

**BEFORE THE CANTERBURY REGIONAL COUNCIL**

**IN THE MATTER OF**

The Resource Management Act 1991

**AND**

**IN THE MATTER OF**

an application by **Five Rivers Ltd** for a water permit filed under **CRC061154** to take and use surface-water from Lake Ōhau for spray irrigation of 1,493 hectares of crops and pasture at Ōhau Downs Station

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**REPORT AND DECISION OF HEARING COMMISSIONERS PAUL ROGERS, MICHAEL BOWDEN, DR  
JAMES COOKE AND EDWARD ELLISON**

**PART B – SITE SPECIFIC DECISION**

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## TABLE OF CONTENTS

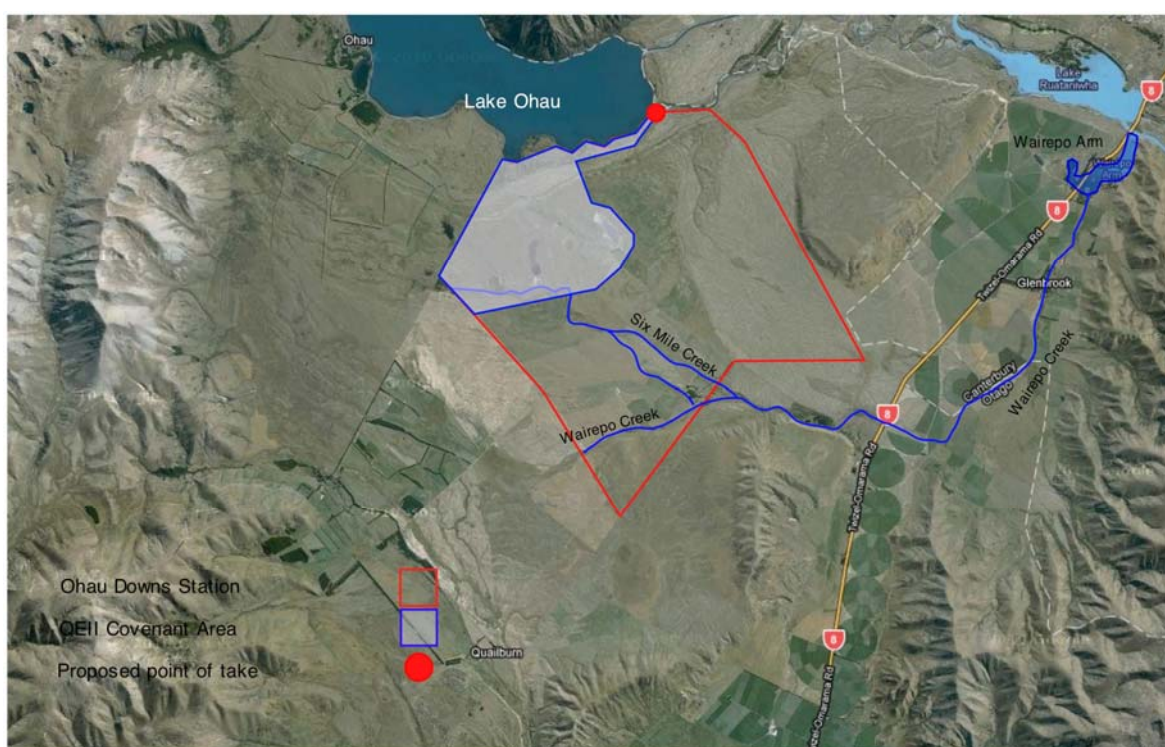
1	INTRODUCTION .....	3
2	THE PROPOSAL.....	3
3	DESCRIPTION OF THE ENVIRONMENT.....	5
4	PLANNING INSTRUMENTS .....	5
5	PRELIMINARY MATTERS .....	6
6	NOTIFICATION AND SUBMISSIONS .....	6
7	THE SECTION 42A REPORTS.....	7
8	THE APPLICANT’S CASE .....	10
9	SUBMITTERS.....	36
10	UPDATES TO THE SECTION 42A REPORTS .....	40
11	APPLICANT’S RIGHT OF REPLY .....	41
12	STATUTORY CONTEXT .....	52
13	EVALUATION OF EFFECTS .....	52
14	EVALUATION OF RELEVANT PLANNING INSTRUMENTS .....	62
15	EVALUATION OF OTHER RELEVANT S104 MATTERS.....	65
16	PART 2 RMA .....	65
17	OVERALL EVALUATION .....	68
18	DECISION.....	69

## 1 INTRODUCTION

- 1.1 This is a decision on an application by **Five Rivers Limited** (the applicant). It is one of many decisions we have made on 104 applications by various applicants for water permits and associated consents in the Upper Waitaki Catchment.
- 1.2 The decision should be read in combination with our Part A decision, which sets out our findings and approach to various catchment wide issues that are common to multiple applications. References to our Part A decision are made throughout this decision as appropriate.

## 2 THE PROPOSAL

- 2.1 The applicant proposes to take and use water from Lake Ōhau at a rate of 950 litres per second and a volume not exceeding 8,958,000 cubic metres per year for spray irrigation of 1,493 ha of crops and pasture at Ōhau Downs Station. The water is proposed to be taken from a purpose built gallery in the shores of Lake Ōhau at the location shown in Figure 1.



*Figure 1: An aerial photo of the applicant's property illustrating its proximity to the surrounding hills, rivers, lakes and existing irrigation. Note that this figure is intended as a visual guide and that the application and applicant's evidence was used to determine actual locations*

- 2.2 The water will be applied to land using 29 pivot irrigators and potentially k-line irrigation as well. The applicant (in evidence) has put forward a number of different farming system scenarios including intensive beef and sheep, dairy cow, and cut and carry systems.
- 2.3 The applicant has proposed a number of mitigation methods for their proposed take. These methods include adopting a minimum lake level of 519.45 metres above sea level (in accordance with the WCWARP) installing a fish screen on the intake and metering the take. To mitigate against potential effects on water quality the applicant has proposed a Farm Environmental Management Plan for their Ōhau Downs property. This mitigation includes housing dairy cows (for the dairy cow system) in cubicle barns over the winter and shoulder season to, amongst other reasons, control the application rates of effluent to the soils.

## The Application

- 2.4 The application is for a water permit to take and use surface-water pursuant to section 14 RMA. Consent is required under the Waitaki Catchment Water Allocation Regional Plan (WCWARP), as further discussed below.
- 2.5 The application (CRC061154) was lodged with the Canterbury Regional Council (the Council) on 6 October 2005. This application was publicly notified and there were a number of submissions both in support and in opposition that are referred to later in this decision.
- 2.6 The application is for a new activity and requested a term until 30 April, 2025 (coincident with the expiry of Meridian's consents for the operation of the Waitaki Power Scheme). This area includes the Swan Lagoon and Raupo Lagoon and runs through to the Lake Ōhau lakeside. It is identified on Annexure 3D of Mr Steven Brown's evidence as the QEII covenanted area.

## Modifications after notification

- 2.7 Since the application was lodged, the applicant has advised of a minor reduction in the volume sought from 9,000,000 cubic metres per year to 8,958,000 cubic metres per year due to a reduction in proposed irrigation area from 1,500 hectares (ha) to 1,493 ha.
- 2.8 At the time of writing the S42A report the Investigating Officer (Ms Penman) noted that the applicant had indicated it might wish to use the proposed irrigated land to support a dairy cow system. The applicant's evidence made it clear that it now wishes to include milking dairy cows as part of the proposed farming system.
- 2.9 Ms Penman's initial opinion was that the use of the property for dairying was beyond the scope of the application because of the increase in effects on water quality. However following consideration of the submissions by Mr Whata on behalf of the applicant, Ms Penman changed her opinion and agreed with Mr Whata that the change was within scope. The key reasons for this were as follows:
- (a) the dairying system as proposed (using cubicle stables for the majority of the year) would result in a lower nutrient discharge than would an intensive sheep and beef operation.
  - (b) the applicant subsequently applied for the related effluent consents, which have been notified with a large number of submissions received;
  - (c) the main effects of concern in relation to dairying, are the impacts of the effluent, which will be considered under those notified applications; and
  - (d) Therefore those parties who have an interest in the dairying aspect of the proposal would have had the chance to submit.
- 2.10 The general principle for modifications after notification is that amendments are allowed provided they do not increase the scale or intensity of the activity or significantly alter the character or effects of the proposal. The key consideration is prejudice to other parties by allowing the change. In this case, we are satisfied that the above changes do not significantly alter the intensity or effects of the proposal and that no party would be adversely affected by allowing the changes.

## Related consents and applications

- 2.11 A consent to take and use groundwater (CRC061155) on the same area of land has also been lodged by the applicant but is currently on hold pending the outcome of this application. According to the S42A Report, should this consent be granted then the applicant has advised that it will withdraw its proposed groundwater take. We note that the notification wording of this application stated that 'the maximum rate and annual

volume of water proposed to be taken under this application will be combined with CRC061154'.

- 2.12 Additional consents to discharge effluent from the proposed dairy farm were lodged with the Council on 27 August 2009. These applications were 'called-in' by the Minister for the Environment on 27 January 2010. Subsequent to this call-in, the applicant withdrew these discharge consent applications. We discuss the implications of the call-in and the applicant's subsequent withdrawal of the effluent applications in Part A.
- 2.13 The applicant has also lodged an application to install an intake structure in the bed of Lake Ōhau (CRC100225). This application was not submitted to the Council in time for the information to be incorporated into the notification of this consent. Consequently, the application was publicly notified on 11 November 2009 and a number of submissions were received. The Panel heard the application on the 15 March 2010. We have provided a separate decision on this application.

### **3 DESCRIPTION OF THE ENVIRONMENT**

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- 3.1 The following description of the environment was provided in the S42A Officer's Report (Report 13) and is intended to provide a brief overview of the environmental setting. Further description of the environment including the relevant watercourses, and current land use is covered in our discussion of the applicant's case.
- 3.2 Lake Ōhau is a natural glacier feed lake with its main inflow from the Dobson and Hopkins Rivers. The lakes outflow has been modified since the construction of the hydro-electric scheme. Its natural out flow (Ōhau River) now only receives a flow of between 8-12 m<sup>3</sup>, with the majority of the flow being diverted into the Ōhau B canal to Lake Ruataniwha. Unlike Lakes Tekapo and Pūkaki, Lake Ōhau's water level was not artificially raised as part of the hydro development. However, Meridian Energy Limited (Meridian) who own and operate the hydro scheme now controls the lake levels.
- 3.3 The majority of the irrigation area on the north side of Lake Ōhau Road will be located on a terrace that is not visible from the road. However, the area to the south of Lake Ōhau Road will be visible to traffic travelling up the Lake Ōhau valley. Lake Ōhau Road leads to the tourist destination of Lake Ōhau Village and dissects the proposed irrigation area. Parts of the applicant's property on either side of Lake Ōhau Road (not within the irrigation area) are designated as 'Outstanding Natural Landscape' in the Waitaki District Plan.
- 3.4 Approximately 1,200 ha of land adjacent to the proposed irrigation area (refer Figure 1) are protected under QEII Trust covenant to maintain the ecological values of the area. These ecological values include several lagoon ecosystems. In addition to the QEII covenant land several lagoons are located within the applicant's property, and several watercourses run through it. These water courses include Six Mile Creek and Wairepo Creek as shown in Figure 1.
- 3.5 In relation to a site visit, we detailed our site visits in Part A and we do not repeat this information here. Whilst we viewed Ōhau Downs from the air (helicopter trip) and the road, we did not go on to the property.

### **4 PLANNING INSTRUMENTS**

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- 4.1 As discussed in our Part A decision, there is a wide range of planning instruments that are relevant under the RMA. This includes national and regional policy documents, along with regional and district plans. The key planning instruments relevant to this application are as follows:
- (a) Waitaki Catchment Water Allocation Plan (WCWARP);
  - (b) Natural Resources Regional Plan (NRRP);
  - (c) Proposed Canterbury Regional Policy Statement (PCRPS);

- (d) Canterbury Regional Policy Statement (CRPS); and
- (e) Waitaki District Plan (WDP)

4.2 The provisions of these planning instruments critically inform our overall assessment of the application under s104(1)(b) of the RMA, as discussed in Section 14 of this decision. In addition, the rules within the relevant planning instruments determine the status of the activity, as set out below.

#### **Status of the activity**

- 4.3 In our Part A decision we provide a detailed discussion of our approach to determining the status of activities. We now apply that approach to the current application.
- 4.4 This application is listed in Schedule 2 of the Resource Management (Waitaki Catchment) Amendment Act 2004. Section 88A therefore does not apply and the relevant plan for this activity is the operative WCWARP.
- 4.5 The following rules from the WCWARP are applicable to this application:
- (a) Rule 3, clause (1) – The applicant proposes to adopt the minimum lake level for Lake Ōhau of 519.45 metres above sea level as per the requirements of the WCWARP.
  - (b) Rule 6 – The activity is within the annual allocation limit of 275 million cubic metres for agricultural activities upstream of Waitaki Dam.
  - (c) Rule 6 – The activity is within the annual allocation limit of 12 million cubic metres for agricultural activities upstream of the Lake Ōhau outlet (see discussion on priority below).
  - (d) Rule 17 – Classifying rule – Discretionary activity
- 4.6 Overall, the proposed water permit is a **discretionary activity** under Rule 17 of the WCWARP and resource consent is required in accordance with Section 14 of the RMA.

## **5 PRELIMINARY MATTERS**

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### **Priority**

- 5.1 We discuss the issue of priority in our Part A decision and have applied that approach to these applications, including the priority order set out at Appendix B to our Part A decision.
- 5.2 Within the Lake Ōhau catchment (upstream of the Lake Ōhau outlet), Williamson Holdings Limited has applied for 12.408 Mm<sup>3</sup>/year (CRC040835) and has a higher priority than this application. If the Williamson Holdings Limited application was granted, the current application would exceed the allocation limit in the WCWARP for agricultural activities upstream of the Lake Ōhau outlet. This would change the status of the activity from discretionary to non-complying in accordance with Rule 18 of the WCWARP.
- 5.3 However for the reasons set out in our separate decision on CRC040835, we have declined the application by Williamson Holdings Limited. We have therefore assessed the current application as a discretionary activity, as noted above.

## **6 NOTIFICATION AND SUBMISSIONS**

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- 6.1 The application was publicly notified on 4 August 2007 and 25 submissions in total were received, including:
- (a) 4 in support;

- (b) 19 in opposition; and
- (c) 2 neither in support nor opposition.

6.2 Table 2 is based on the relevant s42A reports and summarises those submissions that directly referenced the application. In addition to those listed, there were other submitters that presented evidence at the hearing that was relevant to this application. The relevant evidence from submitters is discussed in more detail later in this decision. Please note that all submissions hold equal importance, even if not specifically listed below.

**Table 1. Submissions made on Water Permit Application CRC061154**

Submitter	Reasons	Position
Ōhau Snow Holdings	Consider they have priority to water in the Lake Ōhau catchment	Oppose
Fish & Game NZ	Takes in the catchment may exceed those in the Plan	Oppose
Meridian Energy Ltd	Concerned about water quality, metering and health & safety due to location of the take	Oppose
TJ & J Cooke	Assist in management of land but need to grant Williamson Holdings Ltd consents first	Support
Southdown Holdings Ltd (previously Williamson Holdings Ltd)	Assist in management of land but need to grant Williamson Holdings Ltd consents first	Support
Blue Family Trust	Loss of amenity value on shore of Lake Ōhau as neighbour to proposed operation	Oppose

6.3 Overall, the key effects of concern to submitters include effects on ecosystems, water quality, allocations limits, minimum flows, natural character and landscape, efficiency and cultural values.

## 7 THE SECTION 42A REPORTS

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7.1 A comprehensive officer report on the application and submissions was prepared by the Regional Council's planner (Ms Claire Penman). The report was supported by specialist reports prepared by:

- (a) Claire Penman (Flow and level regimes)
- (b) Maria Bartlett (Annual allocations to activities)
- (c) Tom Heller (Hydrology and hydrogeology)
- (d) Dr Brent Clothier (Land management)
- (e) Carl Hanson (Groundwater quality)
- (f) Dr Adrian Meredith (Surface water quality)
- (g) Dr Marc Schallenberg (Lake water quality)
- (h) Dr Michael Freeman (Overview water quality and landscape effects)
- (i) Chris Glasson (Landscape effects - individual and cumulative)

- 7.2 The report was pre-circulated in advance of the hearing. Specific points noted from the s42A report are summarised below:

#### **Effects on other users**

- 7.3 Ms Penman noted there are no existing consented users from Lake Ōhau that are restricted by minimum lake levels. She added that there is no instantaneous allocation limit for Lake Ōhau, however, the total annual allocation under the proposed applications exceeds that available for agricultural and horticultural activities upstream of Lake Ōhau outlet. Ms Penman stated that the applicant has not assessed the effects of any reduction in water available for other activities as required under Policy 12 of the WCWARP.
- 7.4 Ms Penman noted that Annex 1 of the WCWARP at paragraph 76 states that "The environmental level and flow regimes, and the allocations to activities, are two key components of the allocation framework established by this Plan. They should be binding except in specific cases where it can be established that the adverse environmental effects of the proposal are minor, and where the activity is not contrary to the objectives and policies of this Plan."
- 7.5 In conclusion Ms Penman noted that the applicant has not provided any assessment on the effects of granting an application over the allocation limits on the entitlements to other activities. Therefore she was unable conclude that effects on other water users are minor.

#### **Recreational and Amenity Effects**

- 7.6 The appropriate minimum lake level has been adopted by the applicant as set out in the WCWARP. In Ms Penman's opinion the minimum lake level was set to provide protection of recreational and amenity values for Lake Ōhau.

#### **Efficient and Reasonable Use**

- 7.7 The applicant proposes to take water at a rate not exceeding 950 litres per second, and use up to 8,958,000 cubic metres of water per year for irrigation of 1,493 ha. Ms Penman acknowledged that the irrigation volume has been based on the volume adopted by Mackenzie Irrigation Company of 600 millimetres per ha per year.
- 7.8 The applicant states that the maximum gross depth of water applied will be 5 millimetres per day. They expect the evapotranspiration rates to be over 6 millimetres per day in the peak summer months. Based on these figures, Ms Penman noted that the applicant considered that the proposed volume was efficient.
- 7.9 In response to a request for further information regarding efficiency, Ms Penman noted that the applicant provided details on the soil types and application rates. In this information the applicant stated that the soils have an average water holding capacity of 70 millimetres and that the volume of water applied equates to 4.9mm/ha/day over the 1,493 hectares.
- 7.10 According to Ms Penman at the proposed rate of 950 litres per second, irrigation equates to a gross daily application depth of 5.4mm/ha/day and an application depth of 4.3mm/ha/day at 80% efficiency. Ms Penman also noted that the applicant had not proposed any return period for irrigation.
- 7.11 As a comparison to the applicant's annual volume calculation, Ms Penman used the Council's GIS system and the method outlined in Report U05/15 to determine an appropriate annual volume for irrigation of the proposed area in accordance with Policy 16(c). She based this calculation on intensive land use with 25% light soil (PAW <75mm), 50% medium soil (PAW 75-110mm) and 25% heavy soils (PAW >110mm) and an effective summer rainfall of 230mm. She said that the actual PAW of the soils in the proposed irrigation area range from 30mm to 130mm, but are predominantly between 75-110mm.
- 7.12 Using the above figures, the recommended annual volume for each soil class is 2,193,750 cubic metres for light soils, 3,900,000 cubic metres for medium soils and 1,650,000 cubic



metres for heavy soils. Consequently, Ms Penman considered a volume of 7,743,750 cubic metres would be an efficient volume of water for irrigation of this area using this method (in accordance with Policy 16(c)).

- 7.13 Ms Penman noted that this methodology (Report U05/15) assumes an irrigation efficiency of 80% which is largely achievable for modern spray systems (consistent with Policy 16(b)) and takes into consideration on-site physical and climatic factors (Policy 16(a)).
- 7.14 Given the above discussion, Ms Penman was not satisfied that the annual volume being sought by the applicant of 8,958,000 cubic metres per year would be reasonable and appropriate for the area and method of irrigation proposed.

### **Landscape Effects**

- 7.15 Ms Penman noted that the applicant had not addressed the potential effects on landscape. As part of her assessment Ms Penman reviewed the Waitaki District Plan and noted that none of the land area subject to this application is designated as Outstanding Natural Landscape through Proposed Variation 2 to the Waitaki District Plan (as it then was).
- 7.16 Ms Penman acknowledged that a number of submitters have raised concerns with regard to effects on natural character and amenity values through the change in landscape within the Mackenzie basin. She noted that Mr Chris Glasson (S42A Officer for Landscape Issues) has concluded that that effect on landscape from this proposal are likely to be significant.
- 7.17 In Mr Glasson's S42A report he considered that the proposal requires modification to the irrigated area so that there is a significant buffer between the irrigated area and moraine hills, mountain tarn, lake edge and road edge. He added that these areas should be excluded from the proposed irrigation area. He also considered the applicants should modify the area so that it is compatible with landform patterns on both sides of the road; so as to retain a consistent landscape.
- 7.18 As the conclusions reached by Mr Glasson were that the effects may be more than minor, Ms Penman was not satisfied that the adverse effects on people, community and amenity values, (in terms of effects on landscape) will be minor.

### **Water Quality Effects**

- 7.19 Ms Penman noted that a full mitigation suite and assessment of residual effects on water quality has not yet been provided. Consequently she could not be satisfied that the adverse effects on water quality from the proposed activity would be minor. We note that Ms Penman's S42A assessment on water quality was based on the beef and sheep farming and that at the time it was compiled intensive cropping or dairying were not an intended use of the proposed irrigated land.
- 7.20 In regards to cumulative effects on water quality Ms Penman noted the applicant had been involved with the study by Mackenzie Water Research Ltd (MWRL) on cumulative effects within the catchment. Our findings on the MWRL WQS are contained in Part A of this decision.
- 7.21 According to Ms Penman an audit of the Farm Environmental Management Plan (FEMP) and water quality assessment by the Council's technical experts considered that there are some uncertainties about the potential adverse effects who suggest that either more information is needed or strict monitoring and response conditions would be needed to address cumulative water quality effects. Ms Penman added that at the time of writing, no appropriate conditions addressing water quality on a local or cumulative scale had been proposed by the applicant.

### **Effects on Ecosystems**

- 7.22 Ms Penman noted that the minimum lake level as set out in Table 3 of the WCWARP takes into consideration protection of ecosystems. She added that if a fish screen is installed

which is in accordance with recommended conditions, then the effects of the take on aquatic ecosystems will be minor.

- 7.23 Ms Penman noted in her S42A report that the effects on terrestrial ecosystems may be more than minor and stated that an assessment and mitigation measures is required by the applicant.

### **Cultural**

- 7.24 The applicant had not provided an assessment of the effects of the proposed activity on cultural values according to Ms Penman in her S42A Report.
- 7.25 Submissions were received in opposition to this application from Te Runanga o Ngāi Tahu. Te Runanga o Ngāi Tahu have raised concerns relating to mixing of waters between catchments, deterioration of water quality, dewatering and residual flows, changes to sediment flow and deposition and impacts on sites of cultural significance. Ms Penman also added that Lake Ōhau has a statutory acknowledgement in the Ngāi Tahu Claims Settlement Act 1998.

### **Statutory Assessment**

- 7.26 Ms Penman reiterated that the proposed water permit is a non-complying activity under Rule 18 of the WCWARP (and TRP) and that resource consent is required in accordance with Section 14 of the RMA. Ms Penman in her principal report did note that given the allocation limits for the annual allocation for Lake Ōhau were exceeded there may very well be priority issues. We have commented upon this point earlier in this decision noting that allocation issues alter the status of this activity from non-complying to discretionary.
- 7.27 When considering s104D(1)(b), Ms Penman reviewed the relevant provisions of the RPS and WCWARP. She considered the water permit application was not consistent with several policies of the WCWARP, e.g.:
- (a) Policy 13 due to there being likely effects on water quality and a lack of mitigation proposed by the applicant,
  - (b) Policy 12 as it is over the allocation limit in this catchment, and, Policies 15 and 16 due to effects of inefficient use.
- 7.28 In addition, Ms Penman could not make a conclusion about whether the application is consistent with Objective 1 given the number of submissions to be heard.
- 7.29 In regard to the Purpose and Principles of the Act (Part 2) Ms Penman's view was that although the proposal may provide for the economic and social well-being of the community (through allowing the development of land to occur) the applicant had not proposed measures to "safeguard the life-supporting capacity of water" and "avoid, remedy or mitigate" the potential impacts on surface water quality and landscape values as required in Section 5(2)(c). Nor had they provided information to confirm that the proposed annual volumes requested are reasonable and consistent with the objectives of Section 5(2)(a), which aims to provide for the needs of future generations.
- 7.30 Ms Penman also noted that in her opinion the proposed activities may not meet all the relevant provisions of (Part 2) Section 6 and 7 of the RMA. This is due to a lack of assessment/mitigation regarding the efficient use of the water, maintenance and enhancement of amenity values and the environment, cultural values, and water quality and ecosystems.

## **8 THE APPLICANT'S CASE**

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- 8.1 We note that the majority of the applicant's expert evidence was presented in conjunction with, one or more, of the following applicants: Southdown Holdings Limited, Killermont Station Limited and Williamson Holdings Limited. In this decision the evidence summarised below and in only includes information relevant to the applicant's property.

