

BEFORE THE CANTERBURY REGIONAL COUNCIL

IN THE MATTER of the Resource Management Act
1991

AND

IN THE MATTER of Proposed Plan Change 5 to the
Canterbury Land and Water
Regional Plan

**STATEMENT OF EVIDENCE OF SARAH MARGARET DAWSON ON
BEHALF OF MERIDIAN ENERGY LIMITED**

22 JULY 2016

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INTRODUCTION

Qualifications and Experience

- 1 My name is Sarah Margaret Dawson.
- 2 I hold qualifications of Bachelor of Engineering (Chemical) with First Class Honours and Master of Science (Resource Management) with Distinction. I am a Full Member of the New Zealand Planning Institute, and member of the Resource Management Law Association of New Zealand and the International and New Zealand Associations of Impact Assessment. I was a recipient of the New Zealand Planning Institute's Distinguished Service Award in 1999. I am an accredited Hearings Commissioner with Chair endorsement.
- 3 I have practised as a planner since 1977, as both a consultant and a senior local authority planner. I have been based in Christchurch for most of those years, providing consultancy services for a wide range of clients, mostly throughout the South Island, including local authorities, land and water resource users, and the infrastructure and electricity sectors. Following 20 years as a consultant with Boffa Miskell Limited, I now practice as Sarah Dawson Consulting.
- 4 One of my particular areas of expertise is the development of District and Regional Plans and in the on-going variation and changing of Plans. I have written or, at least, substantially worked on the preparation of numerous District and Regional Plans, and Plan Changes, in different parts of New Zealand. For many of these, I have been involved from the stage of early consultation and policy development to the resolution of appeals. I am currently a member of the Independent Hearings Panel for the Christchurch Replacement District Plan.
- 5 The other main area of my planning and resource management work is the preparation and auditing of assessments of environmental effects, and the processing of resource consents through the various statutory steps and requirements. I have been engaged by numerous clients to co-ordinate and prepare assessments of environmental effects for a wide range of complex projects involving many inter-related technical assessments.

- 6 In regard to this current matter, I was engaged by Meridian Energy Limited (“**Meridian**”) to advise on Plan Change 5 (“**PC5**”) and to assist in the preparation of submissions and this planning evidence.
- 7 I have been engaged to provide advice to Meridian on land and water management matters since Meridian was formed in 1999. This has involved presenting evidence in relation to the following policy / planning documents:
- (a) The Waitaki Catchment Water Allocation Regional Plan (“**WAP**”), including Plan Change 3;
 - (b) The Natural Resources Regional Plan for Canterbury;
 - (c) The National Policy Statement for Renewable Electricity Generation (“**NPSREG**”);
 - (d) The National Policy Statement on Freshwater Management (“**NPSFWM**”);
 - (e) The Hurunui and Waiau River Regional Plan; and
 - (f) The Canterbury Land and Water Regional Plan (“**CLWRP**”)¹.
- 8 I have co-ordinated the preparation of assessments of environmental effects (“**AEE’s**”) and associated specialist technical reports for several plan change and/or resource consent applications lodged for proposed hydro-electricity generation projects within Canterbury, including the North Bank Tunnel Project (“**NBHP**”) on the Lower Waitaki River, Pukaki Hydro Project on Lake Pukaki, Plan Change 1 to the WAP for the emergency lowering of Lake Pukaki, the Amuri Hydro Project (“**AHP**”) on the Waiau River and the Balmoral Hydro Project (“**BHP**”) on the Hurunui River. I also co-ordinated the AEE and consent applications for Hunter Downs Irrigation in South Canterbury. These required land and water-related resource consents under the relevant statutory plan provisions within Canterbury.

Scope of Evidence

- 9 My evidence addresses the following matters:

¹ I provided planning evidence and attended expert conferencing on Plan Change 3 to the CLWRP for Hunter Downs Development Corporation Limited.

- (a) Ensuring the provisions relating to the Upper Waitaki Nitrogen Load Limits (particularly for the Haldon Zone), and the Haldon Zone Nitrogen Headroom, will achieve the freshwater outcomes;
 - (b) Ensuring appropriate Freshwater Outcomes and Water Quality Limits are set including:
 - (i) Recognising the influence of natural variability in water quality in meeting specified outcomes and limits;
 - (ii) Setting outcomes and limits for Lake Ruataniwha, Kellands Pond and Wairepo Arm; and
 - (iii) Provisions providing for the above matters.
 - (c) Ensuring appropriate adaptive management (or monitoring and response) provisions are included.
- 10 In preparing this evidence I have reviewed:
- (a) The statements of evidence of the other witnesses being called by Meridian in relation to PC5, being:
 - (i) Dr Mark James;
 - (ii) Mr Brian Ellwood; and
 - (iii) Mr Jeff Page.
 - (b) The NPSFWM;
 - (c) The Canterbury Regional Policy Statement 2013 (“**CRPS**”);
 - (d) The WAP;
 - (e) The CLWRP;
 - (f) The Canterbury Water Management Strategy (“**CWMS**”);
 - (g) PC5, and relevant parts of the associated section 32 and 42A Reports;
 - (h) Te Runanga o Ngai Tahu Freshwater Policy;
 - (i) The relevant submissions and further submissions of other submitters and
 - (j) Examples of resource consents granted for additional irrigation in the Upper Waitaki.

