

IN THE ENVIRONMENT COURT
AT WELLINGTON

ENV-2021-WLG-000020, 21, 22, 23

I MUA I TE KOOTI TAIAO O AOTEAROA
TE WHANGANUI-A-TARA ROHE

IN THE MATTER of the Resource Management Act 1991

A N D

IN THE MATTER of appeals under Clause 14 of Schedule 1 of the
Resource Management Act 1991 against the decision
of Manawatū-Whanganui Regional Council on Plan
Change 2 to the One Plan

BETWEEN TE RUNANGA O RAUKAWA

AND NGĀTI TURANGA

AND ANDREW DAY

AND WELLINGTON FISH AND GAME COUNCIL

Appellants

AND MANAWATŪ-WHANGANUI REGIONAL COUNCIL
Respondent

AND VARIOUS

Section 274 parties

STATEMENT OF EVIDENCE OF AARON RICHARD PASSEY ON BEHALF
OF FEDERATED FARMERS
(Dairy farmer)
13 October 2023



444 Anglesea Street
PO Box 447
Hamilton
Telephone: 021 136 9422
Email: nedwards@fedfarm.org.nz
Solicitor acting: Nikki Edwards

STATEMENT OF EVIDENCE OF AARON RICHARD PASSEY

Introduction

1. My full name is Aaron Richard Passey. My wife, Jo, and I are 50/50 sharemilkers on Te Angi farm, a 135ha dairy farm (129ha effective area) located 14km north of Dannevirke. We are Fonterra suppliers.
2. Our farm is located in the Upper Manawatū and Weber-Tamaki (upstream of Tamaki Confluence) Water Management Zone (**WMZ**) and the Mana_2b Water Management Sub Zone (**WMSZ**). A map showing the location of our farm, in the context of the target WMZs that are regulated by Plan Change 2 to the Horizons One Plan (**PC2**) is attached as **Annexure AP1**.
3. We are one of the unconsented dairy farms that is affected by PC2. I did not lodge a submission on PC2 in a personal capacity, but I did attend the Council hearing on the day that Federated Farmers and DairyNZ presented a joint submission.
4. I am the National Share Farmer Section Chair for Federated Farmers and the Dairy Section Chair for Federated Farmers' Tararua province.
5. I have a bachelor of applied science (majoring in agriculture). Jo and I have worked our way up the dairy industry – starting out with herd manager roles on dairy farms in Taranaki, we returned to the Tararua in 2007, taking on lower order sharemilking and contract milking roles, then a 50/50 sharemilker role, and today we are 50% equity partners in Te Angi farm (although we are still technically classified as sharemilkers).
6. I am a keen deer hunter and game bird shooter, and I have been an elected member of the Wellington Fish and Game Council since 2018. Photograph 1 below shows Jo, me and our children beside a pond on our farm that we have restored with the help of funding from the Game Bird Habitat Trust.



Photograph 1: Jo, me and our four kids beside a pond on Te Angi farm (the pond was partly funded by the Game Bird Habitat Trust)

7. I have been asked by Federated Farmers to explain the rural community in which we live, our farm system, the impacts of uncertainty on unconsented dairy farmers and the reasons I support the implementation of a workable consenting pathway as soon as possible.

Federated Farmers

8. Federated Farmers of New Zealand Inc (**Federated Farmers**) is governed by a National Council and a National Board. The National Board is elected by the National Council, and the National Council comprises representatives from each of Federated Farmers' 24 provinces and six industry groups (Arable, Dairy, Meat and Wool, Goats, South Island High Country, and Rural Butchers).
9. The dairy industry group is headed by an executive team (elected at the dairy industry AGM) and a Chair (Richard McIntyre) who is also a national Federated Farmers board member. The dairy industry group then has two sub-sections sitting under it – a sharemilkers' section a sharemilker farm owners' section. Each section has an elected executive team, headed by a chairperson. I have been the Chair of the sharemilkers' section since 2020 (this section was recently renamed the "Share Farmer Section").

10. PC2 crosses two of Federated Farmers' provincial boundaries – Manawatū-Rangitikei, and Tararua. Combined, these provinces have over 950 active members.
11. I have been a member of the executive for the Federated Farmers Tararua province since 2015, and I am currently the Dairy Section Chair.
12. I have also competed several times on the East Coast Young Farmer contest and made it to the grand final in 2013.

Rural community

13. Farming is essential to the Manawatu-Whanganui Region. I explain below some of the rural communities in the region and how they rely on dairy, sheep and beef farming.
14. Factors that impact on the profitability of farming, particularly dairy farming (such as a drop in the forecast milk payout or increase in compliance costs), will have a direct impact on the local and regional economy.
15. I am particularly concerned that if unconsented dairy farms in the target WMZs were unable to continue to operate financially viable businesses, this could have significant flow on effects for the economic and social fabric of our communities.

Dannevirke

16. We have lived in Dannevirke since 2007. Dannevirke is a small rural service town at the centre of the Tararua District (with a current population of 5,650, it is the largest community in the Tararua District). Dannevirke is about 45 minutes from Palmerston North. Dannevirke has a modern hospital, three secondary schools (including a Kura Kaupapa) and four primary schools. It even has its own community radio station (107FM).
17. The major source of income for the town is the dairy, beef and sheep farming that happens in the surrounding area (from the Ruahine Ranges in the west to the coast in the east). Dannevirke has a full range of essential services including banking, legal, accountancy and professional services, supermarkets, rural supply stores, fertiliser depots, saleyards, railhead and a range of retail shops (including The Warehouse).

18. We love it here – it's the rural community that really makes Dannevirke great. The community rallies behind each other to help each other out in times of need, whether that is following the birth of a child, pitching in for families coping with injury or illness, or helping each other cope with droughts or weather bombs.
19. To provide some context, Photograph 2 below is a photo of the main street of Dannevirke.



Photograph 2: Dannevirke main street

Dairy companies and rural services

20. The two dairy companies in the Manawatū-Whanganui region are Fonterra and Open Country Dairy (**OCD**).
21. The majority of dairy farmers supply Fonterra (with a total of 283 Fonterra suppliers in the target WMZs, and 194 of them are unconsented).¹ Fonterra has processing sites at Pahiatua (established in 1976) and Longburn (established in 1966).
22. OCD has a processing site at Whanganui, which processes milk from 276 dairy farms in the Manawatū and Taranaki (it accepts milk from farms within a 100km radius).

¹ Evidence in Chief for Dr Paul I Miere at [39].

23. The Environment and Sustainability Manager at OCD (Caleb Higham) has advised that there are 62 OCD dairy farms in the target WMSZs but he is unable to tell from OCD's database how many of them are consented (OCD has consents on its files where farms have completed an OCD Farm Environment Plan but not all farms have done this farm plan so that number is not indicative). Mr Higham was able to advise that 17 of these farms are in the Manawatū WMSZs, and those are the WMSZs that have the lowest numbers of consented farmers (as illustrated in the map attached to Dr le Miere's evidence as Annexure PLM1).
24. Mr Higham also said that the feedback he has received from the unconsented farmers is that the "uncertainty of being in an unconsented position is a killer." This uncertainty, on top of the recent freshwater regulations, is one of the main reasons farmers say they want to leave dairy farming. This is consistent with what I am hearing from farmers, particularly those who are in limbo because they need to sell their farms to exit the industry but being unconsented stops them from being able to sell their farms (or being able to sell them for a price that would cover their debt).
25. In recognition of the significance of dairy farming to the region, there are seven Farm Source stores (Fonterra's farm supply store), nine Farmlands stores and seven PGG Wrightsons stores across the region. There are also four PGG Wrightsons saleyards in the region.
26. There are also the Central Districts field days, which attract over 27,000 each year when they are held in March. It is New Zealand's largest regional field day and has been running for 29 years. It brings together rural communities and primary industries.

Pahiatua

27. Pahiatua is a rural service town that is about 30km east of Palmerston North and has a population of 2,810. The Pahiatua economy revolves around support services for sheep and beef farming, and the dairy industry. The Fonterra dairy factory and Tui Brewery (in Mangatainoka) are the major employers for the town. Tararua College is located in Pahiatua (with a current school roll of 407). There is a Kohanga Reo, two kindergartens, an early childhood centre, two primary schools (with rolls

of 361 and 113) and a public library. Pahiatua has its own bank and post office (with Kiwibank operating a banking agency at the NZ Post Shop), it also has its own swimming pool, an extensive sports complex, supermarket and a cinema (the Regent Theatre). There is also a volunteer fire brigade.

28. Fonterra's Pahiatua site produces milk powder, butter, cheese, casein and other dairy products. It processes 1.4 million litres of milk per day and has an annual processing capacity of 55,000 tonnes of milk powder. The facility employs 175 people.

Longburn

29. Longburn is a rural settlement just outside Palmerston North. It has a population of 348 people and is entirely reliant on the dairy industry (which started in 1884 with a butter factory). Longburn has a state primary school (with a current school roll of 108).
30. Fonterra's Longburn site collects milk from farms located throughout the Manawatū-Whanganui region and either processes it on site or transfers it to other Fonterra manufacturing sites. Goodman Fielder's Longburn manufacturing site is adjacent to the Fonterra factory and accepts raw milk from Fonterra to produce the Meadow Fresh range of milks and yoghurts, as well as specialist yoghurt and other products (over 200 different products in total).
31. The combined Longburn site (i.e. the Fonterra and Goodman Fielder dairy manufacturing sites) employ approximately 300 people and contribute \$25m per annum to the local economy. The Goodman Fielder factory is of key importance because it supplies a large portion of the North Island's packaged fresh white milk and is the major supplier of dairy foods product for all of New Zealand.
32. In summary, Dannevirke, Pahiatua and Longburn are just three examples of rural communities that are close to where we live. Across the region, there are many communities just like these who rely on, and revolve around, farming (particularly dairy farming).

Our farm

33. Four years ago, Jo and I became 50% equity partners in the company that owns Te Angi farm, the herd, the plant and machinery. We contract milk for the equity partnership (so we are responsible for the day to day management of the farm). We are still technically classified as “sharemilkers” because a sharemilker is normally anyone with up to 50% ownership.
34. When we bought the farm it did not have an effluent consent or an intensive land use consent under the One Plan. The effluent consent had lapsed, the previous owner had applied for consent and a draft consent has been approved. However, Council won't issue the effluent consent until we have an intensive land use consent (which we can't obtain because we can't meet the CNLMs in Table 14.2).
35. The only reason we could afford the farm was because it didn't have resource consents. I estimate that the price we paid was 20% lower because of this. We were very lucky that our bank backed us – I'd be surprised if the bank would be willing to do this in the current economic conditions. We took the risk of buying the farm without resource consents because, at the time, we felt we had a good understanding of the situation – we'd been farming in the area and had been involved in the One Plan process. But we never thought that we'd be four years down the track and still not have a consenting pathway.
36. Since we took over the farm, we have had four tough years. We had two droughts, followed by two years of almost constant rainfall. Despite these challenges, and without making much money, we have worked hard to develop the farm, and improve our environmental footprint. Jo works full time as a planner at the Tararua District Council, and her income helps keep us afloat and helps us to repay the debt we took to buy into the farm.
37. In 2021, Fonterra produced a Tiaki Farm Environment Plan for Te Angi farm. The Tiaki farm plan identifies good farming practices, and additional practices relevant to dairy industry goals, for general farm management, land and soil management, irrigation management, effluent management, waterways and biodiversity management, and nutrient management. A

copy of our Tiaki farm plan (with confidential information redacted) is attached as **Annexure AP2**.

38. As Fonterra suppliers, each year Fonterra provides us with a Farm Insights Report. A copy of our 2022/23 Farm Insights Report (with confidential information redacted) is attached as **Annexure AP3**. The Farm Insights Report contains a summary of our key statistics for the past three seasons, as well as key information about how our farm has performed in terms of Fonterra's environment, milk quality and animal welfare assessments.
39. We operate a low input, low cost farm system. By comparison with other farms in the Tararua District, our stocking rate of 2.3 cows per hectare is lower than the average of 2.63 cows per hectare, but our farm size of 129 effective hectares is very closer to the average farm size of 130 effective hectares. Our total milk production of 653kgMS/effective hectare is below the average for the Manawatu of 1,043kgMS/effective hectare.² We are working hard on improving our productivity (e.g. reducing cow empty rates and calving spread) but, as I explained above, mother nature has made the past four years pretty challenging.
40. DairyNZ categorises farms into one of five production systems based on when imported feed is fed to dry or lactating cows, and the amount of feed that is imported or the amount of off farm grazing. We are a System 3 farm. The range is from System 1 (100% home grown feed with all adult stock remaining on the dairy platform all year round) through to System 5 (50-60% of total feed is home grown and more than 31% of feed is imported). System 3 farms are those that grow 80-89% of feed at home and import 11-20% of feed to extend lactation and for wintering dry cows. These definitions are not intended as a ranking system or any indication of DairyNZ's preferences.
41. By way of overview of our farm system:
 - a. In 2022/23, we milked 305 cows peak and had a stocking rate of 2.3 cows per hectare.

² All based on the 2021/22 DairyNZ statistics
<https://www.dairynz.co.nz/media/uzeekwgr/nz-dairy-statistics-2021-22-web.pdf>

- b. We produced 84,251 kilograms of milk solids.
- c. The typical milking season runs from 5 August to the end of May. We milk twice a day until December, then we go to 16 hourly milking until the end of March, then once a day milking until the end of May.
- d. Around two thirds of the milking herd are wintered off the milking platform for eight to ten weeks from early June, and the majority of the young stock are grazed off farm from weaning.
- e. We applied 41kgN/ha/yr in fertiliser in 2022/23.
- f. We imported 246tDM in supplementary feed (with a total nitrogen content of 32kgN/ha) and grew 96% of our feed on farm in 2022/23.
- g. We have a summer and winter cropping programme as part of a re-grassing programme and to supplement pasture grown. In the past, summer crops have included turnips and plantain, and winter crops have included oats, peas and barley. In 2022/23, we cropped 4% of the farm.
- h. The effluent system involves collecting effluent and wastewater from the yard, transferring it to a sump and then either pumping it straight to land or to the lined effluent pond. The effluent irrigation area is 16ha of well-drained soils (which is considered low risk because slope is less than 7 degrees) and effluent is irrigated via a travelling irrigator.
- i. We have a resource consent for our water take for the dairy shed (water is used to cool milk, and that water is then recycled and used for washing down the shed and yards³).

42. Also relevant, are our land, soils and climate:

³ Water is vital for bringing the milk temperature down from around 30 degrees to an industry milk quality standard of less than 18 degrees, on entering the milk silo. Water is then used to wash the milking plant and equipment (high quality hot and cold water, along with detergents are required to keep milking plant clean and free of bacteria). Finally, water is used to wash out the dairy shed and the wastewater and effluent are then recycled back onto dairy farm pastures.

- a. Our farm is located in a valley in the Ruahine Ranges. It is over 300m above sea level.
 - b. The contour of the farm is varied, with flats around the cowshed and across the river, to rolling and some steep hill country out the back of the farm.
 - c. Our farm fronts 3km of the Whakaruatapu Stream (a tributary of the Manawatū River), and two unnamed tributaries of the Whakaruatapu Stream run through our farm. The streams are fenced for stock exclusion and are heavily vegetated. As I explain below, we monitor the water quality of the Whakaruatapu Stream (taking monthly samples).
 - d. Our average rainfall is around 1,500mm per year. We do not irrigate.
 - e. Our average annual temperature is 12 degrees.
 - f. The soils are Matamau silt loam and Kopua silt loam (both well draining).
43. Photograph 3 below shows what the rolling part of our farm is like, with the Ruahine Ranges in the background.



Photograph 3: Me with our milking herd and showing some of the rolling hills out the back of our farm

Resource consent under One Plan

44. We are located in the Upper Manawatū and Weber-Tamaki (upstream of Tamaki Confluence) WMZ, which is one of the target WMZs where dairy farmers are required to obtain resource consent under the Chapter 14.1 rules the One Plan. We cannot meet the CNLMs in Table 14.2 of the One

Plan (the mix of LUC classes on our farm, combined with the nitrogen loss numbers for each LUC class is a killer) and we do not have a resource consent. We are unable to apply for consent until PC2 becomes operative.

45. While we are waiting for PC2 to become operative, we have not been sitting on our hands. We have been proactively taking steps to improve our farming practices and make changes to our farm system to reduce our nitrogen loss.
46. As explained above, in 2021 Fonterra prepared a Tiaki farm plan for Te Angi farm (Annexure AP2). That plan identified a list of eight actions (good farming practices and other practices relevant to industry goals) that we were to complete by dates ranging from 31 May 2021 to 22 December 2022. We have now completed all of those actions.
47. In 2019, we joined DairyNZ's Tararua plantain research project as a plantain partner case study farm. We did this because we felt it was the right thing to do, environmentally, to reduce our nitrogen losses and reduce our environmental footprint.
48. DairyNZ started the Tararua Plantain Project in 2018. The project worked with farms in the Tararua District to see how plantain could be incorporated into pastures to reduce nitrogen loss. It was wound up this year and has now been moved into a national plantain project being run by DairyNZ.
49. Ecotain plantain reduces nitrogen leaching by increasing cows' urine volume, therefore diluting the total amount of nitrogen excreted in urine. Plantain also retains nitrogen in the soil, preventing it from entering waterways. Plantain is an upright perennial herb that can be sown as a specialist crop or sown in a pasture mix.
50. Since 2019, we have been progressively incorporating plantain into our pasture by planting around 6ha of plantain per year, as well as incorporating plantain into other grass mixtures that are sown in other paddocks and by over sowing (spreading plantain seed over existing pastures and focusing on damaged areas of bare soils). I would say that 60% of our farm now has a reasonable coverage of plantain and it makes

up around 10% of the pasture sward. We are currently trialling methods of weed control (one of the downsides of plantain is that it is particularly susceptible to pesticides) and broadcasting (over sowing) plantain at lower rates.

51. In combination with planting plantain, we have been exploring options to change the mix of feed we grow to reduce our nitrogen loss. Whereas we previously grew summer crops (turnips and chicory) and winter crops (oats, peas and barley), the only cropping we do now is to direct drill a 6ha plantain crop. We also direct drill short rotation grass. We are working on getting our plantain up to 20% of the pasture sward.
52. Plantain is not for everyone and it is no silver bullet. It takes time to get a reasonable coverage in the pasture (farms need to re-grass and over sow paddocks whilst maintaining an operational farm). It takes careful management of feed to be able to move away from other crops, and the ability to do this will vary depending on the farm system (and level of imported feed) but also the soils and climate (and therefore dry matter produced by plantain crops). There is also the added burden of weed management.
53. As part of the plantain project, DairyNZ has been taking monthly water quality samples from Whakaruatapu Stream on our farm for the past three years. DairyNZ tests nitrogen, phosphorous, turbidity and E coli, and it also does an annual macroinvertebrate index (**MCI**) assessment. As part of preparing my evidence, I contacted the Principal Water Quality Scientist at DairyNZ (Craig Depree) to get an update on DairyNZ's monitoring results for the testing site on our farm. Dr Depree told me that we are in a 755ha catchment that is all in pastoral land use (largely drystock). He said that, on a three year average basis, our MCI score is 117 (compared with a One Plan target of 100), and our DIN is 0.19mg/l (compared with a One Plan target of 0.444mg/l).

Overseer

54. As part of the plantain project, DairyNZ modelled three scenarios (using Overseer) that could reduce our nitrogen loss. While DairyNZ has done some modelling of our nitrogen loss using Overseer, we do not have our own Overseer subscription or access to our data.

