MORVEN GLENAVY IKAWAI IRRIGATION COMPANY LIMITED

Environmental Management Strategy

Version 1
September 2010

MORVEN GLENAVY IKAWAI IRRIGATION COMPANY LIMITED

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1. Introduction

This Environmental Management Strategy sets out the protocols, policies and procedures that Morven Glenavy Ikawai Irrigation Company Ltd (MGI) will follow in the development, operation and maintenance of the Morven Glenavy irrigation scheme in South Canterbury, including augmentation of flows in the Waihao River, in order to ensure that both the scheme operators and the water users can achieve high environmental standards and sustainable outcomes.

This Environmental Management Strategy has been developed in accordance with the conditions of resource consent for consent CRC091997. As required by consent CRC091997, MGI will prepare and adopt an Environmental Management Strategy for the entire Morven Glenavy Ikawai Irrigation scheme by 22 January 2012 (2 years from grant of consent). Within 2 months of adopting the Strategy and within 2 months of any subsequent amendment, MGI will provide a copy to the Canterbury Regional Council (ECAN).

1.1 Scheme description

Morven Glenavy Ikawai Irrigation Co Ltd (MGI) owns and operates the Morven Glenavy Irrigation scheme. The company abstracts water from the Waitaki River at the Stone Wall and Bells Pond intakes on the north bank.

MGI has consents to abstract a maximum of 6.0 m^3/s at the Stone Wall intake and 14.3 m^3/s at Bells Pond intake and to irrigate up to 26,700 ha within the command area shown on the map in Appendix 2. At present (March 2010) 22,700 ha is irrigated. A further 4,000 ha of irrigation can be progressively developed, but only using water saved from elsewhere in the scheme. Since the scheme cannot take any new Waitaki River water, new irrigation water can only be approved once the board is satisfied efficiency improvements elsewhere mean the scheme will not exceed their seasonal allocation limit.

The scheme also provides water for augmentation of the Waihao River.

A summary of the consent conditions for the scheme is set out in Appendix 1.

2. Sustainability Policy

The objective of MGI is to create sustainable value for its shareholders, employees, contractors, suppliers, business partners and local communities. MGI will strive to be leaders in sustainable irrigation performance in New Zealand. MGI will develop, implement and maintain systems for sustainable management to drive continual improvement and ensure that it will:

- Meet or, where less stringent than scheme standards, exceed applicable legal requirements;
- Understand, uphold and respect cultural heritage, in particular respecting the Ngai Tahu values in relation to water, the natural environment and other taonga[1];
- Promote efficient use of natural resources; including reducing and preventing pollution;
- Enhance biodiversity protection by assessing and considering ecological values and land use aspects;
- Engage regularly, openly and honestly with people affected by the scheme operations and take their views into account in decision making;
- Develop partnerships that foster sustainability in the local communities and enhance economic benefits;
- Regularly review scheme performance and report to shareholders, Canterbury Regional Council and others.

For MGI sustainability is about ensuring that the scheme is viable and contributes lasting benefits to society through consideration of social, environmental, ethical and economic aspects in all that it does.

[1] Sacred treasure, valuables

3. Sustainability Approach

This Environmental Management Strategy sets the policies and protocols at the governance and management levels for the whole scheme. It provides leadership and commitment to achieving positive environmental outcomes.

MGI's goal is to ensure that all activities are carried out with a high standard of environmental care. The focus will be on active management and prevention of problems. To achieve this goal MGI is committed to:

- Ensuring that effective governance and risk management processes are in place;
- Taking all practicable steps to minimise adverse effects of obtaining, reticulating and using scheme water;
- Using all resources efficiently, and minimising waste;
- Working with water users and the wider community to address any adverse environmental effects of providing irrigation water;
- Ensuring a balance between agricultural productivity and environmental protection, both of which are essential for the long term productivity and sustainability of the area.

As a water scheme, the environmental focus is on the effects of obtaining, reticulating and using scheme water. MGI will

- Implement systems and processes to track the scheme's environmental performance and act on complaints and incidents;
- Use systematic methods of monitoring that are consistent with other water user monitoring requirements e.g. for on-farm quality assurance programmes;
- Adopt a training and information provider role so that new research results which can help to improve the sustainability of irrigated farming are readily available to all farmers.

3.1 Farm Plans

Environmental Farm Plans for Irrigated Land Use (Farm Plan) will put in place measures to avoid or minimise adverse impacts of on-farm activities associated with irrigation, and implement best practice farming methods. Initially these will be implemented, as required under consent CRC091997, for each property that uses water authorised by this consent, which is any irrigation developed after 2001. However, it is MGI's intention that all properties receiving scheme water will implement Farm Plans by 2014.

MGI will use a workshop process and individual support to help water users to prepare their Farm Plans. Further details on the Farm Plans are provided in other sections of this Protocol.

The requirements for the Farm Plan will be set out as part of the contractual arrangements between MGI and the user for supply of water (water use agreement). In addition to water

supply arrangements, this agreement will cover environmental management obligations including:

- What the user has to do – i.e. prepare, implement and review farm plan;
- What MGI has to make available e.g. workshops to assist in preparing plans;
- What MGI will do e.g. monitoring, reviewing, auditing;
- Compliance e.g. warning, water cut off.

Figure 1 shows the relationship between the Environmental Management Strategy, water use agreement and Farm Plan, and the ongoing, inter-connected process of adaptive management through monitoring, review and revision.