- 11 In preparing my evidence I am conscious that the objectives of the CLWRP are not being changed by PC5. Therefore, it is the policies and methods (including rules) introduced by PC5 that are to be considered. When considering any changes to these provisions I have considered whether they are the most appropriate to achieve the unchanged CLWRP objectives having regard to their effectiveness and efficiency², and taking into account the risk of acting or not if there is uncertain or insufficient information³.
- 12 I have read and agree to comply with Code of Conduct for Expert Witnesses (Environment Court Practice Note 2014). This evidence is within my area of expertise except where I state that I am relying on facts or information provided by another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

EXECUTIVE SUMMARY

- 13 Meridian's submission on PC5 is generally supportive of the approach to PC5. It has sought a number of changes to specific provisions to ensure that they are clear and capable of effective implementation.
- 14 For the Haldon Zone, Meridian's submission has sought changes to ensure that nitrogen losses are correctly accounted for within the Nitrogen Headroom calculations, and in-lake or in-river nitrogen load limits would not be exceeded as a result of individual, or cumulative, land-based nitrogen losses.
- 15 In order for the policies and rules for the Haldon Zone to be considered the most appropriate way to achieve the freshwater quality management objectives of the CLWRP, I consider that any potential for over-allocation of nitrogen needs to be addressed. Because of the way the provisions are drafted for the Haldon Zone, the achievement of the outcomes and limits for waterbodies is reliant on the nitrogen headroom calculations and apportionments being correct. Any inaccuracy in accounting for existing, or likely future, on-farm nitrogen loss is important because, for farming activities, nitrogen headroom is allocated by way of Schedule 27 on a per hectare per property basis not a cumulative total basis. If the initial

² Relative to the notified provisions of PC5 and any other options being advanced.

³ Section 32 RMA

nitrogen loss is not correctly accounted for, there is potential for more nitrogen loss to be allocated to individual properties than is unutilised and available within the Haldon Zone Nitrogen Load Limit.

- 16 I support the recommendation from Mr Ellwood for an amendment to Schedule 27 to account for both consented and future land uses that post-date the underlying calculations for Schedule 27, but are not subject to the 1.6kgN/ha/yr limit. Such an amendment could ensure that, once PC5 is operative, the calculation of available headroom for other properties takes into account additional nitrogen loss already allocated.
- 17 Meridian's submission also sought changes to a number of policies and rules to ensure that cumulative nitrogen losses from all activities, including farming activities, do not result in the nitrogen load limits in the Ahuriri, Haldon and Lakes Zones being exceeded. My analysis has led me to the view that, if there is confidence in the nitrogen headroom calculation and its apportionment, then further changes to the provisions are not necessary to ensure that total nitrogen load limits are not exceeded.
- 18 I have, however, identified one rule where I consider there is an inconsistency that might lead to an undermining of the PC5 approach to firm application of the nitrogen headroom, as the basis for ensuring the Haldon Zone Nitrogen Load Limits (and associated water quality outcomes) are not exceeded. Rule 15B.5.8 requires a discretionary activity consent for the discharge of nutrients as part of an irrigation scheme. However, unlike other forms of farming, as individual farming activities or as part of a Nutrient User Group (NUG), there is no condition requiring the nitrogen headroom not to be exceeded on properties within irrigation schemes.
- 19 In order to apply the same approach to irrigation schemes as to NUG and farming activities, and to avoid a different activity status indicating a different strength of direction in relation to headroom exceedance, I have suggested a condition requiring compliance with the headroom could be added to Rule 15B.5.8, with non-complying or prohibited activity status not to comply with this condition.
- 20 I have supported the changes to Tables 15B(a) and 15B(b) to address the concerns explained in the evidence of Dr James. However, if amending the tables is not considered the most appropriate way to achieve the CLWRP objectives, particularly 3.8 and 3.16, I consider the freshwater

outcomes tables could remain unchanged and the variability associated with natural characteristics addressed by way of a policy. This could specifically recognise the influence of naturally occurring processes on freshwater quality within the Waitaki sub-region, providing important policy context to the implementation of Policies 4.1 and 4.2 within the Waitaki sub-region.

