effective barrier to avoiding runoff directly to the supply point.

There is a further Gore District Council surface water take on the Mataura River beyond the property boundary to the north. Topography and the ditches associated to Old Coad Road likely prevent any runoff from the applicant's farm from affecting the Mataura River at this registered drinking water site directly.

Piezometric flow of groundwater is generally in a north-westerly direction towards the Mataura River. Therefore, groundwater beneath the applicant's farm is expected to generally flow towards the Mataura River.

The estimated TON in groundwater in the GWM zone suggests it is unlikely the dominant contaminant pathway of concern on the property is deep drainage, this is consistent with the most probable pathway being overland consistent with the Bedrock/hill country, and oxidising (overland flow variant) physiographic zone present on the property.

Therefore, it is highly unlikely that there would be any significant adverse effects associated with nutrient losses from the proposed discharge of effluent from 800 cows on surface water or groundwater quality.

See also Section 7.3 that discussions s104G of the RMA.

### 6.2.6 Odour

The effluent pond is located at a suitable distance from the property boundaries and nearest dwellings. The physical location of the effluent infrastructure coupled with the proposed application methods and effluent discharge buffers means there is no significant risk of adverse effects from odour from any spray drift (when using these methods) on surrounding landowners and occupiers. As such, the effects of odour are avoided.

The proposed 19 ha of new disposal area has accommodated for buffers to dwellings and the cemetery.

### 6.2.7 Contingency Plans

The pond has a leak detection system and inspection chamber, and this acts as a contingency measure in the event of an effluent system failure as the leak detection system will show there is a leak.

A slurry tanker and the umbilical may be used at certain times if the usual methods of effluent discharge are under repair or if conditions allow for more effluent to be applied than the usual system is capable of conveying. Any discharges from the slurry tanker must adhere to the rate and depth limits imposed on the consent.

## 6.3 Assessment of Effects – Groundwater Abstraction for Dairy Operation

### 6.3.1 Allocation

The applicant's existing abstraction represents a negligible portion of the allocation of the Lower Mataura GWM Zone. Therefore, there will be less than minor impacts on current allocation volumes.

The application seeks consent to abstract groundwater at a maximum rate of 130.9 m<sup>3</sup> per day and at a maximum seasonal allocation limit of 38,252 m<sup>3</sup>. The daily rate equates to a total of 140 litres/cow/day for dairy cows, and 45 L/cow/day for youngstock, and 120 litres/cow/day for dairy cows annual on average.

**RWP** - The abstraction is from the Lower Mataura groundwater zone which has a preliminary allocation of 24,800,000 m<sup>3</sup>/year. Cumulative allocation from the groundwater zone, including this application is 2,245,797 m<sup>3</sup>/year, about 9% of the preliminary allocation and 1% of the land surface recharge, which is 165,500,000 m<sup>3</sup>/year.

**pSWLP** - The abstraction is from the Lower Mataura groundwater zone which has a preliminary allocation of 34,980,000 m<sup>3</sup>/year. Cumulative allocation from the groundwater zone, including this application is 1,991,329 m<sup>3</sup>/year, about 6%.

On this basis, the proposed abstraction is within primary allocations limits.

### 6.3.2 Stream Depletion and Interference Effects

Policy 29 in the RWPS and Policy 23 of the pSWLP requires a stream depletion assessment when the daily average rate of take is more than 2 L/s because takes less than this are expected to have a minor effect on stream flows. As the proposed take is 130,900 L/day, over 24 hours of pumping the rate of take is less than 2 L/s and therefore does not require a stream depletion assessment.

Significant interference effects on neighbouring bores are not expected. Given that the average rate of take is relatively low, it is unlikely that the radius of interference would affect any of these bores.

### 6.3.3 Effects on Groundwater Quality

The low rate of take is highly unlikely to result in the drawdown of contaminants from the upper soil profiles and so the proposed abstraction is not expected to have any adverse effects in terms of groundwater quality. The applicant confirms that the bore head casing on the bore is adequately sealed, a concrete lip/surrounding is included at ground level to prevent contamination.

### 6.3.4 Efficiency of Use

The proposed rate of take is based on 140 litres/cow/day for the milking herd, and 45 L/cow/day for bulls and young stock. The annual allocation has been determined at 120 L/cow/day this being the average annual volume based on industry best standards.

- Peak daily demand = (800 cows x 140 L/cow/day) + (420 calves/yearling x 45 L/cow/day) = 130,900 L/day
- Annual average demand = (800 cows x 120 L/cow/day x 304 days) + (800 cows x 120 L/cow/day x 61 days, 23 bulls, 420 youngstock in August, 210 young stock in May - July, Sept - Dec, and 110 youngstock in Jan - April, at 45 L/cow/day) = 38,252 m<sup>3</sup>/year

The applicant intends to continue monitoring abstraction from the bores to ensure the rate of take is not more than what is proposed as part of this application.

## 6.4 Assessment of Effects - NESF Consent for Calving Pads

As the activity to use land for a stockholding area includes calving pads, the continued use of the existing two calving pad is a discretionary activity under Regulation 14 of the NESF as the gravel and wood chip base is not expected to meet the permeability requirements. The below assessment therefore follows the matters referred to in Regulation 14 of the NESF. I note the activity is permitted under the RWPS as the calving pad as a 500mm wood chip base and can meeting the require buffer distances.

See Section 2.3.4 for a description of how the calving pad is used.

The calving pad as a gravel/rock/brick (brick on calving pad 2 as this was thew site of an old brick home, the brick was crushed and compacted) base with 500mm wood-chip material placed on top. This woodchip although it does not meet the permeability thresholds listed under Regulation 13(4)(a) is a suitable base material for a calving pad.

The woodchip and sludge mix will be stored in-situ until spring and applied to land as a sludge woodchip mix and utilised as organic fertiliser under the permitted activity conditions of Rule 38.

The calving pad is not located within 50m of a waterbody, water abstraction bore, drain, or the coastal area.

## 6.5 Assessment of Effects – Dairy Expansion and Intensive Winter Grazing

This assessment of environmental effects (AEE) describes the risks to the environment resulting from the expansion of the dairy platform (from 352.8 ha to 461.5 ha) and addition of 55 cows (from 745 to 800).

This assessment below considers the specific surface water quality issues in the existing receiving environment at the nearest monitoring sites. It looks at the property scale, and the likely contaminant pathways that may impact any water quality issues identified. Any potential water quality issue is considered relative to the proposal, including farm system changes proposed and OverseerFM nutrient budgets, GMPs and mitigations, including their effectiveness and appropriateness, and the contribution that these measures would provide to water quality improvements at the catchment scale.

Policy 5 of the NPSFM requires that freshwater be managed to improve the health and well-being of degraded water bodies. Te mana o te wai includes ki uta ki tai, which includes the integrated approach, gives greater emphasis to the connection between activities upstream and the effects in the lower catchment and estuary.

Objective 6, Objective 8, and Policy 15 of the PSWLP requires that where water quality is degraded it be improved.

These polices and objectives, and assessment, are discussed in following section, and later in Section 7.

Good management practices are managed through the Farm Environmental Management Plan, see Appendix A.



### 6.5.1 OverseerFM Modelling

OverseerFM modelling using Version 6.4.3 has been included to support this application. OverseerFM has been used to model the farm system to estimate nutrient outputs associated with the proposed increase in dairy platform area and cow numbers. Nutrient inputs have been carefully considered to ensure viable farm systems are modelled.

The OverseerFM nutrient budgets have been prepared by Miranda Hunter who is a Certified Nutrient Management Adviser (CNMA). These Overseer budgets have been used to estimate the annual amount of nitrogen and phosphorus discharged from the property.

Please refer to Appendix C for Nutrient Budget Summary Report as provided by CNMA Advisor which further details the inputs for each farm system scenario.

**Table 9: Summary nutrient budgets.**

<b>Nutrient</b>	<b>Current</b>	<b>Proposed</b>	<b>% Difference</b>
Total Farm N Loss (kg/year)	18,288	18,182	-0.6% decrease
Total Farm P Loss (kg/year)	303	283	-6.6% decrease

Overall, modelling indicates that at a farm system level:

- Nitrogen losses are estimated to reduce by 100 kg N/year (-0.6% reduction) compared to the existing consented baseline. It is acknowledged that with the inherent uncertainties in Overseer modelling this may also indicate no significant change compared to the existing environment.
- Phosphorus losses are estimated by Overseer to reduce by 20 kg of P/year (-6.6 % decrease).

The reduction in nutrient losses are discussed further below.

### 6.5.2 Intensive Winter Grazing

The applicant is proposing to graze slopes over 10 degrees, and requires resource consent under the NES-F. The inclusion of sloping land within the crop rotation program is to include pasture renewal as part of the crop rotation and provide for further pasture improvement on the dairy farm.

The applicant is proposing during 1 May to 30 September:

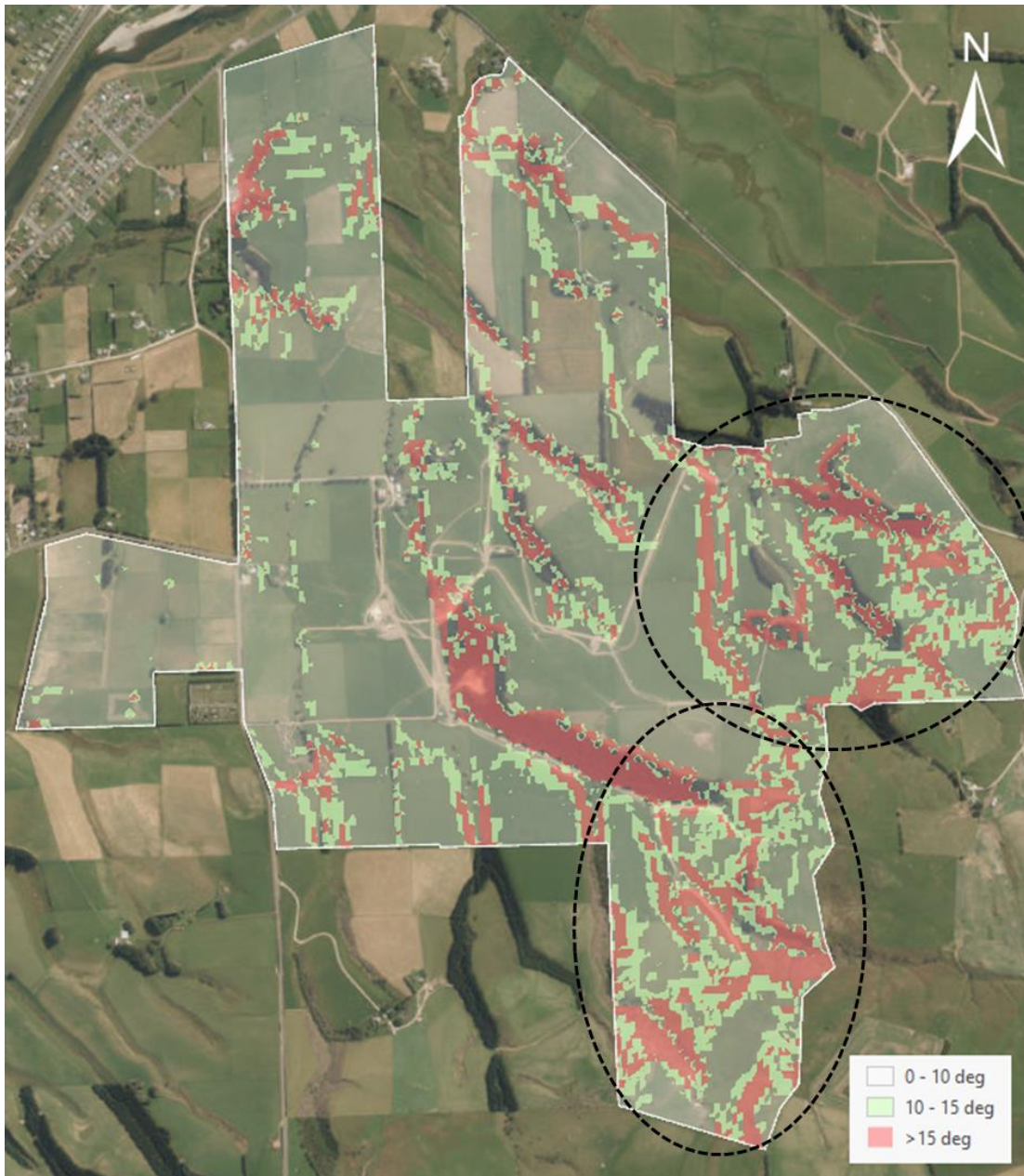
- 10m vegetated (pasture) buffer from all grazing/annual forage crops to freshwater (this is above the minimum required 5m)
- Temporary sediment traps during grazing period using bales in gullies as and when required
- On slopes >10 degrees a 20 m vegetated (pasture) buffer from grazing/annual forage crops to freshwater
- On slopes > 15 degrees, direct drill any annual forage crop and use a 20m buffer from the grazing/annual forage crop to freshwater

An example slope map is provided below. This identifies areas on farm where slopes are likely to be over 10 degrees. Some caution is needed when looking at this map based on the LiDAR data used to derive this terrain

map identifying ground-slope changes between trees tops and ground level. This is an artefact of the modelling/data collection process. Furthermore, this map is largely identifying steep gullies on farm that are planting in forestry, or not part of the effective farm area.

The areas of interest are circled in the below map and show where slopes are over 10 degrees, and the above mitigations will be implemented.

The benefits of wider vegetated buffers are further covered in the section and table below.



**Figure 10: Slope map showing steeper parts of farm (black circles) where effects of IWG on slopes over 10 degrees will be managed with buffers and/or cultivation technique. (Data source: Esri Terrain: Slope Map).**

### 6.5.3 Mitigations and GMPs

OverseerFM estimates what the losses of N and P to water will be, but not what the potential or actual effects of that loss on water quality would be. OverseerFM does not predict transformation, attenuation or dilution of nutrient between the root zone and the farm boundary. The effects of the proposal on water quality are assessed in this section.

The contaminants of concern are N, P and sediment and microbiological contaminants. These contaminants and their potential adverse effects are outlined below:

- **Nitrogen (N) and phosphorus (P)** (nutrients) are needed by plants for growth but when the concentrations of nutrients in water are high, they can result in excessive growth of plants, e.g., periphyton, macrophytes and phytoplankton. High concentrations of nitrate in water can make it unsafe to drink for humans and can be toxic for sensitive organisms (like young trout and salmon). Ammonia at sufficiently high concentrations can be highly toxic to fish and other aquatic organisms that live in water.
- **Sediment** (as indicated by water clarity) refers to particles or eroded soil and rock. Sediment is also a major source of phosphorus because phosphorus sticks to the surface of soil particles carried to water. When erosion rates are excessive, sediment can smother stream and estuary bed macroinvertebrates and can damage the gills of fish. Finer sediment suspended in water can also reduce light penetration (visibility) which plants need to grow and some creatures need to find food.
- **Faecal indicator micro-organisms** (indicators of microbial pathogens) which can have a detrimental effect on human and animal health, particularly when ingested. The main source of pathogens in fresh water in New Zealand are human sewage and animal manure<sup>4</sup>.

Assessing the environmental impact of modelled nutrient losses from a property is complex because these nutrients travel via a number of different pathways through the receiving environment undergoing attenuation, mixing, dilution and dispersion processes which can significantly affect the loading and concentrations that result in the receiving water bodies.

A combination of the farm system changes, and mitigation measures as demonstrated by the nutrient modelling undertaken will result in significantly less nutrients making their way into water bodies which will make a contribution to improving the quality of groundwater and surface water.

Mitigation included within the OverseerFM model are:

- Overall reduction in RSU (4.0% decrease)
- Decrease in peak cows/ha grazed, from 2.7 cows/ha to 2.2 cows/ha.
- Removal of sheep and beef steers
- Less annual forage crop compared to 2014 – 2019 NES-F reference period (52.4 ha to 37 ha)

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<sup>4</sup> Parliamentary Commissioner for the Environment, 2012. *Water quality in New Zealand: Understanding the science*. New Zealand Government, Wellington. 76p.

proposed over the landholding)

- Decrease in imported feed
- Targeting optimum Olsen P and applying fertiliser to maintenance

These, and others proposed are expanded on in the table below.

There is potential for some of the below mitigations to provide additional reductions in contaminant loss to water as some are not fully recognised in Overseer and therefore potential. The quantification of the mitigation not rewarded in Overseer has not been completed given the extent of existing and proposed works.

Furthermore, included within the mitigations proposed is a recognition of the recently released Regional Forum’s report on Achieving the Community’s Aspirations for Freshwater. Namely focusing on livestock intensity over the landholding, nutrient management through the FEMP with on-farm monitoring to match soil need to fertilisers used, capture of the early adoption on this property, and further riparian enhancements with locations suitable for wetland re-development identified.

Many of the mitigations proposed below will provide for immediate improvement (farm system change, mitigations for winter grazing period) while others are targeted at long term improvement (e.g., riparian management).

**Table 10: Summary of mitigations proposed, the purpose and expected outcome.**

<i>Mitigations that address Water Quality</i>	<b>Included in Overseer or not.</b>	<b>Purpose &amp; Outcome</b>
1. Reduction in RSU and decrease in cows/ha. Change in stock type.	Included in Overseer	The primary purpose of this proposal is to transition towards a less intensive farming system whilst maintaining economic performance. A revised stock unit (RSU) is defined as an animal with an intake of 6,000 MJ ME intake per year. RSU is also useful for assessing and comparing a farm’s carrying capacity. This enables the carrying capacity of dairy and non-dairy systems to be compared, based on feed intake. Therefore, a reduction in RSU as proposed shows that the expanded dairy system is operating less intensively than the previous farming system. Furthermore, this is supported by the reduction in cows/ha overall across the landholding.  Using a larger area for on-paddock grazing, and intensive winter grazing over the larger landholding provides opportunities to minimise pugging, maintain groundcover, graze in smaller mobs in multiple paddocks, incorporate more/different land into the pasture renewal program. This minimises risk of overland flow of nutrients from paddocks as more nutrient stays on paddock and can be used by soils as organic fertiliser.
2. Reduction in winter cropping.	Included in Overseer	Intensive winter grazing is a significant source of contaminants with potential for these entering water as result of groundcover not being maintained. A reduction in cropping results in protection of soil structure. Furthermore, less cropping results in less inputs of fertiliser to support crop through the growth phase, and less N fertilizer used on crops. Reducing the amount of intensive winter gazing occurring in the Mataura Catchment (29% on this landholding) will provide opportunities overtime for the hauora of our degraded

		waterbodies to be improved and restored as less sediment and nutrient is released from IWG paddocks.
3. Targeting optimum Olsen P and applying fertiliser to maintenance.	Included in Overseer	Testing soil regularly and managing P fertiliser application to ensure Olsen P levels are within the optimum range minimises the potential for P to be lost to water. Excess phosphorus in water can cause rapid weed growth or algal blooms which can choke aquatic life and cause long-term damage to the health of a waterbody/overall hauroa and mahinga kai species. Reducing the amount of P fertiliser used, minimises the loss of P from the farm to water and will minimise excessive weed growth allowing for mahinga kai sites that are protected from weed, and ensuring mahinga kai is safe to eat.
4. Riparian buffers at variable widths, and planting, forestry.	Not rewarded in Overseer	<p>Vegetated buffers are proven successful methods to mitigate nitrogen (buffers provide 27% (winter) – 93% (summer) removal of N) phosphorus (buffers provide 43% removal when &gt;4m), sediment and microbial contaminants (buffers provide 74% removal when &gt;4m), and function as a large filter to capture contaminants, absorb nutrients, before these can enter water<sup>5,6</sup>. The existing and proposed wide buffers on the property are an effective mitigator of most key contaminants originating in the agricultural setting.</p> <p>The planting of riparian margins at variable widths reduces phosphorus, sediment, and bacteria in runoff, and nitrogen to a lesser extent, in the water quality of the tributary of the Mataura River tributaries on farm which consequently assists with the improvement of mahinga kai sites downstream in the Mataura as well as the mauri of the stream. Where wetland values are established in the riparian zone there is potential for further nitrogen attenuation<sup>7</sup>. Furthermore, the works completed on variable width buffers on the property contributes to the reintroduction of sinuosity, pools and riparian vegetation on waterbodies within the Mataura FMU including through the use of sediment traps, with is further discussed below. The applicant has demonstrated their commitment to this improvement over time with substantial gains made to date. This provides for consistent, progressive, measured improvement meeting some of the draft objectives within the Ngāi Tahu ki Murihiku Freshwater Objectives (Paetae Tuatahi and Paetae Tuarua). Where wetland values can be co-developed alongside the riparian management works planned for the future, the Regional Forum's recommendations on Wetland protection, Restoration and Development provide a direction on approach to this work.</p>
5. 10m buffer of <10 deg; 20m Buffers on slope >10 degrees for	Not rewarded in Overseer	For steeper slopes as a wider buffer slows the velocity of surface run-off to help filter out any sediment and other contaminants. This is well established in the literature, with reports from the late 1980s confirming the benefit of wider buffers, at or greater than 10m. <sup>8</sup> There are two primary drivers <sup>9</sup> that

<sup>5</sup> Low H, McNab I, Brennan J. Mitigating nutrient loss from pastoral and crop farms. A review of New Zealand Literature. Horizons Regional Council.

<sup>6</sup> McDowell R, Wilcock B, Hamilton D. (2013). Assessment of Strategies to Mitigate the Impact or Loss of Contaminants from Agricultural Land to Fresh Waters

<sup>7</sup> McDowell R, Wilcock B, Hamilton D. (2013). Assessment of Strategies to Mitigate the Impact or Loss of Contaminants from Agricultural Land to Fresh Waters.

<sup>8</sup> Smith C 1989. Riparian pasture retirement effects on sediment, phosphorus and nitrogen in channelized surface run-off from pastures. New Zealand Journal of Marine and Freshwater Research 23: 139-146.

<sup>9</sup> Gharabaghi B, Rudra R, Goel P 2006. Effectiveness of vegetative filter strips in removal of sediments from overland

intensive winter grazing		reduce contaminant loss within wide buffer zones 1) infiltration within the buffer zone which reduces runoff reaching the waterway, reducing the contaminants loss; and 2) the reduction of flow velocity due to the rough vegetation, allowing the sediment to settle out. See Figure 10 for a property slope map.
6. Temporary sediment traps using bales in gullies as and when required.	Not rewarded in Overseer	During the intensive winter grazing period (1 May to 30 September) using bales in gullies as and when required, will trap sediment. The hay bales act as a physical barrier to sediment, as well as slowing down water velocity allowing suspended sediment to drop out of the water column. Sediment contamination is a Ngāi Tahu ki Murihiku Indicators of Health, and this mitigation will contribute to minimising overland flow of sediment in creeks on the farm that are generated from any intensive winter grazing practice, 1 May to 30 September.

#### 6.5.4 Catchment Loads - Water Quality

The applicant's farm is located within the Lower Matura Groundwater Management Zone (GMZ) under the RWP and the Longridge GMZ under the pSWLP. The TON concentration around the farm as estimated by Environment Southland (sourced from online GIS, Beacon) is 1.0 - 3.5 mg/l at 7 m below ground level, and is less than the drinking water standard. The OverseerFM modelling indicates a very small improvement in N losses to water is likely to occur.

The dominant contaminant pathway on the property is overland flow, and minimising contamination of surface water has been the primary focus of the mitigations proposed.

Sediment and microbiological contaminants are not modelled within OverseerFM so attempting to demonstrate a reduction in the annual amount of sediment and microbiological contaminants in the proposed scenario compared to the amount which has been lawfully discharged currently is challenging. P loss modelling can be used as a proxy for sediment and microbiological contaminant losses. The reason is that P in the soil readily bonds to fine soil particles and is therefore lost to the environment via the same contaminant pathways: runoff/overland flow and erosion. Microbiological contaminants are also lost to the environment by the mechanics of water flow via these same pathways. The P loss modelling in this application indicates sediment and microbiological contaminants will not increase under the proposal. However, P loss prediction is not exactly the same as microbial and sediment losses, and therefore the assessment is an estimate but provides an acceptable indication of likely losses and risks to the environment.

The specific N and P losses from the applicant's farm are summarised in Table 9 and demonstrates that a very small (-0.6%) reduction in N losses to water is likely to occur under the proposed scenario, with a modelled -6.6% reduction in P loss to water, compared to the existing baseline.

Based on the reductions, expected to occur, and post 2 September 2020 mitigation implemented and those proposed to be implemented it is likely that the applicant's proposal is consistent with Regulation 24 of the

NESF, and that loads, and concentration of key contaminants will not increase, particularly as the baseline Overseer model used is for the 2019/2020 year, which represents farm losses prior to 2 September 2020.

Comprehensive numerical quantification of the improvement, in term of a percentage reduction, has not been completed because the contaminant load reductions are so small in the context of the wider receiving water catchment and the resulting changes in concentrations would not be measurable with the current surface water quality monitoring programme at the local scale.

We do not have detailed knowledge of other sources of contaminants in the catchment, and there is no catchment baseline contaminant losses known to assess the overall likely reduction as a percentage.

Therefore, the reduction in catchment loading of N and P expected as a result of this proposal although small in comparison to the proportion of the farm over the total catchment drainage area is expected to be no greater than what was occurring at close of 2 September 2020. Consistent with Regulation 24 of the NESF.

The attached FEMP, and Riparian Management Plan (Appendix A and B) detail various management practices implemented on farm to reduce the effects of sediment, and bacteria losses via overland flow, including attenuation of nitrogen that will be occurring in existing pond/sediment traps and proposed sites for riparian planting and/or possible wetland development. The primary mechanisms of mitigating and avoiding these losses are by appropriate management of critical source areas on the farm, efficient effluent management, stock exclusion from riparian margins and CSAs and the adoption of above best management practices for intensive winter grazing, including use of wider buffers, and different cultivation techniques where required.

## **6.6 Effects on Statutory Acknowledgement Area**

The Mataura River is a Statutory Acknowledgement Area under the Ngāi Tahu Settlement Act 1998 due to its tribal significance. Iwi planning documents are not statutory instruments, but they do have statutory weight under the RMA in relation to the plan preparation process. The RPS must take into account any relevant planning document recognised by an iwi authority, however, iwi management plans retain their ability to address concepts from a Maori paradigm without constraint from the RMA.

The Kanadale Ltd property is located within the Mataura River catchment, and Schedule 42 of the Ngāi Tahu Claims Settlement, 1998.

A cultural policies assessment and effects on cultural values is considered elsewhere in this report.

Careful consideration has been given to Ngāi Tahu ki Murihiku Freshwater Objectives (2020), Draft Murihiku Southland Freshwater Objectives: Providing for hauora, the health and well-being of waterbodies in Murihiku Southland (2020), and The Cry of the People Te Tangi a Tauira Ngāi Tahu ki Murihiku Natural Resource and Environmental Iwi Management Plan (2008).

These documents provide a very clear statement for the concerns of tangata whenua in Murihiku Southland. We understand the concerns of rūnanga about the quality of freshwater and land use activities that can affect

water quality.

We appreciate the significance of the Mataura River and the cultural impacts of the history of activities that have affected the quality, quantity, hauora and mauri of the river. We also understand the concern that resource consent applications need to explicitly take into account the cultural values and needs of tangata whenua.

This proposal to expand the dairy farm on a family farm incorporates a significant number of new mitigations and significant improvements that have occurred on farm since the purchase of the new land and since 2020. Therefore, we consider that the proposal will result in a reduction in the amount of contaminants entering water. The applicant is excited by the opportunities this farm provides to improve water quality, whilst operating a profitable farming business.

We acknowledge the changes will not be enough to result in measurable changes in water quality or measurable improvements in the health or hauora of waterways catchment wide, this is because the farm is a small piece of a much bigger puzzle. However, if all land users and discharges in the catchment adopted similar approaches there would be significant meaningful improvements.

## **6.7 Cumulative Effects**

As described above, the proposal is very likely to achieve a reduction in annual N and P loss, and sediment and microorganisms, to water as indicated by OverseerFM modelling and the mitigations proposed that directly minimise the effects of overland flow of contaminants to water.

Improvements made under the proposal in isolation from other farms will only have an extremely small impact on long-term water quality. This highlights the importance of catchment wide implementation in water quality mitigation measures and the ongoing restriction on the applicants' operation in accordance with the nutrient output limits will give certainty that water quality will be improved in the long term.

One purpose of the proposal is to enable the business to continue running as a self-contained dairy farm, whilst spreading the wintering activities over a larger land holding, and the amalgamation of the three blocks will help to balance the contour of the milking platform so these wintering activities are occurring on lower slope land. Being self-contained means the consent holder has full control and does not rely on third party contracts to winter stock and/or graze youngstock elsewhere in the catchment or region.

