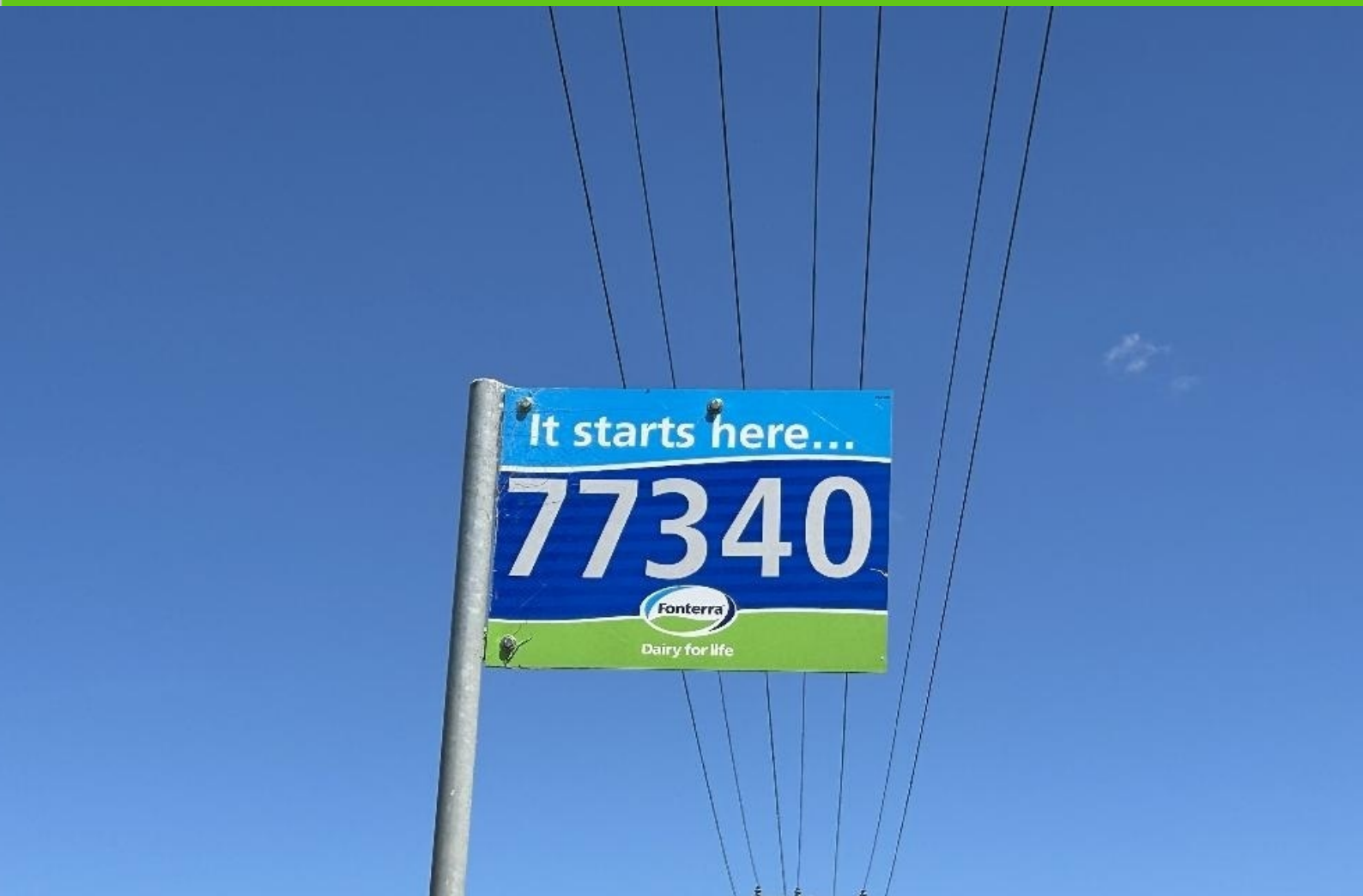
77340

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

CONTENTS:

FARM DETAILS

SUPPLIER NUMBER

77340

FARM OWNER

Toggenburg Trust

C/O E A Gamperle
4511 State Highway 29, RD 3
Matamata 3473

PLAN OWNER

Anthony Lopes

+64 22 1765174

mad4outdoors@gmail.com

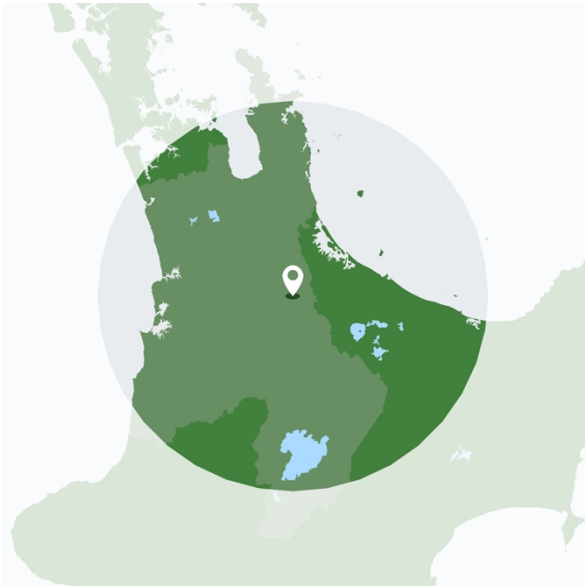
4533 State Highway 29
Matamata
Matamata
Matamata 3473

FARM ADDRESS

SH 29

Hinuera

LOCATION



REGIONAL COUNCIL

Waikato

PLAN LAST EDITED

19 February 2024

POINTS OF NOTE

* NZLRI Land Use Capability
4: 5.05 ha - 6.34 %.
7: 19.50 ha - 24.48 %.
2: 55.09 ha - 69.17 %.

LAND PARCELS

Fee Simple, 1/1, Lot 9 Deposited Plan 7128, 809,371 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
- Major Stock Not Excluded Waterway
- Minor Stock Excluded Waterway
- Minor Stock Not Excluded Waterway
- Farm Boundary
- Compliant Crossing
- Non-Compliant Crossing
- Non-Compliant Non-Regular Crossing
- Dispensation Crossing
- Dairy Shed

GOOD FARMING PRACTICES

This section provides an overall snapshot of the Dairy Tomorrow Good Farming Practices.

FARM MANAGEMENT

The characteristics of the farm and the farm system are identified		ACHIEVED
A risk assessment of the farms inherent and management activity risks is undertaken		ACHIEVED
Accurate and auditable records are kept of annual farm inputs, outputs and management practices		ACHIEVED
Fertiliser is stored and loaded to minimise the risk of spillage and losses to waterways and groundwater		N/A
Feed is stored, transported and fed to minimise wastage, leachate and soil damage		ACHIEVED
Farm waste is minimised		1 ACTION(S)
Hazardous substances (agrichemicals and fuel) are stored, handled, used and disposed of to avoid contamination of waterways and groundwater		ACHIEVED

LAND & SOIL MANAGEMENT

Cultivation is managed to reduce the risk of sediment loss and maintain soil structure		ACHIEVED
Erosion-prone land is managed or retired to minimise soil losses		1 ACTION(S)
Grazing of pastures and crops is managed to minimise sediment and contaminant loss		ACHIEVED
Paddocks selected for Intensive Winter Grazing (including intensive baleage wintering) are low risk and managed to minimise the risk of erosion, run-off to waterways and leaching to groundwater		N/A
Critical Source Areas and farm Hot Spots are identified and managed to minimise contaminant losses to waterways		1 ACTION(S)

 indicates the achievement of the Good Farming Practice will also impact Greenhouse Gas Emissions

GOOD FARMING PRACTICES

WATER USE & IRRIGATION MANAGEMENT

Dairy shed and stock water use is efficient and prevents source contamination		ACHIEVED
The depth, rate and timing of irrigation is managed to meet plant demand and minimise the risk of leaching and run-off		N/A
The irrigation system is designed, operated and regularly checked to minimise the amount of water applied to meet plant demand, and prevent microbial contamination		N/A

EFFLUENT MANAGEMENT

Effluent and manure are applied at depths, rates and amounts that match plant requirements and minimise the loss of nutrients or microbial pathogens to waterways and groundwater		3 ACTION(S)
The effluent system is designed, operated and regularly checked to minimise the risk of nutrient and microbial pathogen loss to waterways and groundwater, and to prevent microbial contamination		2 ACTION(S)

WATERWAYS & BIODIVERSITY

Stock is excluded from lakes and waterways		2 ACTION(S)
Farm indigenous biodiversity and Mahinga Kai values are identified and protected		ACHIEVED

NUTRIENT MANAGEMENT

Soil phosphorus levels are monitored and maintained below or within the target ranges for the soil-type and crop		1 ACTION(S)
The amount and timing of fertiliser inputs, takes account of all sources of nitrogen and phosphorus, matches plant requirements and minimises losses to waterways and groundwater		ACHIEVED
Fertiliser spreading equipment is maintained and calibrated		ACHIEVED

GREENHOUSE GAS EMISSIONS

Farm greenhouse gas emissions are known, and a plan is in place to reduce or offset them, that also considers adaptation to climate change		1 ACTION(S)

 indicates the achievement of the Good Farming Practice will also impact Greenhouse Gas Emissions

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 Leading Practice actions (beyond GFP) or are actions, which are not related to a GFP.

CURRENT ACTIONS

	Target Date
Discontinue piling race scrapings on an unsealed surface	31 Mar 2024
Discontinue piling effluent solids on an unsealed surface	31 Mar 2024
Develop an effluent management plan	31 Mar 2024
Correct fence in paddock 31 where erosion has occurred	30 Apr 2024
Record effluent applications	30 Apr 2024
Permanently stock exclude the section of the tributary stream	31 May 2024
Permanently stock exclude the area near the spring	31 May 2024
Recycle bale wrap through the Plasback Scheme	31 May 2024
Complete an application depth test annually and record the results	31 May 2024
Review farm GHG emissions annually	30 Sep 2024
Monitor & Manage Phosphorus (Olsen P) Levels	30 Sep 2024
Complete a Dairy Effluent Storage Calculation (DESC) by an accredited provider	31 Dec 2024

FUTURE ACTIONS

Target Date

RECOMMENDATIONS

	Target Date
Implement a failsafe to ensure sprayed pasture is not grazed	
Investigate Feed Budgeting	
Investigate bulls for AI based on Environmental indexes	
Install a water meter to measure water use	
Talk to your fertiliser representative	

Key: Action Priority

Low Medium High Critical

CATCHMENT CONTEXT

The Waihou River lies in the north east of the region and marks the eastern border of the region. It arises on the western side of the Mamaku plateau and is fed by numerous tributaries arising in the Kaimai Ranges and flowing through the Kaimai Mamaku Forest Park. The river flows through the Hauraki Plains and drains into the Firth of Thames. The Waihou River main stem measures 186km in length, with about 2945km of tributaries. The catchment area is approximately 1977 square kilometres. The catchment consists of a mixture of flat to gently undulating up to steep topography. The river passes through predominantly pasture, with areas of indigenous and plantation forest in the upper reaches.

The dominant underlying geology is a mixture of tephra, alluvial and volcanic. The sampling sites are in the middle reaches of the river. The Kopuatai Peat Dome (a world-ranked biodiversity site) lies in between the Waihou and Piako Rivers. The main towns in the catchment include Putaruru, Te Aroha, Paeroa, Thames, Matamata and Waihi. There is intensive pastoral and dairy farming in the catchment. There are also working mines in the Ohinemuri River tributary catchment and historic closed mines in that catchment and the Te Aroha area.

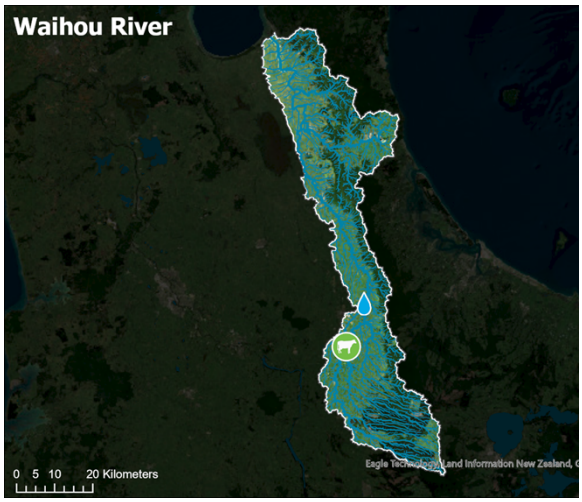
Water quality results are from the Waihou River at Okauia EW-00075

Water quality data is retrieved from the first available monitoring site downstream of the farm. When a farm spans multiple sub-catchments, the site with the least satisfying indicator is chosen. If no sites are located downstream of the farm, the first upstream site is used if, and only if, the farm and the upstream site are within the same sub-catchment.

Water quality state is given as 5-year medians over the 2015-2019 period. Raw data can be accessed via LAWA

If no monitoring site could be associated with a farm, or none of the sites has data for a specific contaminant, modelled water quality state is used instead. The model outputs come from NIWA's 2013-1017 modelled river water quality state. The complete dataset is available on MfE's data portal.

