



FARM ENVIRONMENT PLAN



ABOUT YOUR FARM ENVIRONMENT PLAN

This Farm Environment Plan document is the result of a tailored farm environment planning service provided to you through Tiaki Sustainable Dairying. 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, given your farming operations while documenting existing good management practices and identifying any actions that should be taken to more effectively manage the environmental risks inherent in any farming operation. As any good plan should, this Farm Environment Plan includes sensible implementation timeframes for all identified actions. Now that this plan has been created it's the plan owners responsibility to ensure it is put into action and kept up to date as actions are completed or conditions on farm change. Tiaki Sustainable Dairying 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.

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FARM DETAILS

FARM NAME

Owl Farm

SUPPLIER NUMBER

72847

PLAN OWNER

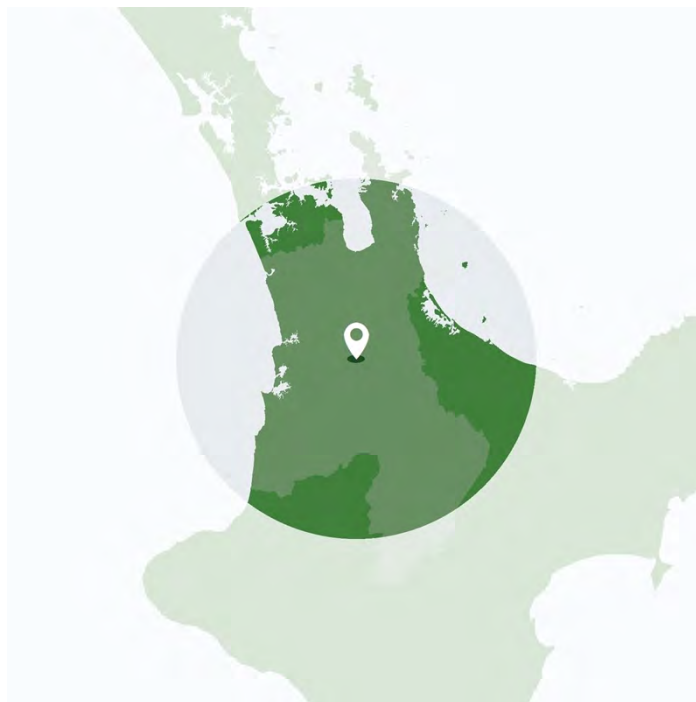
XXX XXX

+ X XXXXXXXX
email@xxx.co.nz

FARM ADDRESS

SH 1 Cambridge, Cambridge

LOCATION



REGIONAL COUNCIL

Waikato

PLAN LAST EDITED DATE

08 January 2019

POINTS OF NOTE

Waikato River: 237.45 ha - 100.00 %.

LAND PARCELS

Fee Simple, 1/1, Lot 1 Deposited Plan South Auckland 15400 and Lot 1 Deposited Plan South Auckland 88412 and Lot 5-8 Deposited Plan South Auckland 30324 and Lot 3-4 Deposited Plan 444339 and Lot 2-3 Deposited Plan 458241, 529,369 m2, Fee Simple, 1/1, Part

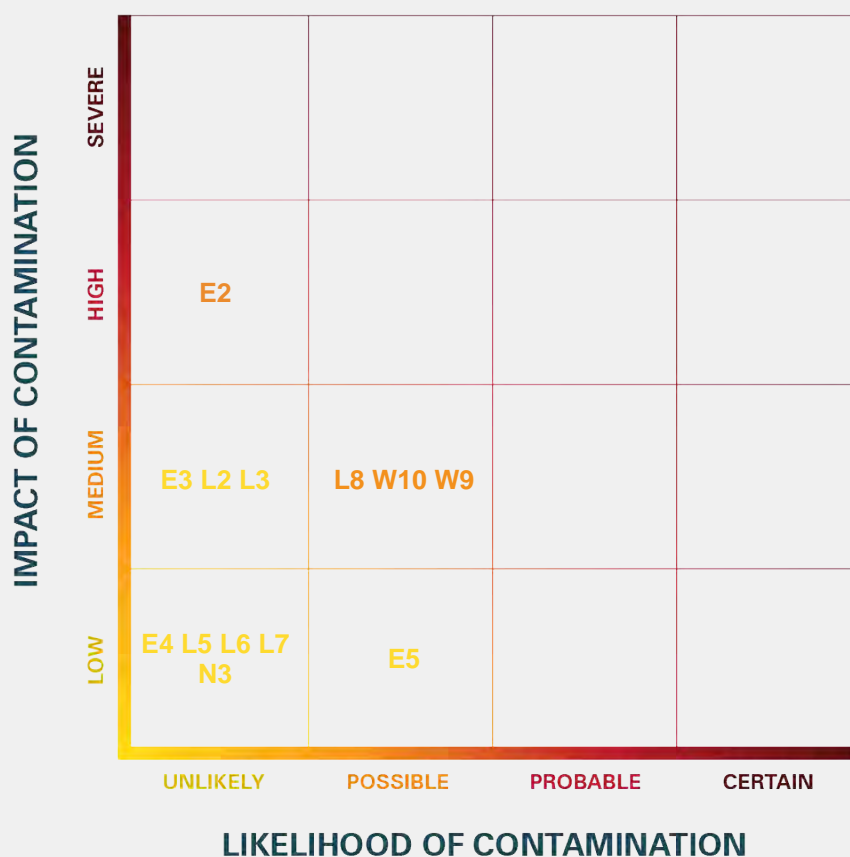
SUMMARY OF OPEN ACTIONS

This table includes all open or ongoing actions that have been agreed as part of this Farm Environment Plan. They are organized by their target due date. Where an action has been identified as especially important an additional (Flag) icon may have been added.