## **6.8 Positive effects**

The continuation of dairy farming will contribute significantly to the social and economic wellbeing of the local and regional community.

The proposal will result in a significant improvement in water quality locally, and overall contribute to an improvement at the catchment level, although small and likely immeasurable. The proposal represents a positive step towards significant meaningful improvement in the Mataura catchment.



## 6.9 Other Assessment Matters

In accordance with Clause 7 of Schedule 4 of the RMA the following provides an assessment of the activity's effects on the environment:

- a) *any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects*

Throughout the duration of the existing consents, there have been no known complaints from neighbours, which indicates that the potential adverse effects on the neighbourhood are less than minor.

The proposal will result in net positive benefits to the neighbourhood as there will be capacity to provide for the social and economic benefits with the employment of staff, as well as contractors and consultants, and the farm is serviced by local schools and many businesses that would not benefit if the activities were unable to occur. The ability for the applicant to continue to operate their dairying operation will enable them to provide for their own social, economic and cultural wellbeing.

The proposal is considered to be wholly consistent with the relevant policies of the Iwi Management Plan (Te Tangi a Tairua).

- b) *any physical effect on the locality, including any landscape and visual effects*

In terms of landscape and visual effects, the presence of effluent irrigation, other farming equipment and cows is expected within the rural locality. The proposal will not have any significant physical effects on the locality over and above that currently experienced.

- c) *any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity*

The dairy farm is located within a highly modified ecological landscape and the proposal will not have any significant adverse effects on ecosystems above that which has been occurring for many decades.

- d) *any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generations*

It is not considered that the activities will have any effect on aesthetic values, as the existing dairy platform is established and in keeping with the general rural nature of the area. The land in this area is historically known for farming activity, and the presence of a dairy operation on this property does not result in any effect contrary to the historical values associated with the natural and physical resources in the vicinity.

The waterways within the proposed dairy platform are non-navigable and public access would be by permission of the applicant only. The effects on any cultural values are assessed below.

- e) *any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminants*

Effluent is proposed to continue to be treated and discharged to land as described earlier in this report. The assessment of alternatives provided in this report has concluded that this is the preferred solution for managing FDE generated at the property. The activity is in keeping with the rural nature of the area, therefore it is not considered there will be any unreasonable emission of noise or odour.

*f) any risk to the neighbourhood, the wider community, or the environment through natural hazards or the use of hazardous substances or hazardous installations*

All hazardous materials carried and used onsite will comply with the relevant rules of the Part operative Southland District Plan 2012, and the Hazardous Substances and New Organisms Act 1996. As such, there will be no risk to the neighbourhood, wider community or the environment due to natural hazards or the use of hazardous substances or hazardous installations.

## 7. STATUTORY CONSIDERATIONS

Schedule 4 of the RMA requires that an assessment of the activity against the matters set out in Part 2 and any relevant provisions of a document referred to in Section 104 of the RMA is provided when applying for a resource consent for any activity. These matters are assessed as follows.

### 7.1 Part 2 of the RMA

The proposal is consistent with the purpose and principles of the RMA, as outlined in Section 5. The proposal will have less than minor effect on the Lower Mataura Groundwater Zone, and the Mataura River's ability to meet the reasonably foreseeable needs of future generations, or on the life-supporting capacity of these water resources and any ecosystems associated with them as the proposal ensures that adverse effects on the environment are mitigated.

There are no matters of national importance under Section 6 of the RMA that will be affected by the proposal. The proposal is also consistent with the requirements of Section 7 of the RMA, with particular regard given to the efficient use and development of natural and physical resources. Regarding Section 8, the proposed activity is not inconsistent with the principles of the Treaty of Waitangi.

Overall, the activity is considered to be consistent with Part 2 of the RMA, given the minor nature of the activities and the proposed mitigation.

### 7.2 Section 104(1)(b) of the RMA

In accordance with Schedule 4 of the RMA, an assessment of the activity against the relevant provisions of a document referred to in 104(1)(b) of the RMA must be included in an application for resource consent. Documentation in this section are noted as being:

- (i) a National Environmental Standard;
- (ii) other regulations;
- (iii) a National Policy Statement;

- (iv) a New Zealand Coastal Policy Statement;
- (v) a Regional Policy Statement or Proposed Regional Policy Statement;
- (vi) a plan or proposed plan.

Under the RMA, regional plans need to give effect to NPSs, NESs and RPSs. For an application of this scale, an assessment of the application against the regional plan is often adequate as these plans ultimately give effect to the higher order statutory instruments. As such, no individual assessment has been made against the National Environmental Standard for Sources of Human Drinking Water. An assessment has been made against the recently released National Environmental Standard for Freshwater (2020) and National Policy Statement for Freshwater Management (2020) as these contain the most up to date national policy directions that need to be considered.

Relevant policies from the RWPS, and the PSWLP are considered relevant to this application and are assessed below. The rules and policies in PSWLP have legal effect from the date of notification and weight must be given to the policies contained in PSWLP alongside the existing policies in the RWPS.

### 7.2.1 National Policy Statement for Freshwater Management 2020

The National Policy Statement for Freshwater Management 2020 (NPS-FM) recently came into force on 3 September 2020. This document is a national direction for managing freshwater in New Zealand and has been introduced alongside some relevant National Environmental Standards for Freshwater. A detailed assessment of this application against each of the NPS-FM policies is not considered necessary. However, because both the RWPS and PSWLP were given legal effect prior to the NPS-FM coming into effect it is considered appropriate to undertake a brief assessment of the proposal against the objectives and policies of the NPS-FM (2020).

The policies of particular relevance to this application for resource consent are outlined below. The proposal has been carefully considered against Te Mana o te Wai, the objective and all relevant policies listed below and in the context of the detailed assessment of effects is strongly considered to be consistent with all the relevant provisions of the NPS-FM.

The fundamental concept underpinning the NPS-FM (2020) is Te Mana o te Wai, that is recognising the fundamental importance of water and the health of water in protecting the health and well-being of the wider environment. Within the context of the NPS-FM this encompasses 6 principles relating to the roles of tangata whenua and New Zealand in the management of freshwater and the implementation of the NPS-FM.

The NPS-FM (2020) also sets out a hierarchy of obligations and an objective for Te Mana o Te Wai that prioritises first the health and wellbeing of water bodies and freshwater ecosystems over second the health needs of people, and third, the ability of people and communities to provide for their social, economic, cultural well-being.

A number of the principles set out for Te Mana o te Wai are directly relevant to Councils in giving effect to the

NPSFM (for example through plan making processes), as they focus on tangata whenua’s authority and responsibility and actions, as well as governance by the council. Many of the principles are more difficult for an applicant to give effect to. The two principles that stand out as relevant are the following:

*“(e) Stewardship: the obligation of all New Zealanders to manage freshwater in a way that ensures it sustains present and future generation.”*

*“(f) Care and respect: the responsibility of all New Zealanders to care for freshwater in providing for the health of the nation.”*

This proposal has been carefully considered against *Te Mana o te Wai*, the objective and all relevant policies, and in the context of the detailed assessment of effects is strongly considered to be consistent with all the relevant provisions of the NPSFM. For the reasons given in the assessment of effects above in Section 6, this balance has been found a reduction in nitrogen and phosphorus as proposed by this application and use of mitigation/GMPs across the dairy farm.

Further discussion of relevant policies within the NPS-FW (2020) is provided in the table below.

**Table 11: Applicable policies from the NPS-FW (2020).**

Policy	Wording	Comment
1	Freshwater is managed in a way that gives effect to <i>Te Mana o te Wai</i> .	See above discussion. The proposal includes mitigations on the dairy farm to ensure the health and wellbeing of water bodies are provided for. Table 10 sets out how the proposed mitigations align with Ngāi Tahu ki Murihiku Freshwater Objectives (2020), the draft Murihiku Southland Freshwater Objectives: Providing for hauora, and Hokonui Rūnanga’s Te Kawa o te Taiao.
2	<i>Tangata whenua</i> are actively involved in freshwater management (including decision making processes) and Māori freshwater values are identified and provided for.	See above discussion.
3	Freshwater is managed in an integrated way that considers the effects of the use and development of land on a whole-of-catchment basis, including the effects on receiving environments.	Surface water quality in the wider receiving environment is considered to be generally poor when assessed against the objectives within the NPSFM national objective framework. The OverseerFM modelling of the proposed farm system in its entirety models that nitrogen losses to below the root zone will reduce by a 0.6% and an 6.6% reduction in annual phosphorus loss to water. Using the reduction in P as a proxy, there is also a high likelihood of a reduction in sediment and microbial organisms. The health and well-being of the receiving environments is predicted to improve as a result of the proposal as described, as the result of the mitigations included within the Overseer nutrient budget and the mitigations related to riparian buffers offer opportunity for a significant improvement in water quality. Table 10 sets out how the proposed mitigations will improve water quality.
4	Freshwater is managed as part of New Zealand’s integrated response to climate change.	Same as for Policy 3. Climate change is a matter addressed through the FEMP (Appendix A). The FEMP includes a section detailing the impact of the

		<p>operation on climate change, including estimated of Green House Gas emissions and any actions implemented to mitigate or offset these impacts.</p> <p>Greenhouse gas emissions are currently not a relevant matter under the Resource Management Act and He Waka Eke Noa and the Emissions Trading Scheme are proposed to address greenhouse gas emissions in New Zealand.</p> <p>The proposal has not yet accounted for current, and future mitigations on farm, such as riparian planting, forestry, and decreased nitrogen fertiliser use, which are all likely to result in an overall landholding reduction in greenhouse gas emissions. Overtime, the quantification of these improvements will be included through the FEMP process.</p>
5	Freshwater is managed through a National Objectives Framework to ensure that the health and well-being of degraded water bodies and freshwater ecosystems is improved, and the health and well-being of all other water bodies and freshwater ecosystems is maintained and (if communities choose) improved.	Same as for Policy 3.
12	The national target (as set out in Appendix 3) for water quality improvement is achieved.	Same as for Policy 3.
13	The condition of water bodies and freshwater ecosystems is systematically monitored over time, and action is taken where freshwater is degraded, and to reverse deteriorating trends.	Water quality monitoring on the Maitai River in Maitai is undertaken by ES under the State of the Environment monitoring programme to ensure continuous monitoring over time to identify trend data. The proposal includes simultaneous monitoring and management of nutrient inputs and outputs from the farm via OverseerFM nutrient budgets and the FEMP in order to identify areas of improvement which could improve water quality in the receiving waters.
15	Communities are enabled to provide for their social, economic, and cultural wellbeing in a way that is consistent with this National Policy Statement.”	The expansion the dairy farm provides greater opportunities of the local economy in terms of permanent jobs and support of local schools and communities. Positive economic, social and cultural well-being should result.

### 7.2.2 National Environmental Standards for Sources of Human Drinking Water

The National Environmental Standard for Sources of Human Drinking Water (NESDW) is a regulation made under the Resource Management Act (1991) that sets requirements for protecting sources of human drinking water. The NESDW require regional councils to manage the resource consent process to protect drinking water quality supplies. No consent requirements arise from the NESDW provisions.

### 7.2.3 Regional Plans, NESFW, and Te Tangi a Tauria

Relevant policies from the RWPS, and the PSWLP are considered relevant to this application and are assessed below. The rules and policies in PSWLP have legal effect from the date of notification and weight must be given to the policies contained in PSWLP alongside the existing policies in the RWPS. Consideration of the

National Environmental Standard for Freshwater water 2020 and IWI Management Plan – Te Tangi a Taurira are also included below.

### 7.2.3.1 Discharge of Effluent

Planning Document	Particularly relevant sections
Southland Regional Policy Statement	Objective: RURAL.1, 2, Policy: Rural 1, 2, 4, 5
Regional Water Plan for Southland	Objectives: 9A, 9B, 9C Policies: 7, 31A, 31C, 31D, 41, 42, 42A, 43
Proposed Southland Water and Land Plan	Objectives: 13, 13A, 13B Policies: 13, 14, 17, 40, 41
Te Tangi a Taurira	Section: 3.5.1

Objective RURAL.1 enables the sustainable management of Southland’s rural land resource. The proposal includes limits on effluent application, in order to maintain the life supporting capacity of soils (RURAL.2).

The assessment of effects has demonstrated effluent can be discharged in a way that enables FDE to be used as an organic fertiliser. The proposal is consistent with Policy 17 of the PSWLP and operates in accordance with a FEMP/CAEMP to manage agricultural effluent. The use of low-rate discharge methods ensures that effluent is applied at a rate and depth that is suitable to the conditions of the subject site.

Consistent with Te Tangi a Taurira adverse effects on soils and water resources as a result of spray irrigation of dairy effluent to land are mitigated, and effluent entering waterways avoided. Discharge to land in areas with soils that are higher risk is managed by low-rate application methods. The maximum loading rate of nitrogen onto any land area is well within industry and Council best practice.

### 7.2.3.2 Abstraction of Groundwater

Planning Document	Particularly relevant sections
Southland Regional Policy Statement	Objectives: WQUAN.1, WQUAN.2 Policies: WQUAN.1, WQUAN.2, WQUAN.4, WQUAN.5, WQUAN.6, WQUAN.8
Regional Water Plan for Southland	Objective: 5, 7, 8, 9 Policies: B7, 14A, 14B, 21, 22, 23, 25, 26, 28, 29, 30, 31
Proposed Southland Water and Land Plan	Objectives: 1, 7, 11, 12, Policies: B7, 20, 21, 22, 23, 24, 27, 40, 41, 42
Te Tangi a Taurira	Section: 3.5.14

Objective WQUAN.1 enables the sustainable management of the region’s freshwater resources. The proposal includes limits on water use so that allocation is maintained, and this is consistent with the 2014 version of the NPSFM that this objective refers to. The discussion above in relation to the 2020 NPSFM covers allocation in-light of Te Mana o te Wai.

With regards to other Regional Policy Statement Objective and Polices, the assessment of effects has demonstrated aquifer values are unlikely to be affected by the proposal, the intended use of water is efficient, overallocation is avoided, demand for water is managed through allocation limits metering is in place to ensure excess taking does not occur and remains within limits of consent.

The proposal is consistent with Policy 20 to 23 of the PSWLP and manages water resources so that the significant adverse effects on the long-term sustainability, reliability of supply for existing water users, groundwater levels and water quality are avoided, mitigated, or remedied.

The proposal will provide benefits to the applicant and the local community, and the use of the resource is considered an efficient use. Water allocation is managed in accordance with Policy 21 and this proposal does not seek to over-allocate the existing water resources.

The proposed increase in abstraction is consistent with Te Tangi a Taurira by ensuring that the proposed increase is not increasing demand on water resources that cannot be sustained. The extent of existing knowledge about the aquifers is good, and the scale of effects relatively well understood, and consisted of to be less than minor, especially given the low rate of take. Water use has been consisted holistically alongside considering water quality by the interrogated approach to nutrient management on farm. The water use is efficient and represents reasonable use. There is no measurable stream depletion effect due to the low rate of take, and therefore this proposal is not expected to deteriorate the water quality of the Maitara as a result of a reduction in water quantity, as such it is not expected that there is any cumulative effects of water abstractions on surface and groundwater quantity and quality.

### 7.2.3.3 Calving Pads

Planning Document	Particularly relevant sections
Southland Regional Policy Statement	Objectives: RURAL.1 Policies: RURAL. 2, 5
Proposed Southland Water and Land Plan	Objectives: Policies: 13, 16, 40, 41
Te Tangi a Taurira	Section: 3.5.1

Objective RURAL.1 enables the sustainable management of Southland’s rural land resource. The use of the calving pad allows cows a comfortable, safe place to have their calf pad is included within the consent holders FEMP and GMPs are implemented. There are environmental benefits to standing cows off pad during bad weather, and the calving pad allows cows off paddock overnight for feeding and calving in unsuitable conditions.

### 7.2.3.4 Land Use – Dairy Farming

Planning Document	Particularly relevant sections
Southland Regional Policy Statement	Objective: RURAL.1, 2, Policy: Rural 1, 2, 4, 5

Regional Water Plan for Southland	Policies: 13A
Proposed Southland Water and Land Plan	Objective: 1, 2, 18, Policy: 6, 10, 17, 18, 39A, 40, 41
Te Tangi a Tauira	Section: 3.5.1, 3.5.10, 3.5.11

The Regional Policy Statement ensures the sustainable use of rural land resources, and that the life supporting capacity of soils is safeguarded. The proposed increase in cows and dairy platform land does not contravene these objectives or associated policies. The assessment has demonstrated that positive effects to the social, economic and cultural wellbeing will result as a consequence of the proposal, and the effects of the farms development will be sustainably managed through the use of GMPs that ensure protection of soil properties and prevent erosion, compaction, and unnecessary disturbance.

Policies 6 and 10 of the PSWLP appear to have equal weighing, and the proposal is consistent with each of these.

With respect to Policies 6 and 10 we have considered the effects of the activities in the context of the farms physiographic characteristics and conclude that expanded dairy activities will have a negligible effect on water quality.

Furthermore, the proposed expansion provides for improved farm systems and pasture that will over time contribute to improved environmental outcomes and a reduction in nutrient loading. The continuation of farming would provide for the economic and social well-being of the applicant and the communities they support. The proposal is consistent with the objectives and policies in the SRPS and Policy 13 of the PSWLP by supporting the sustainable use and development of rural land resources, both environmentally and economically, if undertaken in the manner as proposed.

The applicant has implemented a farm environmental management plan which is in accordance with Appendix N of the PSWLP. Good Management Practices and mitigations are most effective at the farm scale if they are targeted to the risk area, in this instance the effects of combined deferred FDE storage, greater flexibility to better utilise the less vulnerable areas of the farm, and adherence to the appropriate buffer zones between water bodies and grazed areas, and successfully avoid or mitigate adverse effects to a practical minimum where they are less than minor. Sediment run-off is managed to a level that it is low risk for the farm system proposed. The FEMP identifies the critical source areas on the landholding and describes how they will be managed by the applicant to minimise nutrient losses at these points.

Compaction of soils as a result of increased number of cows on farm is not anticipated as RSU and cows/ha is reducing, and therefore impacts on the ability of land to absorb effluent and damage from grazing is avoided and mitigated by spreading cows over a larger area. The existing milking platform has rolling contour land. These steeper parts of the farm have already been fenced off and retired from milking and by amalgamating the three blocks the Bastaansian and Murray blocks (both flat) will help to balance the contour of the milking platform and allows cows to graze a larger, flat area, with lower cows/ha effect.



### 7.2.3.5 Water Quality

Planning Document	Particularly relevant sections
Southland Regional Policy Statement	Objectives: WQUAL.1, WQUAL.2 Policies: WQUAL 1, 2, 5, 7, 8, and 9. RURAL.5
Regional Water Plan for Southland	Objectives: 2, 3, 4 Policies: 1A, A4, 1, 3, 6, 7,
Proposed Southland Water and Land Plan	Objectives: 6 and 8, 13B, 18 Policies: 6, 10, A4, 13, 14, 15B, 16, 18, and 39A
Te Tangi a Taurira	Section: 3.5.11, 3.5.13, 3.5.16, 3.5.17, 3.5.19, 3.5.20

Objective WQUAL.1 is of significant relevance to the proposal as it sets the water quality framework for the management of water quality in Southland.

Part of the maintain or improve ensures that any decline is halted, and an improvement occurs across lowland water bodies. This proposal demonstrates that an improvement in water quality in the receiving environment will occur. This ensures that water quality is enhanced and as a result indigenous biodiversity is likely to be enhanced along with the mauri of water.

The proposed dairy platform is within the Oxidising and Bedrock/Hill Country Zones. Policy 6 and 10 requires the implementation of good management practices to manage adverse effects cumulatively and propose GMPs and mitigations (where appropriate) to mitigate and/or avoid effects of the activities on water quality. These GMPs and mitigations are proposed to be implemented by way of a FEMP that has been prepared by the applicant and appended to this application. Genuine attention and thought have been given to the potential adverse effects of the proposal on water quality, in the context of the most likely contaminant pathways. The Riparian Management Plan (Appendix B) identified the most probable contaminate pathways on farm with appropriate mitigation proposed through use of variable width buffers, retirement of steep gullies, unsuitable paddocks for grazing, and riparian planting.

With regards to Policy 15B, effort has been made to provide an assessment of the likely nutrient loading from the property and shows that nutrient loss is unlikely to have an impact on current nutrient loads in the receiving environment. The proposal to expand the dairy farm provides for a variety of measures which either avoid or further mitigate against adverse effects on water quality which are described in detail earlier in this report, and in the Overseer report (Appendix C) and the Riparian Management Plan (Appendix B). The proposal would therefore result in a reduction in contaminant losses compared to the legal existing environment over time and compared to 2 September 2020. Therefore, the proposal is consistent with the relevant policies noted above and the National Environmental Standard for Freshwater.

Policy 16 requires the minimising of adverse environmental effects from farming activities. Part (a) applies as the property is within proximity of the Mataura River and Toetoes Harbour that is identified as a sensitive waterbody in Appendix A of the PSWLP. This proposal includes an increase in the number of cows and land area that comprises the dairy platform from what is already consented. Therefore, this proposal includes assessment to demonstrate the adverse effects, including cumulatively, on the quality of groundwater, or

water in lakes, rivers, artificial watercourses, modified watercourses, wetlands, tidal estuaries and salt marshes is mitigated, and therefore the proposal is consistent with Policy 16 as the assessment here demonstrates the GMPs and mitigation that will be applied to minimise adverse environmental effects on the downstream sensitive receiving environments.

Policy 16(1)(b)(iii) likely applies as it is our assumption that no lowland surface water body in Southland meets the Appendix D water quality standards. However, in the context of demonstrating that there will be some improvement in water quality over time as a consequence of the expansion and mitigations proposed, it is considered that the 'generally' component of the policy applies and Policy 15B and the higher objectives would provide an appropriate approach that would support granting applications that have been able to demonstrate that they would result in an improvement in water quality.

Addressing issues identified in Te Tangi a Taurira the run-off of agricultural contaminants, e.g., nitrates and phosphates, in water bodies through accelerated soil erosion are avoided where practicable by appropriate GMPs and mitigation. As a result of these GMPs and mitigation, the water quality of waterways in the Matura Catchment will be improved, albeit very small and likely immeasurable based on the scale of property in the wider catchment. The consent holder through the proposed mitigations is proposing to improve riparian areas, manage effects of intensive winter grazing with better than GMP buffers to be in place, and reduce the intensity of the farming operation through an overall reduction in crop area, RSU and cows/ha on the landholding.

### 7.2.3.6 Tangata Whenua

Iwi planning documents are not statutory instruments, but they do have statutory weight under the RMA in relation to the plan preparation process.

Planning Document	Particularly relevant sections
Southland Regional Policy Statement	Policies: TW.3
Regional Water Plan for Southland	Polices: 1A
Proposed Southland Water and Land Plan	Objective: 3, 4, 5, 15, Policies: 1, 2, 3, 44,
Te Tangi a Taurira	Section 3.5.1, 3.5.11, 3.5.13, 3.5.14, 3.5.16, 3.5.17, 3.5.19, 3.5.20
Te Kawa o Te Taiao	See below.
Draft Ngāi Tahu ki Murihiku Freshwater Objectives	See below.

The Southland Regional Policy Statement describes the resource management issues important to Ngai Tahu in the Southland regional and includes ensuring tangata whenua is considered in decision making, iwi management plans are recognised, taonga and sites of special significance are protected and food gathering resources are protected. Te Tangi a Taurira is the iwi management plan recognised by Ngai Tahu which encompasses the Southland region. Policies TW.3 and Policy 2 of the PSWLP require iwi management plans to be taken into account.

The application has considered the relevant iwi management plan (Te Tangi a Taurira) and is therefore consistent with Policy 1, 2, and 3 of the PSWLP.

The Ngāi Tahu ki Murikiku Natural Resource and Environmental Iwi Management Plan, 2008 (NREM, a.k.a. *Te Tangi a Taurira*) is the iwi management plan relevant to the Southland Region.

This proposal includes activities which are contained within the property boundaries and with the proposed farm system changes and mitigation/GMPs will ensure that the effects of the activities will not materially impact on tangata whenua values or compromise sites of special significance of food gathering sites. The cumulative effects assessment concludes that any effects felt outside the boundary of the property will not degrade water quality and not impact on cultural values such as mahinga kai.

In addition, the application provides for the following in accordance with Te tangi a taurira:

- The provision of buffer zones to water abstraction sites and waterways;
- The existing riparian margins are protected and improved where practicable;
- Nutrient loading to land is within industry best practice limits;
- The system and management practices are considered appropriate for the risks associated with the receiving environment;
- Water abstraction is to be monitored with metering results to be submitted to Council;
- Regarding Policies 3.5.14.17 and 3.5.1.17, the consent periods proposed are less than 25 years.

### **Te Kawa o Te Taiao**

Significant reductions in contaminant losses of nitrogen (N) phosphorus (P) and sediment are needed to improve the health of degraded waterways throughout Murihiku. Hokonui Rūnanga have prepared the report Te Kawa o Te Taiao which was developed to support Hokonui Rūnanga kaitiaki in regulatory decision making. The proposal has focused on the effects of the proposed activities on water quality and has proposed mitigations that are tailored to the landscape. The protection of existing and proposed riparian areas is outlined in the Riparian Management Plan (Appendix B) and provides for improvement in the mauri of freshwater on farm and mahinga kai with mitigations, but also limits on resource use to ensure mauri is not further degraded, and there is no overuse or depletion of natural resources on the landholding. In summary:

- The use of variable width buffers, sediment traps/ponds, and retirement of steep gullies, reduces overland flow of contaminants to freshwater and minimises this diffuse source of pollution. Furthermore, the proposed buffers for intensive winter grazing (minimum 10m for any IWG for freshwater) will overland runoff of contaminants is minimised.
- Variable width buffers, and riparian planting, provides biodiversity through native riparian planting adjacent to freshwater, sediment trap/ponds/wetlands on the property. See Appendix A and B. Furthermore, this creates biodiversity corridors on the property and habitat for mahinga kai.
- The implementation of mitigations and proposed farm system changes is expected to halt further degradation. Overall, it is anticipated that the approach taken from the consent holder will ensure that the mitigations proposed by work towards achieving a state of hauroa in the Mataura FMU in time.

## **Draft Ngāi Tahu ki Murihiku Freshwater Objectives**

Te Ao Marama and the Regional Forum have worked together to identify the things that are important to people about water in Southland Murihiku. Environment Southland led the conversation about community values for freshwater in 2019, and then developed draft environmental outcomes (objectives) for different water body classes (rivers, lakes, estuaries, groundwater, wetlands, and open coast). Te Ao Marama led a workstream that followed a similar process to establish values and outcomes (objectives) at a catchment level. The weaving together of the findings into one set of draft environmental outcomes for the whole region subsequently followed.

There are five draft freshwater objectives<sup>10</sup> that have been identified by Ngāi Tahu ki Murihiku to apply within all the freshwater management units. These are expanded on below.

The five draft objectives are:

### **1. Paetae Tuatahi**

*The way water is managed will:*

- *recognise and provide for rangatiratanga, customary rights and development rights*
- *enable customary use and protection and restoration of cultural heritage, and*
- *utilise and support the intent of Ngāi Tahu Settlement instruments.*

### **2. Paetae Tuarua**

*All waterbodies that have been degraded will be returned to a state of hauora, which will in turn improve provision for cultural use and association.*

### **3. Paetae Tuatoru**

*There will be no further deterioration of waterbodies and consistent, progressive measured improvement where waterbodies have been degraded, towards a state of hauora.*

### **4. Paetae Tuawhā**

*The goal is to:*

- *establish a long term monitoring programme using Ngāi Tahu Indicators of Health that adds to the existing council monitoring programme, and*
- *use Ngāi Tahu Indicators of Health to assess the state of waterbodies and the impact of proposed activities on them, including in resource consent decision-making processes.*

### **5. Paetae Tuarima**

*Communities and catchment groups will be supported to understand Ki Uta Ki Tai, Te Mana o te Wai, Hauora and Mahinga Kai, and will be provided with the means to work effectively towards a state of hauora for each waterbody.*

We have reviewed the draft objectives, and we consider the proposal to be generally consistent with the

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<sup>10</sup> Ngāi Tahu ki Murihiku Freshwater Objectives (September 2020).

direction of the objectives as they appear in the current September 2020 version. With regards to **paetae tuatahi**, this application has considered the statutory acknowledgement area, and in particular mahinga kai which is a core element of cultural use in relation to freshwater and an aspect of living cultural heritage requiring protection, as well as restoration. For the reasons outlined below, the improvement in water quality expected as a result of this proposal will more than likely improve the quality of habitat for mahinga kai, and provide for cultural use and association. The applicant intends to maintain and enhance these areas through managing any critical source area nearby and has invested significantly in the creation of variable width buffers and retirement of land from grazing already on the landholding.