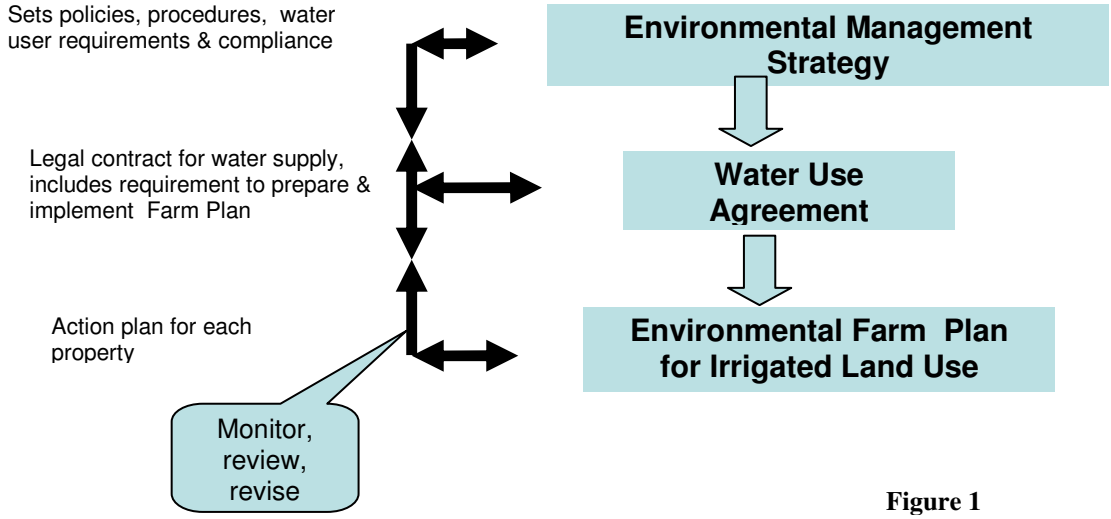

Figure 1

3.2 Training and Information Provider

MGI will actively promote and facilitate an ongoing training and information programme to assist water users improve farm performance, maximise environmental benefits and minimise adverse effects. MGI will also be proactive in providing growers with information on new technologies for best practice irrigated farming.

MGI will facilitate workshops for water users. Workshop topics could include:

- Understanding nutrient effects and best management practices;
- Soil moisture monitoring and use for scheduling irrigation;
- Operation and maintenance of irrigation systems;
- Scheme specific guidelines on planting and managing native species;
- Other irrigation or environmental management information.

3.3 Waihao River Augmentation

The scheme provides water that augments flows in the lower Waihao River. This contributes significantly to supporting:

- Ecological sustainability in both the lower river and the Wainono Lagoon;
- Recreational opportunities in the lower river; and
- Groundwater recharge.

3.4 Environmental Reports

3.4.1 Annual Reports

As required by consent CRC091997, MGI will report annually to the Canterbury Regional Council (ECAN) including:

- Details of the properties irrigated under this consent, including whether the property was developed for irrigation prior to, or post, 31 December 2009.
- A summary of on-farm water supply for each period 1 July to the following 30 June.
- A summary of the results of the Farm Management Plan audits for the preceding season, including:
    - Any issues of non-compliance with the Plans, the Strategy or the conditions of consent CRC091997;
    - Actions taken by MGI to remedy any non-compliance matters.

3.4.2 Other Reports

If it applies, MGI will report to the Canterbury Regional Council (ECAN) regarding condition (l) of consent CRC091997 which covers irrigation developed after 31 December 2009 in certain mainly foothills catchments[2], if the relevant water bodies maintain surface flow for at least 6 months per year on average prior to irrigation:

- within 3 months of carrying out any assessment of the water bodies specified in condition (l) (ii)
- if an assessment carried out under (l)(ii) shows a decrease in the ecological values of the water bodies specified in condition (l), then updated Farm Plans indicating corrective actions on-farm will be provided within 3 months.

[2] Catchments specified in condition (l) are:
(a) the foot-hill catchments (i.e. north of Redcliff Back Road and Pikes Point road and west of Old Ferry Road) of :

- Dog Kennel Creek;
- Whitneys Creek;
- Waikakahi Stream;
- Elephant Stream;
- Waihuna Stream;

b) Waihao River catchment upstream of McCulloughs Bridge.

4. Key Environmental Management Issues

4.1 Efficient Water Use

MGI recognises that using water resources for irrigated farming is only one of many options for that water and, therefore, all water taken into the scheme must be used as effectively as possible.

Scheme water distribution network

MGI will minimise losses in the off-farm distribution network through:

- A high standard of maintenance of the supply canals and distribution system;
- Use of scheme control and management systems to supply water on demand and avoid operational by-wash. This includes receiving timely notification from farmers of their water requirements, and use of all water requested.
- Regular review of the volumes of water taken and distributed by the scheme to identify any water loss issues. (Undertaken using flow gaugings.)
- All spray irrigators will be required to have meters on pumps by August 2011.

Supply of water

- MGI will meter and record all water takes and will provide users with reports that benchmark water efficiency performance across the scheme for different soil types, irrigation systems and land uses. If poor efficiencies are noted these will be reviewed;

Water Application

- Water users will be required to maximise the use of their available water resources by applying water efficiently at a time, and volume, that meets the needs of their crops and ensures the long term sustainability of their production levels.
- New water users will be required to take all practicable steps to ensure that the volume of water used does not exceed that required for the soil to reach field capacity;
- All water users will be required to take all practicable steps to:
    - avoid leakage from pipes and structures;
    - avoid applying water onto non-productive land, including tracks, impermeable surfaces and river/stream margins.
- MGI does not intend to specify on-farm application methods, but will ensure through water use agreements[3] and Farm Plan requirements that new irrigation systems are highly efficient.
- Different types of enterprises will make use of irrigated water from the scheme. MGI does not intend to restrict activities, but to have suitable measures in place to ensure that growers understand and manage any adverse environmental effects of irrigated farming;
- MGI will continue to invest in improvements to scheme infrastructure to improve supply efficiency.