SURFACE WATER QUALITY



NITROGEN

TON	1.23 mg/L	B	Recorded at monitoring site: EW-00075
NH_4	0.013 mg/L	A	Recorded at monitoring site: EW-00075
TN	1.44 mg/L		Recorded at monitoring site: EW-00075

PHOSPHORUS

DRP	0.06 mg/L	D	Recorded at monitoring site: EW-00075
TP	0.084 mg/L		Recorded at monitoring site: EW-00075

BACTERIA

E. coli	310 CFU/100ml	D	Recorded at monitoring site: EW-00075

SEDIMENT

Clarity	1.03 m	D	Recorded at monitoring site: EW-00075

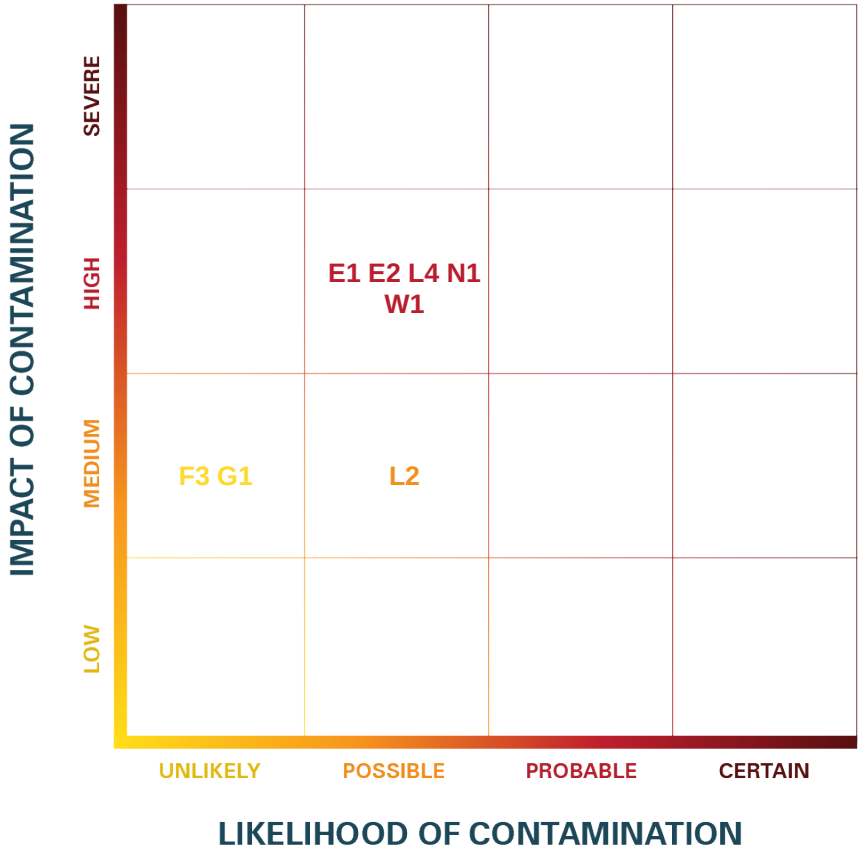
Key: Water quality indicator at nearest monitoring points

A Q1	Good quality	B Q2	Moderate quality	C Q3	Needs improvement	D Q4	Significantly degraded	E	Needs significant improvement – high human health risk

**E.Coli is the only recording that has a 5 band rating system (A-E). All others use a 4 band system (A-D or Q1-Q4).*

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

F3 Infrastructure, Storage and Waste Overview

L2 Land & Soil Overview

L4 Race Maintenance & Management

E1 Effluent Overview

E2 Effluent Irrigation

W1 Waterways & Biodiversity Overview

N1 Nutrient Overview

G1 Greenhouse Gas Emissions Overview

MAHI WHAKAHAERE
FARM MANAGEMENT

- F1 Relevant Regulations
- F2 Farm Overview
- F3 Infrastructure, Storage and Waste Overview
- F4 Hazardous Substances
- F5 Silage Storage
- F6 Key Feature - Silage Pit
- F7 Key Feature - Chemical Storage
- F8 Key Feature - Fuel

FARM MANAGEMENT

GOOD FARMING PRACTICES

The characteristics of the farm and the farm system are identified Practices: The property and farm enterprise details are recorded, including management and ownership structure A map(s) or aerial photograph of the farm is produced at a scale that clearly shows • Key infrastructure • Natural features • Cultural sites	ACHIEVED
A risk assessment of the farms inherent and management activity risks is undertaken Practices: Risk factors to water quality associated with the landscape and farm system have been assessed and are managed appropriately	ACHIEVED
Accurate and auditable records are kept of annual farm inputs, outputs and management practices Practices: Accurate and auditable records of annual farm inputs, outputs and management practices are maintained that support the actions being undertaken to achieve the Dairy Good Farming Practices and reduce any additional risks identified through the risk assessment	ACHIEVED
Fertiliser is stored and loaded to minimise the risk of spillage and losses to waterways and groundwater	N/A
Feed is stored, transported and fed to minimise wastage, leachate and soil damage Practices: Feed is stored: • at least 50 metres away from waterways • away from community drinking-water protection zone • away from critical source areas Silage remains sealed while stored to prevent rotting Feed-out areas are located away from critical source areas Soil damage from feeding-out is minimised	ACHIEVED
Farm waste is minimised	1 ACTION(S)
Hazardous substances (fertilisers, agrichemicals and fuel) are stored, handled, used and disposed of to avoid contamination of waterways and groundwater Practices: An inventory of all hazardous substances stored on-farm is kept, including Safety Data Sheets (SDS) All hazards are identified, and staff made aware of these and how they are to be managed Hazardous substance information and training is provided Appropriate Personal Protective Equipment is made available, well-maintained, and	ACHIEVED

FARM MANAGEMENT

worn
Procedures are in place for managing emergencies
Fertilisers, agrichemicals, and fuels are stored separately
Storage locations are:
• Located away from waterways or areas prone to flooding
• Well ventilated with adequate lighting
• Appropriately signed
• Able to contain a spillage and provide secondary containment where appropriate
• Agrichemicals are stored in containers constructed of non-flammable material

*Additional GFP relevant to the dairy industry goals

FARM MANAGEMENT

RELEVANT REGULATIONS

F1

WAIKATO REGIONAL COUNCIL

The farm is located within the Waihou Piako River catchment in the Waikato Region. This catchment is not within the Proposed Waikato Regional Plan Change 1 (Healthy Rivers – Wai Ora) area. The current Waikato Regional Plan must be complied with. A link to the Waikato Regional Councils Farmers Guide to Permitted Activities is included below.

ESSENTIAL FRESHWATER

The National Policy Statement for Freshwater Management 2020 was released in September 2020 by the New Zealand Government. The National Policy Statement provides local authorities with updated direction on how they should manage freshwater under the Resource Management Act 1991. This is commonly referred to as the Essential Freshwater package.

These new regulations apply nationally and sit above Regional Plans. The 'law of stringency' applies, meaning that the strictest of all applicable rules must be adhered to whether they be national or regional rules. In addition, all Regional Councils must review their Regional Plans to ensure that the plans give effect to the Freshwater NPS.

Industry understanding of how the 2020 regulations will be implemented, monitored, and enforced is still developing. Existing and potential requirements for your farm may change as the regulations start to be implemented by the Regional Council.

Key focus areas within the regulation include:

- Stock exclusion from natural waterways over 1 metre wide
- Synthetic fertiliser use capped at 190kg N/ha/yr
- Land use intensification
- Wetland protection
- Intensive Winter Grazing of forage crops
- Minimum standards for stock-holding areas (such as feed pads, standoff pads, loafing pads)

Links to key Essential Freshwater package documents below.

Essential Freshwater Package	Essential Freshwater https://environment.govt.nz/what-government-is-doing/areas-of-work/freshwater/e/freshwater-reform/ National Policy Statement https://environment.govt.nz/acts-and-regulations/national-policy-statements/national-policy-statement-freshwater-management/ Resource Management (National Environmental Standards for Freshwater) Regulations 2020 https://www.legislation.govt.nz/regulation/public/2020/0174/latest/whole.html#LMS364323 Resource Management (Stock Exclusion) Regulations 2020 https://www.legislation.govt.nz/regulation/public/2020/0175/latest/LMS379869.html?search=qs_act%40bill%40regulation%40deemedreg_stock+exclusion_resel_25_h&p=1&sr=1.

FARM MANAGEMENT

WRC's Farmers Guide to Permitted Activities	https://waikatoregion.govt.nz/assets/WRC/WRC-2019/Farmers-Guide-to-environmental-rules-in-Waikato.pdf
On-going Management	Collate and maintain documents to support farm inputs, outputs, and management practices. Record and Report Synthetic N Fertiliser Use From 1 July 2021, all dairy farmers are required to keep records to allow them to annually report pastural synthetic nitrogen fertiliser use to their regional council. Continue to maintain records to allow the reporting to Regional Council of the following: - Synthetic nitrogen fertiliser use below a cap of 190 kg N/Ha/yr, averaged across all grazed land and forage crops on the farm; and - Synthetic nitrogen fertiliser use below a cap of 190 kg N/ha/yr to any one hectare of pasture grazed by livestock (excludes forage crops) There are three tools that farmers can choose from to submit their synthetic nitrogen use records: • Ballances MyBallance https://ballance.co.nz/MyBallance • Ravensdowns HawkEye https://www.HawkEye.farm/ • The Regional Sectors web portal named N-Cap https://n-cap.teurukahika.govt.nz

FARM MANAGEMENT

FARM OVERVIEW

F2

The farm 77340, is owned by Elizabeth Gamperle, and trades as Toggenburg Trust. The property currently has sharemilkers, Anthony and Michaela overseeing the day to day running of the farm. The farm is situated 10 minutes south of Matamata in the suburb of Hinuera. Access to the property is off State Highway 29.

The farm is a total of 80ha, with an effective area of approximately 70ha. This is made up of a bush buffer zone near the river, a gully through the property with the remainder being infrastructure, races, and housing.

The contour of the farm is steep to rolling with a couple of flat sections in the middle. River terraces are present throughout the property with a steep drop down to the river itself. Soils have been identified by Landcare Research S-maps as allophanic, gley and recent soils which are relatively well draining but gley soils in particular can be known to hold water during winter and wetter months.

Contracted to a maximum of 200 cows each season, this is the target number of cows to calve with numbers slowly dropping throughout the season. Cows are milked twice per day all season, transitioning to once per day approximately a week prior to drying off in the beginning of May. In the 2021/2022 season the farm produced 64,392 kgMS and went on to increase production in the 2022/2023 season to 75,104 kgMS. Anthony maximises the proportion of 'excellent milk' he puts in the vat opposed to quantity, as he strives for 100% excellence and low somatic cell counts.

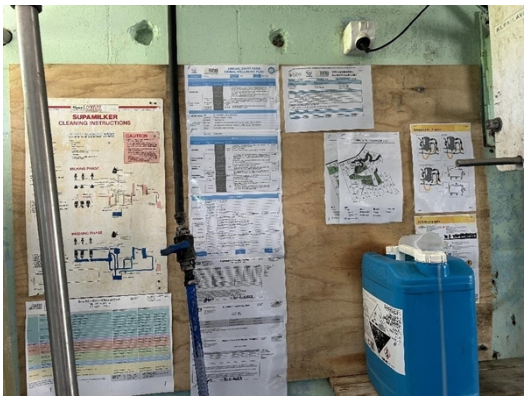
Typically, 50 replacements are reared each season with calves leaving on the 1st December and returning as R2's on the 1st May the following year. The farm has hay and grass silage bales as imported feed with bales, maize and turnips being made and grown on farm.

The farm currently has a lined effluent pond with effluent irrigated to pasture as required when the weather allows. Fertiliser is typically applied in the form of nitrogen to encourage grass growth. Autumn and Spring mixes recommended by the Ballance Agri-Nutrient Rep and are applied if required. All fertiliser applications are carried out by Wealleans Groundspread.

There is one permanent waterway on farm that is stock excluded, the Waihou River and a stock excluded intermittent waterway as well as multiple land drains. There is a buffer zone along the river and a gully area along with multiple shade and shelter trees.

On-going Management	Ensure Farm Dairy Records are entered correctly

FARM MANAGEMENT



FARM MANAGEMENT

INFRASTRUCTURE, STORAGE AND WASTE OVERVIEW

F3

IMPACT OF CONTAMINATION  +  LIKELIHOOD OF CONTAMINATION = LOW RISK RATING

FEED STORAGE

Grass silage is made on farm in the form of bales. Bales are stored on grass down fence lines or on an old section of race down the farm. Due to the plastic silage wrap, there is minimal risk of leachate occurring and entering the surrounding environment. Leachate should be kept in mind and the area monitored, even though bales are wrapped. If leachate occurs sawdust or wood chip can be used to absorb the concentrated nutrients to prevent them leaching into the ground water or nearby waterways.

Maize is made on farm and stored in a stack. Maize can sometimes be purchased into the system if required. Grass silage is also purchased into the system along with hay. Hay is stored in a hay barn down the farm. Grass silage, maize and hay are fed to stock in the paddock. When feeding out in the paddock proximity to waterways, ephemeral flow paths and possible wet areas where additional wastage could occur are considered and avoided.

WASTE MANAGEMENT

Any waste on farm is removed from the property and taken to the town dump. Anything that can be recycled is. Green waste and any organic material such as trees can be burnt on farm when required but anything that won't break down is removed from farm.

Outdoor burning is a permitted activity under Waikato Regional Council rule but there are conditions that must be adhered to. Some important ones to note are that material must only come from your own property and not others and that the material must be predominantly organic materials.

Silage wrap is not recycled through the Plasback scheme; however, this should be considered as a large amount of waste can be generated from bales. Agrichemical containers are recycled through the AgRecovery scheme.

Dead stock are taken directly to Wallace Corp as required. The odd animal may be buried on farm but this is not common. Pests are controlled on farm with bait stations are placed in key areas around the property including shed, feed storage areas and housing. Shooting also takes place when required.

On-going Management	Ensure feed is covered while being stored. Maintain and upgrade feed storage areas as required. When feeding supplements in paddocks, select dry areas that are away from surface water. Ongoing visual monitoring for leachate. The area immediately surrounding the silage storage location must be checked regularly for evidence of leachate. This may be required more frequently over winter. Carbon-rich material (such as sawdust) can be used to soak up small volumes of leachate at a point of discharge if it is being generated. Contaminated sawdust must be spread as per effluent solids, directly to land at a low, even rate when weather and soil

FARM MANAGEMENT

conditions are suitable, or, stored on a sealed surface until ready to spread. If leachate is being produced in quantities greater than the woodchip can absorb, an alternative form of collection would be required.