Of relevance is the Hauora Plan for the Maitua Freshwater Management Unit. The application for expanded dairying activities as considered Te Mana o te Wai in Section 7.2.1 above, and the proposed improvement in water quality for the farm is a key driver in meeting the principles set out under Te Mana o te Wai. We are confident that the mitigation measures proposed will ensure kaitiakitanga will be upheld through the establishment and enhancement of riparian margins on the farm, among other proposed mitigations. This will ensure there is no further degradation of freshwater resources on the farm and will make a contribution to the wider efforts of the Maitua FMU over time. This proposal will result in no further deterioration of freshwater at the farm-scale, and contribute overall (albeit very small) to the wider catchment consistent with **paetae tuatoru** and **paetae tuarua**.

With regards to long term monitoring (**paetae tuawhā**), the applicant encourages Environment Southland to continue monitoring water quality at the Maitua River SOE site, and to include monitoring of Ngāi Tahu Indicators of Health.

With regards to priorities for protection, the farms contribution to a water quality improvement at the site locality will overtime contribute to an improvement in the wider catchment.

The applicant's proposed groundwater abstraction is efficient for the intended purpose, and it is not anticipated that this is inconsistent with the values associated to the Lower Maitua Groundwater management Zone. Groundwater quality in this zone is expected to be maintained as a consequence of this proposal. Drinking water sites are not expected to be considered affected by the proposal.

Overall, it is anticipated that the approach taken from the consent holder will ensure that the mitigations proposed by work towards achieving a state of hauora in the Maitua FMU in time.

### 7.3 Section 104G of the RMA

Section 104G of the RMA requires consent authorities to have regard to:

- The actual or potential effect of the proposed activity on the source of a registered drinking water supply; and
- Any risks that the proposed activity may pose, that are identified within a source water risk management plan.

The applicant has discussed the proposal with the Gore District Council, and conversations have been had

with regards to the longevity of the drinking water site located on the creek running through the dairy farm, this is set to be decommissioned as part of water supply upgrades within the Gore District.

The drinking water site is located upstream of land proposed to be amalgamated, and so the effects are namely from the discharge of effluent on the existing dairy farm. Overall cows/ha is decreasing and so it is not expected that on average there will be more cows near the site.

Furthermore, the site is separated from any paddock receiving with the physical barrier of the farms implement yard, or dairy lanes with appropriate drainage/fall separating the pump shed/water abstraction point, and stock have no access to.

As the applicant is proposing to reduce their grazing intensity and there is sufficient deferred storage for effluent on farm, low-rate irrigation methods are used, the effects on the drinking water supply from the proposed activity are either avoided or mitigated. Furthermore, the increase of 19 ha to the disposal areas offsets any additional N loading on the same discharge area, and these additional area means there is no change overall to the area of disposal area per 100 cows on farm.

#### **7.4 Sections 105 and 107 of the RMA**

In addition to the matters in Section 104(1) of the RMA, if an application is for a discharge permit a consent authority must have regard to the matters as specified in Section 105.

The discharge of FDE can be undertaken in a manner which avoids contaminants from entering water through controls on application method and conditions of consent. As nutrients can be reused, there is a direct benefit to the property as a method for improving soil fertility. The discharge of effluent to land (low-rate methods) is the best method for avoiding adverse effects on water as might otherwise occur in the event that the discharge was directly to water, which would result in a worse environmental outcome.

There are no matters under Section 107(1) of the RMA that would require the consent authority to decline this application.

There are no practicable alternatives (Section 105(1)) to the application of effluent on to land. The discharge of effluent to land will not result in any of the effects listed in Section 107(1) (c)-(g).

#### **7.5 Section 124 of the RMA**

When considering an application affected by section 124 of the RMA the consent authority must have regard to the value of the investment of the existing consent holder. The capital valuation for rating is \$10.11 million (Quickmap, August 2022).

### **8. Consent Duration, Review and Lapse**

With regard to consent duration, special consideration has been given to Policies 14A and 43 of the RWPS and Policy 40 of the PSWLP, and Te Tangi a Taurira.

Potential effects of the proposed activities are understood reasonably well, and these are to be managed as far as reasonably practicable. Potential adverse effects have in the first instance been mitigated by appropriate management techniques on farm followed by contingency planning, ongoing monitoring and reporting in an auditable format.

A consent term equivalent to an expiry of 31 December 2030 is sought by the applicant.

While the water permit and effluent discharge permit are not considered under the NES-F and a 10-year duration could be sought, there are advantages of a common expiry date. A common expiry date is supported by Policy 40(5) for applications which may affect the quality of the same resource. Therefore, a 31 December 2030 common expiration date for all the permits applied for is considered appropriate.

Significant investment has been required just to get to the point of making application with expenditure on professional services, including business feasibility studies, nutrient advice, effluent system review, water quality and policy and planning assessments.

It is considered that granting the 31 December 2030 expiry will enable implementation of any revised framework establish in the FMU section of the PSWLP. Furthermore, this proposal makes substantial steps towards meeting the objectives of the Draft Ngāi Tahu ki Murihiku Freshwater Objectives and recognised the expectations of Hokonui Rūnanga as outlined in Te Kawa o te Taiao.

The applicant is happy for ES to impose standard review conditions in accordance with Sections 128 and 129 of the RMA. In accordance with Section 125 of the RMA, the applicant seeks a 5-year lapse period for these consents. These consents must not be exercised until any current consents for the same activity have been surrendered or have expired.

## 9. CONCLUSION

A decision to grant the resource consent application(s) under Section 104B is recommended on the basis that:

- a) the adverse effects on the environment are likely to be insignificant;
- b) The proposal is consistent with the requirements of the RMA, relevant regional plan objectives and policies and other relevant matters.

Granting the resource consent application(s) will be consistent with the purpose of the RMA for the reasons explained within this report. The proposed activities are unlikely to result in further degradation of water quality and potential adverse effects will be avoided or mitigated as far as practicable.

## Appendix A: Farm Environmental Management Plan



## Appendix B: Riparian Management Plan



# Kanadale Ltd - Riparian Management Plan

22 August 2022

Landpro Reference: 22272

Prepared for: Ryan Moseby, Kanadale Ltd

Prepared by: Christina Bright, Environmental Consultant, Landpro Ltd

## 1. Introduction

### 1.1 Purpose of the Riparian Management Plan

Kanadale Ltd is seeking resource consents to expand their family-owned dairy farm at 135 Boundary Road, Mataura. The purpose of this Riparian Management Plan is to outline works completed on two new blocks of land since 2020 and to support the consent application for expanded dairy activities on these new blocks, including any works proposed in future. The plan is supported by a map, Appendix A, that identifies the below:

- The location of new (post 2 September 2020) fencing with variable width buffers (>3m wide)
- The location of proposed fencing and variable width buffers (>3m wide)
- The location of possible future riparian planting/wetland
- Existing new and proposed forestry (*Pinus radiata*)

Please note this Riparian Management Plan is an aspirational plan for future work and is a living document that will be used to capture areas where works have been completed, and where further riparian planting/management works can be undertaken in future on the new blocks of land. Substantial riparian management including establishment of variable width buffers with native and other planting has occurred already on the existing dairy platform, and over the landholding, and the applicants intend to continue the current practice of identifying areas to work on as and when time and finances allows. The landowners are dedicated to managing existing riparian areas and are committed to implementing further environmental projects on the property over time. This Plan is focused on the Bastaansian Block and Murray Block (Appendix A).

### 1.2 Existing Environment

Surface waterways present on the property include several unnamed tributaries and drains. These water bodies are a mixture of naturally formed and manmade drains. On the existing dairy platform all waterways are fenced, and significant planting of some riparian areas has occurred, including the retirement of steep gullies and planting in forestry, or native planting. On the two new blocks of land all streams have been fenced since 2020 with variable width buffers established on most. Waterways at time of land purchase were very exposed with little riparian vegetation. Waterways are spring fed and subsequently flow into the Mataura River.

All fencing on the Bastaansian block was completed during the first summer the block was owned by Kanadale Ltd in January/February 2021 after the October 2020 takeover. The Murray Block was taken over

the following April in 2021 and all fencing was completed that winter (June/July) within 3 months of owning the new block.

The landscape and farm are made up of Bedrock/Hill Country and Oxidizing physiographic zones, of overland flow variations where the dominant containment transport pathway is overland flow. Therefore, the landscape is well suited to respond positively to the implementation of variable width riparian margins, riparian planting, retirement of land and planting steep gullies in forestry, and sediment ponds/traps.

## 2. Benefits of Riparian Planting

There are many known benefits of riparian planting and management as identified below:

- Reduction of overland nutrient flow;
- Exclusion of stock from waterways;
- Controlling stream bank erosion;
- Reduction of flood impact;
- Enhancement of in- stream habitat and increase in instream food supplies;
- Shading and associated lowering of instream temperature;
- Mahinga kai species and fish habitat protected;
- Increased biodiversity and mahinga kai values;
- Amenity values and increase in future farm value;
- Establishment of habitat corridors over the agricultural landscape;
- Provision of food and habitat for pollinators and seed dispersers, enhancement of ecosystem services;
- Improved water quality

## 3. Proposed Fencing

Waterways which have been identified as requiring permanent fencing have been highlighted on the map attached as Appendix A to this document.

## 4. Proposed Riparian Planting

Waterways which have been identified for further riparian planting have been highlighted on the map attached as Appendix A to this document. There are two areas identified where planting, or wetland construction would be beneficial, and the consent holder will continue to explore options for these identified areas.

### 4.1 Plant Species

The types of plants used in new areas will be similar to planting completed already on the property, and include a variety of the below:

- Pittosporum tenuifolium (Black Mapou)
- Broad Leaf (Griselinia littoralis)
- Koromiko (Hebe salicifolia)
- Kowhai (Sophora microphylla)
- Halls Totara (Podocarpus cunninghamii)
- Cabbage Tree (Cordyline australis)
- Toetoe Cortaderia richardii
- Chinochloa rubra (Red tussock)
- Ribbonwood (Plagianthus regius)
- *Eucalyptus regnans*

### 4.2 Planting Methodology

Once fencing has been established around the waterways it is important to allow grass to develop, this has largely occurred in all areas of completed fencing. Plants will be removed from nursery containers and plants

placed in holes. Soil should then be replaced and lightly compacted with the surface firm and slightly depressed. Species should be planted in small groups to replicate the natural environment. Where possible plants will be sourced from local nurseries or self-propagated to ensure the best chance of survival and adaptation to local growing conditions.

Plants will be planted approximately 1.5-2 metres apart depending on the species of plant. If possible, placement of mulch around the base of the plant would be beneficial. Planting would ideally occur in autumn through until early spring, especially for natives. Pest control, both animal and plant, need to be maintained to ensure the ongoing survival of the riparian margins on the property. Hares, rabbits and possums can cause damage to young trees and the use of either or both protective sleeves and/or repellent are viable options.

### 5. Examples of Existing Riparian Planting

The below provides example of existing riparian planting and variable width buffers on waterways and in gullies that will be replicated at other areas around the property.



## 6. Example of Areas for Future Planting

The below provides example of waterways or gullies where future native planting could be undertaken.



## 7. Examples of Existing Sediment Traps/Ponds and Forestry

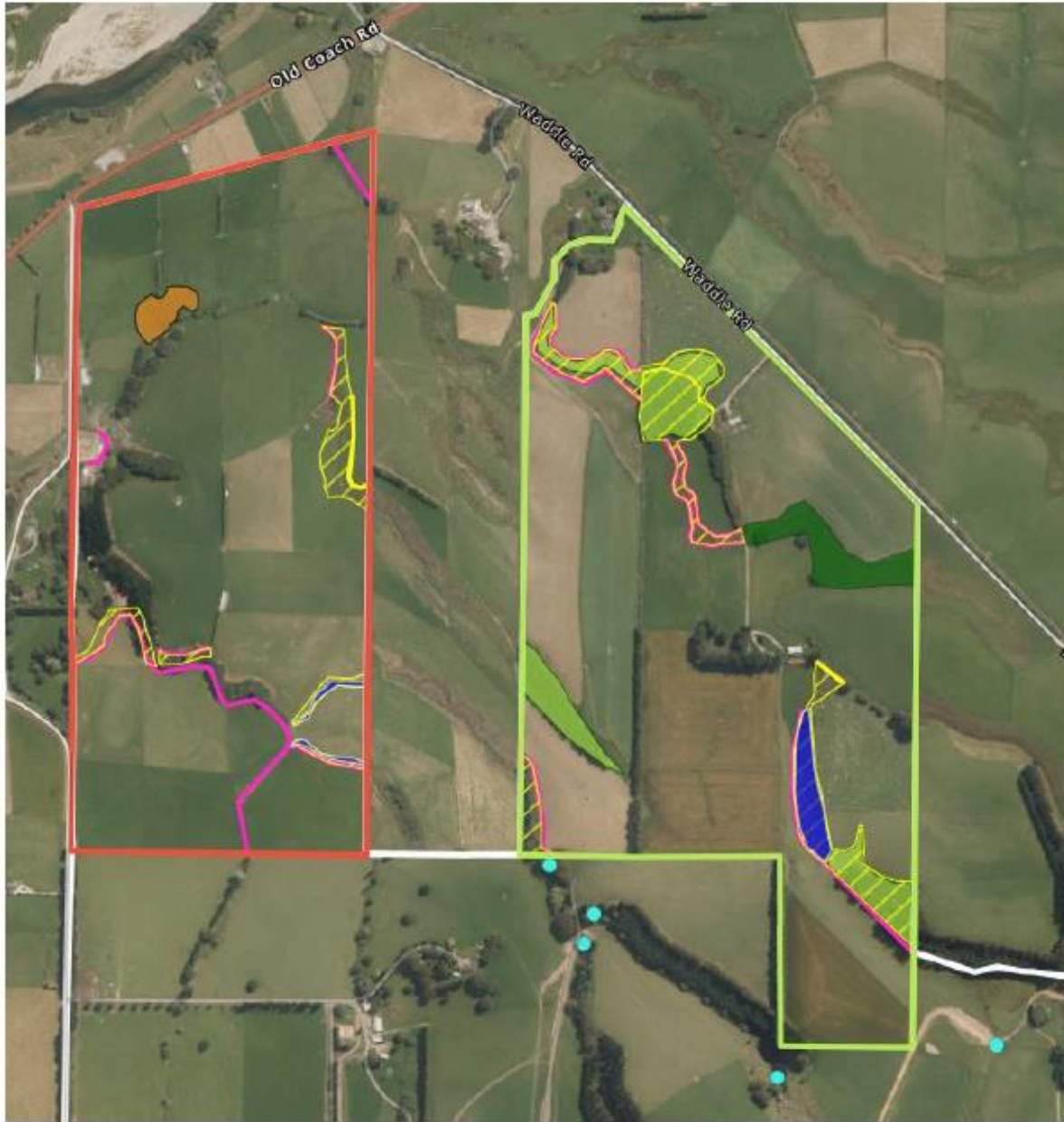
In addition to riparian margins, other control measures on the property to minimise contamination from runoff via overland flow pathways include retirement of steep land and planting of forestry on steep land and in gullies, and sediment traps/ponds to capture and filter runoff.



## 8. Conclusion

Overall, the staged implementation of further riparian planting and/or wetland improvements and measures to minimise overland flow of contaminants to water on the Kandale Ltd property, including nitrogen attenuation, is expected to improve water quality.

## Appendix A: Farm Map



### Kanadale Ltd Riparian Management Plan – Bastaansian Block and Murray Block

#### Legend

- New Fencing
- Proposed Fencing
- Sites identified for possible riparian planting/wetland
- Planted Forestry July 2022
- Proposed Forestry 2023
- Wetland
- ▨ New Variable Width Buffers
- Existing Sediment Trap

## Appendix C: Nutrient Budget Report



# Roslin Consultancy Ltd

OverseerFM farm system modelling to support  
a consent application for expanded dairy

**Report prepared for:**

Kanadale Limited

**Property Address:**

c/- R & A Moseby  
135 Boundary Road  
R D 2  
Gore 9772

**Overseer File and Report**

**Prepared By:**

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**Overseer Files and Report**

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15<sup>th</sup> August 2022

# Kanadale Limited

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# Kanadale Limited

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## 1.0 Executive summary:

Kanadale Limited (Kanadale) is in the Mataura district in Eastern Southland. The property is a mix of flat to rolling topography with brown and gley - silt/silt loam soils. The property currently operates three adjoining blocks:

- Milking platform – 352.8 ha total (277 ha effective)
- Murray block – 58.2 ha total (50.8 ha effective)
- Basti block – 50.5 ha total (43.0 ha effective)

The Basti block was purchased in October 2020 (previously sheep and beef).

The Murray Block was purchased in April 2021 (previously dairy support).

To be more self contained it is intended to integrate the Basti and Murray blocks into the milking platform. The client is seeking to increase cow numbers from 745 peak milked (2.7 cows / effective hectare) to 800 peak milked (2.2 cows / effective hectare).

The milking platform is roughly 1/3 of flat contour with the remaining land utilised as the effective area of rolling contour. Steeper parts of the farm have already been fenced off and retired on the milking platform. By integrating the three blocks the Basti and Murray blocks (both flat) will help to balance the contour of the milking platform.

Due to the two support blocks having differing take over dates the following modelling approach was taken:

### Milking Platform

- Modelled actuals 19/20 year end in line with 2<sup>nd</sup> September 2020 for NES.  
Note: only 12.5ha of winter crop modelled, in the reference period there was 39ha of winter crop used.

### Murray Block

- Information has been provided from the real estate brochure and soil testing completed when the was block purchased.

### Basti Block

- Google Earth has been used as a guide to estimate a conservative sheep and beef system and soil testing completed when block was purchased.

It is proposed to:

- Peak milk 800 cows
- Remove previous sheep and beef operation
- Target Olsen P at agronomic optimum with P applied at maintenance

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To inform the assessment of effects nutrient budgets have been prepared to compare 19/20 to proposed land use.

Nutrient budgeting has been completed using Overseer version 6.4.3 to support a consent application for expanded dairy. These budgets estimate the nitrogen and phosphorus losses from the farm. Four budgets have been completed:

- Current (Three Nutrient Budgets)
  - Current milking platform 19/20
  - Current Murray Block
  - Current Basti Block
- Proposed combined

## 1.1 Nutrient loss estimates

The table below compares the estimated nutrient losses from the current landuse with the estimated losses under the proposed system.

	Current Platform 19/20	Current Murray Block	Current Bastiaasen Block	Current Total
<b>Total Farm N Loss (kg)</b>	15 069	2 490	729	18 288
<b>N Loss/ha (kgN/ha/yr)</b>	43	43	14	
<b>Total Farm P Loss (kg)</b>	269	19	15	303
<b>P loss/ha (kgP/ha/yr)</b>	0.8	0.3	0.3	
<b>Pasture Grown (tDM/ha)</b>	15.9	13.5	11.4	

	Proposed Combined		Difference Between 19/20 and Proposed
<b>Total Farm N Loss (kg)</b>	18182		-0.6%
<b>N Loss/ha (kgN/ha/yr)</b>	39		
<b>Total Farm P Loss (kg)</b>	283		-6.6%
<b>P loss/ha (kgP/ha/yr)</b>	0.6		
<b>Pasture Grown (tDM/ha)</b>	14.8		

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## 1.2 Drivers of changes in nutrient losses

### 1.2.1 Nitrogen loss estimates

Nitrogen losses from a farm system can have negative impacts on water quality downstream. This in turn can have negative implications on aquatic life and human health.

OverseerFM has estimated a 0.6% decrease in nitrogen losses between the current and proposed scenarios. This is the cumulative result of many changes to the farm system including:

- Overall reduction in RSU
- Increase to 800 cows peak milked
  - Decrease in peak cows/effective ha grazed from 2.7 to 2.2
- Increase in milk solids
- Removal of sheep and beef steers
- Increase in total crop area (however less than winter crop area in reference period)
- Decrease in nitrogen fertiliser used
- Decrease in imported feed

### 1.2.2 Phosphorus loss estimates

Phosphorus losses from the farm can cause algal growth in surface waterways. OverseerFM has estimated a 6.6% decrease in Phosphorus losses in the proposed system. Key changes include:

- Overall reduction in RSU
- Increase to 800 cows peak milked
  - Decrease in peak cows/ effective ha grazed from 2.7 to 2.2
- Increase in milk solids
- Removal of sheep and beef steers
- Increase in total crop area (however less than winter crop area in reference period)
- Targeting optimum Olsen P and applying fertiliser to maintenance

OverseerFM is not spatially explicit and a phosphorus mitigation plan should be developed as part of the Farm Environmental Management Plan to reduce phosphorus losses.

## 2.0 Report purpose

The results of the nutrient budgets will be utilised to support a land use consent application for expanded dairying.

This report will emphasise the relevant requirements in the proposed Southland Water and Land Plan, and the National Environmental Standards from a nutrient budgeting perspective. The broader range of requirements should be captured in the Farm Environmental Management Plan (FEMP). This report will inform the FEMP which will be completed separately.

Potential environmental risks on the property have been considered and should be included in the FEMP. These include:

- Contamination of ground water

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- Contamination of surface water
- Undesired changes in soil nutrient status
- Nutrient application to non-target land
- Accumulation of non-nutrient impurities in the soil profile
- Excess stocking rate
- Pugging and compaction
- Poor cultivation methods

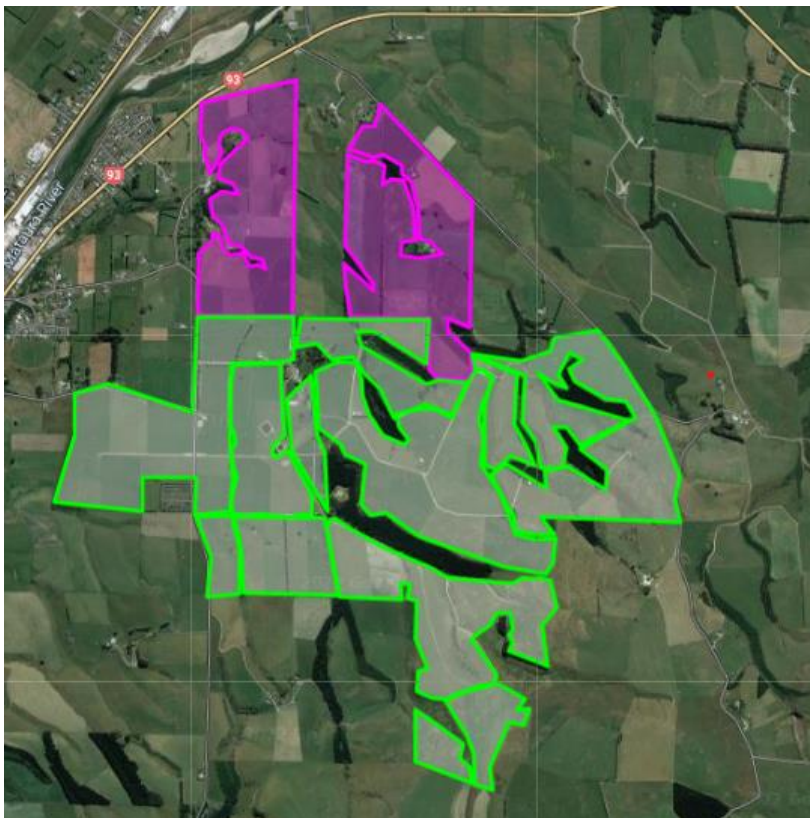
## 3.0 Farm overview

### 3.1 Ownership

Kanadale own and operate 3 adjoining blocks:

Blocks	Total Area (ha)	Effective Area (ha)
Current milking platform	352.8	277
Murray Block	58.2	50.8
Basti Block	50.5	43
	<b>461.5</b>	<b>370.8</b>

### 3.2 Location of Blocks



Note: Green = Milking Platform  
Purple West = Basti Block  
Purple East = Murray Block

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## 3.3 Farm particulars:

<b>Address</b>	135 Boundary Road Mataura		
<b>Legal Description</b>	<u>Current milking platform</u> Section 12 Blk XVII Town of Mataura Bridge SL230/54 Section 11 Blk XVII Town of Mataura Bridge SL230/54 Section 35 Blk I Tukurau SDSLA3/75 Section 58 Blk III Tukurau SD SLA3/75 Section 12 Blk III Tukurau SD SLA2/1445 Lot 1 DP 979 SL8B/647 Lot 1 DP 7031 SLA2/439 Section 8 Blk XVII Town of Mataura Bridge SL3A/202 Section 7 Blk XVII Town of Mataura Bridge SL3A/202 Section 10 Blk XVII Town of Mataura Bridge SL3A/202 Section 9 Blk XVII Town of Mataura Bridge SL3A/202 Section 6 Blk XVII Town of Mataura Bridge SL3A/202 Section 13 Blk XVII Town of Mataura Bridge SL3A/202 Section 5 Blk XVII Town of Mataura Bridge SL3A/202 Section 4 Blk XVII Town of Mataura Bridge SL7/124 Section 2 Blk XVII Town of Mataura Bridge SL7/124 Section 1 Blk XVII Town of Mataura Bridge SL7/124 Section 3 Blk XVII Town of Mataura Bridge SL7/124 Section 34 Blk I Tukurau SDSL8C/835 Section 23 Blk I Tukurau SDSL160/139 Section 37 Blk I Tukurau SDSL124/102 Section 22 Blk I Tukurau SDSL25/78 Lot 2 DP 15385 SL12B/250 <u>Murray Block</u> Section 41 Blk I Tukurau SDSL124/83 Lot 1 DP 565316 1009319 Section 42 Blk I Tukurau SD1009319 <u>Basti Block</u> Lot 1 DP 1109 SLA3/797 Section 46 Blk I Tukurau SDSL174/274		
<b>Area</b>	461.5 ha		

## 3.4 Consent Application Modelling Requirements

Kanadale Ltd is required to apply for a consent to expand dairying across the entire land holding. To inform the assessment of effects nutrient budgets have been prepared to compare the current land use to proposed land use. For the current milking platform the 19/20 year end has been used to best represent what was happening on the farm up to 2nd Sept 2020 in line with the NES requirements.

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## 3.5 Farm system overview

A detailed description of the modelling methodology and Overseer input data is given in the appendices of this report. This section gives an overview of the farm system modelled in each budget.

### 3.5.1 Current Milking Platform

Nutrient budgets were completed using the following:

#### **Milking Platform**

- Modelled actuals 19/20 year end in line with 2<sup>nd</sup> September 2020 for NES.
  - Note: only 12.5ha of winter crop modelled, in the reference period there was 39ha of winter crop used.

#### **Murray Block**

- Information has been provided from the real estate brochure and soil testing completed when the was block purchased.

#### **Basti Block**

- Google earth has been used as a guide to estimate a conservative sheep and beef system and soil testing completed when block was purchased.

### **CURRENT FARM SYSTEM**

#### **Stock and production:**

- Milking Platform
  - 650 Cows wintered in June increasing to 725 in July then dropping to peak milk 720 cows from September, culling in December, February, April and May.
  - 20 Jersey Bulls start of December to start of February.
  - 343 850 kg/yr Milk Solids.
- Murray Block
  - 4 Beef bulls start of October to February.
  - R1 Dairy heifers mid December, wintered and carried until start of June.
  - 275 Mixed age cows wintered in June and July.
- Basti Block
  - 15 yearling steers from mid October sold in April/May.
  - 350 mixed age ewes (Romney).
  - 490 Lambs born in September sold from January to May.
  - No replacements on farm
  - 10 Breeding Rams (Romney).

#### **Feed**

- Milking Platform
  - Winter Crop
    - 12.5ha Kale (fodder crop) fed to dairy cows.
  - Imported
    - 194t DM Barley Grain fed in milking shed.
    - 75t DM DDG fed in milking shed.

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- 88t DM PKE fed in milking shed.
- 176t DM silage fed on pastures.
- 5t DM Baleage fed on Kale.
- Harvested
  - 70t DM Baleage fed on kale.
- Murray Block
  - Winter Crop
    - 11.6ha Kale (fodder Crop) fed to dairy stock.
  - Harvested
    - 48t DM Baleage fed on Kale.
- Basti Block
  - Winter Crop
    - 1.9ha Swedes (fodder Crop) fed to sheep.
  - Harvested
    - 9t DM Baleage fed on Swedes.

## Fertiliser

- Milking Platform
  - Soil test were taken by Ballance in 2020. The tests found an average Olsen P 30.
  - Fertiliser has been entered for 2019/2020 year from Ballance records.
  - Pastoral nitrogen was on average 222kg N/ha/yr.
- Murray Block
  - Soil tests were taken by Ballance in August 2021 (after the block was purchased), the tests found an average Olsen P 42.
  - Fertiliser has been assumed at maintenance levels.
  - Pastoral nitrogen has been assumed at an average 129kg N/ha.
- Basti Block
  - Soil tests were taken by Ballance in August 2021 (after the block was purchased). The tests found an average Olsen P 30.
  - Fertiliser has been assumed at maintenance levels.
  - It is assumed that no pastoral nitrogen has been applied.

