BEFORE THE CANTERBURY REGIONAL COUNCIL

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	of resource consent applications made by **VARIOUS PARTIES** to the **CANTERBURY REGIONAL COUNCIL** associated with the irrigation of 25,000ha of land in the Upper Waitaki Catchment.

EVIDENCE OF JOHN KYLE
ON BEHALF OF MACKENZIE WATER RESEARCH LIMITED
(2 SEPTEMBER 2009)

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1. INTRODUCTION

Qualifications and Experience

1.1 My name is John Kyle. I hold an honours degree in Regional Planning from Massey University, obtained in 1987. I am a Partner with the firm Mitchell Partnerships Limited, which practices as a planning and environmental consultancy throughout New Zealand, with offices in Auckland and Dunedin.

1.2 I have been engaged in the field of town and country planning and resource and environmental management for twenty two years. My experience includes a mix of local authority and consultancy resource management work. In recent years, this experience has retained a particular emphasis on providing consultancy advice with respect to Regional and District Plans, designations, resource consents and environmental management and environmental impact assessments. This includes extensive experience with large-scale projects involving inputs from a multidisciplinary team.

1.3 An outline of projects in which I have been called upon to provide resource management advice in recent times is included as **Appendix A**.

1.4 I have read and agree to comply with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note for Expert Witnesses (31 March 2005).

Scope of Evidence

1.5 I have been commissioned by Mackenzie Water Research Limited (MWRL) to present at this hearing with respect to three specific matters being:

(a) to provide an overview of the relevant planning instruments that are pertinent to the proposed irrigation of agricultural land within the Upper Waitaki Catchment;
(b) to assess the outcomes of the MWRL Water Quality Study (WQS) by reference to the relevant objectives of the relevant planning documents; and
(c) to describe the approach adopted by the MWRL participants in order to address potential cumulative water quality effects arising from agricultural intensification in the Upper Waitaki Catchment, including recommending conditions of consent which are intended to apply to all consent holders

and which require adherence to the monitoring and mitigation regime set out in the WQS.

1.6 My evidence does not provide any assessment of the merits of the individual applications that have been made by the various MWRL participants. Rather, this brief comprises an overview statement and the respective merits of the various applications made will be brought before you later in this hearing process. My evidence today covers the following topics:

- Planning framework;
- Overview of the relevant regional planning provisions;
- An assessment of the efficacy of the cumulative effects assessment and the approach to the management of nutrient runoff proposed;
- Evaluation of suggested mitigation measures;
- The use of adaptive management as a tool; and
- Recommended conditions of consent.

2. PLANNING FRAMEWORK

Waitaki Catchment Allocation Regional Plan (WRP)

2.1 Section 14 and 15 of the Resource Management (Waitaki Catchment) Amendment Act 2004 state that:

> *"The regional plan developed and approved under this Part, when it is operative in accordance with section 27, -*
>
> *(a) Is the Canterbury Regional Plan for the allocation of water in that part of the Waitaki catchment that is within the Canterbury region; and…*[1]*"*

> *"Where the regional plan is developed and approved under this Part and is operative in accordance with section 2, the Canterbury Regional Council may prepare or change any other regional plan, including a regional plan relating to water in the Waitaki Catchment –*
>
> *(a) In a manner that is consistent with the regional plan development and approved under this Part; and*
>
> *(b) Provided the plan does not deal with the allocation of water in the Waitaki Catchment*[2]*".*

1 Section 14 Waitaki Catchment Amendment Act 2004
2 Section 15 Waitaki Catchment Amendment Act 2004

2.2 Other regional planning documents (e.g. the Transitional Regional Plan (TRP) and the Proposed Natural Resources Regional Plan (NRRP) are therefore prevented from dealing with the allocation of water within the Waitaki Catchment.

2.3 The Waitaki Catchment Water Allocation Regional Plan (WRP) provides for the allocation of water in the Waitaki catchment. The WRP identifies that water is essential in sustaining the natural and social values of the catchment[3]. It identifies that water is required for a number of differing values and at times these values can compete with each other.

2.4 The WRP states that water allocation has a relationship with other aspects of resource management including landscape, water quality, soil and bank erosion, wetland fencing and siltation, operational management of beds and rivers and the management of floods[4]. However, the WRP does not specifically address these issues.

2.5 Water allocation is defined in the WRP as:

> *"addressing the taking, using, damming, and diverting of water in relation to the following matters:*
>
> - *A whole catchment approach*
> - *Environmental flow and level regimes*
> - *The mixing of waters*
> - *The allocation to activities*
> - *Efficient and effective use*
> - *Water metering*
> - *Transfer of resource consents*
> - *Restrictions during times of low water availability*
> - *Replacement of existing consents[5]".*

2.6 Table 2[6] of the WRP identifies the issues relating to water allocation and use in the Waitaki Catchment. Table 2 acknowledges that the taking, using, damming and diversion of water can reduce or alter surface water flows, groundwater,

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3 WRP, page 14
4 WRP, page 19
5 WRP, page 19
6 WRP, page 21

wetland or lake levels and may adversely affect the availability of water necessary to meet other requirements. The WRP also notes that there is competition between different users of water, within the same activity and between present and future water users.

2.7 It is these issues which form the basis of the objectives, policies and methods in the WRP which are discussed in section 3.0 below.

Activity Status

2.8 The following rules apply to all applicants seeking to extract water from the Upper Waitaki.

2.9 It is permitted in the WRP to take water up to a volume of $10m^3$ per day, at a rate not exceeding 5 litres per second. This applies only to those water bodies identified in the WRP as not having High Natural Character[7].

2.10 The primary control in regard to water allocation in the Waitaki catchment is through Rules 2[8], 3[9] and 6[10] of the WRP. Rules 2 and 3 require that the taking, damming, diverting and using of water must be within the allocation limit set for the particular water body affected, and is subject to any minimum flow or lake level, flow sharing regime and flushing flow specified in Table 3[11] of the WRP or minimum lake levels specified in Table 4[12].

2.11 Any activity which fails to comply with Rule 2 (i.e. the conditions in Table 3) is a non complying activity. Any activity which fails to comply with Rule 3 (i.e. the conditions in Table 4) is a prohibited activity. It is noted that it is not a permitted activity to take and use water in accordance with the minimum flows specified in the WRP (Table 3). Subject to meeting other conditions, if the minimum specified flows are complied with, the take and use of water is a discretionary activity.

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7 Policy 2 of the WRP lists all High Natural Character water bodies in the Waitaki catchment.
8 WRP, page 46
9 WRP, page 50
10 WRP, page 52
11 WRP, page 46
12 WRP, page 50

2.12 Rule 6 requires that takes shall be within the annual allocations expressed in Table 5[13]. Any activity which complies with the annual allocation volumes expressed in Table 5 is a discretionary activity and the consent authority is required to have regard to a number of policies within the WRP. These are identified later in this statement. If the annual allocation volumes are exceeded, any further resource consent applications must be considered as a non complying activity pursuant to Rule 16[14]. The allocations identified in Table 5 provide for existing water takes and those (generally abstractive) takes that can be reasonably foreseen (150 million cubic metres per annum for irrigation of some 25,000ha). Of note is the specific reference to the agreement entered into by Mackenzie Irrigation Company (MIC) Limited and Meridian Energy Limited. This agreement effectively enables up to 25,000ha of new irrigation in the Upper Waitaki catchment. Annex I to the WRP states that:

> "*Mackenzie Irrigation Company, on behalf of a large number of land owners in the upper Waitaki catchment, submitted that through the MEL-MIC agreement, MEL had agreed to make available a maximum quantity of 150 million cubic metres per annum to be used for additional irrigation of some 25,000 hectares in the upper catchment. The Board accepted that this is a realistic estimate of an area for future irrigation in the upper Waitaki catchment.*
>
> *The Board had regard to the MIC agreement and decided to make an allocation in the Plan that would allow effect to be given to the substance of the agreement. Based on the evidence of possible expansion in irrigation as proposed by the owners of land situated above the outlets of Lakes Tekapo, Pukaki and Ohau, as well as evidence of the additional areas of land that might be serviced by takes directly from these three lakes, the Board decided to allocate volumes of 8 million m^3 from each of Lakes Tekapo and Pukaki, and 12 million m^3 from Lake Ohau, within the total 275 million m^3 to agriculture and horticulture in the Upper Waitaki catchment"*[15].

2.13 Those takes which are within the allocation limits identified in Table 5, require consent as a discretionary activity. Any application which has the effect of exceeding the allocation limits (either individually or cumulatively when considered against other applicants who may have priority) identified in Table 5, require consent for a non complying activity. It should be noted that the

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13 WRP, page 52
14 WRP, page 55
15 Annex 1, WRP paragraph 205 and 206, pg 36

evidence of Mr. McIndoe concludes that the applications before the Committee fall below the 275 million cubic metre limit. I anticipate that each individual applicant will undertake an assessment in order to determine the activity status under the WRP.

Transitional Regional Plan (TRP)

2.14 The TRP became operative in October 1991 and is still in effect as the Council has not resolved to withdraw this document. However as stated earlier the abstraction and use of water is addressed via the WRP. Therefore it is my view that consideration of water abstraction in terms of the TRP is not necessary.

Proposed Natural Resources Regional Plan (NRRP)

2.15 The NRRP addresses sustainable management of natural resources in the Canterbury Region and consists of eight chapters. The first three were notified in 2002, and the remainder were notified in 2004. The Council's decision on Chapters 1 – 3 was released in September 2007, and a number of appeals have been made to that decision. Chapters 4 - 8 are currently going through a hearing process that commenced in 2006.

Land and Water Use

2.16 Generally applicants in the Upper Waitaki have applied to take and use water for irrigation purposes. There has been some debate as to whether or not consent is required under the provisions of the NRRP for the use of water for irrigation and any resulting discharges of that water and any entrained contaminants into groundwater. Without wishing to be unduly critical, many of the provisions included in the NRRP are drafted in a way that renders them difficult (and in some cases impossible) to administer. Many of the rules are not expressed with sufficient certainty, and when one comes to interpret them, one is often confronted with a situation whereby it is not at all clear whether a given activity is captured by a rule or not. This situation has of course been raised by numerous parties in submissions and evidence presented to the NRRP hearings panel. The officers advising that panel, and the members of the panel itself, have expressed that in many areas, the drafting of the plan is not ideal. As yet though, decisions on submissions have not been issued. The various applications that are being called before this panel are in a position whereby they must be considered against a set of provisions which clearly have some deficiencies. In my opinion, this poses a significant challenge to any of the

parties in ably determining which elements of a given proposal might or might not be subject to the various Plan rules. Moreover, I hold the view that when the various applications are considered against the objectives and policies of the NRRP, this situation should have a significant bearing on the weight to be attached in the course of evaluation. I expect that the individual applicants will address you on this matter as the hearing proceeds.

2.17 Chapter 4 of the NRRP relates to the management of the region's water quality. The Upper Waitaki area is identified as being largely situated within the Mackenzie Basin Groundwater Allocation Zone. The planning maps also identify much of the Upper Waitaki Catchment as being within 'Zone IB'. Zone IB relates to inland basins in the Waitaki area. Section 4.8 of Chapter 4 states that many of these areas could be subject to land use intensification with potentially adverse effects on groundwater and surface water quality[16].

2.18 Below I outline the NRRP rules that are of potential relevance to the use of water in the Upper Waitaki.

Relevant Rules

2.19 Rules WQL18[17] and 19[18] relate to the use of land that may result in the discharge of contaminants into groundwater. Rule WQL18 relates specifically to the use of land that may result in the discharge of nitrate-nitrogen into groundwater in an unconfined or semi-confined aquifer. Such a discharge is permitted subject to a number of technical conditions (e.g. average annual concentration of nitrate-nitrogen). Rule WQL18 is only applicable where WQL19 does not apply. If the conditions attached to Rule WQL18 can not be met, and consent has not been obtained by Rule WQL19, consent is required as a discretionary activity pursuant to Rule WQL59[19]. I note however that Rule WQL18 does not take effect until the Plan and the rule becomes operative. Consequently, it does not apply to these proceedings.

2.20 Rule WQL19 relates to the use of land that may result in the discharge of contaminants into groundwater in an unconfined or semi-confined aquifer or surface water in an inland basin. Consent for a Discretionary Activity is

16 Chapter 4, NRRP page 4 -211
17 Chapter 4, NRRP page 4-122
18 Chapter 4, NRRP page 4-124
19 Chapter 4, NRRP page 4-174

required. Condition 1 of Rule WQL19 requires the preparation of a property management plan.