55. Table 1 below shows our nitrogen loss in 2020/21 and for the three scenarios DairyNZ modelled.

Table 1: Overseer N loss numbers under different scenarios

Scenario	Description of feed grown	Nitrogen loss (kgN/ha/yr)
2020/21	Baseline: 5ha winter oats, 3ha turnips, 4ha peas and barley, no plantain	37
1	Removal of 5ha of winter oats	34
2	Removal of 6ha of homegrown cereal silage and winter oats	33
3	Removal of oat and turnip crops, removal of homegrown cereal silage and addition of plantain in 20% of pasture sward	28

56. The above scenarios were for illustrative purposes only. So far, we have stopped growing winter and summer crops (and instead grow a 6ha plantain crop), and we have incorporated 10% of plantain into our pasture sward. While I do not know what our current Overseer nitrogen loss number is, based on the above table it could be around 33kgN/ha/yr.
57. The above scenarios also show a reduction against the 2020/21 baseline. I understand that the decisions version of PC2 required a 20% reduction in Overseer N loss against a 2012/13 baseline. We weren't farming Te Angi farm in 2012/13 so I do not know what our baseline number is (and therefore the level of reduction we would have been required to make). However, it is likely that we wouldn't be required to make much of a reduction to our current Overseer number because of the practice changes and other mitigations we have implemented since taking over the farm.

Nitrogen risk score

58. I understand that Fonterra calculates a nitrogen risk score for its farmers but it does not provide farmers with their nitrogen risk score number. Instead, Fonterra provides us with information about our risk rating (e.g. very high, high, medium etc) for each factor in the nitrogen risk scorecard (as set out on pages 5 and 6 of Annexure AP3). Fonterra does not provide farmers with an Overseer number and I understand Fonterra has not used Overseer for its farmers since 2017/18.

59. As part of preparing my evidence, I asked Fonterra to provide me with my nitrogen risk score “number” for the 2022/23 season. Attached as **Annexure AP4** is a copy of the nitrogen risk scorecard information I was provided. My risk score is 111.
60. On its own, a risk score of 111 does not mean anything to me – I do not know if this is high or low, or good or bad.
61. Dr le Miere has advised me that the nitrogen risk scorecard that is proposed for PC2 has an additional mitigation (that is not included in Fonterra’s calculation) to recognise the reduction in nitrogen risk on farms that have incorporated plantain into their farm system. Dr le Miere told me that my risk score would reduce by 10% because we have incorporated 10% plantain into our pasture sward. This would mean that my nitrogen risk score would be 100, for the purposes of the Council’s proposed amendments to PC2.
62. Dr le Miere has advised me that, based on the rainfall band and profile available water category that would apply to our property, we would have a target nitrogen risk score of 130 (in the matrix the Council has proposed in its PC2 provisions). This gives me confidence that I would qualify for the controlled activity pathway and, if that was available (i.e. if PC2 is operative), I would make that application.
63. To provide some context for our risk number and farm system, and where we are relative to others, we are well below the 50th percentile (or average farm) risk score of 140.⁴ This makes sense to me because we operate a low input, low cost farm system with fewer cows per hectare than the average dairy farm in the Tararua District. We are low or very low risk for all of the nitrogen risk scorecard factors, except for cropping and cultivation for which we have a medium ranking. We are proactively reducing our cropping and cultivation risk by direct drilling a 6ha plantain crop and by increasing the percentage of plantain in our pasture.
64. If the controlled activity pathway in the Council’s provisions was available, I would get my consent application in as quickly as I could. As explained above, we have an effluent consent that is on hold until we have our

⁴ Statement of Evidence of Dr Paul le Miere at paragraph 47(a).

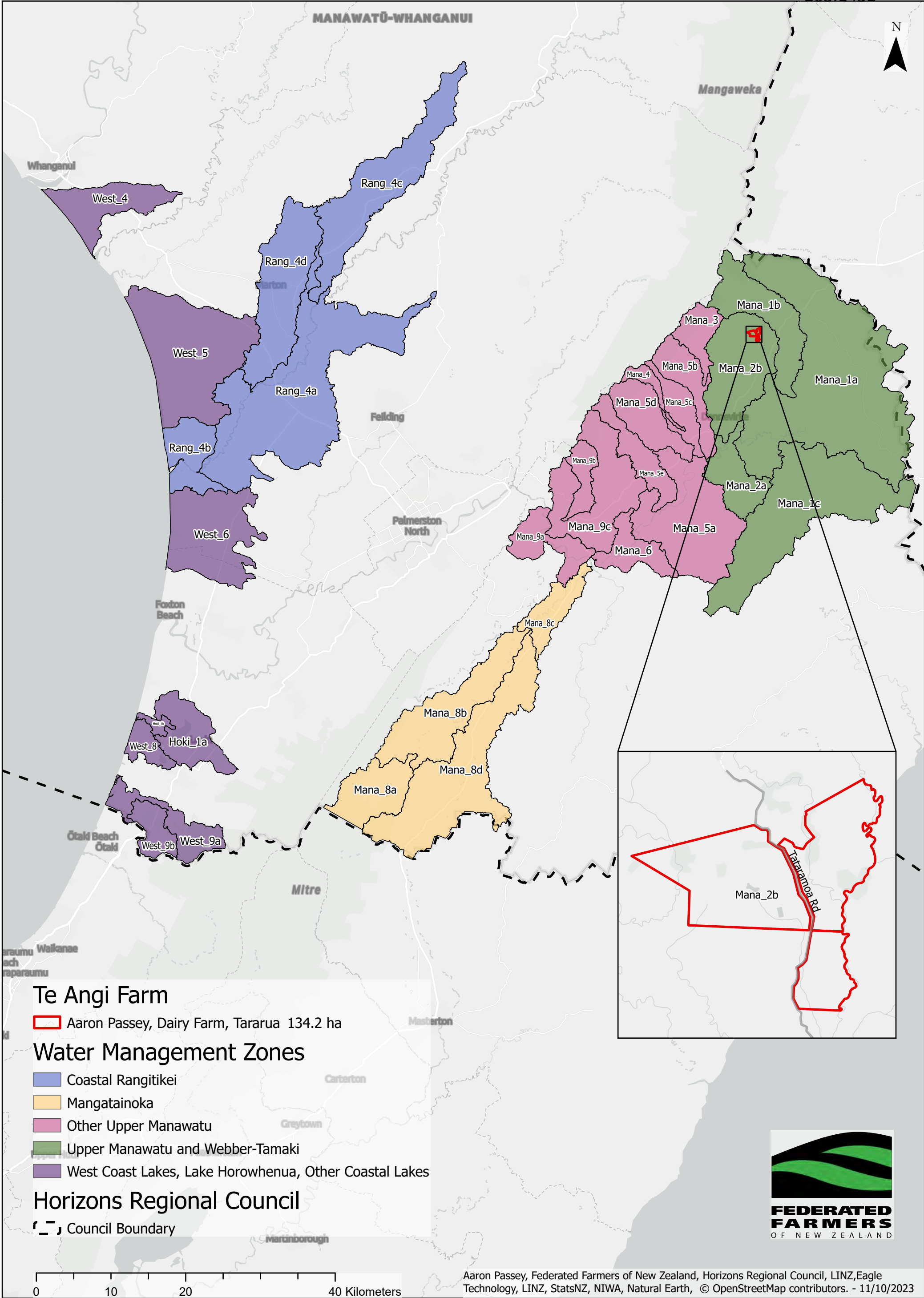
intensive land use consent. We really don't like being in this position and are keen to have everything ticked off and "legal" as soon as possible. I'd also hope that getting the consents would reduce our debt servicing cost (and that's a big incentive in itself). I think that the other unconsented farmers are likely to be in the same or similar situation.

Uncertainty for unconsented farmers

65. The unconsented farmers in the target WMZs have been dealing with uncertainty for a long time now (it's seven years since Horizons stopped issuing consents). Initially, I observed quite a few farm sales and conversions from dairy to drystock. However, that's tapered off now either because uncertainty has become the new normal or because those farms that are left can't afford to take the hit in terms of selling their land for a lower price (than if they were consented) or converting to a less profitable land use.
66. My observation is that it is when there is a need to change, e.g. for personal reasons (such as illness, injury, relationship break up) a farmer needs to sell the farm or increase borrowings, that the uncertainty associated with being unconsented becomes a big issue. The rest of the time I would describe it as bubbling away in the background – it's always there but we can't control it so we try to get on with business as usual.
67. In saying this, I do still worry about how and when this is all going to end. I worry about how much resource consents will cost, what we will have to do to get consent, how long we will be granted consent for, and how much notice we be given about a new consenting regime. These are the kinds of worries that are always on the back of my mind, but they are out of my control and they are not something I can currently plan for.
68. I support PC2 because it would help to give us back a certain amount of control over our destiny – we could finally plan and move forward, and stop living in limbo.

A Passey

13 October 2023





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

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FARM DETAILS

SUPPLIER NUMBER

[REDACTED]

FARM OWNER

Te Angi Farm Limited

[REDACTED]

PLAN OWNER

FARM ADDRESS

[REDACTED]
[REDACTED]

LOCATION



REGIONAL COUNCIL

Horizons

PLAN LAST EDITED

16 April 2021

POINTS OF NOTE

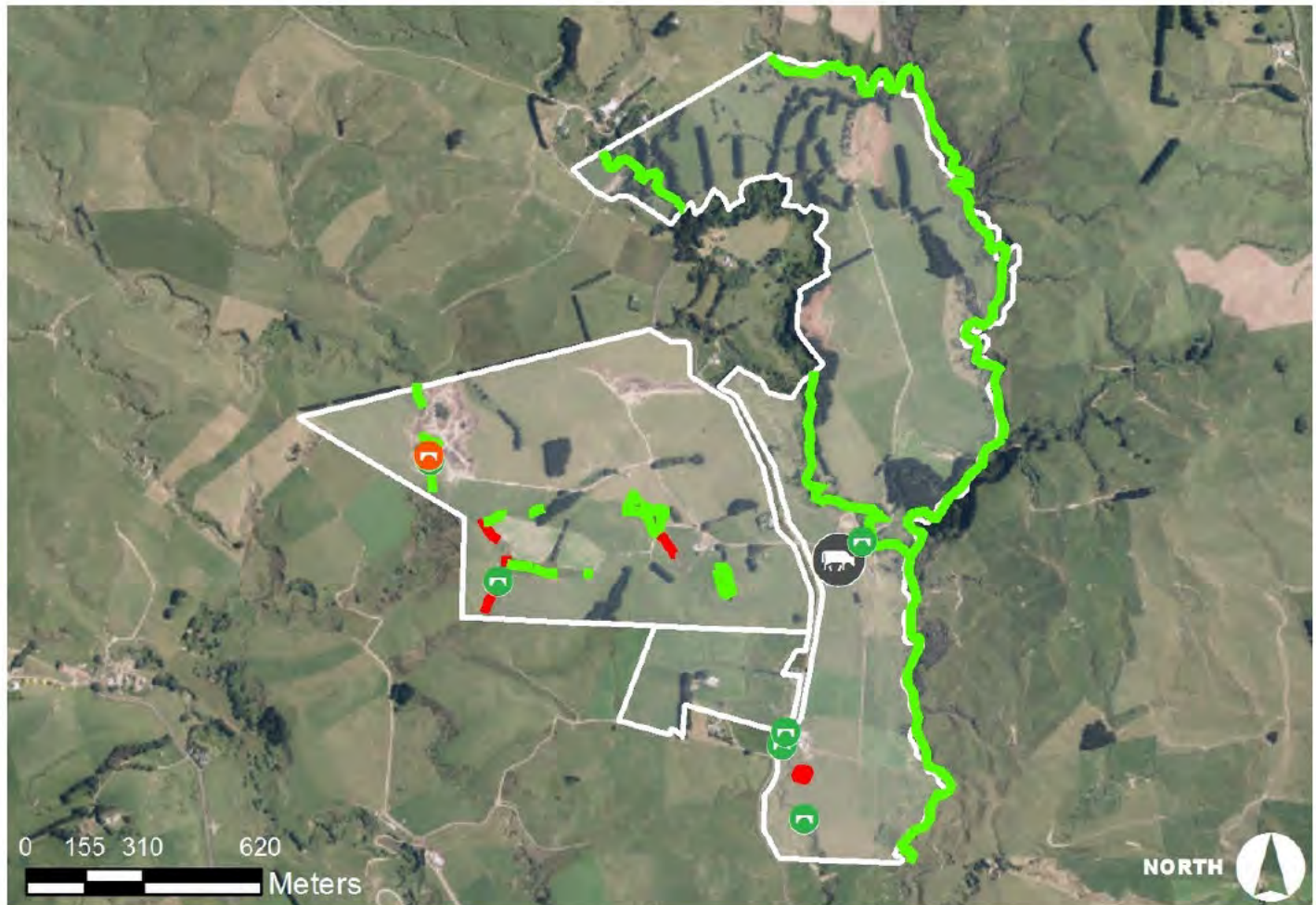
* Horizons Priority Catchments
 Weber-Tamaki : 174.70 ha - 100.00 %.
 * NZLRI Land Use Capability
 6e 9: 0.04 ha - 0.02 %.
 4e 7: 0.18 ha - 0.10 %.
 7e34: 17.10 ha - 9.79 %.
 2s 9: 3.45 ha - 1.97 %.
 2s 9: 49.90 ha - 28.56 %.
 4e 7: 104.03 ha - 59.55 %.

LAND PARCELS

[REDACTED]

FARM OVERVIEW MAP

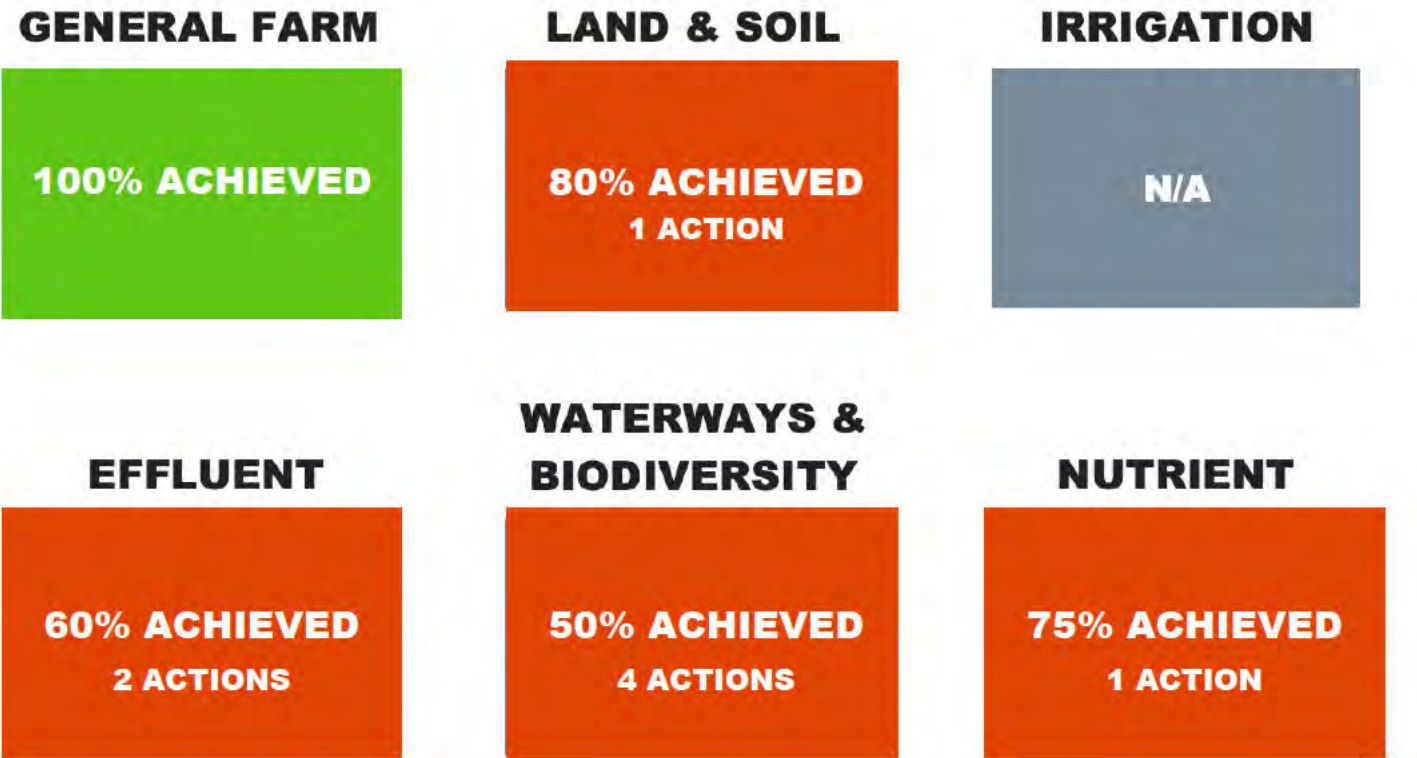
The map below presents the land in which the farming operations covered in this document occur and identifies some key points of interest. More detailed maps looking at specific environmental management topics are contained throughout the document.