## Structures

- Milking Platform
  - Wintering Barn used by 10% of the herd in August and September
- Murray Block
  - None
- Basti Block
  - None

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## 3.4.3 Proposed Dairy System

A budget was completed for the proposed integrated dairy system

### **PROPOSED FARM SYSTEM**

#### **Stock and production**

- Milking Platform
  - 830 Cows wintered in June and July, peak milking 800 in October culling in October, December, February, April and May.
  - 23 Mixed age Jersey breeding bulls from start of December to start of February
  - 210 Calves born on farm in August, with 100 grazed off farm start of January. The remainder are grazed January to April before the 100 off farm return to the mob and are grazed through winter until the start of September.
  - 384 000 kg Milk Solids/year.

#### **Feed**

- Winter Crop
  - 27ha Kale (fodder crop) fed to dairy cows.
  - 10ha Fodder beet (fodder crop) fed to dairy cows.
- Imported
  - 175t DM Barley Grain fed in milking shed.
  - 150 t DM silage (fed in paddock)
- Harvested
  - 350t DM Baleage fed on pasture blocks.
  - 225t DM Baleage fed on Kale and Fodder Beet.

Note: increased amount of supplement made due to lower stocking rate – some of this could be exported off farm. Have modelled worse case scenario (in terms of nutrient loss) and left all on farm.

#### **Fertiliser**

- Overseer default soil test levels have been used.
- Fertiliser has been entered at maintenance levels.
- Pastural nitrogen was on average 186kg N/ha/yr.

#### **Structures**

- Wintering Barn used by 10% of the herd in August and September.

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## 4.0 OverseerFM nutrient loss estimates

### 4.1 OverseerFM loss estimates

Nutrient budgets have been prepared to support the assessment of effects of the current and proposed dairy systems. The table below shows the OverseerFM version 6.4.3 estimated nutrient losses from the current and proposed land use.

	Current Platform 19/20	Current Murray Block	Current Bastiaasen Block	Current Total
<b>Total Farm N Loss (kg)</b>	15 069	2 490	729	18 288
<b>N Loss/ha (kgN/ha/yr)</b>	43	43	14	
<b>Total Farm P Loss (kg)</b>	269	19	15	303
<b>P loss/ha (kgP/ha/yr)</b>	0.8	0.3	0.3	
<b>Pasture Grown (tDM/ha)</b>	15.9	13.5	11.4	
<b>RSU</b>	7487	826	634	8947

	Proposed Combined		Difference Between 19/20 and Proposed
<b>Total Farm N Loss (kg)</b>	18182		-0.6%
<b>N Loss/ha (kgN/ha/yr)</b>	39		
<b>Total Farm P Loss (kg)</b>	283		-6.6%
<b>P loss/ha (kgP/ha/yr)</b>	0.6		
<b>Pasture Grown (tDM/ha)</b>	14.8		
<b>RSU</b>	8592		-4.0%

*Note: There is an increase in rain/clover fixation calculated by Overseer. This is accounted for by the decrease in N applied to all pastures and a decrease in pasture production in the proposed scenario.*

## 5.0 Drivers of changes in nutrient losses

### 5.1 Nitrogen Loss estimates

#### 5.2.1 Nitrogen loss estimates

Nitrogen losses from a farm system can have negative impacts on water quality downstream. This in turn can have negative implications on aquatic life and human health.

OverseerFM has estimated a 0.6% decrease in nitrogen losses between the current and proposed scenarios. This is the cumulative result of many changes to the farm system including:

- Overall reduction in RSU
- Increase to 800 cows peak milked
  - Decrease in peak cows/effective ha grazed from 2.7 to 2.2
- Increase in milk solids
- Removal of sheep and beef steers

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- Increase in total crop area (however less than winter crop area in reference period)
- Decrease in Nitrogen fertiliser used
- Decrease in imported feed

## 5.2 Phosphorus loss estimates

### 5.2.2 Phosphorus loss estimates

Phosphorus losses from the farm can cause algal growth in surface waterways. OverseerFM has estimated a 6.6% decrease in Phosphorus losses in the proposed system. Key changes include:

- Overall reduction in RSU
- Increase to 800 cows peak milked
  - Decrease in peak cows/effective ha grazed from 2.7 to 2.2
- Increase in milk solids
- Removal of sheep and beef steers
- Increase in total crop area (however less than winter crop area in reference period)
- Targeting optimum Olsen P and applying fertiliser to maintenance

OverseerFM is not spatially explicit and a phosphorus mitigation plan should be developed as part of the FEMP to reduce phosphorus losses.

## 6.0 Recommendations from here

OverseerFM can model a specific range of good management practices. Below is a summary of the potential environmental risks on this property and gives recommendations to mitigate these risks.

Good practice for fertiliser use:

- Regular soil testing is used to inform fertiliser recommendations that target agronomic optimum P, K, S, Mg and Ca levels.
- Develop a fertiliser plan with your fertiliser representative. Recommend you make this OverseerFM modelling available to your fertiliser representative to assist them in developing the fertiliser recommendations.
- Apply using a Spreadmark accredited company for fertiliser application – apply at correct rate and with a buffer to waterways.
- Use of Fertmark registered products.
- Record fertiliser applications (location, date of application and amount applied).

Nitrogen:

- Apply nitrogen strategically to meet plant demand.
- Applications should generally be avoided in May due to rapidly declining growth rates.
- Spring nitrogen applications should not be on soil less than 7 degrees Celsius.

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## Phosphorus:

- OverseerFM is not spatially explicit and a phosphorus mitigation plan should be developed to reduce phosphorus losses.

## Critical source areas:

- These include laneways, gateways, swales in paddocks and wallows.
- Review your Farm Environmental Management Plan to update as required and take action on mitigating risk on any new critical source areas identified.

The Proposed Water and Land Plan is currently in the appeals process and is partially operative. It will be important to stay up to date with developments in Environment Southland policy and rules, including the limit setting process which will develop over the next few years.

A National Environmental Standard (NES) has been gazetted. This has implications for the wintering of stock on crop, stock exclusion from waterways, nitrogen fertiliser use, changes in landuse and the use of stockholding areas for cattle.

Both the Proposed Water and Land Plan and the National Environmental Standards require a farm of this size to have a farm environmental management plan. This should be updated to include the recommendations within this report.

### Appendices

#### Appendix 1. Modelling Methodology

Nutrient losses have been estimated using the OverseerFM Version 6.4.3 model. OverseerFM is a software application that models nutrient movements within a farm system. Input data detailing the farm system is entered into the software and interpreted through the use of a series of sub-model that calculate the flow of seven major farm nutrients (Nitrogen, Phosphorus, Sulphur, Calcium, Magnesium and Sodium). Output data is reported for interpretation and to inform farm management practices. It currently requires an expert user to describe the physical and management details of a farm.

#### OverseerFM assumptions

Within the OverseerFM software, assumptions have been made of the farm management:

- Long term annual average model  
The model uses annual average input and produces annual average outputs.
- Near equilibrium conditions  
Model assumes that that the farm is at a state where there is minimal change each year.
- Actual and reasonable inputs  
It is assumed that input data is reasonable and a reflection of the actual farm system. If any parameter changes, it is assumed that all other parameters affected will also be changed.
- Good management practices are followed  
OverseerFM assumes the property is managed at industry agreed good management practice for a specific list of factors including effluent and fertiliser applications. OverseerFM does not assume that all industry agreed good management practices are undertaken on farm.

#### OverseerFM limitations

Key limitations of the OverseerFM model are:

- OverseerFM does not predict transformations, attenuation or dilution of nutrients between the root zone or farm boundary and the eventual receiving water body. A catchment model is needed to estimate the effects of the nutrient losses from farms on groundwater, river or lake water quality.
- OverseerFM does not calculate outcomes from extreme events (floods and droughts) but provides a typical years result based on a long-term average.
- OverseerFM does not calculate the impacts of a conversion process, rather it predicts the long-term annual average nutrient budgets for changed land use.
- OverseerFM is not spatially explicit beyond the level of defined blocks.
- Not all management practices or activities that have an impact on nutrient losses are captured in the OverseerFM model.
- OverseerFM does not represent all farm systems in New Zealand.
- Components of OverseerFM have not been calibrated against measured data from every combination of farm systems and environment.



Information on OverseerFM can be obtained from the following reports:

- Technical Description of OVERSEER for Regional Councils, September 2015
- Review of the phosphorus loss submodel in OVERSEER®, September 2016
- Using OVERSEER® in Regulation – Technical Resources and Guidance for Regional Councils, August 2016

### Data input standards

Nutrient budgets have been constructed using the OverseerFM Version 6.4.3 model.

The nutrient budgets have been developed in accordance with the Overseer data input protocols - “Overseer, Best Practice Data Input Standards, March 2018” and the “OverseerFM User Guide, October 2019.” No deviations have been made from these protocols.

## Appendix 2. Modelling Inputs

### Soil types

Soil type has a large bearing on nutrient loss levels from a property. This is due to different soil types having different water holding capacities, and drainage characteristics. It is therefore important that soil type is inputted correctly.

The table below gives a brief description of the soil types found on the properties.

S-map ref	Group	Soil Order	Drainage class	Description
Heret_47a.1	Sedimentary	Brown	Mod well	deep, moderately well drained, silty loam
Wynd_9a.1	Sedimentary	Brown	Imperfect	deep, imperfectly drained, silty loam
Otari_3a.1	Sedimentary	Brown	Well	deep, well drained, silty loam
Eure_22a.1	Sedimentary	Gley	Poor	deep, poorly drained, silt

The table below shows the area and the proportion of the block that the soils identified covered:

	Milking Platform	Murray	Basti	Combined
Heret_47a.1	206.8	45.7	37.8	<b>290.3</b>
Wynd_9a.1	48.9	5.1		<b>54.0</b>
Otari_3a.1	21.3			<b>21.3</b>
Eure_22a.1			5.2	<b>5.2</b>
	<b>277</b>	<b>50.8</b>	<b>43.0</b>	<b>370.8</b>

### Climate Data

The following climate information has been used from the OverseerFM climate station tool:

<b>Annual Rainfall (mm)</b>	1114 - 1122
<b>Mean Annual Temp (°C)</b>	9.6 – 10.1
<b>Annual PET (mm)</b>	741 - 758

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### Blocks

The farms have been split into the following pastoral, riparian and fodder crop blocks based on soil type, contour, drainage and land use.

		Current Platform	Murray Block	Bastiaasen Block		Proposed dairy platform
<b>Pasture blocks</b>						
	<b>Effluent flat</b>	21				21
	<b>Effluent rolling</b>	69				69
	<b>Non effluent flat</b>	53.8		43.0		53.8
	<b>Non effluent rolling</b>	133.2	50.8			133.2
	<b>Non effluent flat – Murray Block</b>					50.8
	<b>Non effluent flat – Bast Block</b>					43.0
	<b>Productive Block Area</b>	<b>277.0</b>	<b>50.8</b>	<b>43.0</b>		<b>370.8</b>
	Non-effective area	75.8	7.4	7.5		90.7
	<b>Total area</b>	<b>352.8</b>	<b>58.2</b>	<b>50.5</b>		<b>461.5</b>
	<b>Fodderbeet</b>					<b>10.0</b>
	<b>Kale</b>	<b>12.5</b>	<b>11.6</b>			<b>27.0</b>
	<b>Swedes</b>			<b>1.9</b>		

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### Farm System Inputs

Description	Platform 19/20	Murray Block	Bastiaasen Block		Proposed combined																																																		
<b>Dairy cows</b> (note: stock numbers refer to those on the last day of the month)	Production: 343850 kgMS  Mean calving date: 20 Aug Dry off date: 31 May	N/A	N/A		Production: 384000 kgMS  Mean calving date: 20 Aug Dry off date: 31 May																																																		
	<table border="1"> <thead> <tr> <th>Month</th> <th>Dairy Herd – FrJx</th> </tr> </thead> <tbody> <tr><td>Jul</td><td>725</td></tr> <tr><td>Aug</td><td>725</td></tr> <tr><td>Sep</td><td>720</td></tr> <tr><td>Oct</td><td>720</td></tr> <tr><td>Nov</td><td>720</td></tr> <tr><td>Dec</td><td>715</td></tr> <tr><td>Jan</td><td>715</td></tr> <tr><td>Feb</td><td>710</td></tr> <tr><td>Mar</td><td>710</td></tr> <tr><td>Apr</td><td>700</td></tr> <tr><td>May</td><td>690</td></tr> <tr><td>Jun</td><td>650</td></tr> </tbody> </table> <p>20 breeding bulls Dec / Jan</p>	Month	Dairy Herd – FrJx	Jul	725	Aug	725	Sep	720	Oct	720	Nov	720	Dec	715	Jan	715	Feb	710	Mar	710	Apr	700	May	690	Jun	650			<table border="1"> <thead> <tr> <th>Month</th> <th>Dairy Herd – FrJx</th> </tr> </thead> <tbody> <tr><td>Jul</td><td>830</td></tr> <tr><td>Aug</td><td>820</td></tr> <tr><td>Sep</td><td>805</td></tr> <tr><td>Oct</td><td>800</td></tr> <tr><td>Nov</td><td>800</td></tr> <tr><td>Dec</td><td>788</td></tr> <tr><td>Jan</td><td>788</td></tr> <tr><td>Feb</td><td>780</td></tr> <tr><td>Mar</td><td>780</td></tr> <tr><td>Apr</td><td>766</td></tr> <tr><td>May</td><td>758</td></tr> <tr><td>Jun</td><td>835</td></tr> </tbody> </table> <p>23 breeding bulls Dec / Jan</p>	Month	Dairy Herd – FrJx	Jul	830	Aug	820	Sep	805	Oct	800	Nov	800	Dec	788	Jan	788	Feb	780	Mar	780	Apr	766	May	758	Jun
Month	Dairy Herd – FrJx																																																						
Jul	725																																																						
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Mar	780																																																						
Apr	766																																																						
May	758																																																						
Jun	835																																																						
<b>Dairy replacements</b>	200 heifer calves 24th August to 1 <sup>st</sup> Nov	95 heifer calves arrive mid Dec, wintered and leave as in calf heifers 1 <sup>st</sup> of June  4 bulls for mating Oct to Jan	N/A		210 heifer calves August to 1 <sup>st</sup> January.  100 heifer calves 1 <sup>st</sup> Jan to 1 <sup>st</sup> May																																																		

## Kanadale Limited

Description	Platform 19/20	Murray Block	Bastiaasen Block		Proposed combined
		275 cows from 1 <sup>st</sup> June to 10 <sup>th</sup> August			210 R1's May to 1 <sup>st</sup> Sept (wintered)
<b>Beef</b>	NA	NA	15 beef steer yearlings arrive mid October and all gone by mid of May		NA
<b>Sheep</b>	N/A	N/A	350 romney ewes all year 140% lambing 490 lambs all gone by mid May 10 romney breeding rams all year		N/A
<b>In shed feeding</b>	100% of herd fed inshed Aug – May	N/A	N/A		100% of herd fed inshed Aug – May
<b>Structures</b>	Covered wintering pad Bark surface  Management: 10% of cows Aug & Sept  Bark applied to effluent area	None	None		Covered wintering pad Bark surface  Management: 10% of cows Aug & Sept  Bark applied to effluent area

## Kanadale Limited

Description	Platform 19/20	Murray Block	Bastiaasen Block		Proposed combined
<b>Animal distribution</b>	No difference between blocks	No difference between blocks	No difference between blocks		No difference between blocks
<b>Crop management</b>	<u>Kale (rotating)</u> 12.5 ha ex pasture 12TDM/ha yield Planted in Nov – conventional cultivation 250kg/ha CZ at sowing 100kg/ha sustaiN applied in Jan & March Grazed in June to Sept Sown into permanent pasture in Oct	<u>Kale (rotating)</u> 11.6 ha ex pasture 12TDM/ha yield Planted in Nov– conventional cultivation 250kg/ha DAP at sowing 100kg/ha Urea applied in Jan & March Grazed in June to Sept Sown into permanent pasture in Oct	<u>Swedes (rotating)</u> 1.9 ha ex pasture 12TDM/ha yield Planted in Nov– conventional cultivation 250kg/ha DAP at sowing 100kg/ha Urea applied in Jan & March Grazed in June to Sept Sown into permanent pasture in Oct		<u>FB (rotating)</u> 10 ha ex pasture 24TDM/ha yield Planted in Nov – conventional cultivation 500kg/ha FB base at sowing 100kg/ha Urea applied in Jan & March Grazed in June to Sept Sown into permanent pasture in Oct  <u>Kale (rotating)</u> 27 ha ex pasture 12TDM/ha yield Planted in Nov – conventional cultivation 250kg/ha CZ at sowing 100kg/ha urea applied in Jan & March Grazed in June to Sept Sown into permanent pasture in Oct
<b>Imported Supplements</b>	Barley grain – 194 t DM fed in shed PKE – 88 t DM fed in shed DDG – 75t DM fed in shed	None	None		Barley grain – 175 t DM fed in shed  150 t DM silage fed in pdk

## Kanadale Limited

Description	Platform 19/20	Murray Block	Bastiaasen Block		Proposed combined
	5 t DM baleage fed on crop 176 t DM silage fed in pdk				
<b>Harvested supplements</b>	70 t DM Baleage harvested and fed on crops	48 t DM Baleage harvested and fed on crops	9 t DM Baleage harvested and fed on crops		225 t DM Baleage harvested and fed on crop  350 t DM Baleage harvested and fed in paddocks
<b>Exported supplements</b>	None	None	None		None
<b>Soil Fertility</b>	Ex Ballance records Olsen P of 30	Ex Ballance records Olsen P of 42	Ex Ballance records Olsen P of 30		Default Olsen P of 30
<b>Fertiliser</b>	Ex Ballance records 60 kg P / ha	Fertiliser applied to maintenance	Fertiliser applied to maintenance		Fertiliser applied to maintenance
<b>Pastoral Nitrogen Fertiliser</b>	222 kgN/ha was applied to the pasture area in split application between Aug and April	129 kgN/ha was applied to the pasture area in split application between Sept and April	None		186kgN/ha was applied to the pasture area in split application between Aug and April
<b>Drainage</b>	20 % on flats	20%	20%		20 % on flats
<b>Effluent system</b>	Holding pond Effluent is applied using at less than 12mm	N/A	N/A		Holding pond Effluent is applied using at less than 12mm

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Description	Platform 19/20	Murray Block	Bastiaasen Block	Proposed combined
	Liquid effluent is applied to the “eff” blocks of 90 ha  No separation, holding pond  Solids from barn are spread on all pastoral areas			Liquid effluent is applied to the “eff” blocks of 90 ha  No separation, holding pond  Solids from barn are spread on all pastoral areas



## Appendix D: DESC

## Disclaimer

I/We acknowledge and agree that:

1. the results contained in the report which DairyNZ will provide following my/our use of the Dairy effluent storage calculator ("the calculator") are generated based on the data which I/we have inputted into the calculator; and
2. the reliability of the results and the report is dependent upon a number of variables including, without limitation, the accuracy of the input data, and the validity of the assumptions and algorithms used in the calculator in relation to the input data which may be updated to reflect development in effluent knowledge; and
3. the results contained in the report cannot be relied upon solely to ensure the effluent storage system:
  - a. meets the current or future requirements of the district or regional plans of the local territorial authority or regional council or any other authority having jurisdiction.
  - b. has the storage capacity to allow practical management of the effluent system.

**Accordingly, DairyNZ does not accept liability for any loss, damage, cost or expense suffered or incurred by me/us or any third party to whom this report has been provided (whether by me/us or another person) in connection with the use of, and reliance on, the report and the results contained in it.**

DairyNZ's website terms and conditions (which can be found at <https://www.dairynz.co.nz/terms-and-conditions>) otherwise apply to the use of this service and the provision of the report and the results in it.

## KAN20293 Kanadale Limited S1(b)

135 Boundary Road, Mataura

<b>Supplier Number</b>	34101
<b>Storage max m<sup>3</sup></b>	4,997.60
<b>90th percentile m<sup>3</sup></b>	3,554.68
<b>Total pond useable volume m<sup>3</sup></b>	3,725.34
<b>File owned by</b>	Donna McBeath RES Rural Environmental Solitons
<b>Created by</b>	Donna McBeath RES Rural Environmental Solitons
<b>Created on</b>	03 Aug 2022
<b>Last edited by</b>	Donna McBeath RES Rural Environmental Solitons
<b>Last edited on</b>	14 Aug 2022

### 1(b). RES Base Calculation

795 Peak Cows, high risk soils for effluent application; permanent shed roof diversion; yard, tanker pad and concrete lane diversion when cows are dried off; NO other Silage Pads or underpass or stand off pads or other areas drain to the pond; 50 lt/cow/day wash down water used in the dairy shed; 2 sets of low rate pods (20m<sup>3</sup>/hr for a minimum of 2 hours per day when there is a soil moisture deficit of 3mm and increasing as the soil moisture levels increase); existing pond; effluent application all year round; 3 days emergency storage.

Other areas include: NIL

All information entered and assumptions made in this report are based upon information gathered from management and staff while onsite. Please check that all information and assumptions made in this report are correct.

Under the management system parameters described in this report and on the balance of probability, it is 90% likely that 3,555m<sup>3</sup> of liquid effluent storage will be adequate for storage in any one year.

Based on the pond dimensions of 45.5m x 45.5m x 3.0m, with a 2:1 batter (as shown in the original pond design drawings by RDA), you currently have approximately 3,725m<sup>3</sup> of effective storage (being a total hole in the ground volume of approximately 4,717m<sup>3</sup>) which is over 90% probability that you will have sufficient storage in any one year.

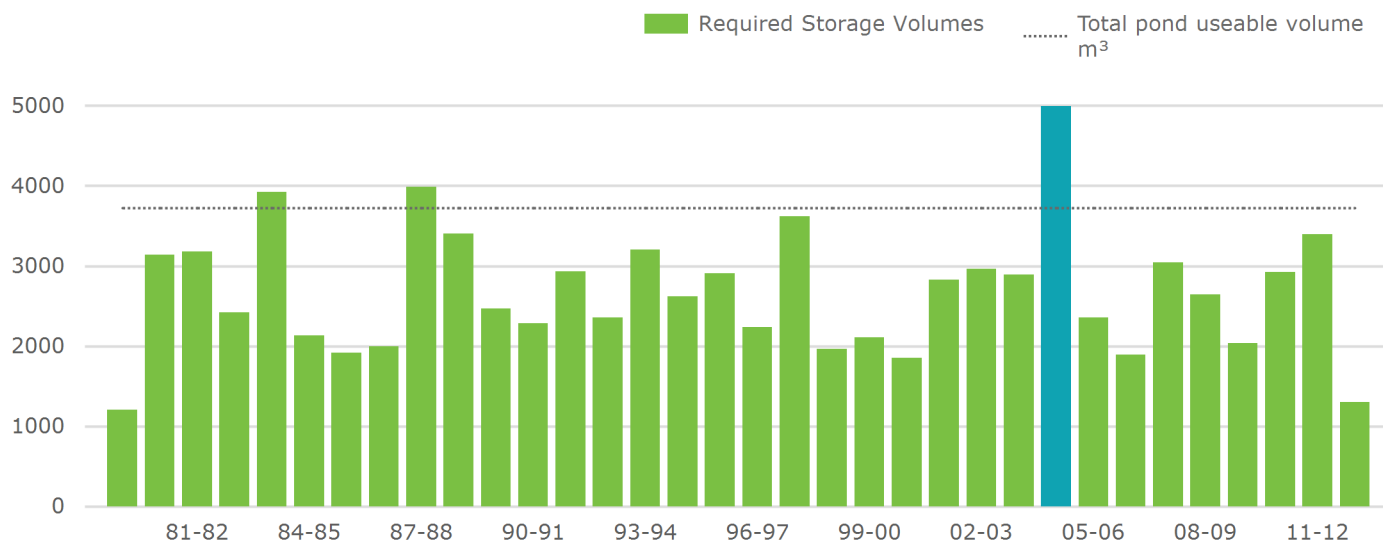
This calculation assumes that you will irrigate for around 200 days every year and that there are around 165 days each season that effluent cannot be applied to land and should be stored in the main effluent pond.

There is approximately 14,500m<sup>3</sup> of effluent produced each season, approximately 38.5m<sup>3</sup> per day.

Good management is essential for liquid effluent storage of this size.

There is no solids separation currently in the effluent system.

### Required Storage Volumes



### Climate

Site	Mean Rainfall mm	Altitude m
Gore	959	123

### Soil

Low Risk Soil ha	Minimum High Risk Soil ha	Surplus high risk soil ha
0	171.71	0

### Irrigation

Calculated option	Application depth mm	Pump volume m <sup>3</sup>
Option 1: Pump rate 20m <sup>3</sup> /hr and pump time 2hrs	3	40
Option 1: Pump rate 20m <sup>3</sup> /hr and pump time 4hrs	6	80
Option 1: Pump rate 20m <sup>3</sup> /hr and pump time 6hrs	9	120
Option 1: Pump rate 20m <sup>3</sup> /hr and pump time 3hrs	4.5	60
Option 1: Pump rate 20m <sup>3</sup> /hr and pump time 7hrs	7.5	140
Option 1: Pump rate 20m <sup>3</sup> /hr and pump time 6.75hrs	10	135

### Solid Storage Volumes

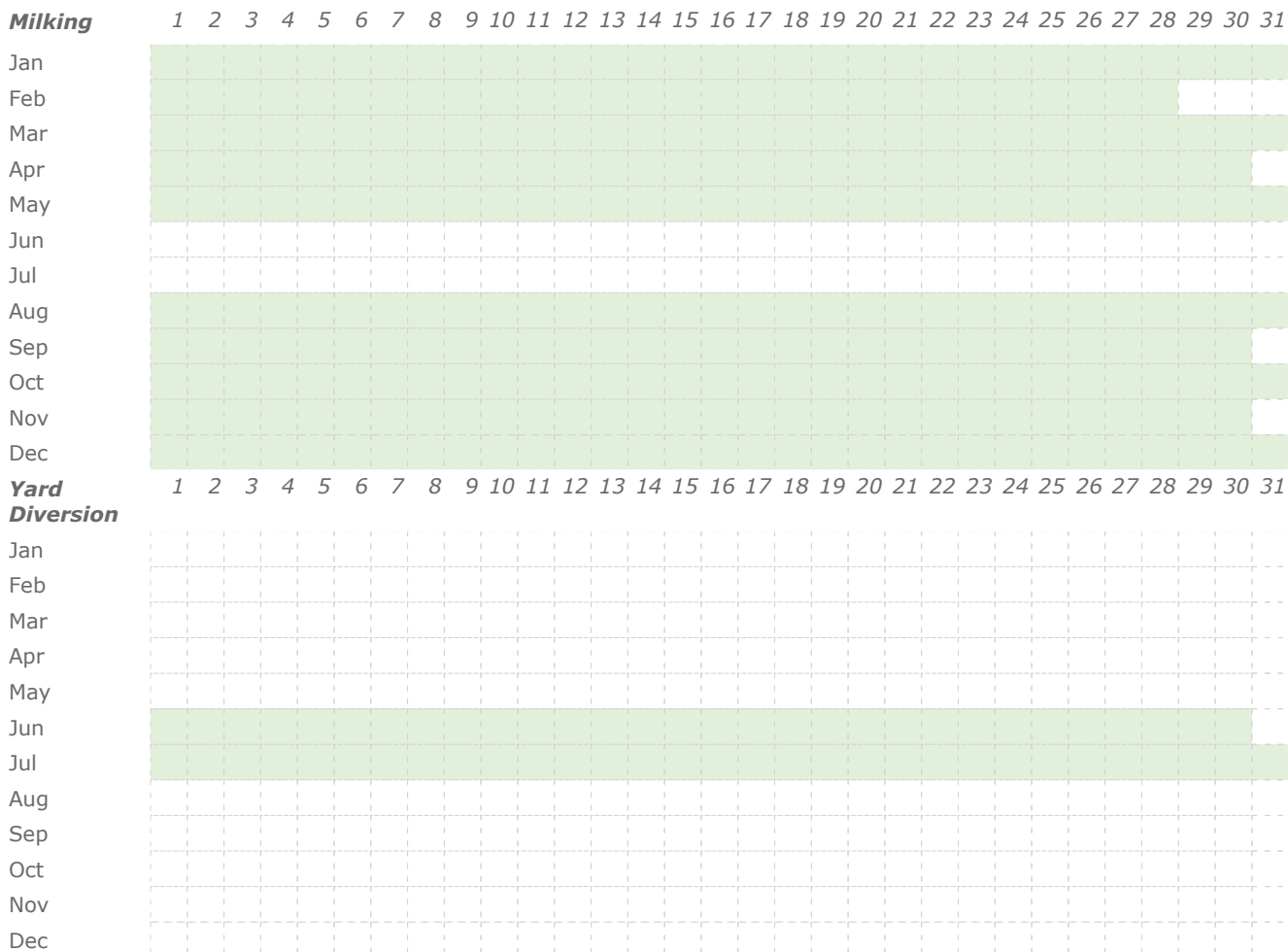
--- No Data Available

**Catchment**

<b>Shed</b>		<b>Yard</b>		<b>Feedpad</b>			<b>Animal Shelter</b>			<b>Other</b>
Area m <sup>2</sup>	Diverted	Area m <sup>2</sup>	Diverted	Area m <sup>2</sup>	Covered	Diverted	Area m <sup>2</sup>	Covered	Diverted	Area m <sup>2</sup>
450	Yes	1240	Yes	0	No	No	0	No	No	0

	<b>Yard</b>			
	Cows	Hours	Volume m <sup>3</sup>	Wash LCD
Jan	800	6.5	40	50
Feb	800	6.5	40	50
Mar	730	6.5	36.5	50
Apr	680	6.5	34	50
May	580	6.5	29	50
Jun	0	0	0	0
Jul	0	0	0	0
Aug	530	6.5	26.5	50
Sep	680	6.5	34	50
Oct	800	6.5	40	50
Nov	800	6.5	40	50
Dec	800	6.5	40	50

## Calendar



## Solid Unit

No Data Available

## Storage

Emergency Storage Period

Storage Name	Covered	Pumped	Type	Dimension
Main Effluent Pond	No	On	Regular - Rectangular	length 45.5m, width 45.5m, height 3m, sludge height 0.001m freeboard height 0.5m and batter 2:1

## Appendix

Season	Required Storage Volumes m <sup>3</sup>
79-80	1,206.64
80-81	3,136.29
81-82	3,180.23
82-83	2,420.71
83-84	3,920.79
84-85	2,135.85
85-86	1,914.38
86-87	1,997.53
87-88	3,989.84
88-89	3,405.40
89-90	2,465.59
90-91	2,285.03
91-92	2,931.92
92-93	2,357.85
93-94	3,201.36
94-95	2,619.43
95-96	2,908.61
96-97	2,237.03
97-98	3,618.65
98-99	1,961.57
99-00	2,110.32
00-01	1,854.99
01-02	2,826.98
02-03	2,962.31
03-04	2,893.10
04-05	4,997.60
05-06	2,354.18
06-07	1,890.07
07-08	3,043.68
08-09	2,643.80
09-10	2,037.46
10-11	2,924.95
11-12	3,397.46
12-13	1,302.71

34101



# TIAKI FARM ENVIRONMENT PLAN



# ABOUT YOUR TIAKI FARM ENVIRONMENT PLAN

This Tiaki Farm Environment Plan document is the result of a tailored farm environment planning service provided to you through the Co-operative Difference. It's part of the advantage you get through Farm Source as a member of the Fonterra Co-Operative. The purpose of this plan is to describe the environmental conditions present on your farm and the management of these conditions. From this, mitigations to potential impacts to water quality are documented and additional mitigations maybe planned, with sensible timeframes. Underpinning this plan, are the agreed national Good Farming Practices that are supported by the agricultural and horticultural sectors. Industry bodies along with Regional Councils and Central Government have developed the Good Farming Practice: Action Plan for Water Quality 2018 in a commitment to swimmable rivers and improving the ecological health of our waterways. The Dairy Industry Strategy (Dairy Tomorrow), as well as the Good Farming Practice: Action Plan for Water Quality 2018, both align with the goal for all dairy farms to have a Farm Environment Plan by 2025. Now that this plan has been created it's the plan owner's responsibility to ensure it is put into action and kept up to date as actions are completed or conditions on farm change. Farm Source is here to help with that implementation and ongoing management through our team of Sustainable Dairying Advisors who can be contacted via the details below.