2.21 The development of a property management plan is set out in section 4.7.5.4[20] and requires an applicant to address:

- Stock types, stocking rates and duration;
- The location of facilities including fences, tracks, stormwater systems, pits to dispose animal waste or domestic refuse, culverts, bridges, feed pads and stock holding pads,
- The management of riparian margins and wetlands,
- The type, frequency and location of inputs including water and nutrients including fertiliser, animal effluent and imported feed,
- Cultivation practices, including the type of crops, area under cultivation, timing of planting, and
- Details of how the adverse effects will be monitored, reporting of effluent fertiliser and who will take responsibility for monitoring and reporting to Environment Canterbury.

2.22 Failure to comply with the conditions attached to Rule WQL19 means that the activity will be non complying pursuant to Rule WQL61[21]. Rule WQL61 relate to the discharge of a contaminant onto or into land.

2.23 Rule WQL62[22] also refers to the use of land for certain activities, including the use of land in Zone IB that may result in contaminants entering ground or surface water. An activity requiring consent under Rule WQL62, is a non complying activity.

2.24 In the following section of my evidence I undertake a review of these rules and determine their relevance to the Upper Waitaki applications.

Assessment

2.25 Rule WQL18 is relevant to the subject applications. However, the NRRP is clear that Rule WQL18 has no effect until it is made operative. As stated

[20] Chapter 4, NRRP page 4-190
[21] Chapter 4, NRRP page 4-178
[22] Chapter 4, NRRP page 4-179

above, Rule WQL18 is not applicable at this time. Given this, it is my view that Rule WQL59 cannot be considered to be applicable at this time either.

2.26 Rule WQL19 clearly applies to activities in the Waitaki Basin resulting from the use of irrigation water. It is intended to specifically address land use intensification associated with irrigation and farm management procedures. However, Rule WQL19 only applies "where the use of water is authorised under Rule WQN26". Rule WQN26[23] (which appears in Chapter 5 of the NRRP) relates to the use of water for irrigation purposes (allocation and efficiency rates). Rule WQN26 is not, in my opinion, applicable within the Upper Waitaki as the allocation and use of water within the Waitaki catchment is covered by the WRP, which replaces the NRRP for those activities. It is therefore my view that Rule WQN26 cannot be applied, and consequently neither can Rule WQL19. I note, for completeness, that the provisions of the NRRP were drafted prior to the WRP being developed. This could explain why the NRRP was drafted such that WQL19 appears to apply to land use intensification activities in the Waitaki Region.

2.27 If that were to be the case an applicant would need to prepare a farm management plan in order to comply with condition 1. These would need to be developed to address the requirements of section 4.7.5.4 of the NRRP. As will become apparent from the cases of the individual applicants, the MWRL participants are relying on the development of and adherence to such plans to guide their individual farming practices. This obligation arises from the approach advocated within the WQS and represents a critical tool that is being advanced by the applicants. On this basis the obligation emanating from Rule WQL19 will be met in any event.

2.28 Rule WQL62 also refers to the use of land for certain activities, including the use of land in Zone IB that may result in contaminants entering ground or surface water (refer to **Appendix B**). It is not clear if this rule applies to the applications at issue. The drafting of Rule WQL62(1)(a) and (b) is poor and this creates confusion as to how the rule should be applied.

[23] Chapter 5, NRRP page 5-147

2.29 On first reading of Rule WQL62(1)(a) it would appear to be a catch all for any use of land in Zone IB that *may* result in contaminants entering ground or surface water. However it is my opinion that this rule is only intended to apply where condition 1 of Rule WQL19 cannot be complied with (and as noted above Rule WQL 19 does not apply to the applications). This is confirmed by the statement which follows Rule WQL62(1)(b) which clearly states "*that does not comply with Condition 1 of Rule WQL19.* In my view this part of the rule is intended to apply to the entirety of Rule WQL62(1). This is consistent with the structure of the other conditions contained within Rule WQL62, and is consistent with the structure of the NRRP. It is therefore concluded that Rule WQL62 is not applicable to these applications, as they will comply with condition 1 of Rule WQL19 as outlined above.

2.30 On the basis of the foregoing, I conclude that the use of irrigation water in the manner and locations proposed by the MWRL participants does not contravene any rule of the NRRP such that a consent is required.

2.31 Overall, I conclude that consent is not required for the use of water for irrigation and stockwater purposes under the NRRP.

2.32 Detail relating to stockwater takes will be provided by the individual applicants in presenting their applications. It is important to signal however that some parties are seeking consent for stockwater under the provisions of the WRP, whilst others are relying on s14(3)(b) of the Resource Management Act 1991. This section of the Act relates to the taking of water for the reasonable needs of an individual's animals for drinking water. I have attached as **Appendix D** a series of consent conditions that I recommend apply to those that have sought consent for their stockwater take.

3. OBJECTIVES AND POLICIES OF THE REGIONAL PLANNING DOCUMENTS

3.1 The following planning instruments are considered to be relevant to the assessment of applications to take and use water in the Upper Waitaki catchment:

- Canterbury Regional Policy Statement

- Waitaki Catchment Allocation Plan
- Proposed Natural Resources Regional Plan

Canterbury Regional Policy Statement

3.2 The Canterbury Regional Policy Statement (RPS) was made operative on 26 June 1998. A broad range of objectives and policies set out within the RPS are generally relevant to water abstraction and use. The chapters of relevance are:

- Chapter 6 - Provision for the relationship of Tangata Whenua with Resources;
- Chapter 7 - Soils and land use;
- Chapter 8 - Landscape, ecology and heritage;
- Chapter 9 - Water;
- Chapter 10 - Beds of rivers and lakes and their margins.

3.3 The relevant objectives and policies in Chapter 6 seek to enable Tangata Whenua to exercise their relationship, culture and their traditions with their resources including land and water to the fullest extent practicable[24]. A method to achieve this is identified as being through resource management practices and planning including provisions in plans, and decisions on resource consents[25].

3.4 A Cultural Impact Assessment (CIA) was prepared by Tipa and Associates[26] in relation to new and existing irrigation in the Upper Waitaki Catchment. This assessment was commissioned by MWRL to inform the overall impact assessment of irrigating an additional 25,000ha of land. The CIA and a peer review of that assessment by Buddy Mikaere[27] are attached to my evidence as **Appendix E**.

3.5 The peer review of the CIA found that all the cultural impact matters identified are capable of being addressed. Importantly, the efficacy of that response relies on the ability of the individual applicants and Te Runanga o Ngai Tahu (TRONT) to work together to address the issues of concern. A proposed

[24] Canterbury RPS, Chapter 6, Objective 1
[25] Canterbury RPS, Chapter 6, Policy 3
[26] Tipa G, & Nelson K, *Cultural Impact Assessment of New and Existing Irrigation in the Upper Waitaki*, February 2009.
[27] Mikaere, B. Cultural Impact Assessment – Peer Review, 2009.

consultation framework between TRONT and the applicants is offered by Mr Mikaere and this is in line with TRONT's proposal for the establishment of a consultation forum. I understand that many applicants have accepted the recommendations offered by the CIA and Mr. Mikaere's review of the same and have engaged with TRONT representatives over their proposals.

3.6 Chapter 7 is specific to soil and land use. Issues in this chapter are identified as:

- Degradation in the quality and life supporting capacity of soils;
- Land use activities which reduce the availability of land comprising versatile soils;
- Land use activities which result in soil contamination and consequent adverse effects;
- Land use effects on water quantity and quality in catchments.

3.7 Policy 1 seeks that:

> *"Land use activities that actually or potentially have significant adverse effects on the following soil quality factors: soil structure, organic content, soil fauna, water holding capacity, and soil fertility, should be avoided or those effects remedied or mitigated.*
>
> *Significant adverse effects on any of these factors include:*
>
> *(a) any deleterious change in a soil quality factor which would persist for 25 years or more, or would be impracticable to remedy;*
>
> *(b) a change in a soil quality factor that increases the rate of runoff and/or nutrient contribution to waterbodies"*[28].

3.8 A number of objectives and policies within Chapter 7 also seek to prevent soil erosion. The use of irrigation which assists to establish groundcover after cultivation, or maintain it in drought is identified in the RPS as a method to avoid soil erosion[29].

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[28] Canterbury RPS, Chapter 7, Policy 1
[29] Canterbury RPS, explanation to Policy 2 pg 81

3.9 Chapter 8 relates to landscape, ecology and heritage. Objectives 1, 2 and 3 relate to the protection or enhancement of wetlands, landscape, indigenous vegetation and habitats of indigenous fauna and heritage. Policy 3 seeks to protect natural features and landscapes (of significance) from the adverse effects of the use and development. It states that:

> *"Activities that may have adverse effects include those involving the clearance or modification of areas of indigenous vegetation, earthworks, alteration to landforms, tree planting or the erection of structures".*

3.10 Irrigation is not listed as a potentially adverse effect on the landscape. However it should be noted that the Waitaki Catchment is identified as a regionally significant landscape in the RPS. The implications of this are discussed later in my evidence.

3.11 Chapter 9 is specific to water and its use. Issue 1 states that:

> *"There are competing demands for the quantity of water in water bodies from: abstractors; those who discharge into water either directly or indirectly through activities on land; instream users including those who store water and generate electricity; those who drain or divert water; fishers and other recreational users; those who value the water for its natural character and its ecological life supporting capacity; and Tangata Whenua who value the water for its wahi tapu, wahi taonga and mahinga kai".*

3.12 Issue 3 states:

> *"Land uses and the discharges of contaminants into water or onto or into land, can adversely affect water bodies and coastal waters including; their ecological value; their use by present and future generations; and their recreational, cultural, social, economic, health and other values to the Canterbury community. Point source discharges can also compromise the cultural relationship of Tangata Whenua who value water for its wahi tapu, wahi taonga and mahinga kai".*

3.13 Objectives 1, 2 and 3 of Chapter 9 relate to the allocation of water for present and future generations while seeking to safeguard the values of the relevant water body, the use of land where it affects flows in a water body and water quality.

3.14 Through the implementation of objectives and policies in Chapter 9 the following environmental results are anticipated:

- Protection of the life supporting capacity of water resources;
- Efficient use and better water availability;
- Greater benefits from the use, development and protection of water bodies;
- The maintenance of the health, integrity and value of groundwater[30].

3.15 Chapter 10 relates to beds of rivers and lakes and their margins. Objectives and policies seek to ensure that land use and development *within the beds and margins of lakes and rivers* does not have an adverse effect on:

- areas of natural character,
- significant habitats of indigenous flora and fauna,
- significant natural features and landscapes,
- recreational and amenity values,
- public access,
- tangata whenua or heritage values,
- significant areas of trout and salmon.

3.16 Objectives also seek to protect the stability and performance of essential structures in river beds and their margins. Policies also seek to retain and establish riparian vegetation[31].

Waitaki Catchment Allocation Regional Plan

3.17 The WRP contains objectives and policies relevant to the assessment of water take and use applications.

Objectives

3.18 The WRP contains 5 objectives, all of which are considered relevant to the take and use of water within the Waitaki Catchment.

30 Canterbury RPS, pg 144
31 Canterbury RPS, Chapter 10, Objectives 1, 2, 3, 4 and Policies 1,2,3,4,5,6,7

3.19 Objective 1 sets out the overarching aim of the WRP *"to sustain the qualities of the environment of the Waitaki River and associated beds, banks, margins, tributaries, lakes, wetlands and aquifers…".*

3.20 Objective 1 contains a number of anticipated outcomes including:

> *(a) recognising the importance of maintaining the integrity of the mauri in meeting the specific spiritual and cultural needs of the tangata whenua, and by recognising the interconnected nature of the river.*
> *(b) Safeguarding the life supporting capacity of the river and its ecosystems.*
> *(c) Managing the water bodies in a way that maintains natural landscape and amenity characteristics and qualities that people appreciate and enjoy.*
> *(d) Safeguarding the integrity, form, functioning and resilience of the braided river system;*
> *(e) Providing for individual's reasonable domestic water needs;*
> *(f) Providing for individual's reasonable needs for their animals' drinking water;*
> *(g) Providing for fire-fighting water needs.*

3.21 Objective 2 seeks:

> *"To the extent consistent with Objective 1, to enable people and communities to provide for their social, economic and cultural wellbeing and their health and safety, by providing for water for:*
> *(a) town and community water supplies;*
> *(b) hydro-electricity generation;*
> *(c) agricultural and horticultural activities;*
> *(d) industrial and commercial activities;*
> *(e) tourism and recreational facilities;*
> *(f) any other activities[32]."*

3.22 This objective provides for water to be taken for agricultural and horticulture purposes to the extent that the effects of the activity are consistent with Objective 1. It is stated in the WRP that the order of the items listed does not imply importance or priority.