Continue to recycle farm waste where possible, e.g., scrap metal, plastic containers, bale wrap

Continue to recycle plastic containers through Ag Recovery

Continue to dispose of dead stock appropriately on farm. When burying deadstock on farm the site must be 100m from all surface water and 1m above the shallowest groundwater table.

Continue to manage pest animals on farm.

Continue to comply with the Waikato Regional Council rules when burning on farm.

Burning rubbish compliance - Burning rubbish is a permitted activity in the Waikato region, however, ensure compliance with permitted activity rules:
PA rule 6.1.13.1 You can only burn the following things, and they must have come from your own property:
• Untreated wood and vegetative/organic matter, for example leaves.
• Paper and cardboard.
• Food waste.
• Halogen-free plastics (generally plastics with a 1, 2, 4, 5 or 6 recycling code are halogen-free, but some of these plastics may be unsuitable for burning because they give off a lot of smoke). See page 36 - https://www.waikatoregion.govt.nz/assets/WRC/WRC-2019/Farmers-Guide-to-environmental-rules-in-Waikato.pdf

ACTIONS | RECOMMENDATIONS

Target Date

Recycle bale wrap through the Plasback Scheme - To Achieve GFP — 31 May 2024

Recycle bale wrap through the Plasback Scheme. Unfortunately, this is only a scheme for bale wrap and net cannot be included. Collection is $50 or full liners can be dropped off at a local depot. More information can be found on the website https://plasback.co.nz/

FARM MANAGEMENT

FARM MANAGEMENT

HAZARDOUS SUBSTANCES

F4

IMPACT OF CONTAMINATION  +  LIKELIHOOD OF CONTAMINATION = LOW RISK RATING

Hazardous substances are products that pose a threat to human health and the environment, containing properties that are explosive, flammable, oxidising, toxic, or toxic to the environment.

There are two main pieces of legislation that cover hazardous substances:

- Hazardous Substances and New Organisms Act 1996 (HSNO); which aims to protect the environment and the health and safety of people from the adverse effects of hazardous substances

- The Health and Safety at Work Act 2015 (HSWA); which aims to protect people against harm to their health, safety and welfare caused by risks arising from work.

Hazardous substances are appropriately stored on site, with fuel, fertiliser and agrichemicals stored separated. All chemicals used can be stored in a locked and labelled facility that is flood free and situated well away from water sources, streams, and other water bodies. The facility is also situated further than 20 metres from houses, animal feeding and storage areas and 6 metres from combustible materials, like hay barns or fuel stores.

An inventory of the substances on farm is present and Safety Data Sheets are available. These are kept in the lockable cage on farm with the hazardous substances.

No restricted or tracked substances are currently present on farm, but if these are purchased, a GROWSAFE or Certified Handler Certificate must be held. Farm staff, however, are appropriately trained in the use of chemicals and fuels used on farm.

Spraying of chemicals only take place when conditions are suitable. Before spraying, sensitive areas are identified (including waterways) and wind speed and direction is taken into consideration.

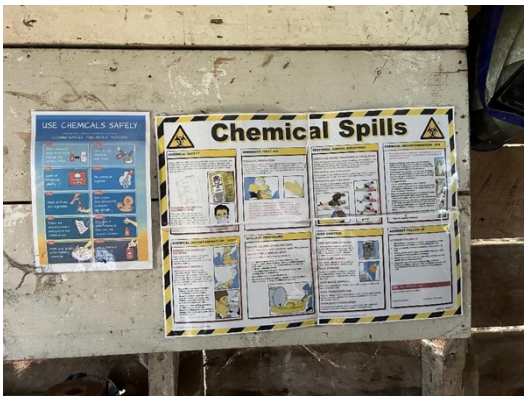
FERTILISER, FUEL AND CHEMICAL STORAGE

Generally, no synthetic nitrogen fertiliser is stored on farm. It is ordered, collected by Wealleans Groundspread then spread directly to pasture in bulk.

There is an above ground petrol and diesel tank on farm which is near the calf sheds. The most common chemicals aside from shed chemicals are weed sprays. Chemicals are stored in an implement shed with adequate signage. Anthony did have a Certified Handlers Certificate at his previous job, but it is thought to have since expired. No restricted or tracked substances are used by anyone on farm.

Personal Protective Equipment is provided in the form of gloves, mask, glasses, and it is expected that anyone handling chemical wears boots and overalls and takes care when spraying. Spot spray applications are carried out by Anthony along with some boom spray applications, but the bulk of the crop sprays are done by helicopter and agricultural spray contractor.

FARM MANAGEMENT



FARM MANAGEMENT

SILAGE STORAGE

F5

IMPACT OF CONTAMINATION + LIKELIHOOD OF CONTAMINATION = MEDIUM RISK RATING

Historically a silage was made on farm in the form of a stack. There is a silage bunker on farm that is used for machinery storage and bales if necessary. The silage pit becomes increasingly we during winter and hence the reason for not using it.

Maize is stored on farm in the form of a ground stack. Previously the stack was made near the haybarn on a large section of race. However, the stack is generally too big for that area and therefore, the ground stack is created in next years crop paddock so once the maize is utilised the ground is worked up for the crop.

On-going Management	Ongoing visual monitoring for leachate. The area immediately surrounding the silage storage location must be checked regularly for evidence of leachate. This may be required more frequently over winter. Carbon-rich material (such as sawdust) can be used to soak up small volumes of leachate at a point of discharge if it is being generated. Contaminated sawdust must be spread as per effluent solids, directly to land at a low, even rate when weather and soil conditions are suitable, or, stored on a sealed surface until ready to spread. If leachate is being produced in quantities greater than the woodchip can absorb, an alternative form of collection would be required.

WHENUA ME TE ONE
LAND & SOIL MANAGEMENT

- L1 Soil
- L2 Land & Soil Overview
- L3 Critical Source Area
- L4 Race Maintenance & Management
- L5 Cropping
- L6 Key Feature - Critical Source Areas
- L7 Key Feature - Quarry/ Sand Pile

LAND & SOIL MANAGEMENT

GOOD FARMING PRACTICES

Cultivation is managed to reduce the risk of sediment loss and maintain soil structure Practices: The suitability of each paddock for cultivation is assessed, and high-risk cultivation activities avoided. Considerations include: • Topography and soil type • Proximity to waterways • Erosion susceptibility • Crop sowing and harvest dates • Cultivation methods • Previous cropping history Crop rotations are planned to enable timely resowing and to minimise the time in bare cover during the high-risk winter period Pugging and compaction of soils is avoided No or minimum tillage cultivation techniques are predominantly used such as, direct drilling, strip-tillage, or non-inversion tillage Conventional cultivation is undertaken only to rectify compacted soils or when recontouring is required Permanent vegetation cover is retained in gullies, on steep slopes or beside waterways Crops are sown across slopes not up and down where practical	ACHIEVED
Erosion-prone land is managed or retired to minimise soil losses	1 ACTION(S)
Grazing of pastures and crops is managed to minimise sediment and contaminant loss Practices: A farm grazing policy is developed that considers and manages: •Erosion susceptibility •Soil pugging and compaction •Overgrazing •Adverse climatic events •Stock type, class and intensity •Grazing rounds/ rotation lengths If paddocks near waterways are used during wet periods, a buffer strip beside the waterway is fenced off A larger feeding area is offered in cold conditions when demand is high and utilisation low When break feeding pasture or crops: • Feeding is towards the waterway and any critical source areas are not grazed • Fences are moved daily rather than offering a few days feed at a time • Land that has already been grazed is back-fenced • Long narrow breaks are offered rather than wide breaks	ACHIEVED
Paddocks selected for Intensive Winter Grazing (including intensive baleage wintering) are low risk and managed to minimise the risk of erosion, run-off to waterways and leaching to groundwater	N/A
Critical Source Areas and farm Hot Spots are identified and managed to minimise contaminant losses to waterways	1 ACTION(S)

LAND & SOIL MANAGEMENT

LAND & SOIL MANAGEMENT

SOIL

L1

The below information has been sourced from Manaaki Whenua - Landcare Research where the data is available and may not be 100% accurate https://smap.landcareresearch.co.nz/

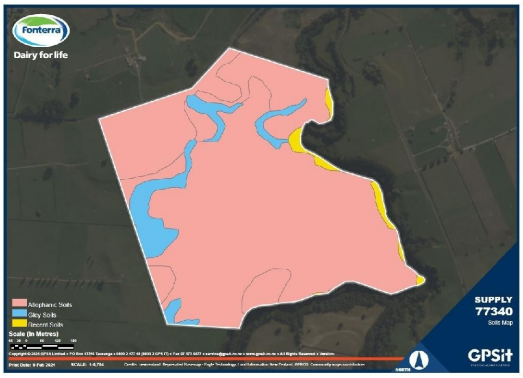
Allophanic Soils:Ngak_13a.1	FEP coverage: 11.61% Depth: Deep Texture: loam This soil belongs to the Allophanic soil order of the New Zealand soil classification. Allophanic Soils are dominated by allophane (and also imogolite or ferrihydrite) minerals. These stiff, jelly-like minerals coat the sand and silt grains and maintain a porous, low density structure with weak strength. The soils are identified by a distinctly greasy feel when moistened and rubbed firmly between the fingers. The soil is easy to dig and samples crumble easily when crushed in the hand. It is formed in fragmental material erupted from a volcano, from rhyolite parent material. The topsoil typically has loam texture and is stoneless. The subsoil has dominantly loam textures, with at least 30 cm of rock fragments deposited by a volcano within 100 cm of the mineral soil depth. The plant rooting depth extends beyond 1m. Generally the soil is well drained with very low vulnerability of water logging in non-irrigated conditions, and has high soil water holding capacity. Inherently these soils have a very low structural vulnerability and a low N leaching potential, which should be accounted for when making land management decisions.
Allophanic Soils:Moes_2a.1	FEP coverage: 6.40% Depth: Deep Texture: loam This soil belongs to the Allophanic soil order of the New Zealand soil classification. Allophanic Soils are dominated by allophane (and also imogolite or ferrihydrite) minerals. These stiff, jelly-like minerals coat the sand and silt grains and maintain a porous, low density structure with weak strength. The soils are identified by a distinctly greasy feel when moistened and rubbed firmly between the fingers. The soil is easy to dig and samples crumble easily when crushed in the hand. It is formed in fragmental material erupted from a volcano, from rhyolite parent material. The topsoil typically has loam texture and is stoneless. The subsoil has dominantly loam textures, with at least 30 cm of rock fragments deposited by a volcano within 100 cm of the mineral soil depth. The plant rooting depth extends beyond 1m. Generally the soil is well drained with very low vulnerability of water logging in non-irrigated conditions, and has high soil water holding capacity. Inherently these soils have a very low structural vulnerability and a low N leaching potential, which should be accounted for when making land management decisions.
Gley Soils:Matak_2a.1	FEP coverage: 17.62%

LAND & SOIL MANAGEMENT

	Depth: Deep Texture: loam This soil belongs to the Gley soil order of the New Zealand soil classification. Gley soils are strongly affected by waterlogging, have been chemically reduced, have light grey subsoils, and usually have reddish brown or brown mottles. Waterlogging occurs in winter and spring, and some soils remain wet all year. It is formed in alluvial sand silt or gravel deposited by running water, from rhyolite parent material. The topsoil typically has loam texture and is stoneless. The subsoil has dominantly loam textures, with at least 30 cm of rock fragments deposited by a volcano within 100 cm of the mineral soil depth. The plant rooting depth is 40 - 70 (cm), due to lack of oxygen in soil pores. Generally the soil is poorly drained with high vulnerability of water logging in non-irrigated conditions, and has high soil water holding capacity. Inherently these soils have a high structural vulnerability and a very low N leaching potential, which should be accounted for when making land management decisions.
Allophanic Soils:Punn_1a.1	FEP coverage: 39.13% Depth: Deep Texture: loam This soil belongs to the Allophanic soil order of the New Zealand soil classification. Allophanic Soils are dominated by allophane (and also imogolite or ferrihydrite) minerals. These stiff, jelly-like minerals coat the sand and silt grains and maintain a porous, low density structure with weak strength. The soils are identified by a distinctly greasy feel when moistened and rubbed firmly between the fingers. The soil is easy to dig and samples crumble easily when crushed in the hand. It is formed in fragmental material erupted from a volcano, from rhyolite parent material. The topsoil typically has loam texture and is stoneless. The subsoil has dominantly loam textures, with at least 30 cm of rock fragments deposited by a volcano within 100 cm of the mineral soil depth. The plant rooting depth extends beyond 1m. Generally the soil is imperfectly drained with low vulnerability of water logging in non-irrigated conditions, and has high soil water holding capacity. Inherently these soils have a very low structural vulnerability and a low N leaching potential, which should be accounted for when making land management decisions.
Gley Soils:Ngar_1a.1	FEP coverage: 6.97% Depth: Deep Texture: sandy loam/loam This soil belongs to the Gley soil order of the New Zealand soil classification. Gley soils are strongly affected by waterlogging, have been chemically reduced, have light grey subsoils, and usually have reddish brown or brown mottles. Waterlogging occurs in winter and spring, and some soils remain wet all year. It is formed in alluvial sand silt or gravel deposited by running water, from rhyolite parent material. The topsoil typically has sand texture and is stoneless. The subsoil has dominantly loam textures, with gravel content of less than 3%. The plant rooting depth is 40 - 60 (cm), due to lack of oxygen in soil pores.