**PHONE:** 0800 65 65 68

**EMAIL:** [sustainable.dairying@fonterra.com](mailto:sustainable.dairying@fonterra.com)

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## FARM DETAILS

SUPPLIER NUMBER **34101**

FARM OWNER **Kanadale Limited**  
C/- R Moseby  
Kanadale, RD 2  
Gore 9772

PLAN OWNER

FARM ADDRESS  
Boundary Road  
Mataura

LOCATION



REGIONAL COUNCIL Southland

PLAN LAST EDITED 19 August 2022

POINTS OF NOTE

\* Southland Physiographic Zones

Bedrock/Hill Country: 1.64 ha - 0.35 %.

Bedrock/Hill Country: 0.03 ha - 0.01 %.

Gleyed: 6.07 ha - 1.30 %.

Riverine: 0.54 ha - 0.12 %.

Bedrock/Hill Country: 247.68 ha - 53.10 %.

Bedrock/Hill Country: 16.22 ha - 3.48 %.

Oxidising: 191.71 ha - 41.10 %.

Oxidising: 2.54 ha - 0.54 %.

\* Southland Consents

Type:Land Use Permit,ID:AUTH-20191679,Expiry:2020-10-11: 0.01 ha - 0.00 %.

Type:Land Use Permit,ID:AUTH-20191679,Expiry:2020-10-11: 0.01 ha - 0.00 %.

%.

Type:Land Use Permit,ID:AUTH-20191679,Expiry:2020-10-11: 0.01 ha - 0.00

%.

Type:Land Use Permit,ID:AUTH-20191679,Expiry:2020-10-11: 0.01 ha - 0.00

%.

Type:Water Permit,ID:AUTH-206964,Expiry:2019-11-25: 0.01 ha - 0.00 %.

Type:Dairy Consent,ID:AUTH-302684-V1,Expiry:2028-11-27: 0.01 ha - 0.00

%.

Type:Water Permit,ID:AUTH-302685-V1,Expiry:2028-11-27: 0.01 ha - 0.00 %.

Type:Land Use Permit,ID:AUTH-302687,Expiry:: 0.01 ha - 0.00 %.

\* NZLRI Land Use Capability

3e10: 2.47 ha - 0.53 %.

3e10: 214.72 ha - 46.03 %.

3e10: 3.79 ha - 0.81 %.

5c 2: 2.19 ha - 0.47 %.

3e10: 36.32 ha - 7.79 %.

3s 2: 8.83 ha - 1.89 %.

4e 3: 5.74 ha - 1.23 %.

5c 2: 192.39 ha - 41.25 %.

## LAND PARCELS

Fee Simple, 1/1, Lot 1 Deposited Plan 979, 812,609 m2, Fee Simple, 1/1, Country Section 22 Block I Tuturau Survey District, 266,308 m2, Fee Simple, 1/1, Section 12 Block III Tuturau Survey District, 204,771 m2, Fee Simple, 1/1, Section 23 Block I Tuturau Survey District, 276,856 m2, Fee Simple, 1/1, Lot 2 Deposited Plan 15385, 919,867 m2, Fee Simple, 1/1, Section 37 Block I Tuturau Survey District, 267,093 m2, Fee Simple, 1/1, Section 35 Block I Tuturau Survey District and Section 58 Block III Tuturau Survey District, 343,983 m2, Fee Simple, 1/1, Section 34 Block I Tuturau Survey District, 137,593 m2, Fee Simple, 1/1, Section 11-12 Block XVII Town of Maitara Bridge, 48,107 m2, Fee Simple, 1/1, Section 1-4 Block XVII Town of Maitara Bridge, 81,139 m2, Fee Simple, 1/1, Section 5-10 and Section 13 Block XVII Town of Maitara Bridge, 166,275 m2, Fee Simple, 1/1, Section 46 Block I Tuturau Survey District, 471,712 m2, Fee Simple, 1/1, Lot 1 Deposited Plan 1109, 33,462 m2, Fee Simple, 1/1, Section 41 Block I Tuturau Survey District, 202,343 m2, Fee Simple, 1/1, Lot 1 Deposited Plan 565316 and Section 42 Block I Tuturau Survey District, 380,059 m2, Fee Simple, 1/1, Lot 2 Deposited Plan 565316, 24,730 m2

# FARM OVERVIEW MAP

The map below presents the land in which the farming operations covered in this document occur and identifies some key points of interest. More detailed maps looking at specific environmental management topics are contained throughout the document.



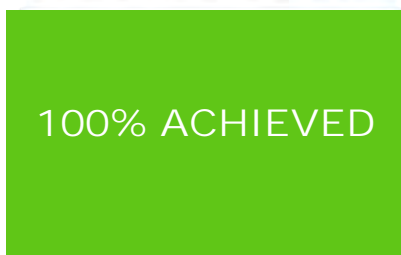
- |   |  |
|---|--|
|  Major Stock Excluded Waterway     |  Compliant Crossing                 |
|  Major Stock Not Excluded Waterway |  Non-Compliant Crossing             |
|  Minor Stock Excluded Waterway     |  Non-Compliant Non-Regular Crossing |
|  Minor Stock Not Excluded Waterway |  Dispensation Crossing              |
|  Farm Boundary                     |  Dairy Shed                         |

# GOOD FARMING PRACTICES

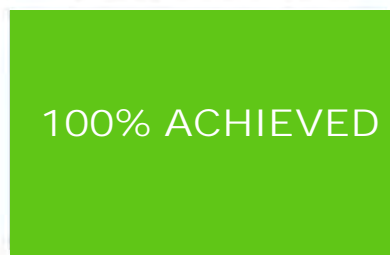
This section provides an overall snapshot of the farm's Good Farming Practices (GFPs). Based on industry-agreed identified practices, the GFPs in this Farm Environment Plan are grouped by the six core management areas on farm. Each management area below displays the farm's progress towards achieving all the GFPs within that area. This section also includes additional GFPs relevant to the dairy industry goals.



## GENERAL FARM



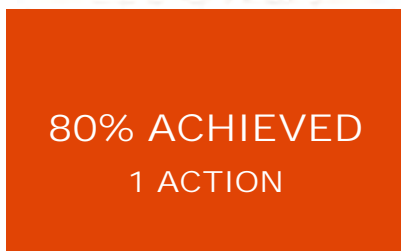
## LAND & SOIL



## IRRIGATION



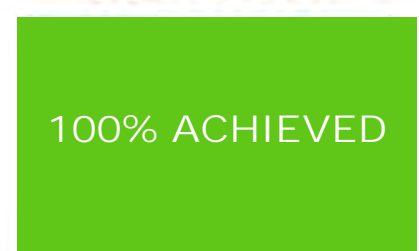
## EFFLUENT



## WATERWAYS & BIODIVERSITY



## NUTRIENT



# GOOD FARMING PRACTICES

The tables below assess the GFPs recorded in this Farm Environment Plan. GFPs already in place on this farm, will be listed as “Achieved”. GFPs yet to be achieved or in progress, will show the number of open actions required to achieve the GFP. GFPs that are not applicable in this Farm Environment Plan will be listed as “N/A”

## GENERAL FARM MANAGEMENT

Identify the physical and biophysical characteristics of the farm system, assess the risk factors to water quality associated with the farm system, and manage appropriately	ACHIEVED
Maintain accurate and auditable records of annual farm inputs, outputs and management practices	ACHIEVED
Store and load fertiliser with minimal spillage and leaching	ACHIEVED
Store, transport and distribute feed to minimise wastage, leachate and soil damage	ACHIEVED
*Farm waste is minimised and managed properly	ACHIEVED
*Water use for the dairy shed and stock water is efficient	ACHIEVED

## LAND & SOIL MANAGEMENT

Manage farming operations to minimise direct and indirect losses of sediment and nutrients to water, and maintain or enhance soil structure, where agronomically appropriate	ACHIEVED
Reduce periods of bare soil between crops and pasture to reduce erosion and leaching	ACHIEVED
Retire all LUC 8 land and retire LUC 7e land or ensure that it has soil conservation measures in place	N/A
Use appropriate paddocks for intensive grazing	ACHIEVED
Manage grazing to minimise nutrient loss from risk areas	ACHIEVED

## IRRIGATION MANAGEMENT

Irrigation rates and timing match plant requirements	N/A
Design, calibrate and operate irrigation systems to use water efficiently	N/A

# GOOD FARMING PRACTICES

## EFFLUENT MANAGEMENT

Effluent system meets code of practice	ACHIEVED
Sufficient suitable storage available	ACHIEVED
Spreading equipment is well maintained and calibrated	1 ACTION(S)
Effluent applied at correct depth, rate and time	ACHIEVED
*All effluent systems	ACHIEVED

## WATERWAYS & BIODIVERSITY MANAGEMENT

Identify areas where runoff may occur and manage to avoid runoff entering waterways	ACHIEVED
Tracks, feed areas, gateways and troughs are located away from waterways	ACHIEVED
Stock are excluded from waterways	1 ACTION(S)
*Areas of native plants or significant biodiversity are protected	ACHIEVED

## NUTRIENT MANAGEMENT

Monitor and maintain P levels at the economic optimum	ACHIEVED
Fertiliser application matches plant requirements and minimises losses	ACHIEVED
Spreading equipment is well maintained and calibrated	ACHIEVED
*General Nutrient Management	ACHIEVED

# ACTIONS & RECOMMENDATIONS

This list includes all actions and recommendations that have been agreed as part of this Farm Environment Plan. Actions are required to achieve Good Farming Practices. Actions that have a target date within 2 years are captured as "Current Actions". Actions with a target set more than 2 years in the future are captured as "Future Actions". "Recommendations" cover all other actions that are not related to a GFP.

## CURRENT ACTIONS
















	<b>Target Date</b>
  Fence off creeks/ditches	30 Sep 2022
  Bucket test K-line pods	31 Dec 2023

## FUTURE ACTIONS

**Target Date**

## RECOMMENDATIONS

**Target Date**

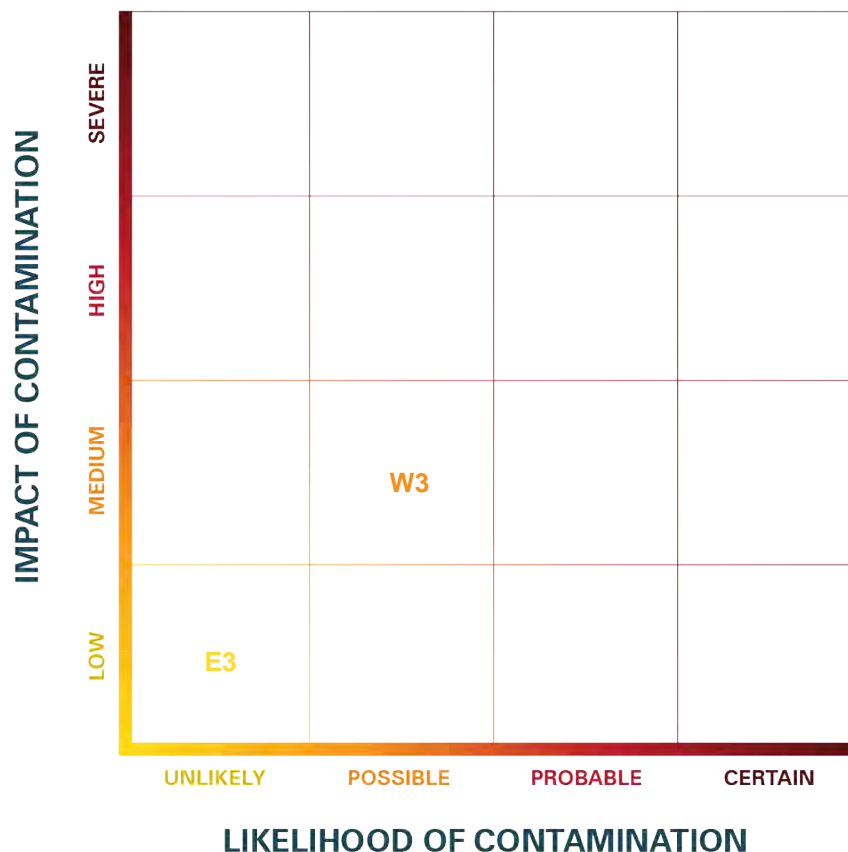
	Manage the risk of fuel or chemical spills	
	Top up woodchip on calving pads	
	Minimise the risk of silage leachate losses	
	Mitigate environmental risks from land in the Bedrock/Hill Country Zone	
	Mitigate environmental risks from land in the Oxidising Zone	
	Update the Winter Crop Grazing Plan	
	Continue lane development and maintenance	
	Plan for forestry harvesting and replanting	
	Create extra sediment traps/wetlands	
	Protect and enhance habitat	
	Review Farm Dairy Records & the Fonterra Farm insights Report	
	Evaluate environmental mitigations	
	Review waste management	31 Jan 2023
	Obtain certification or consent for winter grazing on fodder crops	31 May 2023
	Review Nitrogen Fertiliser Use	31 Jul 2023

### Key: Action Priority

 Low     Medium     High     Critical

# UNDERSTANDING THE RISKS ON YOUR FARM

This section provides some context to help understand the relative impact and likelihood of environmental risks that have been identified on your farm. The chart on this page together with the map on the following page can be useful when thinking about what environmental risk areas on your farm need the most focus.



## HOW ARE RISK RATINGS MEASURED?

The issues plotted on the chart above have been done so based upon two measures that are assigned to a specific area of your farm where an environmental risk has been identified. 1. Impact of contamination (on the vertical axis, or the first dial) is a measure of the potential scale or significance of contaminants that may be lost from this area of your farm. It's about quantifying how bad could the outcome for the environment be; 2. Likelihood of contamination (on the horizontal axis, or the second dial) is about the chance of the contamination actually occurring from that area of your farm. It takes into account things like how far the area might be from waterways as well as the slope or aspect of the area; When combined together the two measures also give an overall 'risk rating'. The measures and the combined rating are presented for each risk area along with other descriptive information about the risk area on the subsequent pages of this document.

### Example:





# UNDERSTANDING THE RISKS ON YOUR FARM

The map below shows the location of the risk areas identified on your farm. The Risk Rating presented here is a combined measure of the impact and likelihood of contamination occurring from each risk area.

● Low      ● Medium      ● High      ● Critical



**E3** Effluent Irrigation

**W3** Waterways Fencing

# MAHI WHAKAHAERE GENERAL FARM MANAGEMENT



- F1** Farm Environment Plan Objectives
- F2** Farm and Catchment Overview
- F3** Resource Consents
- F4** Farm Infrastructure Overview
- F5** Key Feature - Dairy Shed
- F6** Key Feature - Calving Pads
- F7** Key Feature - Silage Stacks
- F8** Key Feature - Urea Silo

- F9** Key Feature - Fuel Storage
- F10** Key Feature - Chemical Shed
- F11** Key Feature - Houses
- F12** Water Use Overview
- F13** Key Feature - Bore CF12/5003
- F14** Key Feature - Bore F46/0365
- F15** Waste Management Overview
- F16** Dairy Support Land



F17

Key Feature - Murray Dock

F18

Key Feature - Sasthaansen Brook

# FARM MANAGEMENT

## GOOD FARMING PRACTICES

<p>Identify a farms environmental characteristics and plan for their management</p> <p>Practices: The physical and biophysical characteristics of the farm system are identified, risk factors to water quality associated with the farm system have been assessed and are managed appropriately</p>	ACHIEVED
<p>Maintain records of good environmental management</p> <p>Practices: Accurate and auditable records of annual farm inputs, outputs and management practices are maintained.</p>	ACHIEVED
<p>Store and load fertiliser with minimal spillage and leaching</p> <p>Practices: The Fertiliser Industry - Code of Practice for fertiliser handling, storage and use is followed Storage sites are located away from waterways Stored fertiliser is covered</p> <p>Evidence: Farm map with storage sites identified</p>	ACHIEVED
<p>Store, transport and distribute feed with minimal wastage, leachate and soil damage and leaching</p> <p>Practices: Feed storage areas are located away from waterways Silage is sufficiently wilted before being put into stack Silage remains sealed while stored to prevent rotting</p>	ACHIEVED
<p>*Farm waste is minimised and managed properly</p> <p>Practices: Waste is recycled where possible Waste is contained and removed from farm where feasible Dead animals are sent off farm for processing or correctly disposed on-farm On-farm waste pits are small, away from waterways, and above the water table Pests are controlled</p> <p>Evidence: Refuse transfer receipts/invoices</p>	ACHIEVED
<p>*Water use for the dairy shed and stock water is efficient</p> <p>Practices: All water use on farm is measured (water meters) Water wastage is minimised from the dairy shed All leaks are fixed as soon as possible Water troughs are checked daily where animals are grazing</p>	ACHIEVED

# FARM MANAGEMENT

**Evidence:**

Water meter and telemetry records

\*Additional GFP relevant to the dairy industry goals

# FARM MANAGEMENT

## FARM ENVIRONMENT PLAN OBJECTIVES



This Farm Environment Plan is designed to:

- summarise current farming practises and describe farm infrastructure
- outline the physical characteristics of the property and the key environmental risks
- review waterways, habitat and biodiversity values that impact or enhance Mahinga Kai (natural resources and wildlife/foods)
- describe under the 'Overview' sections of this plan how actions/mitigations on this farm will assist with achieving the objectives listed in Appendix N of the Southland Water and Land Plan
- identify any aspects of the farm operation which need to be changed/upgraded to meet national environmental standards, regional council rules or resource consent conditions
- list industry agreed Good Farming Practises as either achieved or needing to be actioned, and set clear, timebound actions where they are not
- address any issues relating to the Fonterra terms & conditions for milk supply
- identify other actions which could provide additional environmental benefits

The Southland Water and Land Plan outlines objectives and requirements for Farm Environment Plans in Appendix N of the plan. Appendix N Objectives relevant to this farm include:

- \* Nutrient and soil management: To avoid where practicable, or otherwise minimise, nutrient and sediment losses from farming activities to ground and surface water, to maintain or improve water quality;
- \* Waterways and wetland management: To manage activities within waterways, critical source areas, natural wetlands, and their margins, by avoiding stock damage, and avoiding where practicable, or otherwise minimising inputs of nutrients, sediment and faecal contaminants to ground and surface water;
- \* Collected agricultural effluent management: To manage collected agricultural effluent in accordance with best industry practice, to ensure contaminants derived from collected agricultural effluent do not cause adverse effects on water quality.
- \* Drainage maintenance: To manage drainage maintenance activities to ensure contaminant losses to water bodies and damage to aquatic habitats are avoided where practicable, or otherwise minimised.

# FARM MANAGEMENT

## FARM AND CATCHMENT OVERVIEW



### Farm Overview:

The dairy farm owned by Kanadale Ltd (Fonterra Supply # 34101) is located at Mataura in Eastern Southland.

\* The property covers approximately 461.5 ha with up to 277 ha grazed by the dairy herd. Two support blocks (about 94 ha effective) are attached to the dairy farm. There is also a significant area in forestry (over 40 ha).

\* The farm is mostly self-contained, with cows wintered on farm and replacement heifers grazed on the support land (young stock also graze on a lease block nearby).

\* The dairy herd of 745 spring calving cows is milked twice a day

\* Supplement are fed through the milking shed (barley and DDG or PKE), with 2-4 kg fed per cow daily.

\* Nitrogen fertiliser use is high - N applications per ha were 222 kg in the 2019/20 season

\* The farm has rolling contour with some steeper hill paddocks. The elevation ranges from 60m asl to 300m asl.

\* Moderately well drained Tutarau soils cover most of the farm.

\* There are several areas of habitat and biodiversity mostly associated with the ponds/wetlands/waterways - these have been fenced off.

### Catchment Overview:

Waterways on the farm flow into Mataura River (lower Mataura catchment) on the eastern margins of the Southland Plains. The Mataura River is fed by streams and creeks running out of semi-intensive developed hill country on the east side of the river, and by creeks and drains flowing through highly developed farmland on the west side.

The farm is located in the Mataura Freshwater Management Unit (FMU). The Mataura FMU has been classified as being 'in need of improvement' with regards to the following contaminants:

- Nitrogen
- Phosphorous
- Sediment
- E. coli

Reducing losses of these contaminants will require both actions/mitigations on this farm and larger community initiatives within local sub-catchments and the wider FMU.

# FARM MANAGEMENT

## RESOURCE CONSENTS



Several activities on this farm have been consented by Environment Southland or may require resource consents in future. A 'certified freshwater farm plan' will also be required and may provide an alternative option to resource consents for assessing and controlling the effects of some activities.

### Effluent:

Key conditions for the effluent discharge consent (AUTH-302684-V1, expiry 27-11-2028) include:

- no more than 745 cows may be milked on the property (winter milking is excluded)
- effluent applications shall not exceed a depth of 10mm per application and shall not be applied at a rate exceeding 10mm/hour
- the maximum N loading from effluent shall not exceed 150kgN/ha/year on the effluent paddocks
- effluent shall not be applied within buffer zones close to waterways, bores, farm boundaries or houses on neighbouring land

### Groundwater Take:

Key conditions for the water take consent (AUTH-302685-V2, expiry 27-11-2028) state that:

- the water take shall not exceed:
  - a) 2 litres/second
  - b) 89,400 litres/day; and
  - c) 32,631 cubic metres/year
- the water take shall be metered, with volumes recorded monthly

### Winter Grazing:

National regulations control wintering of cattle on crops (between 1 May and 30 September). Intensive winter grazing on this farm will have to comply with permitted activity rules (see section on Intensive Winter Grazing) and/or have a management plan to mitigate adverse effects from intensive winter grazing (in a certified Freshwater Farm Plan). If the grazing activity does not comply with permitted activity rules and/or have a Freshwater Farm Plan with clear mitigations then a resource consent will be required. A resource consent will also be required if the total area of winter crop is greater than the maximum area that was cropped in any year between July 2014 and June 2019.

### Stand-off Facilities:

Resource consent may be required to use a 'stockholding area' such as a stand-off/calving pad - unless the farm has a 'certified freshwater farm plan' and effects of this activity are assessed and certified as being equivalent to those from a stand-off pad that meets the permitted activity conditions in the NES:

- effluent cannot leak to groundwater
- effluent is contained and applied to land in a way that complies with Regional Council rules
- the stand-off pad is not within 50m of a waterway or bore.

### Nitrogen Fertiliser:



# FARM MANAGEMENT

The National Environmental Standards for Freshwater Management limit the use of nitrogen fertiliser on pastoral land (crops are excluded from the 'nitrogen cap'). No more than 190kg/ha of N from manufactured fertilisers can be applied to pasture (in any individual paddock) on any landholding. Where more than 190kgN/ha is used on crops this must be offset by reductions in N applications to pasture. All dairy farmers must supply fertiliser purchase records and application records to the Regional Council by 31 July each year. On this farm annual fertiliser N use on pastoral land has been above the nitrogen cap of 190kgN/ha - the amount of N applied will have to be reduced to meet this limit.

## Other Activities:

The National Environmental Standards for Freshwater also regulate other activities including changes in land use (for wintering sheds, feed pads and stand-off pads, dairy conversion/expansion, dairy support or irrigation), wetland development, and construction of culverts or dams. Resource consents may be required for these activities.

## ACTIONS | RECOMMENDATIONS

### Target Date



### Obtain certification or consent for winter grazing on fodder crops

31 May 2023

If intensive winter grazing practices on this farm do not fully comply with all of the permitted activity rules in the National Environmental Standards for Freshwater <https://environment.govt.nz/acts-and-regulations/regulations/national-environmental-standards-for-freshwater/> and/or any additional regional council rules, either:

- Ensure that winter grazing practices (including mitigations for sediment run-off, nutrient loss etc) are listed in the Farm Environment Plan and certified as being adequate and appropriate to minimise any harmful effects on fresh water from grazing the crops
- Obtain a resource consent from the regional council for winter grazing on the property (this may involve supplying full details of the crop area, number of stock wintered + an Assessment of Environmental Effects, a Nutrient Budget, a winter grazing plan and any other information that the council needs to make a decision on the application + set conditions in the consent).

# FARM MANAGEMENT

## FARM INFRASTRUCTURE OVERVIEW

F4

Key farm infrastructure includes:

- a rotary dairy shed
- two calving pads
- silage stacks
- a fertiliser silo
- fuel and chemical storage facilities
- five houses

\* The dairy shed is a 54 bail rotary with an in-shed feeding system. Nib walls on the outside yard and concrete drainage sumps allow full capture of effluent from the yard areas and shed platforms. Over winter rainwater from the yard is diverted to drainage and does not enter the effluent system.

\* Two small calving pads have been set up at/near the implement yard. Woodchip/bark is used for bedding. In wet weather cows are held on the pad overnight and fed baleage (but grazed on pasture during the day). The larger pad may hold up to 90 cows in early spring, and the small pad can hold 60.

\* Silage is stacked on a rock pad on a ridge, well away from the nearest creek or gully. There are no obvious inflows of surface water or seepage from springs to this site. Two buns are usually built and silage is wilted to minimise leachate losses.