| CATEGORY | FEATURE TYPE & NAME | ACTION REQUIRED | TARGET DATE |
|--|---|---|------------------|
|  L2 | Race Management - Crossing over main fram track by Te Awa Cycleway/Walkway | Dig Cut-out both sides of race - Completed | Completed |
|  L3 | Crossing point - Crossing between old wetland | Retire Crossing point - Completed | Completed |
|  E5 | Effluent Storage - Old Effluent Pond | Construction of new effluent pond - Completed | Completed |
|  W9 | Re-alignment of drain | Re-align drain - COMPLETE | Completed |
|  W1 | Riparian Management Unit - Drain heading towards McGraths Boundary from swimming pool | Relocating fence and planting - Update | 31 May 19 |
|  W1 | Riparian Management Unit - Retired area to be planted below the kobby block | Planting | 01 Dec 19 |
|  W1 | Riparian Management Unit - Drain leading from driving range towards Waikato River | Relocate fence and further plant | 01 Dec 27 |
|  L5 | Race Management | On-going maintenance | Ongoing |
|  L6 | Sand Quarry - Sand Quarry | Esnure lip at far end remains in-tact | Ongoing |
|  L7 | Entry/Exit Race | Continue scraping as required | Ongoing |
|  L8 | Sub-surface drainage | Avoid applying nitrogen when wet | Ongoing |
|  E2 | Effluent Storage - New Effluent Pond | Manage pond levels | Ongoing |
|  E3 | Effluent Irrigation | Irrigator maintenance | Ongoing |
|  E3 | Effluent Irrigation | Develop an Effluent Management Plan | Ongoing |
|  W1 | Waterways and Bio-diversity Overview | Ongoing Maintenance | Ongoing |
|  W4 | Riparian Management Unit - Riparian Buffer between farm and Waikato River | Removal of wildling pines and gorse | Ongoing |

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.

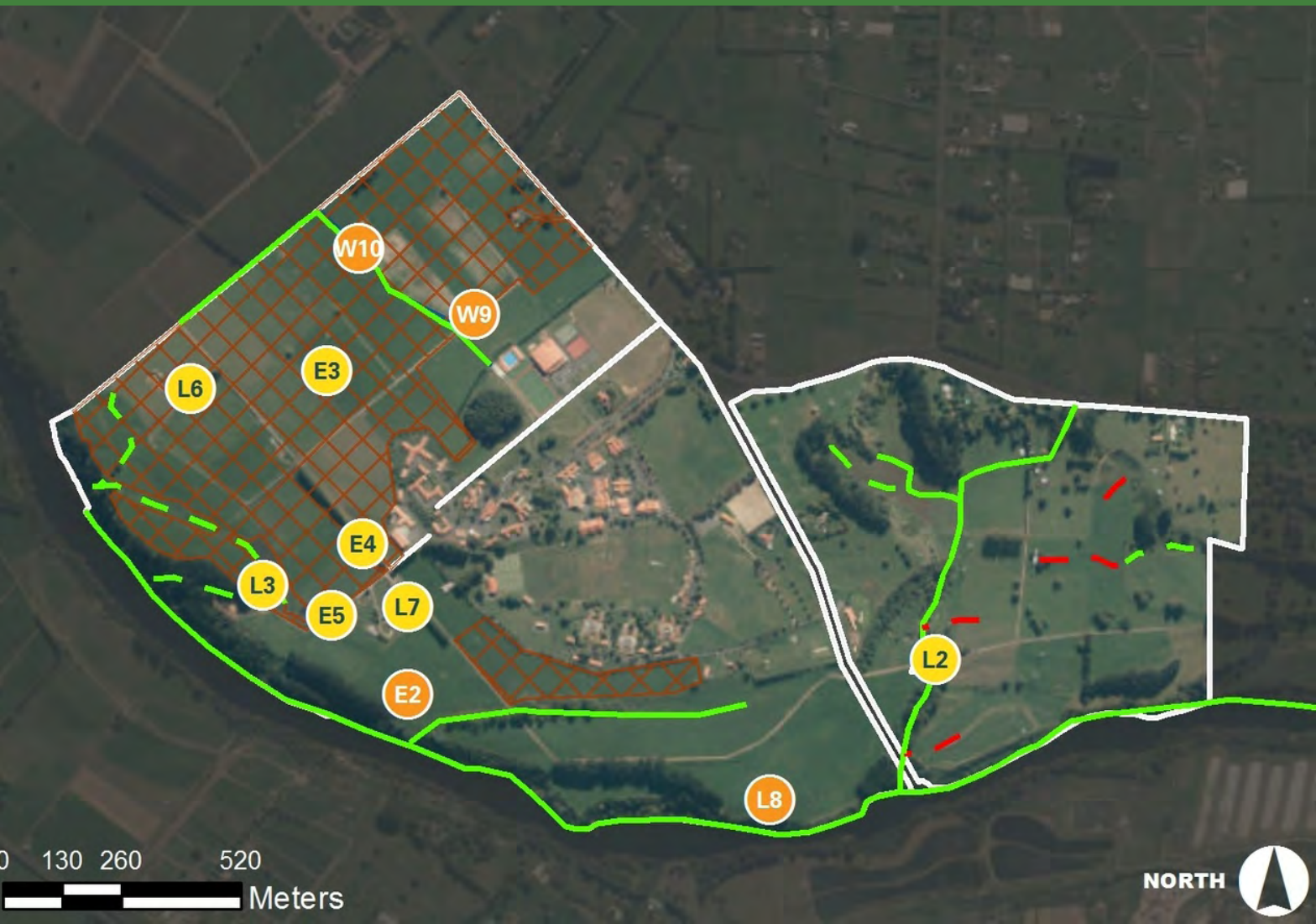
Example:



RISK RATING

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
 ● SEVERE



- | | |
|--|---|
| <ul style="list-style-type: none"> F1 General Description F2 Water-use Overview F3 Storage, Infrastructure & Waste Overview F4 Wash down pad - Wash down pad F5 Bio-Security L1 Land and Soil Overview | <ul style="list-style-type: none"> L2 Race Management - Crossing over main fram track by Te Awa Cycleway/Walkway L3 Crossing point - Crossing between old wetland L4 Cropping - Cropping practices L5 Race Management L6 Sand Quarry - Sand Quarry |
|--|---|