LAND & SOIL MANAGEMENT

	Generally the soil is poorly drained with moderate vulnerability of water logging in non-irrigated conditions, and has high soil water holding capacity. Inherently these soils have a very high structural vulnerability and a very low N leaching potential, which should be accounted for when making land management decisions.
Allophanic Soils:Ngak_9a.1	FEP coverage: 18.28% Depth: Deep Texture: loam/sandy loam This soil belongs to the Allophanic soil order of the New Zealand soil classification. Allophanic Soils are dominated by allophane (and also imogolite or ferrihydrite) minerals. These stiff, jelly-like minerals coat the sand and silt grains and maintain a porous, low density structure with weak strength. The soils are identified by a distinctly greasy feel when moistened and rubbed firmly between the fingers. The soil is easy to dig and samples crumble easily when crushed in the hand. It is formed in fragmental material erupted from a volcano overlying alluvial sand silt or gravel deposited by running water, from rhyolite parent material. The topsoil typically has loam texture and is stoneless. The subsoil has dominantly sand textures, with at least 30 cm of rock fragments deposited by a volcano within 100 cm of the mineral soil depth. The plant rooting depth extends beyond 1m. Generally the soil is well drained with very low vulnerability of water logging in non-irrigated conditions, and has high soil water holding capacity. Inherently these soils have a very low structural vulnerability and a low N leaching potential, which should be accounted for when making land management decisions.



LAND & SOIL MANAGEMENT

LAND & SOIL OVERVIEW

L2

IMPACT OF CONTAMINATION  +  LIKELIHOOD OF CONTAMINATION = MEDIUM RISK RATING

The contour of the farm is flat with a slight rise towards the west and southern boundaries. A Land Use Capability (LUC) is a rating of each area of the platform and its ability to sustain agricultural production, based on an assessment of factors such as climate, effects of past land use and the potential for erosion.

LUC classes on farm are identified by Landcare Research NZLRI as:

2: 55.09%

4: 6.34%

7: 19.50%

LUC 2 land is good multiple use land with slight limitations but is suitable for pastoral grazing and certain cropping. LUC 4 is arable but with significant limitations, suitable only for occasional cropping. LUC 7 is non-arable with moderate to very severe limitations to pastoral use and high-risk land requiring active management to achieve sustainable production, however, it can be suited to grazing with intensive soil conservation measures but more suited to forestry.

Soils have been identified by Landcare Research S-maps as being allophanic, gley and recent soils. Gley soils are mostly around the area where there is land drainage or wet areas while the recent soils are where the Waihou River runs down the east of the farm and the allophanic soils mape up the rest of the property. As the LUC and soils map are regional scale, they may not be accurate at a farm level.

To reduce soil compaction and pasture damage during wet weather conditions, cows are given adequate space and grass silage is fed out. The grazing of wetter paddocks is prioritised earlier in the season before utilising the drier ones as wetter conditions persist. The cows can be split into mobs if required. Any unsuitable areas in paddocks should be avoided and fenced using temporary fences in the form of a reel and standards.

If conditions are severe cows will be stood off on the cowshed yard. However, this is a last resort as lameness issues often arise from this. Anthony finds giving cows a larger or additional break is adequate. Standing cows off an acceptable method of standing cows off and is the best place to do it as there is effluent capture.

CULVERTS

There are multiple culverts on farm along intermittent waterways and drains. Culverts crossings have a lip on the side to ensure sediment and nutrients are unable to run off and enter the waterway below. Keeping culverts clear to enable water flow is essential and therefore, weed control in drain areas should be carried out on a regular basis. This helps to prevent waterways from becoming blocked which in turn can help drainage in paddocks and reduce wetness.

SAND QUARRY

There is small rise near the north eastern side of the property that has historically been used to access sand. There is a small pile of sand remaining which is used to fill in parts of raceways, around troughs etc. The rise is now all grass

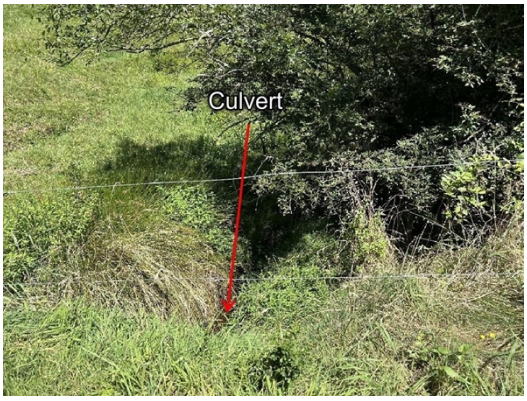
LAND & SOIL MANAGEMENT

and there are no plans to remove any more sand from the area. When using a quarry or sidling to access material on farm it is important to ensure it sloped inwards and not outward so when rainfall occurs sediment is not carried into a waterway.

On-going Management	Continue to manage cows during wet conditions to avoid soil and pasture damage by offering more feed. Avoid grazing the paddocks prone to wetness during wet conditions. Continue to manage cows during wet conditions to avoid soil and pasture damage. Continue to monitor and mitigate erosion. Ensure culverts always have nibbing to stop nutrients entering the waterway below Continue to monitor quarry area for sediment loss while grass regrows

ACTIONS | RECOMMENDATIONS

	Target Date
Correct fence in paddock 31 where erosion has occurred - To Achieve GFP Correct the fence in paddock 31 and move it back from the fence line to ensure cattle don't cause further erosion by grazing up to the riverbank.	30 Apr 2024



LAND & SOIL MANAGEMENT

LAND & SOIL MANAGEMENT

CRITICAL SOURCE AREA

L3

IMPACT OF CONTAMINATION + LIKELIHOOD OF CONTAMINATION = MEDIUM RISK RATING

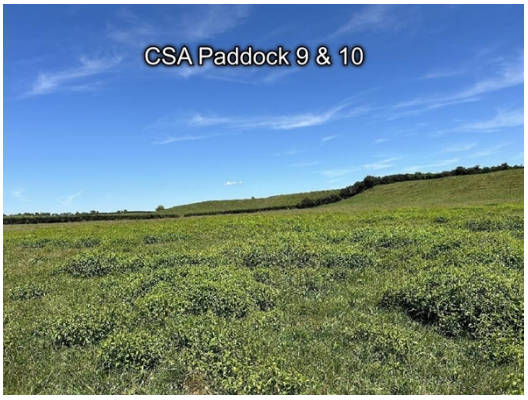
Critical Source Areas (CSA) are features in the landscape where water flows or accumulates, and there is a connection to waterways. Contaminant Hotspots are areas where there is potential for point source contamination to waterways. CSA and hotspots on farm include races where they are near waterways, crossings, and low lying or wet areas of paddocks.

The risk associated with these areas can be managed by:

- undertaking regular maintenance on races and cut outs,
- ensuring culverts/crossings have bunding along edges or grass margins,
- avoiding grazing low lying or wet areas in paddocks by using temporary fencing or avoiding paddocks prone to wetness during wet conditions,
- avoiding cultivating low lying or wet areas in paddocks.

During wet conditions paddocks with ephemeral flow paths should be avoided along with those that contain critical source areas where there is likely to be ponding and the risk of high concentrations of nutrients entering the ground water table. If there are suitable areas in these paddocks, then any unsuitable areas should be avoided and fenced using temporary fences in the form of a reel and standards.

There are a couple areas on farm Anthony would consider Critical Source Areas. Paddocks with drains can become increasingly wet when poor conditions persist. There are three areas in particular, in paddocks 3, 9, 10 and 21 that are highlighted on the farm map. These areas are avoided with temporary fencing or paddocks left out in the round and grazed when they are drier. Heavy machinery is generally not taken into these areas.



LAND & SOIL MANAGEMENT

LAND & SOIL MANAGEMENT

RACE MAINTENANCE & MANAGEMENT

L4

IMPACT OF CONTAMINATION + LIKELIHOOD OF CONTAMINATION = HIGH RISK RATING

Raceways can be considered as Critical Source Areas particularly when there is a build-up of nutrients that pond or remain on the race instead of draining away. The property has raceways that are on or along hills and consideration should be given to these and how they can become a Critical Source Areas. In times of heavy rainfall, nutrients and raceway material could flow down these ephemeral flow paths and reach a waterway or the ground water table.

Race maintenance is completed as required, with cut outs being constructed near the cowshed as needed. Race scraping occurs as required with scrapings being added to the pile of sand trap solids. Scraping or adding new material to races more frequently can help stop nutrient pooling particularly and help water to flow off the races more easily preventing build up. At the time of the visit the races were in good condition with minimal disturbance.

On-going Management	Use and maintain cut outs on sections of race to direct runoff and reduce damage to the race surface during rainfall. Upgrade races as required to maintain an even crowned surface and prevent ponding of water on races.

ACTIONS | RECOMMENDATIONS

Target Date

Discontinue piling race scrapings on an unsealed surface - To Achieve GFP

31 Mar 2024

As race scrapings can contain high concentrations of nutrients it is best practice to pile these on a sealed surface such as compact metal or concrete to avoid nutrients leaching into the ground water or running off into waterways. Spreading scrapings directly to land would also avoid potential leaching of nutrients as they are spread over a larger surface area.

LAND & SOIL MANAGEMENT

LAND & SOIL MANAGEMENT

CROPPING

L5

Each season 10ha of the property can be cropped. Therefore, Anthony plants 5ha of turnips and 5ha of maize. Paddocks are sprayed out in October/ November before turnips are direct drilled and before maize ground is cultivated and drilled. The turnips are strip grazed in situ by dairy cows, who are moved to the turnips for one hour prior to afternoon milking. Maize is harvested in March-April depending on the season and stored in a ground stack on farm.

Paddocks are chosen for turnips and maize based on pasture damage or condition, weed and pest burden and pugging over winter. Each year a new paddock is chosen, it is very uncommon for a paddock to be cropped more than one year in a row. After the turnips have been fully grazed and the maize harvested, the paddocks are sprayed out and returned to permanent pasture. The maize stack is also created in the next years cropping paddock so any damage to soil and pasture can be corrected during cultivation and planting.

ACTIONS | RECOMMENDATIONS

Target Date

☐ **Implement a failsafe to ensure sprayed pasture is not grazed**

Implement a failsafe mechanism to ensure once whole paddock spray applications are completed that pasture is not grazed by cattle during the withholding period. This will prevent inhibitory substances from entering and being detected in milk.

LAND & SOIL MANAGEMENT

WHAKAMĀKŪKŪ
WATER USE & IRRIGATION MANAGEMENT

I1 Water Use Overview

I2 Key Feature - Bore

WATER USE & IRRIGATION MANAGEMENT

GOOD FARMING PRACTICES

Dairy shed and stock water use is efficient and prevents source contamination Practices: Water minimisation techniques are in place at the dairy shed A leak detection system is in place All leaks are fixed as soon as possible Water troughs are checked daily where animals are grazing All well heads are sealed, and stock permanently excluded from them	ACHIEVED
The depth, rate and timing of irrigation is managed to meet plant demand and minimise the risk of leaching and run-off	N/A
The irrigation system is designed, operated and regularly checked to minimise the amount of water applied to meet plant demand, and prevent microbial contamination	N/A

WATER USE & IRRIGATION MANAGEMENT

WATER USE OVERVIEW

I1

All water on farm is sourced from two bores which are located at the cowshed. The bores supply the houses, cowshed, and farm with water. Stock water is a permitted activity under the Resource Management Act, Section 14-3b.

This farm does not currently hold a Resource Consent Certificate with consent for ground water take as it is below the threshold of 210 cows. There is no water meter installed on the farm, but consideration could be given to installing one. This is an acceptable method of providing evidence of the volume of water taken, should it be needed. It would also aid in the detection of leaks on farm.

Water saving methods have been considered at the cowshed with plate cooler water being recycled and directed to the washdown tanks after use. The backing gate is also water driven which helps keep the yard wet for easier hosing down at the end of milking.

Leaks are detected on farm through the monitoring of tank level indicators on water tanks and the checking of troughs and ball cocks after the cows have left paddock. Leaks are repaired as soon as possible to make sure unnecessary water usage does not occur.

On-going Management	Continue to check water troughs daily where animals are grazed, and fix identified leaks as soon as possible. Continue to use water minimisation practices.

ACTIONS | RECOMMENDATIONS

Target Date

☐ **Install a water meter to measure water use**

Consideration should be given to installing water meters to monitor shed water. If Waikato Regional Council has reason to believe water usage is above the permitted activity quantity of 15m3 per cow per day, a water meter is an acceptable method of proving water usage. It can also aid in the detection of leaks on farm.

Telemetry water meters would enable water flow to be monitored from a phone app and allow automatic recording of water use.

WATER USE & IRRIGATION MANAGEMENT

PARAKAINGAKI EFFLUENT MANAGEMENT

- E1 Effluent Overview
- E2 Effluent Irrigation
- E3 Key Feature - First Sand Trap
- E4 Key Feature - Collection Point/ Stormwater Diversion
- E5 Key Feature - Effluent Pond
- E6 Key Feature - Second Sand Trap
- E7 Key Feature - Effluent

EFFLUENT MANAGEMENT

GOOD FARMING PRACTICES

Effluent and manure is applied at depths, rates and amounts that match plant requirements and minimise the loss of nutrients or microbial pathogens to waterways and groundwater	3 ACTION(S)
The effluent system is designed, operated and regularly checked to minimise the risk of nutrient and microbial pathogen loss to waterways and groundwater, and to prevent microbial contamination	2 ACTION(S)

*Additional GFP relevant to the dairy industry goals

EFFLUENT MANAGEMENT

EFFLUENT OVERVIEW

E1

IMPACT OF CONTAMINATION  +  LIKELIHOOD OF CONTAMINATION = HIGH RISK RATING

This farm operates under the Waikato Regional Plan's permitted activity rule 3.5.5.1 - 'Discharge of Farm Animal Effluent' and therefore does not require a consent to operate. It is unknown if a Dairy Effluent Storage Calculation (DESC) or an Effluent Warrant of Fitness (WOF) were completed at the time the new pond was installed. A DESC will need to be located or completed, by an Accredited Provider, to assess how much storage is required and whether what is installed is adequate.