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[32] Annex 1 to the WRP, paragraph 95, page 18 states that originally objective 2 contained the term "future unknown activities", however this was later reworded to read "any other activities". The exact meaning of this is not detailed in this Annex 1, but it is implied that it relates to future activities not already provided for.

3.23 Objective 3 states:

> ***Objective 3*** *In allocating water, to recognise beneficial and adverse effects on the environment and both the national and local costs and benefits (environmental, social, cultural and economic).*[33]

3.24 It is noted in the discussion in Annex 1 to the WRP that no weighting should be given to local costs and benefits over national costs and benefits. Therefore, to be consistent with this objective, the beneficial and adverse effects of an activity are to be recognised at both a local and national scale.

3.25 Objective 4 states:

> ***Objective 4*** *To promote the achievement of a high level of technical efficiency in the use of allocated water.*[34]

3.26 The WRP requires the resource to be used *"…in a way that any given output is produced at least cost, including avoiding waste".* This objective seeks to ensure that water is not used in a manner that is wasteful or inefficient. Each applicant will present evidence on their irrigation not being inefficient or wasteful. This objective also recognises that there are a number of competing demands for its use (both instream and abstractive). This matter is dealt with in the Economic Impact Assessment prepared by Butcher Partners[35]. Please refer to **Appendix F** for a copy of this assessment.

3.27 Objective 5 states:

> *To provide for a practical and fair sharing of allocated water during times of low water availability.*[36]

3.28 It is anticipated that the sharing and allocation of water during periods of low water availability would be addressed by the applicants and the Regional Council through the consenting process.

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33 WRP, page 24
34 WRP, page 24
35 Butcher Partners Ltd, *Upper Waitaki – Mackenzie Irrigation Economic Impact Assessment*, April 2009.
36 WRP, page 24

Policies

3.29 The WRP contains 46 policies which are set out to achieve Objectives 1 – 5. The policy framework is one which is largely effects based. The policies discussed below are considered particularly relevant.

3.30 Policies 2 – 8 all deal with environmental flow and level regimes. Policy 2 recognises that some water bodies should be managed to retain their high natural character values. Identified water resources are the tributaries of Lakes Tekapo, Pukaki and Ohau.

3.31 Policies 3[37], 4[38] and 5[39] recognise the range of components that may make up the environmental flow and level regime in any particular instance including flow sharing, allocation limits, flushing flows and minimum flows and levels. Matters identified include:

- mauri and healthy ecosystems of indigenous species;
- effects on iwi sites of significance;
- natural character, landscape and visual amenity;
- vegetation within and adjacent to the water body;
- habitats;
- fish passage;
- effects on water quality.

3.32 It is stated in the explanation to policies 4 and 5 that *"these [matters] should be addressed when considering an application for a resource consent that is a non complying activity in respect of the environmental flow and level regimes established in this Plan".* Under Rule 19 of the WRP Policies 4 and 5 are also relevant assessment matters for discretionary activities.

3.33 Policies 11[40], 12[41], 13[42] and 14[43] deal with the allocation of water and outline values to consider when allocating water to agricultural and horticultural activities.

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37 WRP, page 26
38 WRP, page 26
39 WRP, page 27
40 WRP, page 30
41 WRP, page 31
42 WRP, page 32

3.34 Policy 11 outlines the scope of effects as they are to be considered when allocating water to activities in the WRP. This includes:

> *(a) Tangata Whenua values;*
> *(b) National effects refer to those that arise within New Zealand;*
> *(c) Local effects refer to those which arise in the Mackenzie District, the Waimate District and the Waitaki District.*

3.35 According to the evidence of Mr McIndoe, the cumulative water take does not exceed that specified by the WRP of 275m^3/year.

3.36 Accordingly effects are to be considered from both national and local perspectives (11(b) and 11(c)). Agriculture and horticultural activities play a significant role in New Zealand's economy and this should be recognised on both a national and local level. The proposed abstractions for irrigation and stockwater purposes will contribute to the long term needs of individual applicants for a reliable water supply, as well as provide the associated economic and social benefits to them and local communities supported by farming in the area. This is further emphasised in the Economic Impact Assessment by Butcher Partners.

3.37 Policy 12 outlines a number of matters that must be considered when allocating water to an activity and links directly to Rule 6 and the annual allocations outlined in Table 5 of the WRP. The matters include:

- *regard to national and local effects;*
- *reference to relevant national, regional and local plans and strategies;*
- *recognising the iconic nature of Lakes Tekapo, Pukaki and Ohau,*
- *recognising the importance of identified waterbodies and their associated infrastructure to NZ's electricity system;*
- *recognising the importance of irrigation for agriculture and horticulture;*
- *considering relative environmental effects of activities including effects on landscape, water quality, mauri and the beds of lakes and rivers.*

3.38 The explanation to this policy states that *"a non complying activity…must demonstrate the effect of granting the consent on the entitlements to other*

[43] WRP, page 32

activities over the timeframe of the consent". As outlined in the Economic Impact Assessment by Butcher Partners there are significant benefits that accrue as a result of the water take and use within the Upper Waitaki catchment for uses other than electricity generation.

3.39 Policy 13 deals with water quality issues resulting from land use intensification, and states:

> *In considering whether to grant or refuse consent to take, divert, dam or use water allocated to agricultural and horticultural activities, the consent authority will have regard to the extent to which exercise of the consent could result in the water quality objectives in the Natural Resources Regional Plan not being achieved.*

Relevant objectives from the NRRP are identified later in this evidence.

3.40 Policies 15[44], 16[45], 17[46], 18[47] and 19[48] seek to ensure that the rate of abstraction and annual volume are reasonable for the intended use. Policy 15 seeks to ensure that the rate of abstraction and the annual volume associated with any water take and use is reasonable and avoids significant wastage. Policy 16 sets out the methods to determine whether the use of water is "reasonable". The reasonable use test set out in the policy framework requires one to consider:

- The land use of the site and the physical characteristics of the site such as soil type, water holding capacity, climatic factors, evapotranspiration and irrigation systems and management; and
- Irrigation systems which are at least 80% efficient.

3.41 It is noted that Policy 16 c. of the WRP does not require assessment of annual volumes based only on report U05/15 relating to a review of the seasonal irrigation demands set out in Schedule WQN9, Chapter 5 of the Proposed NRRP. Individual applicants will address the matter of efficiency in their

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44 WRP, page 33
45 WRP, page 33
46 WRP, page 33
47 WRP, page 33
48 WRP, page 39

evidence, though it can be noted at this point that 'efficient use' of water underlies the MIC/MEL agreements.

3.42 Policies 23 – 27 deal with restrictions during times of low water availability. Policy 23 seeks to ensure that environmental flow and level regimes are complied with by requiring that all consent holders restrict their rate of take during times of low flow, except where the water is used for essential domestic uses, essential animal drinking needs and for the processing and storage of perishable product. Policy 25 encourages water user groups as a means for users to collectively manage their cumulative abstraction within the limits of the environmental flow and level regime. As part of the farm environmental management plans (which are discussed in more detail later in my evidence) it is anticipated that water take and use during low flows will be properly accounted for.

3.43 Policies 29 – 46 are location specific policies. Policy 29 recognises the high natural character of water bodies listed in Policy 2 through restricting the cumulative allocation from them.

3.44 Policy 31 seeks to discourage the taking, use, damming or diversion of water for irrigation purposes from the tributaries of Lakes Tekapo, Pukaki and Ohau as these water bodies possess a high natural character worthy of a high level of protection.

3.45 Policies 35 – 37 recognise the values of Lakes Tekapo, Pukaki and Ohau both for natural values and their importance in terms of hydro electricity generation. The minimum lake levels set seek to recognise the iconic nature of the lakes and enable appropriate access to water for the activities identified in Objective 2, to the extent consistent with Objective 1. The abstractions proposed will need to demonstrate that individually and collectively they will not significantly affect the lake levels in Lake Tekapo, Pukaki or Ohau.

3.46 Policy 40 relates to 'other rivers and streams' in the Upper Waitaki Catchment. This policy sets the basis for the environmental flow regimes set in the rules for these rivers. It recognises the connectedness of those rivers and streams to wetlands and groundwater systems of the Mackenzie and Ahuriri Basins and

enables appropriate access to water for the activities identified in Objective 2, to the extent consistent with Objective 1.

3.47 It should be noted that there are no locality specific policies for the Ahuriri Catchment. The National Water Conservation Order for the Ahuriri River sets provisions including allocation limits and minimum flows for taking, using, damming and diverting of water from the water bodies to which the order applies. The abstractions proposed from the Ahuriri River (assuming proposed mitigation measures will be adopted) will need to demonstrate that they comply with the provisions of the Water Conservation Order. This matter will need to be further addressed by the individual applicants who are seeking to take water from the Ahuriri River.

Discretionary Activities - Assessment Matters

3.48 For discretionary activities, the consent authority is directed to have particular regard to the following matters[49] (which are specific to the policies listed above):

- *Recognise the connectedness between all parts of the catchment;*
- *Alternatives e.g. abstraction taken from large water bodies vs smaller streams;*
- *Water quality provisions of the NRRP;*
- *Water availability to meet current and future needs;*
- *Is it a reasonable use of water;*
- *Consents for irrigation need to consider –*
- *Land use and onsite physical factors including soil water holding capacity and climatic conditions;*
- *Irrigation application efficiency of at least 80%.*
- *Water metering;*
- *Recognising high natural character of water bodies.*

Non Complying Activities - Assessment Matters

3.49 For non complying activities, the consent authority is directed to have regard to the following matters[50] (which are specific to the policies listed above):

- *Recognise the connections between all parts of the catchment;*

[49] Rule 15 – WRP page 54

[50] Rule 16- WRP page 55 states that *"In considering an application to which this rule applies the consent authority will have regard, among other matters, to all the policies*

- *Alternatives e.g. abstraction taken from large water bodies vs smaller streams;*
- *For activities outside the allocation limits recognise – national and local benefits, other plans and strategies, iconic nature of Lake Tekapo, Pukaki and Ohau, and importance of contribution to NZ electricity system; importance of irrigation for agriculture and horticulture; environmental effects of allocation limits on landscape, water quality, mauri and the beds of lakes and rivers;*
- *Water quality provisions of the NRRP;*
- *Water availability to meet current and future needs;*
- *Is it a reasonable use of water;*
- *Consents for irrigation need to consider –*
  - *Land use and onsite physical factors including soil water holding capacity and climatic conditions;*
  - *Irrigation application efficiency of at least 80%.*
- *Water metering;*
- *Recognising high natural character of water bodies;*
- *Recognise iconic nature and mana of Lakes Tekapo, Pukaki and Ohau and enable appropriate access to the water;*
- *Recognise connections of rivers and streams to wetlands and groundwater systems of the Mackenzie and Ahuriri Basins.*

3.50 In most cases non complying activity status means that a proposal is not generally anticipated by the planning provisions set out in the relevant plan. On that basis planning documents do not usually include assessment matters for non complying activities, as they might for applications having controlled, restricted discretionary and discretionary status. In this instance it appears that the WRP anticipates, to some degree at least, non complying applications being made as it provides for specific guidance for assessing such applications. Without excluding the provisions of s104D of the RMA, the specific assessment matters under Rule 16 provide guidance as to what should be considered with a non complying activity. By listing the assessment matters to be considered generally narrows the focus of the assessment to those pertinent points.

Proposed NRRP

3.51 The provisions of the NRRP are specifically incorporated into consideration of the Upper Waitaki applications by reference in policies of the WRP (Policy 13) to the relevant water quality objectives. I understand that in considering

applications to abstract water in the Lower Waitaki Catchment, the panel there confined its consideration in this regard to the objectives only. This is reflective of the specific wording of Policy 13.

Chapter 4 – Water Quality Objectives

3.52 The objectives of Chapter 4 set out the thresholds for water quality changes in terms of the NRRP and as outlined above there is a relationship between these objectives and the WRP. Policy 13 of the WRP (relating to the effects of water allocation and use for irrigation) only refers to the water quality provisions of the Proposed NRRP and also that it refers to the Proposed NRRP as notified. Accordingly the key mandatory assessment matters relate to the objectives of Chapter 4 of the NRRP.