- L7 Entry/Exit Race
- L8 Sub-surface drainage
- E1 Effluent Overview
- E2 Effluent Storage - New Effluent Pond
- E3 Effluent Irrigation
- E4 Underpass
- E5 Effluent Storage - Old Effluent Pond
- W1 Waterways and Bio-diversity Overview
- W2 Riparian Management Unit - Constructed Treatment Wetland
- W3 Riparian Management Unit - Older Wetland beside effluent pond
- W4 Riparian Management Unit - Riparian Buffer between farm and Waikato River
- W5 Riparian Management Unit - Riparian planting
- below Avantidrome
- W6 Riparian Management Unit - Mountain Biking Track
- W7 Riparian Management Unit - Drain in paddock 47
- W8 Riparian Management Unit - Reconstructed wetland
- W9 Re-alignment of drain
- W10 Riparian Management Unit - Drain heading towards McGraths Boundary from swimming pool
- W11 Riparian Management Unit - Retired area to be planted below the kobby block
- W12 Riparian Management Unit - Drain leading from driving range towards Waikato River
- N1 Nutrient Management Overview
- N2 End of Season Nitrogen Report
- N3 Nitrogen Fertiliser Applications



FARM MANAGEMENT



General Description



Water-use Overview



Storage, Infrastructure & Waste Overview



Wash down pad - Wash down pad



Bio-Security

F1

General Description

DESCRIPTION:

Owl Farm (72847) is a Demonstration Dairy Farm set up through joint venture between St Peter's School Cambridge and Lincoln University. This is supported both financially and philosophically through industry partners Fonterra Farm Source, DairyNZ, Ballance, LIC, PGG Wrightson Seeds, Westpac and Opus.

Owl Farm's vision is to apply proven research, utilising good on farm practice and scientific monitoring for the farm to become an exemplar in dairy production, financial, environmental and people performance, while maintaining the highest standards of health and safety.

Owl Farm is 180ha with an effective dairy platform of 152ha. The farm surrounds the school and borders the Waikato River north of Cambridge in the Waikato. The farm is comprised of an effluent block, main pasture block and numerous retired and planted areas. Soil types on farm vary with both high and low risk soil types intercepting the mixed contoured farm. This includes a mixture of allophanic and pumice soils which are both well drained as well as gley soils which are poorly drained.

The farm currently peak milks 420 cows producing on average between 170,000-180,000kgMS at approximately 400kgMS/cow/yr. While replacements are grown off farm all other cows remain on farm throughout the year, including winter. In addition to pasture, Owl Farm feeds a range of home grown (turnips, chicory, plantain, grass silage) and imported (PKE) supplements.

Good Farming Practice:

Maintain records of good environmental management

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

Good Farming Practice:

Identify a farm's environmental characteristics and plan for their management

* 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.

IMAGES:



F2

Water-use Overview

DESCRIPTION:

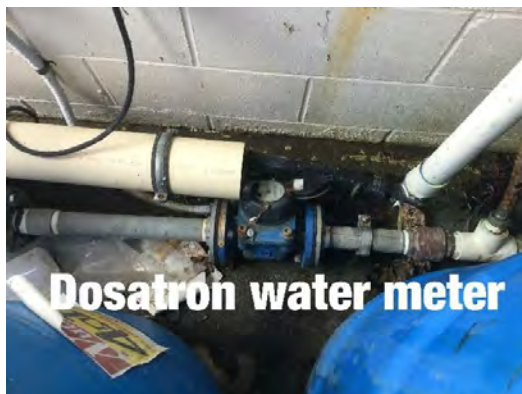
Owl farm sources its water from both the school supply and a bore near the farm dairy. Total water use is telemetered using the HALO system from the main water lines coming into the dairy and stock drinking is telemetered from the dosatron, subtracting the latter allows dairy shed volumes to be calculated. A new pump and yard configuration as well as the use of hydrofan nozzles has led to a more efficient water use at an average of 30-40 cubic meters per day (70-95L/cow) this is a 20% reduction on where it used to be but further efficiencies from the platform can potentially be identified. All cooler water is also recycled back into the washdown tanks. The farm doesn't have a Variation 6 consent as such as the total use comes out of the Schools water use.

Good Farming Practice:

Water use for the dairy shed and stock water is efficient

- * 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

IMAGES:





Main water use meter



New yard configuration

OPEN ACTIONS:

✓ NO ACTION REQUIRED

F3

Storage, Infrastructure & Waste Overview

DESCRIPTION:

A purpose built concrete and roofed PKE bunker has been constructed beside the implement shed at the cowshed, a concrete apron and compacted metal beyond means the build-up of mud is not an issue. A concrete based clay sided grass silage bunker is available for use on farm. Although there is no capture of leachate silage is sufficiently wilted once harvested and leachate hasn't been an identified issue. Smaller pasture surpluses are baled and wrapped meaning all leachate is contained.

All nitrogen is supplied in 500kg bags and stored under cover on a concrete floor in the implement shed. All other fertiliser is applied through Whelleans so isn't stored on farm.

Owl farm employs a responsible policy around waste management with soft plastics recycled using Plasback, fertiliser bags collected and returned to manufacturer and all other farm rubbish disposed of through the schools waste management site. Dead stock and slinks are collected by Wallace corp.

