Farm Environmental Management Plan: Te Akatarawa Station

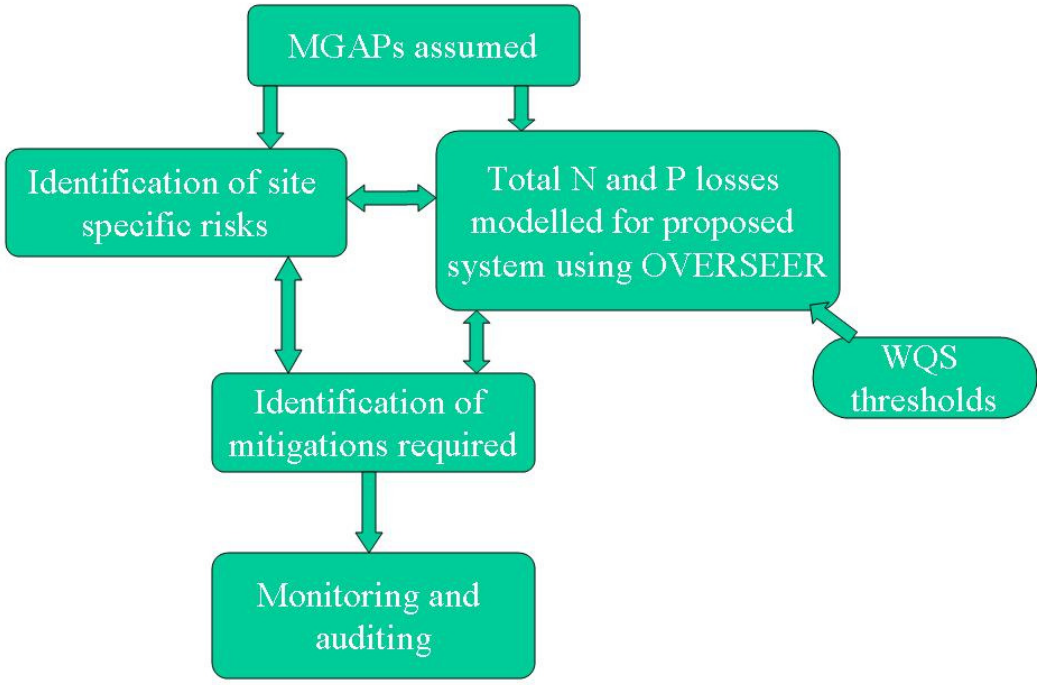
1. Introduction

The Water Quality Study ('WQS') funded by Mackenzie Water Research Limited ('MWRL'), found that the additional irrigation proposed in the catchment could take place without significant adverse effects on the environment providing that nutrient reduction occurred on the farms.

The process that was advocated for ensuring this on-farm nutrient reduction was through Farm Environmental Management Planning. A clear process for building a Farm Environmental Management Plan (FEMP) was laid out in the Water Quality Study and has been followed here. An overview schematic of the process of building a FEMP is shown in Figure 1.

The responsibility of the implementation, monitoring and auditing of the plan lies with the **farmer**.

Figure 1: Overview schematic of the process to build a Farm Environmental Management Plan



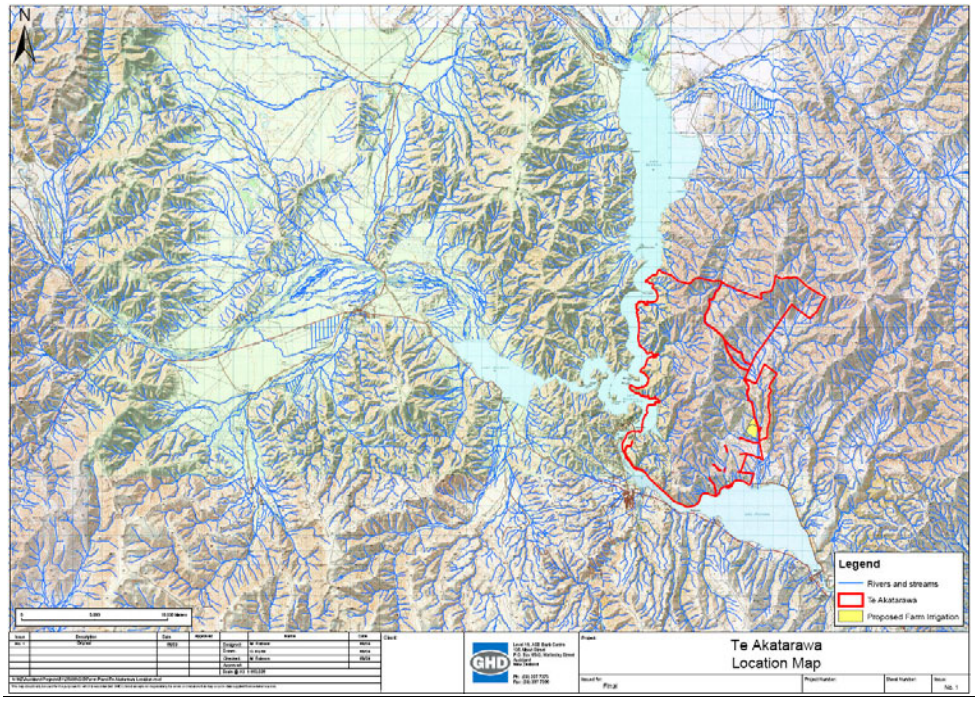
MGAP – Mandatory good agricultural practices

2. Farm Description

2.1 General farm description

Te Akatarawa Station is an 11,597 ha property located on Te Akatarawa Road on the northern shores of Lake Aviemore, Of which 407 ha of the property is freehold with the remaining 11,190 ha of the property being pastoral lease.

Te Akatarawa Station consists of approximately 407 ha of “easy” freehold land, 616 ha of low altitude “easy” land, 5,427 ha of steep hill country, 4,811 ha of very steep hill country and 366 ha which cannot be grazed. The 25 ha to be irrigated under this application is located within the 407 ha freehold and this land is of considerable value to the applicant as during the 1960’s the majority of Te Akatarawa Station’s productive river flats were flooded during the formation of Lake Aviemore.



