

Advanced Mitigation – Farmer Guide

Introduction

Advanced Mitigation (AM) describes a set of on-farm practices for Irrigation and Nutrient Management areas. The practices can be implemented by ALIL shareholders to improve water use efficiency and reduce N surplus beyond the standards expected by the industry agreed Good Management Practice (2015), while remaining cost-neutral or beneficial to a typical farm.

The outcomes were developed in consultation with MHV Water Ltd and Barrhill Chertsey Irrigation Ltd, industry experts and farmers.

Key Principles of Advanced Mitigation:

- A property is an “A” audit grade (Good Management Practice).
- Cost-neutral or beneficial to a typical Mid-Canterbury farm.
- Developed to improve environmental footprint of typical Mid-Canterbury farms.

Why Advanced Mitigation?

Some farms or parts of farms, have a higher risk of nitrogen loss compared to others and Advanced Mitigation expects more to be done to address those risks.

Where a property’s overall grade is audited as ‘Advanced Mitigation,’ the scheme can report a lower nitrogen loss for the property and therefore a lower nitrogen loss for the scheme, which contributes to target reductions.

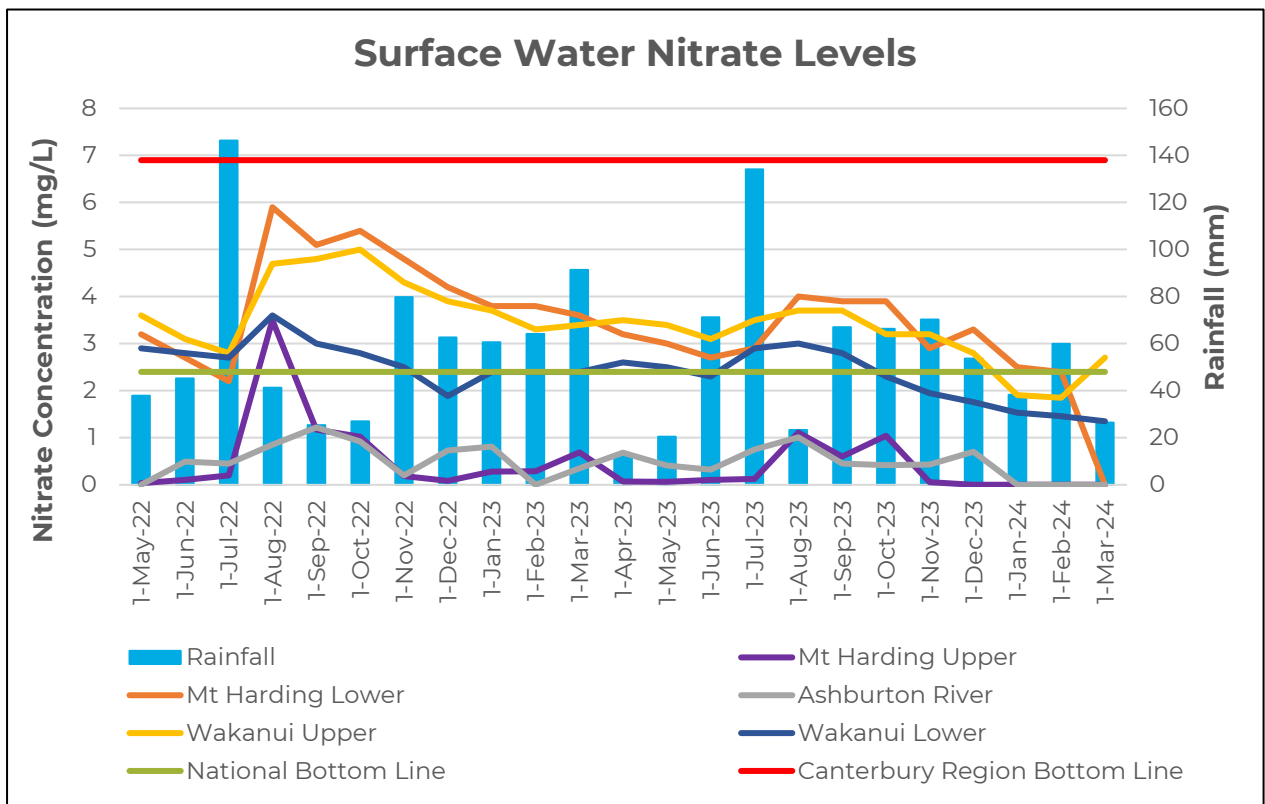
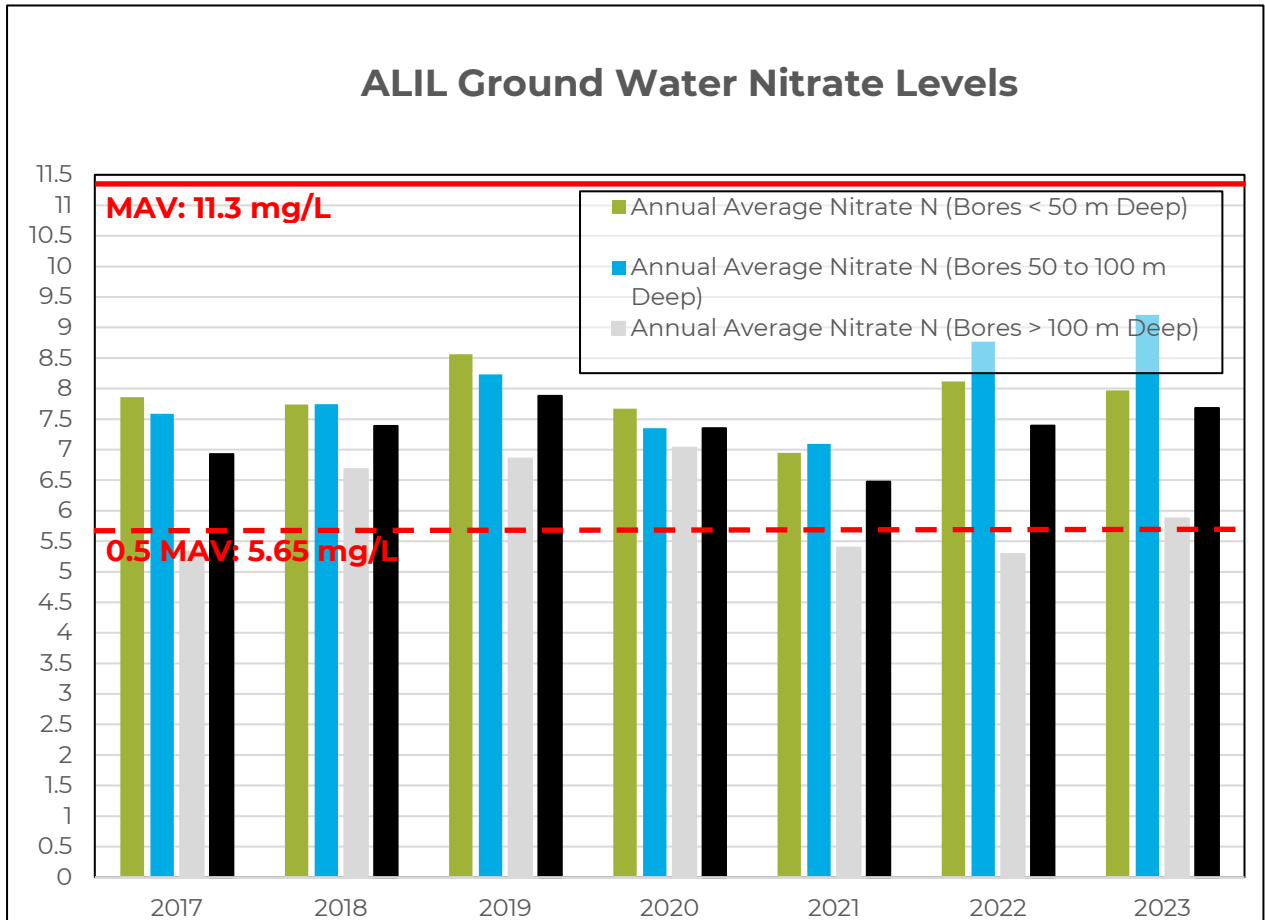
ALIL Reduction Targets

- **10%** reduction from 2020 nutrient load
- **20%** reduction from 2020 nutrient load

Water Quality Update

The water monitoring completed by ALIL is a key component to the operation of the scheme. ALIL have five years to determine a baseline from this data. Water quality needs to show improvement from the baseline, otherwise a response and remediation plan is required. ALIL are currently in the second year of water sampling and shareholders need to be continuing to implement practices to improve water quality.

The below graphs show the nitrate levels measured within the groundwater and surface water monitoring area.



Advanced Mitigation Irrigation Management

Drainage from irrigation or rainfall moves nitrogen available to plants in their root zone to our groundwater system. Refining your irrigation system and management practices reduces your water costs, wear and tear on your irrigation system and replacement costs of nutrients.

