# Farm Environmental Management Plan

**MIRAKA FARMS LTD**
**DYKES P J & WITSEY M**
**162 BOYLE ROAD**
**RD 3 WINTON 9783**


**Prepared with assistance from:**

**Mark Crawford**
**Senior Farm Environmental Consultant**


ravensdown

optimiser™
Environmental analysis and planning

## Business details:

| | | | |
|---|---|---|---|
| **Farm name:** | MIRAKA FARMS LTD | **Physical address:** | 162 BOYLE ROAD<br>RD 3 WINTON 9783 |
| **Contact person:** | Peter Dykes | **Owner details:** | Peter Dykes and Mary Witsey |
| Relationship to property: | Owner | Phone: | (03) 2361121 |
| Phone: | (03) 2361121 | Mobile: | (027) 2224578 |
| Mobile: | (027) 2224578 | Email: | mirakafarms@gmail.com |
| Email: | mirakafarms@gmail.com | | |
| **Property size (total area):** | 259.2 ha | | |
| **Farm type:** | Seasonal supply dairy farm. | | |
| **Vision statement:** | Peter and Mary have created a dairy farm as a family owned business with the aim of retaining ownership in the family and ensuring the farm is a viable, sustainable operation. They take real pride in the appearance of the property and their operation. | | |

| | **Legal description** | **Idenfifier** | **Legal Area (ha)** |
|---|---|---|---|
| **Land information:** | Lot 1 Deposited Plan 4967 & 6647; Lot 1 Deposited Plan 471006 Part Lot 5 Block I Deposited Plan 168; Lot 3 Block I Deposited Plan 168 Part Lot 2 Deposited Plan 471006 and Section 144 Oreti Hundred | 637659,637660, SL189/163, SL189/164, SL8B/626, SLB2/436 | 202.24 ha titled plus part area of 119.97 (calculated at 57 ha) equates to 259.2 ha |

| | **Activity type** | **Consent number** | **Termination date** |
|---|---|---|---|
| **Regional council resource consent information:** | | | |

## New actions to address environmental risks:

| Planned action | Why? | Proposed timeline | Who responsible? | Evidence |
|---|---|---|---|---|
| Investigate the potential to incorporate catch crops as a means to reduce nitrogen losses from grazed fodder crop areas. | Catch crops sown post winter crop have the ability to utilise excess nitrogen remaining in the soil profile and reduce potential nitrogen leaching losses. | Will consider over the next 12 months | Peter Dykes | Crop managemnt plan. |
| Continue to apply nitrogen differentally to the non effluent and effluent blocks. | Takes into account the additional nitrogen being applied to certain aras in the form of effluent. | Spring 2018 | Peter Dykes and Agrimanager | SaFire fertiliser plan and notes with nutrient budget. |
| Investigate options for utilising GPS technology with own fertiliser spreader recording proof of placement. | Minimise the risk of nutrients being applied in unwanted places and reduce the risk of overland flow. | Will consider over the next 12 months | Peter Dykes | Alternatives and costing. |
| Investigate the cost of a feed pad and/or loafing pad to stand stock on when conditions are wet. | Potential to minimise soil treading damage and store nutrients at risk of surface run off and apply at appropriate time. | Will consider over the next 12 months | Peter Dykes | Alternatives and costing. |
| Streams will be progressively fenced with appropriate buffer zones. | Fencing with appropraite buffer zones will reduce the risk of nutrient loss to waterways via overland flow and/or direct stock access. | Will phase in over next 5 - 7 years | Peter Dykes | 5 - 7 year plan outlining fencing requirements and proposed riparian planting. |

| | | | | |
|---|---|---|---|---|
| Prioritise and plant areas with appropriate riparian vegetation. | Effective riparian planting is able to mitigate nutrient losses from overland flow as well as increase on-farm biodiversity. | Will phase in over next 5 - 7 years | Peter Dykes | 5 - 7 year plan outlining fencing requirements and proposed riparian planting. |
| All bridges, culverts and tracks will be cambered and nib walled so as track run off is directed away from waterways. | Reduce the risk of nutrient loss to waterways via overland flow. | Will phase in over next 5 - 7 years | Peter Dykes | Site visit. |