Effluent is directed from the yard to a central collection point before being directed to the first sand trap. From the first sand trap it is directed to central point where storm water diversion can occur. This is also where effluent from the concrete entry race is directed. Effluent then flows from the central point to the larger sand trap before entering the lined effluent pond. Irrigation occurs from the pond when required. Solids are removed from sand traps weekly and more frequently if required. Effluent solids removed from the sand traps are stored in the corner of the paddock on grass until they have dried out and are spread to the paddocks prior to cropping.

Storm water diversion is after the first sand trap at the central collection point and controlled by placing a pipe over the outlet pipe to direct effluent down the pipe to the paddock. Storm water diversion is only activated during the dry period and Anthony ensures all surfaces are free from effluent and the sand traps empty prior to diversion.

On-going Management	Routinely remove effluent solids that accumulate. Continue to service, inspect, and undertake maintenance on the effluent and irrigation system ensuring records are kept of work completed. Continue to wash all catchment areas thoroughly to effluent system prior to diverting stormwater. Keep effluent storage volumes as low as possible, particularly prior to winter. Always maintain a minimum free board of 300mm.

ACTIONS | RECOMMENDATIONS

	Target Date
Develop an effluent management plan - To Achieve GFP An effluent management plan would usually include permitted activity rules, instructions for use, frequently asked questions, Emergency Management Procedures, and contacts etc. All irrigation activity and maintenance should also be recorded in this document or the dairy diary. An effluent management plan poster can be downloaded from the DairyNZ website here: https://www.dairynz.co.nz/environment/effluent/managing-and-operating-effluent-systems/	31 Mar 2024

EFFLUENT MANAGEMENT

Discontinue piling effluent solids on an unsealed surface - To Achieve GFP 31 Mar 2024

As effluent solids from the sand traps contain high concentrations of nutrients these must be stored on a sealed surface such as concrete to avoid nutrients leaching into the ground water or running off into waterways. Spreading solids directly to land would also avoid potential leaching of nutrients as they are spread over a larger surface area.

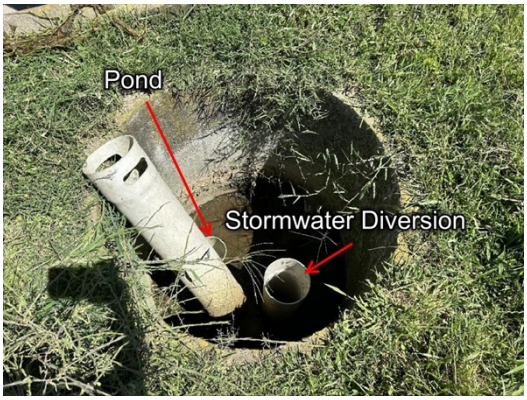
Complete a Dairy Effluent Storage Calculation (DESC) by an accredited provider - To Achieve GFP 31 Dec 2024

Complete a Dairy Effluent Storage Calculation to provide evidence that sufficient storage is available on farm. A list of providers of this service can be found at:

https://www.irrigationnz.co.nz/DataFilter?Action=View&DataFilter_id=132

https://www.effluentwof.co.nz/index.php/the-wof/find-a-wof-assessor/waikato?filter_tag[0]=9

EFFLUENT MANAGEMENT



EFFLUENT MANAGEMENT

EFFLUENT IRRIGATION

E2

IMPACT OF CONTAMINATION  +  LIKELIHOOD OF CONTAMINATION = HIGH RISK RATING

Currently effluent applications are not recorded. Waikato regional Council rules state that Effluent cannot be applied over 150kg of nitrogen per hectare per year. Recording ensures monitoring of nutrients applied to pasture. There is approximately 20ha of effluent area on farm and effluent paddocks are carefully selected with topography in mind. This area is sufficient for the system with the minimum being worked out at ＞4ha per 100 cows.

An application depth test has not been carried out, a test will need to be carried out and recorded so if Waikato Regional Council request this information, there is proof it was completed. Application rates cannot be greater than 25mm as set by Waikato Regional Council. Therefore, an application depth tests should be carried out annually and recorded. They are also a useful guide and can help with application rates, nutrient loading and ensuring run off is not occurring on the steeper sections of the property.

The pump and irrigator are regularly serviced and Anthony checks the irrigator each time it is moved to a new paddock and completes general maintenance if required. High/ low pressure or shut off valves are installed as a failsafe when irrigating from the pond.

On-going Management	Comply with the Waikato Regional Plan's permitted activity rule 3.5.5.1 'Discharge of Farm Animal Effluent onto Land'. The main requirements under this rule are: - Effluent must not discharge into surface water or contaminate groundwater. - Effluent ponds and storage facilities must be sealed to prevent seepage. - Effluent must be spread to land ensuring there is no ponding on the surface and the depth does not exceed 25mm per application. - The loading rate from effluent must not exceed 150kgN/ha/yr. - There must be no offensive odour or discharge of effluent outside the property boundary. Assess weather and soil conditions prior to spreading effluent and store effluent when conditions are unsuitable.

ACTIONS | RECOMMENDATIONS

	Target Date
Record effluent applications - To Achieve GFP Effluent application records should have as a minimum the date and paddock number where it was applied. Ensure the two sections are available for each application to ensure nutrient overloading does not occur.	30 Apr 2024
Complete an application depth test annually and record the results - To Achieve GFP Complete an application rate test on the irrigator annually to ensure compliance	31 May 2024

EFFLUENT MANAGEMENT

with Waikato Regional Councils Permitted Activity Rule 3.5.5.1 which states you must not exceed the loading rate of 25mm per application.

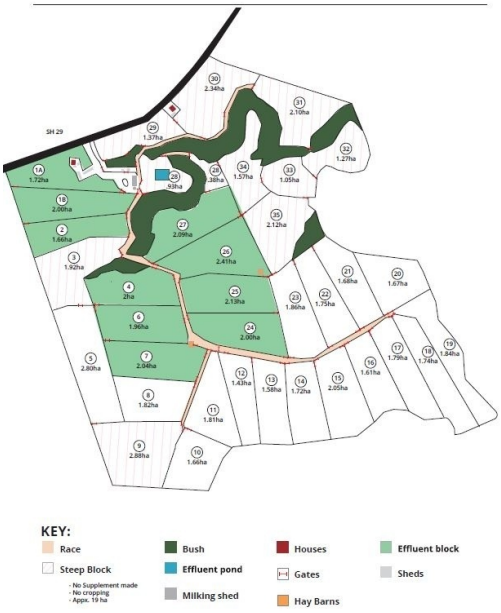
Where slope is above 7 degrees soils are classified as high- risk for farm dairy effluent applications. To match management practices to soil and landscape risk to prevent loss of effluent into the surrounding environment, effluent should be applied at no more than 10mm on high-risk soils.

Perform a bucket test and repeat annually to check application depths. If required, investigate, and discuss options with an effluent irrigator provider to ensure effluent can be applied at 10mm with your irrigator.

https://www.dairynz.co.nz/environment/effluent/effluent-management-and-operation/

Determining soil risk for effluent:
https://www.dairynz.co.nz/publications/environment/pocket-guide-to-determine-soil-risk-for-fde-application/

TOGGENBURG TRUST EFFLUENT MAP



RARENGA RAUROPI
WATERWAYS & BIODIVERSITY

W1 Waterways & Biodiversity Overview

W2 Mahinga Kai

W3 Key Feature - Biodiversity

WATERWAYS & BIODIVERSITY

GOOD FARMING PRACTICES

Stock are excluded from lakes and waterways	2 ACTION(S)
Farm indigenous biodiversity and Mahinga Kai values are identified and protected Practices: Areas are identified on the farm map Stock are fenced out of the area Animal pests are trapped or poisoned	ACHIEVED

*Additional GFP relevant to the dairy industry goals

WATERWAYS & BIODIVERSITY

WATERWAYS & BIODIVERSITY OVERVIEW

W1

IMPACT OF CONTAMINATION  +  LIKELIHOOD OF CONTAMINATION = HIGH RISK RATING

There is one permanent waterway on farm, the Waihou River, which is stock excluded. In addition to this there is an intermittent waterway in the gully that is stock excluded and multiple drains.

As there are steeper hill sections on farm surface drainage is required to direct water during times of heavy rainfall. These sections are unfenced however, when these surface drains contain water for extended periods of time Anthony ensures they are temporarily stock excluded with a reel and standard.

There is approximately 10ha of biodiversity on farm with more shade and shelter trees across the property. The gully area contains both native and wild species with majority being pine trees. The gully is permanently stock excluded and helps to provide stability to the riverbank.

There are two areas on farm that will need to be stock excluded as they meet the new Essential Freshwater Regulations as they are both wider than 1 meter and contain water for most of the year. One section is in paddock 3 and is a tributary stream of the Waihou River, while the other is part of a natural spring that feeds a 'wetland' area. Permanent stock exclusion means a post-and-batten fence with driven or dug fence posts, or an electric fence with at least two electrified wires and driven or dug fence posts, or a deer fence. Completing this before winter will ensure animals do not further contaminate the area before wetter conditions persist.

ACTIONS | RECOMMENDATIONS

Target Date

Permanently stock exclude the area near the spring - To Achieve GFP — 31 May 2024

Permanently stock exclude the section stream that is fed by the natural spring in the small paddock between 29 and the cowshed. As this stream is both wider than a meter and natural it requires fencing to meet the National Essential Freshwater requirements. Until permanent fencing can be completed this area must be temporarily fenced with a reel and standards, to ensure stock cannot access the area. Fencing this area will also help preserve the culvert exit and prevent sediment loss to the Waitoa River.

The National Essential Freshwater stock exclusion regulations require any lake, natural wetland, river, or modified water course that is wider than 1 metre anywhere in the land parcel (measured as the bed width bank-to-bank) to be permanently fenced by 1 July 2023 to exclude dairy cattle, and 1 July 2025 for dairy support cattle regardless of land slope. This excludes artificial watercourses, ephemeral flows, and smaller streams where the bed of the stream does not reach 1 metre wide at any point. Beef animals on land that is not low slope (>5 degrees) and are not break feeding or feeding on annual forage crops or irrigated pasture are excluded currently. Temporary fencing must

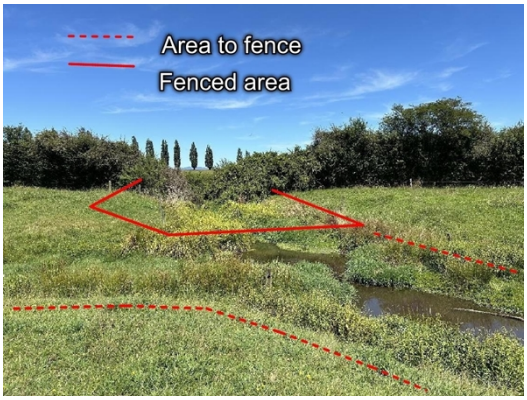
WATERWAYS & BIODIVERSITY

be used in the interim to exclude stock. 'Permanent fence' means a post-and-batten fence with driven or dug fence posts, or an electric fence with at least two electrified wires and driven or dug fence posts, or a deer fence.

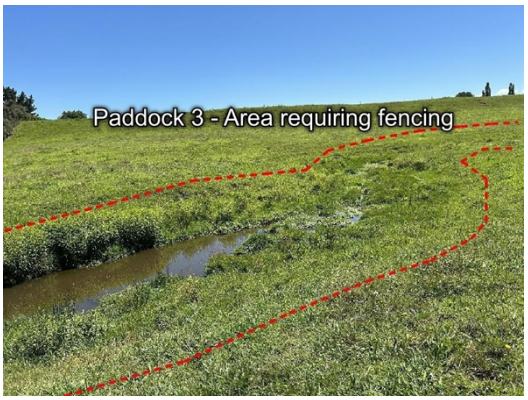
Permanently stock exclude the section of the tributary stream - To Achieve GFP 31 May 2024

Permanently stock exclude the section of the tributary stream in paddock 3. As this stream is both wider than a meter and natural it requires fencing to meet the National Essential Freshwater requirements. Until permanent fencing can be completed this area must be temporarily fenced with a reel and standards, to ensure stock cannot access the area. Fencing this area will also help preserve the culvert exit and prevent sediment loss to the Waitoa River.

The National Essential Freshwater stock exclusion regulations require any lake, natural wetland, river, or modified water course that is wider than 1 metre anywhere in the land parcel (measured as the bed width bank-to-bank) to be permanently fenced by 1 July 2023 to exclude dairy cattle, and 1 July 2025 for dairy support cattle regardless of land slope. This excludes artificial watercourses, ephemeral flows, and smaller streams where the bed of the stream does not reach 1 metre wide at any point. Beef animals on land that is not low slope (>5 degrees) and are not break feeding or feeding on annual forage crops or irrigated pasture are excluded currently. Temporary fencing must be used in the interim to exclude stock. 'Permanent fence' means a post-and-batten fence with driven or dug fence posts, or an electric fence with at least two electrified wires and driven or dug fence posts, or a deer fence.



WATERWAYS & BIODIVERSITY



WATERWAYS & BIODIVERSITY

MAHINGA KAI

W2

Mahinga kai is a broad term referring to all natural resources that sustain life. This includes things such as species, natural habitats, materials, and practices used for harvesting food, and places where food or resources are, or were, gathered.

Areas on farm with mahinga kai values include:

- All waterways, drains (with water), wetlands, and springs
- Native vegetation and riparian areas
- Areas with specific mahinga kai species and their habitats.