- 8.2 It should also be noted that where the applicant's evidence has referred to multiple properties, which includes the applicants, we have used that information in the context of applying to the applicant's property. Consequently, the original evidence should be referenced to determine whether the information in this decision is relevant to any other property.
- 8.3 Legal counsel for the applicant, Mr Whata, presented opening submissions and called 11 witnesses as follows:
- (a) Mr Zeestraten (Five Rivers Ltd) -owners submission
  - (b) Mr McIndoe (Aqualinc Research Ltd) - Proposed activity, reasonable use, stockwater, Effects on QEII covenant, Effects on waterways)
  - (c) Mr Kyle (Mitchell Partnerships) - Planning
  - (d) Dr Robson (Ryder Consulting) - Farm Environmental Management Plan
  - (e) Mr Englebrecht (Robert Engelbrecht Consultancy Ltd) - Farm Management
  - (f) Mr Borrie (Aqualinc Research Ltd) - Cubicle Barn Waste Disposal
  - (g) Dr Bartlett (Mitchell Partnerships) - Terrestrial Effects
  - (h) Dr Bright (Aqualinc Research Ltd) - Nutrient discharge allowance, groundwater, and leaching
  - (i) Dr Ryder (Ryder Consulting Ltd) -surface water quality, aquatic ecology, and avifauna
  - (j) Mr Mikaere (Buddy Mikaere and Associates) - Cultural Effects

#### **Opening legal submissions**

- 8.4 The applicant, together with Southdown Holdings Ltd, Williamson Holdings Ltd and Killermont Station Ltd, was represented by Mr Christian Whata. Mr Whata also represented McKenzie Water Research Ltd, who presented the cumulative effects assessment on behalf of all applicants seeking consents at this hearing.
- 8.5 Mr Whata opened his evidence by stating that the applicant is committed to best practice and that their farm management proposals are cutting edge. He added that the applicant fully appreciates the need to avoid adverse effects. Importantly, he stressed, best practice combines with high productivity to make the farms viable.
- 8.6 Mr Whata acknowledged that the application covers relatively large irrigable areas (though small within the context of the Basin as a whole). He added that they should not be penalised for this and should be judged on their merits, which in his view include:
- (a) More efficient and productive use of land and water resources;
  - (b) Comprehensive management of resources to agreed standards on an integrated basis so as to avoid effects of significance;
  - (c) Better enablement of both people and communities through long term sustainable and viable use of resources;
  - (d) Enhancement of stream and terrestrial environments, and protection of valued areas, through uniform farm management practices across large land holdings; and
  - (e) Greater ability to respond to and mitigate unanticipated adverse effects through the application of entire farm management systems over large irrigable areas.

- 8.7 Mr Whata noted that some applicants have expressed concerns about the level of mitigation required to meet the WQS thresholds. He added that the starting point is that all applicants need to engage in farm management practices that minimise the effects of their activities irrespective of the allocation methodology. In his view this is exactly what this applicant is doing, with the result that the nutrient loading associated with their farms is well below the WQS thresholds for nitrogen and have bettered them for phosphorus.
- 8.8 Mr Whata detailed the existing environment and noted that it is not pristine and reflects the reality of dryland farming in a tough environment. He noted that the applicant's property is currently farmed and these activities have an impact on the environment including generating nutrients, waterways not fenced, minimal riparian planting and significant soil erosion.

#### The future environment

- 8.9 Mr Whata then discussed the permitted baseline in terms of the relevant NRRP rules. He noted that the permitted activities included: minor takes or diversions for activities such as stock water outside of water bodies identified as being of high natural character; general farming activities such as intensive pastoral grazing, fertiliser application, dryland cropping and ancillary activities.
- 8.10 In terms of land use activities Mr Whata noted that the District Plan permits all farming activities and irrigation (except in Outstanding Landscape Areas in the Waitaki District). Mr Whata noted that the applicant holds a number of resource consents and certificates of compliance that permit certain farm related activities.
- 8.11 He noted that ECan had recently refused to issue certificates of compliance for the application of fertiliser on the basis that the regional plans do not currently permit the application of fertiliser. He submitted that consent for fertiliser is only required if it enters water or causes contamination of water, emanating as a result of natural processes from that contaminant. He said that if it can be shown that fertiliser will not enter water, then in the absence of a rule to the contrary, fertiliser application is a permitted activity. The key point, he told us, is that we are not examining a static environment. It could be subject to some change irrespective of the grant of consents. It is against this context, he told us, that we should assess the scale of the effects of the proposed applications.
- 8.12 Mr Whata then noted that the applicants have undertaken an assessment of how the ecological values of the property will be affected by applying water to the land. He drew on the other expert witness evidence and noted there will also be ecological benefits, such as improved vegetation cover and exclusion of stock from streams.

#### Lakes

- 8.13 In terms of effects on Lake Ōhau, Mr Whata noted that the proposed abstraction will comply with the minimum lake level set out in the WCWARP. He added that overall the takes will have no discernible effect on lake levels. He added that the intake will safely screen a wide range of fish sizes, including adult and juvenile salmonids.

#### Streams

- 8.14 According to Mr Whata, the local streams (Wairepo Creek and Six Mile Creek) all appear ecologically degraded relative to typical streams classified as in 'natural state'. He added that riparian margins will enhance the physical character of streams and maintain and potentially enhance the health of local stream aquatic communities.

#### Tangata Whenua

- 8.15 Mr Whata noted that the applicants have been guided by the matters identified through consultation, the Cultural Impact Assessment (CIA) and the statutory recognition of the tangata whenua values. He added that the independent expert advice is that the best practice, intensively managed approach adopted by the applicants addresses the concerns expressed by tangata whenua.

## Landscape

- 8.16 The landscape objectives and policies in the NRRP relate only to the natural character of water bodies according to Mr Whata. He added that there is nothing in the regional planning framework that merits addressing land use effects or describing them as adverse. He added that the Regional Policy Statement clearly sets out that the effects of land use on landscape should be managed by the relevant District Plan.
- 8.17 According to Mr Whata no land use consent is required for the proposed activity as all areas of ONL on the property are being avoided. Mr Whata submitted that the effects associated with the "greening" of the landscape are specifically addressed in the District Plan and the permitted activity status forms part of the permitted baseline.
- 8.18 Nevertheless, Mr Whata noted that Mr Brown has undertaken a thorough analysis of the potential landscape effects of the applications. While not strictly necessary for the reasons outlined above he has included an analysis of the cumulative effects of the applications in terms of the "greening" of the landscape.

## Cumulative effects

- 8.19 Mr Whata noted that the applicant has adopted the thresholds given in the Water Quality Study (WQS). Mr Whata outlined the most stringent mitigation requirements as detailed by Dr Robson. He added that the WQS figures are conservative and worse case nutrient loadings have been assessed. He noted the on-farm nutrient management and mitigation approaches have been developed to achieve these thresholds.
- 8.20 Mr Whata evaluated the application in terms of the objectives and policies of the WCWARP and the NRRP. He then noted Part 2 of the RMA and provided an overview of the application in relation to Sections 5-8. In his evaluation he drew on the evidence of other expert witnesses and the applicant's own evidence.

## S42A Issues

- 8.21 In Mr Whata's view many of the concerns set out in the S42A Reports stem from a lack of information, a misunderstanding of the information provided or concerns relating to the WQS. Mr Whata outlined other witnesses' evidence that, in his opinion, addressed these issues.

## **Farming activity**

- 8.22 **Kees Zeestraten** (Director, Five Rivers Limited) told us that he had 29 years experience in the New Zealand dairy industry. He said that he owned and operated a number of dairy farms in Southland one of which incorporated cubicle stables. Mr Zeestraten provided guidance and costings on Southland dairy farms, which included employment of the managers/sharemilkers.
- 8.23 Mr Zeestraten outlined the key elements to running a successful dairy farm from his experience. These included:
- (a) enthusiastic, skilled and reliable managers/staff;
  - (b) ensuring that the farming happens in a long term sustainable manner;
  - (c) ensuring that stocking rate is kept at an optimal level that balances production against pasture growth; and
  - (d) optimising pasture growth through effective management such as grazing rotation, avoiding stock trampling and strategic application of fertilisers.
- 8.24 Mr Zeestraten explained that Five Rivers Limited purchased Ōhau Downs in 2004. Since then a number of improvements have been made on the farm including: fencing approximately 70 km of the property including the roadside and QEII covenant area;

cutting down wilding pine in the QEII areas; general pasture improvements including developing new blocks of land into productive areas.

- 8.25 Mr Zeestraten explained that currently Ōhau Downs comprises a substantial area of unimproved grasses, sweet briar and hieracium (a pest). He noted that when he first purchased Ōhau Downs the stock carrying capacity was around 4,000 stock units but with the above improvements, including the application of fertiliser, more intensive subdivision of the farm (by way of improved fencing) and planting of new grass species the stock numbers carried have lifted to 11,000.

#### Proposed land use

- 8.26 Mr Zeestraten explained that he proposed to irrigate 1,493 ha of Ōhau Downs. He added that he aimed to irrigate up to 2,000 ha, for which Five Rivers will need to buy more shares from Mackenzie Irrigation Company (MIC).
- 8.27 Seven separate dairy farming units are to be established, comprising a total of 7,000 cows. Cows will be housed on each of these units in cubicle stables for up to eight months of the year. As an alternative Mr Zeestraten is also considering an intensive sheep and beef operation with dairy support.
- 8.28 Mr Zeestraten explained how a typical cubicle stable (also known as herd homes) operates. He noted that cows are housed in individual cubicle stables but able to walk around. Feed is managed on a daily basis with silage and hay being fed twice a day into feeding lanes. As a result of the cubicle stables, Mr Zeestraten said, effluent is able to be managed and spread onto paddocks in a controlled manner. The effluent is scraped from the stable with a continuous moving automatic scraper and stored in effluent ponds so that it can be spread onto paddocks under ideal conditions.
- 8.29 Cubicle stables are commonly used overseas and Mr Zeestraten has visited a number in the United States and Europe. He noted that farmers who used these systems agreed that cubicle stables have brought economic returns to the dairy industry by increased production.
- 8.30 Mr Zeestraten explained that his cubicle stable in Southland was built in 2004 and can house up to 500 cows. It is used as a weather dependent operation with cows often being housed for up to six weeks during the winter due to bad weather and then at night over the autumn/early spring months. He added that he has seen a number of improvements on his property in Southland as a result of this cubicle stable including: increased production/cow; greater pasture production; increased feed utilisation; less fertiliser used; better distribution of effluent; less soil compaction and improved animal welfare.
- 8.31 Mr Zeestraten told us that he has undertaken extensive research on the financial viability of cubicle stables and has a full appreciation of the capital costs and operational costs involved. While each housing unit on Ōhau Downs may cost up to \$3 million to develop, there were a number of financial and environmental benefits, such that he is prepared to make the investment.

#### Proposed conditions / FEMP

- 8.32 Mr Zeestraten explained that he had read the FEMP prepared for Ōhau Downs. He noted that while the measures it proposes are onerous, they are workable. From his experience in the dairy industry it is clear that the days of loose regulation are over, farmers have to operate carefully to ensure that their environmental impacts are minimised and he was comfortable with the mitigation measures required. Mr Zeestraten added that he understands the risks involved, but he believed he will be able to respond if it is necessary to change the operation.

#### Conclusion

- 8.33 Mr Zeestraten concluded by stating that, while a cubicle stable operation is uncommon in New Zealand dairying, it has been proven around the world as a successful and viable

dairy farming system and one which he believed would be highly suitable to the Upper Waitaki climate and environment.

- 8.34 He noted that although we are currently in tough economic times, irrigation in the Mackenzie Basin has the potential to make properties such as Ōhau Downs a viable operation. He added that he has seen other areas of the country turned into successful dairy environments and believe that if irrigation is not permitted in the Mackenzie Basin then it will be a loss not only to the local community but to also to progress for the entire dairy industry in New Zealand.

### **Description of the proposed development**

- 8.35 **Mr McIndoe** (Senior Engineer, Aqualinc Research Limited) provided a property description, a description of the proposed activities and the relevant consents requirements. Mr McIndoe told us that Six Mile Creek, Six Mile Creek water race, Wairepo Creek and Wairepo Creek water race are all located within the proposed irrigation area. Six Mile Creek, a tributary of Wairepo Creek, flows across approximately 7 km of Ōhau Downs, south of Ōhau Lake Road. The creek typically flows all year round. Approximately 3.3 km of Wairepo Creek crosses through the southern corner of the property, south of Ōhau Lake Road.
- 8.36 According to Mr McIndoe, Ōhau Downs no longer requires the water races, as any water taken for stock water supply purposes will be combined with the irrigation abstraction from Lake Ōhau. He added that the applicant proposes that these water races be closed off, and the water be redirected to the natural flow path, back into the main stems of the Wairepo and Six Mile creeks.
- 8.37 Mr McIndoe then provided details of the proposed intake gallery intake, pipeline and pump station. We have summarised this information in our decision on the Land Use Consent (CRC100225).
- 8.38 Mr McIndoe noted that the proposal is to use 38 centre-pivots (26 full circle, 12 half or part circle) with K-lines being potentially used in gaps and corners. On-farm pipelines will be PVC pipe or similar, buried with minimum 400 mm cover. He added that power lines will be required to supply electricity to pumps and irrigators and other infrastructure.

### **Reasonable Use**

- 8.39 A flow rate of 950 l/s for irrigation has been applied for under this consent application. Mr McIndoe noted that this equates to an average system capacity of 5.5 mm/day over the proposed 1,493 ha irrigated area. Based on a return period of 2-5 days, the application depth will be between 11-27.5 mm.
- 8.40 Mr McIndoe said that the proposed farming systems have been described in the evidence of Mr Englebrecht and Dr Robson. He added that the systems include a cubicle stable dairy option and a conventional intensive beef/ sheep/ dairy support option. However, the important point from a reasonable use perspective is that the farming system is proposed to be based primarily on an intensive pastoral system.
- 8.41 The annual volume of water (8,958,000 m<sup>3</sup>) applied for is based on the Mackenzie Irrigation Company share allocation of 6,000 m<sup>3</sup>/ha/year over the irrigation area. Mr McIndoe noted that an irrigation demand modelling using IrriCalc, a crop-soil water balance model, has been undertaken for the applicant's property to determine whether the 6,000 m<sup>3</sup>/ha/year that has been applied for is reasonable.
- 8.42 According to Mr McIndoe the results of the modelling show that an annual allocation of 10,427,190 m<sup>3</sup>/y for the 1,493 ha (or 698 mm/year, on average) is required to meet full irrigation demand every eight out of ten years. This is greater than that allocated by the MIC shares, and in Mr McIndoe's view shows that the proposed take will meet the reasonable use test.

- 8.43 Mr McIndoe noted that the analysis indicated that the applicant may have insufficient water to fully meet demand more frequently than 20 % of the time. Therefore, he told us, the applicant will have to manage the proposed irrigation system to achieve an application efficiency greater than the 80 % to ensure significant yield losses do not occur in extreme years. He said the applicant proposed to use soil moisture monitoring to ensure over-watering does not occur and maximum possible water use efficiency is achieved.
- 8.44 Mr McIndoe noted there were a number of areas on the property at risk of ponding. If ponding became a problem, he told us, the appropriate sprinklers on the pivot would be fitted with a variable depth irrigation control system so that individual sprinklers could be turned off to mitigate this effect.

### **Stockwater**

- 8.45 Mr McIndoe said that water may be required for up to 7,000 dairy cows over 2,000 ha. Based on a peak daily water use of 70 litres per cow, this equates to an indicative peak daily volume of 490 m<sup>3</sup> and 122,500 m<sup>3</sup> per year (based on 250 days at the peak rate). The applicant proposes to take stockwater from the total allocation proposed for the property and will be sourced from the Lake Ōhau together with the water required for irrigation. Mr McIndoe added that if stockwater requirements exceed that stated above, additional stockwater will be taken under Section 14(3)(b) of the RMA.
- 8.46 We note that the derogation approval from Meridian noted that the volume requested by the applicant as stated by Mr McIndoe above, is in addition to the volumes requested for the take and use.

### **Planning Issues**

- 8.47 **Mr John Kyle** (Partner, Mitchell Partnerships Limited) was engaged by the applicant (and Southdown Holdings Ltd, Williamson Holdings Ltd and Killermont Station Ltd) to present evidence with respect to various planning documents (Regional Documents and RMA) as well as site specific evidence relating to overall mitigation and conditions.
- 8.48 Mr Kyle outlined the relevant planning documents and which plan the applicant's activity relates to. He noted the 'permitted baseline' concept and added that in terms of relevant Regional Plan rules the permitted baseline is limited to minor takes or diversions for activities such as stock water outside the water bodies identified as being of high natural character. In Mr Kyle's opinion, general farming activities such as pastoral grazing, fertiliser application and ancillary activities are permitted under the NRRP.
- 8.49 He added that in terms of land use effects, farming activities are generally permitted in the Waitaki District and he provided a list of these permitted activities from the Waitaki District Plan. Given the permitted baseline that prevails, it is Mr Kyle's opinion that the landscape issues generated by farming activities are generally not significant.
- 8.50 Mr Kyle then went on to discuss the relevant matter from the RMA including Part 2 and Section 104 matters. He considered that the proposed abstraction and use of water for irrigation will not generate any significant Part 2 issues. The total abstraction is within the limits established by the WCWARP and is consistent with the agreements in place between the MIC and Meridian. With appropriate mitigation and management in place, it is Mr Kyle's view that the applicant's proposal will not generate significant adverse effects on the receiving environment.
- 8.51 Mr Kyle stated that the RMA does not seek to prevent changes to the environment. Rather, it seeks to provide for the use and development of natural and physical resources, subject to the provisions in Section 5. In regard to these applications, in Mr Kyle's opinion the ability to irrigate land will provide significant social and economic benefits to people and communities. These benefits arise from the employment of people on the farms, increased land productivity, and flow on social and economic benefits (e.g. secondary industries, employment) on a local, regional and national level. With appropriate mitigation which is set out within the suggested conditions, values such as the life supporting capacity of the water resources will be safe-guarded, and in some cases enhanced (localised waterways and riparian margins). Furthermore he added that the mitigation proposed will ensure that



the applications will not compromise the values of the water resource and its ability to provide for existing uses and meet the needs of future generations.

- 8.52 Mr Kyle then discussed in depth the policies and objectives of the WCWARP and NRRP and how, in his view, the applicant's proposed activities were consistent with these Policies and Objectives. In regards to site specific evidence Mr Kyle drew on the evidence of Mr Brown, Dr Ryder and Dr Robson, which is discussed further below.

#### Supplementary Evidence

- 8.53 Mr Kyle also provided supplementary evidence on 15 October 2009 in response to our interest in those applications that have been filed by the applicants but have yet to "catch up" with the applications being considered here. Mr Kyle explained that for Five Rivers Limited additional applications have been sought for:
- (a) Fertiliser and agrichemical application (Certificate of Compliance). Mr Kyle noted that the Council Officer for this CoC application maintains that a CoC cannot be issued as the TRP does not expressly permit the application of agrichemicals and fertiliser.
  - (b) Effluent disposal (Discharge Permits). Mr Kyle told us that permits to discharge an average of 378,000 litres per day of undiluted dairy cow effluent (solid and liquid) on to land by spray irrigation and the consequent discharge of contaminants to air have been applied for. We note that these applications have been 'called-in' by the Minister for the Environment pursuant to Section 142 of the RMA.
  - (c) Proposed water intake structure (Land Use Consent). Placement of a gallery intake structure under the bed of Lake Ōhau, including excavation of the bed to establish the gallery. This application was applied for on 27 July 2009 was publicly notified and was amalgamated into this hearing process. As previously noted a description of the proposal and decision on this application is contained in a separate decision (CRC100225).
- 8.54 Mr Kyle told us that all of the consents are in some way associated with the intensification of farming. This intensification is reliant upon the applicant first obtaining consent to take water in the manner proposed. Without that water it is unlikely that the applicant will pursue the remaining consents listed above. As such these consents can be viewed as being secondary, and in Mr Kyle's view there is no need to have these matters considered now as is suggested by some of the submitters.
- 8.55 The focus for this hearing as Mr Kyle understood it, relates to the proposed water based consents to abstract and use water for irrigation purposes. In his assessment, the information accompanying these applications is sufficiently robust to enable a full assessment of all the relevant effects to be carried out.

#### **Farm Environmental Management Plan (FEMP)**

- 8.56 **Dr Melissa Robson** (Environmental Scientist, Ryder Consulting Limited) presented evidence on the applicant's Farm Environmental Management Plan (FEMP). Dr Robson's evidence on the purpose and development of FEMPs was covered in Part A of this decision and will not be repeated here. Only evidence specific to this application is considered in this section. Similarly information on waterbodies within the applicant's property and groundwater flow is covered in other experts' evidence.
- 8.57 For the applicants property Dr Robson noted that the nitrogen mitigation requirements are the most stringent for the Ōhau River groundwater sub-catchment and the phosphorus mitigations are most stringent for the Ahuriri Arm (Dr Robson noted that a proportion of the Wairepo Creek is diverted into the Willow Burn sub-catchment). These mitigation requirements set Ōhau Down's nutrient discharge allowance (NDA) at 55,954 kg nitrogen per annum and 3,793 kg phosphorus per annum.

- 8.58 At a highly developed setting, the modelled nitrogen losses were above the NDA (56,030 kg) when 150 kg nitrogen was input to the cubicle dairy option. However increasing the restricted grazing from two months to six months reduced the modelled nitrogen losses to 52,363 kg which is within the NDA.
- 8.59 Under the alternative system (intensive beef/sheep and dairy support) at a highly developed status, losses of 57,003 kg nitrogen were modelled. In order to maintain this system under the NDA (52,714 kg N/ha) it was necessary to increase the proportion of beef stock on the feed pad in winter to 100%.
- 8.60 Dr Robson provided an overview of the applicants proposed farm system including a brief description of the proposed production, effluent handling, fertiliser and water (irrigation) use. She then provided the details of the FEMP for Ōhau Downs Station (discussed later in this decision) including the monitoring and audit plans.
- 8.61 The proposed monitoring 'trigger' for groundwater was >2 mg/L NO<sub>3</sub>-N greater than the current concentration. The response in the event of a breach was to reduce nitrogen application to land, or withhold stock for longer until a root cause analysis could be carried out. Similarly for surface waters (Six Mile Creek, Wairepo Creek) the monitoring trigger is defined as "a significant decrease in water quality" but the response indicated determining the cause of the breach, which if effluent, would require the ceasing of irrigation on the implicated pivots.
- 8.62 The audit plan examines both the compliance with the WQS thresholds and the management options implemented to address identified site specific environmental issues. The audit also includes the action to be taken in the case of non-compliance.

#### Response to S42A Report

- 8.63 Dr Robson noted that the Section 42A report stated that the application site only be used for intensive beef and sheep. However the applicant is now proposing a housed dairying system using cubicle stables, which, she said will reduce the nutrient losses below that of an equivalent intensity beef and sheep operation.
- 8.64 Dr Robson also outlined a response to the submitters concerns which related to general water quality concerns, insufficient mitigation, efficiency of water use and appropriate monitoring. Dr Robson addressed these concerns by referring to the proposed type of irrigation (water efficiency) the FEMP and MWRL WQS (Water quality and monitoring) and proposed cubicle farming system (mitigation).

#### **Farm Management**

- 8.65 **Robert Engelbrecht** (Director, Robert Engelbrecht Consultancy Ltd) provided evidence on the following:
- (a) A description of the importance of farm management in New Zealand and the Upper Waitaki;
  - (b) A peer review of the FEMPs prepared by GHD and an assessment of the practicality and feasibility of the proposed farm management techniques outlined in the FEMPs; and
  - (c) An assessment of the practicality of the auditing and monitoring proposed in the conditions/FEMP.

#### Importance of Farm Management (and Farming)

- 8.66 Mr Engelbrecht provided evidence on the importance of farming for New Zealand on global scale and local markets. Mr Engelbrecht then described the risk of intensification relative to the Mackenzie Basin that included nutrient loss to waterways and visual effects. Mr Engelbrecht then described how irrigation would help the soil in terms of reducing windblown losses and increasing organic matter and produce more grass dry matter.

- 8.67 Mr Engelbrecht then provided a brief history of irrigation. He added that the advent of centre pivot irrigators and technical development of them in the past five years has made an enormous improvement in the ability of irrigation to be viable on shallow and/or low moisture holding capability soils.
- 8.68 According to Mr Engelbrecht, without irrigation, there are now almost impossible demands on the biological production system of many farms from an economic viability point of view. He added that irrigation provides some opportunities for farmers to at least partially reduce some of these production risks.
- 8.69 As the pressures on farmers have increased progressively over the last 40 or 50 years, the margin at which irrigation becomes viable has moved further into higher rainfall areas as well as shallower soils and more fragile environments. Farmers move into irrigation to enhance their opportunities for survival by improving profitability (or at least maintaining profitability) through intensification and diversification. According to Mr Engelbrecht there is no other option available to farmers. However we do note this view seems to contradict Mr Zeestraten's evidence where according to him improvements on the application site since 2004 without any irrigation have allowed an increase from 4,000 stock units to 11,000 stock units.

#### FEMPs

- 8.70 In Mr Engelbrecht's opinion, the FEMPs developed for the applicant's property (and three other properties he provided evidence on) are more advanced than any other he has seen developed in New Zealand. He added that the scope and detail of these FEMP's is extremely comprehensive and provides the appropriate templates and guidelines to ensure, as much as is humanly possible, the ability to carry out the necessary tasks of identification, compliance, monitoring, auditing and therefore the management of environmental issues involved with irrigation in the Mackenzie Basin. In his view the FEMP more than adequately covers the nine environmental risks to be addressed, that is; soil, water, fertiliser, chemicals, run-off, tracking, livestock, effluent and bio-diversity.
- 8.71 Mr Engelbrecht acknowledged that while he is not an expert on the formulation of FEMPs and the use of such computer models as OVERSEER®, his practical experience indicates that the FEMP's (based on other experts evidence and the WQS) are very comprehensive and robust.
- 8.72 He added that the use of cubicle stables for dairy cows enables much more accurate and precise management of dairy effluent than is possible under normal dairy farming conditions, both in terms of gathering and holding the dairy slurry (no water added) from the cubicle barn as well as the appropriate storage, management and spreading of it back onto the land under the most suitable soil and climatic conditions to ensure minimum environmental effect.
- 8.73 For the proposed irrigated area of Ōhau Downs, Mr Engelbrecht noted that the main site specific environmental risks included soil risks (wind erosion), run-off (into waterways), use of chemicals and stock management including suitable farm tracts and stock encroachment onto waterways).