3.53 Objective WQL1.1 and WQL1.2 specify the water quality outcomes for rivers and lakes. Objective WQL1.1 (1)(a) seeks that where a river is in a natural state, the water quality and the characteristics of the substrate are to be maintained in that state. Rivers in a natural state are defined in the NRRP as being a waterway where the water quality is unaffected or largely unaffected by human activities. Water bodies, where the water quality is in a natural state as defined by the NRRP, are those that are generally low in nutrients and the riverbed substrate is comprised predominately of gravels with a relatively small proportion of fine sediment[51]. It is noted in the NRRP however that many hill country sourced rivers are significantly influenced by the extent of Tertiary age sediments, many of marine origin, in the catchment. These sediments are a source of nutrients and rivers draining these catchments have naturally higher levels of nitrogen and phosphorous.

3.54 Where a river is not in a natural state, as a result of point source and non point source discharges, the water quality and the riverbed substrate are to be maintained or improved so that:

(i) They are suitable for contact recreation in those reaches that are valued for this purpose;

(ii) Water is suitable for stock drinking water;

(iii) They are suitable as a habitat for indigenous species or salmonids;

(iv) They provide for amenity values;

[51] NRRP Chapter 4, page 4-23

(v) They provide for Ngai Tahu cultural values, including mahinga kai.

3.55 In addition to the above, Objective WQL1.1(2) seeks that water quality is either maintained or enhanced to meet the outcomes contained in Table WQL5, and that there are no visible heterotrophic slime growths in the river. Table WQL5 sets outcomes for water quality and sedimentation of riverbeds, to ensure that rivers will be suitable for a wide range of uses and instream values. The rivers which are affected by the Upper Waitaki applications are identified on the planning maps as being either high country rivers, or rivers of upper plains or inland basins. Table WQL5 (included in **Appendix B**) seeks that the thresholds be adhered to for certain nutrient indicators in these rivers.

3.56 Objective WQL1.1(3) seeks to provide outcomes for the quality of water or the river bed substrate of a river where the flow is regulated or strongly influenced by the discharge or diversion of water. The objective seeks to maintain or return the water quality to that which existed prior to the flow regime change and ensure that any changes to the flow regime have no adverse effects on the instream values of the river.

3.57 Objective WQL1.1 establishes the water quality outcomes for Canterbury's rivers. The purpose of this objective seeks to ensure rivers are managed to maintain their water quality and bed substrate in a natural state[52]. The objective also seeks to provide a clear point of reference for measuring the impacts of human activities on water quality and the effectiveness of measures to maintain or improve water quality[53]. The NRRP planning maps indicate that the rivers within the Upper Waitaki catchment are considered to be "natural". I concur with the evidence of Dr. Ryder that several streams in the Mackenzie Basin are already significantly modified by surrounding land use practices and are by no means in a 'natural state'[54]. The objective and the planning maps do not adequately recognise that many of the rivers have been affected by existing uses such as hydro electric generation and farming practices including modifications to riparian margins and irrigation.

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52 Objective WQL1.1(1)(a)
53 Objective WQL1.1(2) and Objective WQL1.1(3)
54 Evidence of Dr. Ryder, page 9

3.58 Objective WQL1.1(2) requires the maintenance of water quality in a state above the baseline indictors specified in Table WQL5. It would appear that the values represented in Table WQL5 provide a guideline for the determination of what constitutes a 'significant adverse effect' on water quality. In my view Table WQL5 does not represent an appropriate guide when the existing environment of the Upper Waitaki is taken into account. I note that Table WQL5 does not take into account natural perturbations that may affect water quality such as severe floods or droughts. The explanation on page 4-24 of Chapter 4 states that *"natural perturbations, such as severe floods or drought, which occur relatively infrequently, will influence the water quality of rivers and lakes...Monitoring of rivers, lakes and climate patterns by ECan will be used to distinguish between naturally occurring and human induced changes to water quality and river bed substrate."*

3.59 However, the ability to make the distinction in reality may be much more difficult than the explanation suggests. In addition, in terms of an assessment of effects in accordance with orthodox practice, the 'existing environment' should form the baseline. It is therefore my view that Table WQL5 does not represent an appropriate baseline for determining an adverse effect on water quality. Instead I suggest reliance on the existing environment assessment and thresholds established by the WQS is a more appropriate approach when assessing the effects of these applications on water quality in the Upper Waitaki Catchment.

3.60 I agree that maintaining and enhancing water quality is an important objective and it is my opinion that the science applied to the cumulative water quality study is robust. The water quality sampling, analysis and modelling along with ecological response assessments have accurately determined the current condition and assimilative capacity of the environment so that absolute discharge thresholds can be established throughout the Upper Waitaki catchment. By implementing mitigation and adopting farm management practices any adverse environmental effects arising from nutrient runoff will be not more than minor and will achieve the recommended thresholds as outlined by Dr. Coffey, Dr. Ryder, Dr. Bright and Dr. Robson. Consent holders would be committed via consent conditions, to undertaking further monitoring throughout the life of the consents to determine the actual effects of nutrient runoff, and will be required to implement an adaptive management strategy should any adverse effects be detected and the established thresholds exceeded. This is

further addressed later in my evidence. This approach comprises an acceptably robust one with respect to managing water quality issues. Indeed it is a more robust and valid strategy than that outlined in the NRRP.

3.61 Objective WQL1.2 sets out the water quality outcomes for natural and artificial lakes. The purpose of Objective WQL1.2(1) is to maintain the existing water quality in high country lakes. The NRRP states that the water quality of large high country lakes is still largely in its natural state[55]. The objectives seeks that where the water quality of a high country lake is within a natural state, it is to be maintained in that state. Where the water quality is not within a natural state, objective WQL1.2(1)(b) states that the water quality is to be maintained or improved so that it is:

> *(i) Suitable for contact recreation;*
> *(ii) Suitable as a habitat for indigenous species and salmonids;*
> *(iii) It provides for Ngai Tahu cultural values, including mahinga kai*
> *(iv) The average annual phytoplankton biomass does not exceed five milligrams of chlorophyll a per cubic metre; and*
> *(v) There is no conspicuous change to the visual clarity of the lake.*

3.62 Objective WQL1.2(3) sets out the water quality outcomes and thresholds for artificial lakes. It requires that the water quality of artificial lakes be maintained so that they are suitable for:

> *(i) Activities and uses for which the lake and its water is used; and*
> *(ii) It does not result in persistent seasonal stratification leading to oxygen depletion in the lake; and*
> *(iii) It does not result in toxic or nuisance algal blooms; and*
> *(iv) The average annual phytoplankton biomass does not exceed five milligrams of chlorophyll a per cubic metre of lake water.*

3.63 Objective WQL1.2 establishes the water quality outcomes for Canterbury's lakes and seeks to establish water quality standards for high country lakes, coastal lakes and artificial lakes. In my view Lakes Tekapo, Pukaki and Ohau have been significantly modified by human uses over time including the construction and operation of an extensive hydro electric power scheme, farming operations and existing consents to take and use water. Objective

[55] Proposed NRRP – Chapter 4, page 4-25

WQL1.2 seeks that where the water quality is in a natural state, it is to be maintained in that state. In my view it is difficult to discern whether or not the water quality is natural or otherwise, as in many instances it has been affected by human modification. Moreover, naturally occurring influences including geological conditions, climate change, and the effects of floods or freshes impacts upon water quality. Therefore it is appropriate in my view to assume that for the purposes of this assessment that the water quality of lakes affected by the proposed applications is not in a state that is 'natural' in the way the NRRP might convey. If you accept my interpretation the provisions contained in Objective WQL1.2(1)(b) are more applicable to the applications before you. With the imposition of careful and comprehensive farm practice management, the proposals to take and use water will not significantly affect the existing water quality of Lakes Tekapo, Pukaki and Ohau. The measures set out within WQL1.2(1)(b) can be met.

3.64 Lakes Benmore, Waitaki, Ruataniwha and Aviemore are identified as being artificial lakes, created for hydro electricity purposes. The existing water quality of these lakes has been assessed as part of the Water Quality Study. The lake quality information indicates that the current trophic status in Lake Benmore is generally Microtrophic in the Northern Arm and Oligotrophic in the Ahuriri Arm. Post irrigation, Lakes Waitaki, Aviemore and Ruataniwha are predicted to be in the Microtrophic to Oligotrophic range and the Wairepo Arm of Lake Ruataniwha is likely to be in a Mesotrophic state. Following further analysis and consultation with limnololgists and aquatic ecologists throughout New Zealand and internationally, the team assembled to undertake the WQS determined that Lake Benmore should be maintained within an Oligotrophic state. The evidence of Dr's Bright, Coffey and Ryder set out the rationale for this. With mitigation and appropriate farm management practices and systems to minimise nutrient runoff and leaching, it is considered that Lake Benmore can achieve this threshold. Monitoring of Lakes Benmore, Waitaki, Ruataniwha and Aviemore will need to be imposed to ensure that water quality is maintained in the long term.

3.65 Objective WQL2 sets out the water quality outcomes for groundwater resources within the Canterbury region. Objective WQL2(2) states that in semi-confined, unconfined and other confined aquifers or parts of these aquifers, where the water quality is unaffected or largely unaffected by human activities as reported

in 2004, the water quality is to be maintained in that state. Where the water quality has been affected by human activities the objective seeks that the groundwater quality shall meet a number of values as listed in **Appendix B**.

3.66 In my view Objective WQL2(2) is largely impracticable due to its restrictive approach to managing groundwater quality. The objective seeks to apply groundwater quality standards in two very disparate means; one by placing a numerical limit independent of existing groundwater nitrate-nitrogen concentrations, and the other by placing numerical limits dependent on maximum groundwater nitrate-nitrogen concentrations between 1996 and 2001. The success of using both methods in tandem assumes that all aquifers are hydraulically independent, and that the transmission of contaminants from one aquifer to another will never occur. Such a concept is unrealistic, and the objective will only restrict land uses in certain areas with no guarantee of any improvement or preservation of existing groundwater quality. In addition, given the complexity and slow responsiveness of groundwater systems to land use changes, it is impractical to monitor and enforce such varied restrictions upon every land user.

3.67 While the protection and improvement of groundwater quality are laudable goals, Objective WQL2(2)(b) appears to do so at any cost. This runs counter to the sustainable management purpose of the Act. The MWRL Water Quality Study Report (WQS) assesses the existing environment and concludes that groundwater in some areas of the Upper Waitaki catchment is already affected by human influences, although the quality remains high. The measured nitrate concentrations in 90 bores show that 98% of bores monitored had groundwater nitrate-N concentrations of below 1mg/l. 1mg/l guideline as adopted in the WQS is in my view an appropriate baseline, as opposed to comparing results that were undertaken between 1996 and 2001. I discuss this further later in this evidence.

Other Matters

3.68 Section 104(1)(c) requires consideration of other matters that may be relevant and reasonably necessary to determine the applications.

Ahuriri River National Water Conservation Order

3.69 As discussed above there are no locality specific policies for the Ahuriri Catchment in the WRP. Rather, the National Water Conservation Order for the Ahuriri River sets out provisions including water allocation limits and minimum flows for taking, using, damming, and diverting water from the water bodies to which the order applies.

3.70 In summary, the Ahuriri River and its tributaries were declared to include and provide for outstanding wildlife habitats, outstanding fisheries, and outstanding angling features. Because of these outstanding features, the National Water Conservation Order provides that the quantity and level of natural water in all lakes, ponds, tarns, lagoons, and streams forming part of the protected waters are to be retained in their natural state.

3.71 As discussed in the evidence of Dr. Coffey the water quality of the Ahuriri River will be maintained by appropriate land use management practices to minimise increased nutrient runoff. Maintaining the allocation and flow regime set out within the Order is addressed by the individual applicants, though I understand that the allocation and flow regime will be met.

Landscape Considerations

3.72 The 'greening' of land is not an issue that is identified specifically in the WRP, nor is it an issue identified in the NRRP. I note that a number of submitters to the various applications express concerns about the extent to which consents granted for irrigation will impact upon the Upper Catchments landscape values. To assist in determining the extent to which landscape considerations are relevant to an evaluation of applications to take and use water in this context I set out the relevant Plan provisions as follows.