[3] 'water use agreement' refers to the contractual arrangements, including conditions of supply, between MGI and each property receiving water from the Scheme

4.2 Water Quality

The key potential adverse effects of the scheme on water quality are increases of nitrate-N, phosphorus and microbiological contamination leaching into surface and groundwater due to land use intensification.

Nutrient and other losses to water from fertiliser and stock will be minimised through a focus on output management (e.g. minimising surface runoff and leaching through soil profile to groundwater), rather than input management (e.g. restricting stock numbers or fertiliser amounts) to deal directly with potential problems and enable water users maximum flexibility to be innovative in the management of their own businesses.

Through the Farm Plan requirement, MGI will require Best Management Practices to manage and reduce water quality problems, particularly nitrate and phosphorus losses, and contamination by stock. Best Management Practices will include:

- Use of nutrient budgets and nutrient management plans to achieve output management;
- Management of waterways, including riparian buffer strips, stock crossings, limiting stock access and appropriate plantings.

The 'Dairying and Clean Streams Accord'[4] will set a minimum standard for all dairy farms.

For users getting water under CRC091997:

- all cattle, deer and pigs must be excluded from all flowing waterways (excluding farm distribution races which do not discharge into natural waterways) for irrigation developed after 31 December 2009;
- all cattle, deer and pigs must be excluded from flowing sections of Dog Kennel Creek above Old Ferry Road and flowing sections of Waikakahi Stream for irrigation areas developed prior to 31 December 2009.

From September 1 2011 all water users will be required to keep cattle, deer and pigs out of flowing waterways (excluding farm distribution races which do not discharge into natural waterways).

Examples of other management practices that would be encouraged, where appropriate, to reduce the loss of nitrate nitrogen to soil drainage water, include:

- Split applications of fertiliser;
- Timing of fertiliser applications to plant growth;
- Avoiding application of fertiliser to saturated soil;
- Nitrogen is not applied when soil temperature is low[5] to avoid leaching loss when plant nitrogen uptake is low.

[4] "Dairying and Clean Streams Accord between Fonterra Co-operative Group, Regional Councils, Ministry for the Environment, and Ministry of Agriculture and Forestry" May 2003

[5] "Nitrogen is not applied when the 10 cm soil temperature at 9am is less than 6°C and falling" p 39 Code of Practice for Nutrient Management (with emphasis on fertiliser use) NZFRMA 2007

- Using nitrification inhibitors or winter cover crops

Water quality monitoring will be carried out, and reported, as required by the resource consents. If water quality problems occur because of the scheme activities, they will be thoroughly investigated and strategies for improvement developed and implemented.

Scheme Main Distribution races
After September 1 2012, all cattle, deer and pigs will be excluded from main races, when these are flowing. During periods when races are dry, races may be grazed at low stocking rates.

MGI does not endorse flushing of effluent ponds with irrigation company water.

4.3 Biodiversity and Ecosystem Management

MGI recognises that biodiversity is a critical aspect of environmental management. MGI notes that the report "A Biodiversity Strategy for Canterbury Region" [6] has a target 'That there is no further loss of significant habitats and ecosystems from 2010'.

The key threats to biodiversity that are particularly relevant to irrigation, especially new developments, include:

- Further loss of remaining patches of indigenous vegetation;
- Impact of shelterbelt removal where these function as wildlife corridors;
- Loss and degradation of riparian areas, impacting on water quality and wildlife movement;
- Lack of understanding and specific information on state of wetlands in the region;
- General lack of understanding and awareness of biodiversity issues.

While the scheme has potential adverse effects, it also provides opportunities to increase awareness of, and to protect and enhance areas of indigenous vegetation both on-farm and within the wider scheme area.

Scheme wide

MGI will actively incorporate enhancement of ecological values in managing the open channels and other scheme infrastructure, in ways that do not conflict with scheme operation.

When any new irrigation (after 31 December 2009) is going to occur in:

a) the foot-hill catchments (i.e. north of Redcliff Back Road and Pikes Point road and west of Old Ferry Road) of :

- Dog Kennel Creek;

[6] 'A Biodiversity Strategy for the Canterbury Region' Environment Canterbury Report Number: R08/13 ISBN: 978-1-86937-774-8 published February 2008. http://www.ecan.govt.nz/Our+Environment/Land/Biodiversity/

- Whitneys Creek;
- Waikakahi Stream;
- Elephant Stream;
- Waihuna Stream;

or

b) Waihao River catchment upstream of McCulloughs Bridge;

MGI will undertake monitoring and ecological evaluations of any sections of water bodies that, prior to irrigation development, maintained surface flow for at least 6 months per year, on average (Consent CRC091977 – condition (l)(i) and (ii)), and if necessary, take the actions described in condition (l) (iv).