#### Feasibility of Irrigation Development

- 8.74 Mr Engelbrecht noted that the proposal for the 2,000 ha of irrigation on the application site is to develop eight cubicle barn dairy farms averaging 250 hectares and 875 milking cows, each at a production of 400 kgs milk solids per cow. We note this differs from Mr Zeestraten's evidence of 7 dairy units of 1000 cows each.
- 8.75 Mr Engelbrecht told us that a conventional beef and sheep farming system would be possible and profitable (depending on the level of indebtedness) following the development of centre pivot irrigation, but would produce a lower return on investment than a dairy farming enterprise. Also, it would almost certainly have a greater degree of variability in returns from season to season.

- 8.76 Mr Engelbrecht noted that over time, with the progressive development and enhancement of the soils, increasing soil organic matter levels and consequently, soil moisture and nutrient holding capability, profitability would increase further, as greater numbers of sheep and cattle were able to be carried and improved performance per stock unit was achieved.
- 8.77 Mr Engelbrecht noted if and when it is necessary, farmers are very good at complying with these rules provided that they understand the logic behind them. For this reason, in his opinion, a detailed and thorough education programme needs to be undertaken, firstly with farm owners and/or managers and secondly with senior staff, if not all farm staff over time. He added that the new generation of farmers usually have better familiarity and understanding of the techniques required and the confidence to use appropriate computer programmes.
- 8.78 According to Mr Engelbrecht the OVERSEER® programme should be continually reviewed throughout the season on individual farm properties, and different areas of those farms, when and where appropriate, to ensure that there is no excess use of fertiliser. This requires fully accounting for the contributions made by livestock and/or (in the case of the cubicle barn dairying operations) dairy effluent, whether liquid (via the centre pivot irrigators) or solids (spread over the land by machinery) to ensure that the nutrient budgets are maintained in the appropriate balance relative to soil nutrient reserves and pasture requirements.

#### **Cubicle Barns and Waste Disposal**

- 8.79 **David Borrie** (Senior Environmental Engineer, Aqualinc Research Ltd) was engaged by the applicant (and two other applicants subject to this hearing process) in relation to the collection, storage and spreading of dairy effluent from the proposed dairy sheds and cubical cow barns.
- 8.80 While Mr Borrie's evidence mainly related to effluent disposal, the applications for which were 'called-in' and subsequently withdrawn, we have considered his evidence in the context that it helps us to understand how the total nutrient load resulting from this take and use application, is derived.
- 8.81 Mr Borrie noted that on the Ōhau Downs property the proposal is to establish seven separate stand alone dairy farms comprising a total of 7,000 cows. He added that on each of the properties it is proposed that the cows will be housed in cubicle barns for 100% of the time during the months of March to October and for 50% of the time during the summer months of November to February. The pasture on the properties will primarily be harvested under a cut-and-carry operation for feeding to the cows housed in the cubicle barns, with only limited grazing by the cows during the summer months.
- 8.82 He told us that on each of the stand alone dairy farms the cows will be housed in two cubicle barns each housing between 500 to 650 cows. The cubicle cow barns are enclosed barns (150 m x 33 m) built on a concrete floor. The barns comprise of cubicles for the cows and a concrete channel along the back of each cubicle to collect the cows' excreta. The feed is transported into the barn for the cows and the cows' effluent is collected by a mechanical scraper system.
- 8.83 Mr Borrie noted that the cows on each of the dairy farms will be milked at the properties by conventional methods for factory supply for up to 300 days of the year. On each of the stand alone dairy farms there will be a dairy shed for milking the cows. The cows will be walked from the cubicle barn to the adjacent dairy shed for milking.
- 8.84 On the basis that each cow produces approximately 54 l of raw effluent per day, the total volume of raw effluent collected during the period while the cows are housed for 100% of the time from a 1,000 cow herd will be approximately 54 cubic metres per day.
- 8.85 Mr Borrie said that the system at the dairy sheds and the cubicle cow barns has been designed to minimise water use. He estimated that with wash down water from the dairy sheds and the cubicle cow barns, plus an allowance for dirty stormwater, the average total diluted effluent per day would be approximately 125 l/cow/day (i.e. 54 l of raw effluent

plus 70 l of washdown water and drainage water). For a 1,000 cow dairy herd this would equate to 125 cubic metres per day of diluted effluent.

#### Effluent Collection System

- 8.86 Mr Borrie told us that the excrement produced from both the dairy shed and the cubicle barns will be scraped and discharged into a sump. From the sump the effluent will be pumped to a mechanical solids separator, such as an effluent press, to separate the solids.
- 8.87 The liquid effluent exiting the solids separator will be discharged into a storage pond until the summer months (i.e. October to March) when it will be applied to the areas designated for effluent application. The separated solids will be stored on a concrete pad or in a concrete bunker and these solids will be spread over the property predominantly during the summer months.

#### Effluent Storage Ponds

- 8.88 Mr Borrie said that the proposed holding capacity of the liquid storage pond on each of the dairy farms will range from 30,000 to 37,000 cubic metres which will be able to provide for up to seven months storage.
- 8.89 He told us that each storage pond will be of earth construction partly below ground level and partly above ground level such that approximately 50% of the storage volume would be below existing ground level. The storage ponds will be lined with an impermeable geotechnical fabric liner to achieve a seepage rate not exceeding 10<sup>-8</sup> metres per second.

#### Effluent Discharge System

- 8.90 Mr Borrie explained that the liquid effluent will be pumped from the storage pond and applied to the land by the centre pivot irrigators that are used to apply the irrigation water to the properties. The applicant proposes to inject the liquid effluent into the irrigation water prior to it being irrigated onto the land. The liquid effluent will be injected into the irrigation water at a ratio of approximately 5-10%. For example an application depth of 1 mm of effluent would equate to a nitrogen application of approximately 20 kg nitrogen/ha.
- 8.91 He told us the quantity of liquid effluent applied to the land per pass by the centre pivot irrigators will be determined according to the nitrogen requirement of the pastures. The total application depth per pass of the irrigator (i.e. irrigation water plus liquid effluent) will be less than half of the average water holding capacity of the soils. The liquid effluent will only be discharged to land during the summer months of October to March each year.
- 8.92 The separated effluent solids will be spread onto the property, by a travelling mechanical solids spreader, over the total area of the property. The quantity of solids applied to the land will be determined according to the nitrogen requirement of the pastures.
- 8.93 The size of the liquid effluent storage pond (providing for up to 7 months storage) and the separated solids storage pad will provide adequate backup in the event of pump or machinery breakdown and will also ensure that effluent is not discharged during undesirable weather conditions, such as during periods of heavy rain, frozen or snow covered ground.

#### **Landscape Effects**

- 8.94 **Stephen Brown** (Landscape Architect, Stephen Brown Environments Ltd) was engaged by the applicant (along with three other applicants subject to this consent process) to assess the landscape effects of their combined implementation. Mr Brown explained that In undertaking the evaluation he has focused upon the following:
- (a) key components of the applications that would, or could, have landscape implications;
  - (b) existing landscape character (both at present and as they are currently evolving);

- (c) the catchments and audiences likely to be affected by the proposed water abstraction and irrigation;
  - (d) changes to the landscape character and values of the Waitaki Basin; and,
  - (e) determination of the appropriateness of such effects in relation to the current statutory environment that manages the landscape of the Waitaki area.
- 8.95 Mr Brown stated a number of components of the proposal are critical in terms of the applicant's activities. Firstly he noted the Lake Ōhau water intake structures and pipeline connections to the applicant's property (and similar design for Southdown Holding Limited). Mr Brown added that when viewed from the DoC reserve and a gravel access way near the lake's canal gate and channel these would actually have very limited exposure to the wider landscape and potential audiences.
- 8.96 Secondly, he commented on the pivot irrigators, which in his opinion would comprise the most visible structural components of the irrigation schemes proposed. They would also, in conjunction with fertiliser enhancement of the subject properties, result in the greatest direct change to the landscape of the southern Waitaki Basin by modification of the vegetation cover. Consequently, although such modification may well be regarded as an effect in its own right, it is also a 'component' of change associated with the proposed irrigation system that would generate its own effects in relation to the wider Waitaki landscape.
- 8.97 Mr Brown then provided a description of the Basins. For the applicant's property he noted the farm occupies the alluvial terraces south of Lake Ōhau and, for the most part, occupy land that has been subject to grazing for a considerable period of time. He noted that most of the landscape of the applicant's station is open and almost flat, although part of it ascends towards an area of terminal moraine closer to Lake Ōhau and also descends into a lower river terrace north of Lake Ōhau Rd. The bulk of the property has been used regularly for pasture – including that on more undulating terrain between Six Mile Creek and Quailburn Creek and Road, which is presently covered in a mixture of coarse grass species, weeds and the odd remnant clump of tussock.
- 8.98 Regardless, these parts of the Ōhau Downs (and Glen Eyrie Downs) Station's landscape are clearly modified and their paucity of vegetation cover, combined with limited landform variation, give much of it a rather bleak and austere character, in his view.
- 8.99 Closer to Lake Ōhau, the landscape also undulates through a series of terraces, ridges and spurs wrapped around perched wetlands, bogs, and ponds south of Maori Cove. This highly variable environment, together with that near the Wairepo Stream, is dominated by tussock and matagouri – contrasting with the coarse grass cover and weeds prevalent within the adjacent areas of pasture. Mr Brown noted that much of the area physically embracing the Red Lagoon, Raupo Lagoon and Swan Lagoon within the Ōhau Downs property is subject to a QEII covenant and protection.
- 8.100 Mr Brown then discussed amenity values associated with the property including any high Natural Character values and outstanding landscapes. Mr Brown went into detail regarding these points including case law and his assessment frame work.
- 8.101 In Mr Brown's opinion only limited parts of the application properties qualify as true Outstanding Natural Landscape (ONL). In saying this he added that the QEII covenanted part of the Ōhau Downs property contains a number of ponds, bogs and wetlands, together with rock outcrops and tussock country, south of Lake Ōhau and Maori Cove that, in his opinion display significant naturalness, endemic quality, expressiveness, legibility and cohesion. Although he considered they were not outstanding when viewed in isolation, he said the covenanted area still qualifies as such when appreciated as part of a much more extensive ONL which also embraces an iconic Lake Ōhau, the dramatic profile of Ben Ōhau, and the alpine backdrop of the Ōhau Range.
- 8.102 The Waitaki District Council has identified a series of ONLs and Rural Scenic Zones within a variation to the District Plan. He noted none of these areas are within the applicant's proposed irrigation area.

### Effects in General

- 8.103 Mr Brown described the visual effects in general that included the establishment of Irrigation systems (pivots), the greening of irrigated areas, establishment of associated intake structures and pipelines and cubicle barns.
- 8.104 Mr Brown's views on the 'greening' effect are incorporated within Part A.
- 8.105 He told us that the proposed structures that would draw down water from Lake Ōhau would substantially meld into the lake comprising their immediate setting.
- 8.106 He noted (from visiting other cubicle barns at Waimate) that in general, cubicle barns have a very elongated profile and, with their roof areas potentially extending for as much as 155m from end to end, they are also exceptionally long – and large – buildings. More positively, he said, their elongated, low slung, built forms mimic, to a degree at least, the planar, often quite emphatically horizontal, landforms which characterise much of the Waitaki Basin floor.

### Site specific Landscape effects

- 8.107 Mr Brown acknowledged that Lake Ōhau Rd is a significant public thoroughfare. Moreover, it reveals important introductory views of Ben Ōhau as well as Lake Ōhau and the Ōhau Range from atop the moraine around Swan and Raupo Lagoons.
- 8.108 Mr Brown noted that the applicant has already covenanted the 'moraine' area around, and including, both lagoons with QEII and this protection extends to the margins of Maori Swamp and Cove. In addition he added a trapezoid of open space would be maintained either side of Lake Ōhau Rd, protecting key views to Ben Oahu and the slightly more distant Ōhau Range. Mr Brown acknowledged that two irrigators would come closer to the road corridor at a certain point, but that this would occur well after the key viewing area and within an area already used for dry stocking. He added that the two irrigators near this part of the road would still sit below the outline of Table Hill and the base of Ben Ōhau, reducing their potential intrusion into the skyline.
- 8.109 He said that all of the other irrigators and areas of nutrient enhancement would be set well back from the road: 900m or more to the south and in excess of 650m to the north. The southern irrigators would be all but impossible to discern, while those north of Lake Ōhau Rd would be concentrated on a slightly depressed (lower) river terrace that becomes increasingly divorced from the main terrace either side of the road as you move towards Swan Lagoon and Lake Ōhau.
- 8.110 Mr Brown added that a large linear mound of moraine material effectively separates the road from the main area of proposed irrigation closer to Table Hill once the viewer is 2 km or more west of the 'transmission corridor'. Consequently, Mr Brown expected that 40 – 50% of the pivot irrigators north of Lake Ōhau Rd would be difficult to see at all and the bulk of remaining irrigators would sit well below the skyline – receding into the broad mantle of Table Hill to the north or the expanse of terraces, foothills and mountains around Glen Eyrie and Ribbonwood Stations to the south.
- 8.111 Closer to Lake Ōhau, the much more jumbled moraine landscape around Swan and Raupo Lagoons would screen most of the irrigators from view when travelling from the west (Lake Ōhau and the Ōhau Ski Area). According to Mr Brown at this point the pivot irrigators would sit firmly within the cultural landscape of this farmland, with little sense of connection to the alpine and moraine landscapes closer to Lake Ōhau.
- 8.112 Mr Brown therefore considered that the proposed irrigation system would affirm a pattern of use and division between the more natural and managed halves of the Waitaki landscape that is already well established. In his view, much the same would apply in relation to those parts of Ōhau Station that are subject to irrigation and nutrient enhancement. For the most part, all of the areas subject to 'greening' are located within parts of the local landscape that are already subject to well established pastoral use, with their grass cover and fenced off areas clearly reflecting this. In other words, the proposed

irrigation would simply affirm a pattern of land use and land cover that is already very marked within and around the Ōhau Downs.

#### Cubicle Barns

- 8.113 Mr Brown noted that fourteen cubicle barns are proposed for Ōhau Downs at 3 sites south of Lake Ōhau Rd and 4 north of it. He told us the 3 southern pairings would sit low down in the planar landscape south of Lake Ōhau Rd, well beyond Six Mile Creek, in an entirely recessive location that would make them all but impossible to see except when descending from the moraine area near Swan Lagoon. Even at this juncture, he maintained, they would be so lying and viewed over such a distance that they would have little real presence or impact.
- 8.114 The four pairs of cubicle barns to be located north of Lake Ōhau Rd would sit on the depressed river terrace north of the road corridor. He told us that 2, perhaps 3 of those groupings would be all but totally screened by the moraine 'strip' at the edge of the terrace, while one pair of barns would be located some 2.6km from the road. In his view, the combination of all 8 barns' low profile, recessive location and viewing distance would effectively meld them into the wider Ōhau landscape. As such, it was his opinion that the siting of the 14 barns would maintain the open character of the basin landscape and minimise the barns' actual effects. They would not, in his opinion, have a significant impact on public perception of key local features, in particular Ben Ōhau, the Ōhau Range and Lake Ōhau.

#### Response to s42A Officers Comments

- 8.115 In response to Mr Glasson's and Ms Penman's comments regarding the requirement to provide buffer zones from natural features and the requirement to not undertake irrigation in a spotty and discontinuous manner, Mr Brown noted that since the landscape peer review report was prepared, it appears that many of the comments in relation to the applicant's proposed scheme have, in fact, been addressed. The proposed areas of irrigation have been pulled back from the QEII covenant areas, with irrigation concentrated on two terraces that are physically segregated from most of Lake Ōhau Rd and the covenanted areas by 'dry land grazing areas'. Although 2 - 3 irrigators would be sited close to the northern side of the road corridor, a substantial buffer has been established and the 'introductory viewshaft' would remain.
- 8.116 Mr Brown therefore considered that most, if not all, of the issues and mitigation measures identified by Mr Glasson and reflected by Ms Penman in relation to Ōhau Downs have already been addressed. Mr Brown then provided suggested mitigation methods and proposed consent conditions in his evidence. His only mitigation method/condition related to the colour of the proposed cubicle barns.

#### **Effects on QEII Covenant Area**

- 8.117 **Mr McIndoe** told us that any potential effects to the QEII covenant area relate to the installation of infrastructure. These potential effects are mainly through the installation and maintenance of the delivery pipeline conveying water from Lake Ōhau to the irrigation area. In a change from the original application, the applicant is now proposing that the intake will be positioned near the Ōhau River weir at or about map reference H39:6566-5350, outside of the QEII Covenant area. According to Mr McIndoe any pipelines and associated works will also occur outside of the covenant area, ensuring effects on the covenant area are minor.
- 8.118 As the covenant area is located up gradient of the proposed irrigation area, effects relating to water quality on the covenant area from the proposed irrigation are considered minor according to Mr McIndoe.



## Terrestrial Ecology

- 8.119 **Dr Ruth Bartlett** (Botanist, Mitchell Partnerships) was engaged by the applicant (and three other applicants subject to this consent process) to assess the potential effects of the irrigation on the terrestrial ecology of their sites.
- 8.120 Dr Bartlett provided a brief description of the environmental setting and history of the Mackenzie Basin and the Omārama Ecological District (which the applicant's property is located in) as the first part of her evidence. Dr Bartlett provided a detailed account of the vegetation types and how these had changed from pre-Maori and European settlement to the current situation.
- 8.121 In summary Dr Bartlett noted that the vegetation of the Mackenzie Basin area is thought to have undergone one of the most dramatic transformations seen in New Zealand due to human influence and the pervasive effects of exotic species. Any remaining areas of indigenous vegetation and the braided river habitat are recognised as nationally significant because of their rarity and the usually degraded nature of the habitats where they remain.
- 8.122 Dr Bartlett provided site specific information on the applicant's property in relation to terrestrial ecology. She noted that Ōhau Downs is mostly in pasture, some of which has been cultivated, and some of which has been over sown but remains in a relatively natural condition. Most of the flat plains on the property would be irrigated and this large area has already been cultivated and used either for grazing or cropping in the past. On the terraces and gentle slopes surrounding the plains the vegetation is a mix of exotic and native species, similar to that on the adjacent QEII covenant area.
- 8.123 Exotic grasses and herbs most commonly present on the hummocky ground away from the command area include browntop, sweet vernal, sheep's sorrel, mouse-ear chickweed (*Cerastium vulgatum*), bird's foot trefoil (*Lotus pedunculatus*) and hawkweed according to Dr Bartlett. She added that the exotic briar rose (*Rubus rubiginosa*) is commonly present.
- 8.124 Native species included fescue tussock, *Coprosma petrei*, *Leucopogon fraseri*, *Raoulia subsericea*, tauhinu, matagouri, the native broom *Carmichaelia petrei*, tiny *Pimelia aff. oreophila* and *phosphorus. prostrata* subsp. *prostrata*, *Gaultheria macrostigma*, and tufts of the grass *Deyeuxia avenoides*.
- 8.125 Dr Bartlett added that continued grazing in these areas means that the ecological values found there are unlikely to improve and that patchy vegetation cover means that soil loss from these areas will continue.
- 8.126 Dr Bartlett noted that the QEII covenant was applied to 1,186 ha in the year 2000. This includes hummocky land around and inland of Lake Ōhau surrounding two ephemeral ponds (Swan Lagoon and Raupo Lagoon). She noted that part of this covenanted area was recognised as a priority natural area for conservation by Espie et al. (1984) on the basis that its protection would protect the representative fauna of the region. The investigation of the QEII covenant area and adjacent grazed tussock grassland on the Ōhau Downs property indicates that the Ōhau Downs grassland is in a similar state to that in the QEII area, and this extends across a very large area between the proposed irrigation area and the QEII covenant band around the lake shore.
- 8.127 In addition to the matters discussed below, Mr Bartlett also provided comment on the potential effects on terrestrial ecology of the works associated with the intake structure. We discuss this evidence in our decision on application CRC100225.

## Six Mile Creek

- 8.128 Six Mile Creek crosses Ōhau Downs from west to east on the southern side of Lake Ōhau Road according to Dr Bartlett. Dr Bartlett told us that the low-lying land on either side of the creek supports a cover of scattered fescue tussock, matagouri, and *Melicytus alpinus* amongst browntop, sweet vernal, *Deyeuxia avenoides* and white clover (*Trifolium repens*). Further upstream *Schoenus pauciflorus*, *Juncus articulatus*, *Gaultheria macrostigma* and

*Oreomyrrhis ramosa* were present amongst taller tussocks. Dr Bartlett noted that the irrigation layout avoids this area.

#### Ecological Values (of the Proposed Irrigation Area)

- 8.129 The irrigation command areas on Ōhau Downs are under cultivation or have been developed as pasture. In Dr Bartlett's view, these areas retain extremely limited ecological value. The tussock grassland areas (that will not to be irrigated, but will continue to be grazed) have similar values to those within the QEII covenant area and these values will not be affected by the proposed irrigation activity.
- 8.130 Dr Bartlett said that the proposed irrigation layout has been designed to avoid irrigating onto Six Mile Creek. The low-lying land adjacent to the creek is often dry but forms the floodplain for the creek (which itself is often dry). The creek's riparian margins and surrounds support a limited number of indigenous species mixed with exotic pasture grasses and herbaceous species. In an environment such as this, where almost all of the indigenous vegetation has been lost, Dr Bartlett noted that this wetland and riparian margin can be considered to be of moderate value, providing connectivity between the wetland areas in the upper tributaries of the stream (the Raupo and Red Lagoon areas) and the environment further downstream which joins Wairepo Creek.

#### Effects of the proposal (and Proposed Mitigation)

- 8.131 Dr Bartlett told us the applicants propose to fence a five metres wide buffer along Six Mile Creek, which will be planted with a variety of tussock, sedge, shrub and tree species. Dr Bartlett added that this will retire approximately 15.5 ha from grazing on this property. The buffer will not be grazed and this will allow gradual regeneration back to taller tussock vegetation over time according to Dr Bartlett. It is possible that irrigation of the cultivated land adjacent to this area will allow the seepage of some water into the riparian margin. This may encourage the development of more lush vegetation than might develop under the natural conditions but this is unlikely to be a disadvantage, in her opinion. Given the present status of the stream margins, which are currently grazed, in Dr Bartlett's view, this buffer will have beneficial effects.
- 8.132 The application of water and nutrients to the irrigated area will result in an improved vegetation cover. Given the rate at which soil is lost from the plains area in the absence of a vegetation cover this is a positive ecological outcome according to Dr Bartlett. Dr Bartlett noted that the vegetation has already been cleared and attempts made to utilise the resulting unproductive pasture. Therefore, in her view, the proposed irrigation is not stimulating further clearance of vegetation on this property.
- 8.133 Dr Bartlett also noted that the alternative farming proposal (to dairying) includes intensive beef farming and dairy support but with a similar management strategy. She added that from an ecological point of view there is little difference in terms of the likely effects on terrestrial values.

#### Mitigation and monitoring (applicable to all three properties)

- 8.134 Dr Bartlett noted the proposed stream fencing and riparian plants (as previously discussed) and provided details on the monitoring and maintenance required for effective plant establishment.

#### Consideration of Submissions

- 8.135 Dr Bartlett then provided a response to the submissions received regarding terrestrial ecology. She noted that these submissions were concerned with the protection of habitat from ecological damage, protection against soil erosion and protection of indigenous biodiversity.
- 8.136 She added that these submissions need to be considered in the light of the severe modification that these habitats have already been subjected to since human arrival. The

sites have already been substantially altered and native species richness, diversity and distribution across the irrigation sites is very limited in her opinion.

- 8.137 Generally the indigenous species are limited to riparian areas and the few limited areas that have not been previously cultivated. She told us that the cessation of grazing and burning is unlikely to restore native species because of the widespread presence of weeds such as hawkweed and wilding pines, which respond very quickly when grazing animals are removed and will out-compete native species.
- 8.138 Dr Bartlett added that removal of stock will protect the indigenous species within the riparian area and the enhancement of this habitat will increase the connectivity of habitats across the plains via the watercourses that will be fenced.
- 8.139 On soil erosion she noted that an increase in vegetative ground cover is expected to result from the proposed irrigation and this will reduce soil erosion across the properties concerned.

#### Section 42A Officers Report

- 8.140 Dr Bartlett noted that the Officer's Report considered that the effects of the proposed irrigation include the loss of indigenous biota, the effects on terrestrial wetland ecosystems and the cumulative effects on the terrestrial ecology of the properties. Dr Bartlett's comments to the 'Officers' reports were generic and did not specifically note which report or report writer she was referring to. However we note that her comments are relevant to this application and have been summarised below.
- 8.141 Dr Bartlett explained that the Omārama Ecological District is characterised by prolonged and severe modification. Limited indigenous ecological values remain outside of formally protected areas and those that do remain are subject to continued grazing and other habitat modifications such as cultivation and exotic forestry.
- 8.142 Loss of soil, particularly due to wind erosion, is a significant problem and the persistence of native species and habitats in this setting is unlikely to change over the medium to long term without active management according to Dr Bartlett. The irrigation proposed by the applicant will restore a vegetation cover, albeit an exotic one, and bind the soil, preventing further soil loss.
- 8.143 The retirement of riparian areas from grazing combined with planting of native species and removal of weeds will protect stream edge plant communities, prevent eutrophication of waterways, provide habitat and increase connectivity between formally protected areas of more natural habitat according to Dr Bartlett. It will also provide the opportunity to restore locally rare species such as *Hebe cupressoides* and *Carex tenuiculmis* to the area, she told us. Dr Bartlett considered that these effects are positive for the indigenous biota of the district.
- 8.144 Natural plant communities are rare in the Omārama District and active management is required to prevent soil erosion and colonisation, particularly by hawkweed and wilding pines. The areas that do support native plant communities are not within the irrigation footprint, and those that remain along riparian margins will not be irrigated. The exotic vegetation cover will help protect soils, while regular monitoring and removal of weeds from riparian buffers will ensure a predominantly native community develops. Without irrigation and with continued grazing further loss of native species and soils can be expected to continue according to Dr Bartlett.

