ALIL
ASHBURTON LYNDHURST IRRIGATION LTD

Environmental Management Strategy (EMS)

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1 Introduction

1.1 ALIL Scheme Overview

The Ashburton Lyndhurst Irrigation Ltd (ALIL) Scheme (referred to in this document as the Scheme) is a shareholder owned cooperative company which operates between the Rakaia and Ashburton Rivers, with consent to take and use water from the Rangitata Diversion Race (RDR) in accordance with water taken and diverted into the RDR under water permits CRC011237, CRC011245 and CRC134808.

ALIL holds a number of further resource consents relating to the Scheme. These include CRC183850 to take and use water from the RDR and CRC185469 to discharge contaminants associated with farming landuse in the Scheme. At the commencement date of this EMS, water was delivered through a pressurised pipe system to its 241 shareholder members who collectively farm around 32,000 ha. This may be amended from time to time in accordance with this EMS and other regulatory/consent requirements.

The irrigation season runs 10th September to 9th May.

Figure 1: ALIL Water ASM Command Area (as at the 2022 commencement date of this EMS)

1.2 Application of this EMS

This Environmental Management Strategy (EMS) applies to all parties who hold either a Water Supply Agreement (WSA) or a Nutrient Management Agreement (NMA) with the Company. Those parties who are parties to a WSA or NMA with the company agree that, in order for ALIL to administer and implement the EMS;

- they shall supply to ALIL, or enable access to ALIL, to all information ALIL requires (including without limitation OverseerFM account admin access)
- ALIL may provide that information to any third parties

2 Overview

This EMS has been prepared to satisfy the requirements of ALIL's consent CRC185469 (and, at the commencement date, is intended to be consistent with the matters set out in Policy 4.41D of Environment Canterbury's Land and Water Regional Plan (the Plan)).

The EMS forms part of an Audited Self-Management (ASM) programme and covers:

- how the nutrient load has been calculated, and the rationale for that nutrient load applied; and
- how nutrients from all land will be accounted for; and
- how properties joining or leaving the irrigation scheme or principal water supplier area are to be managed, including the method to be used to

calculate the nutrient load that will be allocated to any property leaving the scheme; and

- how sensitive receivers will be identified, including water bodies, sites of cultural significance and community drinking water supplies; and
- how the scheme will manage and audit Farm Environment Plans; and
- how change in farming activities are managed under the consent; and
- the proposed monitoring and reporting regime to the Environment Canterbury, including, but not limited to, a description of the:
  - audit systems that will be used to assess individual on-farm compliance with the content of any Farm Environment Plan; and
  - methods used to address non-compliance identified in individual on-farm audits; and
  - proposed data to be collected and the frequency or any proposed reporting to Environment Canterbury

2.1 EMS Purpose and Scope

The purpose of the document is to fulfil the EMS requirements stipulated in the nutrient discharge resource consent CRC185469, granted 28th June 2021 (and any subsequent replacement consent that includes the same or similar EMS requirements). In particular, condition 11(b) of CRC185469 specifies the EMS shall ensure the following:

- Resource Consent CRC185469 is complied with,
- Properties provided for in Conditions 4(a) and 4(b) implement GMP and the reductions required by Condition 4(a)(iii) to ensure nutrient loss reduces over time; and
- Properties required to hold a Farm Environment Plan are achieving or working towards the achievement of an A audit.

A summary of how all key consent conditions are managed through the EMS is detailed in Table 1. Links in the EMS Section take the reader to the relevant policy documentation put in place to fulfil the relevant consent and manage ASM programme.

Table 1: Relevant Conditions of Resource Consent CRC185469

Condition	Requirement	EMS Section
11(a)	The EMS shall identify the roles and responsibilities of the persons and entities involved in the management of the Consent Holder's environmental programme and the implementation of this resource consent.	Section 3: Roles and Responsibilities
11(b)	The EMS shall implement environmental objectives and targets for all Properties described in Conditions 4(a) and 4(b) to ensure: i. Resource Consent CRC185469 is complied with, ii. Properties provided for in Conditions 4(a) and 4(b) implement GMP and the reductions required by Condition 4(a)(iii) to ensure nutrient loss reduces over time; and iii. Properties required to hold a Farm Environment Plan are achieving or working towards the achievement of an A audit.	Section 4: Objectives and Targets
11(c)	The EMS shall ensure the consent holder has robust audit and reporting procedures in place to ensure a high level of compliance with Farm Environment Plans, Management Plans for Farming Activities or Certified Freshwater Farm Plans (as might apply).	Section 8 – Farm Environment Plan (FEP) Management

		Section 9 – Farm Environment Plan (FEP) Audit
11(d)	The EMS has appropriate procedures in place (through the EMS and each Farm Environment Plan, Management Plans for Farming Activities or Certified Freshwater Farm Plan) to ensure the identification of effects on neighbouring sensitive receptors are appropriately avoided, remedied, or mitigated.	Section 7 – Sensitive Receptors Section 8 – Farm Environment Plan (FEP) Management Section 9 – Farm Environment Plan (FEP) Audit
11(e)	The EMS shall be consistent with the Environmental Monitoring Plan and associated requirements provided for in Conditions 21 to 26.	Appendix 3 – Environmental Monitoring Plan
11(f)	The EMS shall require that any Properties wanting to undertake a significant change will first need to obtain the approval of the consent holder, with the EMS providing details on how applications for significant change are to be assessed, including procedures to ensure applications for significant change are only approved where: i. In the case of any NES Equivalent Farm, contaminant loads in the catchment and concentrations of contaminants in the receiving waterbodies are, as a result of the significant change, likely to be no greater than that occurring at 2 September 2020, having regard to: A. Any assessed nutrient loss, and B. The controls set out in any Farm Environment Plan, Management Plan for Farming Activities or Certified Freshwater Farm Plan (as might apply). Provided that Condition 11(f) shall not apply where the significant change application relates to an increase in irrigated area that is not being used for dairy farming (being the use of land by milking dairy cows). Advisory note: Where a property can demonstrate a significant change will not result in any increase in losses from the Property, it is not expected catchment-scale modelling or assessments will be required.	Section 10 – Nutrient Management - Changes

	And ii. Effects on local sensitive receptors are avoided, remedied, or mitigated.	
11(g)	The EMS shall provide reproducible methodology on: i. How the nutrient loads are calculated, and the rationale for that nutrient load applied, and ii. How nutrients from all land subject to this resource consent will be accounted for.	Section 5: Nutrient Accounting using the Matrix
11(h)	The EMS shall provide detail on how the management of Properties joining or leaving the scheme is to occur (including the methodology for allocating nutrients).	Section 6: Properties Joining and Leaving the Scheme
12(a)	The EMS shall provide for or require effects on neighbouring sensitive receptors to be managed through further measures (in addition to Condition 11(b), including: i. Requiring that stock are excluded from waterbodies in accordance with Regional Council rules, any granted resource consent(s), and the Resource Management (Stock Exclusion) Regulations 2020; and ii. Encouraging the establishment of vegetated riparian strips to minimise nutrient, sediment, and microbial pathogen loss to waterbodies.	Section 8: Farm Environment Plan (FEP) Management
12(b)	The EMS shall provide for or require the management of nutrient loss on Properties (which are not Authorised Properties) through a Farm Environment Plan or Certified Freshwater Farm Plan (as might apply) and audit process in accordance with the conditions of this resource consent.	Section 8: Farm Environment Plan (FEP) Management Section 9: Farm Environment Plan (FEP) Audit
12(c)	The EMS shall provide for or require Properties provided for in Conditions 4(a) and 4(b) to: i. Have their annual nutrient losses assessed in accordance with the Matrix Method identified in Schedule CRC185469B, ii. Be subject to an audit procedure in accordance with Conditions 18 and 19 (with the EMS being required to specify the steps that will be taken – including consequences to ensure future compliance – for Properties where Condition 11(b)(iii) applies and is not being met.	Section 5: Nutrient Accounting using the Matrix
12(c)	The EMS shall provide for or require the Farm Environment Plan audit records for each Property undertaken in accordance with this Condition 12(c) being kept and made available for the Canterbury Regional Council to inspect, upon request; procedures to	Section 9: Farm Environment Plan (FEP) Audit

	enable each Farm Environment Plan, Management Plan for Farming Activities or Certified Freshwater Farm Plan to be amended to address any changes that might be recommended following the preparation of a Remediation and Response Plan that is prepared in accordance with Condition 25.	
12(d)	The EMS shall provide for or require for the monitoring and data required under this consent and the EMS to be collected and reported to the Canterbury Regional Council in accordance with Condition 29 (with a copy to be provided to Te Rūnanga o Arowhenua).	Section 11: Reporting
12(e)	The EMS shall provide for or required that within 20 working days of the exit of any Property from Schedule CRC185469A (and the management of nutrient losses by the consent holder), the consent holder is to advise the Canterbury Regional Council of the authorised land use that is to apply to the departing Property.	Section 6: Properties Joining and Leaving the Scheme
13(a)	When preparing the EMS or seeking amendments to any of the matters listed in Conditions 11 and 12, the consent holder shall engage with the Chair of Te Rūnanga o Arowhenua or their representative to discuss the finalisation of the EMS content listed in Condition 12 within reasonable timeframes. The consent holder shall, subject to any alternative procedure that might be agreed with Te Rūnanga o Arowhenua and advised to the Regional Leader – Monitoring and Compliance, Canterbury Regional Council: i. Provide drafts of the EMS or amendments to the EMS along with any relevant supporting materials to Te Rūnanga o Arowhenua at least six weeks prior to the documents being submitted to the Canterbury Regional Council for certification, ii. Offer to meet with Te Rūnanga o Arowhenua representatives within the six-week period for the purposes of discussing the EMS or the amendments to the EMS, iii. Incorporate the comments or changes received from Te Rūnanga o Arowhenua into the EMS or the amended EMS, except that if the consent holder determines the comments or changes are not appropriate, it shall undertake further consultation with Te Rūnanga o Arowhenua to see if alternative further changes can be made. If the consent holder determines that further changes cannot be made, then it shall prepare a document that records the comments or changes that have not been included and the reasons for not including them.	Section 11: Reporting Section 12: Document Management Control
13(b)	The updated EMS along with any document to be prepared in accordance with Condition 13(a) are to be provided to Te Rūnanga o Arowhenua at the time of seeking certification from the Canterbury Regional Council in accordance with Condition 14.	

14	The EMS and any amendment to the EMS that has been prepared in accordance with Conditions 11 to 13 shall be submitted to the Regional Leader – Monitoring and Compliance, Canterbury Regional Council for certification. The EMS and any changes shall only be implemented following certification by the Regional Leader – Monitoring and Compliance, Canterbury Regional Council.	
15(a)	The consent holder shall engage a suitably qualified and independent expert to undertake: A. A full review of the EMS prior to 1 December immediately after the second and sixth anniversaries of the Commencement Date of this resource consent, and B. A review of at least one third of the EMS (to be rotated annually at each EMS review to ensure the full EMS is reviewed at least once every three years) prior to 1 December for each year that is after the second anniversary of the Commencement Date, excluding the full reviews required in the above clause. The reviews shall: Identify and discuss the implementation of the EMS and any improvements that may be able to be made to better achieve the objectives developed in line with Condition 11(b), A. Review any changes made to the use of the property irrigation, land use and management standards as applied through the Matrix Method when calculating the scheme nitrogen loss, and B. Review the process undertaken to update any changes made to the nutrient budget reference files used to calculate scheme nitrogen load limits and losses into the most recent version of OVERSEERFM®.	Section 12: Document Management and Control
15(b)	Following the review, the consent holder shall provide a copy of the review report to Te Rūnanga o Arowhenua and offer to meet with it for the purposes of discussing the findings of the review, and any amendments that might be made to the EMS.	
15(c)	A copy of the review shall be provided to the Regional Leader – Monitoring and Compliance, Canterbury Regional Council as a part of the annual report to be provided under Condition 16.	
16	In the event that a Property is excluded from the ASM programme then the Consent Holder shall notify Te Rūnanga o Arowhenua and the Regional Leader - Monitoring and Compliance, Canterbury Regional Council within 20 working days of the exclusion.	Appendix 2: Non-Complying Shareholder Policy
29	The Consent Holder shall prepare an annual report describing the results of the ASM programme and the audits that have been conducted each year. The report shall include	Section 11: Reporting

a summary of the FEP Auditing programme for the completed year preceding the reporting period, including the following:

a. the name of the FEP auditor(s);
a. a summary of the audit performance grading, including the predominant farming system on the properties graded;
b. the number of properties receiving each audit grade;
d. the number of properties which have received repeated fail grades (being C or D grades in relation to a Farm Environment Plan or any fail grade as may be determined in consultation with the Regional Leader - Monitoring and Compliance, Canterbury Regional Council in relation to any Certified Farm Environment) in the past five years (including a summary of the reasons and actions taken);
e. the total annual calculated loss of nitrogen from all properties within the Command Area over the reported year, in accordance with the method outlined in Schedule CRC185469B, and including information on:
    i. the load that has been calculated or deemed for each Property in accordance with Conditions 3 to 6;
    ii. the total aggregated NDA for each Nutrient Allocation Zone, being the sum of the assessed nitrogen losses from all Properties provided for in Conditions 4(a) and (b) and identified in the relevant part of Schedule CRC185469A; and
    iii. iii. predicted changes in average nitrogen concentrations beyond the root zone.
f. the reporting on environmental monitoring required in accordance with Condition 24;
g. a summary of any significant change applications considered in accordance with Condition 11;
h. the performance of properties in the scheme in meeting the environmental targets and objectives as specified in the Farm Environment Plans required by Condition 17(a); and
i. results of the review required by Condition 15.

3 Roles and Responsibilities

The EMS is administered by ALIL and is intended to be a 'living document' that may, at ALIL's election, be updated from time to time in accordance with the procedure set out in resource consent CRC185469.
Implementation of the EMS will be overseen by the General Manager of ALIL. The General Manager will manage the oversight and delivery of the EMS policies and procedures and the compliance with consent conditions with the assistance of the Environmental Manger and other staff and consultants on an as required basis.

Up to date contact details for the ALIL General Manager and Environmental Manager on the ALIL website (http://www.alil.co.nz)

4 Objectives and Targets

4.1 Objectives

The Objectives of the ALIL EMS are:

1. Resource Consent CRC185469 is complied with;
2. properties provided for in Conditions 4(a) and 4(b) of CRC185469 implement GMP and the reductions required by Condition 4(a)(iii) to ensure nutrient loss reduces;
3. over time; and properties required to hold a Farm Environment Plan are achieving or working towards the achievement of an A audit; and
4. there is engagement with Environment Canterbury and Te Rūnanga o Arowhenua on relevant changes relating to the EMS

4.2 Targets

Objective	Target	Key Performance Indicator	KPI Reporting
• **Resource Consent CRC185469 is complied with**	Improve understanding of groundwater and surface water systems within the catchment	Implement Environmental Monitoring Plan	Annual Compliance Report from 2022
	Farming activities are at good management practice or better	Percentage of land area at an A grade or better	Board Reports through year
• **Properties implement GMP and the reductions required by CRC185469 Condition 4(a)(iii)**	Farming activities are at good management practice or better	Further on farm improvements are actively encouraged.	Board Report
	Shareholders are actively engaged	Information on training in areas	Board Report Annually

to ensure nutrient loss reduces	with improving their environmental understanding and practices	with low auditor levels of confidence to be provided.	
• Properties required to hold a Farm Environment Plan are achieving or working towards the achievement of an A audit.	Shareholders are aware of the environmental characteristics of their property include sensitive receptors and the actions required to avoid, remedy, or mitigate impacts from their farming activities.	75% of scheme shareholders will be at an A audit grade by 2025 and a plan will be in pace to achieve 100% A grades within the timeframe.	Board Report

5 Nutrient Accounting using The Matrix

5.1 Introduction

The Matrix is a catchment nitrogen load calculation tool used by Ashburton Lyndhurst Irrigation Limited (ALIL), Barrhill Chertsey Irrigation Limited (BCI) and MHV Water Limited (MHV) to set and determine compliance with consented nitrogen load limits. The Matrix can also be used to calculate relative changes in catchment average nitrate concentrations in root zone drainage water.

Use of The Matrix is approved under the Plan, as it was deemed "equivalent" to OverseerFM by the Canterbury Regional Council (ECan) Chief Executive on the 29th of April 2020, subject to a number of conditions.

5.2 Purpose

The purpose of this section is to comply with the Canterbury Regional Council's Matrix equivalence approval method and satisfy conditions 6(a) and 11(g) of resource consent CRC185469, which state:

> *6 The NDA to be determined in accordance with Conditions 4 and 5:*
>
> *a. shall be calculated using the Matrix Method (as approved by the Chief Executive of the Canterbury Regional Council on 29 April 2020) and as included in Schedule CRC185469B, or any other equivalent method approved by the Chief Executive of Environment Canterbury (together Matrix Method), provided that:*
>
> *i. if OVERSEERFM® is used, the current version of OVERSEERFM® shall be used and the inputs shall be updated where relevant to reflect the current OVERSEERFM® Best Practice Data Input Standards, but they must still describe the same baseline scenario; and*
>
> *ii. the nitrogen loss calculation for any dairy farming operation where a building consent and effluent discharge consent was granted for a new or upgraded dairy milking shed in the period 1 January 2009 to 31December 2013, shall be on the basis that the dairy farming activity is operational.*
>
> *…*
>
> *11 The EMS required by Condition 10(b) shall:*
>
> *…*
>
> *g. Provide reproducible methodology on:*
>
> *i. How the nutrient load limits are calculated, and the rationale for that nutrient load calculation applied; and*
>
> *ii. How nutrients from all land subject to this resource consent will be accounted for*

Condition 15(v) of resource consent CRC185469 further requires any changes made which impact on how The Matrix is applied is subject to external peer review.

5.3 Conditions of Matrix Equivalence Approval

The Matrix is a modelling tool used by the mid-Canterbury irrigation schemes to calculate aggregated nitrogen loads. The Matrix was given formal approval as "equivalent" to OverseerFM by the Canterbury Regional Council Chief Executive, provided the following conditions are met:

a. Only to be used within the Mid-Canterbury plains, between the Rangitata and Rakaia Rivers, up to the foothills of the mountains, for groups of properties within a combined area of over 2,500 ha
b. To be used only in the context of a resource consent to:
    1. Generate an aggregated nitrogen baseline or nitrogen discharge allowance for groups of properties; and
    2. Generate an aggregated nitrogen loss calculation to determine compliance with consented nitrogen loss limits.
c. Where the Matrix method is recalibrated against OverseerFM files every four years
d. The approval has effect until 30 April 2035.
e. Any proposed amendments to The Matrix method shall be submitted to Environment Canterbury for consideration before being implemented:
    1. The amendments shall be considered by a panel made up of representatives of the Consents, Planning, Science and Compliance Monitoring sections of Environment Canterbury
    2. Within 30 working days of receiving the proposed amendments the panel shall make a recommendation to the Chief Executive for consideration.
    3. Upon receiving the recommendation, the Chief Executive shall make a decision on the proposed amendments within 14 working days and notify all parties within 5 working days of making the decision.

5.4 Description of Matrix Method

The Matrix Method is a spatial tool that relies on the same key principles to calculate nitrogen load as the methodology used by ECan to calculate the nitrogen load for sub-regional catchments[1]. The Matrix uses representative OverseerFM scenarios[2] to provide nitrogen loss values for a nitrogen loss matrix.

The representative OverseerFM scenarios model nutrient losses from eight farm system scenarios over four soil types to give a total of 32 base scenarios. The farm systems are:

a. Arable 1
b. Arable 2
c. Arable 4
d. Dairy 1
e. Dairy 2
f. Dairy Support 1

[1] e.g., Mojsilovic, O, Duff, K., Shaw, H., Palmer, K., Steel, K., 2015. Generation of nitrogen and phosphorus loss estimates in the Waitaki Catchment. Environment Canterbury, Report No. R15/109.
[2] The representative nutrient budgets were prepared by Macfarlane Rural Business and were originally commissioned by Environment Canterbury for catchment accounting purposes in the Selwyn and Hinds Plains zones.

g. Dairy Support 2
h. Sheep & Beef

Copies of the 32 base OverseerFM scenarios were taken and modified to account for various farm management level of practice, to give a total of 192 scenarios. The management levels are:

a. Base (reflective of typical 2009-13 practice)
b. Schedule 28 Good Fertiliser Management Practice (GMP-Fert)
c. Schedule 28 Good Irrigation Management Practice (GMP-Irr)
d. Schedule 28 Good Management Practice (GMP)
e. Advanced Mitigation (AM1)[3]

To obtain nitrogen losses values for use in The Matrix, the OverseerFM block N losses were identified within each of the 32 MRB files. Losses from blocks of each farm system with the same irrigation were grouped and the weighted average of the nitrogen losses calculated, creating a matrix of representative nitrogen losses by farm system, soil type and irrigation type. This process was repeated for each management practice standard to create a total of 6 matrices.