Rivers and streams in the Waikato Region were and continue to be of great significance to iwi communities for food gathering. Maintaining stream health and water quality is vital to ensure that these fisheries can be sustained. Protection and enhancement of wetlands, forest remnants and coastal ecosystems is also crucial to ensure the preservation of the native species that are reliant on those habitats.

Across Aotearoa, as guardians of the land, we all have a commitment to work towards meeting mahinga kai objectives. The contribution to mahinga kai values doesn't have to be only within the farm boundary, as individual actions on farm will have cumulative effects beyond the farm boundary to the wider catchment.

TAIORA
NUTRIENT MANAGEMENT

N1 Nutrient Overview

N2 Nitrogen Efficiency Improvements

NUTRIENT MANAGEMENT

GOOD FARMING PRACTICES

Soil phosphorus levels are monitored and maintained below or within the target ranges for the soil-type and crop	1 ACTION(S)
The amount and timing of fertiliser inputs, takes account of all sources of nitrogen and phosphorus, matches plant requirements and minimises losses to waterways and groundwater Practices: For each land management unit Nutrient levels are monitored: • Annually for capital applications • Biennially for maintenance applications 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 is not applied: --When heavy rainfall is forecast and runoff is likely –Close to waterways Pasture or crop growth rates are considered along with feed requirements before applying N Fertiliser application rates take into account any other source of nutrients applied or naturally occurring on farm. The availability of the nitrogen in fertiliser used is understood Fertiliser applications are adjusted to effluent areas based on soil tests	ACHIEVED
Fertiliser spreading equipment is maintained and calibrated Practices: Fertiliser spreading equipment is maintained in accordance with the manufacturer's instructions Farm spreading equipment is calibrated regularly specific to the product being spread -- spreading width and volume checked Paddocks are checked for paddock stripes after spreading	ACHIEVED

*Additional GFP relevant to the dairy industry goals

NUTRIENT MANAGEMENT

NUTRIENT OVERVIEW

N1

IMPACT OF CONTAMINATION  +  LIKELIHOOD OF CONTAMINATION = HIGH RISK RATING

The farm uses Ballance for any bulk fertiliser, recommendations, and soil testing. Soil testing was last done in September 2023 and is generally completed every two-three years on pasture and every year on crop paddocks. Autumn and Spring mixes recommended by the Ballance Agri-Nutrient Rep are applied based on the season. Fertiliser is also applied in the form of nitrogen to encourage grass growth as required. Fertiliser applications are carried out by Wealleans Groundspread. Fertiliser applications are recorded by Wealleans using Trackmap and rates are calculated accurately.

The soil tests from September 2023 showed different results between the six areas soil tests, paddocks 8 and 9, 29, 2 Effluent, 21 and 21 Maize, 27 Turnip and 25 Turnip. Agronomic optimum for ash soils for Olsen P is 20-30. The Olsen P results for paddock 29, 22 and 21 Maize, 27 Turnip and 2 Turnip were 39, 36 34 and 37 mg/L respectively, which slightly exceeded the optimum range. Paddocks 8 and 9, and 2 Effluent greatly exceeded the range with results of 52 and 107 mg/L.

There is no agronomic or economic benefit to exceeding these optimum ranges, as phosphorus that has been applied in amounts more than required for pasture growth, will bind to topsoil, and potentially be lost with sediment. For this reason, phosphorous fertiliser applications should be lower than maintenance requirements until the value falls within the optimum range. It is important to note than if Olsen P levels do fall within the optimum range, that levels are then maintained. The way in which this is undertaken should be discussed with the farms nutrient advisor to ensure best practice.

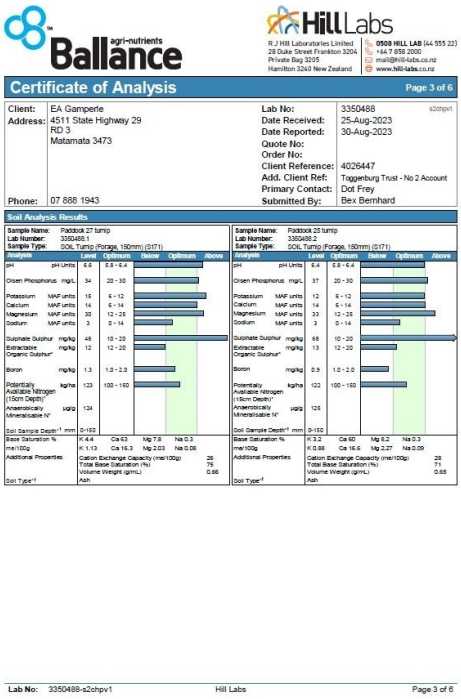
The use of products such as SustaiN, nitrogen with an inhibitor, which allows for the addition of nitrogen to aid in growth and yield but avoids putting on any additional Phosphorous which would cause the Olsen P levels to increase even further therefore increasing the risk of loss to the environment.

Three different management blocks are currently soil tested with fertiliser recommendations being completed for the steep sections, effluent and non-effluent block. Further soil testing and planning with the Fertiliser Representative to ensure Olsen P levels don't increase further beyond the optimum range, particularly for the effluent area, should be considered, with recommendations tailored accordingly.

ACTIONS | RECOMMENDATIONS

	Target Date
Monitor & Manage Phosphorus (Olsen P) Levels - To Achieve GFP Monitor & Manage Phosphorus (Olsen P) Levels – Continue to manage areas with a higher Olsen P level by withholding Phosphate fertiliser to 'mine' current Olsen P levels to within the recommended optimum range.	30 Sep 2024

NUTRIENT MANAGEMENT



Ballance agri-nutrients

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Certificate of Analysis Page 3 of 6

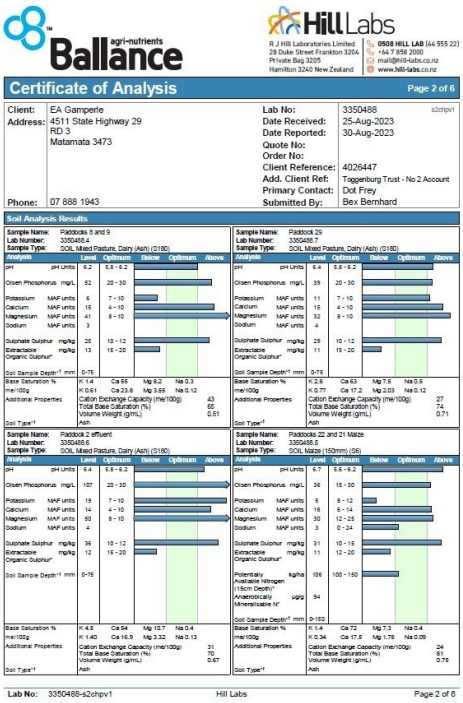
Client:	EA Gamperle	Lab No:	3350488 s2chpv1
Address:	4511 State Highway 29 RD 3 Matamata 3473	Date Received:	25-Aug-2023
		Date Reported:	30-Aug-2023
		Quote No:	
		Order No:	
		Client Reference:	4026447
		Add. Client Ref:	Toggenburg Trust - No 2 Account
		Primary Contact:	Dot Frey
Phone:	07 888 1943	Submitted By:	Bex Bernhard

Soil Analysis Results

Sample Name:	Paddock 27 turnip	Paddock 25 turnip
Lab Number:	3350488.1	3350488.2
Sample Type:	SOIL Turnip (Forage, 150mm) (S171)	SOIL Turnip (Forage, 150mm) (S171)

Analysis		Level	Optimum	Below Optimum	Above Optimum
pH	pH Units	6.6	5.8 - 6.4		
Olsen Phosphorus	mg/L	34	20 - 30		
Potassium	MAF units	15	6 - 12		
Calcium	MAF units	14	6 - 14		
Magnesium	MAF units	30	12 - 25		
Sodium	MAF units	3	0 - 14		
Sulphate Sulphur	mg/kg	48	10 - 20		
Extractable Organic Sulphur*	mg/kg	12	12 - 20		
Boron	mg/kg	1.3	1.0 - 2.0		
Potentially Available Nitrogen (15cm Depth)*	kg/ha	123	100 - 150		
Anaerobically Mineralisable N*	µg/g	124			
Soil Sample Depth*†	mm	0-150			
Base Saturation	%	K 4.4	Ca 63	Mg 7.8	Na 0.3
	me/100g	K 1.13	Ca 16.3	Mg 2.03	Na 0.09
Additional Properties		Cation Exchange Capacity (me/100g)			26
		Total Base Saturation (%)			76
		Volume Weight (g/mL)			0.66
Soil Type*†		Ash			

Analysis		Level	Optimum	Below Optimum	Above Optimum
pH	pH Units	6.4	5.8 - 6.4		
Olsen Phosphorus	mg/L	37	20 - 30		
Potassium	MAF units	12	6 - 12		
Calcium	MAF units	14	6 - 14		
Magnesium	MAF units	33	12 - 25		
Sodium	MAF units	3	0 - 14		
Sulphate Sulphur	mg/kg	68	10 - 20		
Extractable Organic Sulphur*	mg/kg	13	12 - 20		
Boron	mg/kg	0.9	1.0 - 2.0		
Potentially Available Nitrogen (15cm Depth)*	kg/ha	122	100 - 150		
Anaerobically Mineralisable N*	µg/g	126			
Soil Sample Depth*†	mm	0-150			
Base Saturation	%	K 3.2	Ca 60	Mg 8.2	Na 0.3
	me/100g	K 0.86	Ca 16.6	Mg 2.27	Na 0.09
Additional Properties		Cation Exchange Capacity (me/100g)			28
		Total Base Saturation (%)			71
		Volume Weight (g/mL)			0.65
Soil Type*†		Ash			



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Certificate of Analysis Page 2 of 6

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		Date Reported:	30-Aug-2023
		Quote No:	
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		Client Reference:	4026447
		Add. Client Ref:	Toggenburg Trust - No 2 Account
		Primary Contact:	Dot Frey
Phone:	07 888 1943	Submitted By:	Bex Bernhard

Soil Analysis Results

Sample Name:	Paddocks 6 and 9	Paddock 29
Lab Number:	3350488.4	3350488.7
Sample Type:	SOIL Mixed Pasture, Dairy (Ash) (S160)	SOIL Mixed Pasture, Dairy (Ash) (S160)

Analysis		Level	Optimum	Below Optimum	Above Optimum
pH	pH Units	6.2	5.8 - 6.2		
Olsen Phosphorus	mg/L	62	20 - 30		
Potassium	MAF units	6	7 - 10		
Calcium	MAF units	16	4 - 10		
Magnesium	MAF units	41	8 - 10		
Sodium	MAF units	3			
Sulphate Sulphur	mg/kg	26	10 - 12		
Extractable Organic Sulphur*	mg/kg	13	15 - 20		
Soil Sample Depth*†	mm	0-75			
Base Saturation	%	K 1.4	Ca 58	Mg 8.2	Na 0.3
	me/100g	K 0.61	Ca 23.8	Mg 3.66	Na 0.12
Additional Properties		Cation Exchange Capacity (me/100g)			43
		Total Base Saturation (%)			66
		Volume Weight (g/mL)			0.51
Soil Type*†		Ash			

Analysis		Level	Optimum	Below Optimum	Above Optimum
pH	pH Units	6.4	5.8 - 6.2		
Olsen Phosphorus	mg/L	39	20 - 30		
Potassium	MAF units	11	7 - 10		
Calcium	MAF units	16	4 - 10		
Magnesium	MAF units	52	8 - 10		
Sodium	MAF units	4			
Sulphate Sulphur	mg/kg	29	10 - 12		
Extractable Organic Sulphur*	mg/kg	11	15 - 20		
Soil Sample Depth*†	mm	0-75			
Base Saturation	%	K 2.8	Ca 63	Mg 7.6	Na 0.6
	me/100g	K 0.77	Ca 17.2	Mg 2.03	Na 0.12
Additional Properties		Cation Exchange Capacity (me/100g)			27
		Total Base Saturation (%)			74
		Volume Weight (g/mL)			0.71
Soil Type*†		Ash			

Sample Name:	Paddock 2 effluent
Lab Number:	3350488.6
Sample Type:	SOIL Mixed Pasture, Dairy (Ash) (S160)

Analysis		Level	Optimum	Below Optimum	Above Optimum
pH	pH Units	6.4	5.8 - 6.2		
Olsen Phosphorus	mg/L	107	20 - 30		
Potassium	MAF units	19	7 - 10		
Calcium	MAF units	14	4 - 10		
Magnesium	MAF units	53	8 - 10		
Sodium	MAF units	4			
Sulphate Sulphur	mg/kg	36	10 - 12		
Extractable Organic Sulphur*	mg/kg	12	15 - 20		
Soil Sample Depth*†	mm	0-75			
Base Saturation	%	K 4.5	Ca 64	Mg 10.7	Na 0.4
	me/100g	K 1.40	Ca 16.9	Mg 3.32	Na 0.13
Additional Properties		Cation Exchange Capacity (me/100g)			31
		Total Base Saturation (%)			70
		Volume Weight (g/mL)			0.67
Soil Type*†		Ash			

Sample Name:	Paddocks 22 and 21 Maize
Lab Number:	3350488.5
Sample Type:	SOIL Maize (150mm) (S6)

Analysis		Level	Optimum	Below Optimum	Above Optimum
pH	pH Units	6.7	5.6 - 6.2		
Olsen Phosphorus	mg/L	36	15 - 30		
Potassium	MAF units	5	8 - 12		
Calcium	MAF units	16	6 - 14		
Magnesium	MAF units	30	12 - 25		
Sodium	MAF units	3	0 - 24		
Sulphate Sulphur	mg/kg	31	10 - 15		
Extractable Organic Sulphur*	mg/kg	11	12 - 20		
Potentially Available Nitrogen (15cm Depth)*	kg/ha	106	100 - 150		
Anaerobically Mineralisable N*	µg/g	94			
Soil Sample Depth*†	mm	0-150			
Base Saturation	%	K 1.4	Ca 72	Mg 7.3	Na 0.4
	me/100g	K 0.34	Ca 17.5	Mg 1.79	Na 0.09
Additional Properties		Cation Exchange Capacity (me/100g)			24
		Total Base Saturation (%)			81
		Volume Weight (g/mL)			0.75
Soil Type*†		Ash			

NUTRIENT MANAGEMENT

NITROGEN EFFICIENCY IMPROVEMENTS

N2

The annual Fonterra Insights report uses data entered into the Farm Dairy Records at the end of the season to determine the farms Nitrogen fertiliser risks based on various aspects of the farming system. The farms Purchased Nitrogen Surplus (PNS) is also outlined in this report which depicts the relationship between the amount of Nitrogen entering the farm system through fertiliser and feed, versus the amount exported off farm as product. The higher this number is, the more likely the purchased Nitrogen is not being used efficiently leaving more nitrogen available to potentially be lost to water or the atmosphere as nitrogenous gas.