Map A: Location Map for Te Akatarawa Station

Attached in Appendix B, is a map produced by the Canterbury Regional Council in 1991 showing the condition of the land on the station at the time.

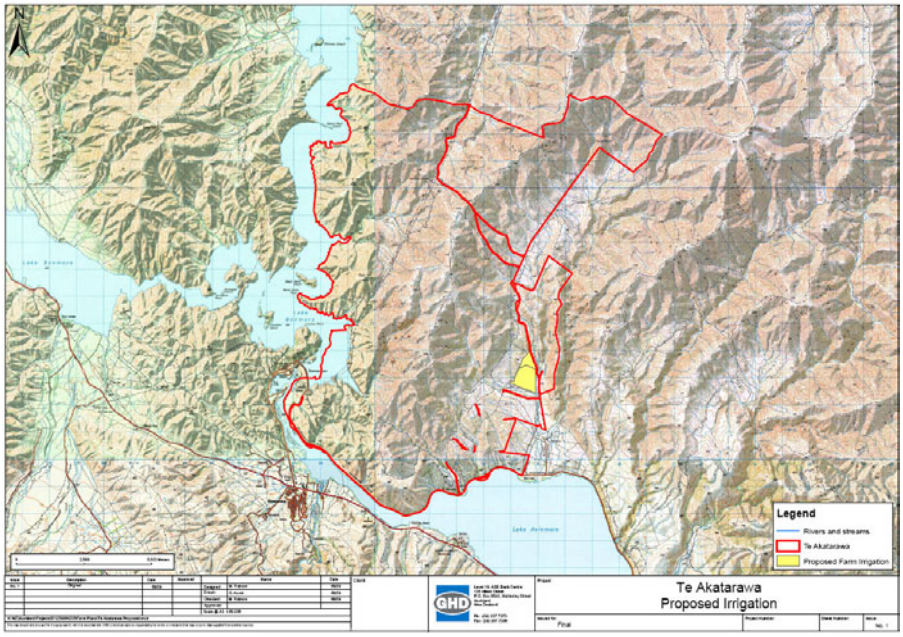
Table 1. Cover utilisation by season and stock class for current system

	Cover utilisation by season and stock class - CURRENT			
Class of stock	**Spring**	**Summer**	**Autumn**	**Winter**
Ewes	Grass flats	Oversewn hill	Native	Oversewn hill
Hoggets	Grass flats	Grass flats	Oversewn hill	Oversewn hill
Breeding cows	Grass flats	Native	Native	Native
R1 Steers	Grass flats	Grass flats	Grass flats	Ryecorn

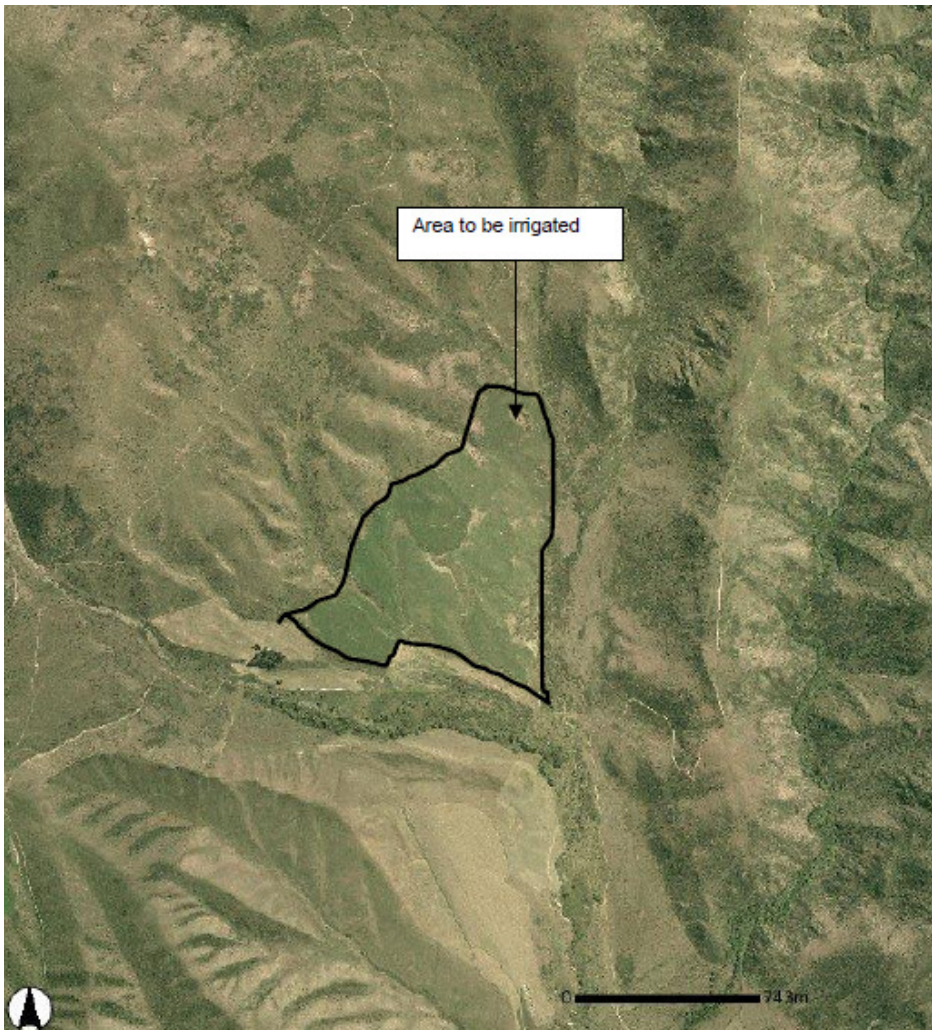
2.2 Proposed farming system

Te Akatarawa Station has 45 ha of existing irrigation. Since irrigation, the way the farm operates has changed, in that the applicant now has high quality feed available to feed younger sheep and ewes. This means that the applicant has been able to breed lambs on farm which can either be on-sold to fattening farms or fattened on-farm and sold for export. From an economic perspective, this means that the applicant is less reliant upon a single income strand being wool. The existing irrigated area is also used to increase the growth rate in the replacement stock. Now the applicant is able to breed from their 2thooths rather than having to wait until the breeding stock were at least 3 years old.