The representative scenarios are updated as necessary to remain consistent with OverseerFM input standards.

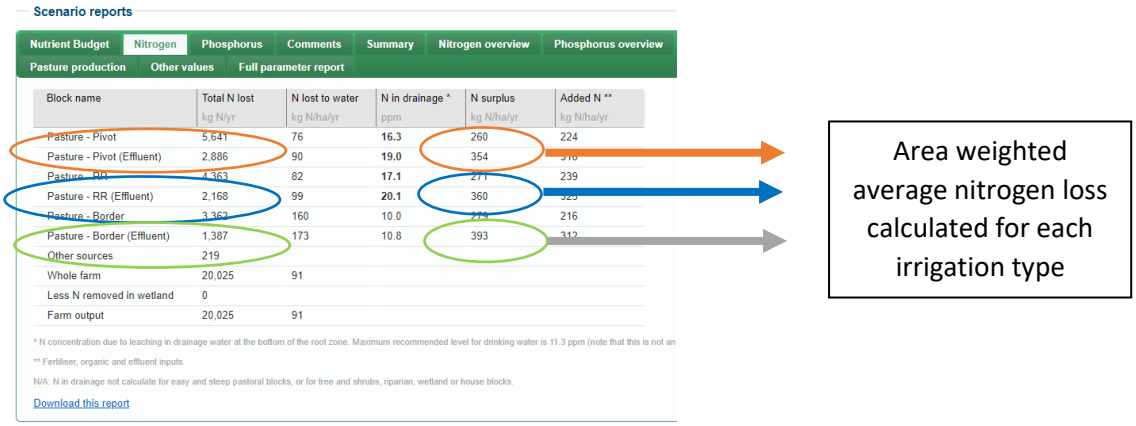


Figure 2: Example of how nitrogen loss values for specific irrigation types were taken from MRB OverseerFM files.

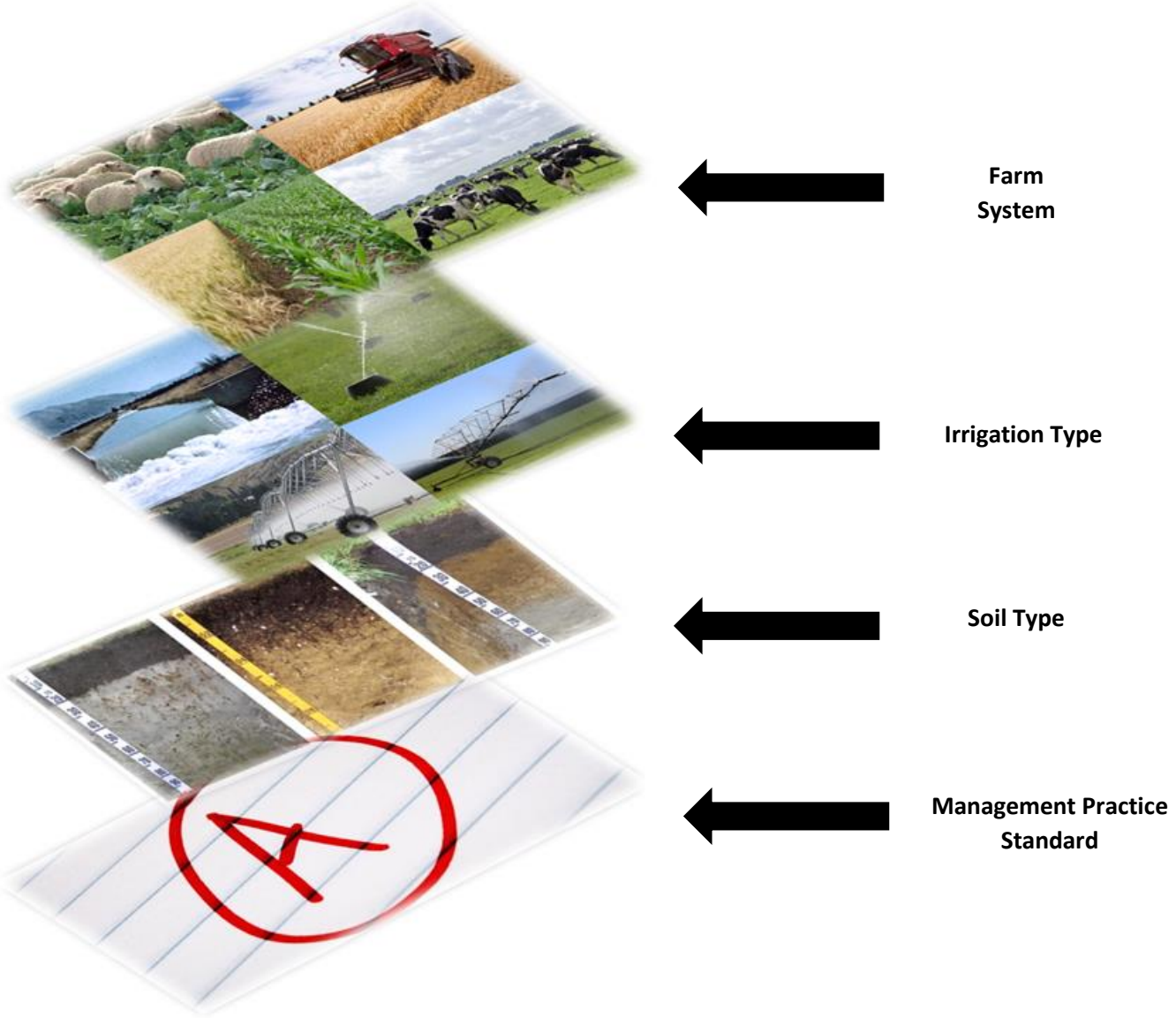
The representative nitrogen loss values are then spatially applied to an individual property by identifying the specific number of hectares of each activity within the matrix, calculated using a GIS mapping tool. The nitrogen loads that are attributable to each property are then aggregated to calculate the nitrogen load for a catchment or irrigation scheme. It is only the aggregated catchment load that is relevant for compliance (with ALIL having flexibility on the extent to which it attributes losses on individual properties, subject to meeting the other requirements of CRC185469.

[3] The Advanced Mitigation files represent cost neutral or beneficial practices beyond that expected of GMP and were developed by Environment Canterbury as part of the Plan Change 2 process.

Four farm-specific criteria are used to create each Matrix assessment. Those criteria are:

a. Farm system (i.e., arable)
b. Irrigation type
c. Soil type
d. FEP audit derived management practice

Figure 3: Summary of Layers Used to Calculate Nitrogen Losses

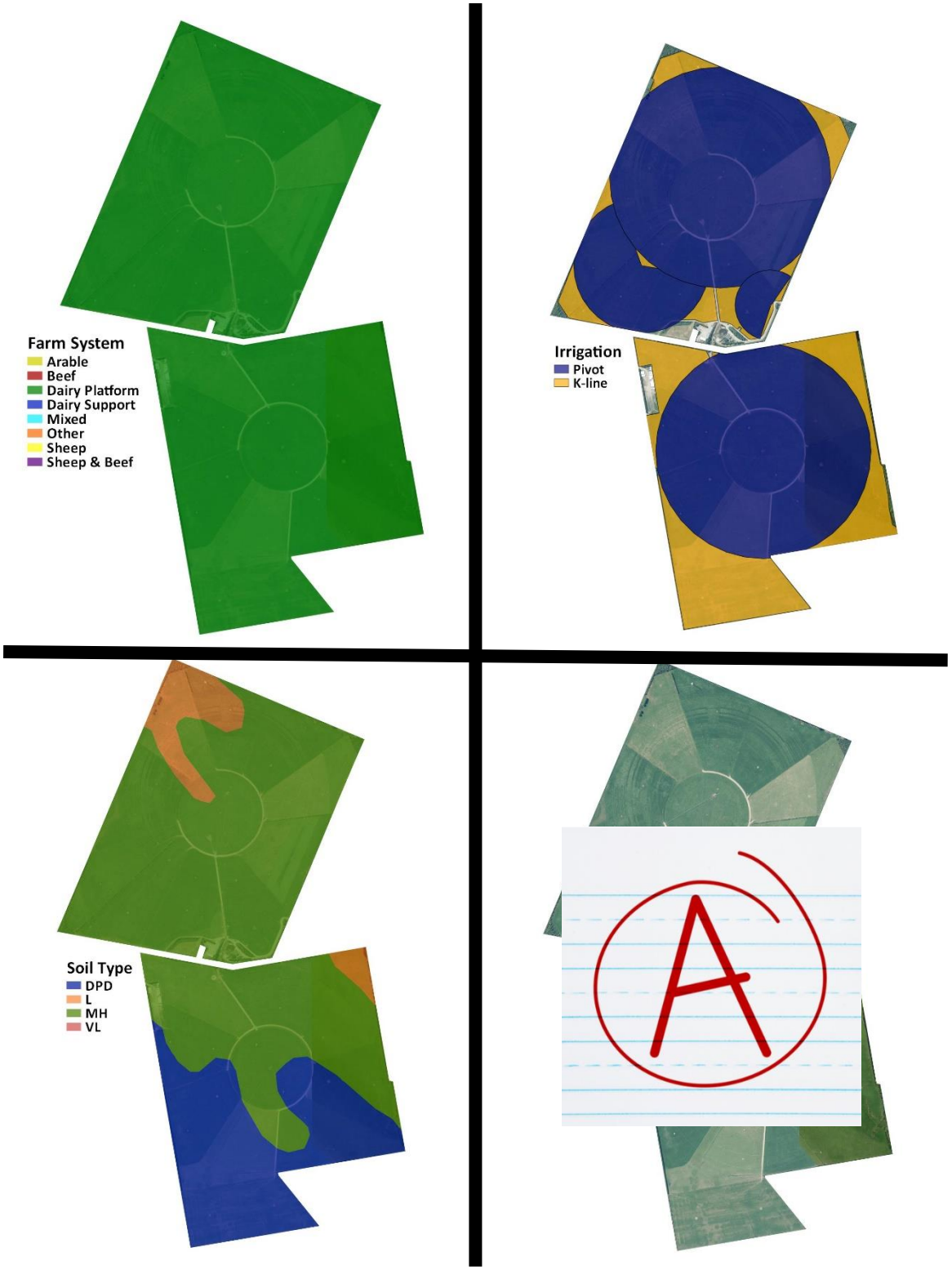


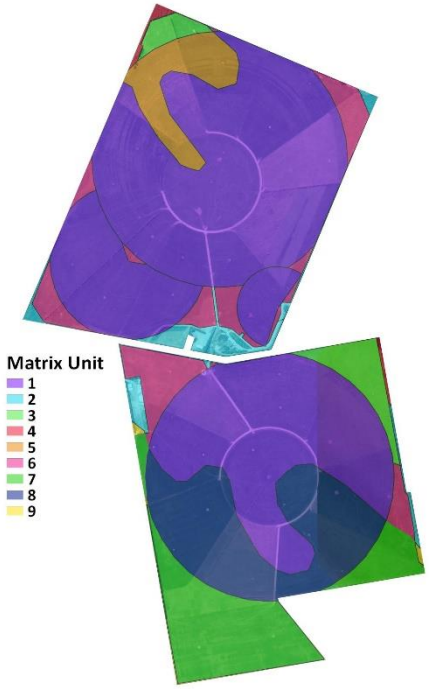
5.4.1 The Matrix

Following the process above, a Matrix was created to identify representative N losses by soil type, farm system, irrigation type, and farm management standard, which are then applied to a particular parcel of land within a property. As noted in section 5.4 above, the representative N losses calculated are based on a particular version of OverseerFM and need to be updated to reflect current OverseerFM N loss estimates at the time of reporting.

5.4.2 Case Study – Property NDA

A hypothetical 167 ha Dairy farm had centre-pivot and K-line irrigation, with some dryland. The farm had Heavy, Light, and Poorly Drained soil, and achieved an 'A' audit grade, meaning Good Management Practices were implemented.





Overlaying the four Matrix components (farm system, irrigation, soil type, and management practice) gave nine different nitrogen loss Matrix parcels for the property. These parcels had a weighted average nitrogen loss of 35.7 kg N/ha, with an average nitrogen leaching concentration of 13.9 ppm using a Matrix based on OverseerFM v6.4.1.

Table 2: Method used to assign nitrogen loss matrix values to parcels of land.

Unit	Area (ha)	Farm system type	Soil category	Irrigation type	Management Practice	Matrix code	N Loss (kg N/ha)[4]	ppm
1	98.0	Dairy (<3.7 cow/ha)	Heavy	Pivot	GMP	D2_Piv_MH_GMP	36.6	13.5
2	5.6	Dairy (<3.7 cow/ha)	Heavy	Dryland	GMP	D2_Dry_MH_GMP	29.9	12.9
3	3.2	Dairy (<3.7 cow/ha)	Light	K-line	GMP	D2_RR_L_GMP	51	17
4	0.8	Dairy (<3.7 cow/ha)	Light	Dryland	GMP	D2_Dry_L_GMP	38.9	15.6
5	7.3	Dairy (<3.7 cow/ha)	Light	Pivot	GMP	D2_Piv_L_GMP	49.4	16.6
6	14.3	Dairy (<3.7 cow/ha)	Heavy	K-line	GMP	D2_RR_MH_GMP	36.6	13.4
7	17.2	Dairy (<3.7 cow/ha)	Poorly Drained	K-line	GMP	D2_RR_DPD_GMP	30.6	14.4

[4] Overseer V6.4.1

8	21.7	Dairy (<3.7 cow/ha)	Poorly Drained	Pivot	GMP	D2_Piv_DPD_GMP	29.5	15.2
9	0.6	Dairy (<3.7 cow/ha)	Poorly Drained	Dryland	GMP	D2_Dry_DPD_GMP	21.7	11.2
Total	168.6	Weighted Average					35.7	13.9

5.4.3 Winter Grazing Activities

Winter grazing of cattle is a common secondary activity on some farm systems. To account for the secondary activity, a Winter Grazing matrix was created using the area weighted average nitrogen loss of the wintering crops modelled in the Dairy Support representative scenarios.

To incorporate winter grazing, the area of winter grazing[5] activities on properties not classified as dairy support needs to be identified and the weighted average nitrogen load between the primary land use and the winter grazing area is to be applied.

For example, if a 100 ha Arable farm also winters dairy cattle on 15 ha, the nitrogen loss for that property would be comprised of 15% dairy wintering and 85% Arable.

5.5 Application of Matrix for Nitrogen Discharge Allowance Calculations

The Nitrogen Discharge Allowance (NDA) is the limit set by resource consent CRC185469 (based on the requirements of Rule 5.62 of the Plan). The NDA is updated when land joins and leaves ALIL's management and reported in the most recent version of OverseerFM.

5.5.1 Source Data – Soils

The layer "Environment Canterbury Soil Types" is accessed via Canterbury Maps at this address:

https://ecan.maps.arcgis.com/home/item.html?id=73dcd5b8021b4d8e97a2330440f5d496

5.5.2 Source Data – Farm System and Irrigation

The farm system, winter grazing area and irrigation type mapped for all land managed within ALIL resource consent CRC185469 as at 28th June 2021[6] has been subject to review by each individual owner of the land at that date.

Any changes to the winter grazing, farm system or irrigation maps used to estimate the consented nitrogen load limit are subject to condition 6(b) of resource consent CRC185469, which states:

[5] Winter grazing is defined as the grazing of cattle within the period of 1 May to 30 September, where the cattle are contained for break-feeding of in-situ brassica and root vegetable forage crops.

[6] Commencement date of resource consent CRC185469.

b. for land listed within Schedule CRC185469A at the Commencement Date, may be updated within the 12 months following, provided that:

a. the update is consistent with the assessment methodology described for the Matrix Method;

b. *information on the changes (including information on the actual land use and irrigation system) is recorded to support each change, including confirmation that the change remains consistent with Condition 4;*

Each change made to the maps was recorded, including maintaining a record of the supporting information used to justify the change in the ALIL shareholder folder for that land. No changes on individual properties will be made after 12 months from the commencement date of CRC185469 (although Schedule CRC185469A may need to be updated as properties join or exit the management of the Scheme).

5.5.3 NDA N Load Allocation

The Matrix NDA is calculated using a four-year rolling average to align with the definition of nitrogen baseline and lawful irrigation set by the Plan.

In accordance with condition 2 of resource consent CRC185469 land is defined as follows:

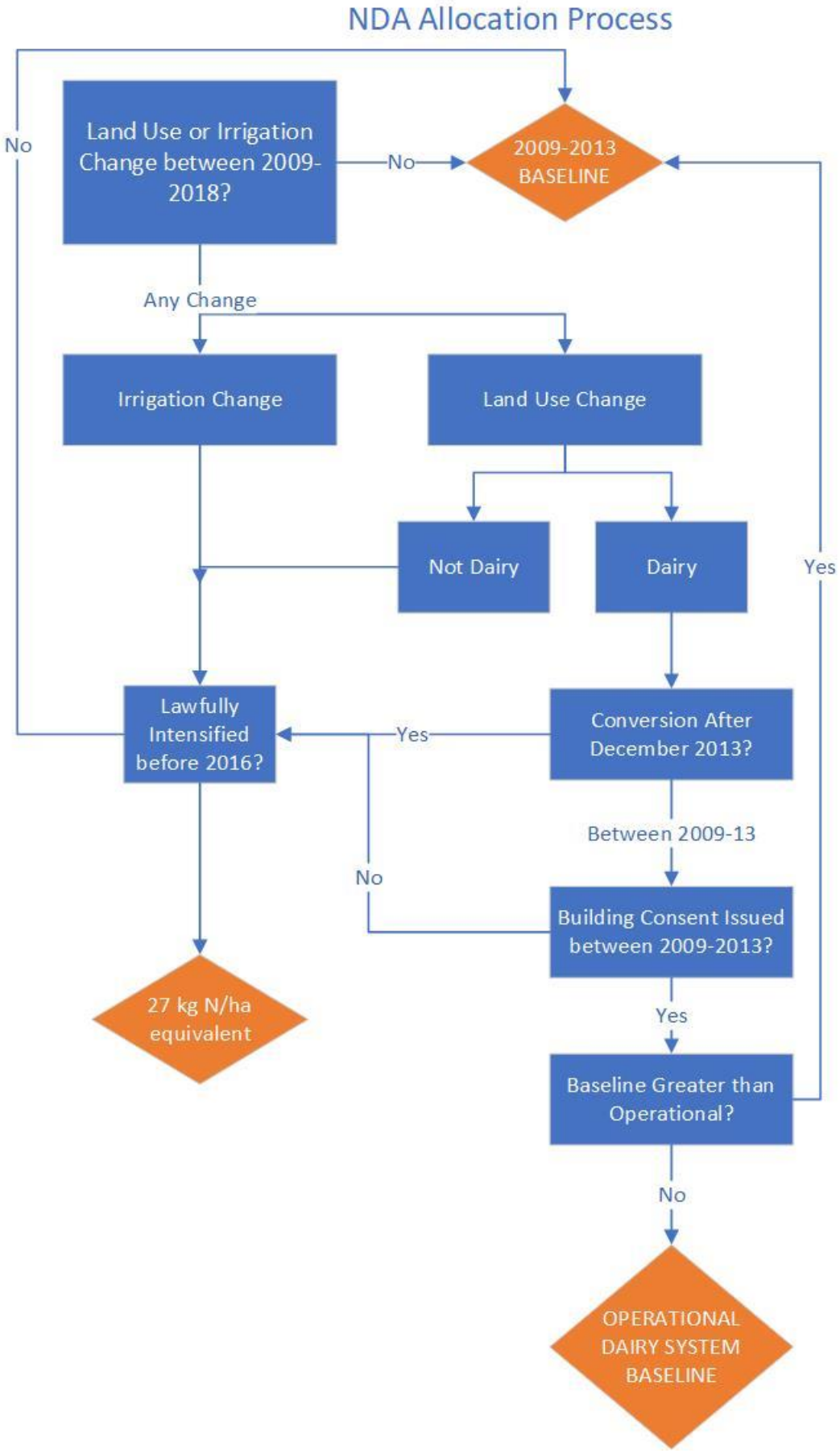
Term	Definition	Allocated Load – to 31st December 2024	Allocated Load – From 1st January 2025
Dry Land	Land that is not irrigated but where nitrogen losses are managed under this consent, and which is not Lawfully Intensified PC5 Land.	2009-13 Baseline[7], adjusted to GMP	2020 + reductions
Existing Scheme Irrigated Land	Land lawfully supplied with irrigation water by an irrigation scheme or principle water supplier prior to 26 May 2014.	2009-13 Baseline, adjusted to GMP	2020 + reductions
Lawfully Intensified PC5 Land	Land which lawfully increased its nutrient losses above its baseline nitrogen losses above its baseline	27 kg N/ha/year[8]	27 kg N/ha/year

[7] Nitrogen baseline means: (a) the discharge of nitrogen below the root zone, as modelled with OVERSEER®, (where the required data is inputted into the model in accordance with OVERSEER® Best Practice Data Input Standards), or an equivalent model approved by the Chief Executive of Environment Canterbury, averaged over a 48 month consecutive period within the period 1 January 2009 to 31 December 2013, and expressed in kg per hectare per annum, except in relation to Rules 5.46, 5.56, 5.58A and 5.62, where it is expressed as a total kg per annum from the identified area of land; and (b) in the case where a building consent and effluent discharge consent have been granted for a new or upgraded dairy milking shed in the period 01 January 2009 to 31 December 2013, the calculation under (a) will be on the basis that the dairy farming activity is operational; and (c) if OVERSEER® is updated, the most recent version is to be used to recalculate the nitrogen baseline using the same input data for the same period as used in (a) above.