Currently the farm has a PNS of 46kgN/ha which well below the average when compared to the other farms in the benchmark group. This is based on nitrogen fertiliser being applied at a rate of 119kgN/ha, imported feed at 0kgN/ha and 73kgN/ha being exported off farm in product. In previous seasons, the PNS has been at the bottom of and below the 50% of the benchmark group which is farmers in the Waikato Region whose production is also between 1001-1200kgMS/ha, however this year the farm is sitting just below the average benchmarking group.

This decrease in the PNS could be attributed to a decrease in imported feed from previous season as well as a decrease in somatic cell count and an increase in production per cows of 19kgMS/ha. In keeping the inputs the same as the previous season and increasing cows number slightly there would be an expected increase in total production, however, this was accompanied by an increase in production per cow showing efficiency gains.

The Nitrogen Fertiliser Optimisation on farm is based on those factors within the farms control. For every tDM of pasture and crops eaten Anthony is using 8kgN whereas the local average (defined as the 100 closest farms in a 20km radius) is using 7kgN with the top 25% using 5kgN. Currently this shows Anthony is not quite as efficient as his neighbours.

An opportunity to further increase nitrogen fertiliser optimisation by working their Ballance Fertiliser Representative to refine fertiliser and nitrogen practices on farm, resulting in potential cost savings due to tailored application rates. Some variables include timing of application, application rate and the quantity of applications. Another option could be to utilise DairyNZ and develop a comprehensive way to Feed Budget to understand and identify paddocks that aren't performing or need a fertiliser application. Completing regular farm walks to identify potential feed gaps could help pasture management and in turn nitrogen efficiency.

On-going Management	Continue to only apply fertiliser when no heavy rainfall is forecasted to reduce risk of runoff. Block paddocks based on soil test results and apply different rates of fertiliser across the farm with the aim of moving nutrient levels in all paddocks towards the agronomic optimum range over time. Particular attention should be given to reducing Olsen P levels where they are above optimal as this increases the risk of P loss to water. Maintain documents to support farm inputs, outputs, and management practices – essentially documents that support the data supplied to Fonterra in your Farm Dairy Records. Such records will need to be kept every year in the future for the life of the plan.

NUTRIENT MANAGEMENT

Ensure nitrogenous fertiliser application timings are matched to times of high plant growth, with a minimum of 1500 kg DM/ha pasture cover. Do not apply at other times of the year if soils are saturated or after a dry period until sufficient regrowth has occurred following rain.

Continue to use inhibitor coated nitrogen fertilisers to reduce risk of nitrogen being lost to the atmosphere.

Continue to apply nitrogen 'little and often' by using no more than 30 units of N per application.

Comply with national regulations which state:
- Synthetic nitrogen fertiliser is applied at rates of less than 190kgN/ha/yr on pastoral areas.
-Annually report synthetic nitrogen fertiliser use to the regional council.

The three tools for reporting nitrogen use are:
• Ravensdowns HawkEye app
• Ballances myBallance app
• Regional and unitary councils N-Cap web portal - https://ncap.teurukahika.govt.nz

Continue soil testing each different management block and repeat no less than every 2-3 years.

ACTIONS | RECOMMENDATIONS

Target Date

Talk to your fertiliser representative

Talk to your fertiliser representative and come up with a fertiliser plan that will help to reduce the quantities of nitrogen being applied in one application, ultimately improving the farms nitrogen efficiency.

NUTRIENT MANAGEMENT

Nitrogen Fertiliser Optimisation

Optimising your current farm system means making the most of the factors within your control. The benchmarking below provides an indication of how others in your local area* are performing. Understanding how you utilise nitrogen fertiliser to supplement pasture growth is our first step in helping you to improve the efficiency of your farming system.

Your Farm's Nitrogen Fertiliser Conversion Efficiency

This data compares your farm's nitrogen fertiliser conversion efficiency against farms in your local area. If an opportunity **to grow the same amount of pasture and crops from less nitrogen fertiliser** looks possible, then the benefits will be estimated.

How does your farm compare?

*Local as defined as the 100 closest farms to your location (radius 10kms).

For every tDM of pasture and crops eaten:

Your farm is using:	Local average farms are using:	Local top 25% are using:
8 kgN	7 kgN	5 kgN

If you grew the same from less nitrogen fertiliser

(by achieving local average efficiency)

Purchased Nitrogen Surplus reduced to **34** ↓12

Additional Benefits

GHG emissions reduced to **12** $KgCO_2e/kgMS$ ↓0.1

Annual spend on nitrogen fertiliser reduced by **$1,428** based on a nitrogen fertiliser price of $800 per tonne

Support and Next Steps

There are many factors that influence nitrogen fertiliser conversion efficiency and before you make any decisions, it is recommended that you seek further advice from your Sustainable Dairying Advisor or a suitably qualified person to complete:

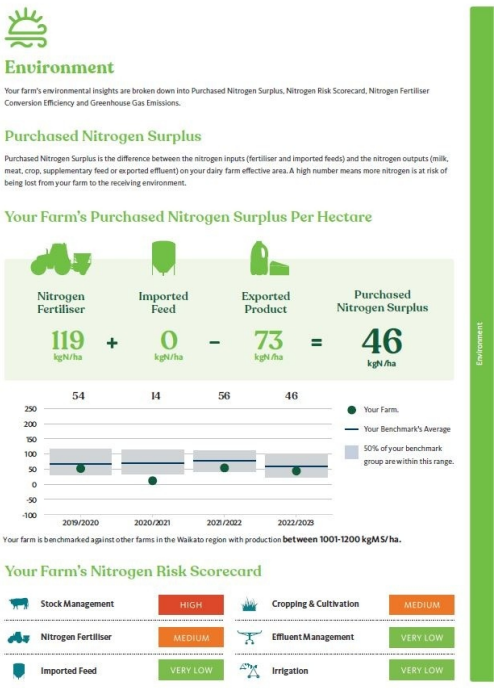
- An assessment on-farm of potential contributing factors
- Prioritise focus areas for improvement
- Further modelling to assess impacts

Examples of factors influencing nitrogen fertiliser conversion efficiency

Fertiliser	Pasture
Effluent	Irrigation
Cropping	Soil

Environment

9



Environment

Your farm's environmental insights are broken down into Purchased Nitrogen Surplus, Nitrogen Risk Scorecard, Nitrogen Fertiliser Conversion Efficiency and Greenhouse Gas Emissions.

Purchased Nitrogen Surplus

Purchased Nitrogen Surplus is the difference between the nitrogen inputs (fertiliser and imported feeds) and the nitrogen outputs (milk, meat, crop, supplementary feed or exported effluent) on your dairy farm effective area. A high number means more nitrogen is at risk of being lost from your farm to the receiving environment.

Your Farm's Purchased Nitrogen Surplus Per Hectare

Nitrogen Fertiliser		Imported Feed		Exported Product		Purchased Nitrogen Surplus
119 kgN/ha	+	0 kgN/ha	–	73 kgN/ha	=	46 kgN/ha

Your farm is benchmarked against other farms in the Waikato region with production **between 1001-1200 kgMS/ha.**

Your Farm's Nitrogen Risk Scorecard

Stock Management	HIGH	Cropping & Cultivation	MEDIUM
Nitrogen Fertiliser	MEDIUM	Effluent Management	VERY LOW
Imported Feed	VERY LOW	Irrigation	VERY LOW

Environment

6

TŪKUNGA HAU KŌTUHI
GREENHOUSE GAS EMISSIONS

G2 Opportunities to offset or reduce GHG Emissions

G1 Greenhouse Gas Emissions Overview

GREENHOUSE GAS EMISSIONS

GOOD FARMING PRACTICES

Farm greenhouse gas emissions are known, and a plan is in place to reduce or off-set them, that also considers adaptation to climate change

1 ACTION(S)

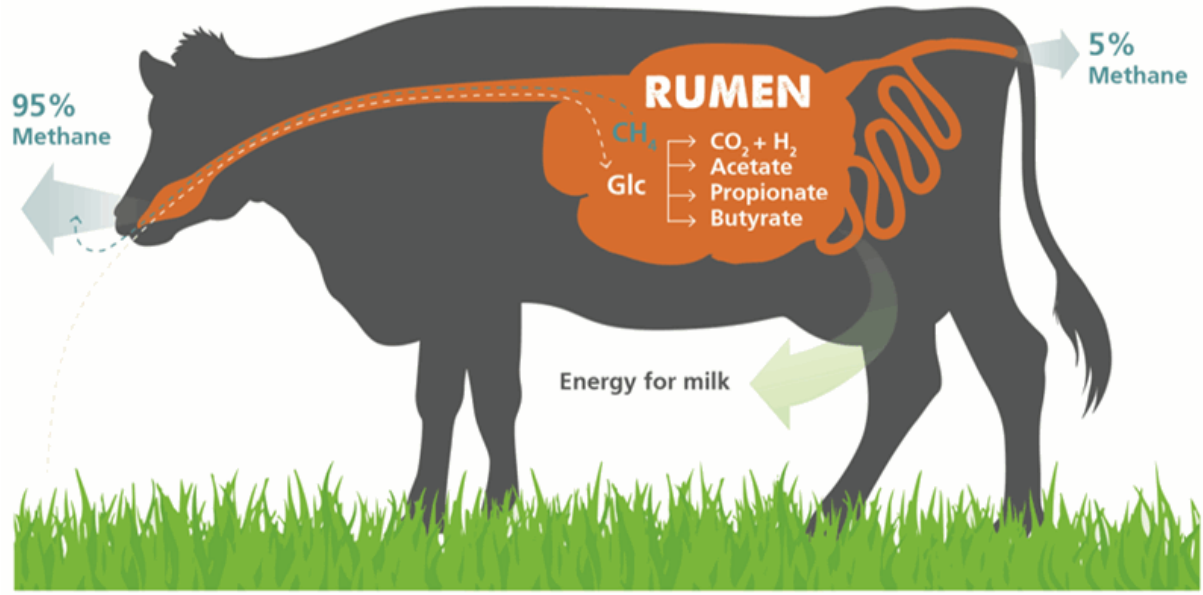
GREENHOUSE GAS EMISSIONS

WHAT ARE GREENHOUSE GAS EMISSIONS?

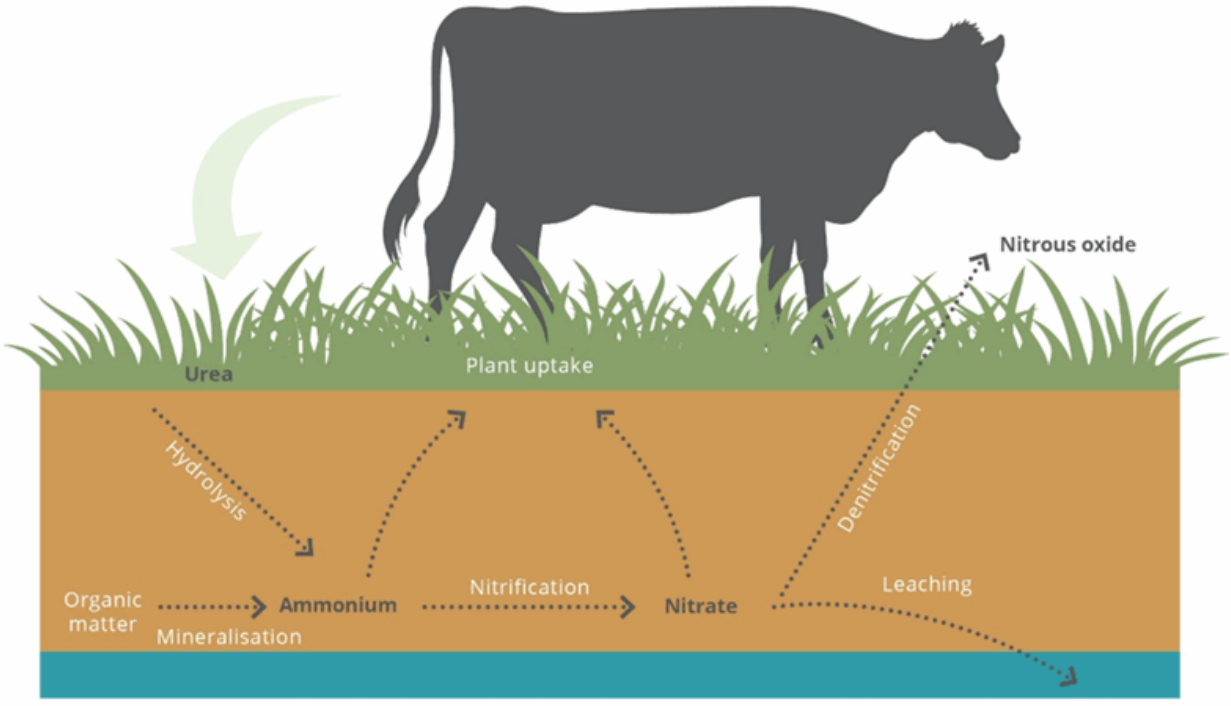
The main agricultural GHGs are methane (CH_4) and nitrous oxide (N_2O). Methane is produced by ruminants (e.g., cows and sheep) by methanogen microbes that are naturally present in the rumen. Most methane is emitted when cattle burp. The amount of methane produced for each farm is directly related to 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 (CH_4) is produced



How a nitrous oxide (N_2O) is produced



GREENHOUSE GAS EMISSIONS

OPPORTUNITIES TO OFFSET OR REDUCE GHG EMISSIONS

To maintain milk production and profitability, actions to reduce GHG emissions should focus on efficiency gains and reduction of inputs. This will help to reduce both the total emissions from the farm (absolute) and the emissions intensity of the milk (emissions per kg milk solids).