Regional Policy Statement

3.73 Environment Canterbury commissioned the Canterbury Regional Landscape Study (Boffa Miskell Limited and Lucas Associates 1993). The study identified a number of regionally outstanding natural features and landscapes. These include:

- the Southern Alps
- the Waitaki Basin and other intermontane basins of the Southern Alps

- Lakes Waimakariri and Lake Sumner.
- braided rivers such as the Rakaia and Waimakariri (internationally significant examples of fluvial landforms)
- Banks Peninsula (as a whole it exhibits a distinct volcanically derived form)
- the limestone landscapes of the Castle Hill basin and Weka Pass (of cultural and scientific value)
- the Canterbury foothills (particularly Mounts Thomas and Oxford, and the Torlesse, Sefton and Puketeraki ranges)[56]

3.74 The Waitaki Basin is identified as a regionally significant landscape, though policy 3 to the Canterbury RPS provides direction as to how these landscapes are to be managed, and states:

> *The particular sensitivity of these natural features and landscapes to regionally significant adverse effects…should be reflected in the provisions of the District Plans of the region.*

3.75 The methods set out to achieve policy 3 in the RPS are:

> *2. District/city councils in the preparation, variation, change or review of their district plans, through the exercise of their functions, should consider provisions to:*
> *(c) protect and enhance natural features and landscapes under Policy 3.*

3.76 The RPS clearly confers responsibility for landscape management onto the District Councils.

Waitaki Catchment Allocation Regional Plan

3.77 Objective 1(c) to the WRP seeks to sustain the qualities of the environment of the Waitaki River and associated beds, banks, margins, tributaries, islands, lakes, wetland and aquifers by:

> *"managing the water bodies in a way that maintains natural landscape and amenity characteristics and qualities that people appreciate and enjoy".*

[56] Note – the Canterbury Regional Landscape Study is being reviewed currently

3.78 Policy 4 considers "*natural character, landscape and visual amenity"* when setting environmental flow and level regimes for water bodies of the Waitaki Catchment.

3.79 Policy 12 describes the approach that was used to determine allocations for activities, including agriculture and horticulture in the WRP. Policy 12(f) states that allocation was determined in part by *"considering the relative environmental effects of the activities including effects on landscape, water quality, mauri and the beds of lakes and rivers".*

3.80 Section 9 of the WRP contains the anticipated environment results that will be achieved through the relevant objectives and policies. Key outcomes include:

> *1. The High Natural Character Water Bodies retain their special features and characteristics;*
> *6. The landscape and amenity values of water bodies within the catchment are maintained or enhanced.*

3.81 In my interpretation of the various Plan provisions I have formed a view that landscape assessment matters relate only to the effects of water abstraction on the water bodies within the catchment.

3.82 Annex 1 to the WRP generally supports this further by stating:

> *"The Board concluded that Map 3, which had been included to depict the High Natural Character Water Bodies, had not clarified the descriptions in Policy 2, and noted that it did not depict high natural character wetlands. Map 3 had been interpreted by some submitters as a judgement on the land, rather than the waterbodies, as was the clause in Policy 2 "or are part of iconic landscapes". These words, and Map 3, have been removed from the Plan.*

Proposed NRRP

3.83 Chapter 4 of the NRRP relates to water quality. The objectives and policies within this chapter recognise that many of the region's lakes or rivers are outstanding natural features of Canterbury's landscape and are highly valued by the community. Policies seek to ensure the water quality of these water bodies is maintained or enhanced to protect them as outstanding natural features in the landscape.

3.84 Chapter 5 of the NRRP relates to water quantity and contains provisions which seek to protect the natural character of water bodies from inappropriate use and development.

3.85 Chapter 6 of the NRRP relates to the beds and margins of rivers and lakes. Relevant objectives and policies within this chapter seek to provide for activities in the bed and margins of lakes and rivers while protecting outstanding natural features and landscapes, which refers to the water bodies themselves.

District Plans

3.86 Farming, irrigation and the issue of the "greening" of the landscape is addressed in both the Waitaki and Mackenzie District Plans. Farming activities are permitted in both the Waitaki and Mackenzie Districts. Irrigation is also permitted except in areas identified as Outstanding Landscape Area in the Waitaki District which require consent as a non complying activity. Should consent be required from either District Council then landscape effects are clearly a relevant assessment matter for that Council. It is my opinion that matters relating to landscape need to be addressed at the District level given that responsibility for such matters clearly rests with the local authorities (in this instance the Waitaki and Mackenzie District Councils) and is not a relevant matter to consider at the regional level, outside of the landscape effects that might occur within the affected water bodies.

4. RECOGNITION OF CUMULATIVE IMPACT

4.1 My evidence now turns to the matter of assessing the potential cumulative impacts associated with the proposed irrigation activity for which numerous consent applications have been lodged.

4.2 It has been recognised by the MIC, Meridian and Environment Canterbury that the proposed irrigation of 25,000ha of land within the Upper Waitaki Catchment could have a potential cumulative impact on water quality. In particular, potential effects arise from nutrient losses (nitrogen and phosphorus) on lakes, streams and groundwater, due to the more intensive farming regimes associated with irrigation. In 2005, Meridian commissioned Glasson Potts Fowler (GPF) to undertake a desktop study to determine what cumulative

impacts may be caused by irrigation within the Upper Waitaki Catchment. The GPF analysis was based on available information relating to landuse, climate and agricultural practices. Nutrient modelling was also undertaken. The report concluded that the change in farming practices would lead to a change in algal biomass and the trophic state of streams and lakes in the Upper Waitaki Catchment with the greatest impact likely to be seen in the Ahuriri Arm of Lake Benmore (GHD, 2009).

4.3 Whilst the GPF report highlighted the potential for an impact from more intensive farming practices, it did not go as far as to determine how such cumulative effects could be managed, particularly by individual farms. As the WQS states, it was considered that further work was necessary to:

1. Enhance the detail of understanding of nutrient losses in the Upper Waitaki;
2. Provide thresholds below which any environmental impact from nutrient loss is minor or less;
3. Determine actual farm nutrient losses for both current and proposed farm development based on the 25,000ha rather than adopt generic farm types and hypothetical irrigation areas; and
4. Provide mitigation tools that provide landowners with guidance as to how they can manage their properties while not exceeding nutrient loss thresholds[57].

4.4 This work forms the basis of the MWRL cumulative effects case.

4.5 The evidence of Dr Robson outlines the methodology that has been applied and the findings reached. At an overall level I have formed the view that approach is robust and appropriate to the circumstances. The environmental thresholds set and the approach to monitoring being promoted are also appropriate taking into consideration the proposed landuse (irrigation and intensive farming) and the existing state of the receiving environment within the Upper Waitaki Catchment. The suggested mitigation measures and methodology for applying those measures are logical and should prove to be effective, subject to being properly applied.

[57] WQS, page 13

5. SUGGESTED MITIGATION MEASURES

5.1 The WQS and the evidence of Dr. Robson provides specific detail relating to mitigation measures to be adopted in addressing the cumulative environmental effects on water quality. Mitigation measures will be required to ensure that environmental values within the catchment's waterways are maintained, and that no significant adverse effects occur as a result of the intensification of farming practices that will accompany the proposed irrigation.

5.2 The principal concern in the Upper Waitaki Catchment is nutrient enrichment of groundwater, streams and lakes. The two contaminants of primary concern are nitrogen and phosphorus. The WQS states that understanding the mechanisms of loss for the key contaminants is important for establishing effective mitigation strategies.

5.3 As identified by Dr Bright and Dr. Robson numerous tools are available to assist with the mitigation of effects associated with nutrient transfer. Having considered the level of mitigation required to achieve the recommended thresholds, the WQS concludes that, with the diligent and objective implementation of the tools available, the required thresholds can be achieved.

5.4 As already referred to, it is recommended that each farm property be subject to a FEMP, which incorporates a range of mitigation measures tailored to the individual property. The WQS states that:

> *the efficacy of all management plans is to a great extent, dependent on their implementation. The principal risk of management plans is that, once written, they are not used/implemented. Therefore a plan needs to be not only technically competent with flexibility for adaptive management, but it needs to be implemented, monitored and impartially audited (GHD, 2009).*

5.5 I concur with this statement. Conditions will need to be effective in requiring adherence to the various plans on an ongoing basis.

5.6 I note from the WQS that three basic data requirements have been identified as being necessary for ensuring FEMP success. These were summarised in the WQS as follows:

1. Nutrient generation estimates – these have been provided to individual farmers who have funded this study. The estimates are provided for the current land use and that proposed under irrigation.
2. Environment assimilative capacity – the assimilative capacity is the difference between the nutrient load and the threshold. Streams, rivers and lakes have a potential natural capacity to assimilate the effects of additional nutrient runoff, without there being any adverse environmental impact.
3. Mitigation techniques - a selection of mitigation techniques to be adopted on the subject farm property.

5.7 The WQS provides an example of how assimilative capacity can be allocated. The landowners receive advice regarding maximum permissible nutrient losses per hectare and relevant environmental thresholds pertaining to their farm in terms of estimated nutrient losses under current, proposed and highly developed scenarios. A comprehensive list of mitigation measures can then be selected to specific properties depending on whether low, moderate, or high levels of mitigation are necessary to address the nutrient generation estimates. The WQS lists over 35 mitigation measures ranging from those which are only applicable when a low nutrient mitigation approach is necessary, through to scenarios where the greatest level of mitigation is required. The mitigation measures can be adaptively applied to a particular property as and when required, depending on the farm practices being undertaken.

6. ADAPTIVE MANAGEMENT AS A TOOL

6.1 As the scientific evidence has shown, there remains some uncertainty associated with how water quality will be affected by more intensive farm management practices, should the subject landholdings be irrigated as proposed. The WQS provides a comprehensive assessment of the potential environmental effects associated with more intensive farming practices and the measures that need to be taken 'on farm' to mitigate those potential effects on downstream water quality. However, given the uncertainty surrounding those potential impacts an adaptive management approach needs also to be adopted.

6.2 Adaptive management begins with the premise that:

> *"policy makers do not sufficiently understand natural and social systems to be able to predict whether their policies will be effective in practice."*[58]

And further:

> *"adaptive management principles are derived from new scientific and ecological insights that interpret the natural world as dynamically changing, full of uncertainty, and continually surprising. Measures are designed to systematically monitor results and modify the measures through constant feedback. Management actions and monitoring programmes are carefully designed to generate reliable feedback, clarify the reasons underlying outcomes, and objectives are then adjusted based on this feedback, and improved understanding."*[59]

6.3 The use of adaptive management techniques in this case is a useful corollary to the setting of performance standards and the imposition of management approaches. A robust approach to monitoring water quality changes throughout the catchment is promoted within the evidence of Dr Coffey and Dr Bright. This is essential in order to highlight any significant changes that might not have been foreseen at the outset, or might not be expected given the management responses that are required to be adopted on a farm by farm basis.

6.4 Put simply, if the results of monitoring indicate that farming regimes are leading towards adverse effects that (left unaddressed) may become significant, these findings can then be used to require the consent holders to adapt their farm management practices.

6.5 It is important that the environmental indicators being measured to trigger adaptive management techniques indicate emergent effects in short order. In many cases the lag time between a change in landuse and an effect being recognised can be in the order of years, or even decades. This is particularly the case with groundwater. Accordingly, environmental indicators such as monitoring of groundwater quality are not optimally suited to adaptive management techniques. Surface water quality measurements at sub-

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58 A T Isles – *Adaptive Management Making Environmental Law and Policy More Dynamic* - Experimentalist and Learning - Environment and Law Planning Journal August 1996.

59 Nyberg – *An Introductory Guide to Adaptive Management for Project Leaders and Participants* – January 1999

catchment nodes are recommended in Table 25[60] of the WQS as being appropriate environmental indicators.

6.6 In my view, the use of adaptive management techniques in the Upper Waitaki Catchment needs to be applied across the board in terms of landowners seeking to irrigate. By doing so, the consent holders within a specified sub-catchment are held responsible for devising remedial action to address any identified water quality impacts that emerge. Furthermore, scope is provided to determine whether the remedial action needs to be undertaken by one or more of the consent holders within a given impacted sub-catchment. However, the mitigation measures can be spread across a number of landholdings if deemed appropriate for the given situation. In such instances, the economies of scale may result in only minor adjustments needing to be taken on individual properties.