## Physiographic zones (and variants where applicable)

| Physiographic zone (and variant) | OVERSEER blocks | Soils | Key transport pathways for contaminants | Management |
|---|---|---|---|---|
| Central Plains no variant (95 %) | Brax_4a.1 Non Eff and Eff; Brax_4a.1 Non Eff and Eff Support and Support Extra | Braxton_4a.1 sibling, a Othic Gley soil with a deep silt loam topsoil over a clay subsoil. PAW of 147 mm, a drainage status is poorly drained | Clay has the potential to shrink, crack and swell when dry / wet, creating pathways for nutrient losses. Potential for nutrietn losses via overland flow as well as direct losses from artificial drainage. A number of small streams flow through the farm which link to the outlet points of artificial drains. | Riparain edges and set back areas for crops; Reduced treading and pugging when soils are wet; deferred grazing over at risk times (autumn) and optimal Phosphate levels and maintenance applications |
| Oxidising no variant (5 %) | Glene_4a.1 Non Eff & Eff support | Glenelg_4a.1 sibling, a Firm Brown soil with a shallow topsoil over a gravel sub soil. PAW of 78 mm, a drainage status of well drained | This soil will not dentrify nitrogen to the same extent as the Braxton and is particularly vulnerable to nitgrogen losses via leaching. It is a soil with good phosphorous retention and little risk of overland flow. | Reduced nitrogen in the autumn will reduce losses over the wet winter when pasture are not actively growing. |

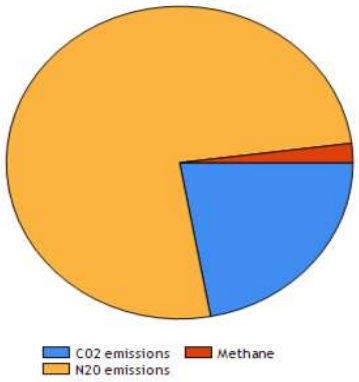
## Nutrient budgeting:

| Total Nitrogen loss 2016-17 (kg N/yr) | Nitrogen loss 2016-17 (kg N/ha/yr) | OVERSEER version |
|---|---|---|
| 8,893 | 34 | 6.3.0 |

| Total Phosphorus loss 2016-17 (kg P/yr) | Phosphorus loss 2016-17 (kg P/ha/yr) | Author |
|---|---|---|
| 182 | 0.7 | M Crawford |

| Methane | N2O emissions | CO2 emissions |
|---|---|---|
| $CO_2$ equivalents (kg/ha/yr) | $CO_2$ equivalents (kg/ha/yr) | $CO_2$ equivalents (kg/ha/yr) |
| | | |

Total farm greenhouse gas emissions CO2

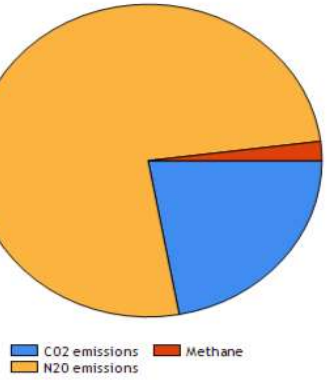



| Consented Total Nitrogen loss 2016-17 (kg N/yr) | Consented Nitrogen loss 2016-17 (kg N/ha/yr) | OVERSEER version |
|---|---|---|
| 8,577 | 32 | 6.3.0 |

| Consented Total Phosphorus loss 2016-17 (kg P/yr) | Consented Phosphorus loss 2016-17 (kg P/ha/yr) | Author |
|---|---|---|
| 189 | 0.7 | |

| Methane | N2O emissions | CO2 emissions |
|---|---|---|
| $CO_2$ equivalents (kg/ha/yr) | $CO_2$ equivalents (kg/ha/yr) | $CO_2$ equivalents (kg/ha/yr) |
| | | |