[8] Or equivalent in reporting version of Overseer.

Term	Definition	Allocated Load – to 31st December 2024	Allocated Load – From 1st January 2025
	nitrogen loss rate between 31 December 2013 and 13 February 2016.		
Other Irrigated Land	Land that is irrigated from any source and which is not Existing Scheme Irrigated Land or Lawfully Intensified PC5 Land.	2009-13 Baseline, adjusted to GMP	2020 + reductions

A summary of the decision-making process to allocate the correct load for land within the ALIL command area in accordance with the conditions of resource consent CRC185469 is detailed below.


NDA Allocation Process
Land Use or Irrigation Change between 2009-2018?
No
2009-2013 BASELINE
No
Any Change
Irrigation Change
Land Use Change
Not Dairy
Dairy
Yes
Lawfully Intensified before 2016?
Yes
Conversion After December 2013?
Between 2009-13
No
Building Consent Issued between 2009-2013?
27 kg N/ha equivalent
Yes
Baseline Greater than Operational?
No
OPERATIONAL DAIRY SYSTEM BASELINE

5.5.4 NDA Schedule

Condition 3 of resource consent CRC185469 states:

> *Schedule CRC185469A attached to and forming part of this consent, shall specify:*
>
> *a. The Nutrient Allocation Zone(s) within which each Property is located; and*
> *b. The load that has been calculated for each property in accordance with Conditions 4 to 6; and*
> *c. A total aggregated NDA for each Nutrient Allocation Zone, being the sum of the assessed nitrogen losses from all properties provided for in Conditions 4(a) and (b) and identified in the relevant part of Schedule CRC185469A.*

Schedule CRC185469A is required to complete the following table as a minimum:

	NDA (kg/yr)	
Property number	Nutrient allocation zone A	Nutrient allocation zone B
Total		

Authorised Properties defined by condition 8 of resource consent CRC185469 are to be listed in the schedule with a nominal N loss of "0".

5.5.5 NDA Calculation for New Land

For any new land joining the ALIL Scheme, sufficient information must be provided to allow GIS mapping of the farm system and irrigation type to calculate nitrogen losses for the property, which includes the following as a minimum:

a. 2009-13 OverseerFM baseline nutrient budget[9]

[9] Except where land was previously managed by either Barrhill Chertsey Irrigation or MHV Water Ltd.

b. Irrigation system maps for each year within the 2009-13 baseline period;
c. Farm system and winter grazing maps for each year within the 2009-13 baseline period and for the 2020 year; and
d. Supporting farm data if required

The NDA for the land is then to be allocated according to the flow diagram above and added to the N load schedule and provided to Environment Canterbury that reporting year.

5.6 Application of Matrix for Calculating Nitrogen Load

The nitrogen load calculation estimates the catchment nitrogen losses from land managed under resource consent CRC185469 at any point in time. The nitrogen losses are to be compared against the NDA for reporting compliance against resource consent condition 5, which states:

The maximum annual amount of nitrogen that is lost to water from the Properties described in Condition 4(a) and (b) and listed in Schedule CRC185469A shall not exceed the combined and aggregated NDA of those Properties for each Nutrient Allocation Zone.

5.6.1 Source Data – Farm System

Farm system information is reviewed with the Farm Environment Plan (FEP) implementer during the annual FEP updates and verified during FEP audits. Farm systems are mapped per Property in the QGIS mapping system as follows:

QGIS Farm System	Description	Measured By	Matrix Farm System / Land Use Classification
Dairy Platform 1	A property where the majority of the land is used by milking dairy cows and the peak annual stocking rate is more than 3.7 cows/ha of effective dairy milking platform.	Annual feed demand on land dominated by lactating dairy cows.	Dairy 1
Dairy Platform 2	A property where the majority of the land is used by milking dairy cows and the peak annual stocking rate is less than 3.7 cows/ha of effective dairy milking platform.	Annual feed demand on land dominated by lactating dairy cows.	Dairy 2
Dairy Support	Where the majority of land is used to graze animals which are farmed for milk production but are not	Area of land (ha) predominantly used to feed non-lactating dairy animals exceeds other	Dairy Support

QGIS Farm System	Description	Measured By	Matrix Farm System / Land Use Classification
	lactating. For avoidance of doubt this classification includes bulls farmed for mating a dairy herd.	land uses (e.g., arable); or Annual feed demand on land dominated by non-lactating dairy animals	
Wintering[10]	Area of land used to break-feed cattle on brassica or root crops between 1st May and 30th September.	Area (ha) of land planted in brassica or root crop to winter graze cattle.	Wintering
Arable/Cropping	A property where the majority of the land is in a crop rotation for seed crops or process crops (see section 217B[11] of the RMA). Arable may include the grazing of livestock, but this activity is secondary to the growing of seed and process crops.	Area of land (ha) used to rotational seed or process crop exceeds the combined area of land dedicated to other uses.	Arable
Sheep, Beef, Deer	Where the majority use of land is for raising sheep, beef, or venison	As defined by stock class which dominated annual feed demand.	Sheep and Beef
Other	A property where the land use is not otherwise classified as dairy, arable, dairy support, or sheep & beef.	As defined by majority area of land (ha) not otherwise classified above.	Sheep and Beef

The farm system / land use classification is determined based on the use of the majority of the property. However, a Property may include multiple farm system / land use classifications where land use is distinctly different within a property. For instance, where a dairy farm always uses the same paddocks for dairy support activities or where deer are only grazed in a particular area then that will result in difference classifications applying to different parts of a property. Conversely, where multiple land uses are in rotation, then

[10] Note Wintering is the only farm system classification which can be applied on the same area of land as another farm system classification, excluding dairy support. The areas reported for the 2020 year are based off the peak of the 14 – 19 years.

[11] arable land use means the use of land to grow any of the following crops for harvest:
(a) grain cereal, legumes, or pulse grain:
(b) herbage seed:
(c) oilseed:
(d) maize grain, maize silage, cereal silage, or mangels:
(e) crops grown for seed multiplication:

the dominant farm system classification applies to the whole area of land within the rotation.

5.6.2 Source Data - Irrigation

Irrigation systems are to be reviewed with the FEP implementer during the annual FEP updates and verified during FEP audits. Irrigation systems are mapped using as built design plans and verified with aerial maps, if available, and limited to the area where installed infrastructure can deliver water in accordance with the design specifications[12].

QGIS Irrigation System	Description	Matrix Irrigation System
Pivot	Low application depth spray irrigation system, centred at a singular point, including an arm or gun to extend coverage.	Pivot
Lateral	Low application depth spray irrigation system, not centred at a singular point, including an arm or gun to extend coverage.	Pivot
Solid Set	Fixed low application depth sprinkler system.	Pivot
Rotorainer	High application depth spray irrigation system from a rotating boom, characterised by a long return period.	Rotorainer
Linear Boom/ Turborainer	High application depth spray irrigation system from a fixed boom, characterised by a long return period.	Rotorainer
Gun	High application depth spray irrigation system from a gun, characterised by a long return period.	Rotorainer
K-line/Long Lateral	High application depth sprinkler system, characterised by a long return period.	Rotorainer
Borderdyke	High application depth surface	Borderdyke
Drip/Mirco	Low application depth sub-surface irrigation system.	Pivot
Dryland	No irrigation or infrastructure to deliver irrigation.	Dryland
Other	System not otherwise defined.	As best represented by one of the 4 systems above

Changes in irrigation system are subject to approval from ALIL in accordance with its own internal Environmental Implementation Policy, however reporting of irrigation is to be as it occurred during the reporting period, irrespective of whether approval was provided by ALIL.

[12] For instance, irrigated area includes land, which is not irrigated in a particular season, but has the infrastructure to do so at any time.

5.6.3 Source Data – Management Standard

All properties which are not defined as "Authorised" under condition 8 of CRC185469 are to be regularly audited against the targets and objectives specified in Schedule CRC185469C at the frequency determined by condition 18(a).

At any point in time, these properties will have a standing audit grade, termed the "Compliance Management Standard" (CMS) grade. The CMS grade is updated when a property is audited and used to allocate the management standard in The Matrix as follows:

Audit Grade	Matrix CMS
C or D Grade	Baseline
B Grade, Medium (M) or Low (L) level of confidence (LOC) for Irrigation Target 3 and Nutrient Target 3	Baseline
B Grade, High (H) LOC for Nutrient Target 3, M or L LOC for Irrigation Target 3	GMP-Fertiliser
B Grade, H LOC for Irrigation Target 3, M or Low LOC for Nutrient Target 3	GMP-Irrigation
B Grade, H LOC for both Irrigation Target 3 AND Nutrient Target 3	GMP
A Grade	GMP
A Grade and can demonstrate advanced mitigation practices are implemented[13]	AM1
Irrigation Target 3: The timing and depth of irrigation water applied takes account of crop requirements and is justified through soil moisture monitoring or soil water budgets and climatic information. *Nutrient Target 3: Manage the amount, timing, and application of fertiliser inputs to match the predicted plant requirements and minimise nutrient losses.*	

5.6.4 Reporting N loss Calculation

To report nitrogen losses, the NDA is to be updated into the most recent version of OVERSEERFM and compared against the nitrogen losses calculated using the Matrix using the farm system, irrigation type and CMS audit grades for the previous 1 July to 30 June. From 2025 the NDA reporting will be replaced with reporting against the 2020 year, and like the NDA the losses will need to be updated in the most recent version of OverseerFM.

5.7 Validation of The Matrix

The Matrix is required to be revalidated once every 4 years by carrying out the calibration process.

5.7.1 Validation

The validation of The Matrix shall use a sample of properties and is detailed in the application to approve the Matrix as equivalent to OverseerFM.

The minimum sample size is intended to ensure 95% confidence of a result within 10% of the true value. As of 2020, this would equate to 90 properties located between the ALIL,

[13] As identified by an Accredited FEP auditor in accordance with the Advanced Mitigation auditor guidance notes once they have been finalised and adopted by ALIL for incorporation into the ALIL EMS.

BCI and MHV consented command areas. The first validation exercise will be completed in 2024. The properties selected will be representative of farming activities within the Mid Canterbury area. A representative sample will have approximately the same distribution of farm system, soil type and rainfall as the Scheme(s) for which the calibration is being completed. Each selected property will complete a Year-End OverseerFM nutrient budget, using a suitably qualified professional in accordance with the most recent OverseerFM User Guide, or equivalent document. All nitrogen losses will be aggregated using the same version of OverseerFM.

A Matrix assessment will be completed for the same sample properties using the land use and irrigation maps and FEP Audit results applicable to the Year-End nutrient budget. The Matrix load will be calculated with the same version of OverseerFM as the representative sample of nutrient budgets.

An acceptable threshold of aggregated nitrogen losses (calculated as kg N/year) as calculated using The Matrix shall be within +/- 10% of the aggregated nitrogen losses as calculated using OverseerFM.

5.7.2 Recalibration Process

Where the validation of the Matrix demonstrates a variation greater than 10%, the user of the Matrix can choose one of two options:

Option A: Expand Validation Sample Size; or

Option B: Update Matrix files and Recalibrate

5.7.2.1 Option A: Increase Sample Size

Option A is suitable where the variation from the nutrient budgets was caused by the randomised samples not being representative of the catchment.

Where Option A is chosen, additional OverseerFM nutrient budgets should be prepared, ensuring the sample properties are representative of the farming activities occurring within the catchment. The additional nutrient budgets are added to the existing validation and compared to the Matrix. If this resolves the issue, the regular validation process can continue.

5.7.2.2 Option B: Update Matrix and Recalibrate

Option B is suitable where the deviation was caused by changes in land use activities and/or location within the catchment. OverseerFM will also need to be capable of modelling these changes.

Where Option B is chosen, a full investigation of the cause of the deviation will need to be completed and a proposal prepared for consideration by Environment Canterbury.

The proposal shall include:

a. A detailed report on the probable cause of the changes resulting in the deviation of The Matrix from the aggregated OverseerFM Nutrient budgets; and

b. A detailed proposal on the amendments required to The Matrix required to maintain equivalence.

An example where this process would be needed could be where climate has been identified as the reason for a difference of >10% between the Matrix and year-end OverseerFM nutrient budgets. In this situation, the proposal would consider methods to take climate into account in the model to re-calibrate the model to within +/- 10%.

Once a proposal is accepted by Environment Canterbury, a suitably qualified person would then update the Matrix files and re-run the model. The updated Matrix shall be then re-calibrated against the OverseerFM nutrient budget samples, and the process repeated until the Matrix is calibrated.

As the Matrix is based on the OverseerFM model, further granularity in the Matrix could be developed to ensure equivalence is maintained at all times.

The Matrix is validated on a 4-yearly basis using the following process described in 5.7.

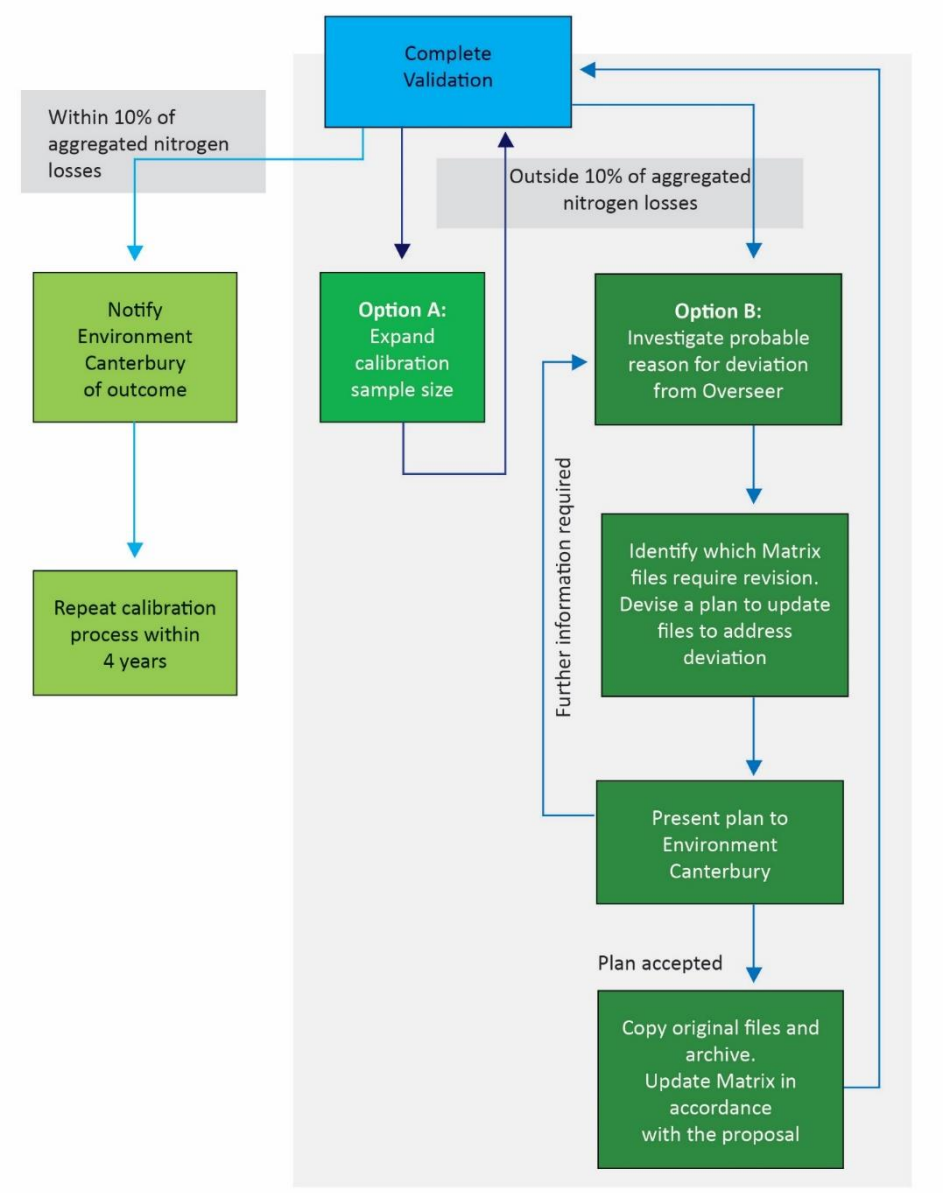


Figure 4: Proposed validation process for The Matrix

5.8 OverseerFM Updates of The Matrix

All OverseerFM updates to the representative nutrient budgets used in the Matrix are subject to peer review under condition 15 (v)(B) of resource consent CRC185469.

The representative nutrient budgets used to calculate nitrogen losses in the Matrix are stored in the ALIL OverseerFMSci account, which automatically updates the nutrient budgets with each version release of the OverseerFM model.

The process to update the Matrix into a later version of OverseerFM is detailed in the application to approve the Matrix as equivalent to OverseerFM.

While OverseerFM automatically re-runs a nutrient budget in the most recent version, it is possible these updates will require new or modified inputs in order to re-calculate nitrogen losses in that particular version. Examples of where this has occurred in the past has been the grazing inputs on crops and the introduction of a new irrigation model.

Environment Canterbury may also identify minor issues with the Matrix files and request changes, provided the change is unlikely to require additional validation of the model and mutual agreement is achieved.

If issues arise when updating the Matrix in a later version, the process described in 5.7 will be followed.

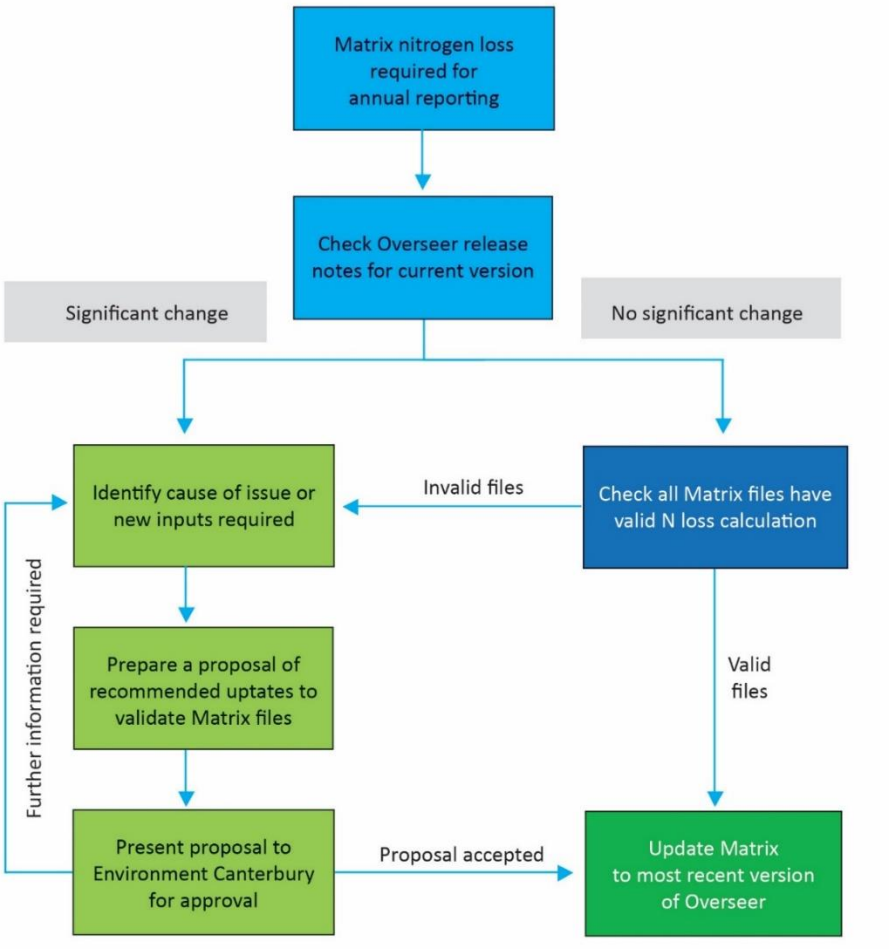


Figure 5: Proposed process for updating The Matrix into most recent version of Overseer

5.9 OverseerFM Updates to the Lawfully Intensified Loss Rates

The nitrogen loss rate of 27 kg N/ha/yr that is provided for in relation to Lawfully Intensified PC5 Land needs to be updated annually to reflect the latest version of OverseerFM.