The area under the existing irrigation also provides the applicant with some certainty that they will have sufficient winter feed to feed their stock over the winter months. This is due to the fact that hay and bailage can be made on this area and is a critical part of the farming operation.



Map B: Proposed irrigation development – Te Akatarawa Station



Map C: Specific area to be irrigated

Table 2. Cover utilisation by season and stock class for proposed system

	Cover utilisation by season and stock class - PROPOSED			
Class of stock	**Spring**	**Summer**	**Autumn**	**Winter**
Ewes	Grass flats	Oversewn hill	Native	Oversewn hill
Hoggets	Grass flats	Grass flats	Oversewn hill	Oversewn hill
Breeding cows	Grass flats	Native	Native	Native
R1 Steers	Grass flats	Grass flats	Grass flats	Ryecorn

2.3 Soils

Light to medium depth of top soil on area irrigated. The farm consists of 407 ha of easy freehold land. 616 ha of low altitude easy county, 5,427 ha of steep hill, 4,811 ha of Class VII (very steep hill) and 336 h of Class VII which is not allowed to be grazed.

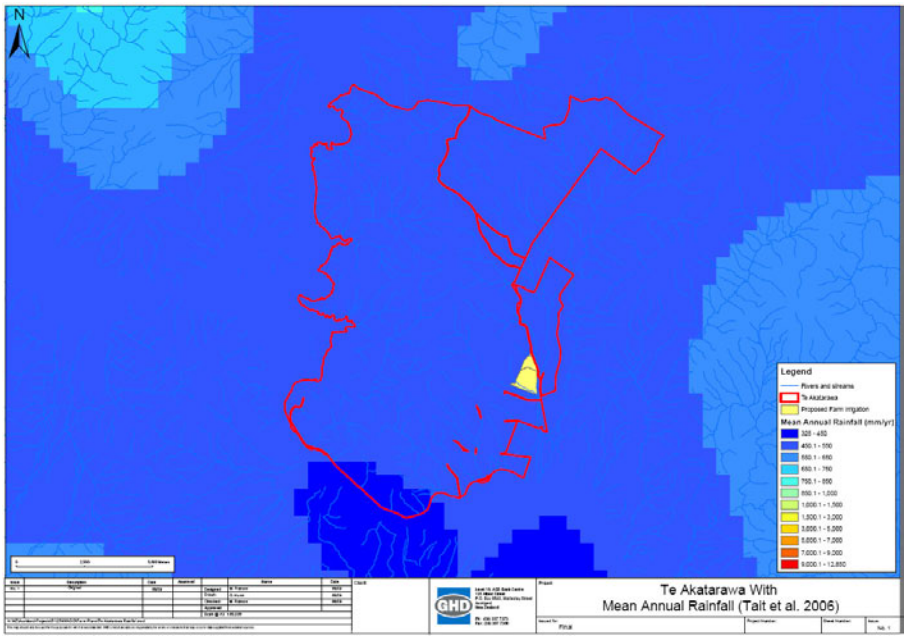
2.4 Topography

The farm consists of 407 ha of easy freehold land. 616 ha of low altitude easy county, 5,427 ha of steep hill, 4,811 ha of Class VII (very steep hill) and 336 h of Class VII which is not allowed to be grazed

Photo A: Showing the topography of Te Akatarawa Station

2.5 Climate

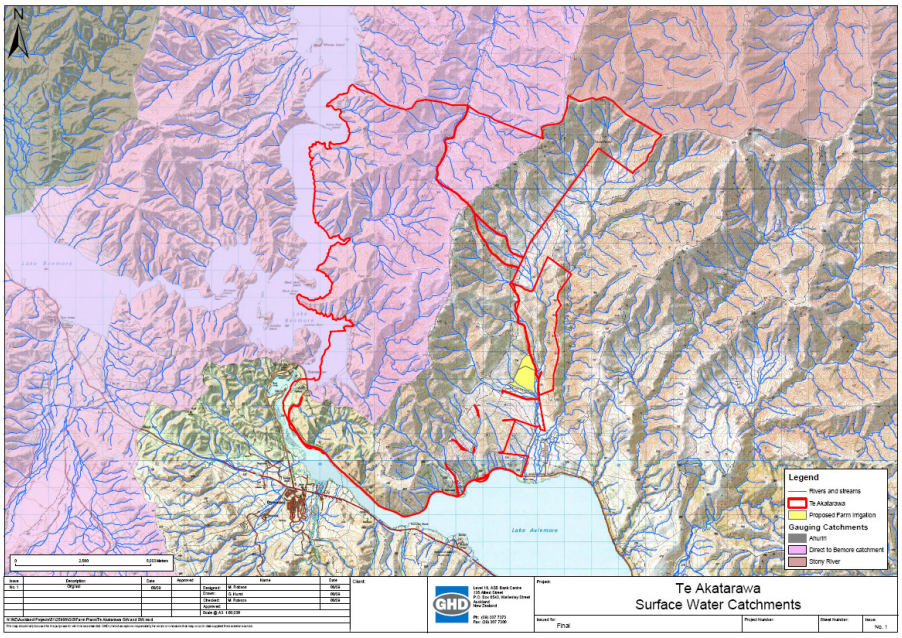
Winter cold (heavy snow fall common) and summer dry with high evaporation levels.