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

GOOD FARMING PRACTICES

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



GOOD FARMING PRACTICES

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

GENERAL FARM MANAGEMENT

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

LAND & SOIL MANAGEMENT

Manage farming operations to minimise direct and indirect losses of sediment and nutrients to water, and maintain or enhance soil structure, where agronomically appropriate	ACHIEVED
Reduce periods of bare soil between crops and pasture to reduce erosion and leaching	ACHIEVED
Retire all LUC 8 land and retire LUC 7e land or ensure that it has soil conservation measures in place	ACHIEVED
Use appropriate paddocks for intensive grazing	ACHIEVED
Manage grazing to minimise nutrient loss from risk areas	1 ACTION(S)

IRRIGATION MANAGEMENT

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

GOOD FARMING PRACTICES

EFFLUENT MANAGEMENT

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

WATERWAYS & BIODIVERSITY MANAGEMENT

Identify areas where runoff may occur and manage to avoid runoff entering waterways	1 ACTION(S)
Tracks, feed areas, gateways and troughs are located away from waterways	ACHIEVED
Stock are excluded from waterways	3 ACTION(S)
*Areas of native plants or significant biodiversity are protected	ACHIEVED

NUTRIENT MANAGEMENT

Monitor and maintain P levels at the economic optimum	ACHIEVED
Fertiliser application matches plant requirements and minimises losses	ACHIEVED
Spreading equipment is well maintained and calibrated	ACHIEVED
*General Nutrient Management	1 ACTION(S)

ACTIONS & RECOMMENDATIONS

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

CURRENT ACTIONS

		Target Date
	 Ensure all cropping information is recorded in end of season FDRs	31 May 2021
	 Temporarily fence ephemeral waterways and/or wet areas	15 Dec 2021
	 Create track cut-outs before culvert	15 Dec 2021
	 Manage winter crop placement and grazing to minimise nutrient loss	15 Feb 2022
	 Bucket test effluent irrigator	15 Mar 2022
	 Implement a Effluent Management Plan	15 Apr 2022
	 Disestablish old effluent pond	31 May 2022
	 Permanently fence waterway	22 Dec 2022

FUTURE ACTIONS

Target Date

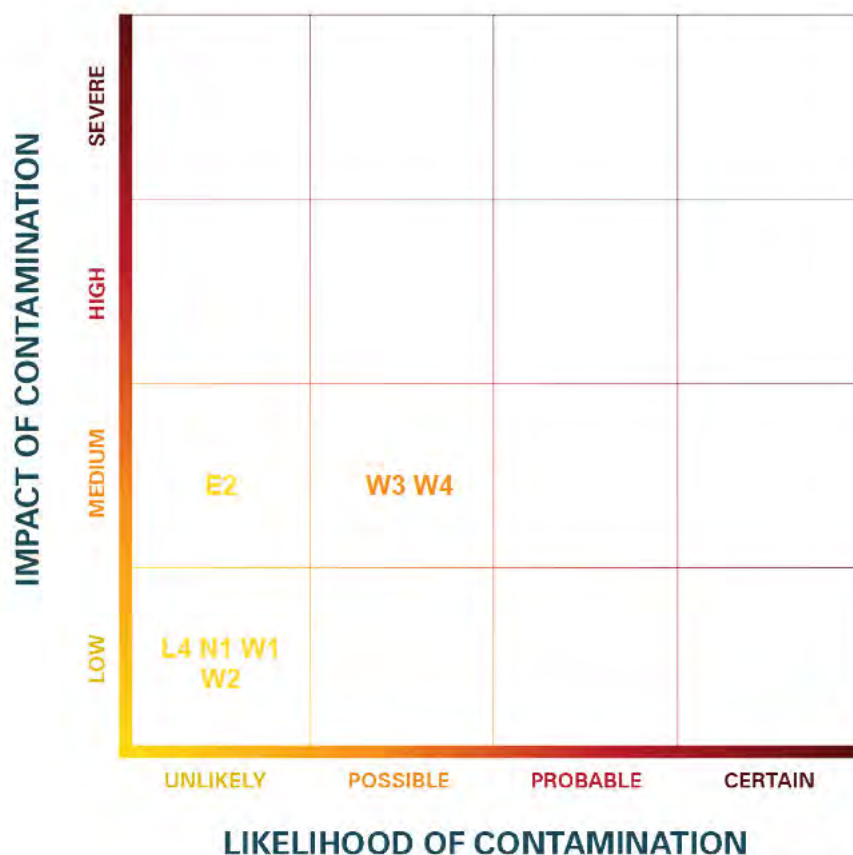
RECOMMENDATIONS

Target Date

	Install secondary catchment for fuel tank
	Monitor leachate from silage stack
	Retire and plant erosion prone areas

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:

IMPACT OF
CONTAMINATION



+



LIKELIHOOD OF
CONTAMINATION

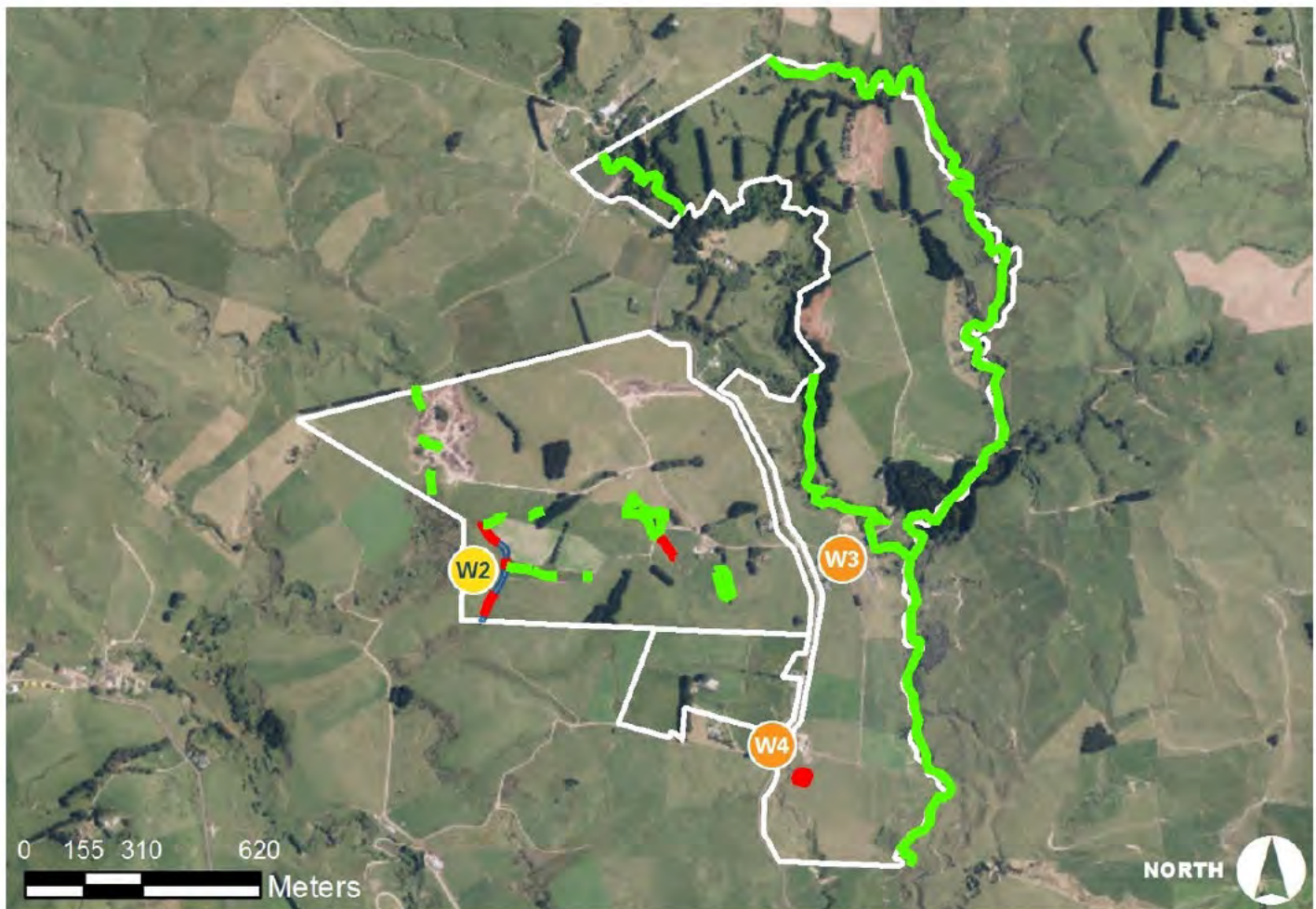
=

LOW RISK RATING

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



- L4 Cropping
- E2 Effluent Overview
- W1 Waterways & Biodiversity Overview
- W2 Intermittent Waterway

- W3 Crossing
- W4 Old effluent pond
- N1 Nutrient Overview

MAHI WHAKAHAERE GENERAL FARM MANAGEMENT



- F5** Farm Overview
- F8** Infrastructure, storage, waste Overview
- F10** Water Use Overview
- F11** Key Feature - Silage Stack - Peas and Barley
- F12** Key Feature - Silage pit

- F13** Key Feature - PKE storage shed
- F14** Key Feature - Fuel Storage
- F15** Key Feature - Water take
- F16** Key Feature - Offal hole

FARM MANAGEMENT

GOOD FARMING PRACTICES

Identify a farms environmental characteristics and plan for their management

Practices:

The physical and biophysical characteristics of the farm system are identified, risk factors to water quality associated with the farm system have been assessed and are managed appropriately

ACHIEVED

Maintain records of good environmental management

Practices:

Accurate and auditable records of annual farm inputs, outputs and management practices are maintained.

ACHIEVED

Store and load fertiliser with minimal spillage and leaching

Practices:

Storage sites are located away from waterways
Stored fertiliser is covered

ACHIEVED

Store, transport and distribute feed with minimal wastage, leachate and soil damage and leaching

Practices:

Feed storage areas are located away from waterways
Silage is sufficiently wilted before being put into stack
Silage remains sealed while stored to prevent rotting

ACHIEVED

*Farm waste is minimised and managed properly

Practices:

Waste is recycled where possible
On-farm waste pits are small, away from waterways, and above the water table
Pests are controlled

ACHIEVED

*Water use for the dairy shed and stock water is efficient

Practices:

All water use on farm is measured (water meters)
Water wastage is minimised from the dairy shed
All leaks are fixed as soon as possible
Water troughs are checked daily where animals are grazing

ACHIEVED

*Additional GFP relevant to the dairy industry goals

FARM MANAGEMENT

FARM OVERVIEW

F5

Te Angi [REDACTED] is a 135ha effective farm. It is located on [REDACTED] in the Upper Manawatu priority catchment area in the Horizons Regional Council Region. The farm is managed in two main blocks, split into; main pastoral and effluent blocks. The farm peak milks 300 Friesian cows, twice-a-day until December and then the herd goes onto 16hourly milking until end of March, then onto OAD. A typical milking season runs from the 5th August through until the end of May. Production for the 2019/20 season was 86,889kgMS and the past three seasons average was 85,381kgMS. Half of the milking cows are wintered off the milking platform for six weeks from early June. The majority of young stock are grazed off farm from weaning.

The contour of the farm is varied, from flats around the cow shed and across the river, to rolling and some steep hill country out the back of the farm. The farm operates under existing effluent discharge and water take consent from Horizons Regional Council. Auditable farm environmental records are kept, such as consents, soil test results and fertiliser application records. This Farm Environment Plan identifies the environmental characteristics of the farm through a risk based approach and the adoption of good farming practices.



FARM MANAGEMENT

INFRASTRUCTURE, STORAGE, WASTE OVERVIEW

F8

Fertiliser enters the farm and is generally spread by contractor immediately. Some Urea is stored on farm in 1 tonne bags.

Fuel storage on farm consists of one above ground split tank (500l petrol and 500l diesel). It is not bunded to contain possible spills (required for tanks over 3000L). Fuel storage is located well away from waterways and critical source areas.

Feed storage infrastructure consists of a concrete lined bunker and a metal lined pad for silage storage (peas and barley silage this season) at the old cow shed. This is located well away from waterways and critical source areas. There is no sump to contain leachate. PKE is stored on concrete in a shed. Other feed stored on farm is wrapped baleage.

For waste management on farm, recycling services (Agrecovery) are utilised for plastics drums and containers. Plasback bags are used for recycling baleage wrap. There is an offal pit for dead animals. This is located 20m away from a waterway and above the water table (planning to relocate).

ACTIONS | RECOMMENDATIONS

Target Date



Monitor leachate from silage stack

Monitor area around silage stack and ensure overland flow and rain water can be diverted away from the area to prevent rotting and reduce the likelihood of leachate generation. Spread carbon rich material (eg sawdust) to capture small amounts of leachate, if any is being generated.



Install secondary catchment for fuel tank

Install a containment system to capture any small fuel leaks. This can include a drip tray or bund.



FARM MANAGEMENT



FARM MANAGEMENT

WATER USE OVERVIEW

F10

Water for the farm comes from a tributary of the Whakaruatapu stream which is pumped to the cow shed holding tank for shed use and stock drinking.

There is a water take consent (ATH-2009013004.00) to take 42 cubic metres/day expiring 1/6/2026. There is a water meter at the cow shed which is manually monitored.

As some water saving initiatives, cooler water at the cowshed is recycled and used for wash down and there is a scraper on the yards backing gate. Troughs are checked for leaks daily where animals are grazing.

Water Meter	Yes
-------------	-----



FARM MANAGEMENT



The image shows a 'Water Permit Inspection Report' form from 'horizons' (a division of the Department of Environment and Natural Resources). The form is titled 'Water Permit Inspection Report' and includes a 'Compliance Indicator' section with a green checkmark and the word 'yes'. Below this, there are fields for 'Date' (2014-12-02), 'Inspector' (Kate Rygiel), 'Compliance Type' (Routine), 'File' (4-1-EMJ), 'Consent' (106020), 'Duty Number' (47228), 'Consent Holder' (Stephen Thomas Davulov), 'Site Contact' (Jeffrey Sweetman), 'Phone' (06-3743253), and 'Email' (s.davulov@hug.co.nz). The form is divided into two sections: 'SECTION 1: WATER SOURCE AND USE' and 'SECTION 2: WATER USE REQUIREMENTS'. Section 1 includes fields for 'Water Source' (Dedicated Water Take), 'Where Used' (Agricultural Production / Domestic), 'Abstraction Volume' (99.2), 'Consented Volume' (42), and 'Flow Meter Readings' (87000). Section 2 includes fields for 'Intake Screen' (Not Installed), 'Backflow Device' (Installed), and 'Intake Screen' (Not Installed). There are handwritten notes at the bottom: '300 m/s' and 'Expend 1/10 photos'. The 'horizons' logo is at the bottom right.



WHENUA ME TE ONE LAND & SOIL MANAGEMENT



L3

Land & Soil Overview

L4

Cropping

LAND & SOIL MANAGEMENT

GOOD FARMING PRACTICES

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

Practices:

Pugging and compaction of soils is avoided
Supplement feed-out areas are located away from waterways

ACHIEVED

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

Practices:

Bare paddocks are re-sown as soon as practical
Cover crops (e.g. oats, mustard) are used to reduce losses and increase soil organic matter

ACHIEVED

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

Practices:

Any LUC 8 and 7e land on the property is identified
LUC 8 and 7e land areas are permanently fenced off

ACHIEVED

Use appropriate paddocks for intensive grazing

Practices:

Low risk paddocks are selected for intensive grazing that are ideally: --Further away from waterways --With soils least likely to pug and compact --Flatter with as few gullies and swales as possible

ACHIEVED

Manage grazing to minimise nutrient loss from risk areas

1 ACTION(S)

LAND & SOIL MANAGEMENT

LAND & SOIL OVERVIEW

L3

The farms contour is varied, from flats around the cow shed and across the river, to rolling and some steep hill country out the back of the farm. It consists of predominantly LUC 4 class land and LUC 2 throughout the flats. There are also areas of LUC 7 along the boundary of the Whakaruatapu stream. The LUC 7 class land is stock excluded for the milking cows. Some areas are in pines and some scrubby gullies allow limited access for young stock only.

The regional scale soil maps for the farm indicate it is located on Matamau silt loam and Kopua silt loam (both well draining).

Races are generally in good condition, with compacted lime surfaces. Race maintenance is carried out annually on high use areas.

ACTIONS | RECOMMENDATIONS

Target Date

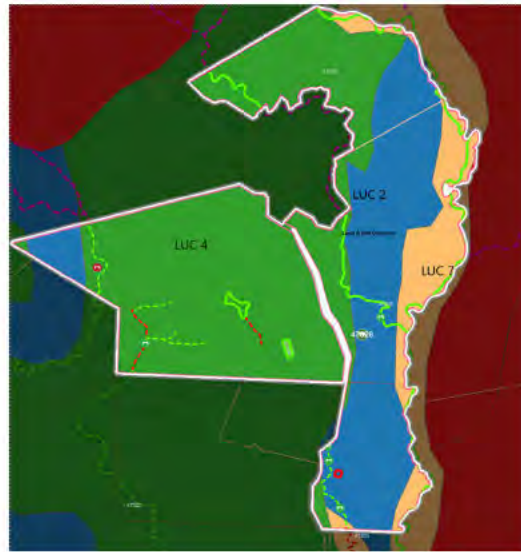


Retire and plant erosion prone areas

Plant steep areas that may show evidence of slumping, this could be done with poplar poles or a combination of natives.



LAND & SOIL MANAGEMENT



LAND & SOIL MANAGEMENT

CROPPING

L4

IMPACT OF
CONTAMINATION

+

LIKELIHOOD OF
CONTAMINATION

=

LOW RISK RATING

The farm has a summer and winter cropping programme as part of its regrassing programme and to supplement pasture grown.

Summer crops include:

- Turnips. Approximately 3ha of turnips have been grown each year (conventional cultivation). However, no turnips are being grown from next season.
- Plantain. 6ha of straight Plantain is also grown annually (conventional cultivation).

Winter crops include:

- Oats. 4.5ha has been sown this season for the first year. This is grazed in situ by cows that remain on the platform through winter and early calvers.
- Peas and Barley. 4ha annually. Cut and carried and fed out as silage through the milking season.

Grass buffers are left between any waterways and cropped areas. Paddock selection for crops is based on a farm rotation and the regrassing programme. Regrassing takes place as soon as soon as possible, depending on weather conditions.

Plantain is also oversown in 1 year old pastures with an aim of achieving a 30% sword across the milking platform.

Cultivation type	Conventional
------------------	--------------

ACTIONS | RECOMMENDATIONS

Target Date

- | | | |
|---|---|--------------------|
| <div style="display: inline-block; width: 20px; height: 20px; border: 1px solid black; margin-right: 5px;"></div> <div style="display: inline-block; width: 20px; height: 20px; background-color: yellow; border: 1px solid black; margin-right: 5px;"></div> | <p>Manage winter crop placement and grazing to minimise nutrient loss – To Achieve GFP</p> | <p>15 Feb 2022</p> |
|---|---|--------------------|

Follow good management practices around winter crop grazing to minimise nutrient loss from risk areas:

- Select low risk paddocks for intensive grazing that are ideally further away from waterways, soil least likely to pug, flatter (10 degrees or less) with few gullies/swales
- Leave riparian margins or buffer strips beside waterways and other areas where

LAND & SOIL MANAGEMENT

sediment & nutrients may flow such as gullies or swales

- Consider no tillage / low impact cultivation methods and timing
- When break feeding, feed towards the waterway i.e. start from the furthest away from the waterway.
- Move fences daily rather than offering a few days feed at a time
- Back-fence land that has already been grazed and use portable troughs
- Offer long narrow breaks rather than wide breaks
- Consider sowing crops across slopes not up and down where practical



WHAHAMĀKŪKŪ IRRIGATION MANAGEMENT

GOOD FARMING PRACTICES

Irrigation rates and timing match plant requirements

N/A

Design, calibrate and operate irrigation systems to use water efficiently

N/A

PARAKAINGAKI EFFLUENT MANAGEMENT



E2 Effluent Overview

E7 Key Feature - Effluent Pond

E9 Key Feature - Effluent sump

EFFLUENT MANAGEMENT

GOOD FARMING PRACTICES

Effluent system meets code of practice

Practices:

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

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

New systems: accredited designer has been used

ACHIEVED

Evidence:

Effluent system design plans

Sufficient suitable storage available

Practices:

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

Effluent is applied whenever possible to keep storage low

Storage facilities are sealed

Effluent solids that accumulate are routinely removed

ACHIEVED

Evidence:

Dairy Effluent Storage Calculator report

Storage design plans

Spreading equipment is well maintained and calibrated

1 ACTION(S)

Effluent applied at correct depth, rate and time

Practices:

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

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

Fertiliser applications are adjusted to effluent areas based on soil tests

ACHIEVED

*All effluent systems

1 ACTION(S)

*Additional GFP relevant to the dairy industry goals

EFFLUENT MANAGEMENT

EFFLUENT OVERVIEW

E2

IMPACT OF
CONTAMINATION

+

LIKELIHOOD OF
CONTAMINATION

=

LOW RISK RATING

The discharge consent for the farm expired in 2017 therefore it is currently operating under a temporary/draft consent; to discharge treated dairy farm animal effluent to land (APP-1996004130.02), expiring 01/7/2031, until an Intensive land Use Consent is accepted.

All effluent and contaminated water from the yard is captured and contained in yard drains, then flows into the stone trap/wedge, then onto the sump and is then either pumped straight to land or to the lined storage pond. There is a roof water diversion and no storm water diversion. A Dairy Effluent Storage Calculation was completed in 2013 when the pond was constructed. Solids will be pumped out by contractor when required.

The farm's effluent irrigation area is 16ha of well-draining soils, which are considered low risk for spreading effluent if the slope is less than 7 degrees. Effluent is irrigated to pasture via a travelling irrigator. Bucket tests are not routinely carried out. An Effluent Management Plan has not been developed at this point.