Total farm greenhouse gas emissions CO2



| **Baseline GMP loss rate** (kgN/ha/yr) | Date produced | OVERSEER version |
|---|---|---|
| | | |

| **GMP Loss Rate** (kgN/ha/yr) | Date produced | OVERSEER version |
|---|---|---|
| | | |

## Nutrients

**Objectives:**

(1) Use nutrients efficiently and minimise nutrient losses to water.

(2) Nutrient losses do not exceed consented nitrogen and phosphorus loss limits.

**Targets:**

− Nitrogen and phosphorus losses from farming activities are at or below the consented nitrogen loss limits.

− Available nitrogen loss mitigation measures (excluding those associated with irrigation, fertiliser or effluent management) are implemented.

− Phosphorus and sediment losses from farming activities are minimised.

− Manage the amount, timing and application of fertiliser inputs to match the predicted plant requirements and minimise nutrient losses.

− Store and load fertiliser to minimise the risk of spillage, leaching and loss into water bodies.

| **Key risks** |
|---|
| Excess nitrogen accumulation as a result of the autumn and winter cropping presents a risk of deep drainage to aquifers. Phosphate losses to waterways from potential overland flow. |

| **Actions currently adopted to meet nutrient targets** | **Why?** | **Evidence** |
|---|---|---|
| **Good Management Practice** | | |
| • Nutrient budgetting is used as a decision making tool to assess and inform farm management. | > Minimise nutrient losses and maximise nutrient use efficiency | > Overseer nutrient budget |
| • Fertiliser application is based on recommendations from a Certified Nutrient Management Advisor. | > Minimise nutrient losses and maximise nutrient use efficiency | > Fertiliser recommendation |
| • Fertiliser application is tailored for different management blocks. | > Minimise nutrient losses and maximise nutrient use efficiency | > Application records |
| • Regular soil tests are conducted to inform fertiliser application. | > Minimise nutrient losses and maximise nutrient use efficiency | > Soil test results |
| • Olsen-P is managed in optimal range for soil type. | > Minimise nutrient losses and maximise | > Soil test results |
| • No fertiliser applications immediately before heavy rain is forecast. | > Minimise nutrient losses and maximise nutrient use efficiency | > Application records / farm diary |

| Actions currently adopted to meet nutrient targets | Why? | Evidence |
|---|---|---|
| • N-fertiliser rates do not to exceed >50 kg N/application or >150 kg N/ha/yr on grazed pasture. | > Minimise nitrogen losses and maximise nutrient use efficiency | > Application records |
| • N application rates match pasture and crop growth requirements. | > Minimise nitrogen losses and maximise nutrient use efficiency | > Application records |
| • Pasture is at least 25mm high (approx 1000kg DM/ha) before N fertiliser is applied. | > Minimise nitrogen losses and maximise nutrient use efficiency | > Application records / farm diary |
| • N is not applied when the 10cm soil temperature at 9am is less than 6ºC and falling. | > Minimise nitrogen losses and maximise nutrient use efficiency | > Application records / farm diary |
| • N is not applied when soils are at or above field capacity. | > Minimise nitrogen losses and maximise nutrient use efficiency | > Application records / soil moisture records |
| • Own equipment used for fertiliser application is suitably calibrated. | > Minimise nutrient losses and maximise nutrient use efficiency | > Calibration test results |
| • No direct application of fertiliser into waterways. | > Minimise nutrient losses and maximise nutrient use efficiency | > Proof of placement maps |
| • Fertiliser is not applied when tile drains are running. | > Minimise nutrient losses and maximise nutrient use efficiency | > Application records / farm diary |
| • N and P fertiliser applications are delayed after any period of drought until sufficient pasture regrowth has occurred. | > Minimise nutrient losses and maximise nutrient use efficiency | > Application records / farm diary |
| • Fertiliser is stored at an appropriate distance from surface waterbodies in accordance with local regional council requirements. | > Minimise nutrient losses | > Field inspection |
| • Storm water discharges are directed away from fertiliser storage area. | > Minimise nutrient losses | > Field inspection |
| • Fertiliser loading sites are at least 50m from any open waterway on areas that are not susceptible to flooding. | > Minimise nutrient losses | > Field inspection |
| • Excess or unwanted fertiliser is spread onto suitable land or crops. | > Minimise nutrient losses and maximise nutrient use efficiency | > Application records / farm diary |