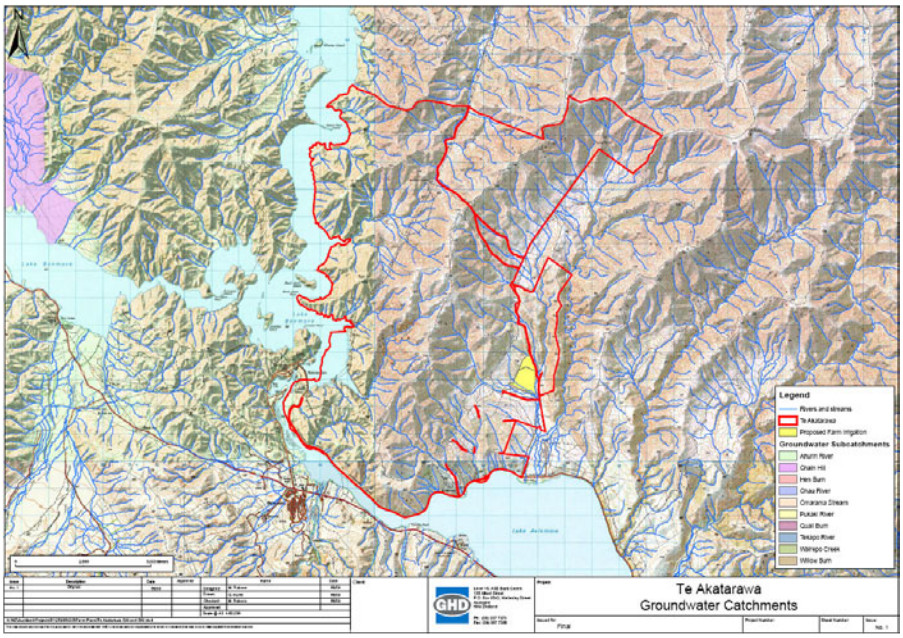
Map C: Mean Annual rainfall – Te Akatarawa Station

3. Environmental Context

The environmental context of the farm is a reference both to local and wider receiving environments.



Map D: Surface water receiving environment



Map E: Groundwater receiving environment

3.1 Water Quality Study receiving environments and mitigation requirements

Te Akatarawa Station, according to the WQS, lies in the Lake Benmore surface water catchment. These maps are shown above.

Table 3 shows the calculated nutrient mitigation requirement of the receiving environments determined in the WQS and the resulting thresholds for N and P for Te Akatarawa Station.

For this farm, the Lake Benmore mitigation requirements are the most stringent. These mitigation requirements cap Te Akatarawa Station's nutrient discharges at 26,302 kg N per annum and 748 kg P per annum.

3.2 Local receiving environments

The existing and proposed irrigation receiving environments are Black Jack Stream which flows along the eastern to south eastern boundary of the propriety and area to be irrigated. Millar Stream also flows along the southern boundary of the existing irrigation area. There are also a number of small springs (seeps) which arise within the area to be irrigated and flow into Black Jack Stream. Black Jack Stream joins with Gibson Stream just before leaving the property.

Table 3 Water Quality Study mitigation requirements for Te Akatarawa Station

	Stream mitigation required for periphyton kg/ha irrigated land	Secondary Stream mitigation required for periphyton kg/ha irrigated land	Stream mitigation required for ANZECC kg/ha irrigated land	Secondary Stream mitigation required for ANZECC kg/ha irrigated land	GWR mitigation required kg/ha irrigated land	Lake Mitigation required kg/ha irrigated land
Totara Peaks						
N	0	0	0	0	0	0
P	0	0	0	0	0	0

4. Farm Environmental Management Plan development

4.1 Stage 1 – Mandatory good agricultural practices

The table below shows the mandatory good agricultural practices that will be adopted. These include the base assumptions of OVERSEER and therefore help validate the use of the model on the farm.

Table 4. Mandatory good agricultural practices

Mandatory good agricultural practices	What these practices mean on farm
Fertilisers applied according to code of practice for fertiliser use	The fertiliser users' code of practice aims to ensure that where fertilisers are used that they are used safely, responsibly and effectively and in a way that avoids, remedies or mitigates any adverse environmental effects. The code of practice includes guidance on fertiliser use, application, storage, transport, handling and disposal.
Use a fertiliser recommendation system (nutrient budget) and account for all sources of nutrients including applied effluents and soil reservoirs accounted for	Planning fertiliser applications to all crops, determining crop requirement and accounting for soil nutrients and organic nutrient supplies, all reduce the risks of applying excessive fertiliser above the crop requirement. This maximises the economic return from the use of fertilisers and reduces the risk of causing nutrient pollution of the environment Accounting for all sources of nutrients including imported sources and soil reservoirs is an important management measure in all farming systems and become especially important on farms where manure is produced and applied to the land. The re-application of organic manures to land is often thought of as a disposal of a waste product, and the available nutrients within the organic manures are not accounted for. The use of an integrated nutrient budgeting tool such as OVERSEER automatically accounts for nutrients supplied in organic manures.
Fertiliser application applied evenly	The even application of fertiliser is an assumption of the OVERSEER model as included in the fertiliser code of practice. Fertiliser spreaders should be tested and calibrated in-house at least annually and every 5 years by an independent auditor.
Irrigation and effluent applied evenly	The even application of water and or effluent is an assumption of the OVERSEER model. Irrigators should be tested and calibrated in-house at least annually and then every 5 years in accordance with the code of practice for irrigation evaluation by a qualified irrigation auditor.
Crop, cultivation, nutrient inputs and yield records kept per farm management unit	Maintaining good crop input records is important for: • The calculation of cumulative annual organic fertiliser applications and also their contribution to long term nutrient supply; • The prediction of realistic crop yields that are used to determine crop requirements;

	• Providing accurate inputs to the OVERSEER nutrient budgeting model that is being used here as a proxy for measuring diffuse nutrient losses.
Good design of irrigation systems	Design will match soil properties and low application amounts on shallower soil to prevent summer drainage.
Robust irrigation scheduling	Good irrigation scheduling to prevent summer drainage.
Supplement and feeding out management	To be addressed in the Farm Environmental Risk Assessment.
Winter grazing management	To be addressed in the Farm Environmental Risk Assessment.