The input parameters shall be consistent with the original Environment Canterbury assumptions of landuse (as documented in an email from Leo Fietje to Angela Fenemor on 18 February 2014), as detailed below:

> *The future area was assumed to be 60% dairy, 20% dairy support and 20% cropping. Nitrogen leaching data was obtained by work carried out by Macfarlane Rural Business (MRB) for the Hinds Nutrient Project. The following MRB representative farms were used to model the 19,486 ha of future irrigated land:*
>
> *a. Dairy 1 (D1) on very light soils – Advanced Mitigations Level 1 (AM1)*
>
> *b. Dairy Support 1 (DS1) on very light soils – Advanced Mitigations Level 1 (AM1)*
>
> *c. Arable 2 (A2) on very light soils – Advanced Mitigations Level 1 (AM1)*
>
> *The calculation is included below:*
>
> *0.2 ha of cropping @ 23 kg N/ha = 4.6*
>
> *0.6 ha of dairy platform @ 26 kg N/ha = 15.6*
>
> *0.2 ha of dairy support @ 33 kg N/ha = 6.6*
>
> *Total 26.8 (27)*

The OverseerFM nutrient budget files used to calculate the Lawfully Intensified PC5 Land loss rate are stored in ALIL's OverseerFMSci account (and are automatically updated into the most recent version of OverseerFM. The updated N losses for each file shall be extracted to repeat the above calculation to work out the lawful irrigated load in a particular version of OverseerFM. This value is then to be applied to the NDA calculation, prepared in the same version of OverseerFM.

All updates to the lawfully intensified load are subject to peer review under condition 15 (v)(B) of resource consent CRC185469.

5.10 Changes to the Matrix Representative Files

Farm systems may evolve over time, and ALIL may deem it necessary or appropriate to incorporate new or update the representative farm system /land use classification files used to feed into the Matrix to maintain the model's validity.

The addition of farm system / land use classification files is seen as an opportunity to enhance the Matrix by providing additional detail.

The process to incorporate new files or update existing files into the Matrix is detailed in in the application to approve the Matrix as equivalent to OverseerFM.

This shall follow the process described in Section 10.7.2.2 "Option B" above (with further calibration potentially being required if the new files are not within +/- 10% of the aggregated OverseerFM nutrient budgets).

5.11 Peer Review of the Matrix

Condition 15 of resource consent CRC185469 requires an annual peer review of how the NDA and N load calculation have been prepared to ensure processes detailed in this document are followed.

The peer review is to be included in the annual compliance report for discharge consent CRC185469, that is to be provided to Environment Canterbury by 1 December each year.

Reviews are to be completed by a suitably qualified and independent expert to assess:

a. A review of any change made to the use of the property irrigation, land use and management standards as applied through the Matrix Method when calculate the scheme nitrogen losses; and

b. A review of the process undertaken to update any change made to the nutrient budget reference files used to calculate scheme nitrogen load limits and losses into the most recent version of OverseerFM.

It is noted that prior to the commencement date of this EMS, OverseerFM has often updated the model in October. If this continues, then it is possible that the version of OverseerFM used to calculate the NDA and compliance losses for the same reporting period (1st July -30th June) could differ to the version in place at the date of reporting (1st December). Therefore, PDF downloads of the information used to calculate N losses are to be kept to enable a peer reviewer to assess the process to calculate the N losses in the instance where OverseerFM updates after the NDA and N load is calculated for that reporting year.

5.12 Data Storage

5.12.1 OverseerFM nutrient budgets

The Matrix consists of OverseerFM nutrient budget files making up 8 x farm systems x 4 soil types x 6 management standards which are stored in the OverseerFMSci tool in ALIL's account.

Access to the ALIL OverseerFMSci account is strictly limited to those who need to view the full OverseerFM nutrient budget details for the period of time they require it. Examples of personnel who require access include:

a. Suitably qualified professionals needing access to nutrient budgets to update Matrix to a later version of OverseerFM or prepare additional representative nutrient budgets
b. Third party auditors to verify the updates made to Matrix nutrient budgets
c. Environment Canterbury to verify compliance with a resource consent
d. Scheme Environmental staff to manage OverseerFMSci account

The original nutrients budgets used to form the Matrix are stored in OverseerFM version 6.3.0 in .xml format on the Scheme filing system.

The original files do not include any updates made in OverseerFMSci as part of the consenting process or to validate files in a later version of OverseerFM.

5.12.2 QGIS Files and Matrix Calculations

All shape files and spreadsheets used to update the NDA and calculate N losses in a particular year are copied and archived in the scheme filing system for future reference

6 Properties joining or leaving the scheme

ALIL is to manage land joining or departing the ALIL ASM in a manner that ensures compliance with resource consent CRC185469, which includes the resource consent requirements that are set out below.

6.1 Joining the scheme

6.1.1 Information Requirements

Properties who come under the management of the ALIL consent CRC185469 are required to provide the scheme with completed OverseerFM Nutrient Budgets for:

i. the Nitrogen Baseline[14] for the land
ii. the year ending 2020 (with a year-end consistent with the same land uses elsewhere in the Scheme)
iii. the then most recent year at the time the land joined the scheme,

including farm maps for this period of time. The maps will be verified using available aerial photography.

The land use and irrigation information contained in the Baseline nutrient budgets will be used in the Matrix. The Matrix information for the new shareholder will be added to Schedule CRC185469A in the appropriate zone (with Authorised Properties defined by condition 8 of resource consent CRC185469 being listed in the schedule with a nominal N loss of "0"). Records of this process will be held on file and made available to Environment Canterbury upon request.

In addition to the base land use information the property will be required to provide the following information about farming land use activities on the Property, together with such supporting information and/or evidence as the Company may require:

i. the maximum area of the Property that was used for Intensive Winter Grazing[15] during the Reference Period[16];
ii. The maximum area of the Property that was used for Matrix Winter Grazing[17] during the Reference Period
iii. the maximum area of the Property that was used as Dairy Support Land[18] during the Reference Period;

[14] Nitrogen Baseline as defined in the Land and Water Regional Plan or the 4 years preceding February 2016 where the land joining the scheme was lawfully intensified.
[15] **Intensive Winter Grazing** means the grazing of livestock on an annual forage crop at any time in the period beginning 1 May and ending on 30 September in any given year
[16] Reference period is defined as 1st July 2014 to 1st July 2019
[17] Matrix winter grazing is the area of brassicas or root vegetables grazed by cattle in the reference period.
[18] Being the farming of non-milking dairy cows, including heifers

iv. the maximum area of the Property that was used as Dairy Farm Land[19] during the Reference Period; and
v. the maximum area of both the Property and any Dairy Farm Land on the Property that was irrigated with water during the Reference Period;

To ensure that the incoming property is able to meet ALIL standards a Farm Environment Plan will need to be prepared for the Property in a form which is acceptable to ALIL and achieving an audit grade equal to A or better in the most recent Farm Environment Plan audit.

6.1.2 Assessment of Applications

ALIL, in deciding that a Property is suitable to be included in Schedule CRC185469A will consider:

i. the ability of the Property to contribute to:
    a. the Company's overall compliance with the Discharge Consent; and
    b. future reductions in nutrient losses;
ii. the Nutrient Discharge Allowance for the Property (as calculated in accordance with the Discharge Consent);
iii. any potential effects on local Sensitive Receptors, and whether any such effects can be avoided, remedied, or mitigated;
iv. any other matters ALIL considers relevant.

Decision in relation to an application will be determined by the ALIL Board. Applications may be approved or declined, with the Board solely acting in its own discretion in relation to any decisions but being required to consider the matters set out.

6.1.3 Other Requirements

ALIL may require properties with individual farming land use consents granted under the Land Water Regional Plan (LWRP) to surrender their consents upon joining CRC185469. In any instance where a consent is not surrendered, ALIL shall advise Environment Canterbury as to which consent applies to the relevant property(s).

Where more than 200 ha of new land is added to Schedule 185469A above what was managed at the commencement date of resource consent CRC185569, a review of the Environmental Monitoring Plan shall be initiated in accordance with condition 26(c) of resource consent CRC185469 to ensure the intent of the groundwater and surface water monitoring continue to adequately capture the potential adverse effects from the scheme.

Further details on reviews are included in the approved Environmental Monitoring Plan.

Once a property is accepted into the ALIL ASM programme, a Farm Environment Plan will be prepared and included in the register for an FEP Audit within 12 months of joining the scheme.

[19] Being the use of land by milking dairy cows (whether irrigated or not)

6.2 Land Leaving the scheme

Where land leaves the scheme, the calculated nitrogen loss on Schedule CRC185469A shall be removed from the scheme load. Where a shareholder sells part of a property, which is then no longer part of the scheme, the Matrix nitrogen loss calculations shall be updated in Schedule CRC 185469A to reflect the area remaining in the scheme, or on such other basis to ensure that there is no overall increase in nitrogen loss.

When any property or land leaves the ALIL ASM programme, the 2009-13 nitrogen baseline farm system and irrigation maps will be provided to Environment Canterbury within 20 working days.

Where a property or land is excluded from the ASM programme, Te Rūnanga o Arowhenua will also be notified within 20 working days.

7 Sensitive Receptors

Some farming activities on ALIL shareholder properties can impact sensitive receptors and additional actions may be needed to avoid, remedy, or mitigate these effects.

Sensitive receptors are defined in resource consent CRC185469 as:

> *Areas of wetland, surface water bodies and riparian areas, sites of cultural significance (as may be further defined in consultation with Te Rūnanga o Arowhenua) and, in the case of any land located within a Community Drinking Water Protection Zone, the Community Drinking Water Supply.*

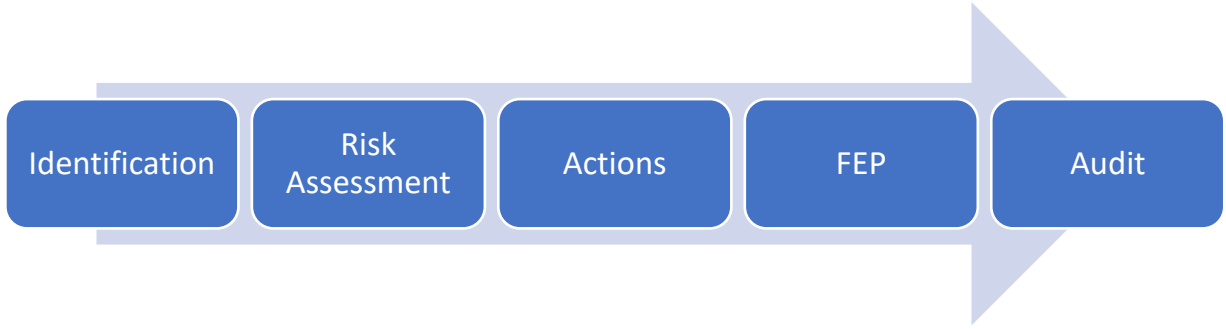
This section of the EMS details the steps ALIL will undertake to identify sensitive receptors within or adjoining shareholder properties and ensure effects from new and existing farming activities are avoided, remedied, or mitigated.

Effects on sensitive receptors from new or varied farming activities are also managed through an internal ALIL process, the Farm Activity Variation Application Process, detailed in section 10.

7.1 Overall Approach

Solutions to avoid, remedy or mitigate impacts on sensitive receptors will be integrated into ALIL's overall environmental management program. Firstly, ALIL will implement processes to identify the location of the sensitive receptor(s) and communicate these to affected shareholders. Secondly, a risk assessment is completed with the shareholder to understand potential effects of farming activities on the sensitive receptor(s) and the actions required to avoid, remedy, or mitigate those effects. Finally, the agreed actions and timeframes will be included in the FEP and audited to ensure their implementation.

The overall process regularly reviews the information available to assess the sufficiency of actions taken to mitigate the effects on the sensitive receptor and promotes continual improvement.



7.2 Sites of Cultural Significance

Sites of significance to Te Rūnanga o Arowhenua are reflective of their traditional migratory lifestyle, designed to optimise collection of food and other resources when and where they were abundant within their rohe.

Through generations of exploration and observation of seasonal life cycles of terrestrial and aquatic food sources, the people of Te Rūnanga o Arowhenua knew where the best food sources were located and the time of year when they would be available and would travel along known routes to hunt, gather or harvest these food sources to bring back to the marae or to be traded. As these sites were regularly used traditionally, there is also a higher likelihood of artifacts of importance being found in these areas today.

Sites of cultural significance have been identified by Te Rūnanga o Arowhenua using historical records held by the Rūnanga and Ngāi Tahu. Some sites may have been lost or degraded due to urban and rural development. Gathering food and other resources is still an integral part of what it means to be Te Rūnanga o Arowhenua, and as kaitiaki, the enhancement of what remains today is a key priority.

7.2.1 Relationship to other Mahinga Kai Protection Frameworks

Recognition of the importance of mahinga kai to Ngāi Tahu has been provided through the regional planning framework, with consideration of effects on mahinga kai values as part of the Farm Environment Plan and auditing framework, which requires:

Mahinga kai values are protected as a result of measures taken to protect and enhance water quality and stream health.

The information included in this section of ALIL's EMS has been developed in consultation with Te Rūnanga o Arowhenua to address effects on specific sites of cultural significance located on land within the ALIL ASM programme, some of which will overlap with the requirements of the Farm Environment Plan. Should Environment Canterbury release guidance on the management of mahinga kai values within the ALIL rohe, we will endeavour to integrate these guidelines where possible.

7.2.2 Core Principles

The core principles to embody management of sites of significance to Te Rūnanga o Arowhenua are:

- Collaborative partnership
- Transparency and openness
- Building knowledge

7.2.3 Collaborative Prioritisation Identification

Between 1879-81, approximately 1712 Ngāi Tahu mahinga kai sites across Canterbury and Otago were surveyed and presented to the Smith Nairn Commission as evidence of the Crown's abdications of their obligations of Te Tiriti o Waitangi.

The location of many of the sites of significance are not available publicly, as tikanga dictates this knowledge is held by few people to effectively manage the mahinga kai resource or protect the taonga. Within the command area of ALIL, sites of significance to Te Rūnanga o Arowhenua have been identified on the ALIL GIS mapping system. These sites were identified and mapped in consultation with Te Rūnanga o Arowhenua in 2022. Variation in the number or extent of registered sites of significance identified on the ALIL GIS mapping system are to follow the process described in ALIL's Environmental Implementation Plan.

Common sites of significance or taonga include:

- Popular harvest locations
- Wāhi tapu sites (e.g., urupa)
- Waterways and their margins
- Common travel routes and camping sites

7.2.4 Risk Assessment

Where a site of significance has been identified, a risk assessment is to be undertaken which takes into consideration the following:

- Nature and history of site to Te Rūnanga o Arowhenua
- Site context today
- Activities on farm which can impact on core values of the site
- Actions required to mitigate the identified risks

The risk assessment process to be completed is included in the Environmental Implementation Plan. Appropriate actions defined in the procedure are to be implemented collectively or through the Farm Environment Plan and auditing framework.

Risk assessments are regularly reviewed when farm plans are updated to ensure actions remain applicable and appropriate.

7.2.5 Implementation

A key part of integrating protections of sites of significance through the Farm Environment Plan is to raise awareness and understanding of the importance of these sites with the landowners and managers.

7.2.5.1 Minimum expectations

As a minimum, any property with an identified cultural site of significance shall adhere to the Accidental Discovery Protocol in the event where artifacts of interest to Te Rūnanga o Arowhenua are found.

7.2.5.2 Collective Action

In some instances, collective action can improve outcomes more effectively than individual actions identified and implemented through the Farm Environment Plan alone.

Where a collective approach is more appropriate to avoid, remedy or mitigate effects on the site of significance, ALIL may work collaboratively with the affected shareholders, Te Rūnanga o Arowhenua and/or other stakeholders to develop a suitable solution.

7.2.5.3 Individual Property

Where mitigations are identified through the risk assessment process detailed in the Environmental Implementation Plan, the actions will be included in the Farm Environment Plan.

Actions identified as necessary through the risk assessment process are assessed through the Farm Environment Plan Audits.

7.2.5.4 Variations in Land Use

Any variation in farm system which results in a significant change, as defined by the Farm Environment Plan on a property with a site of significance will require consultation with Te Rūnanga o Arowhenua to ensure any effects from the proposed change will be adequately avoided, remedied, or mitigated.

7.2.6 Notification

Te Rūnanga o Arowhenua shall be notified for consultation in the following circumstances:

- An accidental incident which can negatively impact on a site of cultural significance
- The Accidental Discovery Protocol has been initiated
- Within 20 working days of when land is excluded from the ALIL ASM programme
- When deteriorating trends[20] in water quality are identified
- Variation in risk assessments detailed in Environmental Implementation Plan, for instance as identified through the Farm Activity Variation Application process.

[20] As defined in Table CRC185469-2 of resource consent CRC185469.

7.3 Wetlands, Surface Water Bodies and Riparian Areas

Effects on wetlands[21], surface water bodies[22] and riparian areas[23] are addressed through a number of EMS protocols, which include:

- A Waterbodies objective in the Farm Environment Plan and Audits
- Consideration of catchment contaminant concentration and loads through the Farm Activity Variation Application process for Significant Change decisions

Farm Environment Plan must include the following objective and targets:

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:

(1) Stock are excluded from waterbodies in accordance with regional council rules or any granted resource consent.

(2) Vegetated riparian margins of sufficient width are maintained to minimise nutrient, sediment, and microbial pathogen losses to waterbodies.

(3) 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.

(4) Mahinga kai values are protected as a result of measures taken to protect and enhance water quality and stream health.

Therefore, properties with or adjoining a wetland, surface water body or riparian area as identified through the Farm Environment Plan will need to undertake a risk assessment in accordance with applicable FEP Auditor Guidance prepared by

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[21] includes:
1. wetlands which are part of river, stream, and lake beds;
2. natural ponds, swamps, marshes, fens, bogs, seeps, brackish areas, mountain wetlands, and other naturally wet areas that support an indigenous ecosystem of plants and animals specifically adapted to living in wet conditions, and provide a habitat for wildlife;
3. coastal wetlands above mean high water springs;
but excludes:
(a) wet pasture or where water temporarily ponds after rainfall
(b) artificial wetlands used for wastewater or stormwater treatment except where they are listed in Sections 6 to 15 of this Plan;
(c) artificial farm dams, drainage canals and detention dams; and
(d) reservoirs for firefighting, domestic or community water supply.

[22] means water above the ground surface and within a lake, river, artificial watercourse, or wetland, but does not include water in the sea, snow or rain or water vapour in the air. When a distance to a surface water body is being considered, it means the distance to the bed of a lake, river, artificial watercourse or to the boundary of a wetland (see wetland boundary definition).

[23] means the land within the following distances of the bed of any lake, river, or wetland boundary:
1. In Hill and High-Country land or land shown as High Soil Erosion Risk on the Planning Maps – within 10 m; and 2. In all other land not shown as High Soil Erosion Risk on the Planning Maps or defined as Hill and High Country – within 5 m.

Environment Canterbury and complete actions as required to avoid, remedy, or mitigate effects on the waterway.

7.4 Community Drinking Water Supplies

Community Drinking Water Protection Zones are the area of land surrounding a human drinking water supply at risk of influencing the quality of the water supply and considered to be sensitive receptors for the purposes of CRC185469.

Community Drinking Water Protection Zone Risk assessments are to be completed in accordance with Schedule CRC185469E of resource consent CRC185469.