ACTIONS | RECOMMENDATIONS

Target Date

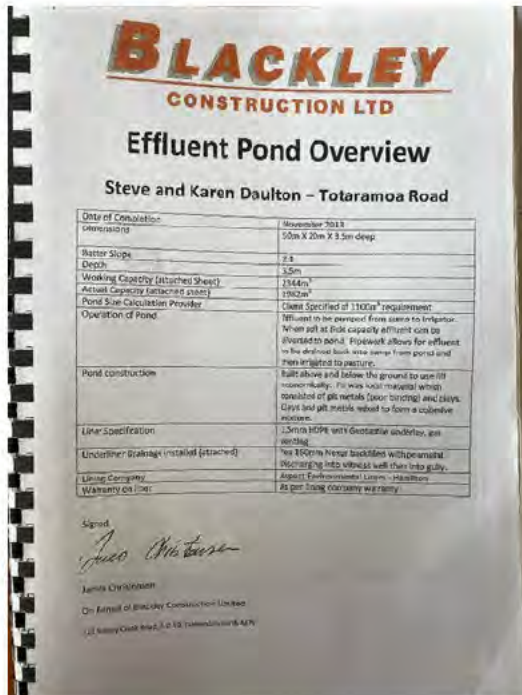
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|---|---|--------------------|
| <div style="display: inline-block; width: 20px; height: 20px; border: 1px solid red; margin-right: 5px;"></div> <div style="display: inline-block; width: 20px; height: 20px; background-color: yellow; border: 1px solid black; margin-right: 5px;"></div> | <p>Bucket test effluent irrigator – <u>To Achieve GFP</u></p> <p>Complete routine bucket testing (once per year) on the irrigator to assess a application depth and distribution uniformity of the effluent irrigated to land.</p> | <p>15 Mar 2022</p> |
|---|---|--------------------|

<https://www.dairynz.co.nz/environment/effluent/managingandoperatingeffluentsystems/>

- | | | |
|---|--|--------------------|
| <div style="display: inline-block; width: 20px; height: 20px; border: 1px solid red; margin-right: 5px;"></div> <div style="display: inline-block; width: 20px; height: 20px; background-color: yellow; border: 1px solid black; margin-right: 5px;"></div> | <p>Implement a Effluent Management Plan – <u>To Achieve GFP</u></p> <p>Develop an effluent management plan and keep this visible in the shed. An effluent management plan will ensure that all staff on farm know the rules, are fully trained in the operation and maintenance of the effluent system and know who to contact if there is a system breakdown. A DairyNZ template can be found at the following link;</p> | <p>15 Apr 2022</p> |
|---|--|--------------------|

<https://www.dairynz.co.nz/publications/environment/effluentmanagementplanposter/>

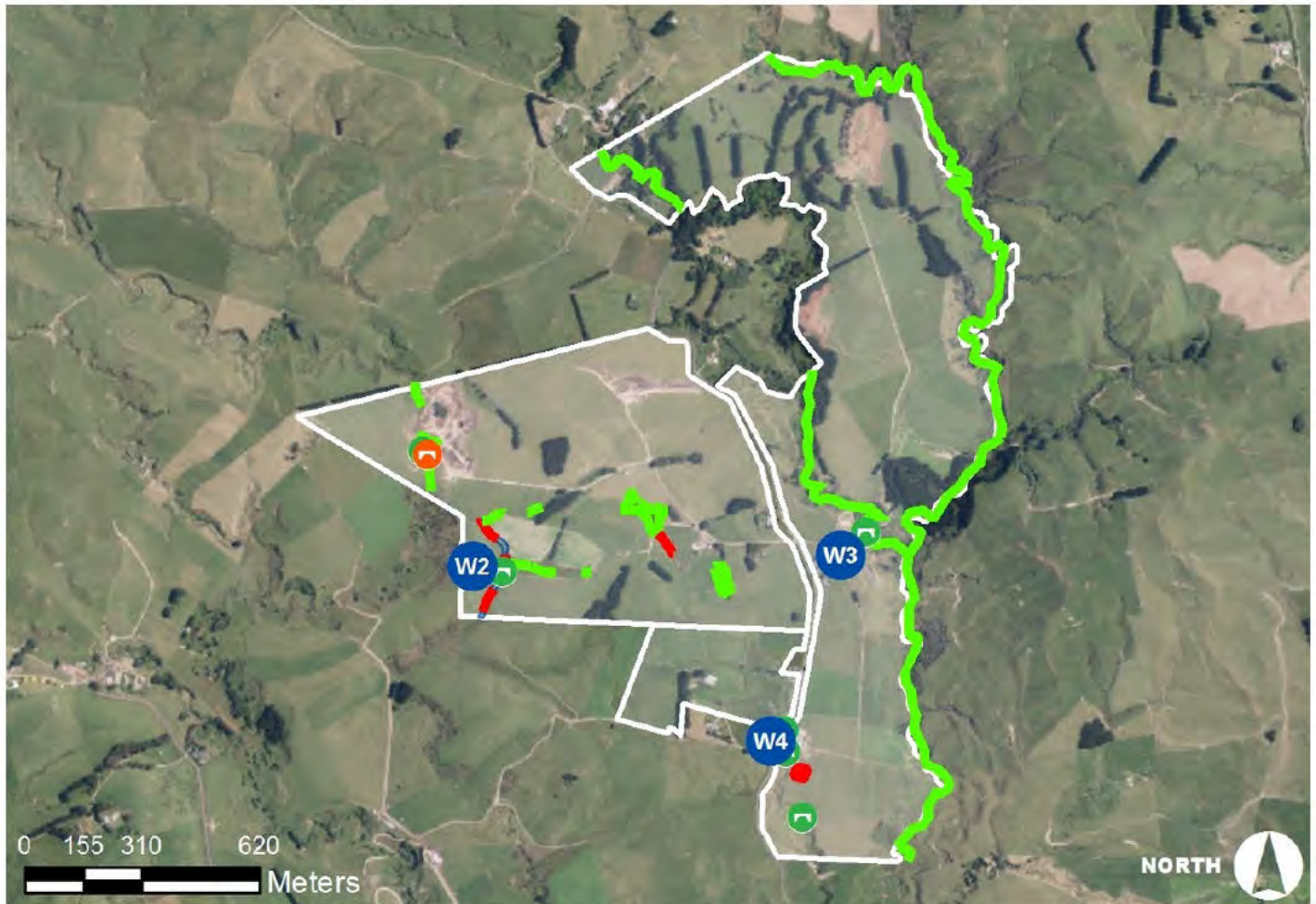
EFFLUENT MANAGEMENT



EFFLUENT MANAGEMENT



RARENGA RAUROI WATERWAYS & BIODIVERSITY MANAGEMENT



W1 Waterways & Biodiversity Overview

W2 Waterway Type - Intermittent Waterway

W3 Crossing

W4 Waterway Type - Old effluent pond

W5 Mahinga Kai

WATERWAYS & BIODIVERSITY MANAGEMENT

GOOD FARMING PRACTICES

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

1 ACTION(S)

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

Practices:

Supplement is fed out away from waterways

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

ACHIEVED

Stock are excluded from waterways

3 ACTION(S)

*Areas of native plants or significant biodiversity are protected

Practices:

Stock are fenced out of the area

Weeds are controlled within the area

Animal pests are trapped or poisoned

ACHIEVED

*Additional GFP relevant to the dairy industry goals

WATERWAYS & BIODIVERSITY MANAGEMENT

WATERWAYS & BIODIVERSITY OVERVIEW

W1

IMPACT OF
CONTAMINATION

+

LIKELIHOOD OF
CONTAMINATION

=

LOW RISK RATING

The Whakaruatapu Stream runs through the farm, this is fenced for stock exclusion and heavily vegetated. There are a number of other intermittently flowing and ephemeral waterways on farm, the majority of these are fenced. There are two sections that are unfenced currently. There is one large pond which is fenced and two old effluent ponds, one of which is unfenced.

Stock crossings over waterways are generally in good condition with grass buffers to filter sediment. There is one bridge at the back of the farm which allows access to one paddock, there is also a unculverted crossing next to it for vehicle access. Both are used irregularly.

Weed control on farm consists of boom spraying before cropping and spot spraying for common weeds when required around the rest of the farm. Pest control consists of traps around the sheds and Horizons Regional Council control possums and stoats with bait stations.

ACTIONS | RECOMMENDATIONS

Target Date



Temporarily fence ephemeral waterways and/or wet areas – To Achieve GFP

15 Dec 2021

Temporarily fence ephemeral waterways when they contain water.



WATERWAYS & BIODIVERSITY MANAGEMENT



WATERWAYS & BIODIVERSITY MANAGEMENT

INTERMITTENT WATERWAY

W2

IMPACT OF
CONTAMINATION

+

LIKELIHOOD OF
CONTAMINATION

=

LOW RISK RATING

There is a section of intermittent waterway that is currently unfenced. It has a grassy bottom and over 5 metres wide in some areas. There is a plan going forward to dam the area and create a wetland and fence it off to allow for an ideal bird life habitat and an improvement in biodiversity. A grant application is in place with the Game Bird Habitat Trust for funding and support around this initiative.

Waterway Type	Intermittent
---------------	--------------

ACTIONS | RECOMMENDATIONS

Target Date

22 Dec 2022



Permanently fence waterway – To Achieve GFP

Permanently fence waterway for stock exclusion. Fences should be constructed with a 3m setback to allow for rank grass buffers to establish. In the interim, use temporary fencing when stock are grazing the paddock.

NB: A waterway more than 1m wide at any point on a parcel of land is defined as a permanent or intermittent waterway. If it has any form of bed and flows at any time that is not directly linked to a rainfall event it is considered intermittent and therefore requires fencing.



WATERWAYS & BIODIVERSITY MANAGEMENT

CROSSING

W3

IMPACT OF
CONTAMINATION

+

LIKELIHOOD OF
CONTAMINATION

=

MEDIUM RISK RATING

There is a culvert crossing over a tributary of the Whakaruatapu Stream. It is in good condition with grass buffers however runoff after rain events has created a cut-out/drain which leads into the stream.

ACTIONS | RECOMMENDATIONS

Target Date



Create track cut-outs before culvert – To Achieve GFP

15 Dec 2021

Create cut-outs from the race to divert any runoff into the rank grass before the culvert to reduce the risk of any sediment reaching the waterway.



WATERWAYS & BIODIVERSITY MANAGEMENT

OLD EFFLUENT POND

W4



There is an old decommissioned effluent pond on the milking platform which is now just freshwater. It is currently unfenced. The plan is likely to fill it in.

Waterway Type	Pond
---------------	------

ACTIONS | RECOMMENDATIONS

Target Date

- 

Disestablish old effluent pond – To Achieve GFP

Disestablish the pond through draining and filling it in, alternatively permanently fence for stock exclusion.
- 31 May 2022



WATERWAYS & BIODIVERSITY MANAGEMENT

MAHINGA KAI

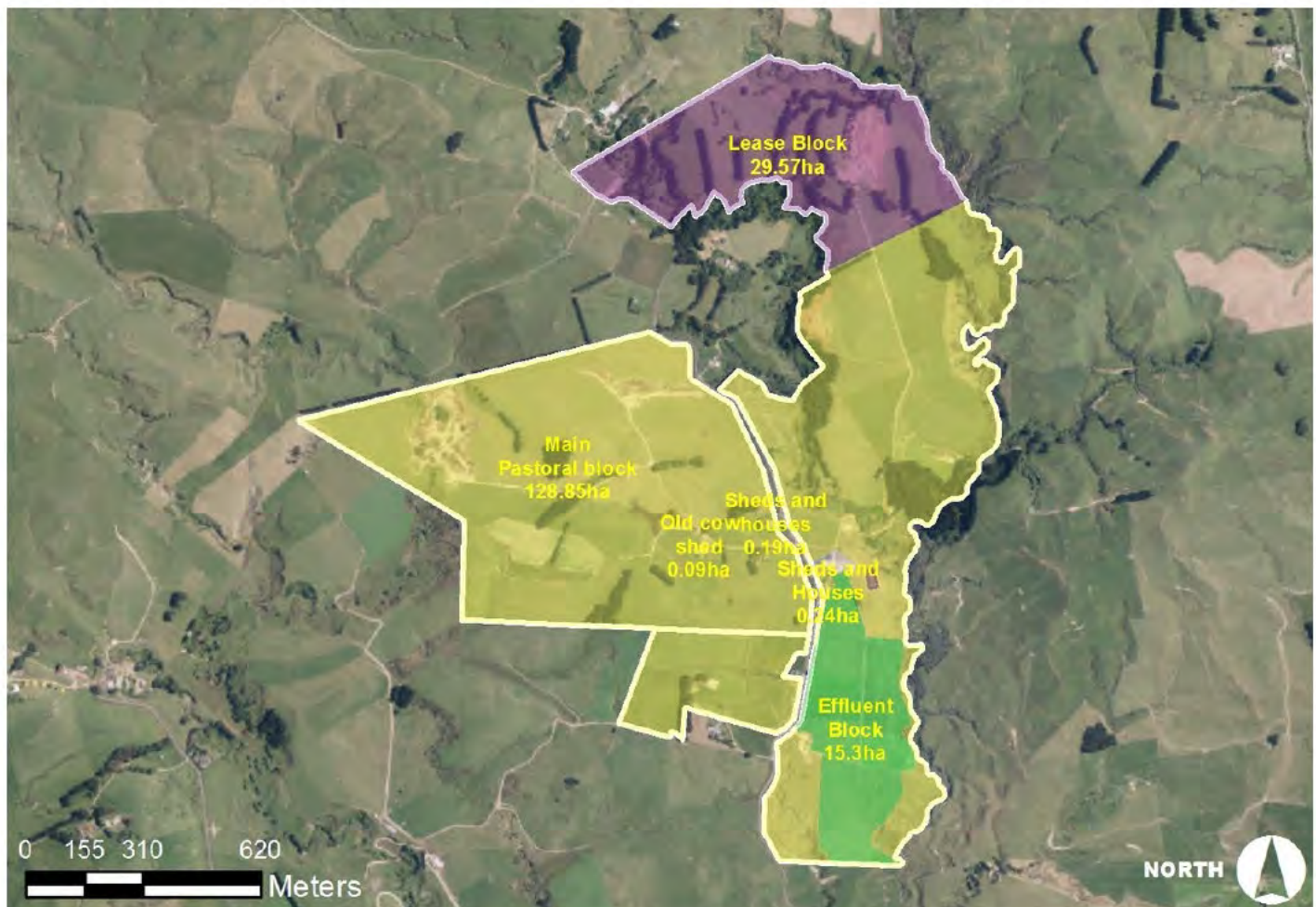
W5

Mahinga kai is about the value of natural resources – our birds, plants, fish, and other animals and resources that sustain life, including the life of people. It is critical to manage these resources to allow people to continue gathering kai (food) in the way the ancestors did. Across Aotearoa as guardians of the land we all have a commitment to work towards meeting Mahinga Kai objectives such as protecting wetlands and fish habitats for species such as nanga and tuna, mitigating the impact of exotic and pest fish species, and ultimately enabling the continued access to healthy mahinga kai species that are safe to eat and in quantities to support local communities. 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.

There are actions done on farm relating to Mahinga Kai and minimising sediment and nutrient loss, these are identified on the farm maps in this report. Specific actions are summarised below

Management of risk areas	Areas of differing soil types that require different management is done on farm as per land management section of this plan.
Mahinga Kai access	Access to mahinga kai is allowed for local communities.
Fish habitat protected	Waterways are fenced off and maintained to support fish habitat. If spawning sites are identified, these are prioritised and protected. If pest fish species are present, actions are in place to remove them, or mitigate their impact and distribution further
Waterways protected	All waterways or areas holding water are fenced to exclude stock with a buffer zone to help filter any run off of nutrients. Any drains are managed to avoid disturbance or damage to mahinga kai species or habitats.
Management of contaminants	Losses of contaminants from the farm have been mitigated or removed through the actions developed within this farm environment plan. This includes management of nitrogen, phosphorus and faecal matter, which are all detrimental to waterway health and the health of mahinga kai.
Management of sediment	Lanes and culverts are maintained to divert run off of nutrients away from the waterways.

TAIORA NUTRIENT MANAGEMENT



Nutrient Overview

NUTRIENT MANAGEMENT

GOOD FARMING PRACTICES

Monitor and maintain P levels at the economic optimum

Practices:

Olsen P trends continue to be monitored over successive years

Olsen P is maintained in the optimum range

Fertiliser applications are tailored for different management blocks

ACHIEVED

Evidence:

Soil test results

Fertiliser application matches plant requirements and minimises losses

Practices:

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

Fertiliser applications are avoided: --When heavy rainfall is forecast and runoff is likely

--Close to waterways

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

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

ACHIEVED

Fertiliser spreading equipment is well maintained and calibrated

Practices:

Spreaders cleaned and greased routinely

Paddocks are checked for paddock stripes after spreading

ACHIEVED

*General Nutrient Management

1 ACTION(S)

*Additional GFP relevant to the dairy industry goals

NUTRIENT MANAGEMENT

NUTRIENT OVERVIEW

N1

IMPACT OF
CONTAMINATION

+

LIKELIHOOD OF
CONTAMINATION

=

LOW RISK RATING

The farm has a nutrient management plan with Ravensdown. Soil tests are typically carried out biannually. Soil tests show an Olsen P range from 25-45 (excluding lease block results). The optimum range for Olsen P in relation to pasture production is between 20-30 therefore indicating the phosphorus risk to water quality is low-medium but being well monitored.

Phosphorus fertiliser is applied in the form 10% Potash Super and Superphosphate which is incorporated into a Spring mix. Applications are tailored per block .

Nitrogen is applied strategically throughout the year to fill feed deficits with soils and weather conditions being assessed prior to spreading. Urea and Ammo 31 is predominantly used at rates of 60-100kg/ha through spring and autumn. The maximum N loading for the farm is approximately 70kgN/ha/yr. Fertiliser is spread by Shannon Spreading who are fitted with TracMap. Urea is spread by bike spreader and applications are recorded. The equipment is calibrated and maintained.

ACTIONS | RECOMMENDATIONS

Target Date

	Ensure all cropping information is recorded in end of season FDRs – <u>To Achieve GFP</u>	31 May 2021
	In order to get an accurate Purchased Nitrogen Surplus number, ensure accurate information is recorded in end of season Farm Dairy Records (FDRs) eg cropping	

NUTRIENT MANAGEMENT

Product	kg
Effluent	0.61
Mining Plant	0.61
Lease	

Total Product Required (Options)			
Fertiliser	10% Potash Super + N	10.4	1
	Effluent Spring 19	5.6	1
	MP Spring 19	41.9	1
Transport and Spreading			
TOTAL			

Mix Name	Option	Formula	Components	Ratio
10% Potash Super + N	1	10.35	10% POTASH SUPER BULK FLEX-N	910.81 189.19

The proposed mix contains a mix of products 1000000 - 10% POTASH SUPER BULK and 4340000 - FLEX-N which are moderately incompatible. Apply promptly or refer to the compatibility matrix to choose a more suitable mix.

Effluent Spring 19	1	5.59	SELENIUM SULPHATE DOUBLE ZINC SUPERPHOSPHATE BULK	1.19 568.51
MP Spring 19	1	41.87	FLEX-N POTASSIUM CHLORIDE GRAN BULK SELENIUM SULPHATE DOUBLE ZINC SUPERPHOSPHATE BULK	132.05 75.47 6.84 791.51

The proposed mix contains a mix of products 1000000 - SUPERPHOSPHATE BULK and 4340000 - FLEX-N which are moderately incompatible. Apply promptly or refer to the compatibility matrix to choose a more suitable mix.