4.2 Stage 2 – OVERSEER and meeting WQS mitigation requirements

The WQS thresholds set for Te Akatarawa Station, using the most stringent nutrient mitigation requirement, are 26,302 kg N/year and 748 kg P/year. The table below shows the output from OVERSEER for the modelled proposed farming system at Te Akatarawa Station. The results illustrate that the proposed farm system losses as modelled by OVERSEER are within the thresholds set out by the WQS. Management or mitigation strategies that have been used to meet this threshold are detailed in Section 5.

Table 5. Total N and P losses modelled by OVERSEER for the proposed farming system on Te Akatarawa Station and WQS thresholds

	OVERSEER modelling outputs kg/year	**WQS threshold kg/year**
Total N leaching/runoff	25,502	26,302
Total P leaching/runoff	259	748

4.3 Stage 3 – Identification and mitigation of site specific environmental risks

4.3 Farm Environmental Risk Assessment

4.3.1 The tracks that lead out to the irrigation area all cross through the Black Jack stream, these tracks all show a small degree of vehicle and stock induced erosion and will be culverted in the future.

4.3.2 Some streams in the irrigation area are semi fenced with stock allowed access for water; these streams will be fenced off in the future.

4.3.3 Other streams on the property are not fenced off but the stock numbers in these areas are low.

4.3.4 The various springs in the area are unfenced as well as the small tributaries running from them, however there was not a significant amount of erosion evident.

4.3.5 No tracks other than the two that don't get used often on the farm that cross through watercourses.

4.3.6 No tracks directly runoff into a watercourse.

4.3.7 No evidence of previous runoff or soil wash.

4.3.8 No silage pits located on the property, all bailage and hay.

4.3.9 Up to 2000 hoggets behind a wire in the irrigated land at the end of the winter. The springs in this area will be connected to the Black Jack but the sheep do not spend time in the water.

4.3.10 Water is used in the yards for dipping, this water is held in the yards and is allowed to evaporate, and these yards are miles from any waterway.

4.3.11 No special areas or species of interest on the farm.

4.3.12 Spraying contractors are brought in to do any spraying out of paddocks.

4.3.13 No border dykes are on the property, all spray (k-line) irrigation.

4.3.14 No evidence of bankside erosion that I saw or was made aware of throughout the property.

4.3.15 Direct drilling is the preferred method of re-sewing, but if a new area is going into crop/pasture then it may be turned over to break in the soils. Often sprays out paddocks at the beginning of summer and puts into Rye Corn or Oats.

4.3.16 Soils are not left bare on the irrigated land or any other land that is able to grow pastures, but a large area of the farm is bare simply as it will not grow feed.

4.3.17 There is a small possibility of runoff from the winter grazing of the hoggets, this runoff could potentially enter the small strings that trickle down to the Black Jack stream.

4.3.18 No compacted or consolidated soils on the farm.

4.3.19 Pest and weed control is undertaken regularly on the farm. Rabbit and Wallaby shooting constantly, and when the populations get high they will poison. Briar, gorse, broom and any wilding pines are targeted constantly with spot spraying.

4.3.20 Fertilisers used are; 120 tonne per year of Sulphur Super at 100 kg/hectare. This is alternated between three blocks, so each block only receives it once every three years. The irrigated land also receives 70-80 kg/hectare of Nitrogen (N) and also a small amount of Phosphate (P) in March. Sometimes this land will also receive extra N and P in the Spring if it has had a cut of bailage off of it to help give it a boost.

4.4 General issues on extensive high country farming systems

In extensive high country farming systems there are a number of issues that on more intensive farming systems would be assessed as being a risk to water quality but on extensive high country farming systems they have not been defined as a risk due to the extensive nature of the farming

systems and the lower stocking rate per hectare. Some of these general issues have been identified below:

1. There will be areas within the farming system where tracks will cross waterways; these are tracks that are used irregularly, in extensive areas of the farm.
2. There are also areas within a high country farming system where stock will have unrestricted access to streams for crossings and stock water. This is an essential access for stock movement and stock water. On most farms there are a number of small creeks/streams that flow within the hill country and it would be logistically impossible to place stock crossings on all of these. There is also the need for stock to move across streams/creeks within a block (paddock) for grazing access. A reticulated water system would be unsustainable in the hill country as troughs would freeze solid in the winter months, preventing access to fresh drinking water.
3. Swamps/heavy grounds are an integral area in a high country farming system; they provide a water source and good grazing for stock in dry years. In undertaking the FERA it has been identified that all swamps/heavy ground need to be monitored to ensure that bank erosion, compaction and pugging does not occur.
4. Wind erosion is a significant issue in the upper Waitaki Catchment. The sparse vegetation on large areas of land in the Mackenzie Basin gives little protection to the shallow, friable soils which continue to be eroded by frost heave and westerly winds. A mean soil loss of 0.22 mm/year or 2.2 tonnes of soil lost per hectare across a number of sites within the Mackenzie Basin has been reported. While it cannot be assumed from this information that erosion rates will continue at this level in the future, the results do confirm a strong relationship between the percentage of vegetation cover and erosion risk. The problem of bare ground and exposure to wind erosion has been compounded since the early 1990s by the rapid spread of hieracium particularly on the poorest soils. One of the most significant impacts of further irrigation in this area would be a reduction in the amount of bare ground and corresponding reduction in wind erosion risk. (***Environmental, Economic and social impacts of irrigation in the Mackenzie Basin. Ministry for the Environment, February 2005.)***
5. Monitoring and identification of any problems arising for the above three issues has been included in Table 8.