#### **Effects on Lake Ōhau**

- 8.145 **Dr Ryder** described the potential effects of the construction of the irrigation water take and pipeline and the application of irrigation on avifauna for Glen Eyrie Downs, which has been discussed in our decision on the application by Southdown Holdings Limited (CRC040835). He stated that these potential effects and mitigation recommendations are also applicable for the applicant's property.

- 8.146 With respect to mitigation, Dr Ryder recommended that construction of the water intake should take place outside the peak of the main avifauna breeding season (August to February). He also recommended that the unavoidable removal of large trees, due to constraints associated with the pipeline alignment, should be undertaken in consultation with the Department of Conservation. Monitoring of Canada geese and mammalian predators is recommended but this should also be approached in consultation with Fish and Game and DOC according to Dr Ryder.
- 8.147 Dr Ryder noted that the proposed rate of water take from Lake Ōhau equates to just 0.3% of the natural annual inflow into the lake. Given this very minor abstraction, he considered that it will have no measurable or meaningful effect on the level of Lake Ōhau.
- 8.148 The irrigation intake design, consisting of an infiltration gallery buried beneath the bed of Lake Ōhau, has been described in the evidence of Mr McIndoe. In Dr Ryder's opinion, this design should be effective at safely screening a wide range of fish sizes, including adult and juvenile salmonids. Consequently, he stated that the effects on lake fisheries will be less than minor.

### **Effects on Waterways**

- 8.149 **Mr McIndoe** told us that two creeks flow directly through Ōhau Downs. These are Wairepo Creek and Six Mile Creek.
- 8.150 Based on the indicative irrigation design plans, Mr McIndoe said that irrigators will not cross over the watercourses present on the property. He stated the applicant will mitigate the potential adverse effects of irrigating adjacent to the creeks by fencing off the watercourses approximately 5 m from the bank to prevent stock access. Where necessary, the applicant will also establish riparian vegetation between the creek bank and fence.
- 8.151 In Mr McIndoe's opinion, it is likely that remnant tussocks existing along the creek margins will expand once the creek is fenced, and therefore no further plantings would be required in such areas. Where the riparian margin is dominated by exotic grasses and weeds, riparian plantings will be undertaken. Riparian vegetation will aid in reducing surface runoff, trapping sediments and provide shade for the waterway.

### **Nutrient Discharge Allowance (NDA), Groundwater, and Leaching**

- 8.152 **Dr John Bright** (Managing Director, Aqualinc Research Ltd) provided evidence on the following issues:
- (a) Development of Farm Environmental Management Plans (FEMPs - this is covered in the evidence of Dr Robson).
  - (b) Identification of specific nutrient discharge allowances
  - (c) Description of the local groundwater environment that is potentially affected.
  - (d) Description of the on-farm nutrient leaching and groundwater quality monitoring proposed to ensure effects on groundwater are no more than minor.

#### Dairy mitigation options and Nutrient Discharge Allowance (NDA)

- 8.153 According to Dr Bright the key to reducing the nutrient losses to below the NDA for the dairy options is to minimise urine patches in the field, and to minimise the opportunity for phosphorus run-off into water ways, by collecting a substantial proportion of the dung and urine on hard-stand areas, separating the solids from the liquid, storing the solid and liquid effluent until it can be applied to land at a rate that matches plant uptake of nutrients, and applying the effluent to land very uniformly.
- 8.154 Dr Bright explained that centre-pivot irrigators are proposed for applying the liquid effluent because they can achieve high application uniformity, their application depth is adjustable over a very wide range to match the soils capacity to store liquid at the time of irrigation,

and they will be in operation for normal irrigation purposes during the pasture growing season.

- 8.155 Separation of liquid from solid effluent minimises the risk of sprinkle nozzle blockage and provides opportunity for any surplus effluent from the farm to be sold off the property as soil conditioner/organic fertiliser. The ability to sell effluent off the property provides an additional practical mitigation option, should monitoring indicate a developing risk of exceeding the NDA.
- 8.156 Sufficient capacity will be provided to store effluent for seven months so that effluent applications can be matched to nitrogen uptake by pasture. Applying nitrogen to pasture at a rate that matches plant uptake of nitrogen minimises the availability of nitrate for leaching and thus the risk of nitrate leaching to groundwater.

#### Groundwater Environment

- 8.157 Dr Bright noted that the proposed irrigated areas on this property lie within the Ōhau and Wairepo groundwater sub-catchments, and within the Wairepo surface water sub-catchment (as defined by GHD). He added that the bulk of the irrigated area lies within the Wairepo groundwater sub-catchment.
- 8.158 Dr Bright explained that his understanding of the nature of groundwater flow and interactions with surface water ways in the sub-catchment is derived from observations of surface water features, flow paths and measured flow rates, and groundwater flow modelling undertaken by GHD. In his view this is a conventional approach to building an understanding of interactions between surface water and groundwater bodies.
- 8.159 According to Dr Bright's understanding, the direction of groundwater flow across the majority of the property is in an east-south-east direction, in general alignment with the direction of flow of Wairepo stream. He added that beyond the property the groundwater flow turns to the north-east and flows towards the Wairepo Arm of Lake Ruataniwha. Dr Bright noted that groundwater under the part of the property that is within the Ōhau groundwater sub-catchment flows in an east-north-east direction towards Lake Ruataniwha.
- 8.160 The Wairepo surface water sub-catchment is estimated by GHD to receive approximately 42 Mm<sup>3</sup> of water per year from the highlands. GHD partition this volume into 20 Mm<sup>3</sup> of groundwater flow and 22 Mm<sup>3</sup> of surface-water flow. The groundwater sub-catchment also receives about 22 Mm<sup>3</sup> of recharge from rainfall and existing irrigation of 1,300 ha. The total outflow is estimated to be 44 Mm<sup>3</sup> of groundwater discharge and 13 Mm<sup>3</sup> of surface-water flow to the Wairepo Arm of Lake Ruataniwha. Dr Bright added that the balance is diverted into the Willow Burn sub-catchment as stock water race flow.
- 8.161 According to Dr Bright, Wairepo Creek loses water to the groundwater system between the Upper Ford flow gauging site to the Lower Ford flow gauging site at a rate of about 12 litres/second/kilometre. Between the Lower Ford and Ōhau Road Bridge all of the stream flow is diverted into the Wairepo water race that runs south into the Willowburn basin.
- 8.162 Dr Bright noted that all drainage from rainfall on the applicant's property is understood to go to groundwater, there being no flow gaining reaches in the Wairepo Creek in the vicinity of Ōhau Downs and no significant surface water features on that part of the property overlying the Ōhau groundwater sub-catchment. In Dr Bright's opinion, this means nutrients leached below the rootzone do not pose a risk to stream health within the vicinity of the property. Because nutrients in drainage water will be transported to groundwater, not surface water, the proposed NRRP rule that nutrient concentrations between the points where a river enters and exits a property not be raised by more than 0.01 mg per litre for nitrogen and 0.001 mg per litre for phosphorus will be met. He added that during times of short duration high intensity rainfall events there may be some lateral subsurface drainage flow to surface water. If such events result in exceedance of the values specified in the rule, in his opinion the effects will be no more than minor because of their infrequency and short duration.

### Current groundwater quality

- 8.163 According to Dr Bright there is currently no data on the quality of groundwater underlying Ōhau Downs. Observed mean nitrate-nitrogen concentrations in groundwater, at well H38/0036 located near the Wairepo Arm of Lake Ruataniwha, is 0.4 mg/litre, with a range of 0.01 to 0.72 mg/litre. Dr Bright acknowledged that there is an increasing trend in concentration. He added that it is probable that the increasing trend is due to recent irrigation development and that the concentration will increase to 1.13 mg/litre that GHD has estimated to be the steady state concentration. Dr Bright noted that the observed mean nitrate-nitrogen concentration in Wairepo Creek near its outlet is 0.051 mg/litre, with a range of 0.002 to 0.16 mg/litre.
- 8.164 Assuming that all of the nitrate-nitrogen that is leached from the farm comes from the irrigated area only, which he thought was a conservative assumption, the average annual nitrate-nitrogen concentration in the drainage water would be approximately 8.3 mg/litre. This means that water from even the most shallow of water supply bores would be less than the 11.3 mg/litre nitrate-nitrogen drinking water limit according to Dr Bright.

### Expected nutrient discharges from this property, and their expected effects

- 8.165 Dr Bright noted that an assessment of the average annual nitrate leaching loss from the farm, when it is fully developed, has been made using OVERSEER®. He added that OVERSEER® input parameters were selected to represent the farm's climate and soils, and the proposed pasture management, animal management, irrigation management, effluent management, and farm production. The predicted average annual nitrogen leaching losses from the whole farm area after mitigation is 44,762kg of nitrogen, and 1,331 kg of phosphorus for the cubicle dairying option.
- 8.166 In conjunction with the OVERSEER® modelling Dr Bright recommended that sets of three drainage lysimeters be installed on the first blocks to be developed for irrigation, and be operated continuously for the duration of the consents. He added that the sets of lysimeters should be strategically located on the applicant's property in an area that has a plant available water capacity of 65mm. According to Dr Bright the proposed sites (in conjunction with Killermont's and Southdown's proposed sites) will provide leaching measurements across a range of soils and climate settings.
- 8.167 Early installation of these lysimeters provides opportunity to measure actual nutrient losses under the first developed areas and to use this data to fine tune OVERSEER®. According to Dr Bright, the lysimeters should be installed prior to the commencement of irrigation so that leaching can be monitored for the whole of the first year of irrigation system operation.
- 8.168 Dr Bright referred us to the lysimeters installed on the Lincoln University Dairy Farm. He noted that the 60 lysimeters built and installed to this design have been operating successfully for several years. Dr Bright provided recommendations on how the monitoring should take place and that the total annual measured nitrogen leached should be compared with the OVERSEER® estimates of the average annual nitrogen leached. If the actual nitrogen leached is greater than the farms NDA then the Dr Bright recommended that:
- (a) A new NDA is calculated by multiplying the current NDA by the ratio of the OVERSEER® estimated nitrogen leached to the actual nitrogen leached.
  - (b) The farm management is then revised so that it results in an OVERSEER® estimate of nitrogen leached that is less than the new NDA.
- 8.169 In Dr Bright's opinion it is unlikely that the average measured annual nitrate losses will exceed the OVERSEER® estimated annual nitrate losses. This assumption was based on a number of observations given in his evidence.

## Water Quality, Aquatic Ecology and Bird Ecology

- 8.170 **Dr Gregory Ryder** (Director, Ryder Consulting Limited) was engaged by the applicant (and two other applicants for their respective properties) to describe the existing aquatic and avifaunal ecological values associated with both the proposed take and use of water, the ecological effects associated with the irrigation developments and the recommended mitigation options to address these effects.
- 8.171 Dr Ryder told us that he undertook biological surveys of the Ōhau Downs area, focusing on the streams in the area, namely Wairepo Creek and Six Mile Creek, with additional areas also surveyed to assess bird habitat values. He acknowledged that other information on water quality, fish distribution and avifauna had been obtained from a variety of sources and he used this information to aid him in his assessment of potential effects.
- 8.172 Dr Ryder noted that the middle reaches of Wairepo Creek are within the proposed irrigation area on Ōhau Downs. Upstream of Ōhau Downs, Wairepo Creek flows through Glen Eyrie Downs and a DOC Reserve. Within the DOC Reserve Wairepo Creek flows in a natural, meandering channel with tussock grasses dominating the riparian vegetation and overhanging the channel, with small native shrubs occasionally present. Downstream of the reserve, however (i.e. within the applicant's property) there are no tussocks overhanging the narrow, shallow channel, which has a gravel/cobble substrate.
- 8.173 He told us that Six Mile Creek drains from the eastern slopes of the Ōhau Range and meets Wairepo Creek near the Ōhau Downs homestead. According to Dr Ryder in the upstream areas, the creek flows in a well defined channel before entering a swampy area with several ponds set amongst stands of wilding pines. Further downstream, below the QEII covenant area boundary, the creek deepens with aquatic plants throughout the channel, before returning to similar habitat characteristics as upstream. Riparian vegetation of Six Mile Creek is dominated by tussocks, rushes and exotic grasses, with a greater dominance of exotic grasses in downstream areas. Dr Ryder noted that there is some evidence of damage to the banks due to stock access. The channel has similar characteristics to Wairepo Creek except that the substrate also contains large areas of fine sediments.

### Water Quality

- 8.174 Dr Ryder reported that Dr Coffey included Wairepo Creek as part of the MWRL study. He told us that water sampling in the Ōhau Downs area generally found nutrient concentrations to be relatively low for farmed catchments. However results presented in the GHD reports for monitoring in the lower end of Wairepo Creek indicated that nitrate concentrations have increased over the last 7-8 years, suggesting that agricultural or anthropogenic sources have increased in relative importance over this time according to Dr Ryder. Dr Ryder added that the results showed some signs of modification expected within a farming catchment, but nutrient levels do not indicate levels of high enrichment. He noted that dissolved oxygen levels are quite low on occasions and *E. coli* levels can be elevated.

### Macroinvertebrates

- 8.175 Macroinvertebrate communities of streams on the Ōhau Downs property were surveyed by Dr Ryder and Dr Ruth Goldsmith. Dr Ryder noted that taxonomic diversity was generally very high, with between twelve and twenty two different macroinvertebrate taxa per sample. This is generally higher than the New Zealand average of 14 taxa per sample. Approximately 40-60% of the taxa found were 'pollution sensitive' EPT taxa, and included *Deleatidium* mayflies and *Hudsonema* and *Pycnocentroides* caddisflies. The freshwater mussel *Hyridella menziesii* was also found at some sites but 'pollution tolerant' oligochaete worms and chironomid midge larvae were also found throughout the survey sites according to Dr Ryder.
- 8.176 Community health index scores were variable and ranged between poor and good, depending upon the amount of modification to the stream channel and/or the amount of bed sediment present. Lower scores were found in soft bottomed areas, where community assemblages were dominated by snails, worms and midge larvae. Semi Quantitative Macroinvertebrate community Index (SQMCI) scores of waterways within Ōhau Downs

ranged from 2.9-5.5 (median 4.2) in Six Mile Creek, and 5.2-5.5 (median 5.3) in Wairepo Creek.

- 8.177 Dr Ryder noted waterways within the Upper Waitaki basin are currently classified as 'natural state'. Hayward et al. (2009) observed that the median QMCI score at sites classified as 'natural state' under the proposed NRRP was 7.4. In Dr Ryder's opinion this, coupled with observations of occasional low dissolved oxygen levels, elevated E. coli levels and modified physical character, indicate that these streams are not in a natural state condition.
- 8.178 Overall, Dr Ryder added that the invertebrate communities do not appear to be unique in any way, with communities typical of those widely spread throughout the South Island.

#### Fish

- 8.179 Dr Ryder searched fish records in the New Zealand Freshwater Fish Database (NZFFD) and said the six fish species had been recorded in waterways within the Ōhau Downs area. Four species are native; Canterbury galaxias, koaro and common and upland bully, with two introduced species; brown and rainbow trout. Dr Ryder noted that none of the native fish are included in the latest DOC threatened species lists. He added that only brown trout and upland bully have been found in waterways on Ōhau Downs, with koaro found in the QEII covenant area located upstream of the farm.
- 8.180 Dr Ryder noted that Wairepo Creek, as it flows through Ōhau Downs Station, is highly modified and lacks habitat diversity. The riparian margins are largely unprotected and given this and the lack of habitat diversity, it is not surprising that uncommon species are not present in this section of the catchment.
- 8.181 Overall, Dr Ryder stated that the fish communities in Lake Ōhau and in waterways in the Ōhau Downs area are not unique in any way.

#### Avifauna Ecology

- 8.182 Dr Ryder said that 55 different bird species have been identified in the Ōhau Downs area and wider surrounds. Nineteen species are introduced, with twenty native and sixteen endemic species. Species of interest include the black stilt, which is listed by DOC as 'Nationally Critical', the black fronted tern, Australasian bittern, Australasian crested grebe and grey duck, which are listed as 'Nationally Endangered', and the wrybill, Caspian tern and falcon, which are listed as 'Nationally Vulnerable'.
- 8.183 Dr Ryder noted that most of the bird species are found predominantly in wetland or farmland habitat, with the exception of seven endemic species and two native species that prefer native bush habitat. The black stilt and wrybill have been found in the protected area of the DOC Reserve.

#### Potential effects on Aquatic ecology

- 8.184 Dr Ryder said that the potential effects on streams and mitigation recommendations that he described for Glen Eyrie Downs (Decision CRC040835) are equally applicable to this applicant's property.
- 8.185 Dr Ryder noted that the applicant proposes to restore historical water race diversions of Six Mile Creek and Wairepo Creek, which would result in a loss of habitat for macroinvertebrate and fish communities within the Six Mile water race (approximately 4 km long) and the Wairepo Creek water race (approximately 2.5 km long). Dr Ryder acknowledged that he did not survey the water races, but in his opinion they are likely to contain bullies and possibly juvenile salmonids, as well as macroinvertebrate communities of average quality (at best). Dr Ryder said that the loss of aquatic habitat in these races would be offset by improving stream habitat through protection and enhancement of riparian margins. The applicant proposes approximately 10 km of riparian protection on Wairepo Creek and Six Mile Creek (5 km on each).



8.186 However, despite this offset, Dr Ryder recommended that an attempt should be made to capture and transfer fish (particularly salmonids and galaxiids – should they be present) from the affected reaches of the races prior to dewatering. He added that any such transfer should be undertaken with consultation and approval from Fish and Game and the DoC.

#### Irrigation Application

8.187 Dr Ryder described the potential effects of intensive farming practices as a result of irrigation development in the Glen Eyrie Downs section of his evidence (refer Decision CRC040835). He noted that these effects included the potential for greater contaminant losses to ground and surface waters than currently occurs.

8.188 Dr Ryder acknowledged the study by GHD which recommended environmental thresholds for Ōhau Downs. He added that GHD's study predicted increases in groundwater nutrient concentrations in the Wairepo sub catchment would adversely impact on the water quality of the Wairepo Arm of Lake Ruataniwha, which is currently in a mesotrophic state.

8.189 In his opinion predicted nutrient concentration increases under irrigation would place the Wairepo Arm in the eutrophic range, an undesirable state. As such, Dr Ryder noted that on farm mitigation of 16.4 kg nitrogen/ha and 0.7 kg phosphorus/ha for all new irrigation has been recommended to prevent the potential for reductions in water quality and in the aquatic health of waterways. We note that these figures for on-farm mitigation are in addition to those that can be achieved using good agricultural practice (the default assumption in OVERSEER®).

#### Recommended Mitigation

8.190 Dr Ryder referred us to the mitigation methods that the applicant believes will ensure they keep within the chosen environmental thresholds. These are discussed in detail in Dr Robson's evidence.

#### **Cultural Effects**

8.191 **Buddy Mikaere** (Principal, Buddy Mikaere and Associates) appeared on behalf the applicant (and two other applicants). He stated that the objective of his evidence was to show how the cultural issues that have been raised in opposing the applications for irrigation in the Mackenzie Basin by Te Runanga O Ngāi Tahu (TRONT) and the Ngāi Tahu Mamoe Fisher People Incorporated have been addressed.

8.192 Part of Mr Mikaere's assessment was to place these applications in a tangata whenua context, that is, to assess what is being proposed against relevant statutory provisions and planning documents. Mr Mikaere explained that these documents included the RMA (Part 2), NRRP, Te Whakatau Kaupapa (1990) and Te Runanga O Ngāi Tahu Freshwater Policy (1999). Mr Mikaere noted that Lake Ōhau in particular forms part of the Statutory Acknowledgment Area.

8.193 Mr Mikaere explained that as part of the MWRL research the CIA was commissioned. Input to the Assessment came from Te Runanga O Arowhenua, Te Runanga O Waihao, Te Runanga O Moeraki and Te Runanga O Ngāi Tahu. Mr Mikaere stated that this evidence responds to the cultural issues as drawn from the CIA and from the opposing submission lodged by TRONT and as discussed at site meetings with Ngāi Tahu representatives. In his evidence Mr Mikaere also listed the issues identified in the CIA.

#### Consultation (with Ngāi Tahu)

8.194 Mr Mikaere discussed the consultation undertaken to date with Ngāi Tahu. He noted that the applicant invited Ngāi Tahu representatives to visit the property. Mr Mikaere said that prior to those visits copies of all the documentation then available was supplied.

8.195 He added that the applicant is happy to discuss any aspect of their applications on request, in addition to the properties remaining open to access by Ngāi Tahu if required. As far as

Mr Mikaere is aware there is no complaint from Ngāi Tahu in respect of an inadequacy or any failings in respect of consultation.

#### Cultural Issues

8.196 Mr Mikaere provided some preliminary comments to place his evidence in context. He noted that while the issues identified in the CIA document are described as cultural by the author, in his opinion they are largely generic in scope, that is, they are basically the environmental issues that one would expect to find associated with irrigation applications.

#### FEMPs

8.197 Mr Mikaere stressed the cultural importance of the FEMP in the consideration of these applications. He explained the importance of the FEMP in cultural terms is that it provides a guide to the management of the farms so as to achieve compliance with not just environmental good practice but with the cultural holistic view that constitutes the Maori perspective on the natural world.

8.198 Mr Mikaere added that fortunately the close correspondence between generic environmental issues and specific Maori values such as the concern for water quality, in-stream ecology, fisheries and the restoration and enhancement of the environment where possible are, through the FEMPs, able to be implemented as part of the normal daily routine of farm management.

#### Ecological impact on customary fisheries and fish passage

8.199 Based on evidence from other expert witnesses, there were no concerns regarding customary fisheries and fish passage in Mr Mikaere's opinion.

#### Deterioration of downstream river reaches

8.200 Mr Mikaere noted that the underlying concern is for the pollution of waterways downstream from the Mackenzie Basin. For the applicant's property (and two other subject to his assessment) Mr Mikaere noted that there would be no direct discharge into waterways (evidence of Ian McIndoe). He acknowledged that some water will, make its way into the Waitaki hydrological system via groundwater and the implications that this has for water quality and in-stream values are dealt with in Dr Ryder's evidence.

8.201 According to Mr Mikaere there is no expectation of a contribution to the deterioration of downstream river reaches from the proposed irrigation on the applicant's property. In fact, Mr Mikaere added, the evidence of Dr Bartlett and Dr Ryder strongly suggests that with the implementation of various water quality protection methods, the overall effect will be an enhancement over the current status quo.

#### Use of irrigation to enable dairy farm conversions (cultural health of waterways and loss of access by tangata whenua to mahinga kai sites)

8.202 Mr Mikaere noted that because of the nature of dairy farming, the assumption is that dairying activities may pollute waterways this might impact upon cultural values such as fisheries, mahinga kai and the overall mauri, the spiritual and physical health of the waterways.

8.203 Mr Mikaere noted that much thought has gone into the maintenance of the health of waterways associated with the property including riparian strip planting and fencing with 5m setbacks. He added that in a major departure from traditional dairying in this country cows will be housed inside cubicle stables for eight months of the year and up to 50% of the time during the remaining four months. He noted that waterways pollution from animal manure on pastures is significantly reduced as a result of the cubicle dairying. He also noted the mitigation methods for the application of dairy effluent.

8.204 According to Mr Mikaere access to mahinga kai sites firstly requires the identification of where those sites are located. Upon that information being recorded there is no reason

why, despite the conversions to dairy farming, that access for cultural purposes cannot be established by arrangement between landowner and Ngāi Tahu. Mr Mikaere noted that the CIA and site visits did not reveal any mahinga kai locations on the four properties.

#### Water quantity issues and the link to mauri

- 8.205 Mr Mikaere noted that this issue is largely dealt with in other expert evidence. He added that there is some debate about the proposed water volumes. His understanding is that the expectation is that the volumes applied for fit within the relevant criteria and the effect on lake levels is less than minor.
- 8.206 There are two aspects to mauri, the tangible and the intangible. His view is that the tangibles are able to be addressed if mauri is considered as representing the health of the particular water body in question. Using the term health in this respect is a simple (though not definitive) way of expressing the mauri concept.
- 8.207 On this basis it follows that if it can be demonstrated that as a result of the activity there is no impact on the health of the overall environment (and this would encompass Maori cultural values), or better still, that the water resource is enhanced, then logically it can be said that the mauri is not affected.
- 8.208 The second aspect, the spiritual, is not something that the applicants, or in his opinion this (hearing) forum, is able to address satisfactorily. How a Maori person might regard their ancestral links and responsibilities to the land is highly personal and the protection or preservation of the spirituality that underpins this viewpoint, the intangible nature of the mauri concept makes provision difficult.
- 8.209 In his experience the best practical approach has been to ensure that the physical aspects are properly addressed and if the impact of these aspects is mitigated to the point where the outcome is either neutral or represents an enhancement then that is the best outcome that can be achieved.
- 8.210 Mr Mikaere then related this to the TRONT Freshwater policy, which he listed. He added that except for the last two criteria (mixing of water bodies and protecting the exchange of freshwater and seawater at the mouth) his view was that the four applications covered in his evidence are in compliance and therefore the impact on mauri is properly addressed.