Good Farming Practice:

Store and load fertiliser with minimal spillage and leaching

Practices:

- * The Fertiliser Industry - Code of Practice for fertiliser handling, storage and use is followed
- * Storage sites are located away from waterways
- * Stored fertiliser is covered

Good Farming Practice:

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

Practices:

- * Feed storage areas are located away from waterways
- * Silage and other feeds are stored on hardsealed areas and leachate is collected
- * Overland flow and rain water are diverted away from feed storage areas
- * Silage is sufficiently wilted before being put into stack
- * Silage remains sealed while stored to prevent rotting
- * Permanent feed-out areas / facilities are sealed and effluent is collected

Status:

Good Farming Practice:

Farm waste is minimised and managed properly

Practices:

- * Waste is recycled where possible
- * Waste is contained and removed from farm where feasible
- * Dead animals are sent off farm for processing or correctly disposed on-farm
- * On-farm waste pits are small, away from waterways, and above the water table
- * Pests are controlled

IMAGES:



OPEN ACTIONS:

✓ NO ACTION REQUIRED



LAND MANAGEMENT



L1 Land and Soil Overview

L2 Race Management - Crossing over main fram track by Te Awa Cycleway/Walkway

L3 Crossing point - Crossing between old wetland

L4 Cropping - Cropping practices

L5 Race Management

L6 Sand Quarry - Sand Quarry

L7 Entry/Exit Race

L8 Sub-surface drainage



Land and Soil Overview

DESCRIPTION:

Owl Farm has a mixed contour with plenty of flat areas surrounding the school and some steeper country at the bottom of the farm towards Cambridge. Some steeper more unproductive areas are permanently retired but there would be nothing which meets LUC 8 or 7e. The mixture of heavier and free draining soils means grazing practices are closely managed. The farm operates a zero-pugging policy through shifting stock regularly during wet weather, providing bigger breaks and targeting low risk paddocks when wet. During winter when wet weather is forecast the farm either targets low risk free draining paddocks or if really bad will stand cows off on the yard.

Summer crops along with winter annuals are used for both additional feed and as part of the wider farm pasture renovation policy. Crops and permanent pasture are strictly direct drilled and there has been no adverse impact on yields as a result. Summer crop paddocks are generally not beside waterways but if they are appropriate setbacks and grazing principles are undertaken.

Good Farming Practice:

Manage grazing to minimise nutrient loss from risk areas

- * If paddocks near waterways are used during wet periods, a buffer strip beside the waterway is fenced off
- * More feed is offered in cold conditions when demand is high and utilization low
- * When break feeding: --Feeding is towards the waterway --Fences are moved daily rather than offering a few days feed at a time --Land that has already been grazed is back-fenced
- * Crops: --Long narrow breaks are offered rather than wide breaks --Crops are sown across slopes not up and down where practical

Good Farming Practice:

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

- * Bare paddocks are re-sown as soon as practical
- * Erosion damaged areas are rest and re-sown
- * Compacted soils are subsoil, ripped or cultivated

Good Farming Practice:

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

- * LUC 8 and 7e land areas are permanently fenced off

Good Farming Practice:

Use appropriate paddocks for intensive grazing

- * 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

Good Farming Practice:

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

- * Pugging and compaction of soils is avoided
- * No tillage or low impact cultivation methods and timing are considered
- * Supplement feed-out areas are located away from waterways
- * Riparian margins or buffer strips are left beside waterways and other areas where sediment and nutrients may flow such as gullies or swales.

IMAGES:



Summer turnips



Steep retired land

OPEN ACTIONS:

✓ NO ACTION REQUIRED

L2

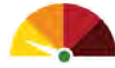
Race Management

Crossing over main fram track by Te Awa Cycleway/Walkway

IMPACT OF
CONTAMINATION



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LIKELIHOOD OF
CONTAMINATION

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LOW RISK RATING

DESCRIPTION:

Update: Cutouts have been installed either side of the crossing on both sides of the farm track, these have already been cleaned out several times.

This is a low point in the race where runoff drains from either side towards the water course below. Although the scale of loss isn't significant it is directly discharging to an area above a water course. This is also visible from the Te Awa cycleway/walkway which heightens the risk from a perception perspective.

Proximity to surface water: 10 Metres

Contaminant risk type: Phosphorus

Contaminant risk type: Microbial Pathogens

Contaminant risk type: Sediment

IMAGES:



**OPEN ACTIONS:****Dig Cut-out both sides of race - Completed**

Dig several cut-outs into both sides of race leading towards the crossing from both directions. Shifting cuts further up the race allows any runoff to flow through considerable vegetation prior to reaching water. This will allow for gradual uptake of nutrients and filtering of sediment.

TARGET DATE: 31 January 2018 (Completed)



Cropping

Cropping practices

DESCRIPTION:

Generally around 8-10% of the milking platform is cropped to ensure high quality summer feed as well as enabling pasture renovation. This summer turnips have been planted. There has also been some planting of a plantain/pasture mix and may in the future be additional maize grown on farm. The farm operates a no cultivation policy meaning all crops are direct drilled. This hasn't had any negative impacts on yields. The farm also avoids cropping steep paddocks which may cause localised erosion during feeding.

IMAGES:



OPEN ACTIONS:

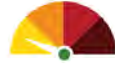
 NO ACTION REQUIRED

L7 Entry/Exit Race

IMPACT OF
CONTAMINATION



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LIKELIHOOD OF
CONTAMINATION

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LOW RISK RATING

DESCRIPTION:

A new yard configuration has led to a change in layout of the entry and exit race. As the farm operates 2 herds there are times the first herd needs to be held in one side of the race until the second herd has entered the yard. As you would expect there is a build-up of effluent around the entry area. Although there is some localised ponding it is all contained and when this builds up the push scraper is used to push solids and liquid back onto the concrete yard where it enters the farms effluent system.

IMAGES:



**OPEN ACTIONS:****Continue scraping as required**

Ensure the scraping of excess effluent build up to the yard continues. Ensure the mechanism for reducing runoff (i.e. bund) remains intact.