5. Farm Environmental Management Plan for Te Akatarawa Station

5.1 Mitigation measures and management options adopted on Te Akatarawa Station

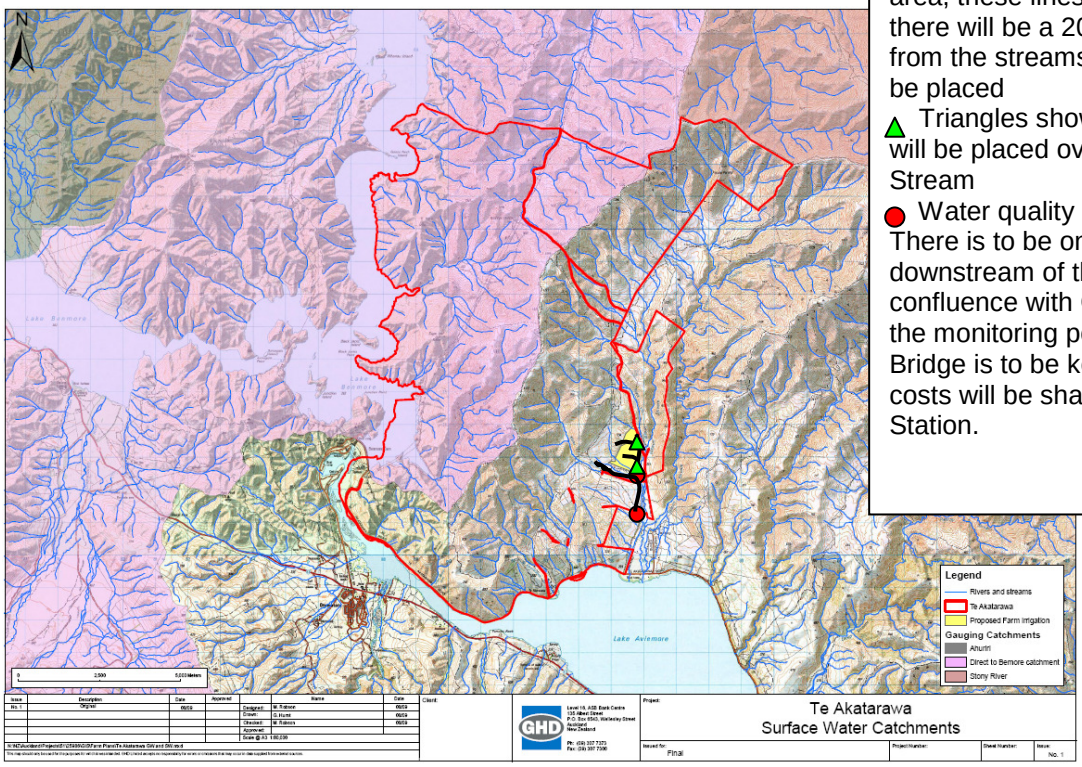
The table below shows the all the mitigation and management tools that are proposed to be undertaken on Te Akatarawa Station. Measures indicated as **FEMP stage 1 are those identified as Mandatory Good Agricultural Practice**, **measures identified as FEMP stage 2 are those changes that have been modelled in OVERSEER to meet the WQS mitigation requirement (if required)**, and those indicated as **FEMP stage 3 are mitigation measures chosen to ameliorate site specific environmental risks on the farm.** Table 7 indicates in brief how the measures are to be monitored and audited.

Table 6. Table of mitigation options, monitoring and auditing for Te Akatarawa Station

FEMP stage	Measure	Monitoring	Auditing
1	Fertilisers applied according to code of practice for fertiliser use		Self certification
1	Accounting for all sources of nutrients including applied effluents and soil reservoirs	Soil and effluent testing and cumulative effluent inputs per management unit	Reconciliation of fertiliser, effluent and soil records with nutrient budget for example blocks. Submission of examples soil and effluent tests
1	Even fertiliser application	Calibrate and optimise fertiliser spreaders annually and every 5 years by an external auditor	Submission of testing and calibration
1	Even irrigation and effluent application	Calibrate and optimise irrigators annually in house and every 5 years by an external auditor	Submission of testing and calibration
1	Record crop, cultivation, nutrient inputs and yields per farm management unit	Upkeep of records	Submission of example block records
1	Good design of irrigation systems	Design of irrigation system by a certified professional	Irrigation system audited by a certified auditor every 5 years
1	Robust irrigation scheduling	Calculation of annual % effective water use	Submission of annual % effective water use
2	No winter application of fertiliser	Field records	Signed field records
2	N fertiliser applications split to under 50 kg N/application	Field records	Signed field records
2	No P fertiliser within three weeks of irrigation	Field records	Signed field records
2	Olsen P of below 30 maintained	Regular soil testing (every 3 years)	Submission of soil tests
3	The various springs/streams located within the irrigation area need to be fenced. The best solution to this is to waratah fence the streams leading from the springs, and then to just put a hot wire around the spring	Photos	Annual auditing visit
3	20 metre layback from any water way when applying fertliser by land based application e.g. bulk spreader	Field records	Annual audit report
3	Maintain a 5-11 metre irrigation buffer from any waterways (such as the springs), these areas should also be planted to allow for filtration of nutrients before they enter the waterway	Photos in the report	Annual auditing report until the planting is complete, then annual auditing visits to monitor the progress
3	Fence off the streams (Black Jack) to restrict stock access, drinking bays may be used. These fences only need to be a temporary fence while stock are in the area	Photos	Annual auditing visit
3	Culverts will be placed in the various positions where vehicles cross the Black Jack stream	Photos in the audit report	Annual auditing visit

Evidence of a crossing through the Black Jack stream that needs to be culverted

Another area where the track crosses through the Black Jack stream that will be culverted



— Black lines show areas that will be fenced as much as possible when stock are in the area, these lines also show where there will be a 20 metre layback from the streams where fert will be placed

▲ Triangles show where culverts will be placed over the black Jack Stream

● Water quality monitoring sites. There is to be one located downstream of the Black Jack confluence with Gibson Stream, the monitoring position at Suttons Bridge is to be kept up, and the costs will be shared with Waitangi Station.