Irrigation Target 1 – Irrigation Scheduling

Outcome: *To minimise water use and drainage during times of high nitrogen loss risk, irrigation water is applied so that the timing and depth targets crop requirements and optimises capture of rainfall to minimise drainage.*

- **Efficient System**

95% of the irrigated area utilises a system which:

- Has a bucket test or full performance test demonstrating 80% distribution uniformity or better;
- The minimum return period is frequent enough to ensure field capacity is not exceeded.

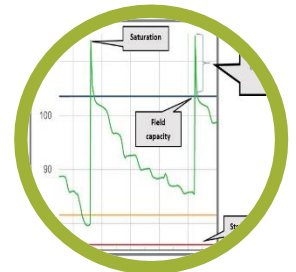


- **Differential Irrigation**

Irrigation system able to vary application by irrigation management zone on 95% of irrigated area on the property.

- **Strategic Irrigation Scheduling**

Optimise rainfall, predominantly through strategic management of irrigation-by-irrigation management zone and demonstrate an understanding of the soil moisture and weather forecast.



- **Accuracy of Tools**

Irrigation system and scheduling tools are maintained to optimise accuracy in application.

Irrigation Target 2 – Irrigation Training

Outcome: *The irrigation manager(s) understands the relationship between the irrigation system, soil, and climate in order to achieve the irrigation management requirement.*

- **Training**

All irrigation manager(s) are trained to understand the property's irrigation system and its limitations in line with the ALIL training template.

- **Understanding**

All irrigation manager(s) can articulate reasons for steps taken to minimise risk of drainage by irrigation management zone.



Advanced Mitigation

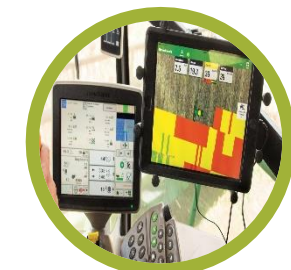
Nutrient Management

A build-up of nitrogen in your soil profile runs a risk of being lost to groundwater the next time it rains. Every farm is different and understanding why nutrient fertility varies on your property means you can target your fertiliser plan and applications accurately, cutting back or adding more where it matters most to improve your farm's profitability.

Nutrient Target 1 – Fertiliser Management

Outcome: *To lower soil nitrogen surplus from higher risk and land use activities and to reduce leaching of nitrogen, fertiliser is applied based on the variability of soils and crop health throughout the season both within paddocks and between paddocks.*

- **Base Soil Fertility**
Soils have sufficient base fertility to optimise plant yield and existing nitrogen remaining in the soil is accounted for when making fertiliser application decisions.
- **Identification of variability**
Property has assessed and identified sources of variability on their land.
- **Targeted Application**
Fertiliser applications are targeted to meet the need of a plant, and account for variability both within and between paddocks.
- **Adaptive Management**
Plant growth and performance is monitored throughout the season, with fertiliser plans adapted in response to realised growth.



Questions to consider for achieving Advanced Mitigation:

- *What drives variability in soil fertility or production on my property?*
- *What information do I use to plan for the coming season's fertiliser requirements?*
- *How do I know if the information shows if there are changes in fertility within and between paddocks?*
- *How do I account for variable soil fertility in my fertiliser plan? OR, Can I manage things differently to reduce variability?*
- *How do I know if my pasture or crop is performing as I planned?*
- *What actions do I take if the season pans out differently to what I expected?*
- *How do I know my fertiliser management has achieved results (or desired results)?*
- *What could be done differently next season?*
- *What information do I have to show there is no variability across my farm?*

Advanced Mitigation Nutrient Management

Reducing nitrogen surplus on your property reduces the chance of excess nitrogen you have paid for, getting lost to groundwater when it gets wet.

Nutrient Target 2 – Nitrogen Surplus Reduction

Outcome: To improve nitrogen fertiliser utilisation, reduce soil nitrogen surplus and lower the risk of nitrogen leaching and increase nitrogen uptake from the soil by optimising pasture and crop growth.

- **Risk Assessment**
Property has completed a risk assessment to understand and quantify nitrogen brought into and removed from the system, how it is stored in the soil and when and how it is likely to be lost to the environment.
- **Pasture or Crop N Uptake Optimised**
Pasture and crop is managed to optimise uptake of N from the soil.
- **Applicable Nitrogen Loss Mitigations**
Tools and techniques to minimise nitrogen surplus are implemented.