TARGET DATE: Ongoing

L8 Sub-surface drainage

IMPACT OF
CONTAMINATION



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LIKELIHOOD OF
CONTAMINATION

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MEDIUM RISK RATING

DESCRIPTION:

There are a number of springs throughout the farm which come to surface when the water table is high. A series of 3 paddocks on the lower plateau before the farm drops away to the Waikato River has recently been novaflowed to make the area more productive. Nova-flow creates preferential flow-paths and need to be closely managed. Fortunately these paddocks don't receive effluent but care should be taken in applying nitrogen when the soils are actively draining after rainfall events. Fortunately there is a large buffer between the edge of the paddock and the river which will reduce the risk of contamination.

IMAGES:



OPEN ACTIONS:

Avoid applying nitrogen when wet

When the outlet is running in a constant stream (indicating active drainage) nitrogen fertiliser should not be applied to the areas directly above the novaflow piping.

TARGET DATE: Ongoing



EFFLUENT MANAGEMENT



E1

Effluent Overview

E2

Effluent Storage - New Effluent Pond

E3

Effluent Irrigation

E4

Underpass

E5

Effluent Storage - Old Effluent Pond

E1 Effluent Overview

DESCRIPTION:

Owl Farm operates under the Waikato Regional Plan's permitted activity rule 3.5.5.1 "Discharge of Farm Animal Effluent onto Land". They have recently upgraded their effluent system in accordance with the industry Code of Practice due to the previous pond not meeting the required sealing standard. All staff have been trained in the management of the new system.

All effluent from all concrete sources surrounding the dairy shed are contained and diverted to a large drive in sediment trap. Effluent then gravities to the newly constructed 3000cm³ lined pond, sized in accordance with the Dairy Effluent Storage Calculator and designed by an Accredited designer.

A large stirrer ensures solids don't settle before effluent is pumped to a 62ha effluent block using a Hi-Tech Cobra travelling rain-gun. All equipment is well maintained serviced annually. The use of a weather station means soil moisture can be observed prior to application and although the application depth hasn't been recently measured its expected the irrigator will be applying less than 12mm based on the new mono pump which creates a consistent pressure. Fail safe measures include the use of the Halo system and runs are recorded. Separate soil testing of the effluent block is undertaken to determine K levels.

All solids from the sediment trap are spread directly to land using the farms muck spreader.

A newly constructed underpass has also been installed. All effluent generated from this point is captured within a sump and transferred to the main storage pond via a pump operating on a float switch.

| | |
|-------------------------------|---|
| Good Farming Practice: | <p>Spreading equipment is well maintained and calibrated</p> <ul style="list-style-type: none"> * Effluent irrigator/spreading equipment is calibrated * Effluent equipment is inspected and maintained regularly * Effluent pumping equipment is routinely serviced |
| Good Farming Practice: | <p>All effluent systems</p> <ul style="list-style-type: none"> * Effluent consent conditions and regional rules are understood and complied with * All effluent applications are recorded * Staff are trained on how to operate and maintain the effluent system |
| Good Farming Practice: | <p>Effluent system meets code of practice</p> <ul style="list-style-type: none"> * 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 |
| Good Farming Practice: | <p>Effluent applied at correct depth, rate and time</p> <ul style="list-style-type: none"> * Effluent application timing and rates are adjusted based on soil moisture levels * Nutrient load is spread evenly across the largest area practical * Tests for high potassium (K) levels on effluent block are done to avoid animal health issues * Fertiliser applications are adjusted to effluent areas based on soil tests * Risk areas for effluent application are identified and recorded on a map * Odour impact is considered during application |

Good Farming Practice:

Sufficient suitable storage available

- * Dairy Effluent Storage calculator has been used to work out storage needs
- * New storage built, has been by an accredited effluent designer
- * Effluent is applied whenever possible to keep storage low
- * Storage facilities are sealed
- * Effluent solids that accumulate are routinely removed
- * Safety barriers, equipment and signage are in place

IMAGES:

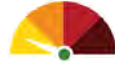
Effluent Storage

E2 New Effluent Pond

IMPACT OF
CONTAMINATION



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LIKELIHOOD OF
CONTAMINATION

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MEDIUM RISK RATING

DESCRIPTION:

Following a failed Opus Pond Drop Test Owl Farm have constructed a new appropriately sized and sealed effluent holding facility. Using the services of Accredited Dairy Effluent System Designer Davieth Verheij from AgFirst a new system has been appropriately sized using the Dairy Effluent Storage Calculator. With 60m x 31m footprint and a depth of 3.5m the pond has a working volume of 3000 cubic meters which far exceeds the required volume. The location of the pond below the farm dairy allows effluent to enter via gravity. The pond has been lined with HDPE from IS Daming and also has gas venting.

The volume of the pond is currently quite high as they transferred all liquid from previous pond across. In addition there have been some early teething issue with the pump and stirrer which means they have only recently started pumping.

The pond is managed via a mono pump which is shore mounted. This progressive cavity pump allows a constant pressure at the irrigator by increasing/decreasing flow rates depending on distance from the pump, this allows consistency and uniformity of application depths/rates. A shore mounted stirrer which pivots side to side and lifts up and down ensures the minimum solids which enter the pond are kept in suspension prior to being pumped to pasture. A deer fence has been constructed around the outside to reduce the health and safety risk.

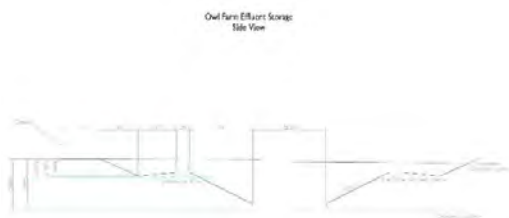
Pond volume: 3000 Cubic Metres

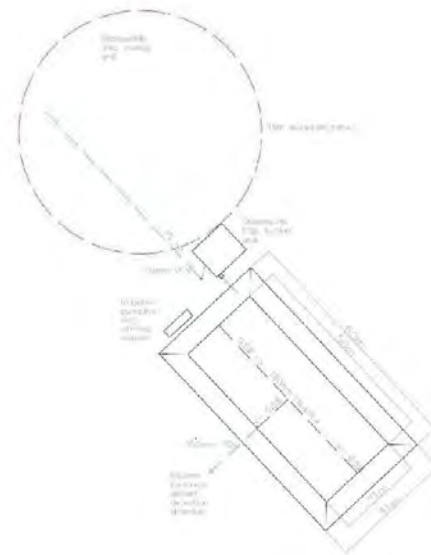
Pond lining: Plastic Liner

Solids management: Spread immediately

Dairy effluent storage calculator: Yes

IMAGES:





OPEN ACTIONS:

Manage pond levels

Ensure effluent pond is as empty as possible coming into winter/spring to maximise storage availability and to enable deferred irrigation.