| Actions currently adopted to meet nutrient targets | Why? | Evidence |
|---|---|---|
| • Cultivation practices and timings are considered to minimise N leaching losses associated with mineralisation. | > Minimise nitrogen losses and maximise nutrient use efficiency by utilising nitrogen avaliable in soil profile | > Crop diary / calendar |
| • Fertiliser application rates take into account any other source of nutrients applied on farm e.g., manure, FDE, factory waste, supplementary feed. | > Minimise nutrient losses and maximise nutrient use efficiency | > Application records / farm diary |
| **Premium actions** | | |
| • N fertiliser application rates are informed by industry crop models. | > Minimise nutrient losses and maximise nutrient use efficiency | > Application records / crop model report |
| • GPS technology is used for precise fertiliser application. | > Minimise nutrient losses and maximise nutrient use efficiency | > Proof of placement maps |

## Irrigation

**Objective:**

The amount and timing of irrigation is managed to meet plant demands, minimise risk of leaching and runoff and ensure efficient water use.

**Targets:**

- New irrigation systems are designed, and installed in accordance with industry codes of practice and standards.
- The performance of irrigation systems is assessed annually and irrigation systems are maintained and operated to apply irrigation water at their optimal
- The timing and depth of irrigation water applied takes account of crop requirements and is justified through soil moisture monitoring or soil water
- Staff are trained in the operation, maintenance and use of irrigation systems.

| Key risks |
| --- |
| |

| Actions currently adopted to meet irrigation targets | Why? | Evidence |
| --- | --- | --- |
| N/A | | |

## Cultivation and Soil Structure

**Objective:**
The physical and biological condition of soils is maintained or improved in order to minimise the movement of sediment, phosphorus and other contaminants to waterways.

**Targets:**
− Farming activities are managed so as to not exacerbate erosion.
− Farming practices are implemented that optimise infiltration of water into the soil profile and minimise run-off of water, sediment loss and erosion.

| **Key risks** |
|---|
| Cultivation for winter crop as well as treading and pugging damage to soils increases the risks of both nutrient and sediment losses associated with overland flow on this farm |

| **Actions currently adopted to meet cultivation and soil structure targets** | **Why?** | **Evidence** |
|---|---|---|
| **Good Management Practice** | | |
| • Direct drilling or minimum tillage is used in preference to conventional cultivation in high erosion risk situations. | > Minimise the transport of sediment, phosphorus and other contaminants to waterways via overland flow | > Farm records / field inspection |
| • Buffer zones and/or riparian strips (of 2m or more or as a required by local rules) are established between any cultivated soils and waterways. | > Minimise the movement of sediment, phosphorus and other contaminants to waterways. | > Field inspection |
| • Winter fodder crops are break-fed to ensure that any critical source areas are grazed last. | > Minimise the transport of sediment, phosphorus and other contaminants to waterways via overland flow | > Farm records / photo |
| • Good pasture covers are maintained. | > Reduce erosion and minimise the movement of sediment, phosphorus and other contaminants to waterways. | > Field inspection |
| • Paddocks are managed to remediate any soil compaction and surface crusting. | > Minimise the movement of sediment, phosphorus and other contaminants to waterways. | > Farm records |
| **Premium actions** | | |

| Actions currently adopted to meet cultivation and soil structure targets | Why? | Evidence |
|---|---|---|
| • Stock on winter fodder crops are back-fenced with a portable trough. | > Minimise the movement of sediment, phosphorus and other contaminants to waterways. | > Farm records / photos |