The following 5 headings are the opportunities He Waka Eke Noa have identified to reduce GHG emissions on-farm.

- Improving the efficiency of pasture and crop production
- Optimise feed eaten
- Matching feed demand with pasture growth and utilisation
- Improving the management of livestock effluent
- Capture and store carbon in vegetation

Other actions within this FEP may also have a co-benefit of reducing impacts on water quality while reducing emissions (look for the co-benefits symbol in the Good Farming Practices summary section). Practices that are already in place and should continue include:

The farm has a ryegrass and clover regrassing plan and tries to minimise the length of time between crops that the soil is not planted for. Nitrogen products with urease-inhibitors are also considered as they can help with slow release of nitrogen to the system to prevent leaching.

The farm prioritises pasture production and uses supplement to fill gaps as required. Anthony cuts and bales silage at times of year where there is a surplus to then use in times of a deficit. This is generally fed out, along with hay as required, during the summer and winter times to help maintain production when grass growth is low.

Herd testing has not been carried out yet as this is Anthony and Michaela's third season on the property and with trying to maintain cow numbers there has been no option to cull based on attributes other than empties. They couple plans to herd test in the coming years as they build their herd and get enough replacements and high in-calf rate which in turn will allow them to cull on production and genetic based attributes. Currently, Anthony culls cows based on in calf rate, mastitis and cows with unproductive quarters.

The farm has an animal wellbeing plan that aims to improve animal health this leads to gains in efficiency and productivity. Key animal health metrics are benchmarked in the farm insights report each season.

Should any further areas on farm be identified as wet or in need of retirement due to erosion, consideration should be given to planting these out also to increase biodiversity on farm. Prior to planting these areas should be assessed against the definitions for inclusion in the Emissions Trading Scheme or the government's agricultural pricing framework to determine if the areas would qualify as being able to generate income or offset farm emissions.

It is recommended the farm's GHG Emissions, and the plan to reduce or offset emissions is reviewed annually. This will allow the impact of implemented changes to be assessed and is an opportunity to identify further actions that can be implemented.

GREENHOUSE GAS EMISSIONS

An emissions assessment from Fonterra should be requested which will allow the farm to know the emissions for the total farm area (including effective dairy platform and support land). This is a government requirement to report total emissions numbers by December 2024 (at this stage) for emission pricing purposes.

USEFUL LINKS	He Waka Eke Noa is a primary sector climate action partnership that are working together to implement a framework to reduce agricultural GHG emissions https://hewakaekenoa.nz/ The Ag Matters website has useful information on how farmers can reduce emissions https://www.agmatters.nz/ The DairyNZ website has a range of information and resources https://www.dairynz.co.nz/environment/agricultural-greenhousegases/

ACTIONS | RECOMMENDATIONS

Target Date

Investigate Feed Budgeting

Investigate the use of Feed Budgeting to identify pasture deficits and surpluses to ensure pasture is being managed efficiently. This will also help with the utilisation and to provide insight into those paddocks that aren't performing as well as others.

Helpful resource can be found on the DairyNZ website at https://www.dairynz.co.nz/tools/feed-budgets/

Investigate bulls for AI based on Environmental indexes

For LIC they have developed a 10-point ranking system, which enable farmers to select bulls based on their predicted ability to generate offspring with a lower environmental impact - the higher the score, the more environmentally efficient they are. This is called Hoof Print.

GREENHOUSE GAS EMISSIONS

GREENHOUSE GAS EMISSIONS OVERVIEW

Each farms greenhouse gas (GHG) emissions vary depending on farm size, inputs, outputs, and management. Fonterra uses Farm Dairy Record information to estimate a farm's GHG emissions for the effective milking platform area. The information below is taken from the farms 22/23 Insights report.

GHG emissions per kg/MS is a measure of emissions intensity and indicates how efficiently product is being produced in relation to GHG emissions. In the 22/23 season, the farms' biological GHG emissions were as follows:

Per kg of milk solids: 12.0 kgCO2e/kgMS (9.2 Methane + 2.1 Nitrous Oxide)

Per hectare: 12,176 kgCO2e/ha (9,954 Methane + 2,222 Nitrous Oxide)

An alternative way to look at a farm biological GHG emissions is on a per hectare basis. In the 2022/23 season biological emissions from the farm were 12,176 kgCO2e/ha. This increased slightly from the previous season.

As the farm dairy records are correct this information can be considered an accurate representation of the input and outputs in the system giving an inaccurate assessment or trends and benchmarking can be made. This has increased slightly from the previous season which could be attributed to the slight increase in cows and subsequent increase in per cow production and increase in total milk solids produced.

ACTIONS | RECOMMENDATIONS

	Target Date
Review farm GHG emissions annually - To Achieve GFP Review farm GHG emissions annually and determine if further actions or changes can be implemented. This may include the implementation of new technologies as they become available.	30 Sep 2024

GREENHOUSE GAS EMISSIONS

Your Farm's Biological GHG Emissions per Hectare

This section shows estimates of your farm's **biological** GHG emissions for your dairy farm effective area. Your biological emissions consist of methane and nitrous oxide gases. A GHG Emissions assessment for your total farm area is available on the Farm Source Business website under Digital Farm Insights (if your Farm Dairy Records Submission included additional information relating to animals and practices on your support land). For the link to this website, please go to the reference guide at the back of this report.

Methane		Nitrous Oxide		Biological Emissions
9,954 $kgCO_2e/ha$	+	2,222 $kgCO_2e/ha$	=	12,176 $kgCO_2e/ha$
(Equivalent to 368 $kgCH_4/ha$)		(Equivalent to 7 kgN_2O/ha)		

Your farm is benchmarked against other farms in Waikato with production **between 1001-1200 kgMS/ha.**

Trees on Farm

In the future farmers may be recognised for their ability to sequester carbon from some types of on-farm vegetation. As a guideline the information below is approximately how much carbon will be removed from the atmosphere from 1 ha of on-farm vegetation that meets the criteria.

Indigenous Vegetation	Riparian Vegetation	Scattered Forest
2,000-6,000 $kgCO_2/ha/year$	1,000-3,000 $kgCO_2/ha/year$	1,000-2,000 $kgCO_2/ha/year$

All estimated carbon sequestration values have been averaged across the country for soil type and growth potential.

For more information

Information relating to agriculture, climate change, and carbon sequestration is available on the He Waka Eke Noa and AgMatters websites. **For links to these websites, please go to the reference guide at the back of this report.**

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Greenhouse Gas Emissions

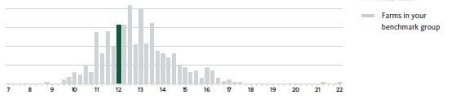
Your farm's greenhouse gas (GHG) footprint consists of both **Biological** and **Non-Biological** sources of emissions. GHG emissions are expressed as Carbon Dioxide equivalents (CO_2) and account for practices on your dairy farm effective area.

Your Farm's GHG Emissions per kgMS: 12.0

Biological 11.3	Non-Biological 0.7
Emissions derived from biological sources on farm.	Emissions derived from non-biological sources.

Methane 9.2	Nitrous Oxide 2.1	Carbon Dioxide 0.7
Produced during the breakdown of plant matter – either through digestion or manure decomposition.	Produced by the breakdown of urine, dung and fertiliser.	Produced in the manufacturing and transport of farm inputs, including all fertilisers, supplements, electricity and fuel.

Enteric Methane	8.5	Urine and Dung	1.7	Nitrogen Fertiliser	0.4
Dung Methane	0.3	Effluent Storage	<0.1	Imported Supplements	0.0
Effluent Methane	0.4	Nitrogen Fertiliser	0.4	Other Sources	0.3



Your farm is benchmarked against other farms in the Waikato with production **between 1001-1200 kgMS/ha**

Your farm is benchmarked against other farms in Waikato with production **between 1001-1200 kgMS/ha.**

Your biological emissions were calculated using the AgriculturalInventory Model (AIM), which was developed by Ministry for Primary Industries. All Non-Biological emissions in this report have been calculated using regional averages and the emissions factors in accordance with NZ GHG Inventory and the AgResearch LCA model.

Environment

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WHAKAPAPA

Wh1 Whakapapa Overview

WHAKAPAPA

WHAKAPAPA OVERVIEW

Wh1

According to Te Kāhui Māngai (the Directory of Iwi and Māori Organisations, website www.tkm.govt.nz) the property lies within the rohe (tribal area) of Raukawa.

Raukawa exercise kaitiakitanga (customary guardianship) over this area. In te Ao Māori (Māori perspective), this is a sacred responsibility that mana whenua (local Māori from the area) are entrusted with, because of their ancestral relationship to the land.

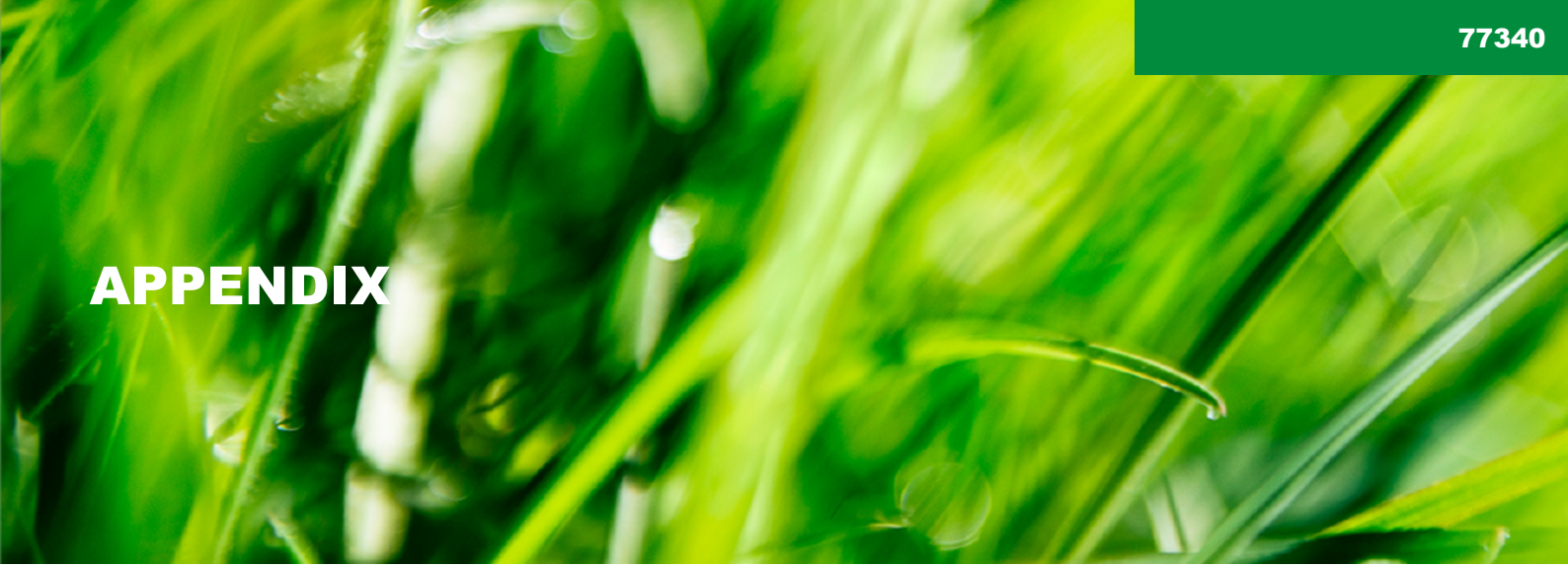
Like mana whenua, the Gamperle and Lopes Families also have a deep connection to their farm and community and a strong sense of stewardship to the land. This FEP was developed with sharemilker Anthony. The goals and aspirations of the Gamperle's and Lopes to improve water quality and biodiversity is documented throughout this FEP. This work likely aligns well with mana whenua, as both parties bear the responsibility of kaitiakitanga and stewardship.

Giving effect to the principles of the Treaty of Waitangi, the Local Government Act 2002 and Resource Management Act 1991, landowners are obligated to consult with mana whenua, if carrying out activities that may result in adverse environmental effects. This is typically carried out as part of the consenting process by council, on behalf of an applicant. This doesn't need to be the only time mana whenua is approached for input. A relationship with mana whenua can be fostered by identifying the local representatives in your community and pursuing opportunities to build and enhance a relationship with them.

It is unlawful for any person to modify or destroy, or cause to be modified or destroyed, any part of an archaeological site without the prior authority of Heritage New Zealand. There are no archaeological or cultural sites of significance identified on the farm however not all sites have been uncovered. If you discovered a significant site on the farm in future, ensure the area is protected from damage.

Relevant Iwi and Maori Organisations https://www.raukawa.org.nz/

WHAKAPAPA



APPENDIX

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.