TARGET DATE: Ongoing

E3 Effluent Irrigation

IMPACT OF
CONTAMINATION



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LIKELIHOOD OF
CONTAMINATION

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LOW RISK RATING

DESCRIPTION:

Effluent is irrigated to approximately 67ha via a Hi-Tech Cobra (travelling raingun). The irrigation area is a mixture of high and low risk soils with the lower risk soils targeted for spring. The location of the pond has meant the effluent irrigation area has been slightly altered with effluent extending up to Cambridge road. The pump has a HALO system which allows effluent irrigation to start and stop using your phone. This also has GPS tracking which records where it has been and when as well as both a motion and pressure sensors as further fail-safe mechanisms should the irrigator stop working. Part of the GPS tracking also allows buffers to be built in around out of bound areas such as distance to road, boundary, dwelling and school, if the irrigator enters any of these areas it will automatically shut off.

Maintenance is undertaken as and when and although an application depth test hasn't been undertaken recently given the irrigator and pump and would be expected to be applying less than 10mms.

The average N applied via effluent has been modelled at 43kgN/ha/yr which is far less than the 150kgN/ha/yr recognised as a minimum standard. This will now be lower again as the effluent block used in last seasons Overseer file was 53ha.

| | |
|---------------------------------|-----------------|
| N Loading from Effluent: | 43kgN/ha/yr |
| Irrigation Area: | 57ha |
| Application depth: | <12 Millimetres |

IMAGES:



OPEN ACTIONS:

Irrigator maintenance

Ensure Irrigator and pump are greased and maintained monthly and serviced annually. Observe hydrants, mainlines and the drag hose regularly to ensure there are no leaks. Complete annual application depth and rate test to ensure appropriate levels are being applied from the cobra raingun.

TARGET DATE: Ongoing

Develop an Effluent Management Plan

This is probably the only missing element in an otherwise exceptionally well designed and managed effluent system. An effluent management plan would usually include the following, permitted activity rules, instructions for use in Tom's absence, frequently asked questions, Emergency Management Procedures and contacts etc. All irrigation activity and maintenance should also be recorded in this document. An effluent management plan poster can be downloaded from the DairyNZ website here <https://www.dairynz.co.nz/media/5787433/effluent-management-plan-poster.pdf>

TARGET DATE: Ongoing

E4 Underpass

IMPACT OF
CONTAMINATION



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LIKELIHOOD OF
CONTAMINATION

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LOW RISK RATING

DESCRIPTION:

The farm has recently invested in an underpass as the tanker track and one of the main thoroughfares through the farm used frequently by the school crossed the main stock race, this required gates to be opened and closed constantly. An underpass has been constructed allowing the stock to go underneath the tanker track. This infrastructure has also improved health and safety given the large number of students and staff who access this point.

All effluent from both entry points drains to bottom of the underpass where it passes through a sediment trap and sump where it is pumped to the main effluent storage pond using a transfer pump on a float switch.

IMAGES:



OPEN ACTIONS:











WATERWAYS MANAGEMENT



- | | |
|---|--|
| <p>(W1) Waterways and Bio-diversity Overview</p> | <p>(W7) Riparian Management Unit - Drain in paddock 47</p> |
| <p>(W2) Riparian Management Unit - Constructed Treatment Wetland</p> | <p>(W8) Riparian Management Unit - Reconstructed wetland</p> |
| <p>(W3) Riparian Management Unit - Older Wetland beside effluent pond</p> | <p>(W9) Re-alignment of drain</p> |
| <p>(W4) Riparian Management Unit - Riparian Buffer between farm and Waikato River</p> | <p>(W10) Riparian Management Unit - Drain heading towards McGraths Boundary from swimming pool</p> |
| <p>(W5) Riparian Management Unit - Riparian planting below Avantidrome</p> | <p>(W11) Riparian Management Unit - Retired area to be planted below the kobby block</p> |
| <p>(W6) Riparian Management Unit - Mountain Biking Track</p> | <p>(W12) Riparian Management Unit - Drain leading from</p> |

driving range towards Waikato River

-  Accord Defined Stock Excluded Waterway
-  Accord Defined Stock Not Excluded Waterway
-  Non-Accord Defined Stock Excluded Waterway

-  Non-Accord Defined Stock Not Excluded Waterway
-  Compliant Crossing
-  Non-Compliant Crossing
-  Non-Compliant Non-Regular Crossing
-  Dispensation Crossing



Waterways and Bio-diversity Overview

DESCRIPTION:

All permanently flowing waterways and many of the ephemeral watercourse are permanently fenced allowing for effective stock exclusion. The farm boundaries the Waikato River which is fenced to a high standard and has a significant buffer between the paddocks and waterway. Additionally, all crossings are culverted ensuring stock have no direct access to waterways. There were no issues identified with culverts construction and no significant issues around runoff of contaminants at these points.

A large number of the waterways have riparian planting in various stages of development, the small number which don't, have plans and timeframes in place for completion (see following features). The farm and school have demonstrated a very proactive attitude to fencing and planting and for most waterways ongoing maintenance is now the primary objective. Many of the projects have been undertaken in collaboration with Ngati Haua Mahi Trust with some funding having been provided through the Waikato River Authority. Among the riparian areas of both constructed and natural wetlands as well as traditional planting on the banks of streams intercepting the property.