#### TRONT Submission

- 8.211 Mr Mikaere listed the issues from the TRONT submission. He noted that as with the CIA most of these issues relate directly to the Waitaki River and, in his view, are outside the scope of these applications. Mr Mikaere added that those that might be applicable such as loss of mahinga kai sites and wāhi tapu have already been dealt with earlier in his evidence.
- 8.212 In terms of modifications to the cultural landscape, in Mr Mikaere's view the changes will be limited to the pivot irrigation systems and discreetly-sited pumping stations. In addition to these issues the TRONT submission also raises Section 5(2)(a) (Part 2) of the RMA concerns. Mr Mikaere's view is that the proposals surrounding these applications have the sustainability of natural and physical resources to meet future needs as an underlying objective.

#### Other Submissions

- 8.213 Mr Mikaere noted two opposing submissions which were asserted to be "cultural" in nature were lodged by New Zealand Federation of United Seafoods Inc; and Ngāi Tahu Mamoe Fisher People Inc. ("the Confederation"). It is Mr Mikaere's understanding is that the New Zealand Federation has subsequently been liquidated and subsumed into the Confederation.
- 8.214 The issues raised by the Confederation relate to their contention that the Council does not have the right to issue consents and various aboriginal and customary use rights through

descent or under Article 2 of the Treaty of Waitangi. He added that this submission is also based on a claim to the ownership of all water, river, stream, and lake-beds, foreshores, sea-bed, sea fish and shellfish, as contained within the boundaries of the Canterbury Purchase Block of 1848.

- 8.215 In Mr Mikaere's opinion these are matters outside the scope of this forum, demonstrate a fundamental misunderstanding of this resource consent application process and should be set aside for that reason.

#### Officer's Report

- 8.216 Mr Mikaere noted that the Officer's report makes a number of general observations about adverse effects on tangata whenua values for all four properties and their associated consent application. He provided an example, from Ōhau Downs where the reporting Officer had noted that she could not determine the scale of actual and potential effects on the cultural values of the area.
- 8.217 Mr Mikaere added that it was the intent of his evidence to assess the respective applications against the known Ngāi Tahu cultural values, the cultural issues identified during the consultation and as set out in the CIA, and the Ngāi Tahu approach.
- 8.218 Mr Mikaere has considered all the applications against these criteria and his assessment is that provided the suggested mitigation proposals are put in place by way of appropriate consent conditions and incorporated into the respective FEMPs then the overall impact on cultural values of the proposed irrigation and associated infrastructure will be less than minor.

#### Part 2 of the RMA

- 8.219 Sections 6(e), 7(a) and 8 of Part 2 of the RMA are normally regarded as the 'cultural' sections according to Mr Mikaere. In his view the applicant is in compliance with these sections of the RMA. Mr Mikaere then provided details on how he believed these applications are compliant with these sections. Mr Mikaere then outlined the relevant 'cultural' policies and objectives from the WCWARP and in summary noted the applicant's proposed activities are consistent with these policies and objectives.

### **9 SUBMITTERS**

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- 9.1 We note that most of the submissions against the granting of large-scale dairy applications (of which Fiver Rivers is one) were aired as generic opposition to the cumulative water quality effects of granting. As such, it has been summarised in Part A and will not be repeated here. However we consider all the Part A evidence along with the specific submissions to this application in our consideration of the issues.

#### **Amenity values -Blue Family Trust**

- 9.2 We note that the Blue Family Trust submitted in opposition to this application, however their concerns related to the intake structure rather than the take and use of water. In particular, the Blue Family Trust was concerned about the visual impact and noise from the pumping station in respect of their property at Maori Bay.
- 9.3 At the time of the submission, the location of the proposed intake had not been identified. However more information was subsequently provided by the applicant, who confirmed that the intake will be located some 3km from Maori Bay.
- 9.4 As a consequence, the concerns of the Blue Family Trust in respect of this application appear to have been addressed. This is reflected in the fact that their evidence at the hearing concerned solely the Southdown application (CRC040835) and they did not make a submission on the separate land use consent application by the applicant for the intake structure (CRC100225).

## Groundwater and Water Quality

- 9.5 In this evidence on behalf of Meridian **Mr Callander** (hydrologist) provided comment on Dr Bright's evidence on the applicant's property in addition to the three other applicants in Mr Whata's suite of applications.
- 9.6 Mr Callander acknowledged that the groundwater sub-catchments relevant to the applicant's property were as described by Dr Bright, namely the Ōhau and Wairepo.
- 9.7 Mr Callander stated that the partitioning of soil drainage water and groundwater flow into each of the groundwater sub-catchments had been determined by observations of surface flow patterns and from the groundwater flow model that was developed as part of the MWRL groundwater assessment.
- 9.8 In Mr Callander's opinion there is a large degree of uncertainty associated with how that partitioning of water into each sub-catchment has been carried out, due to the lack of data with which to calibrate the groundwater model.
- 9.9 He referred us to a figure that showed the bores used to calibrate the water levels for the groundwater flow model. He noted that there is no information available for the Ōhau, Wairepo (and Quail Burn) groundwater catchments. In areas where no water level data is available, it must be concluded, in Mr Callander's view, that there has been no calibration of the groundwater flow patterns. Consequently, the partitioning of drainage water from farms into the groundwater sub-catchments can only be defined with a large degree of uncertainty. Mr Callander added that similarly, the information on current groundwater quality conditions is not well defined.
- 9.10 Mr Callander then noted the conclusion reached by Dr Bright regarding the migration of nutrients from the applicant's property and what nodes the farm is likely to contribute to. He noted that Dr Bright predicted that nutrients lost from Ōhau Downs would enter either the Lower Ōhau River and Lower Ōhau groundwater and then to Lake Benmore or to enter Lake Ruataniwha and discharge via the Ōhau C Canal, Lower Ōhau River and Lower Ōhau groundwater into Lake Benmore. However based on the applicant's data, Mr Callander said that he would expect a proportion to contribute to the Ōhau Canal surface node. He added that unless there is good reason to exclude this node, it would seem appropriate to include it in the consideration of the acceptable nutrient limits.
- 9.11 For the three main groundwater catchments that Dr Bright considered to be affected by several properties in this area Mr Callander used information provided by the applicant to tabulate the changes in nitrogen mass from existing irrigation to the proposed future irrigation scenario.
- 9.12 For the Wairepo Creek catchment (which the applicant's property is within) Mr Callander's calculations showed an increase of nitrogen draining through the soils from 58,551 kg to 157,602 kg which he noted has been assumed to discharge via groundwater. Consequently he added that it is important to understand the final destination of this groundwater. Mr Callander acknowledged that MWRL consultants have advised him that that the information he was provided with to undertake his calculations of increased nitrogen do not include the effects of the proposed mitigation measures.
- 9.13 Mr Callander noted that Dr Bright's evidence did not provide any detail about phosphorus migration. He explained that it was his understanding that the phosphorus losses from soil were assumed to go into surface waterways, but have been scaled back to match the sampled surface water concentrations.
- 9.14 In Mr Callander's opinion it would be helpful to clearly state the migration pathway for phosphorus from each farm, along with the degree of scaling back for input to surface waterways. He was also of the view that the fate and transport of the residual phosphorus that doesn't enter the surface waterways should be described.
- 9.15 Regarding the fate of the groundwater Mr Callander stated that assuming there is groundwater flow across the downstream end of the Wairepo catchment, a simple

comparison of the cross-sectional areas indicated that at least 40% of the groundwater flow could enter the Wairepo Arm. This would correspond to around 23,000 kg of nitrogen at present and 62,000 kg of nitrogen under MWRL's proposed scenario. Mr Callander added that based on the topographic map (provided in his evidence) he would expect most of the nutrients entering Wairepo Arm would flow into the Ōhau C Canal. He reiterated that increased nutrients in the Canal are of concern to Meridian.

- 9.16 Mr Callander considered that Dr Bright's evidence presents a generalised description of a possible migration of nutrients as provided by GHD. In Mr Callander's view however, Dr Bright does not appear to have critically reviewed that information and has not described the uncertainties associated with it. Mr Callander provided a description of the uncertainties, which in his view lessen the confidence we should place on their assessment. This summary of uncertainties has been noted.
- 9.17 Mr Callander acknowledged that these uncertainties are largely due to a lack of reliable field data rather than any basic errors in the assessments. However, due to that lack of data he added that it would be appropriate to present either a conservative analysis (which isn't the current MWRL approach) or a sensitivity analysis to consider a range of possible nutrient generation and migration scenarios that could arise within the constraints of the information available.
- 9.18 Mr Callander acknowledged that the MWRL summary report identifies that nutrient reductions are required for no change in trophic state in the Wairepo Arm, Kellands Pond and the Ahuriri Arm of Lake Benmore. Mr Callander then identified a number of uncertainties in achieving a reduction in nutrient input that included how on-site mitigation methods will be controlled and monitored, and the inaccuracies (in his view) regarding nutrient input and dilution in the Wairepo Arm.
- 9.19 Based on the information he had available to him Mr Callander could not conclude that the developments (Five River, Southdown, WHL Killermont, and Killermont)) will not ultimately contribute to an addition of nutrients to those surface waterbodies, over and above what is currently occurring.

#### Proposed Consent Conditions

- 9.20 Mr Callander provided comment on the proposed consent conditions for the applicant's property. He added that his comments are from a groundwater perspective.
- 9.21 He explained how the seasons are likely to affect drainage discharge into groundwater. He added that this could cause an issue whereby there is a seasonal breach of nutrient conditions, which then resolves itself over a period of weeks or months as climatic conditions change. His concern was that this situation could continue year after year because the groundwater contribution to the problem is not resolved.
- 9.22 He added that measured concentrations of nutrients in surface water, groundwater and lysimeters would provide the criteria from which to monitor changes in the environment in response to the increased irrigation area (in addition to the proposed OVERSEER® modelling). He added it would be prudent to undertake 12 months of monitoring to establish a seasonal baseline against which future changes can be assessed and relevant thresholds could be assessed.
- 9.23 In Mr Callander's opinion groundwater monitoring should be carried out at quarterly intervals. If a threshold is breached, it should be checked by a repeat sample. If the repeat sample confirms the breach, then the groundwater sampling interval should be increased to monthly. In his view, weekly sampling, which is the interval currently proposed for threshold breaching, is too frequent for groundwater, which tends to show changes at a much slower rate.
- 9.24 If lysimeter and/or groundwater thresholds are exceeded, then mitigation measures need to remain in place until at least a 12 month monitoring period to demonstrate that there is not a recurring seasonal breach according to Mr Callander. Furthermore he added if groundwater concentrations increase above a threshold level, then there will need to be a

corresponding reduction in the allowable nutrient discharges via a surface migration pathway, so that the overall nutrient input to surface waterways is controlled.

### Landscape Effects

- 9.25 Ms Di Lucas (landscape architect representing Mackenzie Guardians) provided a description of the property and noted that the site adjoins the Swan Lagoon and QEII covenant area (Figure 1). She added that whilst some of the site has been cultivated and presents as a vivid green, in her opinion this non-irrigation green would mellow seasonally and through time.
- 9.26 In terms of viewing vistas she noted that the site is overviewed from up on Ben Ōhau and the Ōhau Skifield as well as various conservation areas, such as the Ōhau Wetlands Moraine Complex. Ms Lucas added that the site is also variously visible from other public and private places including Glen Lyon Road and the Ōhau village.
- 9.27 In her opinion the landscape overall character is of high naturalness and of an important contribution to the overall natural character of the Lake Ōhau context and setting. The great outwash plain that the applicant's property is located on is a significant natural feature according to Ms Lucas. Whilst some cultivation has been undertaken, in her opinion, the natural landscape values are exceptional. In Ms Lucas's opinion, the contribution of these lands to the Ōhau Basin as an outstanding natural landscape needs to be recognised.
- 9.28 Ms Lucas agreed with Mr Glasson's recommendation that the irrigation should not occur on the moraine. She also noted that Mr Glasson had recommended that the proposal be significantly reduced and refined. Despite this Ms Lucas concluded that the proposal would not protect the legible, natural science and aesthetic values of the Ōhau Basin and in her view the application is inappropriate.

### Terrestrial Ecology

- 9.29 In her site specific evidence (Appendix 15) **Dr Walker** (ecologist representing Mackenzie Guardians) noted that the northern part of the applicant's property is the largest area of undeveloped grassland in the south of the basin, representing an intact ecological sequence. She added that little information on terrestrial values is available, but the property is likely to support threatened species and provides important buffering and linkages for species in this part of the basin.
- 9.30 We note that Dr Walker gave comprehensive evidence on the cumulative effects of irrigation on vegetation in the Mackenzie Basin. This evidence is discussed in Part A and significant points from it are captured in our consideration of the issues for this application.

### Water Quality and Aquatic Ecology

- 9.31 As noted in the introduction to this section, there was no specific evidence in relation to aquatic ecology aspects of this application. However we note that **Dr Snelder** and **Ms Sutherland** (both on behalf of Meridian) provided comprehensive evidence on aquatic ecology in opposition to the cumulative effects aspects of this application, particularly with respect to the Wairepo Arm of Lake Ruataniwha, and the Ahuriri Arm of Lake Benmore. This evidence is covered in Part A and we capture the relevant points in our S104 evaluation.

### Cultural Effects

- 9.32 While Ngāi Tahu did not make a specific submission in relation to Ōhau Downs, they did submit in opposition to all applications at this hearing. They later qualified that opposition (in a memorandum in relation to Simons Hill/Simons Pass stations) saying they remained formally opposed to dairying applications.
- 9.33 Ngāi Tahu witnesses made specific reference to, or alluded to, Five Rivers in their evidence opposing all applications including:

- (a) Ngāi Tahu were concerned with the sheer scale of some of the applications, particularly those draining to sites identified for enhancement of mahinga kai. Ngāi Tahu did not want to see new irrigation that will degrade existing habitats and deny opportunities for enhancements in the Ahuriri Delta and Haldon Arm.
- (b) Ngāi Tahu were alarmed about the scale and intensity of the larger proposals such as Southdown, Five Rivers, Killermont, Simons Hill, Simons Pass and the two Rosehip applications. Mr Horgan urged that given the patchy nature of the science presented in the proposals that a precautionary approach be adopted, he stated that the 'suck and see' approach that the applicants are seeking is cavalier and inconsistent with the special relationship that Ngāi Tahu hold with the Upper Waitaki.
- (c) In relation to the applicant's proposed adaptive management plan Mr Horgan (for Ngāi Tahu) stated:

*"Simply reducing the annual allocation of water for the subsequent season as proposed in the evidence of John Kyle for Southdown, Williamson Holdings, Five Rivers and Killermont Station would not be sufficient to address degraded water problems and the lag effect of accumulated nutrient levels migrating through the gravels and into the groundwater."*

9.34 We discuss Ngāi Tahu evidence in relation to all applications in Part A. Points made in those submissions of relevance to Ōhau Downs are captured in S104 evaluation.

#### **Other issues**

- 9.35 In addition to the above, we received evidence from Ms Devon Christensen on behalf of Fish and Game raising issues in respect of the FEMPs. Also we received evidence from Dr Helen Brookes on behalf of Waitaki First raising issues of concern relating to centre pivot irrigators applying effluent while crossing streams. Both of these matters are discussed subsequently when we consider Dr Robson's views in relation to the FEMPs.
- 9.36 We also receive evidence from Mr Mark Webb on behalf of Fish & Game, Mr Maturin and Ms Anna Cameron on behalf of the royal Forest and Bird Protection Society. Points they made in evidence are discussed in detail where we record Dr Bartlett's right of reply.

## **10 UPDATES TO THE SECTION 42A REPORTS**

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### **Effects on other water users**

- 10.1 In her S42A addendum Ms Penman noted that the applicant had provided an assessment of the effects of the proposed abstraction on other users and activities. She considered that as derogation approval had been received from Meridian, who would be the primary affected party, this matter has been adequately dealt with. However, she added that granting this consent over the allocation limit may have a precedent effect as the WCWARP is an operative plan.

### **Efficient and reasonable use**

- 10.2 In their evidence the applicant outlined an alternative measurement of efficiency using the Irricalc model. In her S42A addendum Ms Penman noted that provided a favourable comparison of the Irricalc input parameters against field measurements is undertaken prior to granting of consent, she would be satisfied that the proposed volume is reasonable for the property, and therefore, efficient and reasonable use would no longer be a concern.

### **Landscape effects**

- 10.3 In her S42A addendum Ms Penman noted that Mr Glasson has reviewed the evidence of Mr Stephen Brown (applicant's landscape expert), but remains of the opinion that buffers from Lake Ōhau Road are still required, in order for effects to be acceptable.



## **Terrestrial ecology**

- 10.4 In her S42A addendum, Ms Penman noted that Dr Ruth Bartlett had provided evidence on terrestrial ecological effects and concluded that the effects would be minor. However, Dr Susan Walker presented evidence in opposition and disagreed with Dr Bartlett's conclusions. Because of this divergence of expert opinion, and in the absence of specialist Council advice, Ms Penman was unable to conclude whether the effects on terrestrial ecosystems are acceptable.

## **Cumulative water quality effects**

- 10.5 Dr Freeman's addendum on cumulative water quality effects concluded that for properties located in the Wairepo Creek catchment there was a high level of uncertainty associated with the hydrogeological modelling – specifically, insufficient evidence to support the theory that drainage water largely bypasses the Wairepo Creek. The implication of this conclusion, he told us, is that a significant proportion of the proposed additional nutrient loading in the catchment could enter the Wairepo Creek resulting in significant cumulative adverse effects.
- 10.6 He recommended that for any new application in Wairepo Creek, more information is needed and/or strict monitoring and response conditions should be imposed that enable a rapid and effective response to any observed significant water quality deterioration caused by increased irrigation.

## **Cultural Effects**

- 10.7 In her S42A addendum Ms Penman acknowledged the assessment provided by Mr Mikaere on behalf of the applicant regarding the effects on cultural values. However, given at the time of writing her addendum she had yet to hear the submission from Ngāi Tahu, she was unable to determine the potential effects on cultural values.

## **11 APPLICANT'S RIGHT OF REPLY**

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### **Closing legal submission**

- 11.1 Mr Whata provided the closing legal submission on behalf of the applicant and three other applicants subject to this consent process. In his overview he stated that the final officer recommendations have lost sight of the big picture, and more particularly a realistic appraisal of the adverse and positive effects of the proposed farming systems.
- 11.2 In particular, he submitted, that the focus on cumulative effects had diverted attention from the very careful management of onsite effects under all of the proposed farming systems and that little credit had been given to the positive localised effects of the farm proposals, including the basically uncontested evidence that the stream and riparian conditions are likely to improve under the proposed systems.
- 11.3 He also submitted that the recommendations do not appear to have taken into account the real net effect of the proposed farming systems, which he said were virtually nil at the Ahuriri Arm, and a small relative increase in terms of the Wairepo sub catchment effects. He said that this was contrary to the recent statement of the Court in the North Bank tunnel case, that the environment must be seen as dynamic and the effects of a proposal assessed accordingly.
- 11.4 He therefore submitted that once all the evidence is properly gathered, and that dynamism fully accounted for, that the adverse effects are acceptable and that there are genuine positive effects to justify grant.
- 11.5 Mr Whata said that from their review of both the submissions and evidence of other parties and the Council, the following matters are not disputed and therefore provide the base foundation to assess the effects of the proposal (these have been particularised to Ōhau Downs Station):

- 11.6 Ōhau Downs is not a pristine natural environment and reflects the reality of dryland farming in a tough environment. It is currently farmed and these farming activities have an impact on the environment through:
- (a) Generating nutrients;
  - (b) Some waterbodies not being fenced from stock, with related effects;
  - (c) Little or no riparian planting adjacent to the waterbodies;
  - (d) Significant soil erosion which contributes significantly to the nutrient loadings in adjacent waterbodies; and
  - (e) Land degradation through invasive species such as wilding pines which cannot be controlled without active farming.
- 11.7 Mr Whata also noted that the future environment will be enhanced from reduced soil loss, and riparian margins will improve the physical character of streams and maintain and potentially enhance the health of local stream aquatic communities.
- 11.8 Mr Whata was critical of the analysis done by Council officers, saying aspects of it are manifestly flawed and provided two examples:
- (a) Landscape - Mr Glasson has not considered the existing or future environment within which the effects of irrigation might occur, or the counterfactual, what the environment might look like if irrigation did not occur on the affected areas.
  - (b) Terrestrial - Global statements have been made about the level and extent of indigenous vegetation without any real empirical foundation. No serious consideration had been given to the counterfactual, for example, to the continued spread of wilding pine.
- 11.9 He urged us to factor in the real 'existing' and 'future potential' environments in evaluating the impacts of the proposed irrigation.
- 11.10 Mr Whata noted that the Officer's recommendation for this application was that it could be granted provided that more information is obtained to reduce the uncertainties and/or subject to strict comprehensive monitoring and response conditions.
- 11.11 He then discussed outstanding issues, as identified by the Reporting Officers. These included the potential effects on water quality, which are discussed extensively in our Part A findings.
- 11.12 Mr Whata provided a number of counter arguments to his clients avoiding or mitigating the effects of concern to the Reporting Officers. We have noted these arguments and return to them again in our evaluation.
- 11.13 He then compared the predicted nutrient loads from the irrigated farms (with mitigation) to those that would arise from a permitted baseline of dryland farming. For Ōhau downs this was 500ha cropping, 200 ha dryland lucerne, 6000 ewes, 5000 hoggets and 500 cattle. This scenario was only a slight intensification of what is undertaken on the property currently he told us, and is not considered fanciful. The WQS irrigated scenario was from the developed setting in OVERSEER, using cubicle stables and a conservative production rate.
- 11.14 Mr Whata reported that for Ōhau Downs these two scenarios resulted in identical phosphorus losses (0.3 kg/ha/y) and that the irrigated scenario actually resulted in lower nitrogen losses (9 kg ha/y) than the dryland scenario (11.9 kg ha/y).
- 11.15 He then referred us to Mr McNae's (audit of OVERSEER inputs) overall conclusion that "*he has a strong level of confidence that the completed modelling provides a reasonable representation of future nutrient loading.*"

- 11.16 Mr Whata then referred us to points made by his client's expert witnesses in their reply evidence.
- 11.17 Mr Whata then traversed issues raised by the reporting Officers specific to each property. For Ōhau Downs these issues were:
- (a) Effluent management;
  - (b) The non-complying take; and
  - (c) Landscape.
- 11.18 The issue with respect to effluent management was whether we could impose conditions in relation to effluent management even though applications for that activity are not before us. Mr Whata submitted that we could, and referred us to pragmatic decisions made by the Court in similar circumstances.
- 11.19 On the issue of the non-complying take, Mr Whata disagreed with Ms Penman who was concerned that granting the consent over the allocation limit may have a precedent effect because the WCWARP is an operative plan.
- 11.20 He submitted that Ms Penman's concerns misconceived the reason for the allocation limits, which were specifically tied to the MIC agreement, the requisite derogation approvals, and the management of lake levels. The Application, he said, had to satisfy these matters and that they are only precedents to the extent that future applicant must also satisfy these matters. Furthermore, he submitted, with agreement reached on the additional water take out of Lake Ōhau, with appropriate derogation approval, more water is available overall for generation purposes as less is now available for abstraction upstream.
- 11.21 He also referred us to Mr McIndoe's conclusion that because Lake Ōhau is operated within a narrow water band (which will be complied with), the effects of taking over the allocation limit will be minor.
- 11.22 Mr Whata then addresses specific issues raised by Meridian experts. He said that Meridian experts were of the view that increased nutrients in the Wairepo arm will stimulate didymo biomass development in the Ōhau B-C Canals. He referred us to Dr Ryder's conclusion that because the canals were man-made systems they had low ecological values and that therefore nutrient management was not warranted. We note that Meridian's concerns about didymo proliferation in the canals were based largely on operational issues, rather than the canals' intrinsic ecological values. He submitted that in any case, there is no basis for attributing didymo to current or prospective land use.
- 11.23 Mr Whata then summarised the lock-step adaptive management approach, which his group of applicants had developed in response to uncertainties associated with the migration path of nutrients from his applicants' irrigated properties. We give our views of the lock-step approach later in this decision.
- 11.24 Finally Mr Whata referred us to the 'needs plus buffer' solution for the allocation of nutrient load from all properties, which had the objective to get all applicants at this hearing "over the line". He told us that notwithstanding the apparent reticence of a couple of UWAG applicants we can now proceed with this allocation basis. We note that as we have rejected MWRL's overall cumulative effects assessment (Part A) we have chosen to treat all applications on their own merits, but taking into account cumulative stressors on each relevant receiving water environment.

### **Reasonable Use**

- 11.25 In her S42A Addendum Ms Penman requested that a favourable comparison of the Irricalc input parameters against field measurements is undertaken prior to granting of consent, to be satisfied that the proposed volume is reasonable for the property.

- 11.26 Mr McIndoe noted that Irricalc is a soil water balance model that has been calibrated against field measurements on the Canterbury Plains. The method is a well-recognised technique for determining irrigation demand. He added that neither Irricalc nor the WQN9 method has been specifically calibrated against soil moisture measurements from the Mackenzie Basin, because such data does not yet exist.
- 11.27 In Mr McIndoe's view it is unrealistic to compare Irricalc parameters against field measurements for specific farms before they are irrigated as the [pasture] would need to be irrigated to undertake these measurements.
- 11.28 When the consents are being exercised, Mr McIndoe noted that water use and soil moisture measurement will occur, and checks for reasonable and efficient use will be able to be made. Mr McIndoe added that conditions have been proposed to ensure good irrigation practices and efficient application of water is achieved.

### Planning

- 11.29 In his right of reply Mr Kyle provided a set of proposed consent conditions for the applicant's consent. He also included a flow chart that explained how the approach to conditions in terms of response to the proposed OVERSEER modelling and water quality monitoring would be achieved.