Prices: All prices are exclusive of GST and are subject to change. Refer to your Ravensdown price list for other terms and conditions.

Application: Ravensdown recommends the use of Spreadmark certified contractors.

Apply fertiliser in accordance with the Fertiliser Research Code of Practice for Nutrient Management (2007).

Mineral products mixed with organic matter products have the propensity to become lumpy even in relatively short periods of time. Application should take place promptly. Segregation may occur when mixed with product with differences in particle size. This should be considered by the operator when determining the appropriate boundaries for spreading product based on this issue and Ravensdown recommends the application of the material should at least meet the Spreadmark minimum performance.

0800 100 123
www.ravensdown.co.nz

ravensdown

549 TATARAMCA ROAD
RD 7

DANMURURKE 4977
09 3747793
8

Service Person: HARRY A
Name: Andrew Harbo
Email: andrew.harbo@ianz.co.nz

Sampled date: 22/08/2020
Report issued: 28/08/2020
Samples received: 24/08/2020
Order number: P0310244

09097341

SOIL ANALYSIS

Lab Number	Sample Name	Core Length (m)	pH	Over the P	Calcium	Magnesium	Chloride	Sulphate	Ammonia	Phosphate	Fluoride	Barium	Strontium
194422	11	7.5	5.5	29	7	58	5	7	7	1	1	1	1
194319	1	7.5	5.6	25	4	50	5	2	4	1	1	1	1
194317	18	7.6	5.8	19	8	11	4	2	5	1	1	1	1
194215	12	7.5	5.5	24	5	22	7	4	6	1	1	1	1
19421	14	7.5	5.5	45	5	23	23	9	29	1	1	1	1
194210	8	7.5	5.5	42	7	16	9	4	21	1	1	1	1
194211	10	7.5	5.5	27	6	15	4	4	9	1	1	1	1
194210	14	7.5	5.5	20	3	7	4	3	33	1	1	1	1

Analysis comment:

Even Saunders, for AFL

- The report applies to samples as submitted by the customer.
- Results are expressed on a dry weight basis.
- Summary of methods used and detection limits are available on request.
- Unless prior authorisation is given in writing, this document may only be reproduced in full.

RPT - Results submitted for repeat analysis. RTP - Results to follow. QTY - Check test case.

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Private customers advised

Page 1 of 1

WHAKAPAPA

History of the farm and local area has not been assessed as part of this Tiaki Farm Environment Plan.

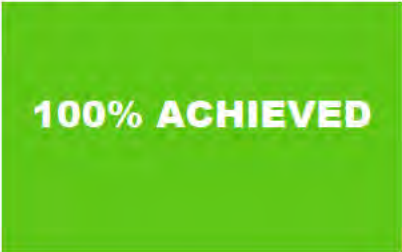
APPENDIX

GREENHOUSE GAS EMISSIONS

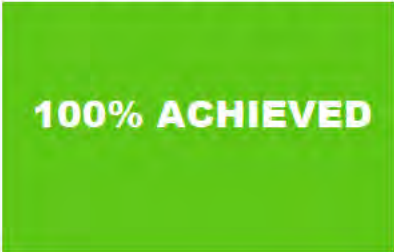
Climate change affects all New Zealanders, including the primary sector. Reducing greenhouse gas emissions is a priority and action is required across New Zealand and internationally. The New Zealand dairy sector is one of the lowest emissions producers of dairy nutrition in the world due to our efficient year-round pastoral grazing system and healthy cows. Through innovation and continued Kiwi ingenuity, our farmers, scientists, and sector partners can ensure New Zealand dairy continues to stay a world leader, while making meaningful contributions to New Zealand’s GHG mitigation targets. This section provides an overview of the current GFPs that could have an impact on reducing emissions on farm.



GENERAL FARM



LAND & SOIL



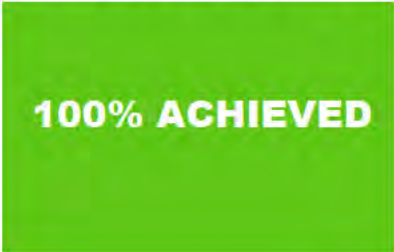
IRRIGATION



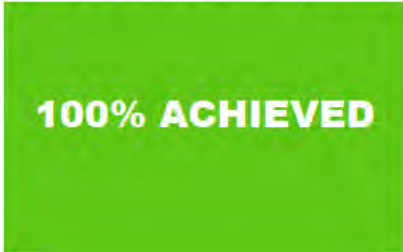
EFFLUENT



WATERWAYS & BIODIVERSITY



NUTRIENT



GREENHOUSE GAS EMISSIONS

The tables below list the GFPs that have an impact on reducing greenhouse gas emissions on farm.

GENERAL FARM MANAGEMENT

Identify the physical and biophysical characteristics of the farm system, assess the risk factors to water quality associated with the farm system, and manage appropriately	ACHIEVED
Store and load fertiliser with minimal spillage and leaching	ACHIEVED
Store, transport and distribute feed to minimise wastage, leachate and soil damage	ACHIEVED

LAND & SOIL MANAGEMENT

Reduce periods of bare soil between crops and pasture to reduce erosion and leaching	ACHIEVED
Retire all LUC 8 land and retire LUC 7e land or ensure that it has soil conservation measures in place	ACHIEVED

IRRIGATION MANAGEMENT

Irrigation rates and timing match plant requirements	N/A
--	-----

EFFLUENT MANAGEMENT

Effluent system meets code of practice	ACHIEVED
Spreading equipment is well maintained and calibrated	1 ACTION(S)
Effluent applied at correct depth, rate and time	ACHIEVED

WATERWAYS & BIODIVERSITY MANAGEMENT

*Areas of native plants or significant biodiversity are protected	ACHIEVED
---	----------

NUTRIENT MANAGEMENT

Fertiliser application matches plant requirements and minimises losses	ACHIEVED
Spreading equipment is well maintained and calibrated	ACHIEVED

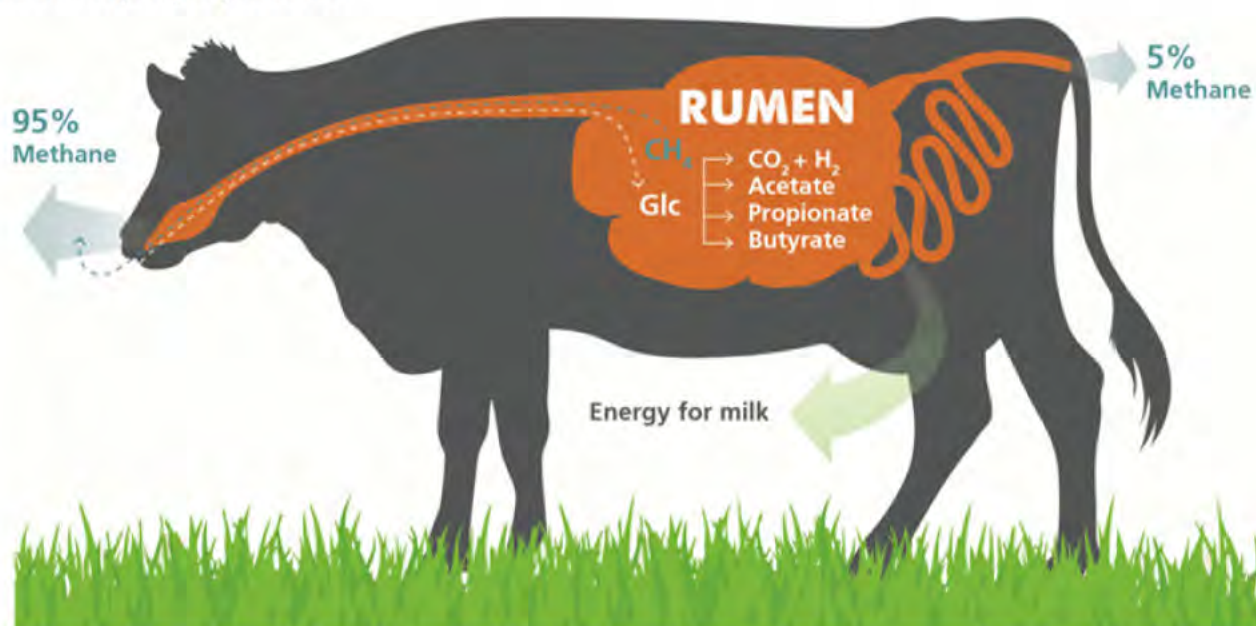
GREENHOUSE GAS EMISSIONS

WHAT ARE GREENHOUSE GAS EMISSIONS?

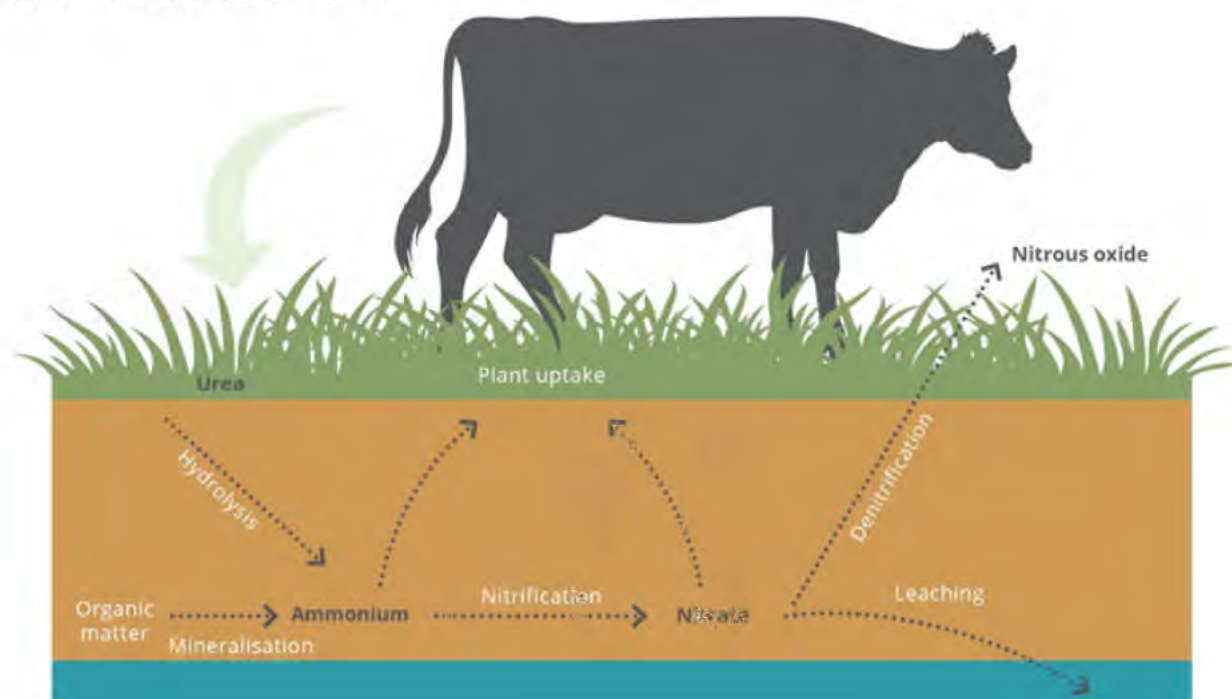
The main agricultural GHGs are methane (CH_4) and nitrous oxide (N_2O). Methane is produced by ruminants (e.g. cows and sheep) by methanogen microbes that are naturally present in the rumen. Most methane is emitted when cattle burp. The amount of methane produced for each farm is directly related to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



GREENHOUSE GAS EMISSIONS

ADDITIONAL GREENHOUSE GAS EMISSIONS

Options to reduce and mitigate greenhouse gas emissions on farms fall into three categories: farm management changes, infrastructure investment, and retiring or planting land. The best options for each farm will vary depending on factors such as the farm system and the region. When choosing changes to adopt on your farm, you may find options from all three of these categories work well together.

Farm management changes

The final report of the Biological Emissions Reference Group (BERG), a cumulative effort by the wider agricultural sector, estimated that biological emissions can be reduced by up to 10% for the dairy sector with currently available farm management practices. Most of these mitigations involve good farm practices, such as feed utilisation, choice of feed type and being more selective about how and when to apply fertiliser and effluent to our land. Outlined below are some options to consider. Before you make changes to your farm system or invest in infrastructure, you should seek advice to help determine what will work best for your situation.

OPTIONS TO REDUCE METHANE EMISSIONS

Managing dry matter intake

Current options available to reduce methane emissions are limited, but managing efficient use of dry matter intake (DMI) is the most important. Research shows that for every additional kg of total feed eaten per hectare, total methane emissions increase proportionally. Managing DMI is about reducing the amount of feed eaten per hectare, and increasing per cow performance for every kg of feed that is eaten.

Over time, as cow performance improves it may be possible to adjust stocking rates (but the DMI per cow must remain constant). Increasing reproductive performance of the herd to allow for reduced replacement rates will decrease your emissions as there is less DMI requirement for young stock and less methane emissions.

OPTIONS TO REDUCE NITROGEN LEACHING AND NITROUS OXIDE EMISSIONS

Nitrous oxide emissions occur when bacteria in the soil remove oxygen from nitrate (NO_3^-). This mainly happens when the soils are in an anaerobic state (e.g. waterlogged soils). Because nitrogen is supplied to the soil from fertiliser, animal excreta, and effluent irrigation, there are a number of options to manage nitrous oxide emissions and nitrogen leaching.

The mitigations options involve reducing nitrogen loss through:

- better fertiliser application
- planting low-nitrogen forages or crops to reduce nitrogen excretion (eg fodder beet and plantain)
- use of low nitrogen feeds
- improving pasture quality.

GREENHOUSE GAS EMISSIONS

Reducing nitrogen surplus

Many of the supplementary feeds contain less nitrogen than normal pastures and can help reduce nitrous oxide emissions on farms. You can evaluate supplements used to see if there is potential to change to a lower-emissions feed.

- Evaluate existing cropping activity and the species grown. This can improve nitrogen inputs to the farm and nitrogen surplus through different types of crop and different methods in cultivation/feeding.
- Exploring the use of alternative forages in the pasture sward such as plantain to reduce nitrogen loss to water and atmosphere. These species can retain more nitrogen in the system allowing for less to be lost.

Optimising your fertiliser and effluent use

DairyNZ analysis shows that for every additional 100 kg N/ha applied via fertiliser, total greenhouse gas emissions increase by 2.6 t/ha. As well as using less nitrogen fertiliser per hectare, mitigations strategies include:

- Ensure you are applying the right type of fertiliser in the right places. Test the soil to gauge optimal levels and use precision application to ensure accurate placement.
- Avoid direct leaching and nitrous oxide emissions by not applying in winter or to waterlogged soils.
- Improve effluent management to accurately apply appropriate depths and rates to the soil so that there are less losses.
- Reduce N fertiliser applications on effluent blocks.

Paddock strategies

- Grazing cows off-paddock in the autumn months limits the build-up of nitrate in the soil when the plant growth is reduced. This build-up is then available to be lost to both water and atmosphere of the following winter and spring months. This strategy can reduce nitrogen leaching and nitrous oxide emissions if the associated effluent is well managed.
- Improve irrigation practices so that water is only applied when the soil profile has the capacity to absorb it and the plants need it and that there is no over application. This can be done by using precision water irrigation and scheduling.
- During wintering urine nitrogen leaching and nitrous oxide emissions can be reduced through appropriate paddock selection, grazing time, and grazing regime.
- Using a 'catch crop' to minimise the fallow period following a winter crop. This will reduce nitrogen leaching and nitrous oxide emissions during this period.

Planting to offset carbon dioxide

Planting trees can help 'offset' emissions from your farm business without impacting on production. As trees grow, they store carbon in trunks, branches, leaves, and roots. Planting will also improve water quality by helping to filter out sediment and nutrients before they enter waterways. Planting could take place in riparian areas, shelter belts, and through retiring land to forestry. Planting also helps to prevent soil erosion and increase the habitat for native wildlife.

THANK YOU



DISCLAIMER

*Provision of advice in relation to effluent storage, effluent irrigation systems and the management of other environmental risk areas on farm.

The advice that Fonterra Co-operative Group Ltd (Fonterra, we, us) provides to farmers in relation to effluent storage capacity and other environmental compliance practices, including mitigation actions described in Farm Environment Plans, is based on the information and assumptions that farmers and their agents have provided to us and on our knowledge and understanding of current best practice in the industry. Fonterra does not purport to replace sound engineering or other professional advice and as such we strongly encourage farmers to seek independent expert advice before any construction, upgrades, or other change to your on farm practices. Farmers are ultimately responsible for the environmental compliance of their farm and on farm practices. Fonterra gives no warranties (express or implied) and, to the maximum extent permissible by law, excludes all liability in contract or tort (including, without limitation, liability for negligence) or otherwise in relation to the advice provided.

Supply Number: [REDACTED]



Farm Insights Report

2022/2023



The
Co-operative
Difference



Dairy for life



A message from Anne

Across Farm Source we're continuously looking at ways to help you maximise the production and efficiency of your business, and your Farm Insights Report is one of the tools we hope you find useful. This is our third year producing these personalised reports which you can use to understand key parts of farm performance and find opportunities to fine-tune farm efficiency. We're always keen to make changes to this tool, based on feedback from our farmers, and this year you'll notice a couple of things:

- There is a new farm efficiency overview section illustrating how increasing efficiency across milk, environment and animals supports farm profitability, productivity and sustainability.
- And, there is a new milk production page benchmarking production per cow and the impact this has on greenhouse gas efficiency.

We've also made some small tweaks to improve the readability in existing sections to improve the value of this report for you, and anyone you choose to share it with. If you have any questions about the information within this report, feel free to get in touch with the Farm Source team or your rural professional.

Thanks for the hard work you do every day and wishing you all the best for the rest of the season.

Ngā mihi,
Anne Douglas
Group Director, Farm Source

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The information and insights provided to you in this report are sourced from information that you have provided through your Farm Dairy Records, together with milk quality and production data that we hold and third party industry research. While the information and insights provided may identify risks and opportunities, such information is general information only and is not in the nature of advice. We make no representations or warranties (whether express or implied) as to whether information or data provided in this report is accurate, reliable or complete. You are solely responsible for your own assessment and evaluation of the information and for the actions or decisions you take in reliance on the information or data generated. Accordingly, Fonterra shall not be liable for any loss arising from any actions or decisions taken by you in reliance on the information contained in this report.



Introduction

This report uses the information that you provide in your Farm Dairy Records, together with milk quality and production data that the Co-op holds, to provide useful insights into what is happening on your dairy farm. The metrics included in this report highlight risks and opportunities that may exist in your farming system, helping you to improve your efficiency and reduce your impact.

Improving your farm’s efficiency can not only have benefits for your individual farm business, but collectively supports our strategy to maintain a sustainable milk supply.