Water use agreements between MGI and those irrigating in any part of the catchments where condition (l) applies will record that if the ecological values are found to decrease in the flowing water bodies as a result of irrigation, then

- the Farm Plans must be updated within 3 months to describe corrective actions that must be undertaken on-farm to mitigate any decrease in ecological values and
- the corrective actions must be implemented as soon as possible

On-farm

MGI notes that in order to design new irrigation systems that are highly efficient in terms of water and energy use it may be necessary to remove existing trees and shrubs. However, where shelter belts and other plantings are removed for irrigation development, MGI will **encourage** replacement of these with suitable native vegetation plantings particularly in locations that assist to develop a network of native vegetation patches and corridors from the mountains to the sea.

MGI will carry out a survey of new areas of irrigation development, as required under consent CRC091977 condition (k), to identify any significant natural wetlands. Farm Plans will need to describe methods for maintaining these wetlands, which must include:

- No reduction in area;
- No loss of significant areas of indigenous vegetation or significant habitats of indigenous fauna;
- Stock are excluded.

Increasing awareness

MGI will raise awareness of biodiversity issues and opportunities by:

- Promoting existing information that has been prepared to help people take positive action e.g. booklets such as ; '*Establishing shelter in Canterbury with nature conservation in mind*'(ECAN); 'Using native plants in Canterbury'(ECAN) 'A guide to managing waterways on Canterbury farms' (ECAN);
- Providing scheme specific guidelines on indigenous biodiversity such as information on suitable plant species, planting plans etc;
- Linking with those agencies, organisations and networks with skills and experience to provide advice and support on-farm and across the scheme.

4.4 Water Levels and Flows

If problems related to water levels or flows (groundwater and surface water) in and adjacent to the scheme occur because of the scheme activities, they will be thoroughly investigated and strategies for improvement developed and implemented.

5. Farm Plans

5.1 Requirement for Farm Plans

Farm Plans are the tool by which MGI will ensure that best management practices are implemented on-farm in order to achieve high environmental standards.

Every new water use agreement will include a requirement that all land irrigated with scheme water must complete and implement a Farm Plan for Irrigated Land Use. The water use agreement will also include:

- Review and audit requirements for Farm Plans;
- Enforcement measures for non-compliance with Farm Plan requirements;
- Provisions for MGI approval of the initial farm plan, and any subsequent changes to a plan.

All water users receiving water under Consent 091997 must implement an approved Farm Plan. For new areas developed after 31 December 2009, the Farm Plan must be completed before water is supplied. For irrigation areas that were developed before 31 December 2009, the Plan must be completed by 22 January 2012. Failure to do this will invoke the scheme's enforcement procedures and supply of water may be reduced or cut-off or a fine imposed.

MGI will also encourage other water users in the Scheme to prepare Farm Plans, with a target of all properties having Plans by 2014.

5.1.1 Transfers / trading (within scheme)

Any transfers of scheme water to another person/property will be subject to approval by MGI and will be required to meet all sustainable management conditions. This includes preparation and approval of a Farm Plan for all land receiving water under a transfer arrangement, even if the transfer is temporary.

5.2 Farm Plan Processes

5.2.1 Preparation of Farm Plans

The Scheme will provide a template for the Farm Plan. The template will specify the objectives and targets that users need to meet. Users will retain flexibility as to how they achieve these. It is accepted that problems can, and will, occur so recording of events and actions taken to remedy problem situations is required.

MGI will provide workshops to assist users develop their own farm plans. Users who have attended the workshops will also be entitled to individual support from MGI, if required, to complete their plan.

5.2.2 Farm Plan Approval and Audit Processes

Farm Plans must be submitted to MGI for approval and signoff . When changes are made to on-farm management practices the plan must be updated and resubmitted for approval.

All plans will be audited by an independent assessor. For the first three years of receiving scheme water each farm plan will be audited annually. Following three years of full compliance for any property, audits of that property may be reduced in frequency to once every three years. Following each audit the water user will receive an audit report and will be required to remedy any problems that are identified. Operational problems must be corrected before the next irrigation season.

5.2.3 Farm Plan Reporting

Each water user will be required to advise MGI, by 1 August each year, of any changes in the areas to be irrigated and associated land uses during the coming season.

MGI will report on farm plan performance to Canterbury Regional Council as required under consent CRC091977.

5.2.4 Review and Update of Farm Plan Requirements

The specific environmental management requirements for the Farm Plans will be reviewed at least every five years, or if the conditions relating to the relevant RMA consents for the Scheme are changed by the Canterbury Regional Council.

5.3 Farm Plan Goals and Objectives

The Farm Plan template includes 6 different management topics, as required by Consent CRC091997. The topics are:

- Irrigation management
- Soils management
- Nutrient management
- Collected animal effluent management
- Biodiversity and ecosystem management
- Waterway and riparian management

For each topic, the goal, objectives and targets are set by MGI based on enabling the scheme to meet all legal and regulatory requirements, but may also include other matters that MGI considers necessary to achieve high environmental standards.

For most objectives, water users will be able to select management practices that suit their property and land uses, as long as they can demonstrate that they are achieving the targets.

The Farm Management Plans include all of the following objectives:

- To ensure that all irrigation systems on the property are capable of operating to meet industry and scheme standards for best practice irrigation
- To maximise water application effectiveness while minimising excess drainage and runoff
- To minimise the incidence of wind and/or water erosion caused as a result of farming practices
- To minimise nutrient losses to surface and ground water through the use of nutrient budgeting
- To minimise nitrate leaching and/or run-off losses to surface and ground water through careful fertiliser management
- To minimise phosphate run-off losses to surface water through careful fertiliser management
- To apply nutrients where needed to maximise effectiveness and minimise losses to non target areas
- To exclude all cattle, pigs and deer from waterways and wetlands
- To minimise soil loss and contamination of waterways
- To protect significant biodiversity sites, particularly wetlands

5.3.1 Irrigation Management

Goal

The goal for best practice irrigation management is to use water efficiently, minimising runoff and drainage in order to avoid, remedy or mitigate problems arising from:

- Inefficient water application
- Ponding of irrigation water
- Excessive runoff of irrigation water
- Excessive losses to groundwater
- Drainage to other properties

Objectives and targets

The objectives for management of irrigation on-farm cover design, operation and maintenance.