7.4.1 Risk Management Philosophy

Risk management is defined as:

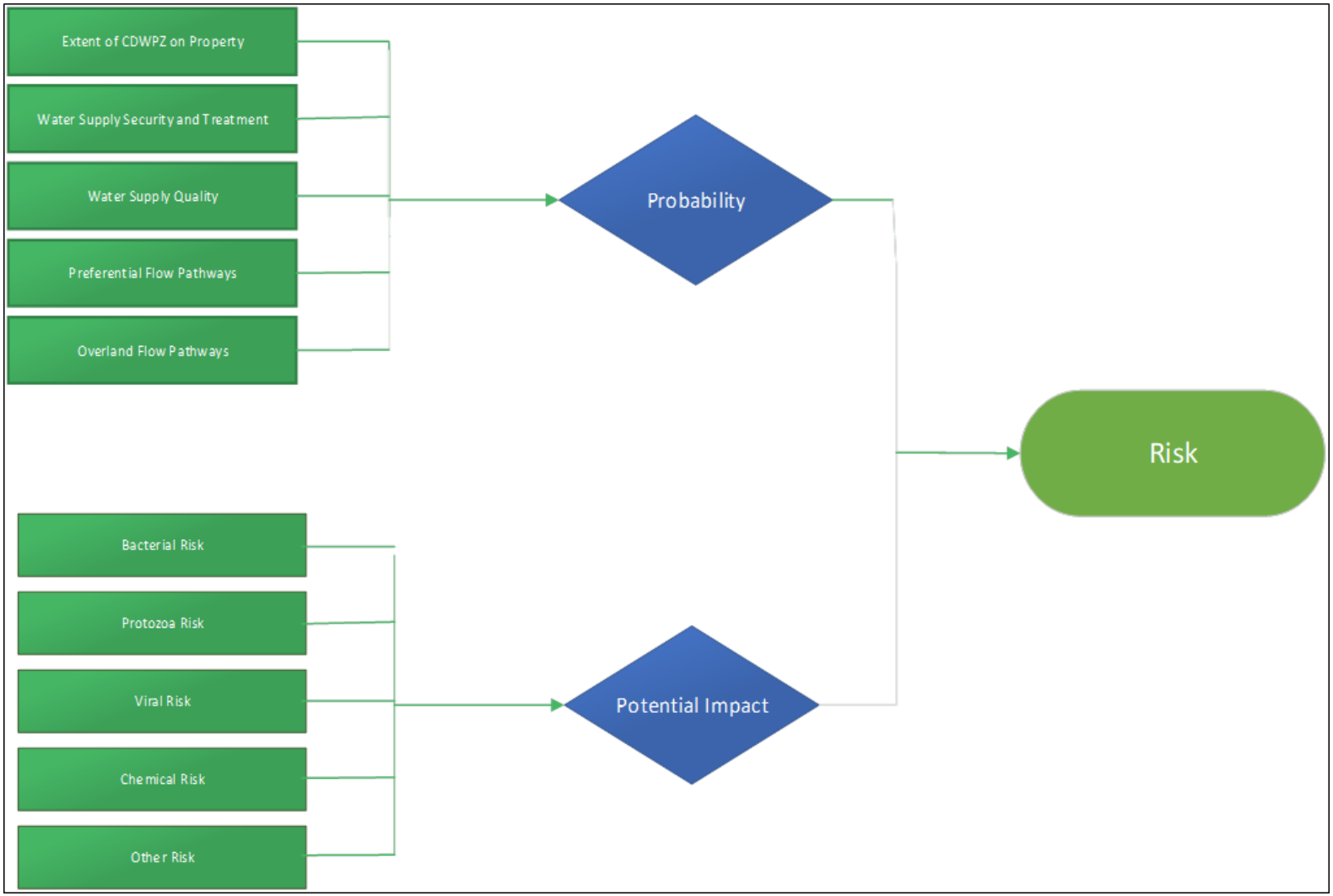
> *The culture, process, and structures that are directed towards effective management of potential opportunities and adverse effects*

This approach seeks to assess potentially significant adverse and beneficial effects on community drinking water supplies, including

a. the magnitude of the impact of adverse effects;
b. the likelihood of occurrence; and
c. options for managing risks

By comparing Impact and Probability of a Hazard (refer to section 7.4 for definitions), a semi quantitative measure can be determined for the Risk. From this position, mitigation strategies can be developed to reduce the risk and corresponding consequence and likelihood of an event.

7.4.2 Risk Assessment Process Summary



7.4.3 Property Information for CDWPS Risk Assessment

7.4.3.1 Information Compilation

Ensure that all relevant information, data, and files specified in section 7.4.4 are available.

7.4.3.2 Spatial Data Compilation

The CDWPZ Risk Assessment is conducted in a standardised QGIS project template.

The CDWPZ spatial data set is to be compared to

i. the shareholder title data set;
ii. the Farm Environment Plan (FEP);
iii. Farm system / landuse classification; and
iv. The Canterbury Bores data set

Any FEP boundary which overlaps with a CDWPZ polygon is subject to complete a CDWPZ Risk assessment in accordance with resource consent conditions.

7.4.3.3 GIS Analyses

7.4.3.3.1 Map Generation

As part of the CDWPZ Risk Assessment, spatial data will need to be presented.

All maps should:

- Be plotted at a suitable scale and rounded to the nearest 1:10,000
- Be plotted in NZTM with north facing upwards
- Have a 1 km graticule and co-ordinates printed
- Possess a locality diagram
- Have a clear legend of the information on the map

7.4.3.3.2 CDWPZ Extent on Property

GIS Tools should be used to calculate the size of the CDWPZ, and the number of hectares located within the property. GIS tools should also be used to calculate the distance from the property to the point of take of the water supply.

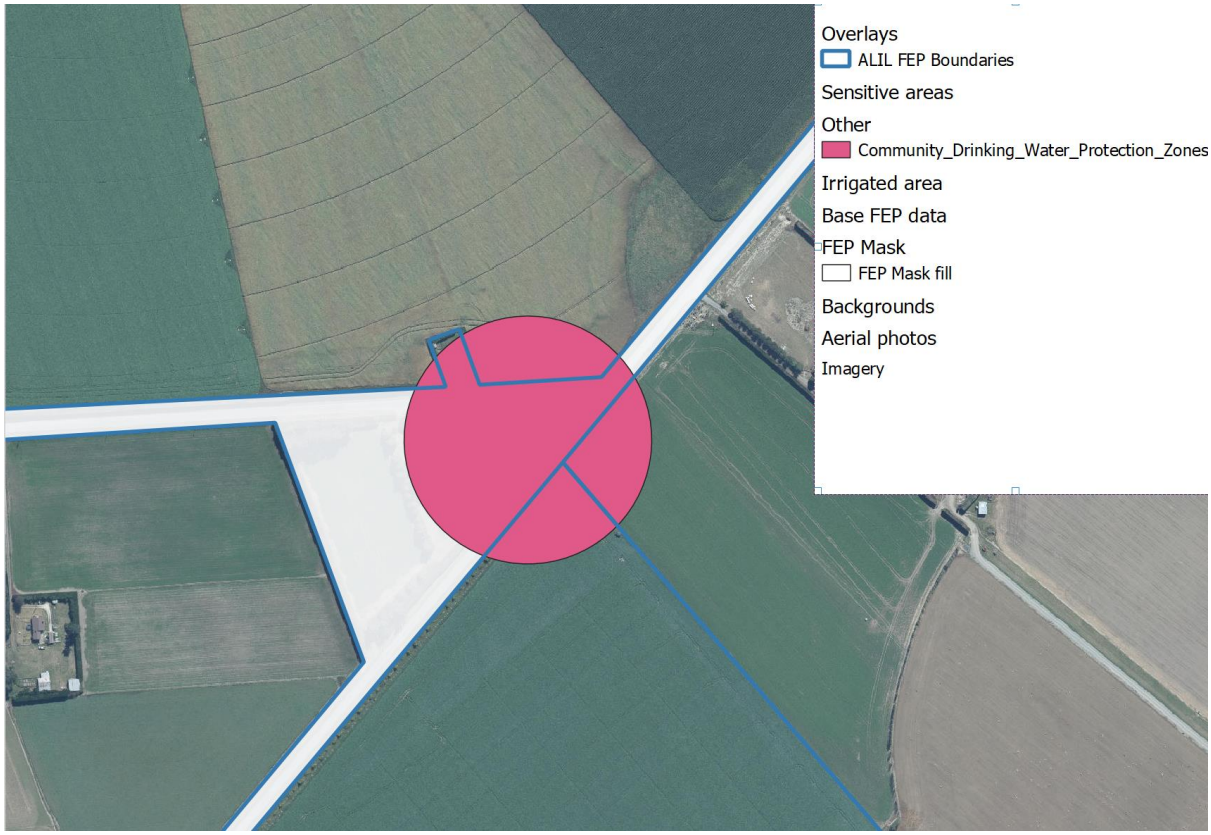


Figure 6 Example of a CDWPZ Risk Assessment map

7.4.4 Drinking Water Supply Details

7.4.4.1.1 Water Supply Information

Borehole and well information such as screen and well depth can be located from the Environment Canterbury Well Card – see https://www.ecan.govt.nz/data/well-search/

Water supply information such the Ministry of Health Code, population served etc. is obtained from the Drinking Water for New Zealand register – see https://www.drinkingwater.esr.cri.nz/general/supplyregistration.asp

7.4.4.2 Water Supplier Notification

ALIL shall notify the supplier of the drinking water of:

- Property contact name and phone number
- Risks identified and actions taken to address risks

Details of the notification are to be recorded and included in the assessment form. ALIL is to advise the water supplier when there are changes in contact details.

7.4.4.3 Other Water Supply Information

Include any other relevant details relating to the water supplier, for instance contact details if private supply or version of water safety plans used to inform the assessment, or if it serves a particularly vulnerable population (e.g., pre-school or rest home).

7.4.5 Drinking Water Standards Compliance

7.4.5.1.1 Water Supply Security Status

Bore water is considered secure when it can be demonstrated that contamination by pathogenic organisms is unlikely because the bore water is not directly affected by surface or climate influences. Water suppliers provide evidence to the Canterbury District Health Board (CDHB) to demonstrate compliance with bore water security criteria (s4.4.2-s4.4.4 Drinking Water Standards for New Zealand 2005 (revised 2018)).

Where a water supply has been assessed as meeting the criteria by CDHB, it is deemed "secure". Where the water take is affected by surface or climate influences or not been assessed, the supply is deemed "insecure".

7.4.5.1.2 Water Supply Treatment

Where a water supply is treated, record and describe the treatment received. The Ashburton District Council (ADC) record these details, with photos, in the water safety plans for the supply. Small, private supplies may not have these details immediately available. Where no information is available, the water supply is assumed to be untreated.

7.4.5.1.3 Water Supply Monitoring

Monitoring details required for water supplies are detailed in the Drinking Water Standards for New Zealand 2005 (revised 2018)). Where insufficient samples are taken or they detect Priority 1 contaminants (E.coli, Protozoa, Chemicals), then they are deemed "non-compliant" or "unknown". The Ministry of Health reports the results of reported water supply results on the New Zealand Drinking Water Registry[24] and in the publicly available annual report for drinking water supplies.

Water supplies are then graded as follows according to the monitoring results provided.

7.4.5.1.4 Grade Description

In 2003, Ministry of Health provided the following grading specification metric.

This grading relates to the water as it is when leaving a water source (or treatment plant) before it enters the reticulation system. It is concerned with the barriers guarding against contaminated water.

Table 3 Ministry of Health metric for water source grading

A1	Completely satisfactory, negligible level of risk, demonstrably high quality
A	Completely satisfactory, extremely low level of risk
B	Satisfactory, very low level of risk when the water leaves the treatment plant.

[24] https://www.drinkingwater.esr.cri.nz/general/supplyregistration.asp

C	Marginally satisfactory, low level of microbiological risk when the water leaves the treatment plant but may not be satisfactory chemically.
D	Unsatisfactory level of risk
E	Unacceptable level of risk
U	Ungraded

Where insufficient information is available to demonstrate compliance with the standards, they are deemed "unknown" for the purpose of the risk assessment, which is equivalent to "non-compliant" status.

7.4.6 Water Supply National Environmental Standard Status

The Resource Management (National Environmental Standards for Sources of Human Drinking Water) Regulations 2007 (NES) specify the resource consenting requirements for discharges which may impact human drinking water. The NES has different consenting criteria if the water supply meets drinking water standards (s7) compared to if they do not meet existing drinking water standards (s8). For the scheme discharge consent applications, the NES status is identified for all water supplies currently located within the scheme ASM area.

7.4.7 Risk Assessment – Impact

7.4.7.1 Sources of Contamination

The property specific risk assessment seeks to understand the potential sources of contaminants on a property and how they may enter the drinking water supply. The drawing below identifies key potential contaminant sources and mobilisation pathways which should be considered for all property specific risk assessments.

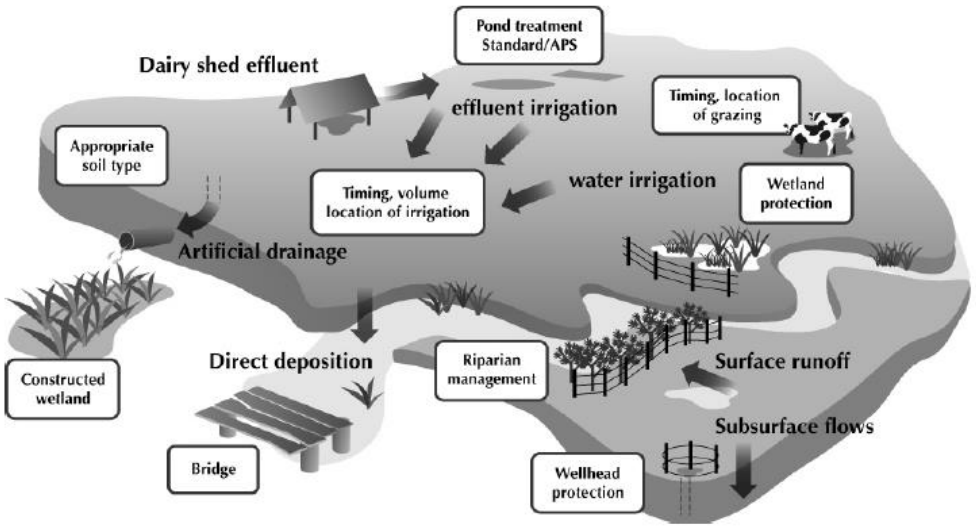


Figure 7 Key potential contaminant sources and mobilisation pathways[25]

Land use activities which occur on farm, which may occur within the CDWPZ are assessed for their potential contribution of the following contaminants:

C. Bacteria and Virus'
D. Protozoa
E. Chemical
F. Other contaminants of potential harm to human health

7.4.7.2 On-Farm Bacterial and Viral Sources of Contamination

Key bacterial and viral contaminants of concern include *E. coli* O157, *Salmonella, Campylobacter,* and norovirus. Drinking water contaminated with these pathogens can cause serious illness, permanent harm or even death, particularly for children, elderly or those who are immunocompromised. Higher contaminant loads are associated with a higher risk of infection.

Microbial and viral pathogens are commonly found in the guts of mammals and humans and faecal matter could become a source of contamination. Key sources on farm could include:

- Grazing of livestock, particularly intensive winter grazing
- Leaking effluent ponds
- Effluent discharges
- Offal holes
- Septic tanks and discharge fields
- Feed pads, animal holding areas
- Dairy sheds
- Heavily used stock races
- Soak holes draining any of the above areas

[25] Guidelines for Drinking Water Quality Management for New Zealand (2017)

- Manure based soil conditioners

7.4.7.3 Protozoa Sources

Other zoonotic contaminants include protozoa, of which *Giardia* and *Cryptosporidium* are of particular concern. As for bacterial and viral contaminants, sources of protozoa are primarily from the gut of mammals and can cause significant harm when ingested.

Land use activities which may result in additional contaminant loads of protozoa include:

- Grazing of pre-weaned lambs and calves
- Possums (e.g., access to surface water in bush)

7.4.7.4 Chemical Sources

Chemical contamination on-farm can occur from several land use activities and biological processes. The potential impact on human health is variable, depending on the type of chemical and amount discharged.

Direct chemical discharges on farm could be acute (e.g., pesticide sprays) or historic (e.g., sheep dips, historic rubbish dumps or orchards).

Indirect chemical discharges may occur following a biological process, such as the production of nitrate after application of urea-based fertiliser.

Common on-farm activities which can contribute to chemical contamination of a water source include:

- Pesticide sprays and other agricultural sprays
- Leachate from rubbish holes
- Animal drench sites
- Fertiliser and chemical storage sites
- Diesel storage tanks
- Nitrate or cadmium from fertiliser applications
- Naturally occurring arsenic or other heavy metals
- Other source of high nitrate concentrations
- Other identified contaminated sites

7.4.7.5 Other Potential Sources

There are a number of other potential sources of contamination which may occur on a property which will need to be considered on a case-by-case basis.

7.4.7.6 Potential Impact Assessment

For each potential source of contaminant, the impact will need to be graded according to a semi quantitative scale as per the Risk Assessment Table on the following page:

1. Minor
2. Moderate
3. Significant

4. Major
5. Catastrophic

Consideration should be given to the intensity and frequency of the activity (i.e., potential contaminant load). For instance, a dairy farm occasionally grazing the calves at a low intensity in the CDWPZ paddock will have a different impact compared to a calf rearer, where the un-lined calf rearing sheds were in the same area.

Table 4 Risk matrix used as part of the CDWPZ Risk Assessment

Regime		OHSE	Environment	Financial	Reputational	Production
Consequences	Catastrophic (5)	1 or more fatalities Irreversible health problems for employees and community	Offsite release un-contained. Long term impacts on environment Ground and surface water affected	Severe financial loss – possible liquidation. $>1 Million	International loss of reputation with international media coverage. Loss of social licence Criminal charges likely	Cessation of farming operations. Projected loss against budget >75%
	Major (4)	Medium to long term health problems for employees and community. Long term to permanent disabilities Multiple MTI's	Offsite release contained & restored in medium term (<1 month). Medium to long term (< 6 month) impacts on environment. Surface water affected with potential risk to groundwater	Major financial disruptions to long term profitability expected $<1 Million	National loss of reputation with national media coverage. Loss of social licence Litigation likely	Major production disruption (<6 months) Projected loss against budget <75%
	Significant (3)	Short - medium term health problems for employees and community Lost time injuries (LTI).	On site release contained & restored in short term (< 7 days). Moderate term (< 1 month) impacts on environment Slight short-lived surface water impact	Moderate financial impact likely to affect annual profit line. $<100,000	Regional loss of reputation with local media coverage. Potential loss of social licence Fines expected	Moderate term production disruption (1-month) Projected loss against budget <50%

	Moderate (2)	Very short-term health concerns Recorded medical treated injuries (MTI)	On site release immediately contained & restored. Short term (< 1 week) impacts on environment Potential impact on surface water only	Minor (tolerable) financial loss or asset loss impact < $10,000	Loss of local reputation by word of mouth	Short term production disruption (1 week) Projected loss against budget <25%
	Minor (1)	Inherently safe- Unlikely to cause health problems First Aid Injuries	Minor Localised Spill with insignificant effects on farm or environment No impact on surface water only	Low financial loss < $1,000	Unsubstantiated rumours Slight impact on reputation	Slight loss of production (< 2 days) Projected loss against budget <10%

7.4.8 Risk Assessment – Probability

The potential likelihood of an event is a qualitative description of its probability or frequency as described in Summary of site pathways.

The site probability assessment identifies the potential pathways available for a contaminant to enter the drinking water supply. The risk assessment allocates a score based on:

i. Preferential Flow Pathways Assessment
ii. Irrigation
iii. Other Preferential Flow Pathways
iv. Overland Flow Pathway Assessment

Details of these the potential pathways is presented below with a summary presented in Summary of site pathways.

7.4.8.1 Irrigation

A key risk factor on irrigated properties is related to additional water provided to the land through irrigation. Excessive water can mobilise contaminants through the soil profile and increase the risk of contaminants entering the drinking water supply.

Irrigation system risk takes into consideration the system potential for applying excessive water in relation to irrigation design specifications, climate, and soil type.

Irrigation systems which are highly reliant on labour to effectively implement Good Management Practice[26] to ensure excessive applications of water are minimised are higher risk compared to automated systems, such as VRI or low application rate systems.

7.4.8.2 Preferential Flow Pathways Assessment

Preferential flow pathways refer to the movement of water through the soil. Surface water can enter groundwater directly by channelizing between stones, or cracks which can develop during wet/dry cycling of some soil types.

7.4.8.3 Other Preferential Flow Pathways

Water supplies screened to a depth greater than 80 m are low risk of contaminant mobilisation from preferential flow pathways, irrespective of other factors.

Where screen depth is less than 80 m, the following factors need to be considered:

- Screen depth
- Length and depth of gallery
- Soil(s) tendency for creating preferential flow pathways
- Sources of preferential flow pathways (e.g., tree roots)
- On farm management practices (e.g., cultivation)
- Rainfall intensity

[26] As defined in the *Industry-Agreed Good Management Practices Relating to Water Quality (September 2018)*

- Other sources of water movement (e.g., leaky stock water races, ponds etc)

Stony soils and clays are more prone to developing preferential flow pathways than deeper, silty, or loam-based soils and should be given a higher risk, particularly if the water supply is shallow and/or insecure.

Regular cultivation tends to reduce the risk of preferential flow pathways developing, whereas clays in low rainfall areas in permanent pasture may be prone to developing cracks in summer.

Higher rainfall areas can also increase the risk of preferential flow pathways developing due to higher soil moisture status, particularly in stony soils.

Stockwater races and other natural or artificial waterways may seep and be a continuous source of water to mobilise contaminants.

7.4.8.4 Overland Flow Pathway Assessment

Overland flow pathways relate to the water supply take site's potential to flood, potentially increasing the risk of a high contaminant loading in an event entering the supply.