5.2 Monitoring and Auditing

5.2.1 Baseline monitoring

Baseline monitoring is already underway on Te Akatarawa Station

Table 7. Baseline monitoring on Te Akatarawa Station

		Location	Frequency	Measured parameters to include
Soil	Soil nutrient testing	All irrigation paddocks and intensive areas in rotation	1 in 3 years	Standard suite of soil nutrients

		Location	Frequency	Measured parameters to include
Water	Surface water quality	Sutton Stream exit from property	April, June October 2007 and January 2008	Total Nitrogen, nitrate, ammonia, total Kjeldahl nitrogen, total phosphorus, dissolved reactive phosphorus, suspended solids.
Pasture	Ground cover and species	All blocks	Annually	% Ground cover, species

5.2.2 On-going monitoring

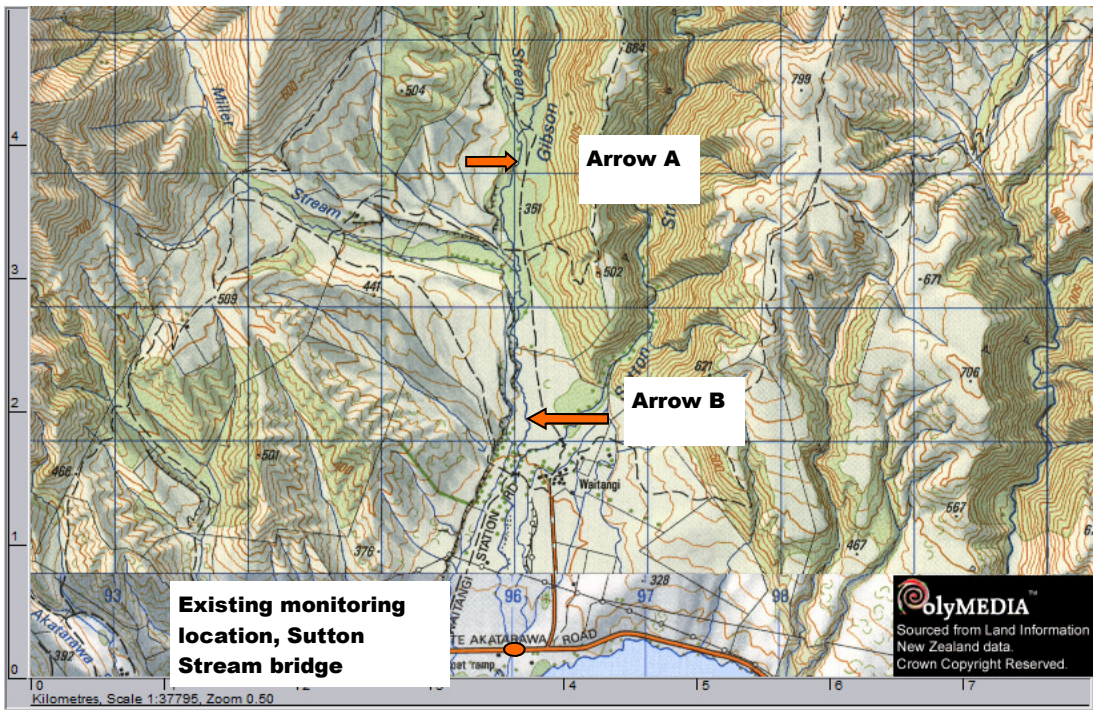
Ongoing monitoring and auditing of FEMP are as important as the plan itself.

Table 7 above shows the current monitoring undertaken on Te Akatarawa and Table 8 below shows proposed monitoring plan, frequency, location for the monitoring and parameters for the monitoring along with the triggers and contingency plans if the triggers are exceeded.

Table 8. Example monitoring plan for Te Akatarawa Station showing location, frequency and parameters for monitoring

		Location	Frequency	Measured parameters to include	Triggers	Contingency plan if triggers are exceeded
Soil	To include: Soil nutrient testing	All irrigation paddocks and intensive areas in rotation	1 in 3 years for soil nutrient status	Standard suite of soil nutrients	Olsen P of 30 in those areas where the Olsen P is naturally less than 30	Reduce or stop the application of P fertiliser to the area and monitor
Soil	Soil compaction testing	All irrigation blocks in rotation.	Annually for soil compaction testing.	Soil compaction	Compaction, surface capping	Remove compaction with the appropriate tool
Runoff	Wet weather survey	All irrigation blocks and tracks	Annually	Runoff	Runoff occurring	Immediately review current runoff mitigation options for tracks. Introduce further runoff removal infrastructure where appropriate.
Water	Surface water quality	The existing Sutton Stream site and another in conjunction with neighbour, yet to be determined (see map below). Also on Black Jack prior to it entering the property	Quarterly for the first 5 years and then reviewed	Total Nitrogen, nitrate, ammonia, total Kjeldahl nitrogen, total phosphorus, dissolved reactive phosphorus, E Coli and suspended solids.	No significant decrease in water quality	If comparative surface water analysis indicates a decrease in surface water quality then the degraded determinant should be identified while a full root cause analysis is undertaken
Water	Irrigation application		Annually in house and 1 in 5 years by an independent	Application uniformity >80 %		Optimisation of the irrigator performance will be performed at the time of testing

		Location	Frequency	Measured parameters to include	Triggers	Contingency plan if triggers are exceeded
Tracks that cross waterways	Visual assessment of bank/track erosion	All tracks that cross creek/stream within extensively farmed areas	Annually	Visual assessment of bank/stream erosion caused by vehicle crossing or stock	Any sign of extensive visual erosion	Restrict vehicle and stock access until an assessment of the damage and cause can be made
Fertiliser	Fertiliser application		Annually in house and 1 in 5 years by an independent	Application uniformity >80 %		Optimisation of the spreader performance will be performed at the time of testing
Pest pressures	pest populations	Relevant blocks	Annually	% or magnitude of infestation	ECAN monitor and communicate if their triggers have been exceeded	Legislative compliance with notice of direction issued by ECAN
Weed	Weed populations	Relevant blocks	Annually	% or magnitude of infestation	Self trigger	Undertaken annually by self monitoring, spray those areas that require



Existing and proposed locations of water quality monitoring. A water quality monitoring point will be chosen between Arrows A and B after consultation with the neighbouring applicant.