### Landscape effects

- 11.30 Mr Brown's right of reply responded to the matters raised in the supplementary report of Mr Glasson. The first part of Mr Brown's evidence responded to the general status of Mr Glasson's comments and have been incorporated into the discussion on landscapes in Part A . The second part of Mr Brown's evidence focussed on the concerns and recommendations raised by Mr Glasson in relation to the individual properties including the applicant's property.
- 11.31 In regards to the applicant's proposed irrigation Mr Brown agreed with Mr Glasson that the relocation of pivot irrigators since the original application has helped to buffer Lake Ōhau and protect the moraine area at the western end of the property. Mr Brown then described in his evidence a number of non-irrigated areas that would maintain key views to Ben Ōhau and the Ōhau Range. However, he acknowledged that part of the pivot irrigation system immediately north of Lake Ōhau Rd would still intervene into views of both Ben Ōhau and Ōhau Range at the entry point to Ōhau Downs from the east.
- 11.32 Mr Brown noted that Mr Glasson had considered that his original buffer recommendation of at least 300m from the road should be retained and that the cubicle barns would have a very high visual impact. In Mr Brown's view this fails to recognise the 'working' farmed nature of the landscape around Lake Ōhau Rd east of Swan Lagoon and the moraine field. He added that it is already modified by farming activity and buildings / structures to a significant degree. He reiterated that the proposed irrigation system would "*affirm a pattern of use, including the compartmentalisation of the landscape's more natural and modified 'halves', that is already well established.*"
- 11.33 In addition Mr Brown noted that the bulk of the northern irrigation field would be hidden behind a strip of moraine that marks the point of transition to a lower terrace on which most of the irrigators would be located. He added that looking from the margins of Lake Ōhau itself, the great bulk of the proposed irrigators would be screened by the jumbled moraine field that flanks the Lake. Any irrigators that remain partially visible would, in his opinion, emerge as wholly subordinate, small scale, components of the wider lake landscape and its setting.
- 11.34 While acknowledging that those irrigators closest to Lake Ōhau Rd would still intrude into views of Ben Ōhau, Mr Brown considered that such effects are of a moderate, rather than high, level. He added that if considered necessary, the possible relocation of two smaller pivot irrigators immediately north of Lake Ōhau Rd (out of the sightline to Ben Ōhau) would appreciably reduce this impact level even further. In Mr Brown's opinion a set-back of around 100m should be sufficient to sink these irrigators into the terrain below Ben Ōhau, without rendering them invisible.

- 11.35 He reiterated this evidence in chief that the cubicle barns south of both Lake Ōhau Rd and Six Mile Creek would be so low lying and distant as to be all but impossible to see, and for those north of Lake Ōhau Rd the viewing distance, the low profile of the structures, and the intervening terrain would render them insignificant components of the visible landscape. He acknowledged that mounding and planting could further soften and mitigate the effects of those barns that remain visible, rendering them wholly subservient elements within the Waitaki's expansive landscape.
- 11.36 In conclusion Mr Brown reiterated that many of the issues raised in Mr Glasson's September 2009 report have become effectively redundant because of modifications to the proposed irrigation fields and related mitigation. He added that he considered that the further mitigation measures outlined above would be sufficient to address the only outstanding concerns that Mr Glasson had identified.

#### **FEMPs**

- 11.37 Dr Robson's reply evidence was in two parts. Firstly she guided us through changes made to the FEMPs for this group of applicants (includes Ōhau Downs). Secondly, she provided comments on the Council's S42A Officer's Reports including (relevant to this application) Mr McNae, Ms Penman and Dr Freeman, the evidence of Ngāi Tahu expert Mr Paul Horgan, the evidence of Waitaki First expert Dr Brookes and the evidence of Fish and Game expert Ms Christensen. Only those matters deemed relevant to the applicant's proposed activities have been included below.

#### Response to Mr Darren McNae (S42A Officer for OVERSEER modelling)

- 11.38 In regards to the applicant's OVERSEER modelling Dr Robson addressed Mr McNae's concerns regarding 'High per cow production'. She noted that the production per cow was given by the owner of Ōhau Downs Station, (Mr Zeestraten) who already manages multiple dairy units in Southland, and is supported by Mr Englebrecht, the farm consultant retained to provide input into the Ōhau Downs application. Consequently, in Dr Robson's view this constitutes a reasonable input to the model.
- 11.39 Dr Robson noted that in Mr McNae's addendum, he accepted that the basis for some production inputs were based on Mr Zeestraten's and Mr Englebrecht's experience of other farming operations rather than from specific modelling. She acknowledged that the lack of specific feed modelling that causes concern for Mr McNae.
- 11.40 To put this issue into context, Dr Robson added that at the higher production, modelled nutrient losses were higher. She added that if Mr McNae's concerns were justified this would result in higher losses being predicted than would actually occur.

#### Response to Mr Paul Horgan (Ngāi Tahu)

- 11.41 Dr Robson noted that Mr Horgan had quoted from the Cultural Impact Assessment that "Ngāi Tahu ... is concerned at the possible conversion to dairy. Almost without exception, the conversion over recent years of dry land farms to dairying has brought with it a host of adverse environmental effects and has resulted in the significant degradation of our rivers, lakes, streams and wetlands."
- 11.42 Dr Robson added that in recognition of the potential deleterious impacts of some dairying systems, significant mitigation measures had been imposed to the dairy farming systems, including extended housing. Dr Robson stated that while Mr Horgan is making well-versed criticism of conventional dairying, he did not seem to have considered that the applicant is proposing extensive and expensive mitigation measures. She added that these measures aim to prevent or minimise the types of damage that have come to be associated with dairy farming, in terms of degraded waterways, degraded stream banks, effluent pollution, soil compaction and erosion with associated phosphorus loss, and winter losses of nitrate associated with urine patches.

11.43 Dr Robson further noted that Mr Horgan stated that this application is objected to because of the potential to degrade the Ahuriri Delta. Dr Robson emphasised that applicant's property does not drain into the Ahuriri Arm of the lake, but losses are routed through the Wairepo Arm, into the Lower Ōhau Canal and into the Northern Arm.

#### Response to Ms Devon Christensen (Fish & Game)

11.44 Dr Robson noted that Ms Christensen expressed doubt as to whether the housing of stock and reduction of nitrogen fertiliser offered a sufficient suite of mitigation tools. According to Dr Robson the removal of stock and the reduction of nitrogen fertiliser are the two most effective mitigation measures for reducing nitrogen loss for a pastoral system.

11.45 Ms Christensen suggested that because changes can be made to the FEMPs, nothing in the FEMP ties the farmer into a serious commitment. Ms Christensen has misunderstood the nature of the changes permissible in the FEMPs according to Dr Robson. She added that it is essential that the FEMPs may be able to be updated and farm systems change as site specific risks arise or become obsolete. She added however to suggest that this flexibility means that they do not bind the farmer to a commitment, is incorrect.

11.46 Dr Robson added that the FEMPs, through their mitigation measures, monitoring and auditing plans that include triggers, contingency plans if triggers are exceeded and actions in case of non compliance with audit measures, are not 'take it or leave it' recommendations, but form an auditable part of the resource consent that is tailored to the specific farm and farming system.

11.47 Again Dr Robson noted that Ms Christensen suggested that some wording in the FEMPs does not show a commitment to addressing risks by the use of the word 'should' and that it should be replaced with the word 'shall'. Ms Robson stated that these FEMPs and FERAs are not written as a series of resource consent conditions. They are aimed for use on farm by farmers.

#### Response to Dr Helen Brookes (Waitaki First)

11.48 In response to Dr Brookes comments that pivots delivering effluent that also cross streams must also apply effluent to those streams, Dr Robson said that although she had previously stated that to avoid effluent application to streams, solenoid valves were originally proposed, this had recently been superseded. Now none of the centre-pivot irrigators used to irrigate the effluent would cross streams. She added that any liquid effluent will be applied by tanker in those paddocks that have streams running through the pivot circles.

11.49 Dr Robson responded to Dr Brookes description of using the same management provisions for prevention of effluent entering a watercourse for two virtually identical effluent irrigation systems as 'sloppy' by stating that if the management provisions for two similar systems, to prevent the same outcome on neighbouring farms with comparable streams had been very different, this would have been more likely to raise a question of confidence.

#### Conclusion

11.50 Dr Robson concluded that she believed that these FEMPs go much further than a step in the right direction and that they outstrip what has yet been seen in New Zealand in terms of combating both diffuse and point source pollution from farms. None of the evidence she has heard at this hearing had caused Dr Robson to deviate from her viewpoint. She added that the consent conditions presented by Mr Kyle that tie these FEMPs in allowing them to be enforced are a key step to their success.

#### **Terrestrial Ecology**

11.51 In her right of reply evidence Dr Bartlett discussed matters raised in the evidence of Mr Mark Webb on behalf of Fish and Game, Ms Sue Maturin and Ms Anna Cameron on behalf of the Royal Forest and Bird Protection Society and Dr Susan Walker on behalf of

Mackenzie Guardians. Dr Bartlett also responded to comments and recommendations from the relevant Section 42A Reports.

#### Response to Mr Webb

- 11.52 In his evidence Mr Webb expressed concern that a continuation and probably accelerated growth in Canadian Geese (*Branta canadensis*) numbers and a widening of their distribution will occur as a result of the changes in habitat abundance brought about by irrigation. Mr Webb considered that more Fish and Game control programmes would be required as a result of this increase.
- 11.53 Dr Bartlett provided details on the Canadian Geese habitat and feeding and how their numbers are currently controlled (hunting seasons). She added that if Canadian Geese become an economic pest for the farmers concerned then she would expect them to be carrying out their own control during the permitted season.
- 11.54 Dr Bartlett also noted that Mr Webb recommended that irrigation should not be permitted where the natural form of the land in the irrigated area collected and channelled drainage to streams and wetlands. Where this cannot be avoided Mr Webb suggested the channels and wetlands should be fenced to exclude stock to reduce bank erosion, and planted to reduce nutrient enrichment of surface waters. Dr Bartlett agreed with his recommendation and noted that in her evidence in chief she has indicated that in any such areas where irrigation water might enter non-irrigated land then the farm manager concerned will monitor the situation and adjust the irrigation to prevent this happening.
- 11.55 Mr Webb also suggested in his evidence that stock should not be allowed access to any water ways within the irrigation areas and that fenced areas should be planted to assist with nutrient removal. Dr Bartlett noted that this is proposed for the applicant's property. She went on and acknowledged that permanent fencing and planting is not recommended for the ephemeral channels and that temporary fencing will be used when these ephemeral channels are flowing.

#### Response to Ms Maturin, Ms Cameron and Dr Walker

- 11.56 Dr Bartlett noted that Ms Maturin, Ms Cameron and Dr Walker's evidence made comments that suggested that the vegetation in the proposed irrigation area on the applicant's property (and other properties in that area) is predominantly natural in character.
- 11.57 Dr Bartlett noted that Dr Walker's evidence contended that the ecological values of the property is high and that the proposed irrigation projects would see the removal of 'the largest area of less developed moraine grassland' in the south of the Mackenzie Basin within the applicant's property. Dr Bartlett added that Ms Penman's S42A report addendum indicated that because Dr Walker's comments in relation to the ecological values were contrary to her evidence she cannot draw a conclusion as to whether the effects are minor or appropriate. Dr Bartlett noted that no similar comments were made in the S42A Addendum Reports on Killermont Station and WHL Killermont.
- 11.58 In addition, Dr Bartlett noted that Ms Cameron suggested in her evidence that the indigenous vegetation cover on the properties is greater than 30% and that therefore vegetation clearance cannot occur as a permitted activity under the rules of the WDP.
- 11.59 Dr Bartlett undertook additional surveys and collected further information from the property owners / managers about the land use practices and cultivation activities on the applicant's property. Dr Bartlett then categorised the current land use in to four categories being: 'natural', 'Oversown', 'Direct drilled' and 'Fully cultivated' of which a description is provided in her evidence. Dr Bartlett then overlaid these four classifications onto topographical maps and added the proposed irrigation layout to show the existing land use on the areas that would be subject to irrigation.
- 11.60 According to Dr Bartlett, Ōhau Downs west of Lake Ōhau Road has almost all been modified to some degree. She added that some land has been cultivated and retains very

limited ecological value, some has been direct drilled and is of similarly low value, and some has been oversown but remains in a relatively natural condition.

- 11.61 Other native grass, herb and sub-shrub species are present where modification has been relatively low. Similarly there is a higher proportion of native species along Six Mile Creek, and a very small part of this will be irrigated. Dr Bartlett reiterated that the proposed irrigation at Ōhau Downs is almost entirely on fully cultivated land which retains very limited, if any, ecological value.
- 11.62 East of Ōhau Road the areas to be irrigated are mostly on modified 'natural' land with a small overlap onto the oversown areas. Of the irrigation sites Dr Bartlett has visited this area she acknowledged that it has the greatest proportion of native species present, including hard tussock (*Festuca novae zelandiae*), the smaller *Festuca filiformis*, *Pimelea oreophylla*, *Luzula ulophylla*, *Coprosma petriei*, and the native broom *Carmichaelia australis* agg. However, Dr Bartlett noted (by referring to her photos) the proportion of native vegetation cover is quite variable.
- 11.63 According to her the tussock species are the most evident native species and all have been grazed. The palatable shrub species in particular have been browsed right down and are only visible when inspected up close. Dr Bartlett added that there are large expanses of hieracium among and between the tussocks and numerous small 'stumps' of tussock that appear moribund. Her estimates of percentage of land area east of Ōhau Road covered by indigenous vegetation is much less than 30% [as suggested by Ms Cameron] based on the site visits that she has undertaken.
- 11.64 Dr Bartlett added that to her knowledge this land is not subject to any offer of purchase for conservation purposes and it will continue to be farmed. If the area proposed for irrigation was left under its current management (i.e., excluded from the irrigation project) in her opinion it appears highly unlikely that that its cover of indigenous vegetation will improve. For improvement to occur grazing would have to cease entirely, drought tolerant shrub species would need to be reintroduced and the area would have to be managed to prevent the invasion of wilding pines, hieracium, briar rose and other exotic weed species. She noted that the QEII conservation area (refer Figure 1) was set aside to protect the higher ecological values that are found there.
- 11.65 As described in her previous evidence Dr Bartlett noted that the construction of the intake area and pipeline will require vegetation removal along the narrow route alignment but in her opinion can be restored in keeping with the surrounding environment and with the species currently present.

### **Aquatic ecosystems**

- 11.66 In his right of reply Dr Ryder responded to several issues raised in the amended Section 42A reports and by a number of submitters, including Meridian, DoC and Fish & Game.

### Screening Intakes for Fish

- 11.67 Dr Ryder noted that Dr Meredith (Council S42A Officer for water quality) appeared more comfortable with the gallery intakes now proposed for the applicant's (and others) takes, subject to appropriate design, installation, and maintenance scrutiny to ensure that adequate fish exclusion performance is maintained. Dr Ryder agreed with this approach and added that consent conditions on performance criteria for fish exclusion at gallery type intakes already exists on some consents in Canterbury and he sees no reason why they cannot be developed for this application.
- 11.68 Dr Ryder noted that Council Reporting Officers have recommended that a condition be developed in relation to fish screening for gallery intakes be included in consent conditions for individual farms. After viewing these recommended conditions, he considered that they are reasonable and appropriate for inclusion as conditions for individual farm consents.



### Effects on Ōhau C Canal

- 11.69 Dr Ryder noted that Meridian remains concerned over the effects of increased nutrient inputs to the Ōhau C Canal. Ms Sutherland (NIWA) considered the individual applications by the applicants (and Southdown Holdings Limited) had not adequately assessed the implications of their land use intensification on the Wairepo Arm and associated Ōhau B-C Canals. Dr Ryder's response on this matter was summarised by Mr Whata.
- 11.70 Regardless of the debate over the ecological values of these canals, Dr Ryder noted that it is his understanding that there will be relatively modest potential increases in the nutrient inputs to the Ōhau C Canal (approximately 6-8% increase). Dr Ryder did not anticipate that such increases would result in a significant change to the plant and algae communities of the canal.

### Monitoring

- 11.71 The approach adopted by these individual farms, and indeed MWRL, in relation to protecting the environment, is reliant on establishing a monitoring programme according to Dr Ryder. He noted that this program firstly establishes existing environmental conditions, secondly determines acceptable levels of environmental change, and thirdly tracks or monitors indicators through time and across the Basin to provide an information feedback loop to the consent holder and the regulatory authority.
- 11.72 Dr Ryder added that the lock-step adaptive management approach put forward by the applicants requires the consent holder to establish a sub-catchment monitoring plan that includes, among other matters, surface water nutrient and periphyton biomass monitoring at relevant node points. He added that pre-irrigation monitoring is intended to establish existing maximum annual periphyton biomass. He noted that the development of a baseline dataset for periphyton had already commenced through the monitoring of Dr Coffey and more recently Ludgate and Ryder (2010) which targeted the node sites throughout the Mackenzie Basin over the 2009/2010 summer.
- 11.73 He told us that data generated from pre-irrigation monitoring is to be compared against post-irrigation monitoring data to assess, for example, whether the 25% increase threshold for peak periphyton biomass is being met. In Dr Ryder's view, this is a pragmatic and ecologically suitable approach to protecting key ecological values for streams and rivers of the Mackenzie Basin.
- 11.74 The FEMP also required surface water quality monitoring for individual farms, according to Dr Ryder. Other proposed farm monitoring conditions relating to fencing of watercourses and monitoring of aquatic biota (fish, macroinvertebrates, macrophytes and periphyton), birds and mammalian predators are sound and in Dr Ryder's view will provide farmers, stakeholders and the regulatory authorities with robust information on the environmental effects of irrigation.
- 11.75 Having viewed further information produced since the commencement of the hearing, Dr Ryder concluded that he has no reason to change his ecological assessments and conclusions relating to these farms as originally set out in his evidence in chief.

### **Cultural effects**

- 11.76 Mr Mikaere stated that the purpose of his reply evidence is to respond to matters raised in the evidence of David Higgins, Di Robertson, Paul Horgan and Mandy Waka-Home on behalf of Te Runanga O Ngāi Tahu.
- 11.77 Mr Mikaere started his reply by reviewing the consultation process with Ngāi Tahu. He noted from the evidence of Mr Horgan that there is some concern about the level of consultation with a starting point of late 2008 identified and a further concern that consideration of the cultural issues arising from the applications was hampered by the absence of technical information such as that derived from the MWRL WQS.

- 11.78 With respect to the implied criticism about the late start of engagement between the applicants and TRONT, Mr Mikaere said that until the completion and release of the CIA, there was little information about cultural issues in those parts of the Mackenzie Basin that form the individual land interests of the applicants. Even with the release of the CIA, he told us that remained largely the case because of the generalist nature of that document which had a heavy focus on the Waitaki River. He added that a similar situation applied in respect to TRONT's submissions that were not property specific, and also seemed to have a focus on issues associated with the Waitaki River. In Mr Mikaere's opinion, the general nature of both the CIA and the TRONT submissions (in terms of the identification of cultural issues and the lack of specificity in terms of individual properties) made engagement of these matters difficult.
- 11.79 Mr Mikaere said that following the release of the CIA, efforts were made to consult with TRONT and Runanga representatives. This consultation centred around site visits to the applicants' properties and Mr Mikaere acknowledged that the purpose of those visits from the applicants' perspective was to identify specific individual property concerns and to gain clarification in respect of cultural issues, for example, wāhi tapu.
- 11.80 As a general observation Mr Mikaere said that detailed knowledge of the properties by the TRONT representatives was limited to some waterways and reserves identified and managed by the Department of Conservation (i.e. information available within the public domain). He noted that there was no identification of mahinga kai or wāhi tapu on the applicants' properties [including Ōhau Downs].
- 11.81 In Mr Mikaere's view a longer consultation would not have assisted in terms of identification of property specific issues but might have in the formulation of appropriate mitigation, remedial and avoidance strategies. He added that the strategies as captured in the Farm Environmental Management Plans (FEMPs) are not challenged by Ngāi Tahu and on that basis it is reasonable to assume that they are accepted as meeting cultural requirements insofar as the individual properties are concerned.

#### Identification of Issues

- 11.82 In regards to responding to the issues set out in the CIA, Mr Mikaere noted that the applicant was working in an information vacuum. He added that determining the nature and extent of the cultural issues associated with the applications had to also take into account various planning and policy documents such as the relevant sections of the proposed Canterbury Natural Resources Regional Management Plan (chapter 2 in particular); Te Whakatau Kaupapa (1990) which is a strategic document that sets out Ngāi Tahu principles in the management of its relationship with natural and physical resources to these areas; and Te Runanga O Ngāi Tahu Freshwater Policy (1999).
- 11.83 In summary Mr Mikaere stated that the applicants' [the four represented by Mr Mikaere] response took into account as best they could, what was provided and what could be gleaned from all sources in terms of cultural issues identification. Consequently, in Mr Mikaere's view the applicants have attempted, successfully, to ensure that proper consideration has been given to the known cultural issues arising from the applications.

#### Response to David Higgins

- 11.84 Mr Mikaere acknowledged that Mr Higgins evidence which describes the Ngāi Tahu association with the Mackenzie Basin and the Upper Waitaki is not disputed. He also noted that Mr Higgins took offence at comments attributed to him earlier in this hearing that Ngāi Tahu did not have a presence in the Mackenzie Basin.
- 11.85 According to Mr Mikaere his comments were misreported. He explained that they were in response to questions from the Commissioners where he had alluded to the fact that there was no "physical" Ngāi Tahu presence in the Mackenzie and that in these circumstances it was difficult to build personal relationships between applicants and the iwi through a daily sharing of the same countryside (as neighbours might).

### Response to Paul Horgan

- 11.86 Mr Mikaere noted that the evidence of Mr Horgan was most helpful in prioritising the focus of cultural concerns raised by the applications. Mr Mikaere also noted that the evidence makes it clear that in addressing Ngāi Tahu concerns there are two distinct aspects, individual properties or on-farm effects and [cumulative] catchment effects.
- 11.87 In respect of on-farm effects, Mr Mikaere noted that, the key point for TRONT and which is highlighted by Mr Horgan is: 'Before Ngāi Tahu will be prepared to depart from this position, it will need to be convinced that suitable measures can be implemented at both the on-farm and catchment level that will be capable of avoiding and/or mitigating the site-specific and cumulative adverse effects that will arise as a result of conversion to dairying'.
- 11.88 Mr Mikaere submitted that the applicants' position is that the on-farm impacts on cultural values are fully addressed in the individual FEMP's for each property. The FEMP's respond to the broad cultural issues that were identified in the CIA and come with an invitation to TRONT for further feedback and consultation as necessary according to Mr Mikaere.
- 11.89 Mr Mikaere noted that this point is acknowledged in his evidence where Mr Horgan stated that '*... it is our view that these consents should only be granted if you are satisfied that there is a high level of certainty that the package of mitigation measures proposed by the applicants (in particular the FEMP) will ensure that sustainable water quality outcomes are achieved.*'
- 11.90 In terms of the wider catchment level, the 'measuring point' for the efficacy of the FEMPs in terms of water quality Mr Mikaere noted is not at the farm gate, but at the Ahuriri Delta and the Haldon Arm. These two areas provide the cultural focal points against which to assess the applications.
- 11.91 Mr Mikaere acknowledged that Mr Horgan had noted the sensitivity of the Ahuriri Delta and small creek and inlets at the lake margin may still be at risk of nutrient enrichment (based on the summary of the MWRL report). Mr Mikaere added that the sensitivity of the Ahuriri Delta to increased nitrogen and phosphorus concentrations is also evident by the impacts that existing irrigation activities are having. Mr Mikaere stated that as he understands it the applicant's expert evidence and subsequent supplementary expert evidence states that there will be no impact on the Haldon Arm or Ahuriri Delta provided the FEMPs are operated as intended.

### Response to Mandy Waka-Home

- 11.92 Mr Mikaere noted that the evidence of Mandy Waka-Home is focused on the Ahuriri Delta and long finned eel. In summary the concern is that water quality and eel habitat will be degraded and negatively impacted by the applicants' proposals. Mr Mikaere noted that as with the previous evidence of Paul Horgan and Diana Robertson, the applicants have sought to address these concerns through their assessments and extensive suite of conditions.
- 11.93 In conclusion Mr Mikaere noted that to accommodate TRONT concerns, the Panel needs to set the benchmark and the applicant needs to demonstrate compliance. Having considered the TRONT evidence he stands by his earlier conclusion that there is no reason from a cultural perspective that these applications should not be granted.

### Our notes on Mr Mikaere's reply

- 11.94 We note that Mr Mikaere's reply is generic to all the applicants he represents and does not cite cultural concerns specific to any one property including Ōhau Downs. We note that nutrient exported from Ōhau Downs will not drain directly to the Ahuriri Arm (except via the diversion of some Wairepo Stream flow to the Willowburn), but that there will be inputs to the Haldon Arm via the Ōhau B/C canal as well as the Wairepo Arm of Lake Ruataniwha.

## 12 STATUTORY CONTEXT

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- 12.1 As The relevant statutory context is set out in detail in our Part A decision. In accordance with those requirements, we have structured this evaluation section of our report as follows:
- (a) Evaluation of effects
  - (b) Evaluation of relevant planning instruments
  - (c) Evaluation of other relevant s104 matters
  - (d) Section 104D jurisdictional hurdles
  - (e) Part 2 RMA
  - (f) Overall evaluation

## 13 EVALUATION OF EFFECTS

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- 13.1 Drawing on our review of the application documents, the submissions, the Officers' Reports, the evidence presented at the hearing and our site inspection, we have concluded that the effects we should have regard to are:
- (a) Landscape;
  - (b) Terrestrial ecology;
  - (c) Groundwater;
  - (d) Water quality and aquatic ecology;
  - (e) Cultural; and
  - (f) Positive effects.

### **Landscape effects**

- 13.2 In our Part A decision we summarised the evidence of a number of landscape experts who expressed differing views the effects that irrigation would have on visual effects. We reached some general conclusions on the issue and set out the general approach for assessing landscape effects for individual proposals. We now move on to apply this assessment approach to the current proposal.