Design and Construction Objective:
To ensure that all irrigation systems on the property are capable of operating to meet industry and scheme standards for best practice irrigation

Achieving good on-farm irrigation system design has major financial and environmental benefits. Management options for achieving efficient water use are likely to be limited if the system design is poor. For new irrigation systems developed after 31 December 2009, MGI requires that designs meet the 'Irrigation Code of Practice and Irrigation Design Standards' March 2007 Irrigation NZ (http://www.irrigationnz.co.nz/publications/code-of-practice/).

Prior to construction of new systems the proposed design must be submitted to MGI for review and approval by a suitably qualified independent person, appointed by MGI. The reviewer will be required to check that the design meets the 'Irrigation Code of Practice and Irrigation Design Standards', and is appropriate for the soils, topography and proposed land uses. Design information provided must include, where relevant:

- Location of water bodies (e.g. rivers, streams, drains, water courses, wetlands) and:
    - Any effects of construction activities on these (e.g. sedimentation)
    - Design measures to avoid application of irrigation water into water bodies or onto riparian areas
- Location of riparian and wetland buffers, proposed stock crossings, fencing, planting etc to ensure that cattle, deer and pigs are excluded, and leaching/runoff of contaminants is avoided.
- Location of any significant wetlands (i.e. those determined by MGI survey)
- Location of pallic type soils (e.g. Ngapara and Claremont)
- How effluent irrigation has been taken into account in design

MGI notes that if any of the proposed construction works (e.g. earth works) require resource consent, it is the responsibility of the water user to obtain these. Users must also comply with all permitted activity requirements such as sedimentation and erosion control during construction.

Design Criteria

- The maximum rate of supply for new irrigation systems is 0.58 l/s/ha. The maximum rate of supply for an individual system must be appropriate for the soil type, and may be less than 0.58 l/s/ha.
- On-farm irrigation efficiency[7] for new developments must be at least 80%.

Seasonal water limit

For all irrigation developed after 2009 the seasonal limit is 700 mm/year. However, in order to demonstrate irrigation is 80% efficient, users must be using no more than 600 mm in an average year and up to 700 mm only in a dry year.

MGI will also encourage other irrigators to move towards greater efficiency, and will consider appropriate methods to achieve this.

Commissioning Report

After the new system has been constructed a report on actual performance of key parameters is required to demonstrate that the system is operating correctly and to design specifications.

As a minimum the commissioning report should include:

- Date of commissioning;

[7] On-farm irrigation efficiency means the volume of water delivered and retained in the root zone after irrigation excluding soil moisture in excess of field capacity that rapidly drains away, divided by the volume of irrigation water delivered to the farm. On-farm irrigation efficiency includes losses from application non-uniformity and excessive application depths, surface run-off, surface redistribution and macro-pore flow, evaporation, and on-farm distribution. Surface run-off means irrigation water that flows over the surface to outside the area of irrigation

- Procedures followed during commissioning;
- Pressures at critical design points;
- Pump pressures and flows; and
- Electrical readings (voltage, amps, etc.) under load.
- Measured application uniformity expressed as CUc[8];
- Estimated surface run-off losses;
- Estimated on-farm irrigation efficiency;
- As-built plan (to scale, with locations, dimensions etc of all key components)

The commissioning report must be carried out a certified Irrigation Evaluator.

Evaluation of Existing Systems

Water users must regularly check and review the performance of their irrigation system and carry out repairs, maintenance and upgrades to ensure that they are operating as efficiently as possible. Evaluation methods suitable for spray systems and designed for non-specialist use include 'DIY Irrigation Evaluation' (Aqualinc) or 'Irrig8quick' (Page Bloomer).

If MGI determines that a water user is operating inefficiently (e.g. runoff issues or excessive water / ha), that user can be required to have a system evaluation performed by a qualified person and carry out recommended improvements. Where it is applicable[9], this evaluation must meet the requirements of the 'Irrigation New Zealand Code of Practice for Irrigation Evaluation' (2006) http://www.irrigationnz.co.nz/publications/code-of-practice/.

As a minimum the evaluation for spray systems should report on:

- Pressures at critical design points;
- Pump pressures and flows; and
- Electrical readings (voltage, amps, etc.) under load.
- Measured application uniformity expressed as CUc[10];
- Estimated surface run-off losses;
- Estimated on-farm irrigation efficiency.

Other water users would be required to report on an evaluation of their system that describes how they comply with MGI requirements for water supply.

Operation and Maintenance

Objectives and targets for operation and maintenance cover best use of water, staff skills and training for day-to-day operation. Excessive and/or persistent runoff or ponding will be considered as non-compliance with water use agreements, and will incur penalties.