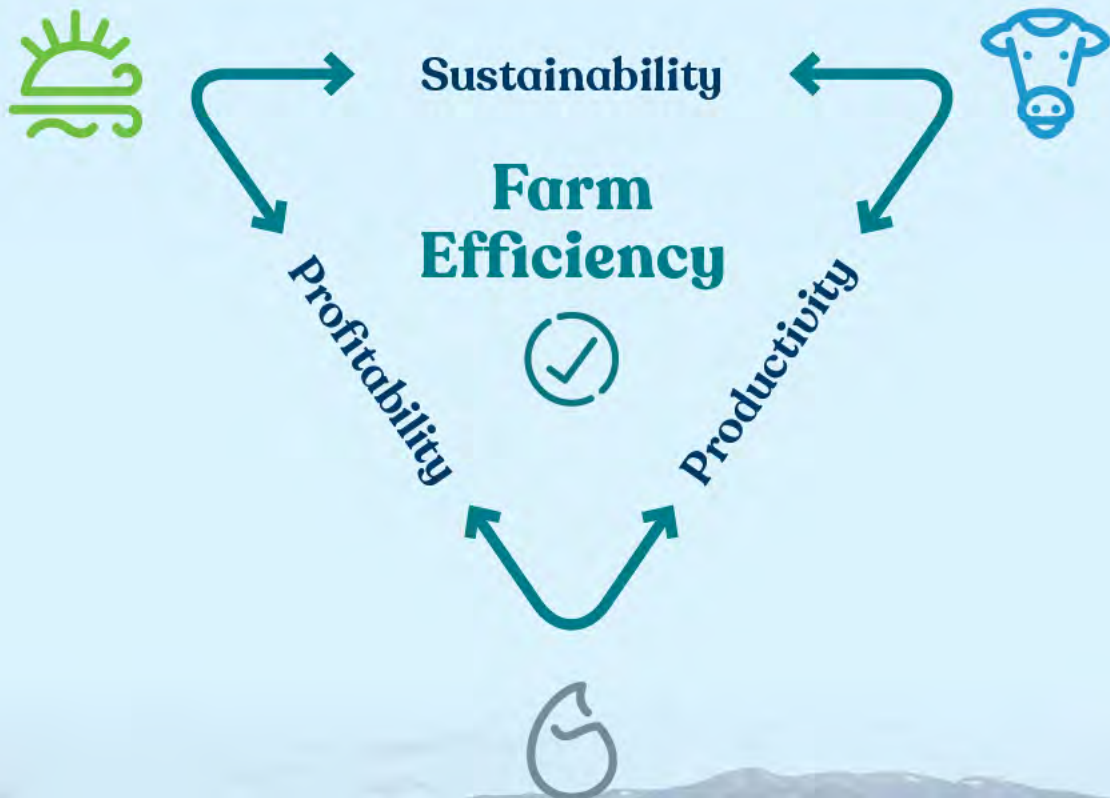
Your Farm’s Key Information	Units	2020/2021	2021/2022	2022/2023
Dairy Farm Effective Area	ha	135	135	135
Peak Cows (Maximum Cow Numbers)	cows	310	400	305
Stocking Rate (Milking Cows)	cows/ha	2.3	3.0	2.3
Production (Milk Solids Produced)	kgMS	88,135	80,695	84,251
Production Per Cow	kgMS/cow	284	202	276
Production Per Hectare	kgMS/ha	653	598	624
Average Somatic Cell Count	cells/ml	208,864	146,400	171,085
Nitrogen Fertiliser Applied Per Hectare	kgN/ha	78	86	41
Imported Supplementary Feed Fed	tDM	134	179	246
Imported Supplementary Feed Fed Per Cow	tDM/cow	0.4	0.4	0.8
Purchased Nitrogen Surplus	kgN/ha	58	68	30
Greenhouse Gas Emissions Per kgMS	kgCO ₂ e/kgMS	16.2	21.3	18.8
Biological Greenhouse Gas Emissions Per Hectare	kgCO ₂ e/ha	9,551	11,499	10,762
Farm Grown Feed	%	96%	96%	96

Previous seasons data will be shown where data is available and farm ownership hasn’t changed.



Farm Efficiency

Operating an efficient farm requires balancing three important areas; sustainability, productivity and profitability. Your Farm Insights Report highlights some of the potential opportunities for your farm and it is important to know how each of the metrics reported work together and contribute to improving on farm efficiency.



Environment

Environmental outcomes are driven by optimising farm inputs and efficient farm management practices, which can lead to a more profitable farm.



Milk

Milk production and quality is influenced by a number of factors related to animals and the environment. Optimising production and quality will result in improved utilisation of inputs and a more profitable farm.



Animals

Nutrition, animal health and reproductive performance all have an impact on milk production and wellbeing.

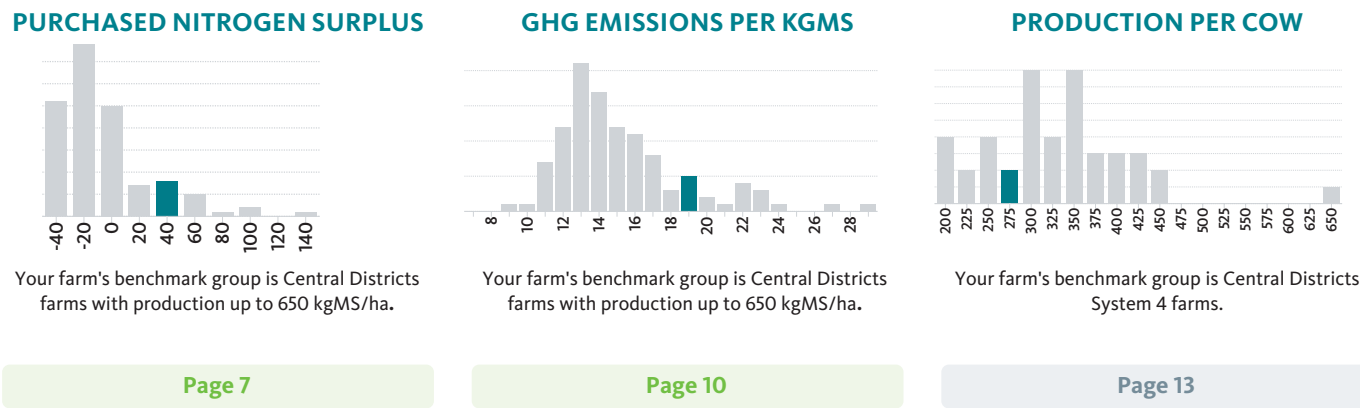


Farm Efficiency

This page provides a summary of how your farm compares to others in three key areas. It highlights specific opportunities for improving efficiency, which may help prioritise sections of the report to focus on first.

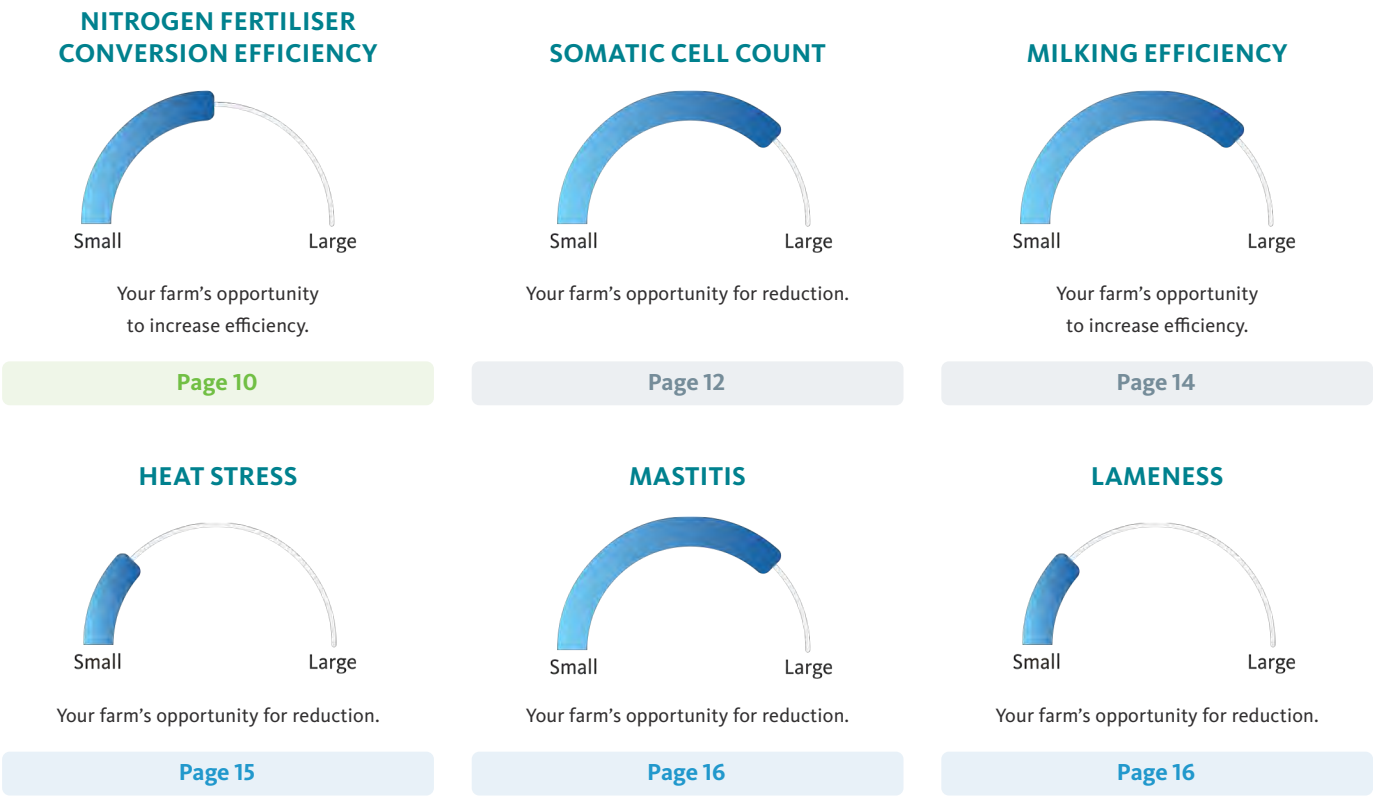
How Your Farm Compares

These charts show how your farm compares against others in its benchmark group* for three important areas. Improving efficiency in these areas can lead to an increase in production, profitability and sustainable outcomes.



Opportunities

These dials show your farm's potential opportunities for improving farm efficiency in the three areas above (Purchased Nitrogen Surplus, GHG Emissions per kgMS, Production per cow). Each potential opportunity is based on your farm's benchmark group*. These are explained in further detail in the relevant section of the Farm Insights Report.



*Please refer to each metric's page for a description of the corresponding benchmark group.



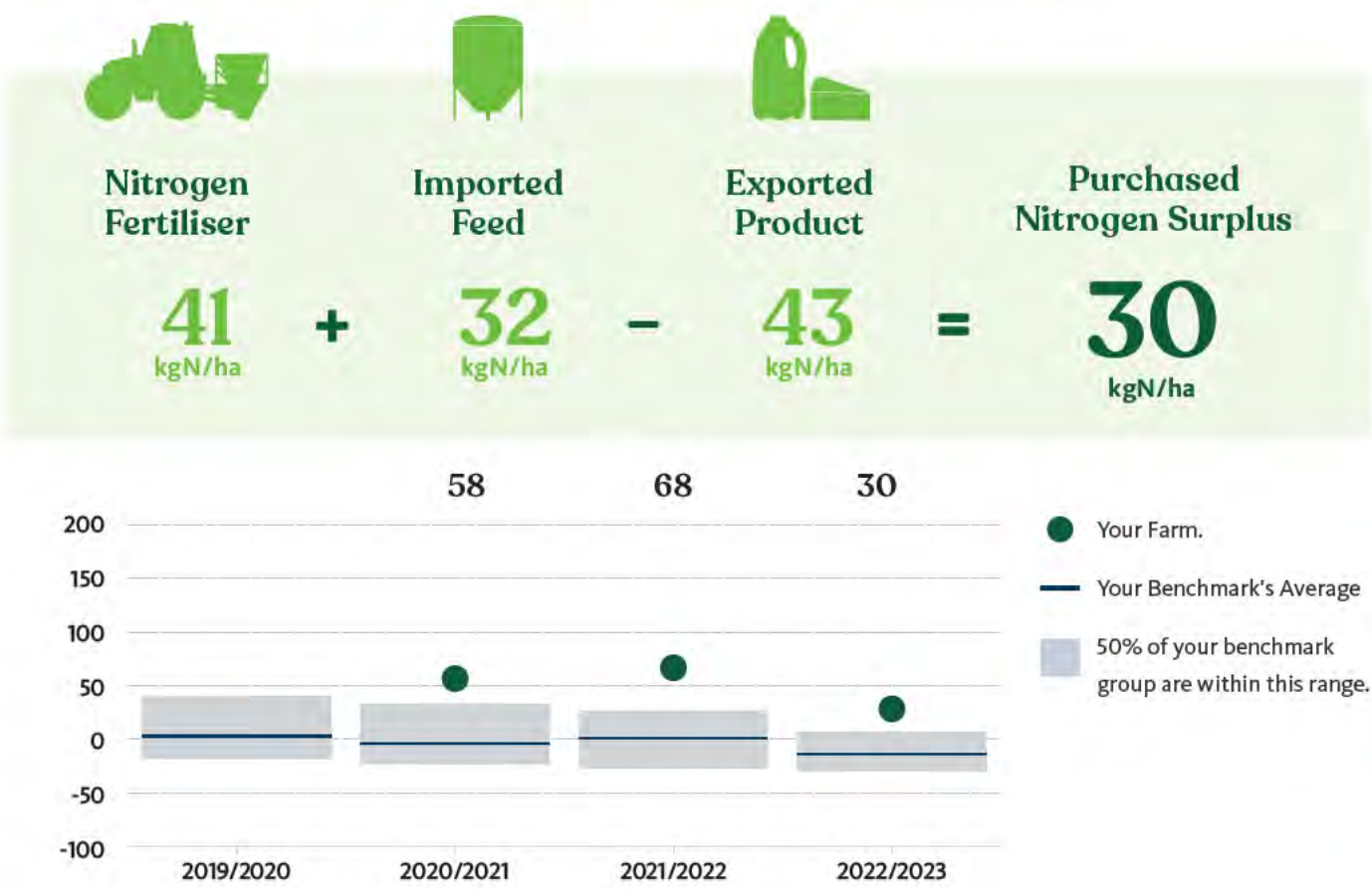
Environment

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



Your farm is benchmarked against other farms in the Central Districts region with production up to 650 kgMS/ha.

Your Farm's Nitrogen Risk Scorecard

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

Your Farm's Nitrogen Risks

STOCK MANAGEMENT

LOW

Stocking Rate

The higher the stocking rate⁽¹⁾ (peak), the greater the nitrogen loss.

Total	23.9 su/ha
--------------	-------------------

Milking herd (2.3 cows/ha)	19.2 su/ha
----------------------------	------------

Replacement/other animals	4.7 su/ha
---------------------------	-----------

Dry Matter Eaten

The more dry matter eaten⁽²⁾ per hectare, the more nitrogen ingested by the animal and returned to pasture as dung and urine.

Total	10.5 tDM/ha
--------------	--------------------

Grown on this farm

Pasture and crops	8.0 tDM/ha
-------------------	------------

Imported to this farm

Pasture and crops ⁽³⁾	2.1 tDM/ha
----------------------------------	------------

All other feeds	0.4 tDM/ha
-----------------	------------

Wintering Off/Culling

Reducing the number of animals on farm (from peak numbers) by culling and/or wintering off (May-Aug) will reduce the nitrogen loss risk on your dairy farm effective area.

45% off platform

Winter Practices

Reducing the amount of time cows spend on pasture and/or crops over winter will reduce the nitrogen loss risk.

Off pasture facility	0%
----------------------	----

On pasture	92%
-------------------	------------

Break fed fodder crop	8%
------------------------------	-----------

NITROGEN FERTILISER

VERY LOW

Nitrogen Fertiliser Applications

The more nitrogen fertiliser applied, the higher the nitrogen loss risk.

41 kgN/ha

Milk Solids per kg Nitrogen Used

Using less Nitrogen fertiliser (all other inputs being equal) whilst maintaining production, will lower purchased nitrogen surplus.

15 kgMS/kgN

Timing of Application

Fertiliser applied during the winter months can increase the chance of nitrogen being lost.

Sep - Apr

Jul - Aug

May - Jun

Highest Application Rate

Lower application rates reduce the nitrogen loss risk.

Below 25 kgN/ha

Above 25 kgN/ha

Feed Budget

Using a feed budget or wedge to help plan strategic fertiliser applications is a good farming practice.

No feed budget used

Feed budget used

IMPORTED FEED

LOW

Nitrogen Imported From Feed

The greater the amount of imported feed, the more nitrogen that enters the system.

32 kgN/ha imported

Nitrogen Content

The greater the average nitrogen content, the higher the amount of nitrogen that enters the system.

Average N content of 1.75%

Nitrogen Use Efficiency of Imported Supplements

The greater the conversion efficiency, the lower the nitrogen surplus available to be lost.

20 kgMS/kgN

⁽¹⁾ Stock Units (su) are a means of calculating stock numbers between species, breeds, and age groups based on relative feed demand. As an example 23.9su is equivalent to approximately 3 cows/ha (Friesian/Jersey cross) or 1500kg liveweight per hectare.

⁽²⁾ Energy model calculations based upon the DairyBase model developed by DairyNZ.

⁽³⁾ Includes feed fed to stock grazed off the dairy farm effective area.

Your Farm's Nitrogen Risks Continued...

CROPPING AND CULTIVATION



Conventional

This is the greatest risk method for sowing a crop and the risk increases as the cultivated area increases.

4% of farm cultivated annually

Minimum Tillage

This is a lower risk activity than conventional cultivation, however the risk increases with the total area cultivated.

Not Applicable

Direct Drill

This is a lower risk activity than both full cultivation and minimum tillage for establishing a crop.

Not Applicable

Season of Harvest/Grazing

Crops harvested/grazed during winter pose a higher risk to nitrogen leaching.

Summer harvest

Winter harvest

Timing of Fertiliser Application

There is greater risk if fertiliser is applied to crops during high risk months of May, June, July and August.

No fertiliser applied during winter

Fertiliser applied during winter

EFFLUENT MANAGEMENT



Effluent Discharge Method

Discharging treated effluent to land is the lowest risk.

Irrigate to pasture

Irrigate to pasture (low storage)

Discharge to water

Discharge to water and pasture

Effluent Irrigation Area

An undersized effluent area can result in the average amount of nitrogen per hectare applied exceeding local rules and regulations.

5ha/100 cows

Application Depth

Low rates will ensure greater flexibility of management with more irrigation days available and increase the chance of the plant utilising the nutrients within the effluent rather than it being lost.

< 12mm application depth

IRRIGATION



Irrigation Method

Irrigation generally increases the nitrogen loss risk due to the potential for over irrigating to induce drainage events. Some systems are inherently riskier than others irrespective of management.

No fresh water irrigation

Irrigation Scheduling

Deciding when to start or stop irrigation is important as poor management of an irrigation event can lead to induced drainage.

Not Applicable

Irrigation Application Method

Having control over the amount and how often water is applied can greatly influence nitrogen loss risk with poor management of irrigation events leading to induced drainage.

Not Applicable

Nitrogen Fertiliser Optimisation

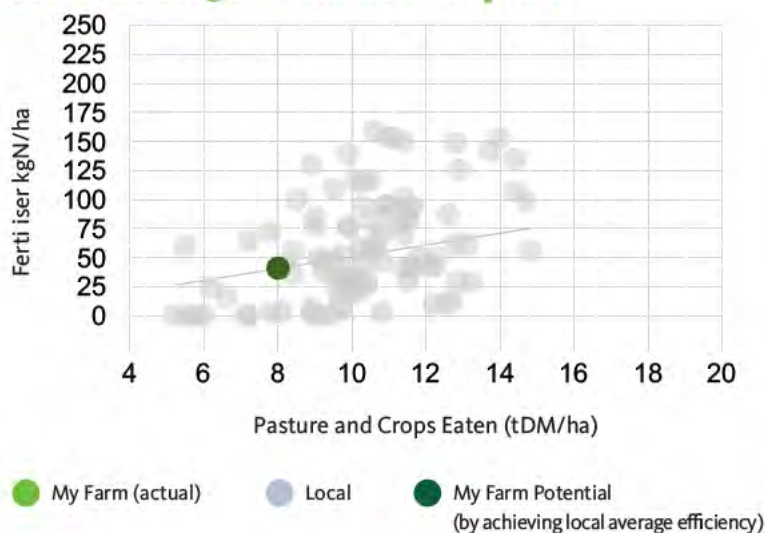
Optimising your current farm system means making the most of the factors within your control. The benchmarking below provides an indication of how others in your local area* are performing. Understanding how you utilise nitrogen fertiliser to supplement pasture growth is our first step in helping you 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 is defined as the 100 closest farms to your location (radius 20kms).