7. RECOMMENDED CONDITIONS

7.1 Should the Commissioners be of a mind to grant consent for all or some of the various applications to take water for irrigation and stockwater purposes, I have included as **Appendix C** to my evidence a draft set of consent conditions to consider. In my view, these conditions are essential in ensuring that:

(a) the obligations of the agreement between Meridian and the MIC will be met (recommended conditions 1-15),
(b) the individual landholdings are bound by the requirement to prepare FEMPs including an obligation to adopt management practices if circumstances dictate that this is necessary, (recommended conditions 16-22),
(c) the consent holder determines the Nutrient Discharge Allowance for their property and undertakes monitoring to ensure that the allowance is not exceeded, and/or take remedial action to address exceedence when this occurs (recommended conditions 23-26); and
(d) each consent holder is bound to the requirement for off-farm monitoring and remediation where necessary (recommended conditions 27-33).

[60] WQS, page 65.

Included as **Appendix D** is the recommended conditions relating to those applications which only seek to take water for stock watering purposes (i.e. no irrigation).

7.2 There is no doubt that consent conditions beyond those proposed in **Appendix C and D** will need to be applied to individual consents, and it is up to those individual applicants to recommend additional consent conditions as they see fit. The conditions recommended as part of this evidence should apply to all MWRL participants in addition to any property specific conditions that will also need to be considered. Moreover, in order to secure the most comprehensive and robust approach, I hold the view that all ultimate consent holders should have such conditions applied. It has been demonstrated that a catchment wide approach is necessary to ensure that the water quality of the Upper Waitaki Catchment is not adversely affected by more intensive farm practices. Accordingly, all resource consents issued will need to incorporate conditions that ensure:

(a) that all properties 'upstream' of a defined monitoring point comply with stipulated thresholds that are tailored to reflect the circumstances that apply in a given sub-catchment; and
(b) that all 'upstream' consent holders contribute to common off-farm monitoring.

Irrigation and Stockwater Conditions

7.3 Conditions 1-15 have been agreed to between Meridian, MIC, and the applicants, and as such, their inclusion with any consent granted forms a cornerstone to the agreement to allow up to 150Mm^3 of water to be taken from the catchment each year for irrigation purposes.

7.4 Conditions 1-4 set to restrict the scope of the consent in terms of: duration, take location, abstraction rates, and the property to benefit from the water take. Such conditions are essential in providing surety to all parties as to the limits of the consent being granted.

7.5 Conditions 5 and 6 require the registration of a memorandum of encumbrance that will bind the consent holder to the agreement between Meridian and the MIC relating to the allocation of water for irrigation. Such conditions are

appropriate in ensuring that the agreements that have been reached in advance of the applications being dealt with are binding on the consent holders.

7.6 Conditions 7-12 are largely technical relating to the metering of the water takes. Water metering and recording are essential in auditing the takes and ensuring compliance with the conditions of consent. Such conditions are in my view appropriate in giving effect to the consents being sought, and providing surety as to the accuracy of water use.

7.7 Condition 13 simply requires the consent holder to inform the Canterbury Regional Council when the consent is first exercised and this is a standard condition appropriate to this situation.

7.8 Conditions 14 and 15 provide the owner/operator of the Waitaki Power Scheme with the authority to require that water takes from its infrastructure to cease, when the owner/operator is undertaking maintenance and/or ensuring the structural integrity of the power scheme. Furthermore, the owner/operator of the Waitaki Power Scheme can require that the taking of water from its canals shall cease, should the owner/operator cease to take, divert and/or discharge water into its canals.

Conditions for Farm Environmental Management Plans

7.9 Recommended conditions 16-22 require the promulgation of FEMPs as a requirement of all consent holders seeking to take water for irrigation and stockwater purposes.

7.10 Condition 16 lists at a broad level the key components of FEMPs, such as:

(a) good agricultural practices to be adopted as a basis for management,
(b) a requirement to utilise OVERSEER (or an alternative industry standard) modelling to determine the nutrient reductions required and changes that will need to be made to farm management,
(c) a Farm Environmental Risk Assessment for the identification and mitigation of site specific environmental risk,
(d) an on farm monitoring plan; and
(e) an auditing system to ensure that the FEMP is being implemented.

7.11 Importantly, condition 16 refers to the WQS in terms of providing guidance as to how a FEMP should be prepared and implemented.

7.12 Condition 17 provides the Consent Holder with the opportunity to change and modify the FEMP, where that change is necessary to give effect to the purpose of the FEMP, the change is undertaken in consultation with the consent authority and has its approval.

7.13 Conditions 18-20 provide the framework to ensure that the FEMP is prepared prior to giving effect to the resource consent granted and also that the FEMP is independently reviewed prior to being submitted to the consent authority for approval. This independent "certifier" approach is one that is commonly applied to management plan conditions in my experience. It means that Management Plans receive independent, objective scrutiny before being submitted to the consent authority for assessment. In my opinion, this is an important step to ensure the efficiency of the plan.

7.14 Condition 21 ensures that the FEMP will continue to be a live document despite any further subdivision of the subject property in the future, meaning that any future landowners are also committed to its implementation.

Sub-catchment Monitoring and Mitigation

7.15 A number of conditions are proposed relating to adaptive management, whereby off-farm monitoring of water quality at specific monitoring points are used to determine whether on-farm management practices and farming regimes needs to be altered. The purpose of these conditions is to ensure that the consent holders are committed to undertaking mitigation where necessary in the future, even though that mitigation may not be foreseen at the time of issuing the consent.

7.16 The conditions are structured so that when a particular off-farm environmental threshold is exceeded, those that contribute to the cause of that exceedence are compelled to identify and adopt methods for adapting farming methods in order that the effects on water quality are returned to an acceptable level. Importantly the conditions recognise that a collaborative approach to mitigation involving a number of consent holders within a particular catchment could be necessary. In such instances consent holders will need to work together to

determine the optimum approach to mitigation. Professional assistance from an appropriately qualified scientist is anticipated by the conditions.

7.17 The Canterbury Regional Council as the consenting authority will have a role in approving the mitigation measure(s) to be adopted, prior to these being applied. Importantly if exceedences cannot be resolved by the respective consent holders, conditions specifically enable the consent authority to invoke a formal review of the consent/s at issue. Such a condition acts as both a "carrot" and a "stick" and ensures that ultimately appropriate environmental thresholds remain intact.

Stockwater Only Conditions

7.18 Conditions attached as **Appendix D** relate to consent applications to take water for stock watering purposes only. These conditions are largely identical to those associated with water takes for irrigation and stockwater purposes, save for the purpose and duration of the take, with the latter being less restrictive than the conditions for irrigation.

8. SUMMARY

8.1 One of the primary functions of this evidence is to provide an overview of the relevant planning instruments that are pertinent to the proposed irrigation of agricultural land in the Upper Waitaki Catchment. The Waitaki Catchment Allocation Regional Plan is a key instrument in this regard. This Plan advocates a whole catchment approach when dealing with allocation issues and the effects that emanate from water allocation. A number of irrigation aspirants will ultimately appear before this committee. Applications are generally deemed to be discretionary or non-complying in terms of the WRP. The WRP reflects an agreement between Meridian Energy and the McKenzie Irrigation Company to make available a maximum quantity of 150 million cubic metres of water to be used for an additional irrigation of 25,000ha in the upper catchment. Before this water is able to be allocated, a key matter for resolution relates to the actual or potential cumulative effects arising from the agricultural intensification of the Upper Waitaki Catchment that would ensue.

8.2 I have endeavoured to quantify the extent to which the provisions of the NRRP are relevant to this consideration. As indicated earlier in this evidence, the

various provisions of this document have been scrutinised to determine the extent to which they interface with the subject applications. In particular, the water quality objectives inherent in the NRRP need to be considered in assessing the issue of cumulative effects. In considering the various proposals against these matters it is important to understand that the WRP requires the adoption of an assumption that the relevant objectives are in fact operative when the reality is that they are not. Notwithstanding this, the MWRL has assumed a role on behalf of the majority of aspirant irrigators in the Upper Waitaki Basin to the commissioning of an extensive water quality study which is aimed at addressing the issue of cumulative effects resulting from the intensification of agricultural use in the context of the relevant plan provisions.

8.3 The result is a highly detailed, scientific study which quantifies the extent to which irrigation can occur, and the way that farming systems need to be managed in order to avoid the creation of adverse water quality effects in the Upper Waitaki Catchment. The water quality study provides farmers with appropriate methods for managing farming operations in order to successfully intensify productive activities, whilst at the same time ensuring the environmental bottom lines are maintained. Moreover, the Water Quality Study and conditions suggested in this evidence, serve to show that these farming systems can be implemented in a way that is responsive to changes over time or unforseen circumstances, such that in the long term adverse water quality effects are successfully mitigated or avoided.

8.4 The opportunities that arise from the intensified land use proposed are significant in economic and social terms. The scientific approach promoted is robust and in my view is leading edge in terms of approaching a catchment on a comprehensive basis. In my opinion, the approach promoted needs to be rigorously applied. This is feasible via the imposition of appropriate consent conditions. Subject to this occurring, it is my opinion that sustainable management of the Upper Waitaki Catchment can and will be achieved.

J C KYLE

2 SEPTEMBER 2009

APPENDIX A

Summary of Recent Project Experience

- TrustPower Limited – Wairau Hydro Electric Power Scheme, water related consents
- TrustPower Limited - Proposed Wind Farm, Kaiwera Downs, Southland.
- Meridian Energy Limited – Project Hayes Wind Farm
- Meridian Energy Limited – Mokihinui Hydro Scheme
- Genesis Power Limited – Awhitu Wind Farm
- Genesis Power Limited – Tongariro Power Development, Water Related Consents
- Genesis Power Limited – Provision of advice regarding the preparation of appropriate Plan provision pertaining to the Huntly Power Station and Meremere sites.
- Williamson Holdings Limited – providing advice with respect to a large scale irrigation proposal in the Upper Waitaki catchment.
- Queenstown Airport Corporation – provision of resource management advice for the airport and its surrounds.
- Marlborough District Council – Business Park Plan Change
- Ravensdown Fertiliser Limited – Coastal and Air Discharge Consent Renewal
- Infinity Investment Group – Pegasus Town, Canterbury
- Infinity Investment Group – Hillend Station, Wanaka
- Infinity Investment Group – Peninsula Bay Plan Change, Wanaka
- Kuku Mara Partnerships – Large Scale Marine Farms, Marlborough
- Marine Farming Industry – Plan Appeals, Tasman Aquaculture Inquiry
- Armada Holdings – Luggate Village, Central Otago
- Willowridge Developments – 3 Parks Plan Change, Wanaka
- Ryman Healthcare – Rest Home and Hospital Facility, Roslyn, Dunedin
- Minaret Resources Limited – Sugarloaf Project, Lowburn, Central Otago
- Otago Land Group Limited – Mitre 10 Mega , Andersons Bay, Dunedin
- Otago Land Group Limited – Smiths City Redevelopment, Andersons Bay Dunedin
- Matukituki Trust – Residential Development, Roys Peninsula, Wanaka
- Nicholls Property Group – Commercial Development, George Street, Dunedin

- Department of Corrections – New Corrections Facility, Milton, Otago
- Department of Child Youth and Family – Youth Justice Facility, Rolleston, Canterbury
- Telecom New Zealand Limited – Mobile Phone and Landline Infrastructure Developments, South Island
- Southland District Council – Hearing Commissioner
- Environment Southland – Hearing Commissioner
- Southern Health – Rezoning Southern Hospital Development, Invercargill

APPENDIX B

Extracts from the NRRP

Rule WQL62

Rule WQL62 Use of land for certain activities - non-complying activity

Activity
The following uses of land are **non-complying activities**, and require a land use consent: 1. The use of land in Zone IB shown on Map Volume Part I -Planning maps that may result in: (a) contaminants entering groundwater or surface water; or (b) the disturbance of the bed of a permanently flowing river, or lake arising from livestock in the bed or on the margin of a permanently flowing river, or lake; and the use of water for irrigation is authorised under Rule WQN 26; that does not comply with Condition 1 of Rule WQL 19; or 2. The use of land to: (a) store human or animal effluent; or (b) store organic waste from industrial or trade processes; or (c) stockpile fermenting or decaying organic matter; that does not comply with Condition 2(e) of Rule WQL29 or that does not comply with Condition 2(e) of Rule WQL30; or 2. The use of land to construct a bore or to excavate land for a water infiltration gallery, for the purpose of taking, investigating, or monitoring groundwater, that does not comply with any one or more of the conditions of Rule WQL38; or 3. The use of land to drill, construct, use, maintain, or decommission a well or bore for the purpose of hydrocarbon exploration or production that does not comply with any one or more of the conditions of Rule WQL39;