## Animal Effluent and Solid Animal Waste

**Objective:**
Animal effluent and solid animal waste is managed to minimise nutrient leaching and run-off.

**Targets:**
− Effluent systems meet industry Codes of Practice or an equivalent standard.
− The timing and rate of application of effluent and solid animal waste to land is managed so as to minimise the risk of contamination of groundwater or surface water bodies.
− Sufficient and suitable storage is available to enable animal effluent and wash-down water to be stored when soil conditions are unsuitable for application.
− Staff are trained in the operation, maintenance and use of effluent storage and application systems.

| **Key risks** |
|---|
| The effluent pond, storage and application systems present a key challenge for this farm. The ability to store nutrients and restrict applications when soils are wet and at risk from overland flow as well being able to apply effluent when pastoral conditions are more appropriate for nutrient uptake are critical |

| **Actions currently adopted to meet animal effluent and solid animal waste targets** | **Why?** | **Evidence** |
|---|---|---|
| **Good Management Practice** | | |
| • Effluent storage is designed to meet the industry specific Code of Practice as well as district and regional council requirements. | > Reduce risk of nutrient and pathogen losses from effluent to waterways | > Effluent system design specifications / field inspection |
| • Sufficient suitable storage is available for farm effluent and waste water to be stored when soil conditions are unsuitable for application as determined using the dairy effluent storage calculator. | > Reduce risk of nutrient and pathogen losses from effluent to waterways | > Effluent system design specifications / field inspection |
| • Effluent storage facilties are effectively sealed. | > Reduce risk of nutrient and pathogen losses from effluent to waterways | > Field inspection |
| • Effluent is applied to pasture and crops at rates and times to minimise risk to water bodies. | > Reduce risk of nutrient and pathogen losses from effluent to waterways | > Application records |

| Actions currently adopted to meet animal effluent and solid animal waste targets | Why? | Evidence |
|---|---|---|
| • Effluent application equipment is inspected and maintained regularly. | > Reduce risk of nutrient and pathogen losses from effluent to waterways | > Maintainance records |
| • Effluent pumping equipment is regularly serviced | > Reduce risk of nutrient and pathogen losses from effluent to waterways | > Service records |
| • Staff are trained to manage effluent applications. | > Reduce risk of nutrient and pathogen losses from effluent to waterways | > Training records |
| • Effluent system incorporates fail safe systems to prevent leaks (e.g. auto cut off, non return valves). | > Reduce risk of nutrient and pathogen losses from effluent to waterways | > Effluent system design specifications / field inspection |
| • Effluent spreader performance (rate and distribution) is regulary checked. | > Reduce risk of nutrient and pathogen losses from effluent to waterways | > Application records |
| • Effluent is not applied when soils are at or above field capacity. | > Reduce risk of nutrient and pathogen losses from effluent to waterways | > Application records |

## Waterbodies

**Objective:**
Wetlands, riparian areas and the margins of surface waterbodies are managed to avoid damage to the bed and margins of the water body, and to avoid the direct input of nutrients, sediment, and microbial pathogens.

**Targets:**
− Stock are excluded from waterbodies in accordance with regional council rules or any granted resource consent.