Example Mitigations:

- Early culling where possible
- Mixed pasture swards (e.g. plantain)
- Catch crops utilised after winter crops
- Low nitrogen feeds in Autumn
- Effluent accounted for with fertiliser applications
- Available nitrogen in soil tested
- Less nitrogen fertiliser used in less productive areas of paddock
- Base soil fertility sufficient not to limit plant growth



Greenlea Farms – Richard & George Lilley

Farm Overview

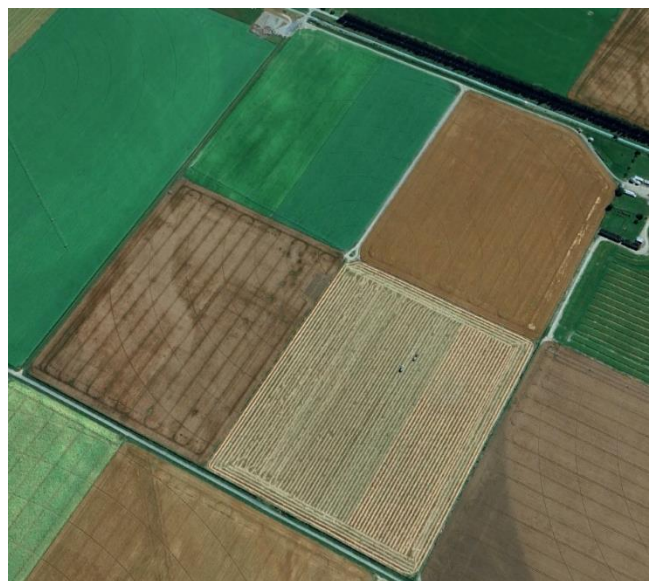
Greenlea Farms is a mixed arable farm with intensive winter grazing, managed and operated by Richard and George Lilley. The farm consists of three blocks: Greenlea, Midlea and Lowlea. Below is an outline of the key parameters of the property.

Greenlea Farm Overview	
Area	194 hectares total 187.6 hectares effective Farm operation consists of three blocks.
Farm System	Mixed arable consisting of cereals, ryegrass, linseed, oats, potatoes and vegetable seeds. The farm also grazes dairy support animals and lambs on winter feed crops and arable crops.
Irrigation	161.7 hectares irrigated by pivots
Soils	Mayfield moderately deep, well drained silty loams

The Lilley’s operation was graded Advanced Mitigation for their audit in October 2023. Auditor comments included that the property is ‘A great win/win example of system optimisation and good environmental stewardship’. Examples of practices used to achieve Advanced Mitigation are described below.

Irrigation Target 1 & 2 – Irrigation Scheduling & Training

- Efficiency calculation for Mayfield soils = 50mm (Irrigation efficiency = Soil Profile Available Water x 0.5/0.8). Current irrigation applications are less than this, reducing risk of drainage events.
- Irrigation infrastructure is set up to allow changes in irrigation rates per crop requirement.
- Tools used to help schedule irrigation include a combination of soil moisture probes, soil water budgets, visual assessments and weather forecasts. Crop stage growth is considered with irrigation events and adjusted according. Soil water budget is used to help make decisions with information from FAR’s Methven Weather Station.
- Irrigation apps such as FieldNet and ReinCloud are used to change irrigation application rates.
- Irrigation operator can clearly articulate how irrigation decisions are made and the relationship between soil moisture, crop requirements,



Lilley's Pivot Layout

soils and weather forecasts are clearly understood and shown in record keeping.

Nutrient Target 1 – Fertiliser Management

- George monitors expected against actual yields in a spreadsheet and adjusts fertiliser application accordingly throughout the season.
- Grid sampling has been completed in the past but was not financially viable compared to other nutrient testing tools.
- Farm advisor is privy to N test results from properties around the district and this information is used to determine nitrogen applications. N testing is also undertaken on farm and used to help make fertiliser application decisions.
- FAR sites and crop models are actively monitored to validate decisions, such as growth stage timings.
- N is adjusted on dry corners and visual assessments are made when applying fertiliser within paddocks (e.g. headland exclusion next to shelter belts where stock have previously camped). This is demonstrated using a mixture of notebooks and GPS records.

Nutrient Target 2 – Nitrogen Surplus Reduction

- Change from solid to liquid fertiliser applications with sprayer has allowed for often and little applications. This has also allowed flexibility and more control when applying fertiliser.
- Crops following winter grazed crops are sown as soon as possible. Back fencing is used to dry ground and allows paddock to be cultivated sooner.
- Dairy support animals are managed on specific winter crop types based on stock class. For example, in calf heifers are on kale and fodder beet (spending more time on kale) and an on/off system is used with the fodder beet. Mixed aged cows graze oats and grass. This mitigates the impact of N leaching.

What's next – is Advanced Mitigation a fit for your farm?

Contact ALIL to discuss how we can support your farm to achieve Advanced Mitigation at your next audit.

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