For every tDM of pasture and crops eaten:

Your farm is using: **5 kgN** Local average farms are using: **5 kgN** Local top 25% are using: **3 kgN**

You are achieving above average efficiency

Further improving efficiency by using less nitrogen fertiliser for the same yield could reduce:

- Purchased Nitrogen Surplus.
- GHG Emissions.
- Annual spend on nitrogen fertiliser.

Further advice should be sought if you would like to explore factors influencing efficiency of your farm system.

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:

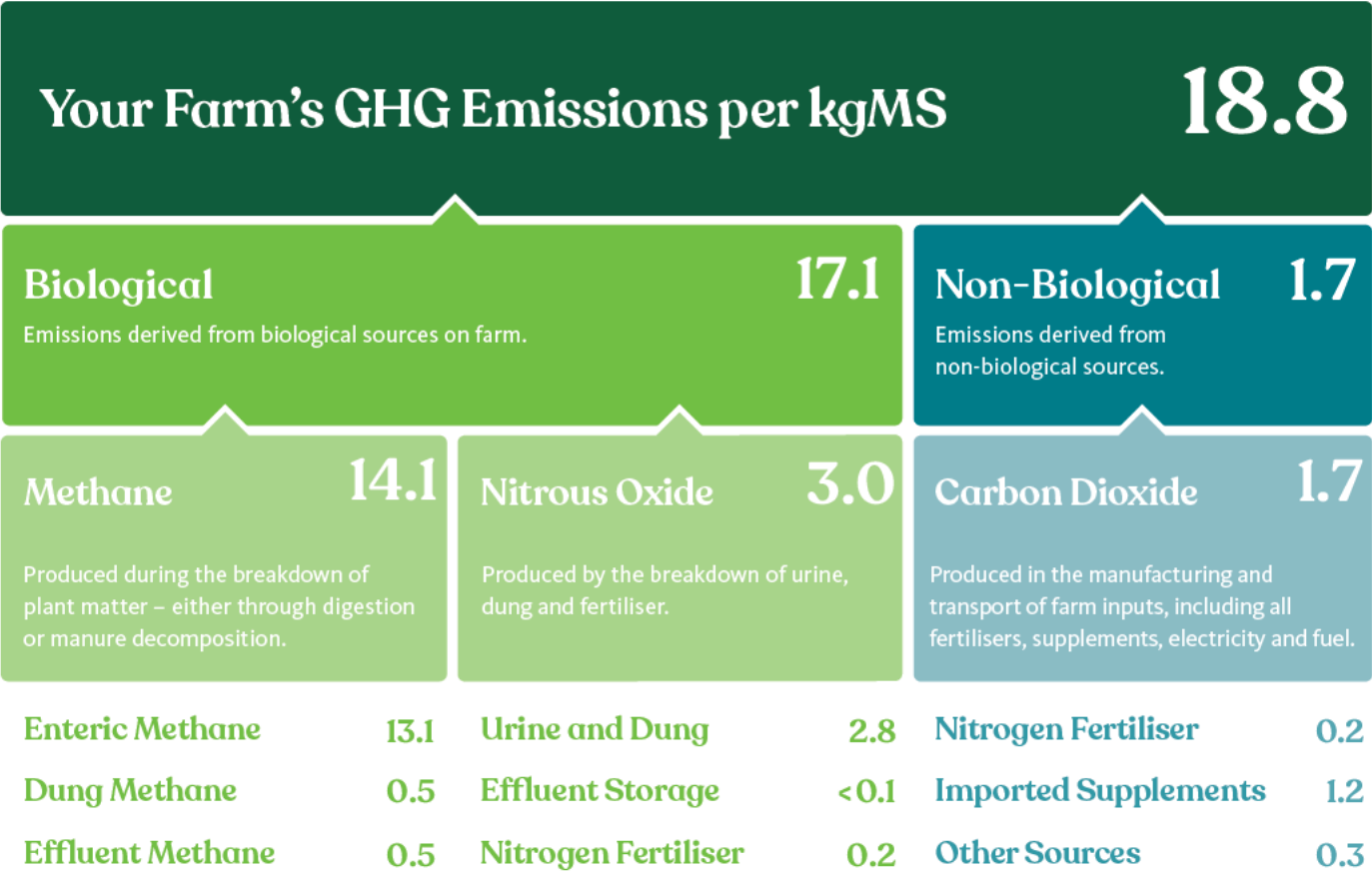
- An assessment on-farm of potential contributing factors
- Prioritise focus areas for improvement
- Further modelling to assess impacts

Examples of factors influencing nitrogen fertiliser conversion efficiency

 Fertiliser	 Pasture
 Effluent	 Irrigation
 Cropping	 Soil

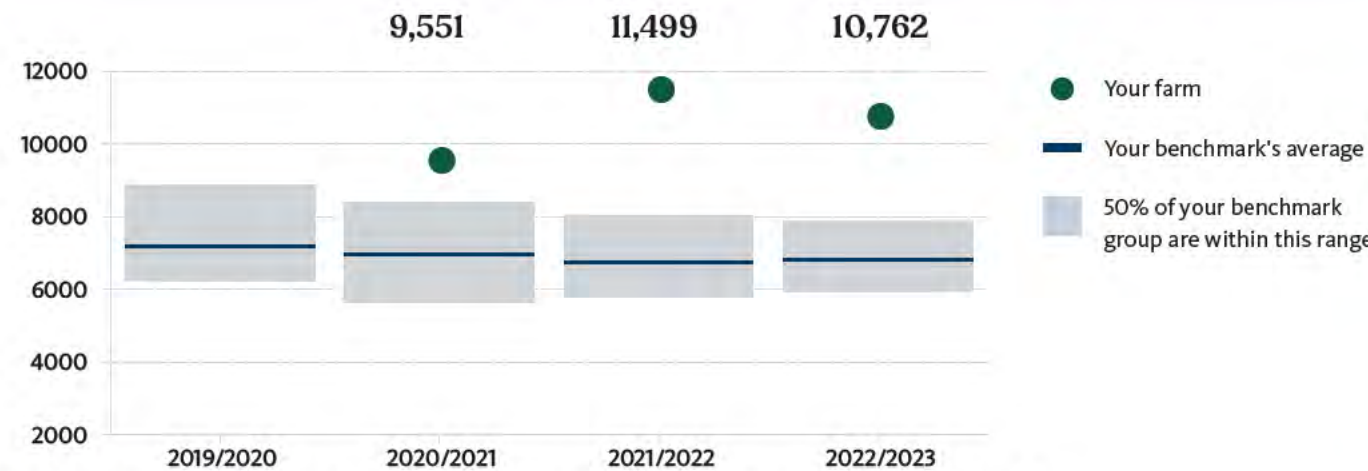
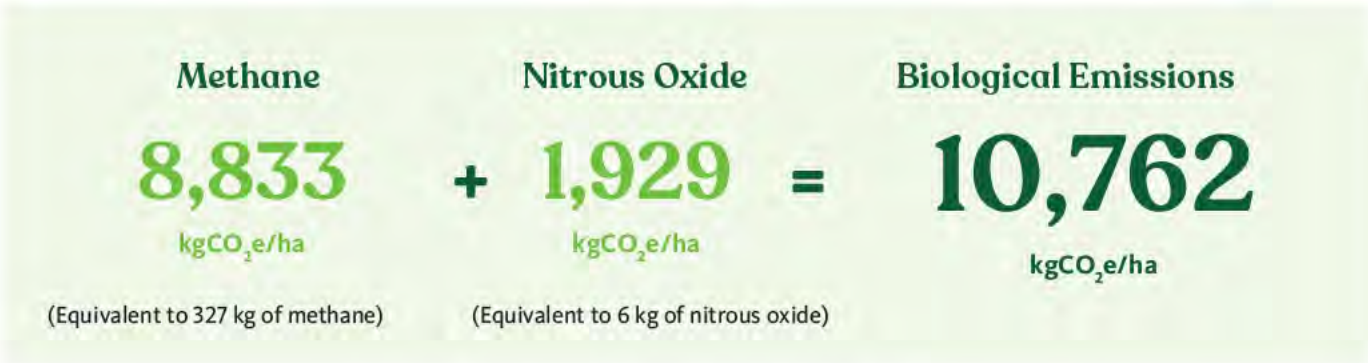
Greenhouse Gas Emissions

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 (CO₂) and account for practices on your dairy farm effective area.



Your Farm's Biological GHG Emissions per Hectare

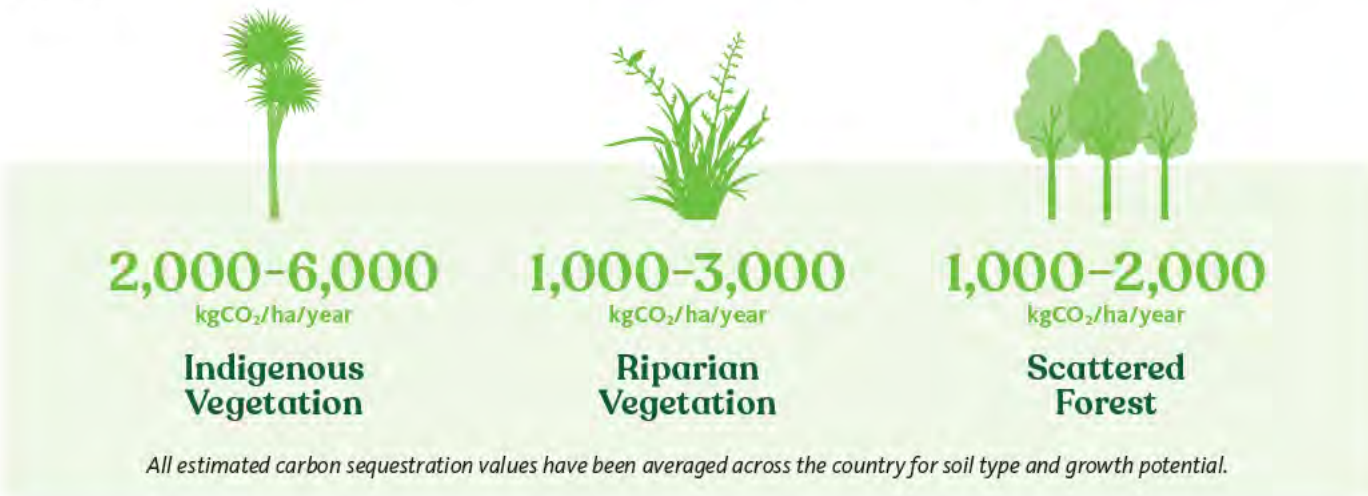
This section shows estimates of your farm's **biological** GHG emissions for your dairy farm effective area. Your biological emissions consist of methane and nitrous oxide gases. A GHG Emissions assessment for your total farm area is available on the Farm Source Business website under Digital Farm Insights (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.



Your farm is benchmarked against other farms in Central Districts with production up to 650 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.



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.



Milk

This section of the report provides key insights into potential savings and opportunities for your farm. These insights have been provided using tools and calculators that have been tested and developed through industry research.

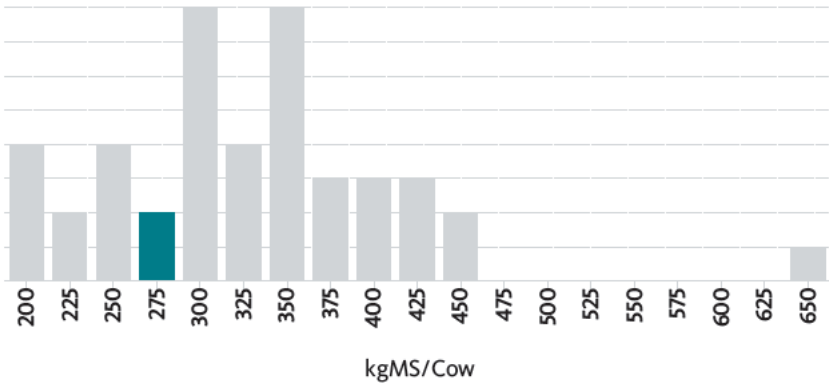
Milk Production

This section benchmarks your per cow production against farms within your region that are the same farm system type. The farm system type has been calculated using your Farm Dairy Record Data and then linked to the Dairy NZ farm system classifications. If you would like more information about DairyNZ Farm System classifications, please visit [DairyNZ - The 5 production systems](#).

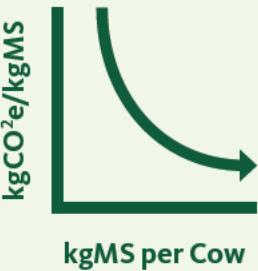
Production Data	2022/2023
Peak Cows	305 Cows
Production	84,251 kgMS
Production per cow	276 kgMS/Cow
Farm System Type	System 4

Your farm is benchmarked against other farms within your region that are **System 4**.

Production Per Cow by Farm System

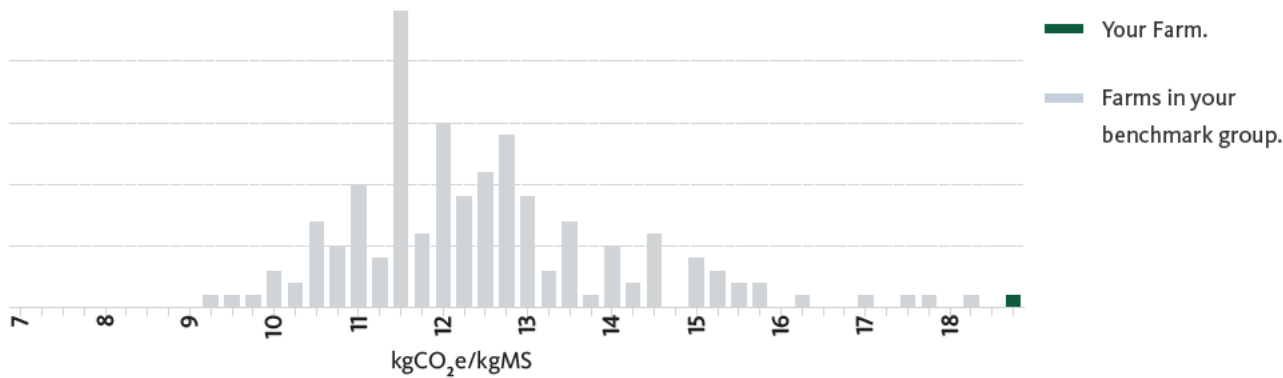


Production Per Cow is a key driver of greenhouse gas efficiency



Cows need a certain amount of feed to support maintenance and growth requirements, then extra feed on top of that to produce milk. The feed and energy required for maintenance is a large contributor to a cow’s GHG emissions. This means, that if a cow produces more milk, the methane produced from the maintenance feed is spread across those extra kg of milksolids so the emissions efficiency improves (she produces less methane per kgMS). This efficiency gain is still achieved even though the cow needs more feed to produce this additional milk.

Greenhouse Gas Emissions Efficiency by Farm System



Your farm is benchmarked against other farms within your region that are **System 4**. For this reason it will appear different to the graph on page 10.

Somatic Cell Count

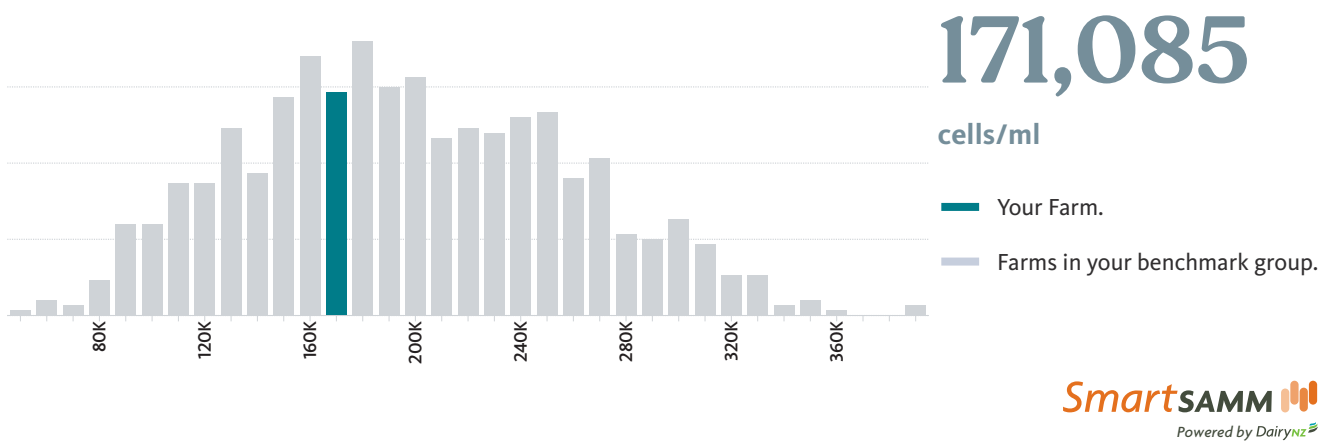
Mastitis is usually caused by bacteria, which enter through the teat canal and infect the udder. Effective mastitis prevention will ensure more milk in the vat, higher quality milk, less use of antibiotics and more time saved on farm. If your bulk somatic cell count (SCC) is greater than 100,000 cells/ml this indicates some cases of sub-clinical infection are present with the potential to impact milk production.

Research has shown there is a 2.1% loss in production for every doubling of somatic cell count over 100,000 cells/ml.

Potential Benefit
\$11,200

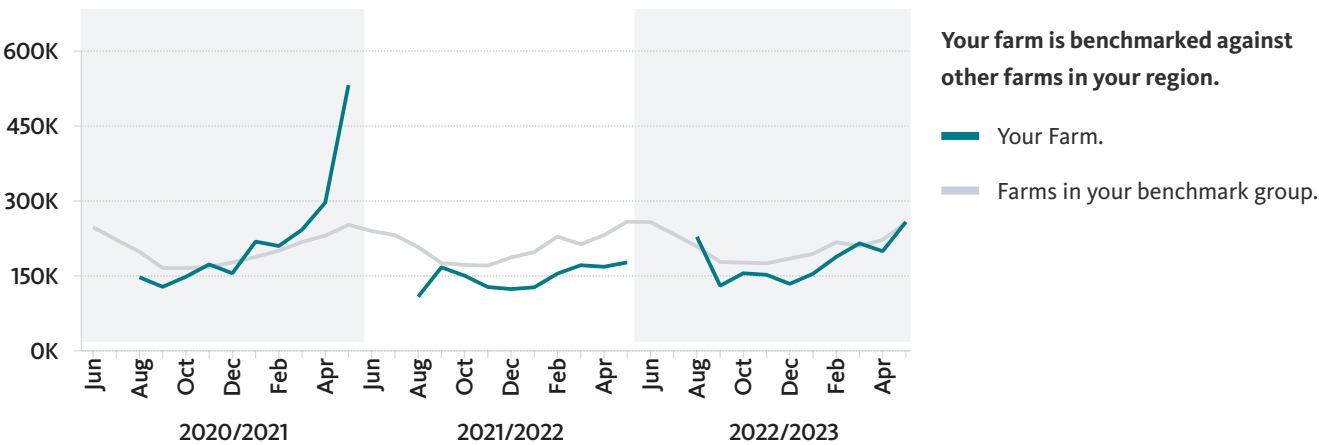
By reducing your cell count to 100,000 cells/ml there is the potential to increase production on your farm that could be worth up to \$11,200. This does not include the cost of treatment or culling and is based off a milk price of \$8.20.