Where triggers are exceeded, the immediate contingency plans in Table 8 should be implemented while a 'root cause' analysis is carried out. Any further mitigation measures to be adopted as a result of monitoring should be added to Tables 6, 7 and 9.

1) Is the current mitigation option implemented correctly?

No – Implement and monitor

Yes – to 2)

2) Has anything changed in the farm system?

Yes – remodel and monitor

No – to 3)

3) Have there been abnormal conditions at the time of trigger breach?

Yes – continue monitoring to see if trigger breach continues

No – Seek advice if suitably qualified person to investigate root cause and suggest appropriate mitigation.

If emergency conditions occur that risk a pollution event, such as a catastrophic failure of the irrigation system that is resulting in overland flow to a watercourse, seek immediate guidance from you regional council:

Environment Canterbury **0800 76 55 88**

5.2.3 Auditing

The auditing process allows both the farm operator to illustrate, and other interested parties to have confidence that the management practices and mitigations planned for the farm are being implemented. In addition, the audit shows that there is a mechanism for the adaptive management of the property should the chosen mitigation or management not perform to expectations.

An annual audit is proposed, and requires both external and in-house input. The annual audit should be completed and submitted to ECan by end of July each year.

Table 9 below shows an example of an annual audit report for Te Akatarawa Station.

Table 9. Table showing proposed contents of an annual audit report for Te Akatarawa Station

Mitigation Measure	Audit Measures	Action in case of non compliance
	Annual audit of OVERSEER nutrient budget and report based on previous 3 years. Submission of compliance with thresholds	Should the OVERSEER report show losses exceeding the threshold, further mitigations should be adopted to effect a reduction in nutrient loss to below thresholds.
	Submission and brief interpretation of water quality analysis	Where triggers have been exceeded, immediate contingency plans should have been carried out and a root cause analysis conducted. The results of which should be presented here.
	Submission and brief of annual wet weather survey	Any remedial actions proposed after the annual survey should be undertaken.
	Submission and brief of annual tracks that cross waterways survey	Any remedial actions proposed after the annual survey should be undertaken
	Submission and brief of annual compaction survey of the irrigation area	Any remedial actions proposed after the annual survey should be undertaken
	Annual pest and weed survey undertaken by Ecan should be submitted	Legislative compliance

Even irrigation application	Calibrate and optimise irrigators annually in house and every 5 years by an external auditor	Submission of testing and calibration
Record crop, cultivation, nutrient inputs and yields per farm management unit	Verification of records	If records have not been produced then this should be rectified for next audit
Good design of irrigation systems by a certified professional and audited every 5 years	Irrigation system audited by a certified auditor every 5 years and any changes recommended should be implemented	If changes recommended not implemented then this should be rectified by next audit
Robust irrigation scheduling	Verification of records	If records not received then this should be rectified by next audit
No June/July application of fertiliser on the irrigated area	Field records	If records not received this should be rectified for next audit.
N fertiliser applications split to under 50 kg N/application	Field records	If records not received this should be rectified for next audit
No P fertiliser within three weeks of irrigation	Field records	If records not received this should be rectified for next audit
Olsen P of below 30 maintained	Submission and brief interpretation of soil test results	Where triggers have been exceeded, immediate contingency plans should have been carried out and a root cause analysis conducted. The results of which should be presented here.
The various springs/streams located within the irrigation area need to be fenced. The best solution to this is to waratah fence the streams leading from the springs, and then to just put a hot wire around the spring	Check fenced areas are present. Photos	Areas of fencing damage should be repaired.
20 metre layback from any water way when applying fertliser by land based application e.g. bulk spreader	Field records and maps	If maps not received with annual audit this should be rectified by the next audit.
Maintain a 5-11 metre irrigation buffer from any waterways (such as the springs), these areas should also be planted to allow for filtration of nutrients before they enter the waterway	Check setback area is present. Photos	Areas of less than 5m setback should be extended to ensure the minimum is 5m.
Fence off the streams (Black Jack) to restrict stock access, drinking bays may be used. These fences only need to be a temporary fence while stock are in the area	Check fenced areas are present. Photos	Areas of fencing damage should be repaired.
Culverts will be placed in the various positions where vehicles cross the Black Jack stream	Photo once installed	Timeline for completion required, if not completed prior to indicated timeframe then should be rectified by next audit

6. Summary

This FEMP has been written to serve two purposes; to ensure the existing farm system can meet the nutrient mitigation requirements set out by the MWRL Water Quality Study, and to set out the process for identification of farm specific environmental risks that arise from the inherent characteristics of the farm and from the existing farm system and its management.

The WQS thresholds and modelled outputs from OVERSEER detailed in Section 4.2 illustrate that this proposed system meets the WQS thresholds identified.

A full on-farm risk assessment was completed in December 2009 with a commitment to address the risks identified. Section 4.3 sets out the risks identified for this property and those issues common to all high country farming systems, along with existing mitigation measures.

The mitigation and management measures detailed in Table 6 set out the measures that have been adopted to mitigate and manage the risks that were identified in the risk assessment along with mandatory good agricultural practices and those measures that have been modelled in OVERSEER.

Baseline monitoring and any additional monitoring proposed for this property are identified and set out in Section 5.2, Tables 7 and 8 allows the performance of the measures chosen to be monitored and where they are performing sub-optimally, these can be addressed through the root cause analysis process.

The auditing of this plan, addressed in Section 5.2.3, Table 9 ensures that the relevant mitigation measures outlined in Table 6 are audited annually either internally or externally and communicated to ECAN by the end of July each year.

Appendix B: ECan Map