\* Storage facilities for fertiliser, feed, fuel and chemicals are located in the implement yard and dairy shed. The key risk with these facilities is spills and leaks - a creek runs along the edge of the yard.

\* The farm has 5 houses. One house has a dispersal field for sewage while the others have septic tank systems which are serviced as needed.

Appendix N objectives:

Infrastructure on the farm is designed to:

- Capture effluent so that it can be safely stored and applied to land when conditions are suitable (dairy shed/yard, calving pads)
- Reduce pugging and losses of sediment and nutrients when soils are saturated (calving pads)
- Safely contain hazardous materials (fuel, chemicals), stock feed (silage) and fertiliser (urea) that could contaminate water directly or via losses of leachate and run-off

See also Good Farming Practices listed at the start of the Farm Infrastructure section of this plan.

## ACTIONS | RECOMMENDATIONS

Target Date



### Manage the risk of fuel or chemical spills

- \* Provide a spill containment and clean-up kit to help manage any fuel overflows/leaks or liquid fertiliser & chemical spills.
- \* Consider relocating fuel and chemical storage to a site that is not close to waterways

# FARM MANAGEMENT



## Top up woodchip on calving pads

Add extra woodchip/bark on the calving pads each season to ensure there is enough bedding to absorb effluent.



## Minimise the risk of silage leachate losses

\* Divert clean rainwater from the cover + surrounding area so it does not create muddy conditions around the stacks eg build a low earth bank along the sides of the silage stacks that the cover can go over

\* Ensure silage is well wilted to minimise leachate running from the stack.

\* When funding is available investigate options for upgrading or changing the current silage pad so that leachate and run-off from the stacks can be collected and stored, then pumped out and applied on paddocks with an irrigator, pod or slurry tank. Collection and application of silage leachate is a permitted activity provided certain conditions are met including:

- the sump/tank does not exceed 35 cubic metres and is made of concrete or has a synthetic liner
- there are adequate buffer zones between the sump/tank and any waterways, dwellings etc
- the leachate is not applied within those buffer zones
- the applications of leachate do not exceed 10mm/application



# FARM MANAGEMENT



# FARM MANAGEMENT

## WATER USE OVERVIEW

F12

Water is pumped from a bore near the dairy shed and a second bore in the corner of Pdk 8 (Wells F46/0965 and CF12/5003 on the Environment Southland website). The bores are capped and protected from stock or other sources of contamination. The water take is metered, with volumes recorded each month as per consent conditions.

Water efficiency measures include:

- a dungbuster system on the backing gate which largely eliminates hosing of the yard
- only entry/exit races are hosed
- the shed is pre-wet before milking to reduce washing down
- cooling water is recycled for washing the yard



# FARM MANAGEMENT

## WASTE MANAGEMENT OVERVIEW



Farm waste and dead stock should be handled in a way that minimises the risks of:

- contamination of groundwater and drinking water supplies with toxic chemicals, leachates or discharges high in harmful bacteria etc,
- pollution of waterways and riparian areas,
- air discharges of harmful chemicals and soot from burning
- odour problems from dead stock or organic wastes,
- plastics, treated timber, scrap metal etc being blown, buried or cultivated in
- attracting rats, mice and other vermin

Many waste items are recycled or re-used including chemical containers, some baleage wrap, pallets, scrap metal and some household rubbish. Other farm waste and household rubbish is put in wheelie bins and sent to landfill.

Sick/injured stock are collected for petfood and dead cows are put in an offall pit.

Appendix N objectives:

Waste management practices on the farm are designed to:

- Minimise the discharge of contaminants from farm waste to the air, soil or water
- Minimise the volume of waste that is buried or disposed of on farm

See also Good Farming Practices listed at the start of the Waste Management section of this plan.

### ACTIONS | RECOMMENDATIONS

**Target Date**



#### **Review waste management**

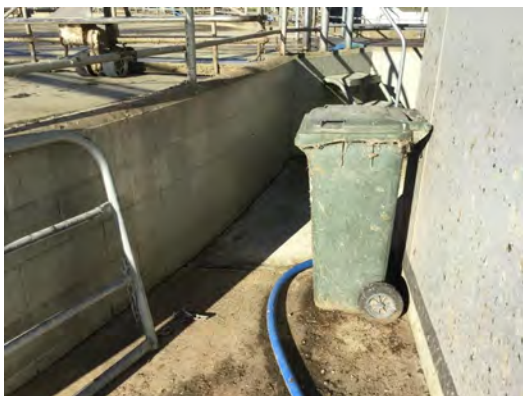
31 Jan 2023

\* Check the Environment Southland website information on farm waste (<https://www.es.govt.nz/environment/pollution-and-waste/farm-waste>) to review the key waste management rules which must be followed

\* Develop a waste management plan and collection system that incorporates the 6 Rs of waste decision making; Refuse, Reduce, Reuse/Repair, Recycle, Rehome and Rot (or compost). See information on the DairyNZ website: <https://www.dairynz.co.nz/media/4209679/waste-management-solutions-technote.pdf>

\* Do an audit/inventory of the types of waste and quantities that are generated on farm to understand where waste is coming from and how much is generated

# FARM MANAGEMENT



# FARM MANAGEMENT

## DAIRY SUPPORT LAND

F16

Two support blocks at the northern end of the farm are used for heifer grazing, wintering cows on crop and harvesting grass silage/baleage. The blocks cover about 109 ha, of which about 94 ha is grazed/cut for supplements.

- The Murray Block (58.2 ha at 48 Waddle Road) has previously been used as a dairy support and beef unit
- The Bastiaansen Block (50.5 ha at 41 Boundary Road) has previously been a sheep & beef farm
- The contour is mostly easy rolling with some gullies, and there is a small area of flats on the Bastiaansen Block.
- The soils are almost all moderately well drained Tukurau soils - the key risk with these soils is nutrient leaching. A small area of poorly drained Jacobstown soils (5.5 ha) on the flats is prone to compaction and waterlogging.
- The 2021 soil tests indicated that Olsen P levels are high on the Murray block (10 tests, average Olsen P of 42) and in the optimum range on the Bastiaansen block (9 tests, average Olsen P of 30).
- The Waikana Stream runs through the Bastiaansen block, and a smaller unnamed creek runs down a main gully on the Murray block. The creeks have been fenced off (generally with wide buffers), and culverts have been installed at all the major crossing points. Some riparian planting has been carried out using native species such as cabbage tree (ti kouka), ribbonwood (manatu) and toetoe.
- Pine trees have been planted on steep sidings and along the edges of gullies, covering about 3.5 ha

The key environmental risks on this property relate to:

- > cultivation and cropping (some paddocks are used for growing winter fodder crops) - bare soil is vulnerable to sediment and nutrient loss
- > intensive winter grazing - causing N leaching, sediment loss and faecal contamination of surface water
- > nutrient loss - especially N leaching from cultivated ground and from crop paddocks grazed off during winter. High rates of P fertiliser are also used for growing fodder crops, and some P loss in sediment/run-off will occur
- > sediment loss from Critical Source Areas

See actions under other sections in this Farm Environment Plan.

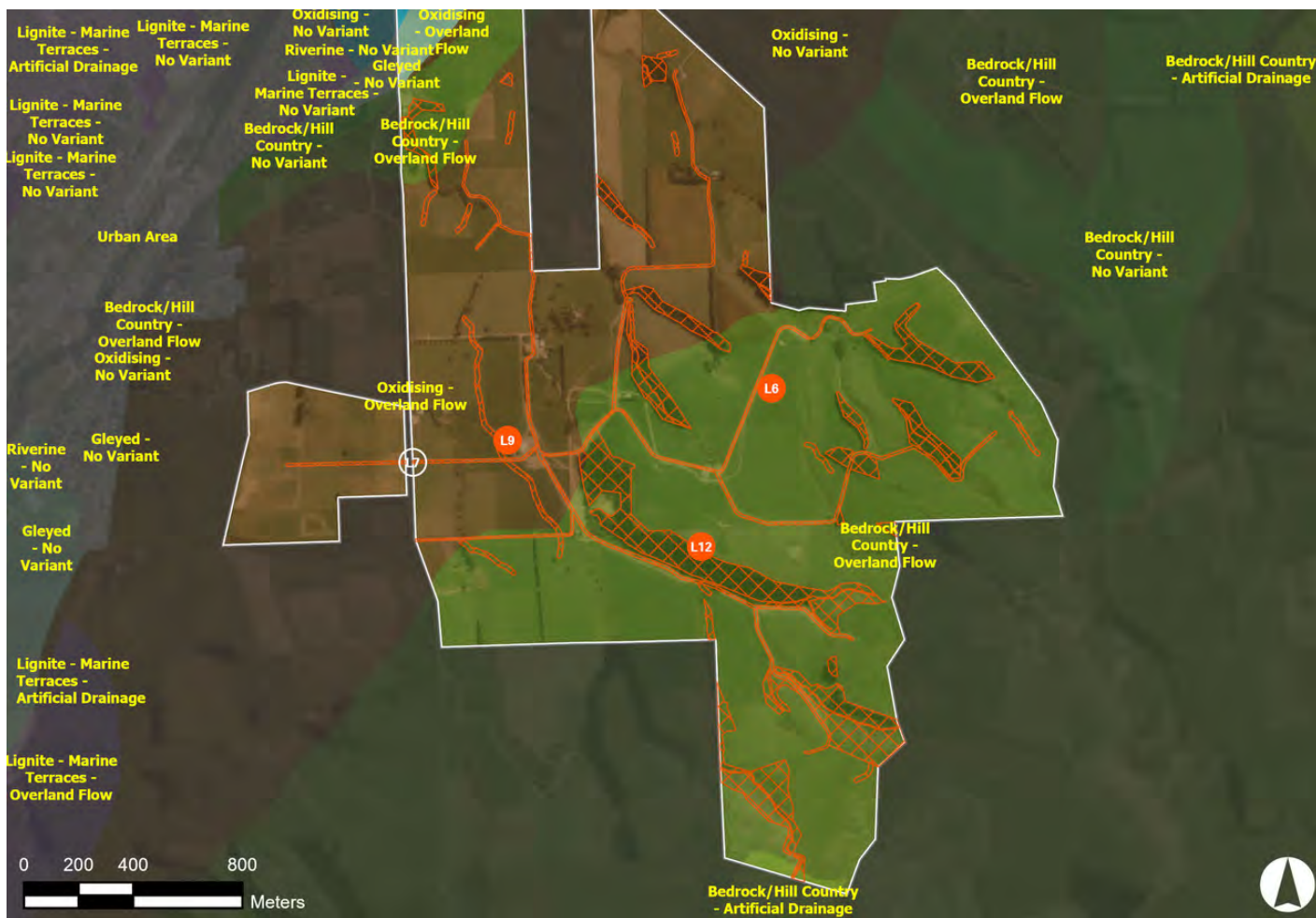




# FARM MANAGEMENT



# WHENUA ME TE ONE LAND & SOIL MANAGEMENT



- L1** Land & Soil Overview
- L2** Southland Physiographic Zone
- L3** Soil Types and Management
- L4** Intensive Winter Grazing
- L5** Cultivation
- L6** Race Maintenance & Management

- L7** Underpass
- L8** Critical Source Areas
- L9** Key Feature - Critical Source Areas
- L10** Gullies and Steep Land
- L11** Calving Paddocks
- L12** Forestry

# LAND & SOIL MANAGEMENT

## GOOD FARMING PRACTICES

Minimise losses of sediment and nutrient to water, and maintain soil structure

Practices:

Pugging and compaction of soils is avoided

No tillage or low impact cultivation methods and timing are considered

Supplement feed-out areas are located away from waterways

Riparian margins or buffer strips are left beside waterways and other areas where sediment and nutrients may flow such as gullies or swales.

ACHIEVED

Evidence:

Wet weather management policies

Reduce periods of bare soil between crops and pasture to reduce erosion and leaching

Practices:

Bare paddocks are re-sown as soon as practical

Erosion damaged areas are rested and re-sown

Compacted soils are subsoil, ripped or cultivated

Cover crops (e.g. oats) are used to reduce losses and increase soil organic matter

ACHIEVED

Evidence:

Cropping/pasture renewal policies and procedures

Retire all LUC 8 land and retire LUC 7e land or ensure that it has soil conservation measures in place

N/A

Use appropriate paddocks for intensive grazing

Practices:

Low risk paddocks are selected for intensive grazing that are ideally:

--Further away from waterways

--With soils least likely to pug and compact

--Flatter with as few gullies and swales as possible

ACHIEVED

Evidence:

Map winter cropping areas

Manage grazing to minimise nutrient loss from risk areas

Practices:

If paddocks near waterways are used during wet periods, a buffer strip beside the waterway is fenced off

More feed is offered in cold conditions when demand is high and utilization low

When break feeding:

--Feeding is towards the waterway

--Fences are moved daily rather than offering a few days feed at a time

--Land that has already been grazed is back-fenced

Crops:

--Long narrow breaks are offered rather than wide breaks

ACHIEVED

Evidence:

# LAND & SOIL MANAGEMENT

Winter management plan

# LAND & SOIL MANAGEMENT

## LAND & SOIL OVERVIEW



The farm has easy rolling to steep contour and runs from flats near the Mataura River to large hills at the back (south) of the property. Large gullies and other blocks of steep land have been retired, with most of these areas now planted in pines and other forestry trees. Moderately well drained Tuturau soils cover most of the farm. The key pathways for contaminant loss are overland flow (especially on the larger hills which are in the Bedrock/Hill Country Physiographic Zone) and deep drainage (on easier contour land which is in the Oxidising Physiographic Zone).

> Land management practices affecting the environment include:

- \* Grazing of wet paddocks or high risk areas within paddocks (Critical Source Areas)
- \* Grazing of winter crops
- \* Cultivation - bare soil is vulnerable to erosion/scouring
- \* Construction or maintenance of lanes
- \* Forestry operations

> High risk areas have been identified:

- \* Farm races - run-off can contaminate surface water
- \* Wet and muddy areas - often around gateways or other high traffic areas
- \* Swales/gullies and other areas where overland flow occurs following rainfall events.
- \* Steep land
- \* Winter crop paddocks
- \* Calving paddocks
- \* Tree blocks (during logging)

> Soil health and risks of soil loss are actively managed:

- \* Paddocks are aerated to improve soil structure/minimise compaction and pugging
- \* Stand-off facilities are used to minimise pugging/compaction during wet and cold conditions in spring and autumn.
- \* Drier paddocks are grazed during wet weather and wet paddocks are left out of the rotation temporarily
- \* Drains (tiles and ditches) minimise waterlogging of soils

Appendix N objectives:

Land and soil management on the farm is designed to:

- Reduce pugging and losses of sediment and nutrients when soils are saturated – especially from high risk areas (Critical Source Areas, winter crop paddocks)
- Reduce losses of sediment from steep or cultivated land and from areas that have been intensively grazed
- Minimise losses of sediment, phosphorous and faecal bacteria from lanes

See also Good Farming Practices listed at the start of the Land and Soil section of this plan.

# LAND & SOIL MANAGEMENT

## SOUTHLAND PHYSIOGRAPHIC ZONE

L2

The Physiographics of Southland were developed to give a greater understanding of the key risks to water quality throughout the Region. The risks to water quality are highly linked to where water comes from and the processes it undergoes as it moves through the soil and drainage networks. Physiographic Zones group areas of Southland that have similar landform types and water quality. The Zones have been identified according to water origin, soil type, geology and topography.

The Physiographic Zones found on the property are the Bedrock/Hill Country Zone (about 265 ha, mostly on the hills at the south end of the farm) and the Oxidising Zone (about 194 ha on the lower paddocks). There is also a small block in the Gleyed Zone (6 ha on the flats beside Old Coach Road).

Characteristics of the Bedrock/Hill Country Physiographic Zone include:

- Mostly rolling to steep land
- Soil overlies bedrock or glacial till.
- No significant areas of groundwater
- Key contaminant pathway: Overland flow

Characteristics of the Oxidising Physiographic Zone include:

- Soils and aquifers have low denitrification potential.
- Flat, free-draining soils - water seeps straight down to underlying aquifers (areas of groundwater). Groundwater in this zone is 'recharged' (topped up) by rainfall that drains down through the soil.
- Slowly permeable soils may experience seasonal waterlogging. On flatter areas, they will often have artificial drainage when elevated above nearby streams. On more sloping areas, they will often have overland flow.
- Key contaminant pathway: Deep drainage

### ACTIONS | RECOMMENDATIONS

Target Date



#### Mitigate environmental risks from land in the Bedrock/Hill Country Zone

1. Reduce the effects of overland flow by:
  - Protecting soil structure, particularly in gullies and near stream areas
  - Managing critical source areas (CSA)
  - Reducing Phosphorus use and loss
2. Reduce the effects of artificial drainage by:
  - Protecting soil structure, particularly in gullies and near stream areas
  - Reducing phosphorus use and loss
  - Reducing the accumulation of surplus nitrogen in the soil particularly during autumn and winter

# LAND & SOIL MANAGEMENT

- Avoiding preferential flow of effluent through drains
- Capturing contaminants at drainage outflows



## **Mitigate environmental risks from land in the Oxidising Zone**

1. Reduce the effects of artificial drainage by:
  - Protecting soil structure, particularly in gullies and near stream areas
  - Reducing phosphorus use and loss
  - Reducing the accumulation of surplus nitrogen in the soil, particularly during autumn and winter
  - Avoiding preferential flow of effluent through drains
  - Capturing contaminants at drainage outflows
2. Reduce the effects of overland flow by:
  - Protecting soil structure, particularly in gullies and near stream areas
  - Managing critical source areas (CSA)
  - Reducing phosphorus use or loss

# LAND & SOIL MANAGEMENT

## SOIL TYPES AND MANAGEMENT

L3

The farm has 3 main soil types: Tuturau, Jacobstown and Wyndham soils. These soils have different risks for compaction, nutrient leaching etc, and have also been given a risk classification for effluent applications (because of factors such as soil texture, slope or drainage).

Tuturau soils cover about 223 ha of pastoral land on the dairy farm, 54 ha on the Murray block and 39 ha on the Bastiaasen block. They are deep, well drained soils with a light silt loam topsoil and loamy silt subsoil, and have the following risk ratings:

- Structural compaction: Slight vulnerability
- Nutrient leaching: Severe vulnerability (higher where sub-surface drains are present)
- Topsoil erosion by water: Slight vulnerability
- Organic Matter loss: Slight vulnerability
- Waterlogging: Slight vulnerability
- Bypass drainage: Medium risk of losing contaminants through soil macro-pores/cracks
- Dairy effluent application risk: Flat land - low risk of losses via bypass drainage or run-off  
Sloping land - high risk of losses via bypass drainage or run-off

Otaraia soils are located on the higher hills, covering about 30 ha. They are well drained heavy silt loams. Soil depth ranges from moderately deep to deep. They have the following risk ratings:

- Structural compaction: Slight vulnerability
- Nutrient leaching: Moderate vulnerability (higher where sub-surface drains are present)
- Topsoil erosion by water: Slight vulnerability
- Organic Matter loss: Minimal vulnerability
- Waterlogging: Slight vulnerability
- Bypass drainage: Medium risk of losing contaminants through soil macro-pores/cracks
- Dairy effluent application risk: Flat land - low risk of losses via bypass drainage or run-off  
Sloping land - high risk of losses via bypass drainage or run-off

Wyndham soils cover about 24 ha on easy hill paddocks to the east of the dairy shed. They are deep and imperfectly drained. Soil texture is light silt loam in the topsoil and loamy silt in the subsoil. They have the following risk ratings:

- Structural compaction: Severe vulnerability
- Nutrient leaching: Slight vulnerability (higher where sub-surface drains are present)
- Topsoil erosion by water: Moderate vulnerability
- Organic Matter loss: Slight vulnerability
- Waterlogging: Moderate vulnerability



## LAND & SOIL MANAGEMENT

- Bypass drainage: High risk of losing contaminants through soil macro-pores/cracks
- Dairy effluent application risk: High risk of losses via bypass drainage or run-off

Ferndale soils (5 ha at the top of the farm) have a silt texture and are imperfectly drained. Soil depth is typically deep. They have the following risk ratings:

- Structural compaction: Moderate vulnerability
- Nutrient leaching: Slight vulnerability
- Topsoil erosion by water: Slight vulnerability
- Organic Matter loss: Slight vulnerability
- Waterlogging: Moderate vulnerability
- Bypass drainage: High risk of losing contaminants through soil macro-pores/cracks
- Dairy effluent application risk: High risk of losses via bypass drainage or run-off

# LAND & SOIL MANAGEMENT

## INTENSIVE WINTER GRAZING



Intensive winter grazing is defined as 'grazing livestock on an annual forage crop at any time in the period that begins on 1 May and ends with the close of 30 September of the same year' (National Environmental Standards for Freshwater 2020). Several regulations within the National Environmental Standards for Freshwater outline practices which must be implemented when winter crop land is cultivated, sown and grazed. These 'permitted activity' regulations include:

- Any land used for growing winter crops must be 10 degrees slope or less (as measured on a 20m transect)
- Critical Source Areas must not be cultivated or grazed, and must have vegetation cover from 1 May to 30 September. Critical Source areas are gullies, swales or depressions where runoff accumulates/flows resulting in the discharge of contaminants (nitrogen, phosphorous, sediment, faecal bacteria) to rivers, lakes, wetlands or surface drains (including ephemeral waterways which may be dry for several months of the year)
- All reasonably practicable steps must be taken to minimise the effects of pugging (eg discharge of sediment, loss of nutrients etc) on freshwater
- Land that has been used for winter crops must be resown as soon as practicable after the land has been grazed off

Where these conditions cannot be met (eg if some winter crop land is more than 10 degrees slope), the landowner must:

- obtain a resource consent from the regional council before the land is cropped and/or
- implement specific practices and mitigations to minimise/prevent contamination of freshwater (as recorded in the certified Freshwater Farm Plan for that farm).

The resource consent application or certified Freshwater Farm Plan would need to show/certify that the effects on freshwater from winter cropping can be mitigated so they are no greater than if all the 'permitted activity' requirements (see above) were met.

Information relating to crop management (eg fertiliser inputs) and grazing practices (eg stock numbers) should also be recorded - relevant information must be provided to a regional council enforcement officer if requested.

Up to 52.4 ha has been sown in winter crops during the 2014-2019 reference period. Many paddocks on the farm have at least some high risk zones such as sloping land, or large swales/gullies. Sediment, nutrients and dung can be lost from these paddocks following cultivation or grazing even when wide buffer zones are left untouched. A number of Good Farming Practices are used to manage these risks - see below and also GFPs listed under the Land Overview section.

- \* Some paddocks which are unsuitable for intensive winter grazing are not winter cropped
- \* Paddocks are soil tested and fertiliser rates are tailored to crop requirements
- \* A winter grazing plan is worked out for each paddock every year
- \* Critical Source Areas are identified and protected – an extra buffer is left in grass along waterways/gullies and fenced off
- \* Sediment loss is minimised by setting up temporary sediment traps (straw bales in swales) if erosion is likely
- \* Bales are set out in crop paddocks pre-winter to minimise tractor use on wet soils

## LAND & SOIL MANAGEMENT

- \* Bale feeders and portable troughs are placed in dry areas/away from swales
- \* Low risk areas of crop paddocks are grazed first, with high risk areas grazed last during good weather
- \* In poor weather stock are shifted to breaks on drier parts of the paddock, and/or offered more supplement
- \* Sloping areas are grazed from top to bottom
- \* Portable troughs are used to minimise stock movement within crop paddocks
- \* Cows on winter crop are grazed in small mobs (less than 120 cows/mob)
- \* Baleage wrap is collected and removed from the paddock for safe disposal

### ACTIONS | RECOMMENDATIONS

Target Date



#### Update the Winter Crop Grazing Plan

Review the winter grazing plan each year after the crop has been eaten off and prepare a new one for the following season. Incorporate any new management practices/mitigations and check that all cropping/grazing activities comply with the current regional council rules. Draw up a paddock map for the new crop paddock(s).



# LAND & SOIL MANAGEMENT

## CULTIVATION

L5

Paddocks are cultivated each year as part of the regular cropping and regrassing programme on the farm. During the cultivation phase there is an increased risk of sediment loss and nutrients can also be lost with soil erosion or through leaching. Several factors influence the risk of contaminant loss including:

- paddock slope
- timing of cultivation eg spring vs summer/autumn
- time from cultivation to sowing/crop establishment
- cultivation method eg plough & power harrow vs minimum tillage
- fineness of cultivation
- soil structure eg cultivation ex pasture vs pugged soil ex winter grazing
- proximity to Critical Source Areas and waterways

On this property cultivation is a high risk activity due to several of these factors (full cultivation of sloping land in spring, including crop paddocks that have been grazed off over winter). These risk are mitigated by:

- leaving large buffers between land that is cultivated and CSA's
- not cultivating large CSA's or very steep land
- sowing crops/new pasture as soon as practical after cultivation has been completed
- direct drilling some paddocks

# LAND & SOIL MANAGEMENT

## RACE MAINTENANCE & MANAGEMENT

L6

Farm lanes can be a significant source of run-off and contaminants including sediment, phosphorous and E coli. Good lane design and regular maintenance can reduce the build-up or loss of these contaminants. Quality lanes improve stock flow, which reduces lameness issues and the build-up of effluent or sediment on the lane surface. Lanes that run alongside a waterway can be very high risk with direct runoff of sediment and microbial pathogens to water.

The farm lanes are flat to moderately steep, have a firm, even surface and are well maintained. They should provide reasonable cow flow around the farm. Short sections of lane run beside small creeks and lanes also cross several waterways/gullies where run-off can concentrate and impact surface water. Areas of highest environmental risk are:

- \* steep or sloping sections of lane, especially where raised edges trap water so it runs down the lane to gullies or waterways, carrying sediment, dung and nutrients.
- \* sections of lane with ruts/potholes or a soft, mucky/slippery surface - cows walk more slowly and deposit more dung in these areas
- \* about 1500m of lanes run alongside waterways. Although there can be a higher risk of lane run-off flowing to the creeks these sections of lane are short and have good riparian buffers with long grass which helps filter out any sediment or dung.
- \* new lanes at the north end of the dairy farm (connecting to the support blocks) are unfinished - more rock will be laid and compacted to provide all weather access

The build-up of effluent on the lanes is minimised by:

- allowing the dairy herd to walk to the dairy shed - cows are not driven/pushed to move fast
- the herd is split into 2 smaller milking herds reducing pressure on stock
- the lanes are not used for standing off or feeding cows

### ACTIONS | RECOMMENDATIONS

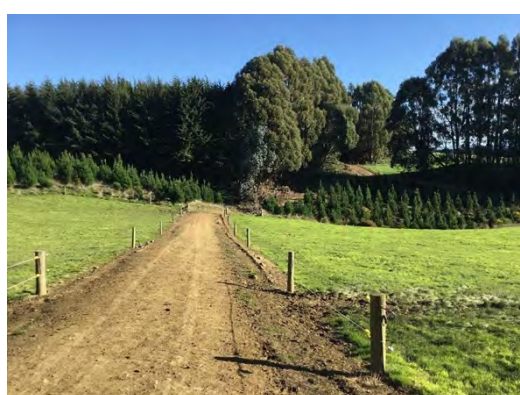
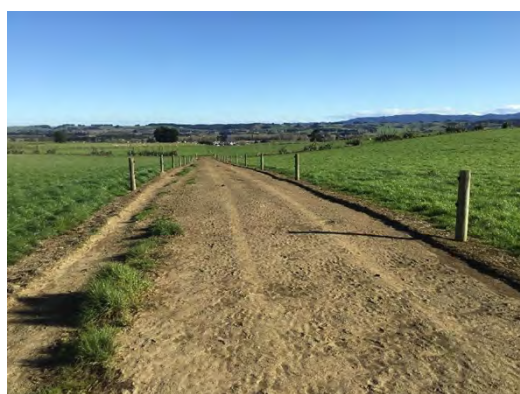
Target Date



#### Continue lane development and maintenance

- \* Complete the development of lanes from the dairy farm to the Murray block
- \* Regularly remove the raised edges on lanes so that rain water can run off to pasture rather than being channelled along the lane to wet or low spots.
- \* Dig several cut-outs on sloping sections of lane to divert water off the edge of the lane and into the paddock
- \* Scrape off mud, fill puddles/ruts and re-surface soft/damaged sections of lane. Crown the lane so that water runs off to pasture.

# LAND & SOIL MANAGEMENT



# LAND & SOIL MANAGEMENT

## UNDERPASS

L7

An underpass has been constructed under Crawford Road. The underpass has a shallow gradient and slopes east towards the dairy shed. There is no build-up of effluent at the underpass and run-off from the concrete is not collected.