Table WQL5

River Types (not in a natural state)	Parts of a catchment		Emergent macrophytes	Algae mats greater than three millimetres thick	Filamentous algae longer than two centimetres	Periphyton		Sedimentation of riverbed substrate
			(percentage cover of width of wetted river channel)	(percentage cover of wetted river channel)	(percentage cover of wetted river channel)	(milligrams Chlorophyll *a* per square metre)		(percentage embeddedness)
			Maximum value	Maximum value	Maximum value	Mean monthly value	Maximum value	
Alpine			N/V	No conspicuous growths	No conspicuous growths	15	50	Not to exceed 20 percent
Rivers of upper plains, inland basins and river valleys			Not to exceed 50 percent					
Hill country scurced	Catchment comprises less than 30 percent Tertiary sediment	Upstream of State Highway One	N/V	Not to exceed 40 percent	Not to exceed 15 percent	15	50	
		Downstream of State Highway One	N/V		Not to exceed 30 percent	N/V	100	
	Catchment comprises more than 30 percent Tertiary sediment		N/V	Less than 60 percent	Not to exceed 30 percent	N/V	200	
Lowland			Not to exceed 50 percent	Not to exceed 60 percent	Not to exceed 30 percent	N/V	200	Not to exceed 40 percent
Volcanic (Banks Peninsula)			Not to exceed 50 percent	N/V	N/V	15	50	N/V
Urban			Not to exceed 50 percent	Not to exceed 60 percent	Not to exceed 30 percent	N/V	200	Not to exceed 40 percent

Explanatory notes: (1) The effects of natural perturbations that may affect; water quality, the growth of aquatic plants, or the characteristics of riverbed substrate, are not included in these values. (2) N/V means no value has been set for this parameter.

Objective WQL2(2) – values for groundwater quality where affected by human activity

(i) For nitrate-nitrogen, the maximum concentration shall not increase by more than two milligrams per litre above the maximum concentration measured between 1996 and 2001, and reported in 2002, and the maximum concentration shall not exceed 11.3 milligrams per litre;

(ii) The water quality shall remain within the guideline value for any aesthetic determined listed in the Drinking Water Standards for New Zealand 2000, except for natural exceedances of the Guideline Value. If the water quality does not meet the Guideline Value, as a result of human activities, the water quality shall be improved so that the Guideline Value is achieved;

(iii) The median concentration of Escherichia coli shall be less than one organism per 100 millilitres of water; and

(iv) Any other inorganic or organic determined of health significance or pesticide (excluding nitrate nitrogen, or Escherichia coli) listed in the Drinking Water Standards for New Zealand 2000 shall not be detected at a concentration greater than one tenth of the Maximum Acceptable Value for that determined.

APPENDIX C

Recommended Conditions of Consent

The following Common Consent Conditions have been drafted to meet the obligations set out within Clauses 15.3 & 14.3 of the MEL/MIC agreement. **This agreement does not apply to '*renewal*' applicants but does apply to those MIC applicants who are seeking to use their MIC shares for irrigation and stockwater (referred to as 'combined applications' in the stockwater agreement).**

1. Consent is granted for a term expiring on the 30th of April 2025. *Clause 15.3(a)*

2. Water shall only be taken and / or diverted from **[insert details of off-take / intake]** located at or about map reference NZMS **[insert map reference]**. *Clause 15.3(d)*

3. Water for irrigation shall only be taken between 1 September and the following 30 April and only in accordance with the maximum rate, daily volume (being from 12.01am to 11.59pm) and annual volume (measured between 1 July and the following 30 June) set out in Table A. *Clause 15.3(d)*

Table A – Maximum Rates & Volumes

Year	Maximum rate of abstraction (litres / second)	Maximum Daily Volume (cubic metres / day)	Maximum Annual Volume (cubic metres / year)
1 September 2009 to 30 April 2010	**X l/s**	**X** m^3/day	**X** m^3/annum
1 September 2010 to 30 April 2011	**X** l/s	**X** m^3/day	**X** m^3/annum
1 September 2011 to 30 April 2012	**X** l/s	**X** m^3/day	**X** m^3/annum
1 September 2012 to 30 April 2013	**X** l/s	**X** m^3/day	**X** m^3/annum
1 September 2013 to 30 April 2014 and every year thereafter	**X** l/s	**X** m^3/day	**X** m^3/annum

4. Water allocated in Table A of Condition (3) shall be used only for the spray irrigation of **[insert uses applied for]** to irrigate x [**insert ha area**] hectares within

a command area of x [**insert ha area**] hectares on the area of land shown on attached Plan **x [insert map reference – the map will show the irrigation area and command area]**. *Clauses 15.3(d) & 14(3)*

4a. Water for stockwater supply shall be taken between 1 July and the following 30 June and only in accordance with a maximum rate of **[insert take rate],** maximum daily volume of **[insert daily volume]** cubic metres per day (being from 12.01am to 11.59pm), and a maximum annual volume of **[insert annual volume]** cubic metres per annum (measured between 1 July and the following 30 June).

5. Water for irrigation shall only be used on or applied to land that is subject to a memorandum of encumbrance that complies with the requirements of the agreement entitled *"Agreement in Relation to the Allocation of Water for Irrigation"* between Meridian Energy Limited and the Mackenzie Irrigation Company Limited dated the 31st of October 2006. *Clause 14.3*

6. The consent holder shall, six months prior to this consent being exercised, provide to the Canterbury Regional Council a certificate from the Consent Holder's solicitor certifying that the memorandum of encumbrance provided for in Condition (5) is registered on the computer registers for the land shown on Plan **x,** and any other evidence of registration as the Canterbury Regional Council may require (if any). *Clause 14.3*

7. The consent holder shall, before the first exercise of this consent:
   a. (i) install a water meter(s) that has an international accreditation or an equivalent New Zealand calibration endorsement suitable for use with an electronic recording device, from which the rate and the volume of water taken can be determined to within an accuracy of plus or minus five percent at a location(s) that will ensure the total take of water from [specify] is measured; and
   (ii) install a tamper-proof electronic recording device such as a data logger that shall record (or log) the flow totals every 15 minutes and have the capacity to hold at least one season's (as specified in conditions (3) and (4(a))) data of water taken as specified in clause (b) (i), or which is telemetered, as specified in clause (b)(ii). *Clause 15.3(b)*

b. The water meter and recording device(s) shall be set to wrap the data from the measuring device(s) such that the oldest data will be automatically overwritten by the newest data (i.e. cyclic recording); and shall:

(i) store the entire season's data in each 12 month period from 1 July to 30 June in the following year, which shall be downloaded and stored in a commonly used format and provided to the Canterbury Regional Council upon request in a form and to a standard specified in writing by the Canterbury Regional Council; or

(ii) be connected to a telemetry system which collects and stores all of the data continuously with an independent network provider who will make that data available in a commonly used format at all times to the Canterbury Regional Council and the consent holder. No data in the recording device(s) shall be deliberately changed or deleted.

c. The measuring device shall be installed at a site likely to retain a stable rating (i.e. a man-made channel, concrete, steel or fibreglass pipe). Installation shall be in accordance with ISO 1100/1-1981 or equivalent and be undertaken by a suitably qualified person.

8. The water meter and recording device(s) shall be accessible to the Canterbury Regional Council at all times for inspection and/or data retrieval. *Clause 15.3(b)*

9. The water meter and recording device(s) shall be installed and maintained throughout the duration of the consent in accordance with the manufacturer's instructions. *Clause 15.3(b)*

10. All practicable measures shall be taken to ensure that the water meter and recording device(s) are at all times fully functional and have an accuracy standard of ±5%. *Clause 15.3(b)*

11. The consent holder shall, within one month of any water meter and recording device(s) being installed, or within one month of any water meter and/or recording device(s) being replaced, and at five-yearly intervals thereafter, and at any time when requested by the Canterbury Regional Council, provide a certificate to the Canterbury Regional Council (Attention: RMA Compliance and Enforcement Manager) signed by a suitably qualified person certifying, and demonstrating by means of a clear diagram, that:

a. the water meter and recording device(s) has been installed in accordance with the manufacturers specifications; and

b. data from the recording device can be readily accessed and/or retrieved in accordance with conditions (7), and (8).

12. The water allocated for irrigation and stockwater in conditions (3) and (4(a)) will be metered, recorded and reported separately to the Canterbury Regional Council in accordance with conditions (7), (8), (9), (10) and (11).

13. The Canterbury Regional Council (Attention: RMA Compliance and Enforcement Manager) shall be informed immediately on first exercise of this consent by the consent holder.

14. The taking of water in terms of this consent shall cease for a period required by the owner and/or operator of the Waitaki Power Scheme, where the owner and/or operator considers it necessary to undertake maintenance on, to ensure the structural integrity and safety of, or to avoid risk or compromise to the operation of, the Waitaki Power Scheme.

15. The taking of water in terms of this consent shall cease whenever the owner and/or operator of the Waitaki Power Scheme ceases to take, divert and/or discharge water into the **[insert relevant name – Tekapo, Pukaki – Ohau, and Ohau]** Canal(s), unless the owner and/or operator of the Waitaki Power Scheme gives written agreement to the continuation of take.

Note: Any transfer or variation of this consent or its conditions that alters the volume or location of the take (or any replacement application) is likely to require the approval from the holder of the consents to operate the Waitaki Power Scheme.

Note: The Waitaki Power Scheme means the works including hydraulic control structures, dams, canals, water diversions, penstocks, spill weirs, spill gates, bypass valves, sluice gates, power stations and generating plant, associated ancillary land and structures and resource consents and other rights held by Meridian Energy to utilise the waters and tributary inflows of Lakes Tekapo, George Scott, Pukaki, Ohau, Ruataniwha, Benmore, Aviemore and Waitaki to generate electricity.

Farm Environmental Management Plans (FEMP)

16. The consent holder shall prepare for the approval of the Canterbury Regional Council a FEMP as is required to give effect to this consent. The objectives of the FEMP are to:

(i) ensure the proposed farm system for **[farm property]** can meet the nutrient mitigation requirements set out by the Water Quality Study, and

(ii) identify and mitigate other farm specific environmental risks that are unique to **[farm property]** and the farm management system that is proposed for this property.

The FEMP shall set out the approach to farm management, monitoring and mitigation that will be implemented by the consent holder to address the actual and potential effects on water quality arising from nutrient runoff. The FEMP shall be prepared in accordance with the measures described in section 9 of the Water Quality Study (August 2009), and shall include, but not be limited to the following components.

(a) A list of mandatory good agricultural practices to be adopted, including (but not limited to) the following:

- The consent holder shall prepare a nutrient budget annually for **[farm property]**. A nutrient budgeting tool will be used to determine fertiliser requirements and inputs from non-fertiliser sources of nutrients. Records shall be maintained throughout the year (including farm management practices and associated data) that will be used as input to the approved method of nutrient budgeting.
- Fertiliser shall be applied in accordance with The Code of Practise for Nutrient Management (With Emphasis on Fertiliser Use) NZFMRA 07. Fertiliser spreaders should be tested and calibrated in-house at least annually, and every 5 years by an independent auditor.
- Regular soil testing is to take place to account for all sources of nutrients, including applied effluents and soil reservoirs.
- All new irrigation infrastructure shall be designed and accredited by a qualified professional, and installed in accordance with the accredited design. The design shall take into account the specific requirements of **[farm property]** soil types.

- If existing irrigation infrastructure is being used, the consent holder shall obtain an evaluation report prepared by a certified irrigation evaluator. The evaluation shall determine the system's current performance in accordance with the Code of Practice for Irrigation Evaluation 2005. This report shall be obtained within three months of the first exercise of the consent. Any recommendations identified in the report shall be implemented within 12 months from the date of receipt of the report. A copy of the report shall be given to the Canterbury Regional Council: attention the Compliance and Enforcement Manager.
- All irrigation infrastructure shall be tested and calibrated in-house at least annually and then every 5 years in accordance with the Code of Practice for Irrigation Evaluation 2005 by a qualified irrigation auditor. Any recommendations identified shall be implemented within 12 months from the date of receipt of the report. A copy of the report shall be given to the Canterbury Regional Council: attention the Compliance and Enforcement Manager.
- Maintaining crop input records for **[farm property]** in relation to the type of crop, nutrient inputs, and crop yield. Such records are to be used as inputs to the OVERSEER or an alternative industry standard nutrient budgeting model.
- Riparian management strategies including but not limited to fencing off waterways, vegetating riparian margins and providing minimum setbacks for farm activities from waterways. Riparian management strategies need to be tailored to the specific farm property as part of the FEMP.