### Existing landscape

- 13.3 This landscape unit is identified as Landscape Unit 4 Quailburn. The unit is characterised by highly legible geomorphic processes that have shaped its formation. Rolling moraine, tarns, wetlands, streams and areas of red and hard tussock and matagouri are common elements in the landscape. Mr Glasson tells us due to the low vegetative cover over the landscape the natural landform pattern of moraines, depressions and outwash gravels is clearly visible.
- 13.4 The significance of this landscape according to Mr Glasson is that it is a foreground to the panoramic views of the Neumann and Ben Ōhau Ranges, through which many tourists and recreationists pass on route to the Ruataniwha Conservation Area, the Ōhau Skifield and Central Otago. We understand and accept that the Lake Ōhau Road is a busy tourist route.

- 13.5 Mr Glasson tells us that modifications to this unit include those associated with existing farming operations such as shelter belts, fences and farm dwellings and irrigated areas adjacent to State Highway 8.
- 13.6 Mr Glasson considers that the landscape unit is moderately visible from the Quailburn and Lake Ōhau Roads and the eastern part of the unit is highly visible from State Highway 8. Therefore he tells us because much of the unit has high to moderate visibility and high naturalness, it is very sensitive to change with a low absorption capacity. He told us this is especially true for the hill slopes, wetlands and rolling downlands where potential irrigation sites could have significant adverse and visual effects.
- 13.7 We accept Mr Glasson's description of the Unit, particularly the highly legible geomorphic processes that are available to be identified and seen. We also accept his evidence about the significance of the landscape in terms of it being a foreground to the panoramic views of the Newman and Ben Ōhau Ranges.
- 13.8 We also accept his views about the visibility of this site and the Landscape Unit generally from Quailburn and Lake Ōhau Roads and also from State Highway 8.

#### Changes to landscape

- 13.9 It was generally agreed between the different experts that granting consent to the proposal would bring about the following changes to the landscape:
- (a) Visibility of irrigation infrastructure in particular the pivot irrigators close to Lake Ōhau Road and located within the view shafts of both Lake Ōhau and Ben Ōhau;
  - (b) Presence of 14 cubicle barns on the site; and
  - (c) Changes to vegetative cover over 1,493ha site otherwise described as greening of the landscape.
- 13.10 We move on to assess the significance of these changes, taking into account the evidence received from the various experts.

#### Significance of changes

- 13.11 A useful reference point when considering the significance of the change the proposal may give rise to on the landscape is to consider how the landscape is treated within the relevant district plan. As we explained in Part A we think this approach helps us to determine whether or not the thrust of the objectives and policies of the CRPS and PCRPS can be met in that that plan provides that this landscape is an outstanding natural landscape and it is to be protected from inappropriate use and development with the "protection mechanisms" being provided through the district plan.
- 13.12 The Waitaki District Plan zones the application site Rural Scenic Zoning. The Waitaki District Plan provides that the Rural Scenic Zone has a particular visual amenity that is associated with the dominance of open-space vistas and land forms, lack of intense subdivision of land use and the overall absence of buildings and structures. However farming and irrigation are permitted activities in the zone.
- 13.13 We do note that the subject site is adjacent to an ONL being the QEII covenanted area which includes the Raupo Lagoon and Swan Lagoon. Immediately to the north of the site there is a lakeside protection area and Ben Ōhau to the north is recognised within the Mackenzie District Plan as a site of natural significance. As we noted earlier there are view shafts from the subject site to Ben Ōhau.
- 13.14 As was common in many of these applications all experts agreed that some form of mitigation was required. There was generally a difference of opinion as to the extent of mitigation that was necessary. In general Mr Glasson supported more extensive mitigation measures than Mr Brown generally in the form of larger set-backs and reducing the number of irrigation pivots from sensitive locations and reducing the number of dairy

sheds. However Ms Lucas while she supported Mr Glasson remained of the view that even his mitigation measures would not protect the legible, natural science and aesthetic values of the Ōhau Basin. As we understood her evidence she was contending that any irrigation was inappropriate.

- 13.15 We do acknowledge that the applicant through Mr Brown brought forward additional mitigation measures particularly in the form of deleting irrigation pivots which would interfere with the view shafts through to Ben Ōhau.
- 13.16 It was notable that the experts took different positions in terms of the mitigation measures for the cubicle barns on this application site. Mr Brown was of the view that generally their location precluded views. Mr Glasson did not share this view and was of the very strong opinion that some of the sheds should be removed.
- 13.17 Overall, we have come to the conclusion in relation to this application site that without the mitigation measures proposed by Mr Glasson and particularly those in relation to views from Lake Ōhau Road, we could not support the grant of consent. In addition, we agree with Mr Glasson's assessment that the dairy sheds when viewed from Ōhau Road will have a very high visual impact and given this is a very sensitive landscape we agree that irrespective of recessive colouring and form that structures of this size will detract significantly from the identity and amenity of the location.
- 13.18 If these mitigation measures (buffering from Lake Ōhau Road, removal of those sheds that can be viewed from Lake Ōhau Road, and other mitigation measures recommended by Mr Glasson) were included we consider the proposal could proceed without compromising the landscape and amenity values. However this conclusion must be considered in combination with our findings on other issues, particularly water quality to inform our overall decision as to whether consent should be granted.
- 13.19 In reaching this conclusion we have taken into account the potential cumulative effects of the proposal. However, our conclusion remains unchanged irrespective of whether we are considering the Five Rivers site in isolation or in combination with other existing and future developments within this landscape unit. For this reason and given our overall findings on these applications we have not provided a detailed discussion on cumulative landscape effects within this decision.

### **Terrestrial Ecology**

- 13.20 As with landscape issues the applicant's expert (Dr Bartlett) and the expert on behalf of Mackenzie Guardians (Dr Walker) have diametrically opposed views on the significance of existing native vegetation. There is no disagreement that irrigation will have major effect on existing vegetation, but there is disagreement on the significance of these effects in the context of areas set aside from irrigation, and the wider Mackenzie basin, which is largely unirrigated. The S42A Officer (in the absence of a Council expert) was unable to advise on whether these effects will be more than minor.
- 13.21 We prefer the evidence of Dr Bartlett, which is based upon a detailed survey of the property in terms of the native vegetative cover, historical analysis of anthropogenic-induced changes in vegetation cover, and reasoned arguments of the likely consequences of not irrigating. We note that her evidence identified some areas (east of Lake Ōhau Road) with higher natural vegetation values (which will be lost), but accept that they are already grazed and are likely to degrade further if left unirrigated. We also accept that the riparian restoration of 6-mile and Wairepo Creeks described by Dr Bartlett will have a positive effect on aquatic habitat of those watercourses and is effective mitigation. Additionally we acknowledge that 'revegetating' this relatively large area will have positive effects in terms of minimising soil erosion.
- 13.22 We acknowledge Dr Walker's view that the irrigation command area is likely to support threatened species, but we prefer Dr Bartlett's evidence based on actual surveys, that the area is currently under cultivation or has been developed as pasture and retains extremely limited ecological value.

## Groundwater

- 13.23 As all drainage from rainfall on the applicant's property is understood to go to groundwater (undisputed evidence of Dr Bright on behalf of the applicant) the flow direction of that groundwater, its speed of travel, and its interactions with surface waters are of critical importance. Dr Bright was confident in the predictions made from the WQS. However Mr Callander (on behalf of Meridian) was of the view that there is a large degree of uncertainty associated with how that partitioning of water into each sub-catchment has been carried out. The Section 42A Officer did not offer advice on this issue that could influence our decision.
- 13.24 As discussed in Part A, we agree with Mr Callander, that the groundwater modelling carried out by MWRL provides a useful conceptual understanding of the overall geohydrology of the Upper Waitaki Catchment. However we consider that it lacks the data, precision and clearly defined error limits on predictions to enable reliable verification of flow paths, travel times and nutrient concentrations that we believe are necessary to assess the cumulative effects of the total MWRL proposition that all the applications before us at this hearing can be granted without causing more than minor water quality effects.
- 13.25 In the context of this particular application we must look at the likely consequences of the deficiencies discussed above on actual and potential effects of this proposal. There seems to be no argument between Dr Bright and Mr Callander that the direction of groundwater flow beneath Ōhau Downs is in an east-south-east direction towards the Wairepo Arm of Lake Ruataniwha. Mr Callander argues that there is good reason to assume that a proportion of the groundwater will end up in the Ōhau C canal which may impact upon Meridian's operations. However our view is that this is a detail that may be addressed by conditions rather than affecting whether we grant or decline consent.
- 13.26 We note that it is not disputed that groundwater does not discharge to the Ahuriri Arm of Lake Benmore, except for a proportion of the groundwater that discharges to Wairepo Creek and is subsequently diverted into the Willow Burn sub-catchment.
- 13.27 The proportion of groundwater recharging Wairepo Creek (or likely to recharge after irrigation) has not been quantified adequately in our view, which has implications to effects on the Creek itself, as well as the ultimate receiving waters. Because of this deficiency we have taken a conservative approach in assessing likely effects.
- 13.28 We note from the FEMP that the applicant proposes a 'trigger for action' of > 2mg/L NO<sub>3</sub>-N from the current modelled baseline conditions. We discuss the appropriateness of this trigger in terms of the WCWARP elsewhere in this decision, but we record here that in terms of actual effects, our principal concern is with respect to surface waters, which we address in the next section.

## Water quality and aquatic ecology

- 13.29 In Part A of this decision we rejected the MWRL proposition that all consents sought in this hearing could be granted (with conditions) and without causing cumulative water quality effects. It is incumbent upon us, therefore, to consider (as far as is possible) whether granting this application, in combination with other water permits we grant, will lead to such effects. In this case it means considering the potential effects of granting this application (in combination with others we grant) on:
- (a) The trophic state of the Wairepo Arm of Lake Ruataniwha of Lake Benmore;
  - (b) The trophic state of the Haldon Arm of Lake Benmore (through nutrient additions to the Ōhau C canal);
  - (c) the trophic state of the Ahuriri Arm of Lake Benmore (through diversions of Wairepo Creek into the Willow Burn);
  - (d) Groundwater chemistry and in particular the MWRL-proposed threshold of 2 mg/L NO<sub>3</sub>-nitrogen; and

- (e) Periphyton growths in the Wairepo Creek and Six-mile Creek.
- 13.30 The applicant has proposed significant mitigation measures to lessen the risk of their activities contributing to cumulative water quality effects.
- 13.31 We need to consider whether the proposed mitigations, are, in our view sufficient to avoid a significant water quality problem occurring, and/or whether refinements to the measures proposed are required.
- 13.32 A starting point for the consideration of effects on points a-c above is the FEMP. Evidence on the FEMP was given by Dr Robson, but for consistency with other decisions we have independently audited the FEMP. Key points arising from our audit and additional to Dr Robson's evidence are summarised below.
- 13.33 Four main soils series were noted on the property; Ōhau, Fork, Mackenzie and Pūkaki/Houlbrook. A series of transects showed the depth of soil (to the C horizon) for the Mackenzie series ranged from 15cm - 40 cm (median ~30 cm). For the other soil series, the depth to C horizon was greater (Fork, median ~35 cm, Ōhau median ~40 cm, Pūkaki/Houlbrook, median ~70cm). While the FEMP did not give a soil map, the inference from the location of transects, is that most of the proposed irrigation area is on the shallow Mackenzie soils. As noted in Part A there are good reasons to expect that OVERSEER will underestimate nutrient load from such soils, which is why Dr Snow recommended that the highly developed setting (which ignores nitrogen immobilisation) be used.
- 13.34 There was clear evidence of wind erosion on the Mackenzie soils. Soil samples taken during the site visit showed that more acidic soils were located on the Mackenzie soils on the Isolation flats area and where tested for exchangeable-Al, returned concentrations in the high toxicity range. The implications of this toxic exchangeable-Al were not discussed except that pH adjustment was identified as being necessary for mitigation. We also note that the Olsen P on these soils was (surprisingly) up to 39, which would put it into the high risk category with respect to phosphorus loss. We also note from Part A that:
- (a) there is some evidence that phosphorus losses via groundwater pathways may be more significant in the Upper Waitaki catchment than other parts of New Zealand (where it is usually not significant because of adsorption by soil materials); and
  - (b) phosphorus may be limiting both phytoplankton (Dr Romero) and periphyton growth (Report by Wilks et al, tabled at the hearing). Therefore we need to be cautious about phosphorus losses as well as nitrogen in this case.
- 13.35 The majority of the proposed irrigated area lies within the Wairepo Creek catchment (both surface and groundwater catchments according to Appendix A of the FEMP). Despite this fact, the WQS calculated that the most stringent nitrogen and phosphorus mitigations arose from the Ōhau River Groundwater catchment (nitrogen) and the Ahuriri Arm of Lake Benmore (phosphorus) (even though only a small amount of nutrients follow this pathway via Wairepo Creek then the Government Race then the Willow Burn then the Ahuriri River and finally into the Ahuriri Arm). These mitigation requirements capped Ōhau Down's nutrient discharges at 55,954 kg nitrogen per annum and 3,793 kg phosphorus per annum. Table 3 of the FEMP presented information which showed that leaching losses from all three proposed systems would be within the above cap, even using the highly developed setting in OVERSEER.
- 13.36 Mitigation measures are as described in evidence including:
- (a) The use of cubicle barns (dairy option) and feedpad (beef option) to remove potential for soil damage from grazing stock in adverse conditions and mitigate winter stock nutrient losses.
  - (b) The exclusion of stock from watercourses by planting and fencing dual function riparian margins. The FEMP proposes that the outermost area of the margin will be densely planted to attenuate flow and promote infiltration and sedimentation, and



that the periodically waterlogged inner area of the margin will be protected and maintained to promote conditions favourable to denitrification.

(c) Manure and effluent management, as described in the evidence of Mr Borrie.

- 13.37 The cubicle barns and effluent management options are factored into OVERSEER. We accept the evidence of Dr Robson for MWRL and Dr Ryan for Meridian (see Part A) that the housing of cows over winter the farms should result in a significantly reduced leaching load compared to a typical New Zealand dairy farm system and that nitrogen loads of the order of 16 –21 kg N/ha/y are achievable.
- 13.38 The exclusion of stock from watercourses and by planting and fencing dual function riparian margins is not factored into OVERSEER. We consider this a worthwhile mitigation but note that its primary function will be to improve aquatic habitat, rather than nutrient stripping, even though the design of the dual function riparian margins seems well thought out and should be effective.
- 13.39 None of the other mitigation measures proposed in the FEMP are likely to result in significant nutrient reductions above that predicted in OVERSEER and/or could be expected using good agricultural practice.
- 13.40 Therefore the critical issues are:
- (a) Is the predicted nutrient load from the three farming systems realistic?
  - (b) What effect will the predicted nutrient load (alone and in combination with other applications we grant) have on the surface waters making reasonable assumptions about flow paths?
  - (c) Can the effects be avoided, remedied or mitigated?

#### Predicted load realistic

- 13.41 The inputs to OVERSEER were audited by Mr McNae who found them to be acceptable. Mr McNae noted that 2000 ha of spray irrigation was modelled in OVERSEER but only 1493 ha applied for. Therefore we conclude that the nutrient losses predicted using the highly developed setting on OVERSEER represent a reasonable approximation of the likely nutrient load, taking into account our caveats on the limitations of the modelling discussed in Part A.
- 13.42 Because the applicant has nominated three alternative farming systems, with variable nutrient loads arising from each, we have used the largest predicted load (Option 3 - Mixed enterprise farm) to assess likely water quality and ecological effects.

#### Effects on waterbodies

##### *Wairepo Arm of Lake Ruataniwha*

- 13.43 In Part A MWRL witnesses (Bright and Robson) stated that to maintain the Wairepo Arm in its current mesotrophic state, nutrient losses from the proposed irrigated area will have to be 16.4 kg N/ha and 0.7 kg P/ha less than is estimated to occur under good agricultural practice. This was based on the TLI in the Wairepo Arm being 3.18.
- 13.44 However Ms Sutherland (on behalf of Meridian) submitted that the median summer TLI (from 3 years of data prior to her writing the report) was 3.7, which is towards the eutrophic end of the scale, and, if assessed on TP the TLI was 3.95 (almost at the eutrophic boundary). She argued that water quality in the Wairepo Arm appears to be degrading under the existing land-use intensification, and that by inference, further nutrient additions will push this water body into the eutrophic zone. In her addendum evidence she showed satellite photos (Figure 4), which demonstrated a dramatic increase in pivot irrigation in the Wairepo subcatchment between 2005 and 2009, which supported her premise that water quality was degrading.

- 13.45 We have not received guidance from the s42A officers on how much additional nutrient load the Wairepo Arm could absorb without becoming eutrophic, which all experts agree would be an undesirable consequence. However there are 4 applicants for new irrigation before this hearing that have properties within the Wairepo catchment: Five Rivers, Southdown holdings (47% in catchment), Birchwood Run, and Marie Horo.
- 13.46 It is difficult to compare the likely nutrient loads emanating from these properties because the Southdown/Five Rivers applicants calculate a conservative load based on the highly developed setting in OVERSEER whereas nutrient loads from the two UWAG applicants are calculated using the developed setting. However based simply on area proposed to be irrigated Ōhau Down could potential contribute 62% (Southdown 972 ha - 27279 kg, Ōhau 2000 ha 55423 kg, Birchwood 56 ha, 6988 kg, Horo 150 ha, 12457 kg) of an increased load above that occurring currently. Calculated on the basis of predicted nitrogen load this percentage drops slightly to 55%.
- 13.47 We agree with Ms Sutherland that there is a significant risk that the Wairepo Arm may turn eutrophic if these applications are granted and that therefore we need to be conservative in our assessment. In our view Ōhau Downs represents the largest risk (of the four new applications within the catchment) of tipping the Wairepo Arm into a eutrophic state because:
- (a) It is the largest area irrigated;
  - (b) It could potentially export the largest nutrient load;
  - (c) Phosphorus leaching is likely to be significant; and
  - (d) The Wairepo Arm is more sensitive to phosphorus additions (in terms of TLI) than nitrogen.
- 13.48 In addition there is already a significant nutrient load on the Wairepo Arm from recent (2004-2009) irrigation activities which may not yet be exerting its full effect due to travel time considerations.

*Haldon Arm of Lake Benmore*

- 13.49 In Part A we determined that the Haldon Arm of Lake Benmore can assimilate an increased nutrient load from the granting of consents (with mitigation) and remain within an oligotrophic state. While we did not accept the MWRL proposition as a whole (that all consents could be granted) we did accept that the increased nutrient load from irrigation would not cause a more than minor effect to the Haldon Arm of Lake Benmore; mainly because of the high inflows from the Ōhau B/C canal and the concomitant relatively short residence time.
- 13.50 Our view is that there is insufficient information from which to assess whether Meridian's operation of Ōhau B canal will be impacted by the applicant's proposal. However our view is that nutrient-related operational issues in Ōhau B/C canal are only likely to arise through didymo proliferation, and that this is not a major issue for our consideration. We agree with Dr Ryder (for MWRL, Part A) that Meridian is in the best position to manage didymo biomass by manipulating water levels and flows.

*Ahuriri Arm of Lake Benmore (though diversion of Wairepo Creek into the Willow Burn)*

- 13.51 In part A we determined that the Ahuriri Arm of Lake Benmore was already close to the oligotrophic-mesotrophic boundary. MWRL agreed with this assessment, but submitted that through improvements to replacement consents and significant nutrient mitigation of new consents, all consents could be granted without causing the oligotrophic-mesotrophic boundary to be breached. We disagreed with the MWRL submission for the reasons given in Part A. Therefore we need to assess each application on its own merits, but taking into account any other applications we grant.

- 13.52 In Dr Freeman's addendum (on behalf of the Regional Council) he gave a useful summary of estimated total property nitrogen loads to the Ahuriri Arm associated with irrigation development proposals, together with their priority as determined by Professor Skelton on the basis of the date the application was deemed to be notifiable. We note that Ōhau Downs is not on this list because it is not within the catchment, and Dr Freeman was not clear of what proportion of the nutrient load could potentially be transferred to the Willow Burn. We note that Dr Robson stated (in response to Mr Horgan) that Ōhau Downs does not drain into the Ahuriri Arm of the lake, but losses are routed through the Wairepo Arm, into the Lower Ōhau Canal and into the Northern Arm. However we also note that that contrary to this statement, GHD identified the Ahuriri Arm as providing the most stringent requirement for phosphorus mitigation from the property.
- 13.53 We conclude that there is insufficient information on the proportion of nutrient load that may be transferred to the Ahuriri catchment.

#### *Groundwater*

- 13.54 We agree with Dr Bright that effects on groundwater in this case are manifest by interaction with surface waters which are dealt with through policy considerations.

#### *Periphyton growths in 6-mile and Wairepo Creeks*

- 13.55 Dr Coffey's evidence (MWRL, Part A) included information on periphyton surveys in Wairepo Creek. He reported an increase in average periphyton cover and biomass between Sampling Sites Wairepo Upper and Wairepo Lower, but both cover and biomass were relatively low. He also noted there was no existing irrigation upstream of hard-bottomed Sampling Site Wairepo Upper or Wairepo Lower. However, there was extensive existing irrigation between Sampling Sites Wairepo Lower and the soft-bottomed Wairepo Node. We note from Dr Ryder's evidence that Wairepo Creek remains hard-bottomed within the applicant's property, and we presume, for some distance downstream before it becomes soft-bottomed.
- 13.56 Dr Coffey also noted that Table 21 of GHD (2009B) showed flows tend to reduce from Wairepo Upper to Wairepo Lower due to a loss of surface water to groundwater in this reach and flows frequently reduced to zero at the Ōhau Road Bridge over the Wairepo Creek. However, Figure 7 of GHD (2009B) showed groundwater recharging surface waters in the lower reach of Wairepo Creek. Mr Callander also noted the uncertainties in deciding where groundwater from each property partitioned in terms of subcatchment and Dr Freeman cautioned that there was insufficient evidence to support the theory that drainage water largely bypasses the Wairepo Creek. The implication of this is that a significant proportion of the proposed additional nutrient loading in the catchment could enter the Wairepo Creek resulting in significant cumulative adverse effects.
- 13.57 In Part A we rejected the MWRL proposal that the threshold for periphyton growth should be a 25% increase in maximum annual biomass calculated from modelled 'current' nutrient concentrations. We found instead, that MfE periphyton guidelines are applicable and should be used to protect streams from nuisance periphyton growths.
- 13.58 MWRL did not consider periphyton growth in Wairepo Creek constituted the most stringent requirement for nutrient mitigation because:
- (a) the WQS identified Ōhau groundwater (nitrogen) and the Ahuriri Arm ( phosphorus ) as being more stringent than the calculated 25% increase in maximum periphyton biomass; and
  - (b) they considered that leachate from the property would travel to deep groundwater, rather than enter Wairepo Creek.
- 13.59 Despite this conclusion the applicant has proposed extensive riparian protection of Wairepo Creek and Six-mile Creek using the dual function riparian margins described in the FEMP. We agree that the outer zone should be effective at filtering sediment and particulate nutrients, and the inner should promote denitrification (nitrate reduction). However there

are still questions remaining about groundwater direction and emergence with Wairepo Creek.

Avoided, remedied or mitigated

- 13.60 We acknowledge the considerable efforts the applicant has proposed to mitigate the effects of their activities. We agree that the cubicle barns (dairy option) and the dual function riparian margins are amongst the most effective measures they could take to reduce nutrient export to surface- and ground-waters from their property. However, we are still not convinced that even these significant mitigation measures will be sufficient to avoid adverse environmental effects as outlined above.
- 13.61 The applicant has proposed a lock-step approach as a measure to ensure that any remaining 'unknowns' are addressed before their activities are fully developed. This is an advancement of the applicant's thinking on adaptive management about which we gave our views in Part A.
- 13.62 The lock-step approach in essence, includes the design and implementation of a pre-irrigation monitoring programme. Simply put, if the baseline assumptions are not confirmed through this monitoring, then irrigation cannot commence.
- 13.63 While attractive at first blush it raised for us the question: Why should consent be granted in the circumstance where what we considered to be fundamental pre-consent research was either not completed or not completed adequately?
- 13.64 Our concern with this approach is that while we see the sense in the circumstances of this case of pre-irrigation monitoring, we note that, firstly, it is more than pre-irrigation monitoring; indeed, it is the design and implementation of a pre-irrigation monitoring programme.
- 13.65 Next, if we are to grant consent on this basis, then our view of the evidence produced there is a very real risk the applicant group would not be able to proceed beyond the pre-irrigation monitoring programme. Rather than grant a consent that could not be given effect to and which might create difficulties for both the applicant group and the consent authority, we considered it more appropriate that we recognise, through declining consent, that the applicant bears the primary responsibility of coming to a hearing with adequate information.
- 13.66 In addition, to the lock-step approach, the applicants have (in Mr Whata's closing arguments) proposed staging (capping nutrient discharge at 80% of the provisional NDA in the first full five years of irrigation) and ratcheting (a mechanism that provides for reducing nutrient discharge in the event that the monitoring reveals that loadings are approaching 90% of the Ahuriri TLI threshold).
- 13.67 The difficulty we have with both of these suggestions is that we are of the view that the Ahuriri Arm is already close to the oligotrophic-mesotrophic boundary and even 80% of the proposed NDA would be sufficient to effect that change in state. Similarly, after 5 years of nutrient discharge (excluding allowances for travel time) we would be reasonably certain that the Wairepo Arm would have crossed the eutrophic boundary. In our view, be irresponsible to grant a consent on the basis that once the Wairepo Arm reached that undesirable state, the applicants would then have to ratchet back their nutrient discharge.
- 13.68 In summary we are of the view that that the lock-step approach should not be a substitute for a robust AEE and/or supporting evidence in which the state of the existing environment is adequately described and reasonable efforts are made to address reasonably foreseeable environmental effects. As discussed in Part A we are of the view that the MWRL WQS falls short of the standard expected for a proposal (the total consents for irrigation before us) of this magnitude.