− Vegetated riparian margins of sufficient width are maintained to minimise nutrient, sediment and microbial pathogen losses to waterbodies.
− Farm tracks, gateways, water troughs, self-feeding areas, stock camps wallows and other farming activities that are potential sources of sediment, nutrient and microbial loss are located so as to minimise the risks to surface water quality.
− Mahinga kai values are protected as a result of measures taken to protect and enhance water quality and stream health.

| **Key risks** |
|---|
| A stream flows through the property which has aesthetic values and supports freshwater ecology. This requires protection from stock and mitigations to reduce the risks associated with overland flow. A key mitigation in this situation is the be continued exclusion of stock from this stream. Effective |

| **Actions currently adopted to meet waterbodies targets** | **Why?** | **Evidence** |
|---|---|---|
| **Good Management Practice** | | |
| • Vegetative riparian zones are maintained around waterways. | > Minimise nutrient, sediment and pathogen losses to surface waterways via overland flow | > Field inspection |
| • Vegetated buffer strips (of 5m or more as a required by local rules) are maintained between areas of winter grazing and any river, lake, drain or wetland. | > Minimise nutrient, sediment and pathogen losses to surface waterways via overland flow | > Farm records / riparian plan |
| • Areas of stream bank erosion are identified and activily managed. | > Minimise nutrient, sediment and pathogen losses to surface waterways via overland flow | > Field inspection |
| • Bridges or culverts are constructed where intensively farmed stock cross waterways. | > Minimise nutrient, sediment and pathogen losses to surface waterways via overland flow | > Field inspection |

| Actions currently adopted to meet waterbodies targets | Why? | Evidence |
|---|---|---|
| • Stockyard runoff is directed to pasture. | > Minimise nutrient, sediment and pathogen losses to surface waterways via overland flow | > Field inspection |
| • Reticulated stock water is avaliable in all paddocks with intensively farmed stock. | > Minimise nutrient, sediment and pathogen losses to surface waterways via overland flow | > Field inspection |
| • Water troughs are located away from waterways in a drier area of a paddock. | > Minimise nutrient, sediment and pathogen losses to surface waterways via overland flow | > Field inspection |
| • Shade trees for stock are avaliable away from waterway margins. | > Minimise nutrient, sediment and pathogen losses to surface waterways via overland flow | > Field inspection |
| • Supplements are fed out away from waterways. | > Minimise nutrient, sediment and pathogen losses to surface waterways via overland flow | > Field inspection |
| • Gateways are located in drier points and are wide enough to allow good stock movements to reduce pugging. | > Minimise nutrient, sediment and pathogen losses to surface waterways via overland flow | > Field inspection |
| • Drain clearance is planned to avoid adverse effects on spawning times or migration of native fish (e.g. November to April are when young eels are present, March to May during the īnanga spawning season). | > Preserve mahinga kai values and native biodiversity | > Farm records |
| • Drain clearance material is disposed of so: (1) Sediment is not lost back into waterbodies; (2) Damage to mahinga kai species and/or habitats is avoided. | > Minimise sedimentation of waterways. Preserve native biodiversity and mahinga kai. | > Farm records |
| **Premium actions** | | |
| • A riparian planting and maintanance programme is implemented. | > Minimise nutrient, sediment and pathogen losses to surface waterways via overland flow. Increase shade cover to waterways. | > Field inspection |

## Point Sources (offal pits, farm rubbish pits, silage pits)

**Objective:**
The number and location of pits are managed to minimise risks to health and water quality.

**Target:**
− All on-farm silage, offal pit and rubbish dump discharges are managed to avoid direct discharges of contaminants to groundwater or surface water.

| Key risks |
|---|
| Offal/rubbish pits can impact nutrient and pathogen contamination of water ways and aquifers if not controlled or sited appropriately. |