Key matters to consider include:

- Topography and slope of land from property to water supply
- Physical features of the property which may impact on overland flow pathways.
- Proximity of natural or artificial waterways to the water supply
- Flood risk potential of the natural or artificial waterway
- Soil type run-off potential

In many instances, even if a site could flood, the influence from the property on contaminant loads is minimal. For instance, if the property is located downhill of a water supply or a physical barrier exists. A physical barrier could be a bund, land contour, railway tracks, buildings, or any other physical impediment to overland flow pathways.

Waterways include drains, stock water races, rivers, lakes, streams, and springs. In most situations drains and natural waterways will be higher risk than stock water or irrigation races, as they are intended to drain water from the land and the influence of rainfall on water levels are high.

Environment Canterbury and District Councils are required to identify flood prone land. Where a waterway is identified, the site should be compared against the flood risk potential identified by the relevant council records.

Heavy soil types have lower infiltration rates and can cause run-off during high-intensity rainfall events. The run-off potential of a soil is recorded in S-maps.

Table 5 Summary of site pathways

Risk level	Irrigation Potential	Preferential Pathways	Overland Flow Pathway
High	• Higher application rate system on insufficiently heavy soils OR • Low application rate system on very light soils in high rainfall area OR • CDWPZ located at start or end of a travelling irrigator run	• One or more flow pathways are present OR • Potential frequency and/or volume of water is medium or higher OR • Well screen depth is less than 30 m	• Water supply located in flood prone area AND • Property land use can contribute to contaminant load
Medium	• Low application rate system, actively poor management required to apply water more than field capacity OR • Higher application depth system on sufficiently heavy soils to minimise risk of excessive application of water AND • No other system factors which could	• One or more flow pathways are present AND • Potential frequency and/or volume of water is low AND • Well screen depth is greater than 30 m	• One or more overland flow risk factors are feasible AND • Property land use can contribute to contaminant load
Low	• No irrigation OR • System incapable of applying water to exceed field capacity OR • Irrigated area within the CDWPZ is insignificant	• All potential preferential flow pathways are low risk	• Water supply is up-gradient from property; OR • Physical barrier prevents overland run-off from property entering water supply take point; OR • No overland flow risk factors are present

7.4.9 Probability Score

The probability score calculates the likelihood of an event occurring on the property, based on the inputs provided.

The probability score allocates up to 10 points for each risk factor and is calculated as shown in the table below.

Table 6 Calculated probability score from CDWPZ Risk Assessment Spreadsheet

Probability Factor	Low Risk Criteria	Medium Risk Criteria	High Risk Criteria
Irrigation Other Preferential Flow Overland Flow	See above	See above	See above
Population Size Served	Less than 250	Between 250-500	More than 500
Water Supply Security Status	Secure		Insecure
Water Supply Treatment	Treated		Untreated
Water Quality History	Compliant		Non-Compliant Unknown
Score Allocated (per factor)	0	5	10
Proportion land in CDWPZ	Score out of 10 proportional to the % of CDWPZ located on the property.		

The score out of 10 for each probability factor is summed and a risk likelihood is allocated as follows (**Error! Reference source not found.**).

Table 7 Risk likelihood allocation based on calculated probability

Probability Descriptor	Score	Description
LIKELY	Greater than 54	• High probability the event will occur • Similar event has occurred recently on the property
POSSIBLE	Between 27-54	• Risk factors present which indicate an event could occur • High chance of cumulative effects • Similar event has occurred in the past on or near the property
UNLIKELY	Less than 27	• Plausible the event could occur at some time • Event has not occurred on or near the property in the past

		• Some chance of cumulative effect

The CDWPZ Risk Assessment form automatically calculates the probability score, based on the inputs provided.

7.4.10 Overall Risk Assessment

Once the contaminant Impact and Probability assessments are completed, the overall risk grading is calculated by scoring the Impact and Probability and multiplying them as detailed in Table 6.

Table 8 Overall Risk Grading based on assessed Impact and Probability

	Probability	Unlikely	Possible	Likely
Impact	Score	1	2	3
Minor	1	1	2	3
Moderate	2	2	4	6
Significant	3	3	6	9
Major	4	4	8	12
Catastrophic	5	5	10	15

Green = Low Risk, Orange = Moderate Risk, Red = High Risk

The risk is calculated for each potential contaminant, with the highest risk rating setting the risk level for the property.

7.4.10.1 Mitigation Strategies

Depending on the highest risk rating the property received, condition 20(b) prescribes the minimum actions to be implemented through the Farm Environment Plan, which are assessed during their audits using the table below.

Table 9 Mitigation Strategies Matrix

Assessed Risk Rating	Minimum Actions
Low *Low risk of land use activities contaminating drinking water*	Complies with regional council resource consent conditions and permitted activity rules
Medium *Potential risk for land use activities to contaminate drinking water*	Low risk actions and, where applicable, the following: • No discharge of solid or liquid animal effluent (including animal-based manures) within 20 m of the CDWPZ • Irrigation is managed to Good Management Practice within the CDWPZ Impacted Land to minimise drainage to groundwater.

	• Actions necessary to mitigate other Medium risk activities specific to the property, not otherwise managed by the above.
High *Likely risk of land use activities to contaminate drinking water*	Low and Medium risk actions and, where applicable, the following: • Avoid any winter grazing (as defined in the Canterbury Land and Water Regional Plan at the Commencement date) within the CDWPZ Impacted Land. • Ensure no increase in stocking rate or fertiliser application on the CDWPZ Impacted Land • Actions necessary to mitigate other High-risk activities specific to the property, not otherwise managed by the above.

A summary of the rules applicable to activities located within a CDWPZ shall be maintained by ALIL. Where an activity within a CDWPZ is identified as needing a resource consent, a minimum action will require the landowner to obtain resource consent for the activity.

Often risks arise from very site-specific activities or management practices. Where these practices or activities result in a medium or high risk of contamination to the water supply, specific actions should be developed to mitigate the potential effects from these activities.

To identify if other additional mitigations are necessary for a property, the Guidelines for Drinking Water Quality Management for New Zealand (2017) list several potential mitigations which may be useful to consider, where applicable, such as:

- Allowing only approved animals
- Specifying stocking rates and grass/fodder length
- Standards for fencing
- Installing riparian strips – specifying size, planting
- Adopting approved fertiliser application rates
- Using approved fertiliser applicators
- Using approved pesticides and applications rates
- Using approved pesticides applicators
- Requiring bunded chemical and fertiliser storage areas
- Instituting waste controls and treatment, including dairy shed, offal pits, sheep dips etc
- Introducing holding paddock/yard/pen waste controls (pens include buildings for pigs, chickens, sale yards etc).
- Retire land from farming activities

All mitigations need to be discussed and agreed upon by the landowner before inclusion as an action.

7.4.11 Finalising

Once a CDWPZ risk assessment is completed, the assessment shall be peer reviewed by a suitably qualified individual and finalised once feedback is incorporated.

A copy of the full report generated in PDF format and provided to the landowner and manager(s), including notification of requirements to contact the water supplier and ALIL if an event occurs in the CDWPZ.

The full assessment and final PDF report are added to the scheme shareholder folder. Actions arising from the assessment are to be incorporated into the FEP and made available to the auditor to be assessed during the FEP Audit.

7.4.12 Frequency of Assessment

Any new property located within a CDWPZ joining the scheme ASM programme will complete an assessment within 3 months of joining the programme.

All CDWPZ assessments are reviewed and updated at least once every three years for existing shareholders as part of the nutrient discharge resource consent application.

All updates will review water supply and farm activities, including consultation with the water supply manager.

Assessments may be reviewed earlier if the following occurs and materially impacts on previous risk assessments:

- Property is sold and/or changes management
- A change in land use or Farm Activity Variation Application is approved
- An event has occurred which may change the risk profile of the site
- A change to the area of a Community Drinking Water Protection Zone as defined by Schedule 1 of the Canterbury Land and Water Regional Plan

In these circumstances, an updated CDWPZ will be completed within 3 months.

7.4.13 CDWPZ Assessors

All CDWPZ Risk Assessments are to be completed and/or reviewed by an individual with sufficient qualifications and experience to effectively assess contaminant mobility and understand impacts on drinking water supplies.

8 Farm Environment Plan (FEP) Management

A Farm Environment Plan is a farm-specific risk assessment tool used to identify activities which have the potential to cause environmental harm. Once these activities are identified, the plan sets out the actions and timeframes the farmer will undertake to implement improvements to minimise these risks and these actions are audited to ensure their implementation.

This section of the EMS outlines the processes undertaken to update and produce Farm Environment Plans or Management Plans for Farming Activities.

In the future, ALIL in consultation with, and the mutual agreement of the Regional leader – Monitoring and Compliance, Environment Canterbury may consider (or be required) to implement Certified Freshwater Farm Plan. In the event of Certified Freshwater Farm Plan being implemented then ALIL shall consider whether this section of the EMS needs to be reviewed.

Absent such a review, any reference to an FEP in this section shall also include any Management Plans for Farming Activities and any Certified Freshwater Farm Plan.

8.1 New Farm Environment Plans

Any new FEP shall be prepared following the same process as detailed below, however will be completed prior to the delivery of ALIL Water or final entry into a Nutrient Management Agreement and then updated annually thereafter.

Any FEP Implementer new to the ALIL scheme is to attend ALIL New Manager training within 12 months of joining ALIL.

8.2 Communications

Any meetings on property in relation to an FEP must be in adherence with all health and safety or biosecurity policies and procedures of ALIL (and the relevant property) as may be amended from time to time.

All external group email communications or handouts to ALIL shareholders in relation to the FEP regime must be signed off by the General Manager.

8.3 FEP Procedure – Farm Environment Plans

Farm Environment Plans are required for all properties, except Authorised Properties, as defined in Condition 8 of Resource Consent CRC185469.

8.3.1 FEP Update

Information related to the farm property and management will be updated in the FEP Dashboard (https://onlinefep.co.nz/) annually.

The FEP Dashboard has been approved by Environment Canterbury as meeting Schedule 7 requirements of the Land and Water Regional Plan and Schedule CRC185469C of resource consent CRC185469.

The FEP Dashboard covers the following management areas:

- Irrigation
- Nutrients
- Soils
- Point Source
- Effluent
- Waterbodies
- Water Use
- Sensitive Receptors

Good management practices implemented on farm will be noted into the relevant management area on the FEP Dashboard.

There will be some objectives and targets that will not be applicable to some properties. Where this occurs include a 'N/A' comment.

FEP implementors will be encouraged to complete their FEP update on farm every second year to allow a review of the properties operation at the time of update and to facilitate discussion around on farm risk areas and potential options to avoid, remedy or mitigate them.

8.3.2 FEP Area

An FEP is to be prepared, updated, and audited for each independently managed operating unit.

Shareholders in conjunction with the scheme will ensure that all areas within the scheme are covered under a Farm Environment Plan.

The FEP can include multiple Properties or parcels of land under different ownership which may or may not be contiguous but managed as a single farming entity within the catchment.

8.3.3 Risk Assessment

The environmental risk assessment identifies the key risks which are present on the property based on the farm system, infrastructure, and physical properties of the farm.

The Risk Assessment for each management area and how each risk is defined will be explained. On-farm management practices aren't related to the risk assessment. The risk moves with the property if it is sold. The only time the management practice would mitigate the risk would be if the infrastructure changed on the farm (e.g., if a more efficient irrigation system was installed to replace a less efficient system).

8.3.4 Significant Change or Farm Activity Variation Application Triggers

Resource consent CRC185469 requires ALIL to approve Significant Changes on farm, which is defined as:

In relation to the farming activity on a Property means:

a) an increase in the area irrigated by more than 10 hectares;

b) an increase in the area used for dairy farming (being the use of land by milking dairy cows) (whether irrigated or not) by more than 10 hectares;

c) any increase in the area used for intensive winter grazing (being the grazing of livestock on annual forage crop at any time in the period 1 May to the following 30 September); and

d) any increase in the area on a property of dairy support land (being the farming of non-milking dairy cows, including heifers),

as compared to the maximum area used on that Property in any year (being the period of 1 July to 30 June) in the period 1 July 2014 to 30 June 2019.

Furthermore, changes in farm system, irrigation, or winter grazing[27] area can impact on the nitrogen loads reported by the scheme and may also need approval through the Farm Activity Variation Application (FAVA) process[28]. ALIL shall actively monitor such changes through FEP updates and advise when such an application is required.

The FEP shall identify the Significant Change and FAVA triggers for the property, where available. When working with shareholders on FEP's, ALIL staff shall try to ensure FEP Implementers are familiar with the Significant Change and FAVA triggers, what they mean and what they need to do if they want to make a change on farm.

8.4 Sensitive Receptors

During any review of an existing FEP, and in any new FEP, sensitive receptors will be identified using the following layers on the scheme GIS system:

i. Sensitive Areas
ii. Hydrology
iii. Canterbury Springs

If there are no sensitive receptors on or adjoining the property, no further action is required.

ALIL staff shall work to ensure the FEP implementor will be made aware of any sensitive receptors on the property. Actions will be included in the FEP to avoid, remedy, or mitigate effects on the receptors. For properties containing Sites of Cultural Significance or Community Drinking Water Supply Protection zones the actions will be in line with the applicable risk assessments carried out under this EMS framework. For waterways, drains, springs, or wetlands implementation of GMP is generally sufficient to achieve the requirements of the resource consent.

[27] Ad defined by the Land and Water Regional Plan
[28] Section 10.3

ALIL will also communicate with FEP implementors to ensure they understand that any Significant Change application will need to ensure effects on the sensitive receptors are avoided, remedied, or mitigated before it can be approved by the scheme.

8.4.1 Community Drinking Water Protection Zones

Shareholder properties which include a Community Drinking Water Protection Zone have an additional objective to meet over and above that specified in Schedule CRC185469C of the consent, which requires:

ii. to include an objective that seeks to ensure land located within the CDWPZ is managed to prevent deterioration of drinking water from activities occurring on that land; and
iii. for the Property Owner to maintain records to demonstrate all agreed minimum actions are being implemented,

The actions required by the property to achieve this target are identified through the property's Community Drinking Water Protection Zone Risk Assessment.

8.5 FEP Procedure - Authorised Properties

Farm Environment Plans or Management Plans for Faming Activities[29] detailed in this section are required for all properties which are Authorised, as defined in Condition 8 of resource consent CRC185469.

8.5.1 Irrigated Authorised Properties

All irrigated small shareholders on authorised properties are obligated to ensure water used on their property complies with water take resource consent CRC183850. Condition 6 of the consent is key:

The consent holder shall take all practicable steps to ensure that all users of water:

a) Ensure that the volume of water used for irrigation does not exceed that required for the soil to reach field capacity; and
b) Minimise leakage from pipes and structures; and
c) *Avoid the use of water for irrigation onto non-productive land such as impermeable surfaces and river or stream riparian strips*.

8.5.2 Authorised Properties Less than 10 ha

No Farm Environment Plan, Certified Freshwater Farm Plan or Management Plan for Farming Activities is required for properties less than 10 ha.

8.5.3 Authorised Properties Greater than 10 ha

Properties greater than 10 ha and less than 20 ha can complete either a *Management Plan for Farming Activities* or a Farm Environment Plan through the FEP Dashboard.

[29] As set out in Schedule CRC185469D

Nutrients from Authorised Properties are not reported against the scheme nitrogen load limit, and therefore are not subject to nutrient management requirements (other than the requirement to note such properties with a nominal nitrogen loss value of '0' in Schedule CRC185469A. However, Authorised Properties greater than 20 ha can still trigger a Significant Change and need to be monitored through the FEP update process.

8.6 Review Farm Maps

Farm maps are to include (as a minimum)

(a) The boundaries of the property or land areas comprising the farming enterprise.

(b) The boundaries of the farm system / land use classification on the Property.

(c) The location of permanent or intermittent rivers, streams, lakes, drains, ponds, or wetlands.

(d) The location of riparian vegetation and fences adjacent to water bodies.

(e) The location on all waterways where stock access or crossing occurs.

(f) The location of any areas within or adjoining the property that are identified in a District Plan as "significant indigenous biodiversity".

(g) The location of any critical source areas for phosphorus or sediment loss for any part of the property including any land within the High Runoff Risk Phosphorus Zone.

(h) The location of flood protection or erosion control assets, including flood protection vegetation.

(i) Public access routes.

(j) Sensitive Receptors

All farm maps are reviewed and updated annually.

Changes to the FEP boundary, irrigation, or farm system type change how nutrients are calculated for compliance reporting. Any changes to the FEP boundary, farm system type or irrigation changes need to be traceable and recorded, and sufficient information will need to be provided to ensure the changes are accurate. For instance, new irrigation updates should include design maps from their installation company. All updates to the maps are to be approved by the Environmental Manager and notified to the General Manager.

8.7 Additional Support

Provide any additional support or guidance during the time of the one-on-one. This may include:

a. Guidance on new technology or resources which assist with reducing on-farm environmental risks
b. Winter Grazing Plans
c. Dairy Effluent Storage Calculation
d. Irrigation Management Plan & SOP
e. Effluent Management Plan & SOP
f. Irrigation Scheduling options
g. ALIL Handouts
h. Irrigation calibration assessment options
i. Guidance on requirements of environmental regulation
j. Upcoming workshops that may be useful
k. Information on FAVA process, Land sales or Leases

8.8 FEP Follow Up Actions

During the follow up it is also important to ensure the following is actioned if applicable:

i. Change of FEP Implementer:
These changes trigger an audit for that season. Ensure that the shareholder audit information is updated in scheme records, a nutrient budget is completed, and the shareholder's details are added to the auditing Excel spreadsheet.

ii. Change in irrigation/FEP Boundary/Land use:
These types of changes may trigger further discussions regarding FAVA and may require updates to FEP maps to be made.

9 Farm Environment Plan (FEP) Audits

Farm Environment Plan audits are an essential component of the farm planning process to ensure actions identified to mitigate risks in the Farm Environment Plan are being implemented and to support farmers with continuous improvement in their farm systems.

All Farm Environment Plan (FEP) Audits will be completed by a suitably qualified professional in accordance with the *Canterbury Certified Farm Environment Plan Auditor Manual May 2020.*

All FEP Audits and supporting information may be subject to external peer review to maintain transparency and consistency in the FEP Auditing process outcomes.

9.1 FEP Auditing Process

9.1.1 Auditor Selection

Farm Environment Plan Auditors are contracted to deliver audits for ALIL in accordance with this procedure. All FEP Auditors must meet the following criteria for selection to complete audits for ALIL:

a. ECan Certified FEP Auditor
b. Suitably qualified and experienced in farm systems
c. Understand ALIL's Environmental policies, objectives, and EMS
d. Sufficient capacity and capability to deliver the volume of audits required to a professional standard

Auditors will usually be randomly allocated to ALIL shareholder properties, but ALIL may also reallocate as determined by the Scheme having regard to, for example, efficiency requirements and ensuing properties in common ownership that form part of a wider farming operation are audited on a consistent basis.

9.1.2 Start of Season Audit Identification

ALIL will identify the properties to be audited during the coming season each spring. Factors to be considered when creating a list of properties to be audited include:

a. Any property due for an audit this coming season, based on their previous grade (Figure 1).
b. Any new shareholders (either transferred or recently joined) in the previous 12 months.
c. Any shareholder where a change of management was identified.
d. Any shareholder who has had a FAVA approved and implemented in the previous 12 months.
e. Any shareholder property in development where ALIL felt it appropriate to audit more frequently.
f. Any property previously defined as an Authorised Property which no longer complies with the Authorised property definition.

g. Any other property that ALIL selects in order to support compliance with CRC185469.

The complete list of properties due for an FEP Audit will be provided to the ALIL Environmental Manager to start the process for FEP auditors.

9.1.3 FEP Audit Scheduling

An ALIL representative will book FEP audits according to consent requirements, land use and location at least 10 working days prior to the audit[30]. Where possible, audits will be timed to avoid high workload periods e.g., during calving for dairy farms, during harvest for arable properties etc.

ALIL will confirm the FEP Audit date, time, and auditor via email, phone and/or mail.

9.1.4 FEP Audit Deferrals

In some cases, FEP Audits may be scheduled outside of the consented timeframes provided exceptional circumstances approval is first obtained from Environment Canterbury in writing under condition 18(d) of resource consent CRC185469. Reasons for a deferral include:

a. Force majeure events
b. Death or serious illness of shareholders, shareholder's representative, or their dependents
c. Biosecurity or natural hazards
d. Recent property sales or changes in lease
e. Other

Where possible, deferrals should first be made within consented timeframes, with approval from ECan only applied for where consented timeframes are unable to be met.

9.1.5 FEP Audit Cancellation

The shareholder will have an opportunity to defer audits to another day at the time of booking, provided the new date is still within the consented timeframe.

Shareholders will be expected to provide at least 5 working days' notice to enable the auditor or a ALIL representative to book in another shareholder in that time slot.