## Cultural Effects

- 13.69 Ngāi Tahu formally opposed the granting of all consents for irrigation at this hearing. However during the course of the hearing Mr Horgan reiterated the position stated in the CIA which was that Ngāi Tahu supports water being made available to provide security of supply for landowners but is concerned at the possible conversion to dairying. Mr Horgan summarized Ngāi Tahu's position as being

*"The Ngāi Tahu experience with large scale land use intensification has, almost without exception, been negative. From our perspective, there is an unequivocal link between irrigation related activities and waterway degradation, and in turn, further loss of access to mahinga kai resources. In this context, it is our view that these consents should only be granted if you are satisfied that there is a high level of certainty that the package of mitigation measures proposed by the applicants (in particular the Farm Environmental Management Plans) will ensure that sustainable water quality outcomes are achieved. In the absence of such certainty, then we submit that you must adopt a precautionary approach and decline the consents."*

- 13.70 While we acknowledge that the mitigation measures proposed by the applicant go further than many other large scale dairy conversions that have gone before it, we do not have the high degree of certainty Ngāi Tahu are seeking, that sustainable water quality outcomes will be achieved.

## Positive effects

- 13.71 The granting and exercising of these consents will have positive economic effects, both for the applicant, the district, and indeed the country. There will also, in our view be significant positive benefits in terms of reducing or halting wind-borne soil erosion over a large tract of land and providing a means of controlling invasive species such as wilding pines and hieracium. The dual function riparian margins along 6-mile Creek and Wairepo Creek will also have significant positive effects with respect to improving aquatic habitat within the applicant's property.

## The permitted baseline

- 13.72 In accordance with s104(2), we have the discretion to disregard an adverse effect on the environment where the relevant plan permits an activity with that effect. The issue of the permitted baseline was raised on several occasions by the applicant in relation to the effects of permitted activities (including minor water takes and dryland farming) on landscape and nutrient loads.
- 13.73 While we have considered the issue of the permitted baseline particularly in relation to water takes and permitted farming activities, landscape and amenity issues and nutrient loads we have reached the conclusion that the application for permitted baseline takes the proposal only so far. Critically in relation to water quality issues the relevant plan we have been focussing on, namely the WCARP does not provide that the activity here proposed is recognised as a permitted activity. Similarly in respect of landscape while we recognise the provisions of the district plan we consider we still need undertake an assessment under the CRPS as to whether or not this particular site is appropriate for the form of development here proposed particularly given that plan recognises this entire landscape as being an outstanding natural landscape.

## Key conclusions on effects

- 13.74 In relation to the actual and potential effects of the proposal, our key conclusions are as follows:
- 13.75 With mitigation proposed by the applicant and the Council expert Mr Glasson, the effects of the applicant's activities on landscape will be minor.

- 13.76 The value of existing 'native' vegetation on the irrigation command area is low. Irrigation will irreversibly eliminate this vegetation, but there are representative reserves within the applicant's property, as well as the wider Mackenzie basin where similar or better stands of representative native vegetation exist and will be unaffected by the applicant's activities. When these factors are taken into account, our view is that effects will be minor.
- 13.77 The applicant has not provided sufficient information to enable an adequate understanding of groundwater flow paths, travel times and nutrient concentrations necessary for us to have confidence that surface water bodies will not be adversely affected by the applicant's activities.
- 13.78 In particular our view is that the Wairepo Arm of Lake Ruataniwha is likely to become eutrophic during the summer because of the significant increase in nutrient loading caused by the applicant's activities. We do not believe that the lock-step approach proposed by the applicant is appropriate to manage this effect because of the likely long travel times before any effect on the Wairepo Arm is manifest.
- 13.79 Uncertainties in groundwater flow paths also give rise to concern about possible nuisance periphyton growths in Wairepo Creek, and the total amount of 'leachate' likely to be diverted through the Willow Burn to the Ahuriri Arm of Lake Benmore. We do not view this as likely as the adverse effects on the Wairepo Arm, but the data is simply not there for us to be confident one way or the other.
- 13.80 The applicant has proposed significant and substantial nutrient mitigation measures; particularly cubicle barns and dual function riparian margins. However in spite of these measures we cannot be confident that sustainable water quality outcomes will be achieved, which was the condition for Ngāi Tahu to accept the granting of these consents.
- 13.81 The granting of these consents would result in significant economic benefits as well as positive environmental effects in terms of reducing/halting wind-borne soil erosion, and controlling invasive species over a large tract of land.
- 13.82 Overall, we are of the view that the applicant's proposed activities, may, even with the significant mitigation measures proposed, cause a more than minor adverse effect. In summary these effects are:
- (a) A change in the trophic state of the Wairepo Arm of Lake Ruataniwha from a mesotrophic to a eutrophic state during summer; and
  - (b) Nuisance periphyton growths in the lower Wairepo Creek above MfE guideline values. We note that this is dependent upon groundwater pathways, about which there is insufficient information to have any certainty.
- 13.83 Both of the above fit within the definition of effects (Section 3 RMA) particularly 3(d)-(f) as follows:
- "(d) any cumulative effect which arises over time or in combination with other effects—regardless of the scale, intensity, duration, or frequency of the effect, and also includes—*
  - (e) any potential effect of high probability; and*
  - (f) any potential effect of low probability which has a high potential impact"*

## **14 EVALUATION OF RELEVANT PLANNING INSTRUMENTS**

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- 14.1 Under s 104(1)(b) RMA, we are required to have regard to the relevant provisions of a range of different planning instruments. Our Part A decision provides a broad assessment of those planning instruments and sets out the approach we have applied to identification and consideration of the relevant provisions. The following part of our decision should be read in combination with that Part A discussion.

- 14.2 In relation to the current application, we consider that the most relevant and helpful provisions are found in the regional plans, including in particular the WCWARP and the NRRP. In addition, the Proposed and Operative CRPS and the relevant District Plans are of assistance in relation to landscape issues that arise.
- 14.3 The following sections of this decision provide our evaluation of the key objectives and policies from these planning instruments. We have organised our discussion in accordance with the key issues arising for this application, which are water quality, tangata whenua, environmental flow and level regimes, efficient use of water, and landscape.

### **Water quality**

- 14.4 In relation to water quality, the key documents we have considered are the WCWARP (incorporating the objectives of the PNRRP) and the operative NRRP provisions.
- 14.5 In relation to the WCWARP, we consider that Objective 1 is the critical objective. In particular, Objective 1(b) seeks to safeguard life supporting capacity of rivers and lakes. We have determined that granting this consent is likely to result in the Wairepo Arm of Lake Ruataniwha becoming eutrophic in summer from its current mesotrophic state. Going from mesotrophic to eutrophic is not simply a case of a slight worsening of a scientific index. It has very real consequences in terms of the life supporting capacity of the ecosystem as tabled and discussed in Dr Coffey's evidence.
- 14.6 For example, a mesotrophic lake still has good biodiversity values whereas for a eutrophic lake they are compromised. There is some risk of toxic algae blooms under mesotrophic conditions whereas with eutrophic conditions, that risk becomes high. Amenity and contact recreation values become poor when a lake is eutrophic and there is a high risk that macrophyte beds will collapse and the phytoplankton will dominate (the pea-soup effect). Therefore if the Wairepo Arm of Lake Ruataniwha goes from a mesotrophic to a eutrophic state, its life supporting capacity will be compromised, which is contrary to Objective 1(b).
- 14.7 Objective 1(c) requires us to manage waterbodies in a way that maintains natural landscape and amenity characteristics and qualities that people appreciate and enjoy. Given our finding in terms of the likely results in the Wairepo Arm of Lake Ruataniwha becoming eutrophic, then in our view granting consent would not be consistent with Objective 1(c).
- 14.8 We note that Objectives 2, 3, 4 and 5 'in the round' deal with and provide for the allocation of water. However, the critical qualification is that water can be allocated provided that to do so it is consistent with Objective 1. Given the findings we have made about Objective 1, we must conclude that allocating water in terms of the balance objectives would not be consistent with the overall scheme of the WCWARP. We have reached this view taking into account the national and local costs and benefits (environmental, social, cultural and economic) of the proposal, as required by Objective 3.
- 14.9 Policy 13 links the WCWARP to the PNRRP (as it existed at the time) by requiring us to have regard to how the exercise of the consent could result in water quality objectives in the PNRRP not being achieved. As explained in our Part A decision, we have considered the objectives of the PNRRP and the now operative NRRP in relation to the current proposal.
- 14.10 Under the PNRRP, both 6-Mile Creek and Wairepo Creek were classified (WQL1) as 'Natural' under which the water quality and substrate had to be maintained in that state (i.e. No change). Policy WQL4 (non-point source discharge to surface water) requires that where all or part of a property is irrigated the annual average concentrations between the points where river enters and exits a property shall not rise by more than 0.01 mg/L soluble inorganic nitrogen and more than 0.001 mg/L soluble reactive phosphorus.
- 14.11 Dr Bright (for the applicant) was confident that the applicant's activities would not cause a breach of this classification, because in his view, all leachate would go to groundwater and rather than enter the Wairepo Creek (within the property boundaries). We accept his view but note Dr Ryder's opinion that these Creeks could not be considered 'natural' in any case. We also note the now operative NRRP has changed the classification to 'spring fed

upland' which has slightly more permissive thresholds than the PNRRP allowed (Table WQL, NRRP).

- 14.12 Lake Ōhau was classified as a High Country Lake in the both PNRRP and operative NRRP, which requires it to be maintained in a natural state if it is in that state. We do not see any difficulties in that respect from the applicant's activities.
- 14.13 The Wairepo Arm is unclassified in the PNRRP. However we note that in the operative NRRP it has been classified as an artificial lake. Under the PNRRP the annual average chlorophyll for an artificial lake should not be greater than 5 milligrams per m<sup>3</sup> (Objective WQL1.2(3)(d)). With the operative NRRP the relevant criteria are that the maximum TLI is 4 (mesotrophic-eutrophic boundary) and ecological health indicators must be suitable for the purpose of the lake. We conclude that it is likely that granting this consent would result in the operative NRRP classification not being met.
- 14.14 For non-point source discharges to groundwater, Objective WQL2 of the PNRRP distinguishes between groundwater that is "*unaffected or largely unaffected by human activities*" [as reported in 2004]. While there is extremely limited groundwater quality data in the Upper Waitaki there appears to be general agreement that nitrate-nitrogen concentrations are generally low (<1 mg/l) and the WQS (#3.85d Part A) proposed a threshold of 1 mg/L nitrate-nitrogen for those catchments that sit below the threshold. Because of the importance of groundwater as a determinant of surface water quality, our view is that the 1 mg/L nitrate-nitrogen threshold is appropriate. We note, however, for this application that the applicant has proposed that 2 mg/L nitrate-nitrogen be the threshold above which a root cause analysis is carried out.
- 14.15 We note the NRRP Objective WQL2.1(3) states that "Where groundwater enters a river of lake, the concentration of any contaminant in the groundwater shall not result in the surface water quality being reduced below the relevant provisions of Objective WQL1, or the standards set by a water conservation order." We note that Dr Bright states the maximum NO<sub>3</sub>-Nitrogen concentration in drainage water for Ōhau Downs Station will be 8.3 mg/L, but that there is insufficient data from which to predict maximum concentrations in groundwater and consequently whether the surface water threshold in WQL2.1(3) could be breached.
- 14.16 Overall then, having regard to the scheme of the WCWARP and the NRRP we reach a conclusion that granting consent in this case would not be consistent with the key objectives and policies of those plans relating to water quality.

### **Tangata Whenua**

- 14.17 Objective 1(a) of the WCWARP relates to the integrity of mauri and is closely linked to Objective 1(b). If we are not satisfied that the health of a particular water body is being safeguarded then the mauri is not being safeguarded either. As noted above, we do not have confidence that even with the mitigation measures proposed by the applicant, sustainable water quality outcomes will be achieved. It therefore follows that granting the consents may not maintain the integrity of the mauri and also, will not meet the spiritual and cultural needs of the tangata whenua.

### **Environmental flow and level regimes**

- 14.18 Policies 3 and 4 of the WCWARP refer to the setting of environmental flow and level regimes to achieve the objectives of the WCWARP. This is reflected in the rules of the PNRRP which specifies minimum flows and levels for water bodies and allocation limits for specific activities. In relation to these applications, the applicant proposes to comply with flow and level regimes in the WCWARP, which should ensure that the proposal is consistent with Policies 3 and 4.

### **Efficient use of water**

- 14.19 Objective (4) of the WCWARP seeks to promote "*the achievement of a high level of technical efficiency in the use of allocated water*". The technical efficiency of the application



is consistent with the provisions of the WCWARP. Application by spray within the constraints of an annual volume will require a high degree of efficiency to ensure that crops and pasture are not stressed in extreme conditions and water is not wasted.

- 14.20 Policies 15 – 20 deal with efficient and effective use of water and are applicable to this application. The Policies provide for an efficient use of water so that net benefits are derived from its use and are maximised and waste minimised. We are satisfied that the rates and annual volumes sought by the applicant reflect an efficient and effective use of water and that the reasonable use test can be met. The proposal is compliant with Policy 16(c)(ii) which the applicants used to calculate the annual volume. Overall, we consider that the proposed irrigation will comply with the reasonable use and efficiency provisions of the WCWARP.

#### **Landscape values**

- 14.21 We discuss the relevant objectives and policies for landscape in our Part A decision. In summary, these are primarily found in the Proposed and Operative CRPS and the NRRP. In broad terms, these provisions seek the protection of outstanding natural landscapes from inappropriate use and development.
- 14.22 In considering these provisions, we are informed by the provisions of the Waitaki District Plan, which identifies the applicant's property as being outside the area classified as an Outstanding Natural Landscape. Given this circumstance, a more permissible or relaxed approach to landscape issues (such as they are in the context of this application) is, we think, available to us. We have also considered the Mackenzie District Plan as well given it recognises the northern lake shore of Lake Ōhau and Ben Ōhau within its plan provisions.
- 14.23 For the reasons already advanced, we think that with appropriate mitigation measures the landscape effects of this proposal are capable of being addressed by conditions and could achieve consistency with the relevant objectives and policies. However, given the finding we make on water quality which ultimately determines the outcome for these applications, we do not think it is necessary for us to advance this matter further.

#### **Key conclusions on planning instruments**

- 14.24 For all of the above reasons, we consider that granting the consent would be contrary to the objectives and policies of the WCWARP (incorporating the PNRRP) and the NRRP relating to water quality. As consequence of this is that the proposal would also be contrary to the objectives and policies relating to tangata whenua values. In terms of landscape issues, if the mitigation measures recommended by Mr Glasson were included then we think that a grant of consent would be consistent with both the Operative and Proposed CRPS.

### **15 EVALUATION OF OTHER RELEVANT S104 MATTERS**

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- 15.1 Under s104(1)(c) RMA, we are required to have regard to any other matter that we consider to be relevant and reasonably necessary to determine the application. After hearing all the relevant evidence, we consider that no such matters exist in relation to this application.

### **16 PART 2 RMA**

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- 16.1 Section 104(1) states that the matters which we have discussed above are subject to Part 2, which covers section 5 through section 8 inclusive. These sections are set out in full in our Part A decision and are discussed below in the context of the current application.

#### **Section 6 – Matters of National Importance**

- 16.2 Section 6 identifies matters of national importance that we must "recognise and provide for" when making our decision, including preserving the natural character of lakes and rivers (s6(a)), protecting outstanding natural features and landscapes (s6(b)) and the relationship of Maori with the environment (s6(e)).

- 16.3 In relation to s6(a), given our finding in relation to the adverse environmental effects of the Wairepo Arm of Lake Ruataniwha and possibly (depending on groundwater pathways) the Wairepo Creek downstream of the applicant's property, we must conclude that a grant of consent would not recognise and provide for the matters in s6(a).
- 16.4 In respect of s6(b), the applicant has avoided siting the irrigation command area within ONLs and has supported some mitigation measures that would help address landscape issues. For the reasons discussed above, if Mr Glasson's mitigation measures are imposed we are satisfied that section 6(b) has been adequately addressed.
- 16.5 In terms of indigenous vegetation as covered by s6(c), the applicant has demonstrated, by way of extensive vegetation surveys that the value of existing indigenous vegetation is low and cannot be restored under current (permitted) land use. We do acknowledge that existing reserves such as the QEII covenant area will better protect indigenous vegetation than would continuing with the status quo on the proposed irrigation areas.
- 16.6 In relation to s6(d), public access along the margin of Lake Ōhau will not be affected, and the applicant proposes to enhance the riparian margins of creeks flowing through the property.
- 16.7 While no sacred sites (wāhi tapu) have been identified within the applicant's property, the grant of consent would not meet the requirements of s6(e) in respect of the relationship of Maori and their culture and traditions with water.
- 16.8 For the above reasons, we consider that granting consent to the proposal would not recognise and provide for sections 6(a) and 6(e), as we are required to do under the RMA.

## Section 7 – Other Matters

- 16.9 Section 7 lists "*other*" matters that we shall "*have particular regard to*". We make the following observations in relation to each of those matters as they are relevant to this application, referring to the sub paragraph numbers of s7:
- (a) The principle of Kaitiakitanga has been observed to the extent that the applicant has endeavoured to consult with and understand the tangata whenua (Ngāi Tahu) values that might be subjected to impacts from the proposed Ōhau Downs irrigation development. The applicant has gone on to develop a Farm Environmental Management Plan and a Nitrates mitigation process that they consider will address the cultural and spiritual interests of Ngāi Tahu. We note however that Ngāi Tahu remain concerned at the end of the hearing with the scale and consequently the potential cumulative impacts the proposed development might have on downstream waterways and mahinga kai values.
  - (b) The ethic of stewardship has been followed with respect to land management of the applicant's property. The applicant has submitted that an irrigated farm system is the only way to arrest the very considerable problem of wind-borne soil erosion and control invasive species such as wilding pine and hieracium. We agree with that assessment. On the other hand, however, we have determined the loss of nutrients offsite is likely to cause adverse effects on waterways, even with the significant mitigation measures proposed, which is not consistent with stewardship. This is brought about because of the position of the applicant's property in the landscape, relative to waterbodies valued by the community.
  - (c) The applicant has demonstrated their proposal constitutes an efficient use of water. Questions remain over the area to be irrigated relative to the application, but the proposed increase in area using the same amount of water will increase efficiency still further. The proposal constitutes an efficient use of energy with the only pumping required being that to get water from Lake Ōhau to the top of the lake terrace.
  - (d) We think the effects on recreation and amenity values, particularly those arising from water quality outcomes from a grant of this proposal, will be significant.

- (e) The intrinsic value of terrestrial ecosystems will be affected with existing vegetation replaced by pasture. However the existing value of terrestrial ecosystems within the irrigation command area is low and there is little prospect of its restoration under existing permitted land use.

Stream ecosystems within the property boundary will be enhanced through dual function riparian margins which should improve stream habitat. However, this may be offset by deterioration of Wairepo Creek downstream should relatively nutrient-enriched groundwater intersect the stream margin, and Wairepo Arm will increase in degree of eutrophication.

- (f) The overall quality of the environment downstream of the applicant's property will in our view be degraded, and although the degree of that degradation cannot be predicted with confidence, there are significant consequences should Wairepo Arm become eutrophic.
- (g) While it may be argued that Wairepo Arm of Lake Ruataniwha is of low value relative to other large high country lakes in the region, it is nevertheless a well-used resource of some significance in the District. The WCWARP and NRRP recognise the finite nature of water resources in the Mackenzie Basin and seek to ensure that they are maintained or enhanced and certainly not degraded.
- (h) Fish & Game have not raised any issues with respect to trout in salmon in water bodies downstream of the applicant's property. However should nuisance growths occur in Wairepo Creek or Wairepo Arm becomes eutrophic then trout and salmon habitat will be compromised to some extent.

16.10 Having particular regard to the above matters in the context of section 7, we conclude that the grant of consent could not be supported

### **Section 8 – Treaty of Waitangi**

16.11 Section 8 of the RMA has had a cascading influence on the development of regional and district plans in so far as they affect the Upper Waitaki through the integration of Ngāi Tahu values into the respective objectives and policies. The applicants were part of the initiative (MWRL) to develop a Cultural Impact Assessment and the subsequent engagement of a cultural expert (Mr Buddy Mikaere) to assist the individual applicants such as Ōhau Downs to relate the findings of the CIA to their property. Ōhau Downs made an effort to consult with Ngāi Tahu interests to clarify and mitigate identified cultural issues, this included on site visits by Ngāi Tahu.

16.12 While the applicant has developed significant mitigation measures to reduce or remove the negative impacts of the proposed activity, we note that the scale of the proposed development has made it difficult for Ngāi Tahu to be confident that the cumulative effects are no more than minor.

### **Section 5 – Purpose of the RMA**

16.13 Turning now to the overall purpose of the RMA, that is, "*to promote the sustainable management of natural and physical resources*".

16.14 We consider that taking all issues into account, the take and use of water from Lake Ōhau for spray irrigation of 1,493 ha of crops and pasture is not consistent with the purpose of sustainable management. Although it will make positive economic contribution to the overall regional (Waitaki) wellbeing and will have the positive environmental effect of reducing soil erosion and managing terrestrial invasive species, the life supporting capacity of aquatic ecosystems will not be safeguarded.

16.15 We say this having considered the significant and substantial proposals made by the applicant to mitigate nutrient export from their property. In our view the scale of the proposal is such that, when the cumulative effects with other existing irrigation in the

subcatchment are considered, adverse effects on the quality of downstream ecosystems is likely.

- 16.16 The applicant has proposed significant and substantial mitigation measures to mitigate nutrients generated by its activities. These include the use of cubicle stables to house dairy cows for much of the year, which will largely eliminate urine spotting, and result in an even distribution of dung and urine across the irrigation command area. We are reasonably confident that the reduction in nutrients predicted from this change in management practice over conventional dairying systems will be achieved. However despite that mitigation, our view is that the scale of the proposal is such that remaining (unmitigated) nutrient leaving the property will be of sufficient magnitude such that, in combination with other existing irrigation in the catchment, adverse environmental effects will ensue.
- 16.17 The applicant has also proposed two other farming systems from the irrigated pasture, being cut and carry (no animals) and a mixed enterprise farm. For these two systems (as well as the cubicle dairy system) the applicant proposes dual function riparian margins along watercourses within the property. The applicant has made it clear that the cubicle dairying system is the favoured option, but the systems remain as options. The mixed enterprise farm has the highest predicted nutrient export of any of the systems proposed and apart from the dual function riparian margins there are no significant proposals to mitigate nutrient export.
- 16.18 The applicant has proposed a lock-step approach as a means of ensuring that the uncertainties discussed during the hearing are addressed prior to full exercise of the consent. The applicant has also discussed adaptive management approach with us. However, for the reasons discussed in Part A, we do not consider that to be appropriate for several reasons, which in summary are:
- (a) We considered the assessment of environmental effects carried out by MWRL on behalf of all applicants inadequate for a proposal (all applications before us) of this scale and our view was gathering the required data after the issue of consents is not the appropriate way to address this deficiency;
  - (b) The lock-step approach is not acceptable in our view because of the potential effects of the activity, the paucity of knowledge and our high degree of concern that potential effects will be significant. Even if adaptive management conditions were utilised, we are not comfortable that consent holders would be able to adjust scale or timing of their activity or change practices, particularly where there was a register of adverse effects on the receiving environment.
  - (c) There are groundwater travel times to consider. Because they could be very lengthy (in terms of travel time) causing lag, they do not fit in with the proposed timetable of the lock-step approach. Such lags make adaptive management conditions, in our view, inappropriate.

## **17 OVERALL EVALUATION**

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- 17.1 Under s104B of the RMA, we have a discretion as to whether or not to grant consent. This requires an overall judgment to achieve the purpose of the Act and is arrived at by:
- (a) Taking into account all the relevant matters identified under s 104;
  - (b) Avoiding consideration of any irrelevant matters;
  - (c) Giving different weight to the matters identified under s 104 — depending on the Court's opinion as to how they are affected by the application of s 5(2)(a), (b), and (c) and ss 6-8 — to the particular facts of the case; and then in light of the above; and
  - (d) Allowing for comparison of conflicting considerations, the scale or degree of conflict, and their relative significance or proportion in the final outcome.

- 17.2 We consider that the key conflicting considerations in this case are that there will be:
- (a) considerable economic benefits to the wider district, positive environmental outcomes in terms of controlling wind-borne soil erosion and invasive weed species; but
  - (b) adverse environmental effects on the Wairepo Arm of Lake Ruataniwha, and possibly (depending on groundwater pathways), the Wairepo Creek downstream of the applicant's property.
- 17.3 We have considered the scale or degree of conflict and note that major focus of this hearing is the preservation of water quality of streams, rivers and lakes in the Upper Waitaki catchment. We therefore consider that because of our finding that the Wairepo Arm is likely to come eutrophic if this consent was granted and exercised, this has to be our overriding consideration. We note that the total lack of data supporting the modelling of groundwater played a significant role in coming to our conclusion as did the position of applicant's property in relation to the Wairepo Arm and other consented irrigated areas. The potential adverse effects are significant, which meant that we took a precautionary approach in coming to our decision, and we consider this is the correct approach given the long-term consequences of granting the consents, and the potential effects being realised.
- 17.4 Having reviewed the application documents, all the submissions, taking into account the evidence to the hearing and taking into account all relevant provisions of the RMA and other relevant statutory instruments we have concluded that the outcome which best achieves the purpose of the Act is to decline consent.

## 18 DECISION

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- 18.1 Pursuant to the powers delegated to us by the Canterbury Regional Council:
- 18.2 For all of the above reasons and pursuant to sections 104 and 104B of the Resource Management Act 1991 we **DECLINE** application CRC061154 by Five Rivers Limited.


DECISION DATED AT CHRISTCHURCH THIS 22ND DAY OF NOVEMBER 2011

Signed by:

Paul Rogers   
\_\_\_\_\_

Dr James Cooke   
\_\_\_\_\_

Michael Bowden   
\_\_\_\_\_

Edward Ellison   
\_\_\_\_\_