(b) The use of OVERSEER or an alternative industry standard to model current and proposed (without additional mitigation) farming systems on **[farm property]** to determine the nutrient reduction required, and changes to farm management practices or farm systems to meet the mitigation requirements of the Water Quality Study.

(c) A Farm Environmental Risk Assessment (FERA) for the identification and mitigation of site specific environmental risks unique to **[farm property]**. The FERA shall be prepared in accordance with section 9.4 of the Water Quality Study.

(d) The FEMP for **[farm property]** shall include an on-farm monitoring plan describing the location, frequency and parameters to be monitored and

the ‘triggers’ if applicable to require a specific mitigation task to be adopted. On farm monitoring by the consent holder shall be in accordance with Table 1 below.

(e) The FEMP for **[farm property]** shall include an annual auditing process with inputs from the farm operator and other interested parties, such as: the Department of Conservation, Ngai Tahu and New Zealand Fish and Game, to demonstrate that the management practices and mitigation measures planned for the farm are being implemented. The annual auditing process shall include (where appropriate) the measures listed in Table 30 of the Water Quality Study.

Table 1: On-Farm Monitoring

On-farm	Monitoring type	Parameter to be measured	Sites to be monitored	Frequency of monitoring	Reporting
Soil		Carbon, Nitrogen, Organic Matter.	Irrigated and non irrigated paired sites on each soil type on farm	Every 3 years	Report as part of annual farm audit report to ECan and MIC
Groundwater		Total nitrogen, nitrate, ammonia, total Kjeldahl nitrogen, total phosphorus, dissolved reactive phosphorus	All groundwater bores on farm at mid aquifer depth	Annually	Report as part of annual farm audit report to ECan and MIC
Surface water	Quality	Total nitrogen, nitrate, ammonia, total Kjeldahl nitrogen, total phosphorus, dissolved reactive phosphorus, suspended solids	All watercourses on farm	Monthly	Report as part of annual farm audit report to ECan and MIC

Advice Note: All off farm monitoring shall be undertaken by the MIC in accordance with Table 25 of the Water Quality Study. The MIC will take an annual levy form the consent holders to undertake this work.

17. The consent holder may without changing the objectives of a FEMP seek the approval of the Canterbury Regional Council for any necessary amendment to such a plan on the following terms:

a. The review shall be undertaken in consultation with and be approved by the Consent Authority.
b. Such review is necessary to give effect to the purpose of the FEMP for **[farm property]**.

18. The FEMP for **[farm property]** shall be prepared and submitted to the Canterbury Regional Council six months prior to giving effect to this consent.

19. The consent holder shall engage an expert Environmental Scientist to review the FEMP for **[farm property]** prior to its approval by the Canterbury Regional Council. The peer reviewer shall be nominated and appointed by agreement between the consent holder and the Canterbury Regional Council. The peer reviewer report shall be part of the documentation submitted to the Canterbury Regional Council.

20. The consent holder shall pay all actual and reasonable costs of the Canterbury Regional Council in connection with the review of the FEMP for **[farm property]** prior to its approval.
Advice Note: Council approval to be within 90 working days of receipt of plan or plans.

21. The FEMP shall apply to **[farm property]** and to any subsequent landholdings resulting from the subdivision of that property.

22. The consent holder shall implement the FEMP from the date on which water is abstracted to give effect to this consent and henceforth, adhere to the requirements of the FEMP required by condition 16 for the duration of this consent.

Nutrient Discharge Allowance

23. The Nutrient Discharge Allowance for **[farm property]** shall be 'X' kilograms of Nitrogen per year, and 'Y' kilograms of Phosphorus per year. Nutrient losses from the farm shall be monitored by the consent holder in accordance with condition 24, to verify that nutrient losses remain below the specified allowance.

24. Monitoring of compliance with the Nutrient Discharge Allowance shall be undertaken by the consent holder by either:

(a) annual use of OVERSEER, or an approved equivalent, with relevant details from the farm management diary, to estimate annual nutrient losses; or

(b) continuous monitoring of nutrient losses using approved monitoring methods (e.g. lysimeters) and annual analysis of the data to calculate the annual nutrient loss at farm scale.

25. The annual auditing process (referred to in condition 16(e)) shall include the preparation of a report to be submitted to the Canterbury Regional Council for verification that the FEMP is meeting its objectives. The results from monitoring as required by condition 24 shall be submitted by the consent holder to the Canterbury Regional Council on an annual basis.

26. If monitoring shows that the Nutrient Discharge Allowance is being exceeded, the consent holder shall review the Farm Environmental Management Plan and identify the further steps that are to be taken to reduce nutrient losses, in order that the Nutrient Discharge Allowance is not exceeded.

Sub-catchment Monitoring and Mitigation

27. Prior to the exercise of this consent the consent holder in sub-catchment 'X' shall prepare a monitoring plan with respect to the necessary off-farm monitoring to ensure that the requirements of Table 25 of the Water Quality Study are met (including the measurement of periphyton biomass). This plan shall specify any pre-implementation monitoring required to confirm baseline conditions, and the required frequency of post implementation monitoring and an appropriate methodology for conducting all monitoring. This monitoring plan shall be submitted to the Canterbury Regional Council for certification as to its efficacy prior to implementation.

28. The cost of conducting all off-farm monitoring at node 'X' shall be undertaken by the consent holders within sub-catchment 'X' in a manner consistent with Table 25 of the Water Quality Study. All costs associated with this monitoring shall be met by consent holder.

29. The objective of monitoring at node 'X' is to ensure that the corresponding sub-catchment (as provided in Figure 4 – river and surface water sub-catchments, and Figure 5 – groundwater sub-catchments of the Water Quality Study)

immediately upstream of that node remains in a state whereby the water quality standards as determined in Chapter 6 of the Water Quality Study for node 'X' are maintained. The consent holder shall actively seek to meet this objective at all times.

30. If monitoring shows that any of the water quality standards for node 'X' are exceeded, the consent holder shall report this exceedence to the Canterbury Regional Council and submit a proposed Remedial Action Plan, for the certification of the Canterbury Regional Council.

Advice Note: The Remedial Action Plan shall be prepared and funded by all of the consent holders in the affected sub-catchment.

31. The Remedial Action Plan shall prescribe the method for altering and/or adapting farming practices on one or more of the farms within the affected sub-catchment to ensure that the exceedence in water quality standards at the affected node are returned to standard 'X'. The Remedial Action Plan shall also include a method for additional monitoring as deemed necessary to demonstrate that the changes in farm management are resulting in the water quality standard(s) being adhered to.

32. Once the Remedial Action Plan prepared in accordance with condition 5 is certified by the Canterbury Regional Council, the consent holder shall undertake any necessary changes to on-farm management practices required by the Remedial Action Plan.

33. Notwithstanding condition 17, the consent holder shall update their Farm Environmental Management Plan (if necessary) to include the changes in farm management to be adopted under (5) above.

34. Should the approach adopted by the consent holder fail to address the exceedence of the standard(s), or agreement is not reached among the consent holders within the affected sub-catchment as to the approach to be taken to remedy the exceedence, the Canterbury Regional Council shall review all sub-catchment consents (including CRC...) in terms of section 128 of the Resource Management Act 1991.

APPENDIX D

Recommended Conditions for Stockwater Only Consents

The following Common Consent Conditions have been drafted to meet the obligations set out within Clause 4 of the MEL/MIC stockwater agreement. This agreement applies to those MIC applicants who are seeking separate resource consents for stockwater (referred to as 'stockwater applications' in the stockwater agreement).

1. Consent is granted for a term expiring on the 30th of April 2025. *Clause 15.3(a)*

2. Water shall only be taken and / or diverted from **[insert details of off-take / intake]** located at or about map reference NZMS **[insert map reference]**. *Clause 15.3(d)*

3. Water shall be taken between 1 July and the following 30 June and only in accordance with a maximum rate of **[insert take rate],** maximum daily volume of **[insert daily volume]** cubic metres per day (being from 12.01am to 11.59pm), and a maximum annual volume of **[insert annual volume]** cubic metres per annum (measured between 1 July and the following 30 June).

4. The consent holder shall, before the first exercise of this consent:
   a. (i) install a water meter(s) that has an international accreditation or an equivalent New Zealand calibration endorsement suitable for use with an electronic recording device, from which the rate and the volume of water taken can be determined to within an accuracy of plus or minus five percent at a location(s) that will ensure the total take of water from [specify] is measured; and
      (ii) install a tamper-proof electronic recording device such as a data logger that shall record (or log) the flow totals every 15 minutes and have the capacity to hold at least one season's (as specified in condition (3)) data of water taken as specified in clause (b) (i), or which is telemetered, as specified in clause (b)(ii). *Clause 15.3(b)*
   b. The water meter and recording device(s) shall be set to wrap the data from the measuring device(s) such that the oldest data will be automatically overwritten by the newest data (i.e. cyclic recording); and shall:

(i) store the entire season's data in each 12 month period from 1 July to 30 June in the following year, which shall be downloaded and stored in a commonly used format and provided to the Canterbury Regional Council upon request in a form and to a standard specified in writing by the Canterbury Regional Council; or

(ii) be connected to a telemetry system which collects and stores all of the data continuously with an independent network provider who will make that data available in a commonly used format at all times to the Canterbury Regional Council and the consent holder. No data in the recording device(s) shall be deliberately changed or deleted.

c. The measuring device shall be installed at a site likely to retain a stable rating (i.e. a man-made channel, concrete, steel or fibreglass pipe). Installation shall be in accordance with ISO 1100/1-1981 or equivalent and be undertaken by a suitably qualified person.

5. The water meter and recording device(s) shall be accessible to the Canterbury Regional Council at all times for inspection and/or data retrieval. *Clause 15.3(b)*

6. The water meter and recording device(s) shall be installed and maintained throughout the duration of the consent in accordance with the manufacturer's instructions. *Clause 15.3(b)*

7. All practicable measures shall be taken to ensure that the water meter and recording device(s) are at all times fully functional and have an accuracy standard of ±5%. *Clause 15.3(b)*

8. The consent holder shall, within one month of any water meter and recording device(s) being installed, or within one month of any water meter and/or recording device(s) being replaced, and at five-yearly intervals thereafter, and at any time when requested by the Canterbury Regional Council, provide a certificate to the Canterbury Regional Council (Attention: RMA Compliance and Enforcement Manager) signed by a suitably qualified person certifying, and demonstrating by means of a clear diagram, that:

a. the water meter and recording device(s) has been installed in accordance with the manufacturers specifications; and

b. data from the recording device can be readily accessed and/or retrieved in accordance with conditions (4), and (5).

9. The Canterbury Regional Council (Attention: RMA Compliance and Enforcement Manager) shall be informed immediately on first exercise of this consent by the consent holder.

10. The taking of water in terms of this consent shall cease for a period required by the owner and/or operator of the Waitaki Power Scheme, where the owner and/or operator considers it necessary to undertake maintenance on, to ensure the structural integrity and safety of, or to avoid risk or compromise to the operation of, the Waitaki Power Scheme.

11. The taking of water in terms of this consent shall cease whenever the owner and/or operator of the Waitaki Power Scheme ceases to take, divert and/or discharge water into the **[insert relevant name – Tekapo, Pukaki – Ohau, and Ohau]** Canal(s), unless the owner and/or operator of the Waitaki Power Scheme gives written agreement to the continuation of take.

Note: Any transfer or variation of this consent or its conditions that alters the volume or location of the take (or any replacement application) is likely to require the approval from the holder of the consents to operate the Waitaki Power Scheme.

Note: The Waitaki Power Scheme means the works including hydraulic control structures, dams, canals, water diversions, penstocks, spill weirs, spill gates, bypass valves, sluice gates, power stations and generating plant, associated ancillary land and structures and resource consents and other rights held by Meridian Energy to utilise the waters and tributary inflows of Lakes Tekapo, George Scott, Pukaki, Ohau, Ruataniwha, Benmore, Aviemore and Waitaki to generate electricity.

APPENDIX E

Cultural Impact Assessment and Peer Review

APPENDIX F

Economic Impact Assessment