| Actions currently adopted to meet point sources target | Why? | Evidence |
|---|---|---|
| **Good Management Practice** | | |
| • Offal pits, silage stacks and rubbish dumps are sited in accordance with district and regional council requirements and are an appropriate distance from waterways, wetlands, bores and property boundaries and are in an area not prone to ponding. | > Reduce chance of nutrient, sediment and pathogen losses to waterways | > Field inspection |
| • Surface water runoff and irrigation is directed away from offal pits, silage stacks and rubbish dumps. | > Reduce chance of nutrient, sediment and pathogen losses to waterways | > Field inspection |
| • Leachate from silage pits is activily managed to prevent any surface runoff into waterways. | > Reduce chance of nutrient losses to waterways | > Field inspection |
| • The offal pit is only used for waste originating from this property. | > Reduce chance of nutrient, sediment and pathogen losses to waterways | > Farm records |
| • Offal pits are managed in such a way to ensure public safety and exclude stock. | > Health & safety | > Field inspection |
| • Wash-down water and/or agrichemical spray mixture is prevented from entering surface waterbodies. | > Reduce chance of contaminent losses to waterways | > Farm records / field inspection |

| Actions currently adopted to meet point sources target | Why? | Evidence |
|---|---|---|
| • Agrichemicals are stored appropriately. | > Reduce the risk of contaminants entering the environment as well as human safety. | > Field inspection |
| • Disposal of agrichemical contaners is managed in accordance with an approved procedure. | > Reduce the risk of contaminants entering the environment as well as human safety. | > Field inspection |
| **Premium actions** | | |

## Water-use (excluding irrigation water)

**Objective:**
To use water efficiently ensuring that actual use of water is monitored and efficient.

**Target:**
− Actual water use is efficient for the end use.

| Key risks |
|---|
| Excessive water use can lead to unnecessary leaching losses. A primary focus for water use efficiency in this farm is the effective use of water in the dairy shed. |

| Actions currently adopted to meet water-use (excluding irrigation water) target | Why? | Evidence |
|---|---|---|
| **Good Management Practice** | | |
| • Non-irrigation water use is monitored and efficiently utilised. | > Minimise wastage of water | > Field inspection / farm records |
| • Regular trough maintenance programme. Any leaks are fixed as soon as possible. | > Minimise wastage of water | > Field inspection / farm records |
| • Water wastage from the dairy shed is minimised. | > Minimise wastage of water | > Field inspection / farm records |

## Native biodiversity

**Objective:**
To conserve and improve on-farm native biodiversity.

**Target:**
− Native biodiversity is enhanced.

| Key risks |
|---|
| The farm prides itself in its native plantings. A key risk is associated with ensuring native plantings are protected from stock. |

| Actions currently adopted to meet native biodiversity target | Why? | Evidence |
|---|---|---|
| **Good Management Practice** | | |
| • An active weed control programme is place. | > Preserve and enhance native biodiversity | > Farm records |
| • An active programme to control pest animals is place. | > Preserve and enhance native biodiversity | > Farm records |
| • Areas of remnant native vegetation, wetlands and springs are protected from stock. | > Preserve and enhance native biodiversity | > Farm records / field inspection |
| **Premium actions** | | |
| • Expert advice sought to identify what native biodivesity is present on-farm. | > Provide expert guidance on means to preserve and enhance on-farm native biodiversity | > Farm records |
| • Covenant areas are established. | > Preserve and enhance native biodiversity | > Farm records |
| • Native planting programme established. | > Preserve and enhance native biodiversity | > Farm records |

## Greenhouse gas emissions

**Objective:**
Minimise on-farm greenhouse gas emissions.

**Targets:**
- Enhance production efficiency.
- Restrict absolute greenhouse gas emissions.

| Key risks |
|---|
| Increased productivity without any increased production efficiencies will lead to increased greenhouse gas emissions. |