Your Farm's Annual Average Somatic Cell Count 2022/2023



Your farm is benchmarked against other farms in your region. This placed you in the top 50% of suppliers in the Central Districts Region for the 2022/2023 season.

Your Farm's Historical Monthly Average Somatic Cell Count



Previous season's trends will be shown for up to three seasons where data is available and farm ownership hasn't changed.

Milking Efficiency

More efficient milking leads to better outcomes for people, cows and farm profitability. Simple changes that save seconds per cow can quickly add up to minutes saved per milking, and hours saved per day.

This section of the report uses milk vat monitoring data for your month of peak production to benchmark your milking efficiency. It uses DairyNZ research to provide an estimate of the amount of time that could be saved by changing the way your dairy is operated.

Your Farm's Peak Milk Production Data

Shed Type	24 bail herringbone
Herd Size	275 cows
Peak Month	November
Peak Volume	5,319 L/day
Milking Frequency	TAD (9.7-14.3 h interval between milkings)

Milking*	Times	Volume
1	06:09 to 08:39	12 L/cow
2	15:50 to 17:45	8 L/cow
3		
Total	4 hours/day	19 L/cow

*Milking is defined as the start of milk flow to the end of milk flow into the vat

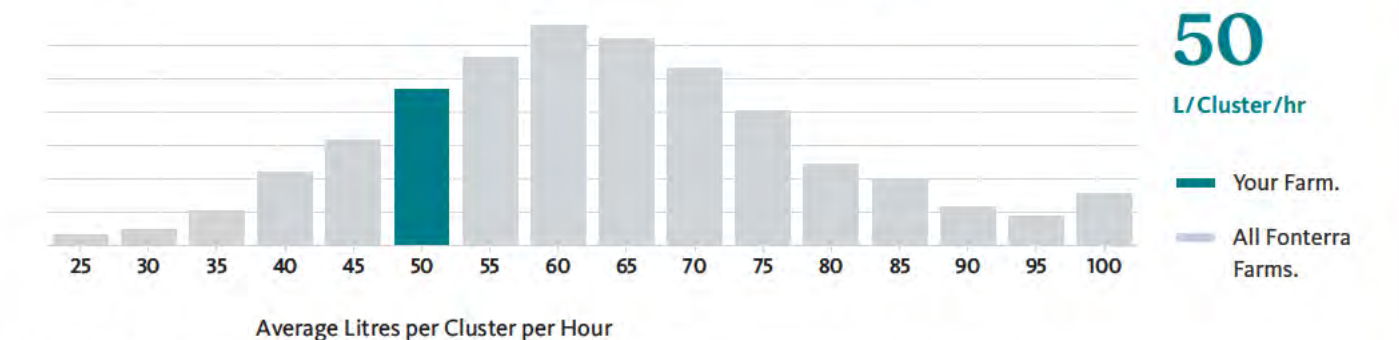
We Estimate You Could Save

8-13 HOURS PER WEEK

This estimate is based on your farm reaching 80-100% of its potential milking efficiency using the maximum milking time (MaxT) strategy.

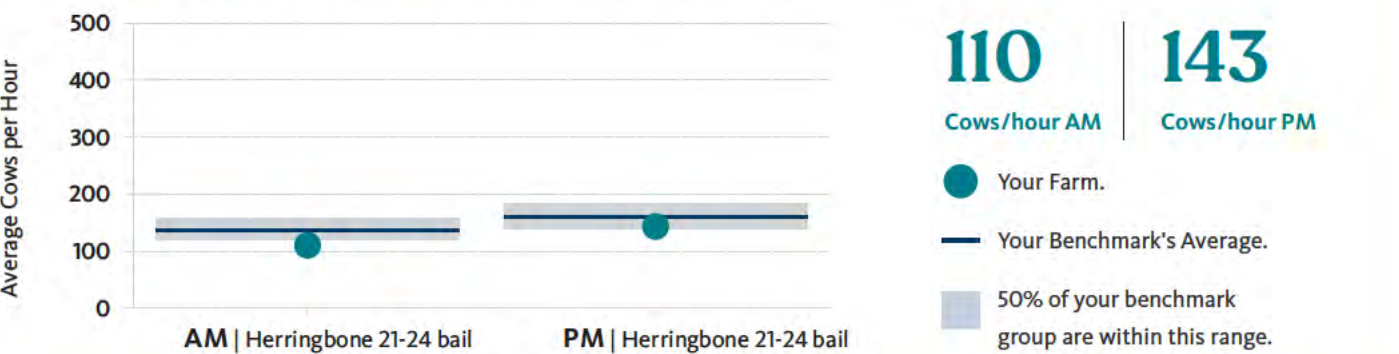
The insights in this section will not be accurate if you have a split calving herd or if part of the herd is being milked OAD. For more detailed information please use the Dairy NZ Milksmart App or visit the website found in the reference guide at the back of this report.

Average Litres Per Cluster Per Hour During Your Peak Month



This benchmark allows a fair comparison of all dairy types, sizes and production levels.
For context, if your cows average milk flow rate is 2 L/min, then the maximum potential would be 120 L per cluster per hour (2 L/min x 60 min/hour).

Average Cows Milked Per Hour During Your Peak Month



This benchmark is influenced by the number of clusters in the dairy and the herd's level of production. Therefore, you are benchmarked against similar sized dairies nationally.

Support and Next Steps

Contact your field team representative or the Service Centre on 0800 65 65 68 for a Milk Quality Improvement visit or Milking Efficiency visit with your Milk Quality Manager.

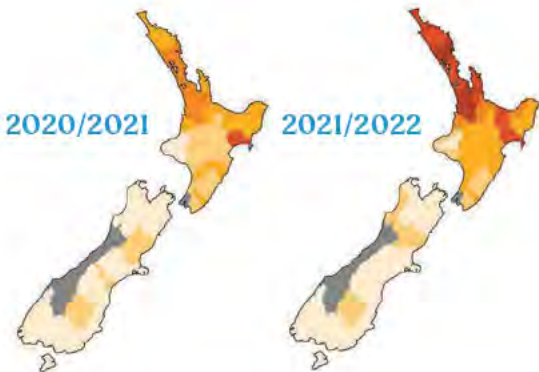


Animals

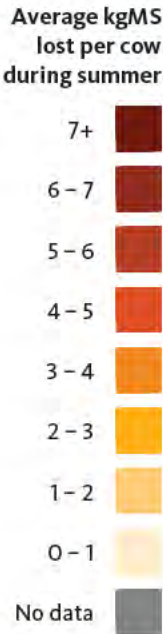
Heat Stress

The heat generated by rumen fermentation means that cattle are more tolerant to cold conditions than humans, but it also makes them more likely to get too hot. Cows that are too hot will seek shade, drink more, and their appetite and rumination times will reduce, depressing production. Severe heat stress can also have impacts on reproductive performance.

New Zealand research (AgResearch and DairyNZ) has shown that milk production decreases relative to increasing temperature and humidity. Combining this research with actual and modeled weather data supplied by NIWA for your farm location, along with your herd size and breed, we have calculated the impact of unmitigated heat stress for your farm.



2022/2023



Farm Details		
Herd size	305	
Predominant breed	Friesian	
Nearest virtual climate station	2.12 kms	
	Above Threshold	Predicted Loss
2020/2021	72 Days	859 KgMS
2021/2022	79 Days	1,032 KgMS
2022/2023	51 Days	474 KgMS

Estimated Impact of Heat Stress For Your Farm

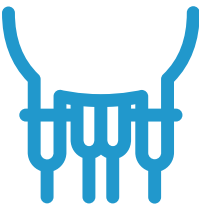
\$3,900
per year

Lost revenue indicated above (predicted production loss @\$8.20/kgMS) is based on the 2022/2023 weather data from your nearest virtual weather climate station. The table also shows predicted loss (kgMS) for the three most recent seasons.

To find out more in depth information about the impact heat stress can have on your herd visit the DairyNZ website. For the link to this website, please go to the reference guide at the back of this report.

Estimates based on a collaborative NZ Bioeconomy in the Digital Age project between AgResearch, DairyNZ, NIWA and Fonterra funded by NZ taxpayers and milk solids levy payers through the Strategic Science Investment Fund and DairyNZ Inc. In preparing NIWA VCSN data for this insight, all reasonable skill and care was exercised and the best available data and methods were used. NIWA accepts no liability for any loss or damage (whether direct or indirect) incurred by any person through the use of or reliance on this information.

Mastitis



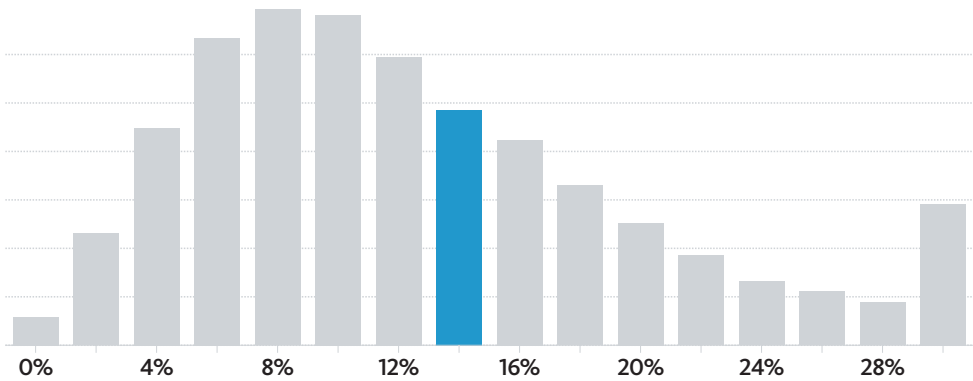
Mastitis is painful for the affected animal, takes time and money to treat, and can have long term impacts on production, reproduction, and cell count. Most antibiotics used in dairy farming are for the control of mastitis, and reducing cases will reduce the risk of development of antibiotic resistant bacteria.

Estimated Impact of Mastitis For Your Farm

\$6,450

This is based on the 43 cases of clinical mastitis reported in your Farm Diary Records, multiplied by \$150. This represents the average cost of treatment and withheld milk, but doesn't cover the longer term costs such as reduced production or increased culling risk. A more detailed calculator is available from DairyNZ. The link for this calculator can be found in the reference guide at the back of this report.

2022/2023 Mastitis Cases as % of Peak Cows



14%

Annual mastitis rate

— Your farm
— All Fonterra Farms

Lameness



As well as being painful for animals, lameness can add considerable cost to a farming operation with impacts on milk production, reproduction and staff time.

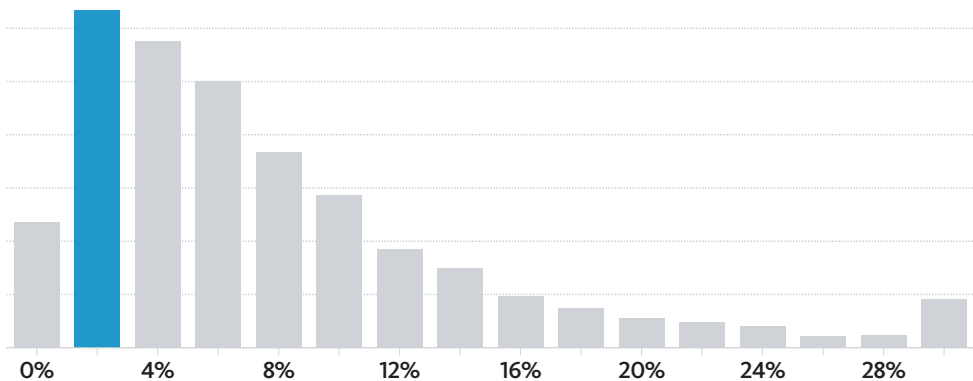
Management decisions have a huge influence on lameness rates, and DairyNZ have created a great guide called Preventing and Managing Lameness, that has some simple actions farmers can take to assess and improve the situation on their farm.

Estimated Cost of Lameness For Your Farm

\$1,250

The base cost to treat and withhold a lame cow is thought to be around \$250 per case. The figure above is calculated for the 5 lame cows you diagnosed or treated last season. DairyNZ have developed a calculator that takes into account the additional costs due to lost reproductive performance and increased culling risk. The link for this calculator can be found in the reference guide at the back of this report.

2022/2023 Lameness Cases as % of Peak Cows



2%

Annual lameness rate

— Your farm
— All Fonterra Farms

Reference Guide

Environment



He Waka Eke Noa
www.hewakaekenoa.nz

11



AgMatters
www.agmatters.nz

11



Farm Source Website - Farm Insights
fonterra.nzfarmsource.co.nz/fs/s/farm-insights

11

Milk



Milking Efficiency
www.dairynz.co.nz/milking/milking-efficiently/milksmart-app

13



Milk Quality Improvement
nzfarmsource.co.nz/business/advice-support/mq-service/

13

Animals



Heat Stress
www.dairynz.co.nz/animal/cow-health/heat-stress

15



Mastitis
www.dairynz.co.nz/animal/cow-health/mastitis/

16



Lameness
www.dairynz.co.nz/animal/cow-health/lameness/

16

Nitrogen Risk Scorecard - [REDACTED]

2022/2023



Purchased Nitrogen Surplus



Nitrogen Risk Scorecard

Aggregate Score

111

Stock Management



LOW

Nitrogen Fertiliser



VERY LOW

Imported Feed



LOW

Cropping & Cultivation



MEDIUM

Effluent Management



VERY LOW

Irrigation



VERY LOW

Stock Management

LOW

Stocking Rate

The higher the stocking rate (peak), the greater the nitrogen loss

Total	23.9 su/ha	MEDIUM
Milking herd (2.3 cows/ha)	19.2 su/ha	
Replacement /other animal	4.7 su/ha	

Dry Matter Eaten*

The more dry matter eaten per hectare the more nitrogen ingested by the animal and returned to pasture as dung and urine

Total	10.5 tDM/ha	VERY LOW
Grown on this farm		
Pasture/forage/fodder crops	8 tDM/ha	
Imported to this farm		
Pasture/forage/fodder crops	2.1 tDM/ha	
All other feeds	0.4 tDM/ha	

*The Dry Matter Eaten calculations utilise Dairy NZ's Dairybase model to calculate energy requirements and feed consumption.

Wintering Off/Culling

Reducing the number of animals on farm (from peak numbers) by culling and/or wintering off (May-Aug) will reduce the nitrogen loss risk

Animals wintered off/culled	45 %	VERY LOW
------------------------------------	-------------	-----------------

Winter Practices

Reducing the number of animals on farm (from peak numbers) by culling and/or wintering off (May-Aug) will reduce the nitrogen loss risk

Hour in Off pasture facility	0 %	N/A
Hours On pasture	98 %	LOW
Hours on Break feed fodder crop	2 %	HIGH

Nitrogen Fertiliser

VERY LOW

Nitrogen Fertiliser Applications

The higher the amount of applied nitrogen, the greater the nitrogen loss risk

Nitrogen applied	41 kgN/ha	VERY LOW
------------------	-----------	----------

Nitrogen Use Efficiency of Fertiliser

The greater the conversion efficiency, the lower the nitrogen surplus available to be lost

kgMS per kgN applied	15 kgMS/kgN	VERY LOW
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Timing Of Application

Fertiliser applied during the winter months will significantly increase the chance of nitrogen being lost

Sep - Apr	
Jul - Aug	MEDIUM
May - Jun	

Highest Application Rate

Lower application rates reduce the nitrogen loss risk

Below 25 kgN/ha	
Above 25 kgN/ha	MEDIUM

Feed Budget

Using a feed budget or wedge to help plan strategic fertiliser application is a good farming practice

Feed budget used	Yes	VERY LOW
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Imported Feed

LOW

Nitrogen Imported From Feed

The greater the amount of imported feed, the more nitrogen that enters the system

Nitrogen imported

32 kgN/ha

VERY LOW

Average Nitrogen Content

The higher the nitrogen content of imported feed, the greater the amount of nitrogen that enters your farm

Average nitrogen content

1.75%

LOW

Nitrogen Use Efficiency of Imported Supplements

The greater the conversion efficiency, the lower the nitrogen surplus available to be lost

kgMS per kgN imported

20 kgMS/kgN

MEDIUM

Cropping & Cultivation

MEDIUM

Conventional

This is the greatest risk method for sowing a crop and the risk increases as the cultivated area increases

% of farm cultivated annually

4 %

LOW

Minimum Tillage

This is a lower risk activity than conventional cultivation, however the risk increases with the total area cultivated

% of farm cultivated annually

N/A

Direct Drill

This is a lower risk activity than both full cultivation and minimum tillage for establishing a crop

% of farm cultivated annually

N/A

Winter Harvest / Grazing

Crops harvested/grazed during winter pose a higher risk to nitrogen leaching

Summer

Winter

MEDIUM

Timing of Fertiliser Applications

There is greater risk if fertiliser is applied to crops during high risk months of May, June, July and August

No Fertiliser Applied During Winter

VERY LOW

Fertiliser Applied During Winter

Effluent Management

VERY LOW

Effluent Disposal Method

Irrigating to pasture is the lowest risk

Irrigated to Pasture

VERY LOW

Effluent Irrigation Area

An undersized effluent area can result in the average amount of nitrogen per hectare applied exceeding local rules and regulations

Disposal Area (without feedpad)

5 ha/100 cows

VERY LOW

Application Depth

Low rates will ensure greater flexibility of management with more irrigation days available and increase the chance of the plant utilising the nutrients within the effluent rather than it being lost

Application Depth

< 12 mm

VERY LOW

Irrigation

VERY LOW

Irrigation Method

Irrigation generally increases the nitrogen loss risk due to the potential for over irrigating to induce drainage events. Some systems are inherently riskier than others irrespective of management

Pivot or linear	N/A
Rotary boom, gun or k-line	N/A
Border dkye	N/A

Irrigation Scheduling

Deciding when to start or stop irrigation is important as poor management of irrigation events can lead to induced drainage

Soil moisture meters / budget	N/A
Fixed routine / visual assessment	N/A

Irrigation Application Method

Having control over the amount and how often water is applied can greatly influence nitrogen loss risk with poor management of irrigation events leading to induced drainage

Variable rate irrigation	N/A
Deficit irrigation	N/A
Fixed depth and return period	N/A

This Fonterra Nitrogen Risk Scorecard ("Tool") was last updated on 8th August 2023. The Tool is intended for calculating your farm's Nitrogen Risk Scorecard results. All results, advice, data or information generated by it are based on data entered, assumptions and other information you provide and are intended to be used for estimate and reference purposes only. We make no representations or warranties as to whether information, advice or data provided by this Tool is accurate correct, reliable, or suitable for your purposes. The results generated by the Digital Nitrogen Risk Scorecard may vary to the results produced by this Tool. We do not accept any liability, direct or indirect, for any loss or damage which may directly or indirectly result from any information generated by this Tool whether negligent or otherwise. You are solely responsible for the actions you take in reliance on the information or data generated by the Tool.