The farm and school boosts significant biodiversity features all of which are permanently stock excluded, these include a remnant stand of kahikatea as well as many wetland and riparian areas which are planted in natives. The farm runs an bi-annual eco-blitz with support from Lincoln University which involves an ecological survey of both fauna and flora with school kids in which a number of protected species have been identified. Although minimal, pests are managed through bait stations at various points around the farm.

Good Farming Practice:

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

- * Risk areas where surface runoff may enter waterways are identified
- * A grass buffer strip or riparian plantings have been left between waterways and fences
- * When cultivating paddocks an uncultivated buffer strip between cultivation and waterway is left (the steeper the land the wider the buffer strip is)
- * Bridges and culverts have raised sides or mounds to stop runoff entering waterway
- * Where tracks are beside waterways, the track is sloped in the opposite direction to avoid effluent and sediment flowing into the waterway
- * Track cut-outs are maintained to appropriately direct track runoff

Good Farming Practice:

Stock are excluded from waterways

- * All permanently flowing waterways (including wetlands) are fenced
- * All regular stock crossings are bridged or culverted
- * Any temporary streams are temporarily fenced if grazing while water is flowing
- * A riparian management plan has been developed (include any plantings)
- * Drains are well managed

Good Farming Practice:

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

- * Tracks are located away from waterways where practical
- * Supplement is feed out away from waterways
- * Water troughs are located away from waterways in a dry area of paddocks
- * Gateways are in a dry point and are wide enough for good cow flow to reduce pugging

Good Farming Practice:

Areas of native plants or significant biodiversity are protected

- * Areas are identified on the farm map
- * Stock are fenced out of the area
- * Weeds are controlled within the area
- * Animal pests are trapped or poisoned

IMAGES:**OPEN ACTIONS:**

Ongoing Maintenance

Given the large established areas of permanently retired and planted areas the main action across the farm is continued maintenance. In some areas this involves the final release of plants but mostly relates to ensuring fences remain intact and both animal and plant pest control continues.

TARGET DATE: Ongoing



Riparian Management Unit

Constructed Treatment Wetland

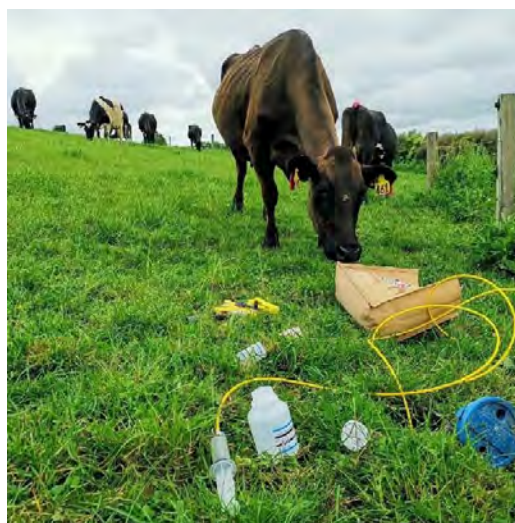
DESCRIPTION:

A Treatment Wetland has been designed and constructed purely for the ecosystems ability to intercept and denitrify shallow groundwater which springs to the surface and exits the farm to the Waikato River. There is water quality monitoring of shallow ground water prior to entering the wetland as well as outlet monitoring once water leaves the wetland. This demonstrates what impact the wetland is having in extracting nitrates from water. Extraction rates of nitrogen have differed depending on time of the season and residence of the water in the wetland itself. Over summer when water levels and therefore flow was low nitrogen was undetectable at the outlet meaning full extraction of nitrogen. The last measurements in July demonstrated an extraction rate of between 30-50% which is still high given the speed at which water would flow through the wetland at this time of the year.

Planting date: 30 September 2016

Vegetation status: Native Dominated

IMAGES:





OPEN ACTIONS:

✔ NO ACTION REQUIRED

W10

Riparian Management Unit

Drain heading towards McGraths Boundary from swimming pool

IMPACT OF
CONTAMINATION

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LIKELIHOOD OF
CONTAMINATION

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MEDIUM RISK RATING

DESCRIPTION:

Update: Drain fence has now been shifted outward on the stretch directly exiting the swimming pool in the first paddock. Carex grasses have been ordered and will be planted in autumn to further help stabilise the banks.

This waterway leading from the swimming pool to the northern boundary of the farm has seen some localised stream bank erosion likely down to stock grazing too close to the edge of the drain, this has only been identified as an issue in the paddocks leading directly from the pool.

Waterway type: Accord Defined Waterway

Planting date: 30 May 2019

Flood risk: Low

Fencing status: Permanently Fenced

Vegetation status: Rank Grass

IMAGES:



**OPEN ACTIONS:****Relocating fence and planting - Update**

UPDATE: Fence has been shifted and planting of carex will take place in autumn next year. Continue to monitor the banks further down the waterway towards the boundary to determine whether this requires fence relocation and planting as well.

TARGET DATE: 31 May 2019



NUTRIENT MANAGEMENT



N1 Nutrient Management Overview

N2 End of Season Nitrogen Report

N3 Nitrogen Fertiliser Applications



Nutrient Management Overview

DESCRIPTION:

As a demonstration farm with Balance as one of the industry partners, effective nutrient management is a key objective. The farm has participated in the Fonterra's nitrogen programme from the outset supplying the farm information to ensure an Overseer model can be developed.

Although the farm only has 2 distinctive management blocks (effluent and main pasture blocks), there are 7 different blocks which are soil tested annually to provide a representative view of fertility on farm, this reflects different soils and states of development. Nitrogen fertiliser is generally consistent across the farm but capital fertiliser varies dependant on soil tests. Olsen P's are managed to optimum levels with capital fert added where low, maintenance added when at optimum and mining taking place where levels are high. Olsen P's range from 17-40 with a range of 20-30 being identified as optimum.