[8] CUc is Christensen's coefficient of uniformity and is defined in the "Irrigation Code of Practice and Irrigation Design Standards"
[9] The code applies to pressurised systems including drip, pivot, spray line, travelling and linear move irrigators
[10] CUc is Christensen's coefficient of uniformity and is defined in the "Irrigation Code of Practice and Irrigation Design Standards"

Objective: To ensure all key staff members are fully trained in the operation and maintenance of those aspects of the irrigation system for which they are responsible.
Those responsible for day-to-day operation and maintenance need to be knowledgeable about the system that they are operating. Training is required to minimise problems arising from poor operation. Water users will be required to demonstrate how they ensure that all those who operate irrigation systems are fully trained.

Objective: To maximise water application effectiveness while minimising excess drainage and runoff.
This objective identifies the need to apply the correct amount of water for plant growth, depending on soil type, slope etc. MGI will encourage all water users to use and understand soil moisture monitoring techniques, and the use results to schedule irrigation applications, and will aim, by 2015, to have all farmers demonstrating that they are using soil moisture monitoring as part of their decision making.

Those taking water under consent CRC091977 are required to identify how they are monitoring soil moisture and using this to ensure that excess water is not applied.

The irrigation management practices required here are for soil moisture monitoring to be used to schedule irrigation, and for regular checks on equipment and operations to ensure that excessive application, drainage, ponding and runoff are avoided or fixed if they do occur.

The amount and type of soil moisture monitoring needs to be matched to the size and intensity of the operation and the irrigation system as well as soil type/s etc.

The following guidelines identify suitable options:

For each soil type or farm management block (see Farm Plan) under spray irrigation:

- 1 telemetered Aquaflex; or
- 1 telemetered set of 5 Decagon 'ECH2O-10HS' probes; or
- 1 Sentek 'Diviner2000' portable probe per farm, and 5-10 access tubes per management block; or
- A contracted soil moisture monitoring service providing scheduling advice

Hand held instruments:

- Campbell Scientific 'Hydrosense' hand-held probe[11] or
- Spectrum Technologies 'Field Scout' hand-held probe[12].

While soil moisture meters are recommended, 'dig and feel', which is simple but relatively inaccurate, or other methods, may be adequate, depending on the land use and intensity of water application.

For border dyke irrigation and properties irrigating small areas assessments of soil moisture are also required, especially to determine irrigation requirements in the shoulder seasons.

[11] Not suitable for stony soils
[12] Not suitable for stony soils

In all cases the Farm Plan must set out the proposed methods and the records that will be kept to demonstrate that the method has been used.

5.3.2 Soils Management

Goal

The goal for best practice soils management is to maintain or improve the physical and biological condition of the soils in the scheme area in order to avoid, remedy or mitigate problems arising from:

- loss of topsoil by wind or water erosion
- movement of soil and contaminants into waterways
- damage to soil structure and health
- contamination of soil

Objectives and targets

Objectives to meet the goal are:

- **To minimise the incidence of wind and/or water erosion caused as a result of farming practices.**
- **To optimise soil structure and soil biological activity**
- **To minimise the risk of soil contamination from fertiliser inputs.**

On-farm systems need to be designed to minimise or eliminate problems with soil breakdown and movement caused by the impact of irrigation water (e.g. from high volume sprinkler irrigation) on soil particles. To reduce problems it may be necessary to avoid using particular types of irrigation systems on certain soil types and under some cultivation / farming systems.

In order to avoid soil and contaminants getting into waterways, spray irrigation systems must be operated to apply water at rates that do not result in surface runoff. To minimise soil (and contaminant) loss in the event of heavy rainfall on land with high soil moisture levels suitable riparian buffers must be provided in accordance with best management practices adjacent to rivers and streams. (see Waterway Management Section)

The pallic type soils (e.g. Claremont and Ngapara) which are found in the scheme command area are particularly susceptible to degradation of soil structure. Farm Plans must identify grazing management strategies that will be used to avoid, minimise or mitigate degradation of soil structure integrity on these soils. These could include:

- Winter grazing arrangements to avoid soil treading and compaction damage by stock on wet soils (e.g. feed pads, stand off pads, off-farm grazing)
- Irrigation management (e.g. soil moisture monitoring, depth and timing of effluent irrigation) to ensure that drainage and overland flow are minimised.

5.3.3 Nutrient Management

Goal

The goal for nutrient management is to minimise nutrient losses to water while managing soil fertility to optimise pasture and crop productivity in order to avoid, remedy or mitigate:

- N and P losses from fertiliser and stock into groundwater and surface water
- Runoff, leaching

Objectives and Targets

The objectives and targets for nutrient management are based on industry best practice[13] which uses a nutrient budgeting and management plan process to plan and track inputs and outputs and implement practices that reduce the risk of contamination of ground and surface water.

Nutrient budget and management plan

All water users must:

- Prepare and implement a nutrient budget and management plan appropriate to their land use activities, keep records of fertiliser applications and other inputs;
- Carry out soil tests, appropriate to their land use;
- Include disposal of collected animal effluent to land in the nutrient budget and plan;
- Adopt, as appropriate for their land use activities, the best management practices set out in the 'Code of Practice for Nutrient Management'[14].
- Demonstrate the use of nutrient budgets and plans to minimise nutrient losses.