To ensure FEP audits are completed within expected timeframes, shareholders will be allowed to defer or cancel their FEP audit once. A second delay or cancellation may result in a written warning, with a request to undertake the FEP Audit within 20 working days to maintain water supply. ALIL may choose to enforce its own internal Non-Complying Shareholder Policy in these circumstances. [31]

[30] Except where specifically requested by the shareholder or FEP operator to undertake the audit in less time.
[31] Section 16 Non-Complying Shareholders

ALIL may use their discretion for cancellation of FEP Audits.

9.1.6 FEP Audit Preparation – ALIL Shareholders

All ALIL shareholders will be provided with an opportunity to have a pre-audit check with an ALIL Environmental Advisor. The pre-audit check will be at least 10 working days before the audit and work through the following:

a. Understand the audit process, what will occur on the day
b. Review Farm Environment Plan
c. Identify records and evidence to have on hand for the audit
d. Identify outstanding actions to be undertaken before the audit and/or identify evidence needed to demonstrate actions have been completed

A pre-audit check should be completed on farm for all shareholders who have an audit grade less than an A, those who are less confident with the process and/or first-time audits.

9.1.7 FEP Audit Preparation - Auditors

ALIL will provide FEP Auditors with the relevant shareholder information at least 10 working days prior to the scheduled date of the FEP Audit.

The FEP Auditor will complete FEP Audit Preparation according to their own procedures, which will follow the requirements of the *Canterbury Certified Farm Environment Plan Auditor Manual May 2020* (or such other methodology, including any subsequent version of the 'Certified Farm Environment Plan Auditor Manual', May 2020, as may have been agreed between Environment Canterbury and ALIL.

9.1.8 FEP Audit Procedures

All FEP Audits will be conducted in accordance with the *Canterbury Certified Farm Environment Plan Auditor Manual May 2020* or such other methodology (including any subsequent version of the 'Certified Farm Environment Plan Auditor Manual', May 2020).

9.1.9 FEP Audit Grades

9.1.9.1 Schedule CRC185469C Objectives and Target Grading

FEP Audit reports shall be assessed and graded in accordance with the *Canterbury Certified Farm Environment Plan Auditor Manual May 2020.*

or such other methodology, including:

- any subsequent version of the 'Certified Farm Environment Plan Auditor Manual', May 2020;

- any Environment Canterbury Auditor Guidance Notes and consistency standards collectively agreed to by the auditors for the targets and objectives specified in Schedule CRC185469C of resource consent CRC185469

as may have been agreed between Environment Canterbury and ALIL.

9.1.9.2 Community Drinking Water Protection Zones

Properties with a Community Drinking Water Protection Zone are subject to additional targets, which are to be included in their Farm Environment Plans, which states:

i. *land located within the CDWPZ is managed to prevent deterioration of drinking water from activities occurring on that land; and*
ii. *for the Property Owner to maintain records to demonstrate all agreed minimum actions are being implemented*

The actions required to be implemented to meet these objectives have been defined through the CDWPZ risk assessment process and resource consent conditions and incorporated into the Farm Environment Plan.

Audits of properties with CDWPZs are to assess that the actions required by the risk assessment are implemented and graded as follows:

CDWPZ Target	
Land is managed within CDWPZ to prevent deterioration of drinking water from activities occurring on that land; and	
High LOC	Farm can demonstrate all actions in the CDWPZ Risk assessments are implemented
Medium LOC	Farm unable to demonstrate all actions in the CDWPZ Risk assessment are implemented, unlikely to result in increased risk to drinking water supply.
Low LOC	Farm unable to demonstrate all actions in the CDWPZ Risk assessment are implemented, likely to result in increased risk to drinking water supply.
Property owner to maintain records to demonstrate all agreed minimum actions are being implemented	
High LOC	All necessary records are available
Medium LOC	Some records are not available, unlikely to result in an increased risk to drinking water supply
Low LOC	Some or all records not available, likely to result in increased risk to drinking water supply.
CDWPZ Objective	
Quality of drinking water supplies do not deteriorate as a result of land use activities within CDWPZ impacted land	
High LOC	Both Targets High LOC
Medium LOC	One or more Targets Medium LOC, no Low LOC
Low LOC	Any Low LOC

Overall Audit Grade	
A	High LOC CDWPZ Objective
B	Medium LOC CDWPZ Objective, on track with meeting requirements
C	Medium LOC CDWPZ Objective, not on track with meeting requirements
D	Low LOC CDWPZ Objective

9.1.9.3 EMS Requirements Grading

To ensure ongoing compliance with resource consent CRC185469, ALIL may include additional requirements in the Farm Environment Plan, which may need to be assessed through the audit process and reported back to the scheme. These requirements are parallel to the audit process required by Condition 18 of resource consent CRC185469, and do not inform the overall audit grade.

Where EMS requirements are audited as not being met, ALIL will follow up with the shareholder.

9.1.9.3.1 Sites of Cultural Significance

Sites of Cultural Significance identified by Te Rūnanga o Arowhenua will be managed through ALIL Environmental Implementation Plan. Where a site of significance is located on a property, a risk assessment will be completed in accordance with a process developed with Te Rūnanga o Arowhenua. The risk assessment will identify recommended actions to be implemented to avoid, remedy, and mitigate effects on the site, which are then included in the Sensitive Receptors section of the Farm Environment Plan.

Guidance to auditors on how to assess if these actions are met is available in Environmental Implementation Plan – Sites of Significance Auditor Guidance.

9.1.9.3.2 Nutrient Management

Schedule CRC185469C does not include a target to manage nutrients from an individual property. Nutrients from ALIL shareholder properties are managed on an aggregated basis as set out in section 10 of this EMS, which outlines requirements for shareholders to ensure their farm system / land use classification, irrigation and intensive winter grazing area do not trigger any Significant Change and Farm Activity Variation Application requirements (or that such approvals are sought if they are triggered).

During the FEP Audit, FEP Auditors are to determine if the property farm system / land use classification is within the permitted limitations, recording their assessments in the FEP Audit reports in accordance with the Scheme Auditor Guidance Notes for Nutrient Management (Environmental Implementation Plan – Nutrient Management) and supplied FEP Audit report templates.

9.1.9.3.3 EMS Requirements Grading

EMS Target 1	
Land is managed to ensure effects on sites of cultural significance are avoided, remedied, or mitigated.	
High LOC	Farm can demonstrate all actions from the Sites of Cultural Significance Risk assessment are implemented
Medium LOC	Farm unable to demonstrate all actions in the Sites of Cultural Significance Risk assessment are implemented, unlikely to result in increased risk to site.
Low LOC	Farm unable to demonstrate all actions in the Sites of Cultural Significance Risk assessment are implemented, likely to result in increased risk to the site.
EMS Target 2	
Farm system operates within scheme permitted parameters.	
High LOC	Farm can demonstrate system is within scheme permitted parameters.
Medium LOC	Farm cannot demonstrate system is within scheme permitted parameters, change is not Significant.
Low LOC	Farm cannot demonstrate system is within scheme permitted parameters, and change is Significant.
EMS Objective	
Additional Requirements of the ALIL Environmental Management Strategy are met	
High LOC	Both Targets High LOC
Medium LOC	One or more Targets Medium LOC, no Low LOC
Low LOC	Any Low LOC

9.1.10 FEP Audit Reports

All FEP Audit Reports will be completed using the template provided to FEP Auditors.

9.2 FEP Audit Draft Report Correspondence to Shareholders

In accordance with the *Canterbury Certified Farm Environment Plan Auditor Manual May 2020,* Shareholders and ALIL are to be provided with the draft FEP audit report/s via email by the FEP Auditor within 10 working days of the audit being completed. The draft audit report communication email will be completed in the format specified and allow the shareholder or a ALIL representative 10 working days to advise if there is any:

a. Factually incorrect information included in the original draft report
b. Further information or evidence is provided

An ALIL representative shall be included in all written correspondence between the FEP Auditor and shareholder.

9.2.1 FEP Audit Final Report

Where the FEP Auditor has received feedback from either the shareholder or a ALIL representative relating to the draft FEP Audit Report, the FEP Auditor will update the FEP Audit report to reflect this information.

The FEP Auditor will finalise FEP Audit reports as required within 10 working days of the draft report being sent to the shareholder.

A final copy of the audit report will be emailed to the shareholder along with a link to the FEP Audit Feedback survey by an ALIL representative.

FEP Auditors will, upon finalising the FEP Audit Report, provide ALIL all information relating to the FEP Audit, including, but not limited to:

a. audit scheduling
b. all written shareholder communications
c. field notes (if available)
d. photographs
e. nutrient budget robustness checks
f. any other relevant information used to inform the Level of Confidence grades of the FEP Audit
g. Any other relevant information required by ALIL

9.2.2 FEP Audit Spot Check

FEP Audit reports and all relevant supporting information will be provided to Environment Canterbury upon request for the purpose of completing spot checks to ensure audits are completed in accordance with the *Canterbury Certified Farm Environment Plan Auditor Manual May 2020.*

10 Nutrient Management - Changes

Any changes in nutrient loss are managed under the ALIL consent through:

- Assessment of the nutrient loss using the Matrix; and
- A requirement to consider Significant Change and FAVA applications (together '*change application*')

Individual shareholders may also have separate requirements for consent (or to be permitted) under the National Environmental Standards for Freshwater Regulations 2020. These requirements do not form part of the ALIL compliance framework.

10.1 The Matrix Parameters

The Matrix and the assessment of nutrient losses in the ALIL Scheme have been set out in Section 10 of this EMS. When considering any change application, ALIL shall consider how losses have been assessed for the relevant property under the Matrix.

The property parameters for each property have been determined by using the Farm Environment Plan (FEP) and Nutrient Budget data provided to ALIL during the course of the previous nutrient discharge resource consent CRC183851.

Each ALIL property will fall into one of the following farm system / land use classifications:

Classification	Description
Dairy 1	A property where the majority of the land is used by milking dairy cows and the peak annual stocking rate is more than 3.7 cows/ha of effective dairy milking platform.
Dairy 2	A property where the majority of the land is used by milking dairy cows and the peak annual stocking rate is less than 3.7 cows/ha of effective dairy milking platform.
Arable	A property where the majority of the land is in a crop rotation for seed crops or process crops (see section 217B of the RMA).. Arable may include the grazing of livestock, but this activity is secondary to the growing of seed and process crops.
Dairy Support	A property where the majority of the land is used to graze animals which are farmed for milk production, but which are not lactating. For avoidance of doubt this classification includes bulls farmed for mating a dairy herd.
Sheep, Beef & Venison	A property where the majority of the land is used to graze sheep, beef & venison.
Other	A property where the land use is not otherwise classified as dairy, arable, dairy support, or Sheep & Beef.

In addition to the core land use classification of Dairy, Arable or Sheep & Beef, properties which have a Reference Period history of "Winter Grazing" as defined under the LWRP, *grazing by cattle of brassica crops and root vegetables (i.e., fodder beet)*,

also have their winter grazing area mapped. Winter grazing is not mapped for Dairy Support properties as an element of Winter Grazing is already incorporated into that farm system / L\land use classification.

10.2 Significant Change

Resource consent CRC185469 introduces a number of requirements to manage the effects of "significant change".

A Significant Change on an ALIL property is:

- an increase in the area irrigated by more than 10 hectares;
- an increase in the area used for dairy farming (being the use of land by milking dairy cows) (whether irrigated or not) by more than 10 hectares;
- any increase in the area used for intensive winter grazing (being the grazing of livestock on any crop other than pasture at any time in the period 1 May to the following 30 September); and
- any increase in the area on a property of dairy support land (being the farming of non-milking dairy cows, including heifers),

as compared to the maximum area used on that property in any year (being the period of 1 July to 30 June) in the period 1 July 2014 to 30 June 2019.

10.3 Farm Activity Variation Application (FAVA)

A FAVA (being an internal ALIL process, not required by resource consent CRC185469) is required where a shareholder seeks a:

1. Change the farm system / land use classification or increase the matrix winter grazing area on the property; or
2. When a Significant Change is triggered. If the proposal includes both triggers, both will be assessed on their merits and the most restrictive elements of both assessments will apply.

ALIL also requires a retrospective FAVA where a farm system / land use classification change has occurred after 1 June 2017 without express approval from ALIL.

Any shareholder wishing to apply for a FAVA, will need to be at an "A" audit grade on their existing farm operations before the application will be considered.

Shareholders may also require separate consent approval from Environment Canterbury under the National Environmental Standards for Freshwater Regulations 2020 if they are looking to change or vary their land use. ALIL will advise shareholders if it considers a shareholder may require a separate consent.

ALIL will typically require such consent to be approved by Environment Canterbury prior to any Significant Change or FAVA application being processed and considered for approval.

Where possible, ALIL will try to meet with potential applicants for a FAVA or Significant Change to advise them of any specific application requirements (over and above the matters set out below).

10.4 Considerations of FAVA Applications

10.4.1 Change in Farm System / Land Use Classification

Shareholders shall be required to make an application in relation to any change in Farm system / Land Use Classification or increase in matrix winter grazing area, which shall consider the following:

- If the change results in an increase in N losses greater than the Nitrogen Discharge Allowance (NDA) or risk of non-compliance with the scheme N load limit following 2025.
- The properties' ability to contribute to future scheme N loss reduction targets.
- Regulatory requirements are complied with.
- The environmental performance history of the applicant. Potential impact of water quality trends in the catchment once the baseline water quality has been established, post 2025.
- How the activity will avoid an increase in catchment contaminant loads or concentrations of contaminates in receiving water bodies relative to those authorised at September 2020.
- Winter grazing can be moved from one non-contiguous block to another in the same farming operation providing the N loss under the matrix remains the same and any necessary NES consent is gained prior to the Significant Change being agreed to by ALIL, where there are known & elevated nitrates levels or any other environmental issues in the area, applicants are to prove there won't be any affect to the environment and this is subject to approval at the Boards discretion.

Where a property is split, the split of Matrix winter feed is at the shareholders discretion but can't be greater than the original matrix winter feed area.

Increases in calculated N loss under the matrix (will only be considered if the applicant has been farming the property at Advanced Mitigation (AM) for at least 12 months prior to the application being made.

10.4.2 Significant Change

Shareholders shall be required to make an application in relation to Significant Change, which shall consider the following:

- Whether confirmation has been obtained from ECan that any regulatory requirements under the NES for Freshwater 2020 have been satisfied. Where consent is required that consent must be granted before the ALIL application is considered.

- How the activity will not result in an increase in catchment contaminant loads or concentrations of contaminates in receiving water bodies relative to those authorised at September 2020.
- Adverse effects on Sensitive Receptors and how they are to be avoided, remedied, or mitigated.
- The environmental performance history of the applicant.
- Potential impact of water quality trends in the catchment once the baseline water quality has been established, post 2025.

10.4.3 Use of Overseer Nutrient Budgets

Where required, scenario/predictive overseer nutrient budgets (NB) reflecting the farm practice for the previous 4 years, standardised to GMP (as a base for the farm) are to be received. GMP Standardisation is to be completed by an ALIL representative. This is then to be peer reviewed & audited against the scenario/predictive NB for the proposed operation. *Note:* if there has been a change in Management of the farm over the 4 years at least one budget must be under the new management.

Decision makers must be satisfied that the reduction in N loss shown in any required Overseer Budget can be explained, (i.e. what triggers the reduction) and is considered achievable with the proposed farm system and management.

10.4.4 FAVA Conditions

Conditions may be placed on FAVA (including Significant Change) approvals to ensure the following:

a) Implemented farm system / land use classification is consistent with approved proposal. Areas of wetland, surface water bodies and riparian areas, sites of cultural significance (as may be further defined in consultation with Te Runanga o Arowhenua) and, in the case of any land located within a Community Drinking Water Protection Zone, the Community Drinking Water Supply, these will be identified in the FEPs.
b) Regulatory requirements are met.
c) Actions required to comply with current scheme resource consents and/or ALIL policies.
d) Proposed mitigations are actioned.

10.5 Decision Making Process

Applications for a FAVA are processed by the ALIL team. Decisions on Farm System / Land Use Change applications which result in an increase in N loss under the Matrix or applications for Significant Change will be considered by the ALIL Board.

Applications which result in a reduction in N loss will be processed by scheme management.

ALIL will only approve Significant Change applications for any NES Equivalent Farm where it has been provided with evidence in accordance with this section of the EMS

and is satisfied that contaminant loads in the catchment and concentrations of contaminants in receiving waterbodies are as a result of the Significant Change likely to be no greater than that at 2 September 2020, having regard to:

1. Any assessed nutrient loss; and

2. The controls set out in the FEP

Provided that the above requirement will not be strictly required where the Significant Change application relates to an increase in the area irrigated that is not used for dairy farming.

Where an application demonstrates a Significant Change will not result in any increase in losses from the individual property ALIL may consider catchment-scale modelling or assessments unnecessary.

Independent advice may be sought from a suitably qualified nutrient and/or farm systems specialist where this is deemed necessary.

Scenario/predictive overseer nutrient budgets (NB) reflecting the farm practice for the previous 4 years, standardised to GMP (as a base for the farm) are to be received. GMP Standardisation is to be completed by an ALIL representative. This is then to be peer reviewed & audited against the scenario/predictive NB for the proposed operation. *Note:* if there has been a change in Management of the farm over the 4 years at least one budget must be under the new management.

Decision makers must be satisfied that the reduction in N loss shown in any required Overseer Budget can be explained, (i.e. what triggers the reduction), and is considered achievable with the proposed farm system and management.

11 Advanced Mitigation

11.1 Introduction

The purpose of Advanced Mitigation is to give farmers credit for advancing their on-farm practices beyond industry agreed Good Management Practices (2015).

Advanced Mitigation (AM) describes a set of on-farm practices in 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 targets represent the practices modelled in the Advanced Mitigation files included in the Matrix and approved for use by ALIL for calculating CRC185469.

Properties can be assessed on achievement of Advanced Mitigation when:

- A property is an "A" audit grade[32]; and
- All 4 Advanced Mitigation targets are met, where applicable[33]

11.2 Advanced Mitigation Objectives and Targets

Table 12 below sets out the Targets and Objective against which the achievement of Advanced Mitigation will be measured. Auditors will either award 'achievement' against a target or 'in progress'.

For those who are at GMP for a target or 'in progress' to Advanced Mitigation will receive recommended actions from the auditor to give guidance on the steps required to be implemented to meet the Advanced Mitigation Targets.

Table 10 Advanced Mitigation Targets

AM Irrigation Target 1: Scheduling	
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.	
Outcome	*Efficient System* Ninety five percent of the irrigated area utilises a system which: • has a bucket test or full performance test demonstrating 80% distribution uniformity (DU) or better; • the minimum return period[34] is frequent enough to ensure field capacity is not exceeded. • Differential Irrigation Irrigation system able to vary application by irrigation management zone[35] 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.
Achieved	Target is Achieved in line with the Outcome.
In Progress	Target in progress to achieving Advanced Mitigation Outcome.
GMP	Irrigation Scheduling at a Good Management Practice level.
AM Irrigation Target 2: Training	

[32] In accordance with the Canterbury Certified Farm Environment Plan Auditor Manual, May 2020
[33] The Advanced Mitigation targets are specified in consent CRC185469 AM can still be achieved overall if some of the targets are not applicable on a property, for instance if there are no point sources or dryland.
[34] Typical period between one irrigation event and the next calculated for the most demanding period
[35] An Irrigation Management Zone (IMZ) is an area of land with similar irrigation requirements within one property, taking into consideration irrigation system, soil type, crop demand.

The irrigation manager(s) understands the relationship between the irrigation system, soil, and climate in order to achieve the irrigation management requirement	
Outcome	*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.
Achieved	Target is Achieved in line with the Outcome.
In Progress	Target in progress to achieving Advanced Mitigation Outcome.
GMP	Irrigation Training at a Good Management Practice level.
AM Nutrient Management Target 1: Fertiliser Management	
To lower soil nitrogen surplus from higher risk 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.	
Outcome	*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.
Achieved	Target is Achieved in line with Outcome.
In Progress	Target in progress to achieving Advanced Mitigation Outcome.
GMP	Fertiliser Management at a Good Management Practice level.
AM Nutrient Management Target 2: N Surplus Reduction	
To improve N 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.	
Outcome	*Risk Assessment* Property has completed a risk assessment to understand and quantify N 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 N Loss Mitigations* Tools and techniques to minimise nitrogen surplus are implemented.
Achieved	Target is Achieved in line with Outcome.
In Progress	Target in progress to achieving Advanced Mitigation Outcome.
GMP	N Surplus Reduction at a Good Practice level.
Advanced Mitigation Objective	
The property is managed to achieve on farm practices beyond industry agreed Good Management Practices (2015) while remaining cost-neutral or beneficial to a typical farm.	
Achieved	All Targets achieved.
In Progress	One or more Targets in progress.

Where a property's overall grade is audited as "Advanced Mitigation", the schemes can apply the "Advanced Mitigation" management standard in The Matrix and report a lower nitrogen loss for the property.