Nitrogen is applied with farms own Sam fertiliser spreader with Tracmap available in the tractor for proof of placement. All other fertiliser is spread by Whelleans who also have proof of placement available. Spreading equipment is well maintained and calibrated regulated. Nitrogen is supplied in 500kg bags which are stored on a concrete floor in the implement shed. A weather station on farm allows soil temperature and soil moisture to be identified prior to applying fertiliser and a regularly monitored feed budget means nitrogen is only applied when necessary. The farm has a self-imposed cap of 150kgN/ha/yr.

Good Farming Practice:

General nutrient management

- * Soil-testing is done each year for each different management block
- * Soil-testing is done well before crops are planted to identify nutrient levels
- * A nutrient budget is used to help fertiliser decision-making
- * Farm nutrient information is supplied to Fonterra at the end of each season

Good Farming Practice:

Monitor and maintain P levels at the economic optimum

- * 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

Good Farming Practice:

Fertiliser application matches plant requirements and minimises losses

- * All fertiliser applications are recorded -- product, rate, date, location (If a contractor is used the information is gathered from them)
- * Soil temperature and moisture levels are assessed before applying fertiliser (i.e. avoid winter months)
- * Fertiliser applications are avoided: --When heavy rainfall is forecast and runoff is likely --Close to waterways
- * N is applied little and often and when pasture is actively growing
- * Pasture or crop growth and feed requirements are assessed before applying N

Good Farming Practice:

Fertiliser spreading equipment is well maintained and calibrated

- * Farm spreading equipment is calibrated regularly -- spreading width and volume checked
- * Spreaders cleaned and greased routinely
- * Paddocks are checked for paddock stripes after spreading
- * Contractors are Spreadmark accredited

IMAGES:

| Soil Analysis Results | | | |
|-----------------------|------------|----------------|-----------------------------|
| Sample Name: | Soil Type* | pH pH Units | Olsen Phosphorus mg/L |
| 1 | Ash | 6.1 | 17 |
| 2 | Ash | 6.1 | 40 |
| 3 | Ash | 6.7 | 39 |
| 4 | Ash | 6.3 | 35 |
| 5 | Ash | 6.2 | 26 |
| 6 | Ash | 6.2 | 29 |
| 7 | Ash | 6.1 | 40 |
| Rodmor | Ash | 6.4 | 18 |



| Whole farm report | Benchmark farm | Current farm |
|------------------------------|----------------|--------------|
| Inputs (farm average) | | |
| Clover N | kg N/ha/yr | 76 |
| Fertiliser N | kg N/ha/yr | 135 |
| Other N added | kg N/ha/yr | 41 |
| Indices | | |
| Average N loss to water | kg N/ha/yr | 35 |
| N ₂ O emissions | kg N/ha/yr | 9.2 |
| Farm N surplus | kg N/ha/yr | 189 |
| N conversion efficiency | % | 25 |



OPEN ACTIONS:

✓ NO ACTION REQUIRED

N₂

End of Season Nitrogen Report

DESCRIPTION:

Owl Farm has provided the information required to develop an Overseer file since the inception of the programme. Given Ballance is also one of 7 industry partners close attention is paid to the Overseer file and Louise (Demonstration Manager) along with Ballance manage their own Overseer files for the property as well as that which is developed through Fonterra. There is a slight difference between the Owl Farm developed Overseer file and the Fonterra one based on inclusion of lease block and how additional feed is documented. For this feature I've used the data provided from the Owl Farm produced Overseer file.

This shows a reasonably effective farm system from a nutrient loss perspective. With an average of 135kgN/ha/yr applied per year and 39kgN/ha/yr brought in via supplements the farm has a modelled loss of 35kgN/ha/yr which would be slightly below average for the region. The farms nitrogen conversion efficiency is currently at 25% which the farm would like to see higher and subsequently closely reflects their productivity objectives of increasing home grown feed and relying less on brought in feed to fill deficits. The farms modelled pasture intake from cows was quite low at 12.2tonnesDM/ha/yr. This is both seasonally variable on climate but also reflects some tired pastures which are rapidly being improved through pasture renovation policy. The nitrogen surplus is currently 189kgN/ha which isn't overly high but does suggest there is a some nitrogen locked up in the

Link:

IMAGES:

| Whole farm report | | Benchmark farm | Current farm |
|------------------------------|------------|----------------|--------------|
| Inputs (farm average) | | | |
| Clover N | kg N/ha/yr | | 76 |
| Fertiliser N | kg N/ha/yr | | 135 |
| Other N added | kg N/ha/yr | | 41 |
| Indices | | | |
| Average N loss to water | kg N/ha/yr | | 35 |
| N ₂ O emissions | kg N/ha/yr | | 9.2 |
| Farm N surplus | kg N/ha/yr | | 189 |
| N conversion efficiency | % | | 25 |

OPEN ACTIONS:

 **NO ACTION REQUIRED**

N3

Nitrogen Fertiliser Applications

IMPACT OF
CONTAMINATION



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LIKELIHOOD OF
CONTAMINATION

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LOW RISK RATING

DESCRIPTION:

Owl Farm has a self-imposed cap of 150kgN/ha/yr with the majority of nitrogen fertiliser spread themselves through the use of the Sam spreader on farm. All applications are tracked using TracMap in the tractor and use of the weather station means soil temperature and moisture can be taken into account prior to applications being undertaken.

The farm opts for little and often applications of N generally applying 25kgN/ha per application. Fertiliser applications are strategic and closely linked with the farms feed budget which is updated weekly. Generally, there are 6 applications of nitrogen in various forms throughout the season with PhaSedN Quickstart used in April and July, Ammo used in August and SustaiN used for the remainder in September, November and December. All urea is agrotain coated. Farm has purposely avoided any applications of nitrogen in May and June when soil temps are low and conversion of nitrogen to feed is hindered.

All nitrogen fertiliser is delivered in 500kg bags and stored on a concrete floor in the implement shed.

IMAGES:



OPEN ACTIONS:

 NO ACTION REQUIRED

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 provide