5.3.4 Effluent Management

The goal for effluent management is to manage effluent systems to optimise the productive benefits of animal effluent while taking all practical steps to avoid contamination of ground and surface water in order to avoid, remedy or mitigate:

- Contamination of groundwater and surface water, especially faecal, N, P

Objectives and Targets

MGI notes that managing collected animal effluent is not a scheme responsibility, but water users must adhere to Canterbury Regional Council requirements and obtain consents if required. However, MGI recognises that the risks to the environment from poor effluent

[13] 'Code of Practice for Nutrient Management (with emphasis on Fertiliser Use)' NZFMRA (2007)
[14] See above

management can be exacerbated through irrigation, and therefore requires all water users who have collected animal effluent (e.g. from dairy shed or piggery) to meet Farm Plan targets for best practice effluent management. In particular, all farm workers must be trained to readily deal with both day-to-day and emergency situations. Failure to comply with effluent requirements will be a breach of water use agreement and dealt with through the compliance procedures i.e. non-compliance with ECAN effluent requirements would put MGI water at risk

In order to minimise adverse effects of irrigation on effluent problems water users will be required to demonstrate that they manage irrigation in effluent irrigation areas. This may include additional soil moisture monitoring in effluent blocks, and particular attention to effluent irrigation when designing new systems.

5.3.5 Waterway and Riparian Management

Goal

The goal is to protect the natural waterways on scheme farms in order to avoid, remedy, or mitigate:

- Stock damage to banks, causing sedimentation
- Contamination of water by stock or agrichemicals
- Soil loss causing sedimentation of waterways
- Poor water quality and stream life

Objectives and Targets

The scheme requires that cattle, deer and pigs are excluded from waterways and their margins. However, controlled sheep grazing, at low stocking rates, is acceptable especially as an option to manage long grass and weeds in riparian areas.

Permanent fences should be set far enough back to allow for bank erosion or changing stream meanders. Temporary fences can be used, especially to protect waterways that only flow intermittently or where grazing is infrequent.

Dairy farmers will be required to meet, as a minimum, the requirements of the 'Dairying and Clean Streams Accord'[15].

Each Farm Plan must identify permanent and intermittently flowing waterways and appropriate management practices.

[15] "Dairying and Clean Streams Accord between Fonterra Co-operative Group, Regional Councils, Ministry for the Environment, and Ministry of Agriculture and Forestry" May 2003

5.3.6 Biodiversity and Ecosystem Management

The scheme goal is to include biodiversity and ecosystem management as an integral part of farm management in order to avoid, remedy, or mitigate:

- Loss of native plants and native animals and their habitats;
- Loss of ecosystem diversity
- Soil health problems
- Loss of habitat for pollinators, beneficial birds, insects etc
- Loss of shelter for stock, crops and soil conservation

New areas of irrigation development (after 31 December 2009) will be required to ensure that any significant natural wetlands identified by the survey carried out by MGI are maintained so that:

- There is no reduction in area; and
- No loss of significant areas of indigenous vegetation; and
- No loss of significant habitats of indigenous fauna; and
- Stock are excluded

MGI will encourage suitable riparian planting for waterway health and biodiversity.

6. Compliance and Enforcement

MGI recognises that it is important to ensure that the water users do comply with the scheme requirements for take and use of water, including the Farm Plan processes. Individual users who do not adhere to the requirements can put the consents for the whole scheme at risk.

Issues of possible non-compliance will be dealt with by establishing procedures for responding to such matters and ensuring that these are implemented when necessary. Water user compliance can be determined either through concerns raised at any time (e.g. by public, neighbour, scheme manager etc.), or as a result of the audit process.

6.1 Promoting water user compliance

MGI will use educational programmes, technical assistance, reduction in audit requirements for good performance and other methods to promote, support and encourage compliance by water users with sustainable irrigated land use requirements.

6.2 Monitoring water user compliance

MGI will monitor compliance, including:

- Inspections and audits, both internal and independent;
- Responding to complaints of non-compliance.

6.3 Water user non-compliance

MGI will respond to breaches by following through an established protocol e.g.

- Notification of breach or alleged breach – phone call, warning letters, notice of violation, inspections (e.g. notice and order to comply)
- Entering discussions and providing advice to those out of compliance in order to develop a programme to achieve compliance
- Action, where necessary:
  - To compel compliance;
  - To impose consequences for breaches (e.g. fines/charges, water restricted/cut off);
  - To correct damages.

Penalties should take into account the:

- Seriousness of the non-compliance;
- Degree of co-operation;
- History of non-compliance.

6.4 Compliance committee

MGI will set up a compliance committee to deal with breaches that cannot be resolved through discussion and advice, or that may have incurred costs to MGI or others. This committee would have the power to:

- Impose a penalty charge upon a water user for breach of their agreement with MGI for supply of water;
- Convene a hearing so that disputes or issues can be presented;
- Restrict or cut off water.

The committee would have a membership of three:

1. Two members appointed by the Board of directors of MGI
2. An independent Chairperson, appointed by the Board of MGI, to ensure that the committee has a balanced representation that includes both farming and environmental management expertise.

Appendix 1: Summary of Consent Conditions[16]

To take and use water for irrigation

Relevant consents	
CRC000897, CRC897381C.2, and CRC091997. Expire April 2028	
Regular monitoring and operational conditions	
Condition	**ECan reporting**
Record flow takes continually at Stone Wall and Bells Pond	Monthly
Record individual on-farm flows for all irrigation since 2001	Annual by 31 Aug
Summary of farms irrigated, area of irrigation, and when irrigation was developed.	Annual by 31 Aug
Farm plan audits summary	Annual by 31 Aug
One-off deadlines	
Condition	**Deadline**
Irrigation developed since 2001 must have meters [& telemetry] installed and recording.	1 Sept 2010
Wetlands mapped	1 Sept 2010
Scheme environmental strategy operative	Jan 2012
Farm environmental plans operative for all irrigation developed since 2001	Jan 2012
Key scheme conditions	
Comply with Waitaki River minimum flow restrictions	
Stone Wall maximum take 6,000 l/s	
Bells Pond maximum take 14,300 l/s	
Seasonal limit during irrigation season: 330Mm^3/y max. Average of 310Mm3/y in any 3 consecutive seasons.	
Maximum area of irrigation: 26,700 ha	
Key conditions for irrigation developed after 2009	
Sampling and ecological surveys of potentially effected foothill streams	
Operative and audited farm plan	
Irrigation systems comply with Irrigation NZ code of practice	

[16] This summary of consent conditions has been prepared by Aqualinc Ltd. While it has been prepared with due care, for certainty please check the relevant consent.