| Actions currently adoted to meet greenhouse gas emission targets | Why? | Evidence |
|---|---|---|
| • High genetic merit of dairy cows. | > More efficient milk production per cow | > Farm records |
| • Good animal health. | > More efficient production | > Farm records |
| • Avoid overgrazing to ensure constant cover and efficient production. | > Reduce emissions by maintaining carbon inputs to soil | > Farm records / field inspection |
| • Limit conventional cultivation. | > Reduce emissions by maintaining carbon inputs to soil | > Farm records |
| • No-tillage / direct drilling systems adopted where practical. | > Reduce emissions by maintaining carbon inputs to soil | > Farm records |
| • Riparian planting programme underway. | > Reduce emissions by utilising trees for carbon sequestration | > Farm records / field inspection |
| • Shelter belts and windbreaks established. | > Reduce emissions by utilising trees for carbon sequestration | > Farm records / field inspection |
| • Areas of native bush preserved and/or enhanced. | > Reduce emissions by utilising trees for carbon sequestration | > Farm records / field inspection |
| • Optimised nitrogen fertiliser use applied according to agreed GMP. | > Reduce emissions associated with nitrogen | > Farm records |
| • Use of urease inhibitors applied in conjunction with nitrogen fertiliser (or animal waste). | > Reduce emissions associated with nitrogen | > Farm records |

| Actions currently adoted to meet greenhouse gas emission targets | Why? | Evidence |
|---|---|---|
| • Effective use of gibberellins to boost pasture growth and replace some N fertiliser use. | > Reduce emissions associated with nitrogen | > Farm records |
| • Avoid speading effluent when soils are saturated. | > Reduce emissions associated with nitrogen | > Farm records |
| • Incorporate mixed pasture swards which include herbaceous plants (e.g. chicory, plantain). | > Reduce emissions associated with nitrogen | > Farm records / field inspection |
| • Effluent storage facilties are effectively sealed to mitigate volatilization losses. | > Reduce GHG emissions | > Field inspection |

## Farm Environmental Management Plan review requirements

The Farm Environmental Management Plan must be reviewed at least once every 12 months by the landholding owner or their agent and the outcome of the review documented; and provided to the Southland Regional Council upon request.

| **Date of review** | **By who?** | **Outcomes of review** |
|---|---|---|

## Examples of evidence

- **Nutrient Management Area**

Nutrient Budgets (latest version of OVERSEER® or equivalent model approved by Environment Canterbury)
Farm Portal Farm Report
Critical nutrient source map
Spreadmark certificate
Proof of fertilizer placement records
Fertiliser records
Fertiliser application records (incl. GPS records)
Soil moisture records
Soil temperature records
Soil test results(incl. Deep soil N test results)
Plant analysis results
Advisors recommendations report
Crop calculator records
Fertilizer application equipment calibration results

- **Irrigation Management Area**

Design specifications
Certified/Accredited designer used
System evaluation report
System commissioning certificate
System calibration
Water take records
Preseason system maintenance records
Maintenance records
Breakages & system failure records
Annual system audit report
Bucket test results
Scheduling record
10 day water budget
Application depth records

Map of irrigation high risk areas
Soil risk map
Irrigation GPS records
Specialised soil mapping records
Rainfall records
Climatic records
Soil moisture records
Staff training records

- **Soils Management Area**

Erosion risk map
Record of erosion control activities
Soil incident records
Soil compaction field test results

- **Collected Animal Effluent Management Area**

Regional Council Compliance letter
Effluent irrigation incident records
Backflow prevention device certificate
Certified/Accredited designer used
System maintenance records
Management plan/procedures
System incident records
Emergency management procedures
Effluent diary
Procedures manual
Effluent area map
System maintenance records
Application records (incl. depth and GPS records)
Bucket test results
Soil moisture records
Effluent storage design specifications
Dairy effluent storage calculations

Effluent storage system leakage test
Staff training records

**• Waterbody (riparian areas, drains, rivers, lakes, wetlands) Management Area**
Stock Exclusion Map
Waterway mapping - fencing
Riparian management records
Riparian planting plan
Risk map and action plan

**• Point Sources (offal pits, farm rubbish pits, silage pits) Management Area**
Pit Location Map
Contingency plan

**• Water Use (excluding irrigation water) Management Area**
Water use data
Water meter data
Water meter certification
Water efficiency calculation
Certification of mechanical device
Design specifications