# LAND & SOIL MANAGEMENT

## CRITICAL SOURCE AREAS

L8

Critical Source Areas (CSA's) are places on the farm which are hotspots for losing nutrients, sediment or other contaminants that impact water quality. These areas often receive sediment, faecal contamination and nutrients from run-off, and also discharge these pollutants to surface water or to groundwater (via leaching and drainage). The risk of contaminant loss through these Critical Source Areas is higher at certain times of year and in specific locations including when:

- soil moisture levels are high and/or there is heavy rainfall
- bare soil is exposed or soil structure is damaged
- there is a source of sediment, nutrients etc feeding into the CSA eg from a lane
- the catchment is large, steep and/or confined eg in a narrow gully where run-off is concentrated

Managing the risk of contaminant loss therefore requires actions/mitigations that target these high risk periods and/or locations.

On this farm the highest risk period is during winter and spring when soils are wet and fodder crop paddocks have been eaten off. The main risk areas are:

- gullies/swales – especially those with poor drainage, a large catchment area and/or where ephemeral waterways run during wet weather,
- areas where water runs down the side of a lane and into a swale/waterway
- wet paddock corners where cows mob up in poor weather,
- small boggy/wetland areas that are grazed,
- wet/sloping areas in fodder crop paddocks.

The largest CSA's have been fenced off and retired (with many of these blocks planted in trees). Other mitigations include:

- protecting CSA's in crop paddocks - not cultivated, fenced off temporarily
- shifting stock to graze lower risk paddocks when there is heavy rain and run-off through large swales
- ponds/sediment traps have been constructed in gullies





# LAND & SOIL MANAGEMENT



# LAND & SOIL MANAGEMENT

## GULLIES AND STEEP LAND

L10

There are several large gullies on farm with small side gullies branching off these. Most of the steep sided gullies have been retired and planted in trees and/or fenced off to protect the creeks and riparian margins. Steep hill paddocks at the southern end of the farm are grazed by the dairy herd and sediment loss can occur in wet weather - though most of this land is free draining and has a rocky subsoil.

- ponds have been built in some gullies to filter run-off
- steep areas are not cultivated and used for growing winter crops



# LAND & SOIL MANAGEMENT



# LAND & SOIL MANAGEMENT

## CALVING PADDOCKS

A blue circular icon containing the text 'L11' in a bold, sans-serif font.

Over spring cows are drafted off winter crop once they are close to their calving dates and intensively grazed on grass paddocks, eating saved pasture and baleage/hay/silage. In wet weather these paddocks can become muddy and pugged, increasing the risk of sediment loss (especially off sloping land). These paddocks are back fenced as they are grazed and a portable trough is used to minimise stock movement and pugging.

# LAND & SOIL MANAGEMENT

## FORESTRY

L12

Forestry blocks cover about 40 ha. Sediment loss can be an issue when trees are harvested and the blocks are windrowed in preparation for replanting.

### ACTIONS | RECOMMENDATIONS

Target Date



#### Plan for forestry harvesting and replanting

Prepare a forestry harvesting and replanting plan well before any blocks are logged so that the environmental risks from site preparation/roading, logging/tree removal and windrowing of slash can be managed effectively.



# WHAKAMĀKŪKŪ

## IRRIGATION MANAGEMENT

### GOOD FARMING PRACTICES

Irrigation rates and timing match plant requirements

N/A

Design, calibrate and operate irrigation systems to use water efficiently

N/A

# PARAKAINGAKI EFFLUENT MANAGEMENT



- E1** Effluent Overview
- E2** Effluent Storage
- E3** Effluent Irrigation

- E4** Key Feature - Effluent Paddocks with Hydrants
- E5** Key Feature - Effluent Paddocks without hydrants

# EFFLUENT MANAGEMENT

## GOOD FARMING PRACTICES

Effluent system meets code of practice

Practices:

Effluent is collected from all sources: dairy sheds, yards, feed pads, underpasses

The system design is appropriate for the soil type, topography, and climate

New systems: accredited designer has been used

ACHIEVED

Evidence:

Effluent system design plans

Sufficient suitable storage available

Practices:

Dairy Effluent Storage calculator has been used to work out storage needs

New storage built, has been by an accredited effluent designer

Effluent is applied whenever possible to keep storage low

Storage facilities are sealed

Effluent solids that accumulate are routinely removed

Safety barriers, equipment and signage are in place

ACHIEVED

Evidence:

Dairy Effluent Storage Calculator report

Storage design plans

Pond or tank liner specifications and warranties

Pond leakage test - approved method by your regional council

Spreading equipment is well maintained and calibrated

1 ACTION(S)

Effluent applied at correct depth, rate and time

Practices:

Effluent application timing and rates are adjusted based on soil moisture levels

Nutrient load is spread evenly across the largest area practical

Tests for high potassium (K) levels on effluent block are done to avoid animal health issues

Fertiliser applications are adjusted to effluent areas based on soil tests

Risk areas for effluent application are identified and recorded on a map

Odour impact is considered during application

ACHIEVED

\*All effluent systems

Practices:

Effluent consent conditions and regional rules are understood and complied with

An effluent management plan is in place

All effluent applications are recorded

Staff are trained on how to operate and maintain the effluent system

ACHIEVED

Evidence:

Regional council compliance record

Effluent management plan

Effluent application records



# EFFLUENT MANAGEMENT

\*Additional GFP relevant to the dairy industry goals

# EFFLUENT MANAGEMENT

## EFFLUENT OVERVIEW

E1

Dairy shed effluent flows to a stone trap and then to a lined holding pond. K-line pods are used to apply effluent and a failsafe device is fitted at the pump to minimise the risk of leaks.

### Appendix N Objectives:

Effluent is managed in accordance with best industry practice, to ensure contaminants derived from collected agricultural effluent do not cause adverse effects on water quality. The risks from storing or applying effluent are minimised by:

#### Effluent volumes are minimised

- \* The yard is cleaned with the scraper and jetters on the backing gate – less water is used for washing the yard
- \* The yard is thoroughly cleaned before winter and rainwater is then diverted off the concrete to a drain when the dairy shed is not in use

#### Effluent storage capacity

- \* The holding pond has the capacity to store large volumes of effluent – there is no need to apply effluent during high risk months or when soils are too wet

#### Pre-application checks

- \* Checks are carried out on irrigation layout to ensure effluent lines are correctly positioned and high risk areas (near waterways, gullies, tile drains, steep land etc) are avoided. Soil and pasture conditions are assessed to check if effluent can be applied safely and application times/pulse intervals are adjusted if required. The pods, effluent pipes and fittings are also checked for leaks or signs of wear.

#### Effluent ponding/spill prevention

- \* Soil moisture levels (from a monitoring site set up by the regional council) are checked before effluent is applied
- \* A failsafe system shuts off the pump if the effluent line pressure rises/drops because there are leaks or blockages.
- \* An adjustable timer is fitted on the pump - the duration of pumping and depth of application can be increased/reduced to match soil moisture levels
- \* The pump & pods operate on a pulsing system – the system shuts off for a set period every hour to allow extra time for effluent to be absorbed
- \* 'Low rate' pods have been installed - the application rate is about 4mm/hour, and the depth of application can be easily reduced (shorter pumping time) if conditions are marginal
- \* The pods are checked once the pump has started to ensure they are operating correctly.

#### Effluent pond monitoring and management

- \* The effluent pond has been drop tested to prove it is not leaking
- \* An inspection chamber has been installed to allow monitoring of drains under/around the pond - any leaks from the pond should be visible in the drainage water.

# EFFLUENT MANAGEMENT

\* The effluent pond level is kept low through autumn so there is adequate storage capacity in spring.

See also Good Farming Practices listed at the start of the Effluent Management section of this plan.

# EFFLUENT MANAGEMENT

## EFFLUENT STORAGE

E2

Effluent from the dairy shed passes through a concrete stone trap into a synthetically lined holding pond. The pond measures approximately 45m x 45m and is about 3.5m deep, with a capacity of about 3800 cubic metres. Drains under the pond connect to an inspection chamber, allowing detection of leaks if there is damage to the pond liner. A stirrer is mounted on the side of the pond to keep solids in suspension - there is minimal buildup of sludge as a result.



# EFFLUENT MANAGEMENT

## EFFLUENT IRRIGATION

E3

IMPACT OF  
CONTAMINATION



+



LIKELIHOOD OF  
CONTAMINATION

=

LOW RISK RATING

Max70 K-line pods are used to irrigate effluent on pasture. There are 2 lines of pods - a line of 3 pods on the higher paddocks and a line of 4 pods on lower paddocks. A pulsing system is used when effluent is applied - one line will run for 20 minutes before shutting off while the second line applies effluent for 20 minutes, and then the pump shuts off for 20 minutes - usually running for 7.5 hours (2.5 hours pumping time). The pumping times are adjusted depending on soil conditions, and shorter application times are used when soils are dry or relatively wet. Effluent applications are recorded on a clipboard at the effluent pumped.

The effluent block covers approximately 65 ha (8.7 ha/100 cows milked), with a further 22 ha consented (hydrants have not been installed in these paddocks). This provides scope to apply effluent (and the nutrients it contains) at low rates across a large area and also some flexibility to choose paddocks which are lower risk when conditions are marginal. All of the soils in this block are 'high risk' for effluent application because the soils are imperfectly drained (which can lead to bypass flow of effluent through soil cracks or large macro-pores) and/or the land is sloping (effluent may run off in some conditions). On high risk soils effluent can only be applied when there is a Soil Moisture Deficit greater than the depth that will be applied via irrigation.

### ACTIONS | RECOMMENDATIONS

Target Date



#### Bucket test K-line pods – To Achieve GFP

31 Dec 2023

Carry out a bucket test on the K-line Max 70 pods in 2 locations - close to the pump on the lower paddocks and in a paddock that is higher/further away (where pressure may not be as high). This will measure the application depth and rate to confirm the system is performing as expected. Testing equipment can be borrowed from Farm Source.

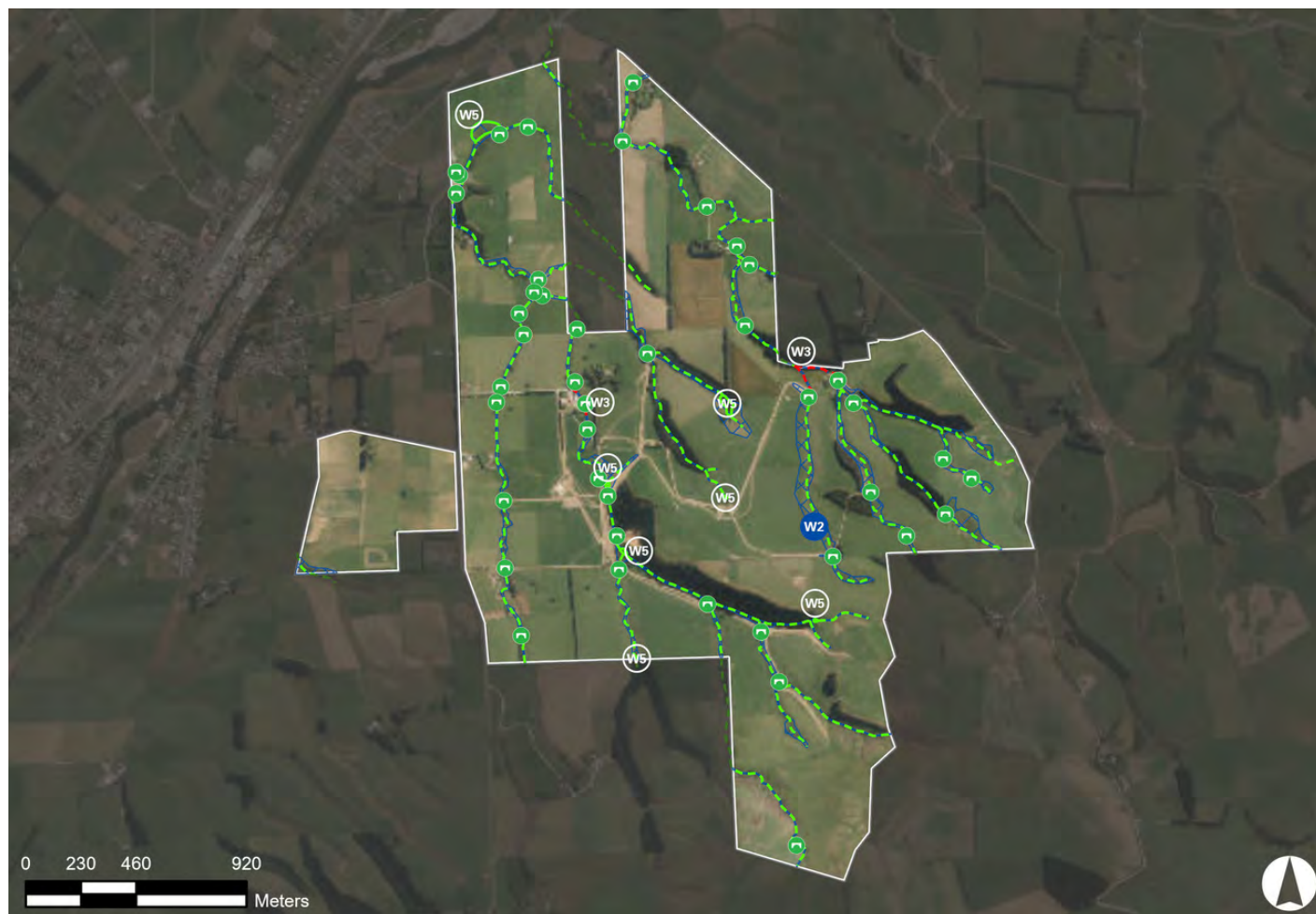


# EFFLUENT MANAGEMENT

10/11/2017  
14/11/2017

Sl. No.	Location	Date	Time	Flow Rate (m <sup>3</sup> /hr)	Temperature (°C)	pH	DO (mg/l)	BOD <sub>5</sub> (mg/l)	SS (mg/l)	Ammonia (mg/l)	Nitrate (mg/l)	Phosphate (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	Hardness (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Total Solids (mg/l)	Other Parameters
1	1	10/11/2017	10:00	100	25	7.5	2.0	150	100	10	5	2	50	50	100	50	50	100	
2	2	10/11/2017	11:00	120	26	7.8	2.2	160	110	11	6	3	55	55	110	55	55	110	
3	3	10/11/2017	12:00	110	25	7.6	2.1	155	105	10.5	5.5	2.5	52	52	105	52	52	105	
4	4	10/11/2017	13:00	130	27	8.0	2.3	170	120	12	7	4	60	60	120	60	60	120	
5	5	10/11/2017	14:00	140	28	8.2	2.4	180	130	13	8	5	65	65	130	65	65	130	
6	6	10/11/2017	15:00	150	29	8.5	2.5	190	140	14	9	6	70	70	140	70	70	140	
7	7	10/11/2017	16:00	160	30	8.8	2.6	200	150	15	10	7	75	75	150	75	75	150	
8	8	10/11/2017	17:00	170	31	9.0	2.7	210	160	16	11	8	80	80	160	80	80	160	
9	9	10/11/2017	18:00	180	32	9.2	2.8	220	170	17	12	9	85	85	170	85	85	170	
10	10	10/11/2017	19:00	190	33	9.5	2.9	230	180	18	13	10	90	90	180	90	90	180	
11	11	10/11/2017	20:00	200	34	9.8	3.0	240	190	19	14	11	95	95	190	95	95	190	
12	12	10/11/2017	21:00	210	35	10.0	3.1	250	200	20	15	12	100	100	200	100	100	200	
13	13	10/11/2017	22:00	220	36	10.2	3.2	260	210	21	16	13	105	105	210	105	105	210	
14	14	10/11/2017	23:00	230	37	10.5	3.3	270	220	22	17	14	110	110	220	110	110	220	
15	15	10/11/2017	00:00	240	38	10.8	3.4	280	230	23	18	15	115	115	230	115	115	230	
16	16	10/11/2017	01:00	250	39	11.0	3.5	290	240	24	19	16	120	120	240	120	120	240	
17	17	10/11/2017	02:00	260	40	11.2	3.6	300	250	25	20	17	125	125	250	125	125	250	
18	18	10/11/2017	03:00	270	41	11.5	3.7	310	260	26	21	18	130	130	260	130	130	260	
19	19	10/11/2017	04:00	280	42	11.8	3.8	320	270	27	22	19	135	135	270	135	135	270	
20	20	10/11/2017	05:00	290	43	12.0	3.9	330	280	28	23	20	140	140	280	140	140	280	
21	21	10/11/2017	06:00	300	44	12.2	4.0	340	290	29	24	21	145	145	290	145	145	290	
22	22	10/11/2017	07:00	310	45	12.5	4.1	350	300	30	25	22	150	150	300	150	150	300	
23	23	10/11/2017	08:00	320	46	12.8	4.2	360	310	31	26	23	155	155	310	155	155	310	
24	24	10/11/2017	09:00	330	47	13.0	4.3	370	320	32	27	24	160	160	320	160	160	320	
25	25	10/11/2017	10:00	340	48	13.2	4.4	380	330	33	28	25	165	165	330	165	165	330	
26	26	10/11/2017	11:00	350	49	13.5	4.5	390	340	34	29	26	170	170	340	170	170	340	
27	27	10/11/2017	12:00	360	50	13.8	4.6	400	350	35	30	27	175	175	350	175	175	350	
28	28	10/11/2017	13:00	370	51	14.0	4.7	410	360	36	31	28	180	180	360	180	180	360	
29	29	10/11/2017	14:00	380	52	14.2	4.8	420	370	37	32	29	185	185	370	185	185	370	
30	30	10/11/2017	15:00	390	53	14.5	4.9	430	380	38	33	30	190	190	380	190	190	380	
31	31	10/11/2017	16:00	400	54	14.8	5.0	440	390	39	34	31	195	195	390	195	195	390	
32	32	10/11/2017	17:00	410	55	15.0	5.1	450	400	40	35	32	200	200	400	200	200	400	
33	33	10/11/2017	18:00	420	56	15.2	5.2	460	410	41	36	33	205	205	410	205	205	410	
34	34	10/11/2017	19:00	430	57	15.5	5.3	470	420	42	37	34	210	210	420	210	210	420	
35	35	10/11/2017	20:00	440	58	15.8	5.4	480	430	43	38	35	215	215	430	215	215	430	
36	36	10/11/2017	21:00	450	59	16.0	5.5	490	440	44	39	36	220	220	440	220	220	440	
37	37	10/11/2017	22:00	460	60	16.2	5.6	500	450	45	40	37	225	225	450	225	225	450	
38	38	10/11/2017	23:00	470	61	16.5	5.7	510	460	46	41	38	230	230	460	230	230	460	
39	39	10/11/2017	00:00	480	62	16.8	5.8	520	470	47	42	39	235	235	470	235	235	470	
40	40	10/11/2017	01:00	490	63	17.0	5.9	530	480	48	43	40	240	240	480	240	240	480	
41	41	10/11/2017	02:00	500	64	17.2	6.0	540	490	49	44	41	245	245	490	245	245	490	
42	42	10/11/2017	03:00	510	65	17.5	6.1	550	500	50	45	42	250	250	500	250	250	500	
43	43	10/11/2017	04:00	520	66	17.8	6.2	560	510	51	46	43	255	255	510	255	255	510	
44	44	10/11/2017	05:00	530	67	18.0	6.3	570	520	52	47	44	260	260	520	260	260	520	
45	45	10/11/2017	06:00	540	68	18.2	6.4	580	530	53	48	45	265	265	530	265	265	530	
46	46	10/11/2017	07:00	550	69	18.5	6.5	590	540	54	49	46	270	270	540	270	270	540	
47	47	10/11/2017	08:00	560	70	18.8	6.6	600	550	55	50	47	275	275	550	275	275	550	
48	48	10/11/2017	09:00	570	71	19.0	6.7	610	560	56	51	48	280	280	560	280	280	560	
49	49	10/11/2017	10:00	580	72	19.2	6.8	620	570	57	52	49	285	285	570	285	285	570	
50	50	10/11/2017	11:00	590	73	19.5	6.9	630	580	58	53	50	290	290	580	290	290	580	
51	51	10/11/2017	12:00	600	74	19.8	7.0	640	590	59	54	51	295	295	590	295	295	590	
52	52	10/11/2017	13:00	610	75	20.0	7.1	650	600	60	55	52	300	300	600	300	300	600	
53	53	10/11/2017	14:00	620	76	20.2	7.2	660	610	61	56	53	305	305	610	305	305	610	
54	54	10/11/2017	15:00	630	77	20.5	7.3	670	620	62	57	54	310	310	620	310	310	620	
55	55	10/11/2017	16:00	640	78	20.8	7.4	680	630	63	58	55	315	315	630	315	315	630	
56	56	10/11/2017	17:00	650	79	21.0	7.5	690	640	64	59	56	320	320	640	320	320	640	
57	57	10/11/2017	18:00	660	80	21.2	7.6	700	650	65	60	57	325	325	650	325	325	650	
58	58	10/11/2017	19:00	670	81	21.5	7.7	710	660	66	61	58	330	330	660	330	330	660	
59	59	10/11/2017	20:00	680	82	21.8	7.8	720	670	67	62	59	335	335	670	335	335	670	
60	60	10/11/2017	21:00	690	83	22.0	7.9	730	680	68	63	60	340	340	680	340	340	680	
61	61	10/11/2017	22:00	700	84	22.2	8.0	740	690	69	64	61	345	345	690	345	345	690	
62	62	10/11/2017	23:00	710	85	22.5	8.1	750	700	70	65	62	350	350	700	350	350	700	
63	63	10/11/2017	00:00	720	86	22.8	8.2	760	710	71	66	63	355	355	710	355	355	710	
64	64	10/11/2017	01:00	730	87	23.0	8.3	770	720	72	67	64	360	360	720	360	360	720	
65	65	10/11/2017	02:00	740	88	23.2	8.4	780	730	73	68	65	365	365	730	365	365	730	
66	66	10/11/2017	03:00	750	89	23.5	8.5	790	740	74	69	66	370	370	740	370	370	740	
67	67	10/11/2017	04:00	760	90	23.8	8.6	800	750	75	70	67	375	375	750	375	375	750	
68	68	10/11/2017	05:00	770	91	24.0	8.7	810	760	76	71	68	380	380	760	380	380	760	
69	69	10/11/2017	06:00	780	92	24.2	8.8	820	770	77	72	69	385	385	770	385	385	770	
70	70	10/11/2017	07:00	790	93	24.5	8.9	830	780	78	73	70	390	390	780	390	390	780	
71	71	10/11/2017	08:00	800	94	24.8	9.0	840	790	79	74	71	395	395	790	395	395	790	
72	72	10/11/2017	09:00	810	95	25.0	9.1	850	800	80	75	72	400	400	800	400	400	800	
73	73	10/11/2017	10:00	820	96	25.2	9.2	860	810	81	76	73	405	405	810	405	405	810	
74	74	10/11/2017	11:00	830	97</														

# RARENGA RAUROPI WATERWAYS & BIODIVERSITY MANAGEMENT



**W1** Waterways & Biodiversity Overview

**W2** Waterways and Riparian Zones

**W3** Waterways Fencing

**W4** Crossings

**W5** Ponds, Sediment Traps and Wetlands

**W6** Artificial or Tile Drainage

**W7** In-Stream Water Testing

**W8** Habitat and Biodiversity

# WATERWAYS & BIODIVERSITY MANAGEMENT

## GOOD FARMING PRACTICES

Identify areas where runoff may occur and manage to avoid runoff entering waterways

Practices:

Risk areas where surface runoff may enter waterways are identified

A grass buffer strip or riparian plantings have been left between waterways and fences

When cultivating paddocks an uncultivated buffer strip between cultivation and waterway is left (the steeper the land the wider the buffer strip is)

ACHIEVED

Tracks, feed areas, gateways and troughs are located away from waterways

Practices:

Tracks are located away from waterways where practical

Supplement is fed out away from waterways

Water troughs are located away from waterways in a dry area of paddocks

Gateways are in a dry point and are wide enough for good cow flow to reduce pugging

ACHIEVED

Evidence:

Farm map identifying tracks, feed areas and troughs

Stock are excluded from waterways

1 ACTION(S)

\*Areas of native plants or significant biodiversity are protected

Practices:

Areas are identified on the farm map

Stock are fenced out of the area

Weeds are controlled within the area

Animal pests are trapped or poisoned

ACHIEVED

\*Additional GFP relevant to the dairy industry goals



# WATERWAYS & BIODIVERSITY MANAGEMENT

## WATERWAYS & BIODIVERSITY OVERVIEW

W1

The Waikana Stream and an unnamed creek run through the farm to the Mataura River, fed by several small waterways and gullies. Eight ponds/sediment traps have been created. Wide buffer zones along the creeks/gullies are fenced off. Crossings have been installed wherever lanes pass over waterways. There are several areas of native biodiversity/habitat such as tussock in some gullies, small wetland areas, ponds, creeks and natives planted along riparian margins.

Appendix N Objectives:

Water quality and habitat is protected by:

- Fencing off creeks and ponds – with wide riparian buffers
- Protecting small wetland areas in the gullies
- Planting natives along the creeks
- Retiring large, steep sided gullies and planting them in trees
- Avoiding cultivation and/or intensive grazing of Critical Source Areas when there is a high risk of sediment loss
- Increasing the buffer zones along waterways when fertiliser or effluent is applied, or when winter crops are sown and grazed
- Having sediment traps/ponds in several of the gullies

See also Good Farming Practices listed at the start of the Waterways and Biodiversity section of this plan.

# WATERWAYS & BIODIVERSITY MANAGEMENT

## WATERWAYS AND RIPARIAN ZONES

W2

Small creeks and the Waikana Stream are permanently fenced, though new fences are required in three places (see Waterways Fencing). A riparian planting plan has largely been completed along these waterways and many gullies have been planted in pines or other forestry species. The creeks mostly have a moderate to steep gradient and are reasonably fast flowing with small pools and a gravelly/rocky base.



# WATERWAYS & BIODIVERSITY MANAGEMENT

## WATERWAYS FENCING

W3

IMPACT OF  
CONTAMINATION



+



LIKELIHOOD OF  
CONTAMINATION

=

MEDIUM RISK RATING

Under the Resource Management (Stock Exclusion) Regulations 2020 many waterways and wetlands must be fenced off. On dairy farms and dairy support land most creeks and ditches (that are over 1m wide at any point on the farm) are required to have a permanent riparian fence with a 3m setback from the bank on both sides.

The following waterways should be permanently fenced:

- the short section of creek beside the implement yard/below Pdk 12
- the gully running through Pdks B8/B9 on the Bastiaansen block

The key risks to surface water quality are sediment loss through damage to the stream banks/cattle stirring up mud, and faecal contamination.

### ACTIONS | RECOMMENDATIONS

Target Date

- |  |  |                    |
|--|--|--------------------|
|   | <p><b>Fence off creeks/ditches – <u>To Achieve GFP</u></b></p> <p>Permanently fence waterways:</p> <ul style="list-style-type: none"> <li>- the creek beside the implement yard</li> <li>- the gully running through Pdks B8/B9</li> </ul> | <p>30 Sep 2022</p> |
|--|--|--------------------|



# WATERWAYS & BIODIVERSITY MANAGEMENT



# WATERWAYS & BIODIVERSITY MANAGEMENT

## CROSSINGS

W4

Culverts have been installed wherever lanes cross waterways and to allow stock or machinery movements where creeks separate paddocks. These crossings are well fenced and sufficiently wide and flat so that there is minimal risk of sediment, dung etc being washed off the crossing and directly into the waterway. The culverts sit in the stream bed, allowing native fish and eels (tuna) to move upstream.



# WATERWAYS & BIODIVERSITY MANAGEMENT

## PONDS, SEDIMENT TRAPS AND WETLANDS

W5

Ponds/sediment traps and wetlands can be very effective at removing sediment (and phosphorous attached to soil) and/or nitrogen from surface water by holding/buffering run-off, allowing sediment to settle out and providing an environment where wetland plants can remove nutrients. The effectiveness of sediment traps will depend on their size, design and location in relation to the catchment area, slope, vegetation and rainfall at each site – larger catchments need larger sediment traps and/or more of them.

Eight ponds/sediment traps have been constructed - mostly in gullies but there is also a large pond connected to a ditch on the flats. All of these ponds are fed by run-off and will capture some of the sediment and other contaminants that are washed off the paddocks above. The sediment traps should be regularly maintained (excess sediment removed). There are also (very small) swampy areas in most gullies.

### ACTIONS | RECOMMENDATIONS

Target Date



#### Create extra sediment traps/wetlands

Investigate additional sites to create extra ponds/sediment traps that can filter run-off flowing down the gullies and creeks and improve water quality before it enters the Mataura River. In the larger gullies the most practical time to construct some of these sediment traps may be when trees are harvested. Ensure there is good access to clean out/maintain these sites after they are developed.