Exclude cattle and deer from all water ways
Retain and fence any wetlands
Net positive effect on stream water quality

By-wash and augmenting the Waihao River

Relevant consents	
CRC897381C.2, CRC091998, CRC093391 and CRC093392. Expire April 2028	
Regular monitoring and operational conditions	
Condition	**ECan reporting**
Record Lateral 3 and Lower Main race discharge flows continually	Monthly
Sample for Nitrogen, E-Coli, and turbidity at (1) Bells Pond; (2) Lateral 3 discharge; (3) Lower main race discharge; and (4) Waihao River 100m upstream of Lower main race.	Monthly
Outside irrigation season, record flow takes continually at Bells Pond	Annual by 31 Aug
Key conditions during irrigation season	
Minimum 300 l/s discharge from Lateral 3	
Minimum 400 l/s discharge from Lower main race	
Maximum discharge *per race* of 1,700 l/s	
Maximum flow rate change: 500l/s per hour *per race*	
Key conditions outside irrigation season	
Comply with Waitaki Plan minimum flow restrictions	
Minimum 700 l/s from Lateral 3 (or Lower Main Race if Lateral 3 is under maintenance) when the Waihao at McCulloughs is less than 660 l/s; or 250l/s when McCulloughs is less than 800 l/s	
Maximum discharge of 1,500 l/s	
Maximum flow rate change: 500l/s per hour [however lower ramping rate recommended]	

Other by-washes

Consent	Expiry date	Location	Max. flow
CRC040814	Feb 2039	Waikakahi Stream @ Cock and Hen Road	450 l/s
CRC040815	Apr 2028	Whitneys Creek	Peak 84l/s. 45 l/s average daily
CRC897373	Apr 2028	Stone wall race overflow pond	2,830l/s
CRC897374	Apr 2028	Redcliffs Lateral 1 to Elephant Hill Stream	1,130l/s
CRC897375	Apr 2028	Redcliffs main race to Waihuna Stream.	1,560l/s
CRC897376	Apr 2028	Redcliffs main race to Elephant Hill Stream	1,130l/s
CRC897378	Apr 2028	Redcliffs Lateral 2A to Redcliff Stream	230l/s
CRC897380	Apr 2028	Redcliffs Lateral 2 to Redcliff Stream	230l/s
CRC897381D	Apr 2028	Bells Pond to Waitaki River	2,000l/s
CRC897382	Apr 2028	Bells Pond Lateral 2A to Waitaki River	Peak 570l/s. 57l/s average weekly
CRC897383	Apr 2028	Bells Pond Lateral 7 to Waitaki River	2,270l/s
CRC897384	Apr 2028	Bells Pond race (Ross Road) to Waitaki River	600l/s
CRC897385	Apr 2028	Bells Pond race (Ross Road) to Waitaki River	550l/s
CRC897386	Apr 2028	Bells Pond race (Ross Road) to Waitaki River	500l/s
CRC897387	Apr 2028	Bells Pond race (Glenavy Tawai Road) to Waikakahi Stream	1,000l/s
CRC897388	Apr 2028	Bells Pond race to Waikakahi Stream	300l/s
CRC897389	Apr 2028	Bells Pond race (Old Ferry Road) to Witneys Creek	100l/s
CRC921492	Apr 2028	Bells Pond Lateral 11 to sea	1,700l/s
Key conditions			
No bank erosion			

Other consents

Consent	Expiry date	Description	Comments
Divert consents			
CRC897372A	Apr 2028	Divert - Stone Wall	Consent descriptions need to be amended.
CRC897381B	Apr 2028	Divert - Top Pond	
Maintenance consents			
CRC041171	Apr 2028	Maintenance work on inverted siphon beneath Waihao River	Refer to consents for conditions when undertaking maintenance.
CRC916272A	Jun 2015	Maintenance work: Waitaki intakes	
CRC916272B	Jun 2015	Maintenance work: Waitaki intakes	
CRC917370	Apr 2028	Maintenance work: Stone wall intake	
CRC917371	Apr 2028	Maintenance work: Top pond intake	
Construction consents			
CRC970317	Apr 2028	Construction: Stone Wall intake divert	Conditions are redundant since construction is complete
CRC970786	Apr 2028	Construction: Pipe under Elephant Stream	
CRC970787	Apr 2028	Construction: Pipe under Waihuna Stream	
CRC992069	May 2034	Construction/maintenance: Waihuna Stream	
CRC041626	Mar 2039	Construction: Lay pipe under Sinclairs Creek, Meikles Creek and Willowbridge Creek	
Redundant consents			
CRC000898	Jul 2010	By-wash discharge. Waihao River	Do not renew consents when they expire
CRC000900	Jul 2010	By-wash discharge. Waihao River	

Appendix 2: Map of Command Area