The guidance notes for Auditors will be included in the ALIL Environmental Implementation Plan (EIP) and will include Targets, Outcomes, Example Questions, Example Reasons For, and Typical Evidence.

Please note that the details in this document are currently being incorporated into the Scheme EMS.

12 Reporting

The following will be reported to the ALIL Board at each Board meeting:

- Progress with completion of FEP updates.
- Draft and finalised FEP Audit grades, including follow up undertaken for B, C or D grade properties.
- Progress with completion of FEP updates.
- Finalised FEP Audit grades, including follow up undertaken for B, C or D grade properties.
- Summary of Significant Change or Land use change applications for a decision.
- Key Performance Indicator reporting.
- The percentage of the scheme land area currently audited to an A grade.

An annual compliance report will be prepared and provided to ALIL Board, Environment Canterbury, and Te Rūnanga o Arowhenua by 1st December each year in accordance with Condition 29 of resource consent

The information to be included in the annual report shall include:

a. A summary of the performance of the scheme in meeting its environmental targets and objectives
b. Methodology and implementation of Farm Audits
c. Summary of FEP audit results including
    1. Name of Auditor (s)
    2. Planned number of FEP audits vs completed audits
    3. Audit results by area and land use
    4. Summary of reasons for C and D grades
    5. Actions taken to remedy C and D grades
    6. Summary of properties with repeated “C” or “D” grades
    7. The progress achieved for previously identified issues, if applicable

The annual report will be approved and endorsed by the ALIL Board of Directors prior to submission to ECan and made available to shareholders upon request.

13 Document Management Control

This EMS may be reviewed on a Section-by-Section basis. Only material changes require approval from the ALIL Board, review by Te Rūnanga o Arowhenua and re-certification by Canterbury Regional Council prior to implementation. Where there is a material change to a single EMS section, only the amended section will need to be re-certified.

In accordance with Condition 15 of CRC185469, the EMS is to be fully reviewed by a suitable qualified individual in 2023, with a third reviewed in 2024, 2025 and 2026, ensure the whole EMS is reviewed every three years. This patten of review will be repeated in the year 2027 – 2030.

The aim of the EMS review is to identify and discuss improvements that can assist in meeting the objectives of this EMS.

In addition to the external review the EMS and any supporting documentation may be reviewed by the Board from time to time.

Prior to the application of any certification or recertification of the EMS by Canterbury Regional Council, the EMS, or amendments, shall first be approved by the Board of ALIL and provided to Te Rūnanga o Arowhenua for comment.

13.1 Amendment Register

Version	Date Reviewed	Purpose / Amendments	Section Reviewed	Reviewer
1.0	Various	Development of EMS	All	GM
2.0	28/06/22	Updated with EMP & Conditions of Consent	SH	GM
3.0	29/03/23	Format Update & section 11 added (Advanced Mitigation)	SH/CF	GM

13.2 Distribution List

Organisation	Role(s)	Document(s)
ALIL	CEO, Board of Directors, ALIL website	EMS EMS Reviews Annual Report

Te Rūnanga o Arowhenua	The person notified by Arowhenua	EMS EMS Reviews Annual Report
Canterbury Regional Council	Regional Leader – Monitoring and Compliance	EMS EMS Reviews Annual Report

Canterbury Drinking Water Supplies References

Lough, H., Clemens, H., Love, N., 2018. Technical Guidelines for Drinking Water Source Protection Zones (No. C01671502_R001). PDP Ltd on behalf of Ministry for the Environment - Manatū Mō Te Taiao. Christchurch.

Ministry for the Environment, 2008. National Environmental Standard for Sources of Human Drinking Water. Wellington

Ministry for the Environment. 2018. Review of National Environmental Standard for Sources of Human Drinking Water. Wellington

Ministry of Health. 2018. Drinking-water Standards for New Zealand 2005 (revised 2018). Ministry of Health. Wellington.

Kerr, T., Cranney, O., Dark, A., 2018. Drinking Water Source Protection Zones: Delineation Methodology and Potential Impacts of National Implementation. Aqualinc Research Ltd on behalf of the Ministry for the Environment. Christchurch.

Appendix 1 – Definitions

Term	Definition
2009-13 Nitrogen Baseline	1 the discharge of nitrogen below the root zone, as modelled with OVERSEERFM® (where the required data is inputted into the model in accordance with OVERSEERFM® Best Practice Data Input Standards), or an equivalent model approved by the Chief Executive of Environment Canterbury, averaged over the period of 01 July 2009 - 30 June 2013, and expressed in kg per hectare per annum, except in relation to Rules 5.46 and 5.62, where it is expressed as a total kg per annum from the identified area of land; and 2 in the case where a building consent and effluent discharge consent have been granted for a new or upgraded dairy milking shed in the period 01 July 2009 - 30 June 2013, the calculation under (a) will be on the basis that the dairy farming activity is operational; and 3 if OVERSEERFM® is updated, the most recent version is to be used to recalculate the nitrogen baseline using the same input data for the period 01 July 2009 – 30 June 2013.
Approved Environmental Programme	Are an environmental programme which have been formally recognised by Environment Canterbury as meeting the equivalent environmental management and auditing standards stated in the Land and Water Regional Plan.
Arable Land Use	Where the majority of the land is in a crop rotation for seed crops or process crops. Arable may include the grazing of livestock, but this activity is secondary to the growing of seed and process crops.
ASM	Audited Self-Management
Authorised Property(s)	Properties that ALIL has elected to treat as Authorised Properties for the purposes of Conditions 8 and 9 of CRC185469.
CDWPZ Impacted Land	Land that is included in a Community Drinking Water Protection Zone, plus any other land within the same paddock where it is not possible to treat such further land on a different management basis for the purposes of condition 20 of resource consent CRC185469. *Advisory note: For example:* *• it will typically not be possible to provide differential stock grazing within the same paddock; and*

	• it may be possible to provide differential management for a cropping or horticultural operation in the same paddock.
Commencement Date	28th June 2021, date resource consent CRC185469 was given effect to.
Community Drinking Water Protection Zone	A Community Drinking Water Protection Zone as identified in Schedule 1 of the Canterbury Land and Water Regional Plan.
Dairy 1 Land Use	Where the majority of land is used by lactating dairy cows and the peak annual stocking rate is more than 3.7 cows/ha of effective dairy milking platform.
Dairy 2 Land Use	Where the majority of land is used lactating dairy cows and the peak annual stocking rate is less than 3.7 cows/ha of effective dairy milking platform.
Dairy Support Land Use	Where the majority of the land is used to graze animals which are farmed for milk production, but which are not lactating. For avoidance of doubt this classification includes bulls farmed for mating a dairy herd.
EIP	Environmental Implementation Plan
EMP	Environmental Management Plan
EMS	Environmental Management Strategy
Farming Activity	All Agricultural and Horticultural land uses (whether irrigated or not) and including but not limited to dairy farming, dairy support, winter grazing, sheep and beef farming, deer, pig and goat farming, arable/cropping, fruit & vegetable productive land uses and other agricultural and horticultural land use and forestry/ineffective areas.
Farming Enterprise	An aggregation of parcels of land held in single or multiple ownership (whether or not held in common ownership) that constitutes a single operating unit for the purpose of nutrient management
FAVA	Farm Activity Variation Application
FEP	Farm Environment Plan or Certified Freshwater Farm Plan or equivalent
FEP Implementer	An individual who makes day to day decisions related to the management of irrigation, fertiliser, soils, or effluent
Good Management Practice	As described in the Industry Agreed Good Management Practice Guide, Version 2 (September 2015) and subsequent variations
	1.
NDA	Nitrogen Discharge Allowance
NES Equivalent Farm	A Property on which: a) 20 ha or more is in arable land use; or b) 5 ha or more is in horticultural land use; or c) 20 ha or more is in pastoral land use; or

	d) 20 ha or more is in a combination of any two or more of the land uses described above: Provided that this definition shall not limit the consideration of, as a significant change application, any increase in the area used for dairy farming (being the use of land by milking dairy cows) by more than 10 hectares.
Other Land Use	Where the majority land use is not otherwise classified, such as forestry, bulbs, and permanent horticultural crops.
PLU	Permitted Land Use
Primary Organisation	A Primary Organisation is an Approved Environmental Programme which a shareholder has confirmed in writing to be responsible for managing the environmental outcomes of the shareholder property
Property	Any contiguous area of land, including land separated by a road or river, held in one or more ownership, that is utilised as a single operating unit, and may include more than one certificate of title
Sensitive Receptor	Areas of wetland, surface water bodies and riparian areas, sites of cultural significance (as may be further defined in consultation with Te Runanga o Arowhenua) and, in the case of any land located within a Community Drinking Water Protection Zone, the Community Drinking Water Supply.
Sheep, Beef, Deer, Goats, Pigs Land Use	Where the majority of use of land is for raising sheep, beef, deer, goats, or pigs or a combination of those animals.
Significant Change	In relation to the farming activity on a Property means: 1 an increase in the area irrigated by more than 10 hectares; 2 an increase in the area -used for dairy farming (being the use of land by milking dairy cows) (whether irrigated or not) by more than 10 hectares; 3 any increase in the area used for intensive winter grazing (being the grazing of livestock on annual forage crop at any time in the period 1 May to the following 30 September); and 4 any increase in the area on a property of dairy support land (being the farming of non-milking dairy cows, including heifers),

	as compared to the maximum area used on that Property in any year within the period 1 July 2014 to 30 June 2019[36].
The Company	Ashburton Lyndhurst Irrigation Limited
The Matrix	Is used to estimate the NDA for the property by using the Authorised Land Use, soil type, and irrigation type
The Schedule	Is a register of the estimated NDAs for each shareholder property, of which the sum of the nitrogen losses forms the NDA for ALIL
TSA	Targeted Stream Augmentation
Wintering Land Use	Area of land used to break-feed cattle on brassica or root crops between 1st May and 30th September.
Matrix Winter Grazing	As defined by the Canterbury Regional Council Land and Water Regional Plan: The grazing of cattle within the period of 1 May to 30 September, where the cattle are contained for break-feeding of in-situ brassica and root vegetable forage crops or for consuming supplementary feed that has been brought onto the property.
Winter Grazing - NES	As defined by the National Environmental Standards for Freshwater 2020: Means grazing of livestock on an annual forage crop at any time in the period that begins on 1 May and ends with the close of 30 September of the same year.
WSA	Water Supply Agreement

4.1 Definitions

Term	Definition
Community Drinking Water Protection Zone (CDWPZ)	Schedule 1 of the Land and Water Regional Plan (operative 8 December 2016) defines some 530 Community Drinking Water Protection Zones in Canterbury representing an area of 320 km2. These designated areas act as spatial buffers around community water sources to mitigate the risk of contamination to community water supplies.
Community Drinking Water Protection Zone (CDWPZ) Impacted Land	Land that is included in a Community Drinking Water Protection Zone, plus any other land within the same paddock where it is not possible to treat such further land on a different management basis for the purposes of condition 20 of resource consent CRC185469.

[36] For clarity, any increase in irrigation area, or the area of land used for Dairy Farm Land and Dairy Support Land for the purpose of assessing if a change is "significant" is defined based on the primary land use mapped for the property in the ALIL QGIS mapping system at the commencement date of resource consent CRC185469 (28th June 2021).

Term	Definition
	Advisory note: For example: *• it will typically not be possible to provide differential stock grazing within the same paddock; and* *• it may be possible to provide differential management for a cropping or horticultural operation in the same paddock.*
Impact	The outcome of an event or situation expressed qualitatively or quantitatively in terms of loss, injury disadvantage – or if resolved, gain, improvement
Farm Environment Plan (FEP)	A planning document that outlines on-farm environmental risks and sets out a programme to manage those risks. It incorporates local climate and soils, the type of farming operation, and the goals and aspirations of the land user.
Hazard	A potential source of harm, or a situation, that could detrimentally impact on to a community drinking water supply from a social, environmental, economic, or cultural perspective.
Likelihood	A qualitative description of probability or frequency.
Risk Assessment	A systematic process of evaluating the potential risks that may be involved in a projected activity or undertaking.
Risk	The chance of an event that will lead to undesirable outcomes and/ or impacts on community drinking water supplies.
Shareholder Water Agreement	A contractual agreement between a shareholder and the water provider that specifies how much irrigation water (m^3) is to be provided to a specified area (ha).

Any reference to a resource consent in this EMS will include any amendment, variation, or replacement of that resource consent (to the extent that the amendment, variation, or replacement is consistent with this EMS).

ALIL shall not be required to implement any other regulatory or non-regulatory documents or processes without first considering their appropriateness in light of the requirements of CRC185469, the possible need to amend this EMS, and approving their use.

Appendix 2 - ALIL Non-Complying Shareholders Policy

1 Introduction

For Ashburton-Lyndhurst Irrigation Ltd (ALIL) to operate effectively and ensure fair and timely delivery to all, shareholders are required to adhere to all Company Policies and contractual obligations under the Water Supply Agreement (WSA) for irrigated properties and Nutrient Management Agreement (NMA) for associated properties.

2 Purpose

The purpose of this policy is to define ALIL's approach to managing shareholder non-compliance, and to outline the consequences of a breach of Company Policy, Environmental Management Strategy (EMS) or WSA/NMA.

3 Scope

This policy applies to all ALIL shareholders, and to ALIL team and Board in the implementation of sanctions where necessary.

4 Policy Details

4.1 Approach to Compliance

ALIL believes that a successful compliance model is fair, reasonable, consistent, and transparent in the process, and that where it is appropriately implemented, shareholders are more likely to make the permanent changes required to consistently perform at a higher standard.

We aim to support shareholders by providing the information, resources and knowledge needed to ensure voluntary compliance with the terms of their WSA/NMA, the EMS and other Company Policies.

4.2 Breach of Water Supply Agreement

There may be instances where shareholders fail to take the steps necessary to meet the requirements of their WSA/NMA, the EMS or other Company Policies, which may result in a breach of terms of the WSA/NMA and jeopardise the secure delivery of water.

Where a breach has been identified, Clause 19 of the WSA (irrigated properties) or Clause 12 and 13 of the NMA can be initiated, permitting ALIL to temporarily reduce the amount of water provided, prohibit a take, or forfeit a shareholder's shares (irrigated properties) or implement breach obligations under the NMA (associated properties).

Educational processes and support will be undertaken prior to the initiation of any formal response to a breach of the WSA/NMA.

4.3 Charges Incurred

Where ALIL takes action as a result of a breach to the WSA/NMA, the shareholder is still liable for all charges in accordance with Clause 19.1 and 19.2 of the WSA or Clause 12 and 13 of the NMA.

4.4 Consideration of Historical Breaches of Water Agreement

In determining whether to take any action under this policy, ALIL will take into account any notice of a breach of the WSA/NMA within the preceding three years, unless the property has been sold during this time and is under new management (subject to section 4.5 below).

4.5 Changes in Property Ownership

Non-compliant shareholders actions are likely to be material information on sale and purchase of land and should be disclosed by the vendor to the purchaser as part of the purchaser's due diligence and failure to do so may breach warranties provided under the sale and purchase agreement. Due to privacy issues, ALIL is generally unable to disclose this information to third parties without the existing shareholders permission.

Where land that is currently subject to non-compliant shareholder actions, has been sold or transferred to another entity, the new owners of the shareholding will be advised of any historical breaches of the WSA and are expected to address the issues within the timeframes set out in any existing FEP, FEP Audit or any Corrective Action Request issued to the property. Where ALIL identifies the new owner subsequently breaching the WSA/NMA, ALIL may use its discretion in its enforcement decisions under this policy to have regard to the history of the property.

4.6 Non-compliance Levels

ALIL have created four possible levels of actions for breaches of the WSA/NMA (as shown in Figure 1 & 2), which the consequences of these breaches ranging from a verbal warning (Non-compliance 1) to cancellation of the WSA/NMA and the forfeiture of shares or removal of the property from the discharge consent (Non-compliance 4).

Non-compliance 1	• Explanation to scheme management
Non-compliance 2	• Formal warning
Non-compliance 3	• Action Plan
Non-compliance 4	• Activation of Clause 19 of the WSA

Figure 8: Non-compliance Levels (Irrigated Properties)

Non-compliance 1	• Explanation to scheme management
Non-compliance 2	• Formal warning
Non-compliance 3	• Action Plan
Non-compliance 4	• Expulsion from ASM and ECan notification

Figure 9: Non-compliance Levels (Associated Properties)

Where ALIL, a member of the public or associated contractors identify potential non-compliances such as:

- Irrigators irrigating the road
- Dairy effluent ponding
- Failure to address FEP actions in a timely manner
- Other issues

ALIL will register the information in the Complaints Register. Where possible the following information will be recorded:

- Date, time, and precise location of the event (sufficient to identify the shareholder and particular machine)
- Date and time ALIL was notified of the event
- Take photographs and/or GPS co-ordinates
- What was seen
- Details of the complainant (to be kept confidential)

ALIL will notify the FEP Implementer and/or the shareholder of the necessary details of the complaint, advise the action required and record any responses.

The information and follow up from the complaint will be stored on the shareholder's FEP Folder and be provided to the FEP Auditor at the next audit for follow up.

4.6.1 Verbal warning – Non-compliance 1 (Irrigated & Associated Properties)

Prior to any formal action being taken against a shareholder for failing to meet their obligations, they will be verbally advised by ALIL staff of their requirements, when these requirements are expected to be completed and potential consequences should any timeframes fail to be met.

Records of all verbal warnings will be held on the shareholder's file and referred to if further action is deemed necessary.

If there are more than three verified complaints within an irrigation season for a similar issue, a formal written warning will be issued.

4.6.2 Formal Written Warning – Non-compliance 2 (Irrigated & Associated Properties)

A formal written warning will be issued for Non-compliance 2 offences and will provide 20 working days' notice to remedy the breach.

In each case the shareholder will be advised of the actions they must take and a reasonable timeframe for completion. Each formal warning will detail steps ALIL will take if the issue is not rectified within the specified timeframes.

4.6.3 Action Plan – Non-compliance 3 (Irrigated & Associated Properties)

The action plan will take affect if the shareholder remains in breach 20 working days (or such shorter time as may be imposed on ALIL by a regulatory body) after being served written notice of the breach.

For irrigated properties the action plan may involve a Cease Water Notice and will apply for different periods of time depending on the seriousness of the offence requiring action by ALIL. The levels and amount of time for which water supply will cease are:

- 24 hours
- 7 days
- 14 days
- 30 days
- Remainder of irrigation season

Where a Cease Water Notice comes into effect during total low flow restrictions, the cease water notice takes effect on the first day low flow restrictions are lifted, and the shareholder is able to take water.

If the breach occurs during the winter season the water will be turned off for the time specified in the Cease Water Notice at the commencement of the following season (provided that the shareholder has first had twenty working days' notice to remedy the breach).

When a shareholder is issued a 30 day or remainder of irrigation season offence notice, they will be required to explain the reasons for the breach(s) and their proposed actions to rectify the issue to the ALIL Board.

For Associated Properties the action plan may involve removal of the property from Schedule A of ALIL's discharge consent either permanently or until such time as the breaches have been rectified.

4.6.4 Activation of Clause 19 of the WSA – Non-compliance 4 (Irrigated Properties only)

Clause 19 of the Water Supply Agreement (WSA) can be initiated where there is a breach, the clause permits the scheme to reduce water supply, temporarily or permanently stop a take or forfeit a customer's shares.

If the ALIL team determines the continued breaches of the WSA cannot be remedied, and such breaches have continued for at least 60 working days after the shareholder was first served written notice of a breach, it will be recommended to the Board of ALIL that the shareholder's WSA is cancelled, and shares surrendered at nominal value.

If a shareholder is excluded from the scheme, ALIL will formally notify Te Rūnanga o Arowhenua and the Environment Canterbury Monitoring and Compliance Manager within 20 working days of the exclusion taking effect.

4.6.5 Expulsion from ASM and ECAN notification (Associated Properties only)

Clause 13 of the NMA can be initiated where there is a breach, and the property will be removed from Schedule A of ALIL's discharge consent.

If a shareholder is excluded from the scheme, ALIL will formally notify Te Rūnanga o Arowhenua and the Environment Canterbury Monitoring and Compliance Manager within 20 working days of the exclusion taking effect.

4.7 Exceptional Circumstances

In the event a shareholder or farmer notifies ALIL of exceptional circumstances which have led to a breach of the WSA/NMA, ALIL may use its discretion when deciding whether to issue any of the above notices or follow any of the procedures described in this policy. Exceptional circumstances may include, but are not limited to:

- Death of a shareholder or a member of a shareholder's family
- Hospitalisation of a shareholder or a member of a shareholder's family
- Significant personal events
- Other relevant events

ALIL will keep a record where exceptions have been made and relevant actions taken. Such application of exceptional circumstances shall not be considered to set a precedent for other shareholders.

Appendix 3: Environmental Monitoring Plan

Appendix 4 – Conditions of Consent