# WATERWAYS & BIODIVERSITY MANAGEMENT



# WATERWAYS & BIODIVERSITY MANAGEMENT

## ARTIFICIAL OR TILE DRAINAGE

A blue circular icon containing the text 'W6' in a bold, sans-serif font.

The farm has some drains (mainly in smaller gullies and some wet spots) but does not have an extensive network of tiles. These drains have been mapped - and this information is used when planning effluent applications. There is a much greater risk of nutrient and effluent losses in areas which are tile drained - especially in very wet conditions or when soils are dry and cracking.



# WATERWAYS & BIODIVERSITY MANAGEMENT

## IN-STREAM WATER TESTING



Water quality testing is carried out in two creeks twice a year to monitor the levels of N, P, sediment and E. coli in these waterways.

# WATERWAYS & BIODIVERSITY MANAGEMENT

## HABITAT AND BIODIVERSITY

W8

Protecting waterways, wetlands, native bush and other areas of habitat is an important step in sustaining high water quality and the food species (eg eels, ducks, koura) or plant materials (eg flax, timber) that are associated with these ecosystems. Preserving and enhancing these natural resources or sources of Mahinga Kai is a key objective in the Southland Water and Land Plan and various national environmental policies.

On this farm the key areas of habitat are in fenced off gullies which have been retired (and mostly planted in trees). They include:

- the creeks/riparian areas and ponds which provide habitat for native fish and birds, wetland grasses and insects
- small wetland areas which have some rushes etc

Vegetation in the gullies is dominated by introduced grasses and trees (there is very little remnant native vegetation). Some riparian planting with natives has also been undertaken. Possums and cats are trapped or shot, and woody weeds are sprayed where practical.

### ACTIONS | RECOMMENDATIONS

Target Date

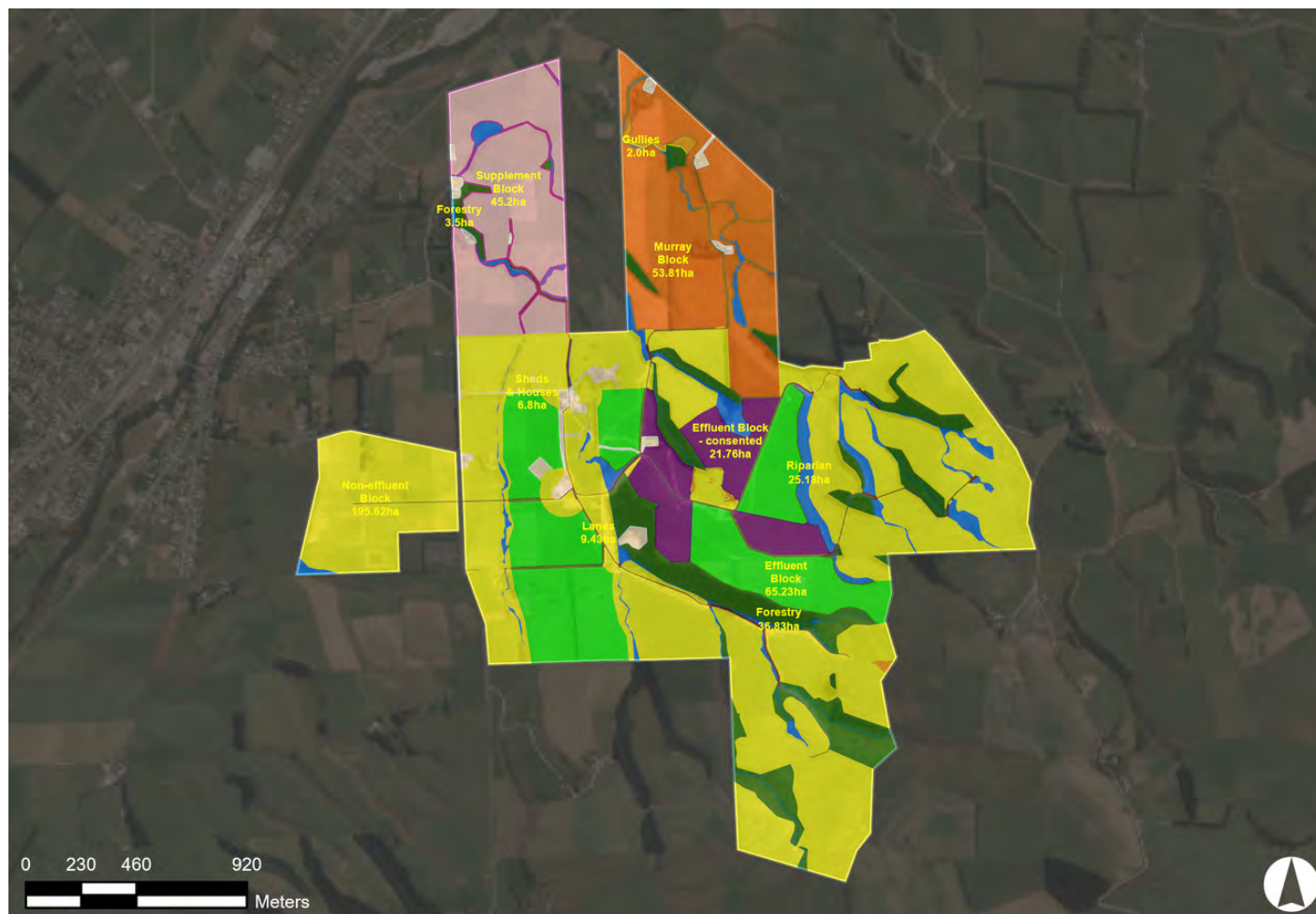


#### Protect and enhance habitat

Continue with work to control weed and pest species that would impact biodiversity. Plant extra natives as time and finances allow.



# TAIORA NUTRIENT MANAGEMENT



- N1** Nutrient Overview
- N2** Nutrient Reporting
- N3** Soil Nutrient Monitoring Programme

- N4** Fertiliser Programme
- N5** N & P Loss Mitigations

# NUTRIENT MANAGEMENT

## GOOD FARMING PRACTICES

Monitor and maintain P levels at the economic optimum

Practices:

Olsen P trends continue to be monitored over successive years

Olsen P is maintained in the optimum range

Fertiliser applications are tailored for different management blocks

ACHIEVED

Evidence:

Soil test results

Fertiliser application matches plant requirements and minimises losses

Practices:

All fertiliser applications are recorded -- product, rate, date, location (If a contractor is used the information is gathered from them)

Soil temperature and moisture levels are assessed before applying fertiliser (i.e. avoid winter months)

Fertiliser applications are avoided:

--When heavy rainfall is forecast and runoff is likely

--Close to waterways

N is applied little and often and when pasture is actively growing

Pasture or crop growth and feed requirements are assessed before applying N

ACHIEVED

Evidence:

Fertiliser proof of placement records - product, rate, date, location

Fertiliser spreading equipment is well maintained and calibrated

Practices:

Farm spreading equipment is calibrated regularly -- spreading volume checked

Spreaders cleaned and greased routinely

Paddocks are checked for paddock stripes after spreading

ACHIEVED

\*General nutrient management

Practices:

Soil-testing is done each year for each different management block

Soil-testing is done well before crops are planted to identify nutrient levels

A nutrient budget is used to help fertiliser decision making

Supply farm nutrient information to your milk company at the end of each season

ACHIEVED

Evidence:

Nutrient budget

\*Additional GFP relevant to the dairy industry goals

# NUTRIENT MANAGEMENT

## NUTRIENT OVERVIEW



\* The dairy farm has a three yearly soil testing programme. Crop paddocks are tested to assess nutrient requirements. Results are analysed by a fertiliser advisor and used to develop a fertiliser programme for pasture and crop paddocks, with different rates/products used on blocks which have specific requirements.

\* Fertiliser is applied by Clinton Waipahi Transport or with a tractor mounted spreader and recorded in TracMap software. Setbacks are maintained along waterways.

\* Fertiliser use and other farm management information is submitted through Fonterra so that an annual Nitrogen Risk Scorecard can be completed.

\* The Purchased Nitrogen Surplus for the farm was 101kgN/ha in 2020/21 (low relative to similar farms). Most farming practices were rated very low risk for N loss apart from stock management (above average stocking rate and pasture production) and N fertiliser use (high rates have been applied in previous seasons).

### Appendix N Objectives:

Nutrient management practices which reduce losses of N & P to ground and surface water include:

- soil testing all paddocks on the farm so that high and low fertility areas can be identified
- withholding P fertiliser on paddocks that have high Olsen P levels
- only applying N fertiliser when pastures are actively growing (adequate soil temperatures and moisture levels)
- using GPS software when fertiliser is applied to achieve more accurate placement/reduce overlapping
- sowing a catch crop after some winter crops have been grazed off

See also Good Farming Practices listed at the start of the Nutrient section of this plan.

# NUTRIENT MANAGEMENT

## NUTRIENT REPORTING



Nitrogen fertiliser use is recorded in the Fonterra Farm Dairy Records each year, along with other farm management data that impacts overall N inputs and losses. Fonterra uses this data to produce a Farm Insights Report which includes a Nitrogen Risk Scorecard. This helps to identify the nitrogen loss risks associated with various farming activities.

The 2020/21 Farm Insights Report has been produced based on the information provided to Fonterra in the 2020/21 Farm Dairy Records and shows that the farm has a Purchased Nitrogen Surplus of 101kgN/ha. Purchased Nitrogen Surplus reflects the relationship between the amount of nitrogen entering the farming system through fertiliser and feed, versus the amount leaving the farm as product (milk and meat). A low number means nitrogen losses to the environment (both to air and to water) are minimised. The 2020/21 Purchased Nitrogen Surplus is low compared to similar farms in the region (farms with higher rates of N fertiliser use or imported feed typically have a higher Purchased N Surplus). N.B. The Purchased Nitrogen Surplus is one measure that is used by Fonterra to assess eligibility for CODOF payments made to suppliers for their milk (aim to avoid a high result - in the top 25% for NZ).

In the 2020/21 Farm Insights Report the key risk areas for nitrogen loss were assessed as:

- \* Stock management - High risk because the stocking rate and grass production is above average
- \* Nitrogen fertiliser use - Medium risk because total N use is high and some applications are greater than 25kg N/ha
- \* Imported feed - Very low risk
- \* Cropping & Cultivation - Very low risk
- \* Effluent Management - Very low risk
- \* Irrigation – Not applicable

N.B. These risk assessments are based on the information supplied in the Farm Dairy Records. Risks will change from season to season if farming practices and inputs change.

### ACTIONS | RECOMMENDATIONS

**Target Date**



#### **Review Farm Dairy Records & the Fonterra Farm insights Report**

Keep good records of feed, fertiliser, crops and stock throughout the season. Where possible record inputs such as fertiliser for each of the main farm blocks (especially effluent or non-effluent blocks, support land and crops) rather than just entering total inputs for the whole farm (this is important if a Nutrient Budget is required). Check data that is auto-populated in the Farm Dairy Records for accuracy as well as the seasonal information that has been entered before it is submitted. Review the Fonterra Farm Insights Report once it is sent through to identify any trends in N loss or high risk practices that are highlighted.

# NUTRIENT MANAGEMENT

## SOIL NUTRIENT MONITORING PROGRAMME

A blue circular logo containing the text 'N3' in a bold, sans-serif font.

A good soil testing programme provides information that can be used to optimise nutrient levels/maintain high pasture & crop production (which can reduce the need for imported supplements or excessive N fertiliser use) and also indicate the risk of P loss (high P results = higher potential P loss).

All paddock soil testing is carried out every three years to monitor nutrient levels and identify paddocks with high, low or adequate nutrient levels. The 2020 soil samples show Olsen P levels average 30 (out of 44 tests only 3 paddocks were above optimum). Crop paddocks are also tested prior to cultivation (if there have been no recent tests) so that P fertiliser requirements can be checked.

# NUTRIENT MANAGEMENT

## FERTILISER PROGRAMME

N4

- \* A fertiliser programme is developed each season with Ballance. Different fertiliser products/rates are used on the effluent and non-effluent blocks and on other areas which have specific requirements. Where other sources of nutrients are applied eg effluent, the rate of maintenance P and K is reduced. The fertiliser programme is also designed to 'even out' nutrient levels across all paddocks so that low fertility areas are brought up to the optimum level and high fertility paddocks receive less nutrients.
- \* Maintenance fertiliser is applied by Clinton Waipahi Transport and TracMap is during spreading.
- \* N fertiliser is applied using a tractor mounted Amazone spreader and TracMap or AgLeader GPS software in the tractors is used for guidance. The Amazone spreader has sectional control (one spinner can be shut off when required eg near waterways) and speed rate control which adjusts the spinner speed whenever the tractor slows/speeds up. Spreading rates are calculated with software in the spreader.
- \* Applications are recorded on paper maps and also entered into TracMap software (when an order and spreading instructions are sent to the transport and/or in the tractor GPS unit).
- \* Spring nitrogen is usually applied once soil temperatures reach 7-8 degrees. N fertiliser applications are made regularly through the season as long as there is adequate rain to ensure good uptake by pasture. Paddocks which have not been recently grazed are missed out so that there is adequate time for N uptake/pasture growth before the herd comes back to that paddock.
- \* N fertiliser use is high - the Farm Dairy Records show about 222 kgN/ha was applied across the farm in 2019/20.
- \* Sustain N fertiliser is used to reduce ammonia volatilisation and improve the efficiency of N use.

### ACTIONS | RECOMMENDATIONS

#### Target Date



#### Review Nitrogen Fertiliser Use

31 Jul 2023

Monitor the use of N fertiliser through the season to make sure the N cap of 190kgN/ha is not exceeded. Look for opportunities to fine tune/optimize the rates used and timing of applications – so that overall N use can be reduced and/or N use efficiency can be maximized.





# NUTRIENT MANAGEMENT

## N & P LOSS MITIGATIONS



Many of the key Good Farming Practices for nutrients are being carried out (see Nutrient Overview). Other farm practices are also helping to reduce N & P loss:

- > Feeding high carbohydrate supplements or fodder (eg grain, Fodder Beet) to cows in autumn - this reduces the amount of urine N that is deposited on soils pre-winter and therefore reduces the amount that will leach
- > Calving pads are used during wet weather in spring, reducing pugging (and P loss with sediment) and the amount of urine N deposited on wet soils
- > A cereal catch crop is sometimes sown after winter crops have been eaten off (if weather and soil conditions allow the crops to be sown early enough and it fits within the cropping/pasture renewal programme) – this can take up large quantities of N left in the soil post-grazing

Several other options for reducing N & P loss could be assessed including:

- \* Sowing plantain - some trial work indicates that sowing Ecotain plantain can reduce overall N losses from grazed pasture.
- \* Introducing dung beetles (which will bury dung and improve water infiltration/reduce run-off + sediment loss).
- \* Using 'Low nitrogen' cattle genetics - breeding cows which have less N in their urine

### ACTIONS | RECOMMENDATIONS

**Target Date**



#### **Evaluate environmental mitigations**

Keep up to date with new options that can help to reduce losses of N or P (or other contaminants) and trial these where appropriate.

# WHAKAPAPA

History of the farm and local area has not been assessed as part of this Tiaki Farm Environment Plan.

# APPENDIX

## APPENDIX

## GREENHOUSE GAS EMISSIONS

Climate change affects all New Zealanders, including the primary sector. Reducing greenhouse gas emissions is a priority and action is required across New Zealand and internationally. The New Zealand dairy sector is one of the lowest emissions producers of dairy nutrition in the world due to our efficient year-round pastoral grazing system and healthy cows. Through innovation and continued Kiwi ingenuity, our farmers, scientists, and sector partners can ensure New Zealand dairy continues to stay a world leader, while making meaningful contributions to New Zealand's GHG mitigation targets. This section provides an overview of the current GFPs that could have an impact on reducing emissions on farm.

**GENERAL FARM**

100% ACHIEVED

**LAND & SOIL**

100% ACHIEVED

**IRRIGATION**

N/A

**EFFLUENT**67% ACHIEVED  
1 ACTION**WATERWAYS & BIODIVERSITY**

100% ACHIEVED

**NUTRIENT**

100% ACHIEVED

## APPENDIX

## GREENHOUSE GAS EMISSIONS

The tables below list the GFPs that have an impact on reducing greenhouse gas emissions on farm.

## GENERAL FARM MANAGEMENT

Identify the physical and biophysical characteristics of the farm system, assess the risk factors to water quality associated with the farm system, and manage appropriately	ACHIEVED
Store and load fertiliser with minimal spillage and leaching	ACHIEVED
Store, transport and distribute feed to minimise wastage, leachate and soil damage	ACHIEVED

## LAND &amp; SOIL MANAGEMENT

Reduce periods of bare soil between crops and pasture to reduce erosion and leaching	ACHIEVED
Retire all LUC 8 land and retire LUC 7e land or ensure that it has soil conservation measures in place	N/A

## IRRIGATION MANAGEMENT

Irrigation rates and timing match plant requirements	N/A
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## EFFLUENT MANAGEMENT

Effluent system meets code of practice	ACHIEVED
Spreading equipment is well maintained and calibrated	1 ACTION(S)
Effluent applied at correct depth, rate and time	ACHIEVED

## WATERWAYS &amp; BIODIVERSITY MANAGEMENT

*Areas of native plants or significant biodiversity are protected	ACHIEVED
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## NUTRIENT MANAGEMENT

Fertiliser application matches plant requirements and minimises losses	ACHIEVED
Spreading equipment is well maintained and calibrated	ACHIEVED

\*Additional GFP relevant to the dairy industry goals

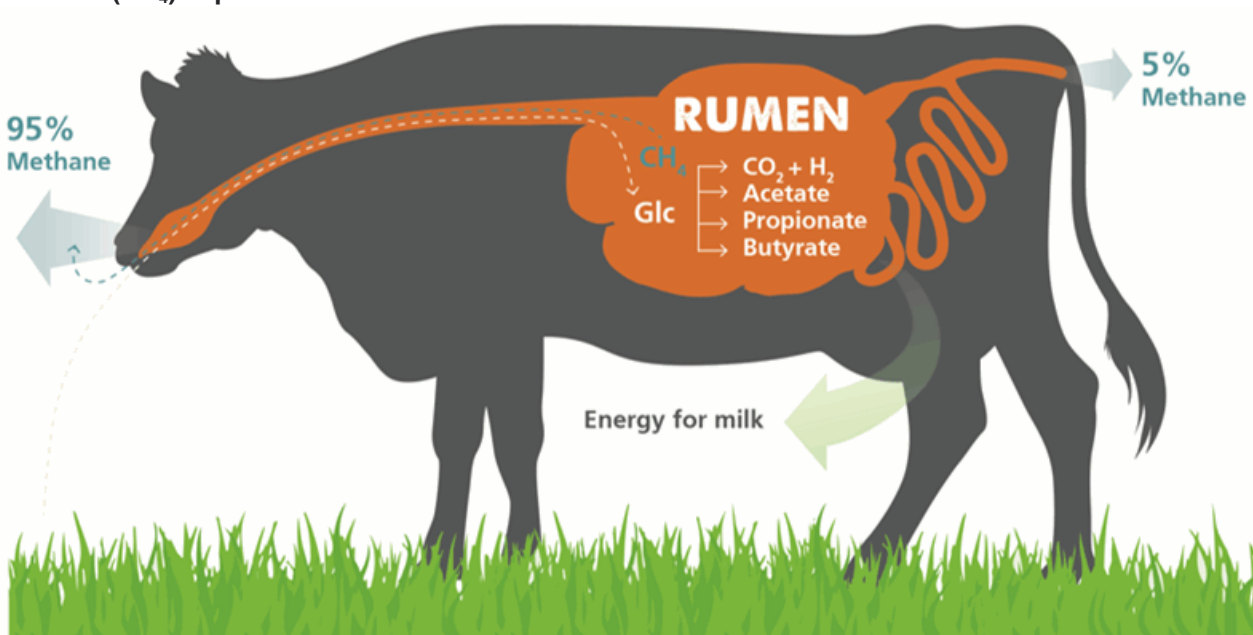
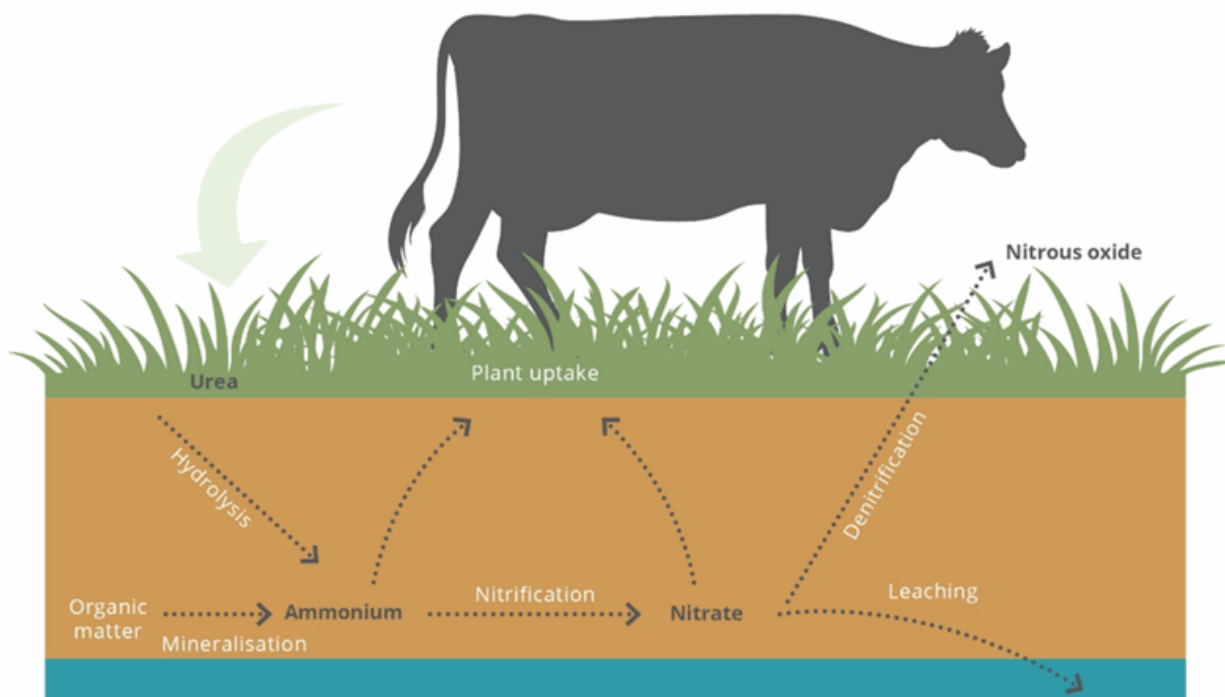
## APPENDIX

## GREENHOUSE GAS EMISSIONS

## WHAT ARE GREENHOUSE GAS EMISSIONS?

The main agricultural GHGs are methane ( $\text{CH}_4$ ) and nitrous oxide ( $\text{N}_2\text{O}$ ). Methane is produced by ruminants (e.g. cows and sheep) by methanogen microbes that are naturally present in the rumen. Most methane is emitted when cattle burp. The amount of methane produced for each farm is directly related to the total feed intake for that farm (including cows, heifers and calves).

Nitrous oxide is emitted from soil when urine, faeces and fertilisers are broken down by microbes in the soil.

How methane ( $\text{CH}_4$ ) is producedHow nitrous oxide ( $\text{N}_2\text{O}$ ) is produced

# GREENHOUSE GAS EMISSIONS

## ADDITIONAL GREENHOUSE GAS EMISSIONS

Options to reduce and mitigate greenhouse gas emissions on farms fall into three categories: farm management changes, infrastructure investment, and retiring or planting land. The best options for each farm will vary depending on factors such as the farm system and the region. When choosing changes to adopt on your farm, you may find options from all three of these categories work well together.

### Farm management changes

The final report of the Biological Emissions Reference Group (BERG), a cumulative effort by the wider agricultural sector, estimated that biological emissions can be reduced by up to 10% for the dairy sector with currently available farm management practices. Most of these mitigations involve good farm practices, such as feed utilisation, choice of feed type and being more selective about how and when to apply fertiliser and effluent to our land. Outlined below are some options to consider. Before you make changes to your farm system or invest in infrastructure, you should seek advice to help determine what will work best for your situation.

## OPTIONS TO REDUCE METHANE EMISSIONS

### Managing dry matter intake

Current options available to reduce methane emissions are limited, but managing efficient use of dry matter intake (DMI) is the most important. Research shows that for every additional kg of total feed eaten per hectare, total methane emissions increase proportionally. Managing DMI is about reducing the amount of feed eaten per hectare, and increasing per cow performance for every kg of feed that is eaten.

Over time, as cow performance improves it may be possible to adjust stocking rates (but the DMI per cow must remain constant). Increasing reproductive performance of the herd to allow for reduced replacement rates will decrease your emissions as there is less DMI requirement for young stock and less methane emissions.

## OPTIONS TO REDUCE NITROGEN LEACHING AND NITROUS OXIDE EMISSIONS

Nitrous oxide emissions occur when bacteria in the soil remove oxygen from nitrate ( $\text{NO}_3^-$ ). This mainly happens when the soils are in an anaerobic state (e.g. waterlogged soils). Because nitrogen is supplied to the soil from fertiliser, animal excreta, and effluent irrigation, there are a number of options to manage nitrous oxide emissions and nitrogen leaching.

The mitigations options involve reducing nitrogen loss through:

- better fertiliser application
- planting low-nitrogen forages or crops to reduce nitrogen excretion (eg fodder beet and plantain)
- use of low nitrogen feeds
- improving pasture quality.

## APPENDIX

## GREENHOUSE GAS EMISSIONS

**Reducing nitrogen surplus**

Many of the supplementary feeds contain less nitrogen than normal pastures and can help reduce nitrous oxide emissions on farms. You can evaluate supplements used to see if there is potential to change to a lower-emissions feed.

- Evaluate existing cropping activity and the species grown. This can improve nitrogen inputs to the farm and nitrogen surplus through different types of crop and different methods in cultivation/feeding.
- Exploring the use of alternative forages in the pasture sward such as plantain to reduce nitrogen loss to water and atmosphere. These species can retain more nitrogen in the system allowing for less to be lost.

**Optimising your fertiliser and effluent use**

DairyNZ analysis shows that for every additional 100 kg N/ha applied via fertiliser, total greenhouse gas emissions increase by 2.6 t/ha. As well as using less nitrogen fertiliser per hectare, mitigations strategies include:

- Ensure you are applying the right type of fertiliser in the right places. Test the soil to gauge optimal levels and use precision application to ensure accurate placement.
- Avoid direct leaching and nitrous oxide emissions by not applying in winter or to waterlogged soils.
- Improve effluent management to accurately apply appropriate depths and rates to the soil so that there are less losses.
- Reduce N fertiliser applications on effluent blocks.

**Paddock strategies**

- Grazing cows off-paddock in the autumn months limits the build-up of nitrate in the soil when the plant growth is reduced. This build-up is then available to be lost to both water and atmosphere of the following winter and spring months. This strategy can reduce nitrogen leaching and nitrous oxide emissions if the associated effluent is well managed.
- Improve irrigation practices so that water is only applied when the soil profile has the capacity to absorb it and the plants need it and that there is no over application. This can be done by using precision water irrigation and scheduling.
- During wintering urine nitrogen leaching and nitrous oxide emissions can be reduced through appropriate paddock selection, grazing time, and grazing regime.
- Using a 'catch crop' to minimise the fallow period following a winter crop. This will reduce nitrogen leaching and nitrous oxide emissions during this period.

**Planting to offset carbon dioxide**

Planting trees can help 'offset' emissions from your farm business without impacting on production. As trees grow, they store carbon in trunks, branches, leaves, and roots. Planting will also improve water quality by helping to filter out sediment and nutrients before they enter waterways. Planting could take place in riparian areas, shelter belts, and through retiring land to forestry. Planting also helps to prevent soil erosion and increase the habitat for native wildlife.



# THANK YOU



## DISCLAIMER

\*Provision of advice in relation to effluent storage, effluent irrigation systems and the management of other environmental risk areas on farm.

The advice that Fonterra Co-operative Group Ltd (Fonterra, we, us) provides to farmers in relation to effluent storage capacity and other environmental compliance practices, including mitigation actions described in Farm Environment Plans, is based on the information and assumptions that farmers and their agents have provided to us and on our knowledge and understanding of current best practice in the industry. Fonterra does not purport to replace sound engineering or other professional advice and as such we strongly encourage farmers to seek independent expert advice before any construction, upgrades, or other change to your on farm practices. Farmers are ultimately responsible for the environmental compliance of their farm and on farm practices. Fonterra gives no warranties (express or implied) and, to the maximum extent permissible by law, excludes all liability in contract or tort (including, without limitation, liability for negligence) or otherwise in relation to the advice provided.