- 21 I have also supported changes to Tables 15B(b) and 15B(d) to address water quality matters for Wairepo Arm and Kellands Pond, and to set outcomes and limits for Lake Ruataniwha, as addressed by Dr James. I consider these changes would positively contribute towards the effective implementation of policies, in particular Policies 4.37 and 4.38. I consider that these changes are most appropriate way to achieve the objectives in the CLWRP, in particular Objectives 3.8 and 3.16.
- 22 I have set out my understanding of adaptive management (or monitoring and response), as addressed in Policy 15B.4.20(d), in the context of maintaining freshwater quality in the Upper Waitaki Freshwater Management Unit (UWFMU). Applying an adaptive management approach, typically through the imposition of conditions of consent, can allow sustainable management to be promoted, when otherwise consents may need to be declined because of uncertainty of effects. Dr James has outlined uncertainties resulting from lag times before the impact of nutrient discharges is evident in waterbodies. There are also inherent uncertainties in the modelling and analysis undertaken to establish the nitrogen load limits and nitrogen headroom to achieve the freshwater quality outcomes. This type of uncertainty can potentially be managed through adaptive management approaches.
- 23 I understand this has been the approach applied to existing consents for irrigation water in the Upper Waitaki and I outline my understanding of the monitoring and response conditions that have been consistently applied to these consents. These provide for nutrient reductions at source if the receiving environment is unacceptably affected, and enables the cause of any unanticipated nutrient load effects to be investigated and determined on either an individual or collective basis. As consistent conditions have now been imposed on a large number of consents, if water quality trigger levels are exceeded, remedial actions including nitrogen loss reduction can be enforced across contributing properties. This provides the ability to implement remedial actions, without having to delay any response until a

Plan Change and consent review process and timeframes have been gone through.

- 24 I do not support the recommended change to Policy 15B.4.20(d) to add the words “and relates specifically to the effects caused by the activity”. I consider this change is unnecessary and does not assist in the effective implementation of the policy, which is to maintain freshwater quality in the UWFMU. Further, the inclusion of these words does not appear consistent with the adaptive management approach applied on consents for irrigation activities in the Upper Waitaki.
- 25 I support Meridian’s request to include reference to “*outcomes*” and “*Tables 15B(a) and 15B(b)*” in Policy 15B.4.20(d). Many, if not most, of the recent consents for irrigation in the Upper Waitaki, include conditions based on freshwater outcomes and limits.
- 26 I have reconsidered the additions to this Policy 15B.4.20(d) sought by Meridian, as well as the changes in the Section 42A report, and have recommended wording I consider will most appropriately assist in the effective and efficient implementation of this policy to maintain freshwater quality in the UWFMU.

Upper Waitaki Freshwater Management Unit – Nitrogen Load Limits and Nitrogen Headroom

- 27 Within the Upper Waitaki Freshwater Management Unit (“**UWFMU**”), PC5 establishes a number of nutrient zones. The zones addressed in the submission by Meridian are the Haldon, Ahuriri and Lake Zones. Meridian’s interest in the Lake Zones is in relation to Wairepo Arm and Kellands Pond. It is in this context I undertake my evaluation.
- 28 The zones have different nutrient management approaches and nitrogen load limits, depending on the actions necessary in each area to achieve the freshwater outcomes and limits specified. PC5 establishes Nitrogen Load Limits⁴ for the Haldon and Ahuriri Zones, with associated Nitrogen Headroom⁵ for the Haldon Zone.

⁴ Calculated as tonnes nitrogen / year in the Haldon and Ahuriri Arms of Lake Benmore after attenuation.

⁵ Being the maximum nitrogen loss rate (measured in kg/ha/yr) available to a farming activity (property) within the Haldon Zone (inclusive of their Baseline GMP Loss Rate) as estimated by Environment Canterbury using the formula set out Schedule 27.

- 29 For the Lake Zone, the key provisions are primarily located in Part A of PC5 being region wide amendments⁶. Part B of PC5 also has provisions of relevance to the Lake Zone through setting outcomes for Wairepo Arm and Kellands Pond and limits for Kellands Pond, and in managing the transfer of nutrients between the Lake Zone and other zones.
- 30 The approaches in PC5 to nutrient management for farming activities within these zones are:

Ahuriri Zone

- (a) Avoiding⁷ the granting of any resource consent that will allow nitrogen losses from a farming activity to exceed the Baseline Good Management Practice (“**GMP**”) Loss Rate⁸;
- (b) Restricting sharing of nitrogen losses between properties to: properties forming part of a Nutrient User Group (“**NUG**”) and all located within the Ahuriri Zone; and the combined nitrogen loss calculation for those properties does not exceed their combined Baseline GMP Loss Rate⁹;

Haldon Zone

- (c) Restricting increases in nitrogen losses from farming activities to a limit not exceeding the Nitrogen Headroom¹⁰;
- (d) Requiring any discharge permit for an irrigation scheme to be subject to conditions that restrict the total nitrogen loss from properties supplied with water from the scheme to a limit not exceeding the Nitrogen Headroom applicable to those properties within the zone¹¹;
- (e) Restricting sharing of nitrogen losses to properties forming part of a NUG¹²;

⁶ Policies 4.37, 4.38D and 4.41C and Rule 5.49A-5.52A

⁷ Policy 15B4.20(b)

⁸ Except where Policy 15B.4.13 applies (where a nitrogen baseline has been lawfully exceeded prior to 13 February 2016 and the application contains evidence that the exceedance was lawful; and the nitrogen loss calculation remains below the lesser of the Good Management Practice Loss Rate or the nitrogen loss that occurred in the 4 years prior to 13 February 2016.)

⁹ Policy 15B.4.21(a) and (b)

¹⁰ Policy 15B4.20(a)

¹¹ Policy 15B.4.18(b)

¹² Policy 15B.4.21(a)

- (f) Where the NUG properties are all located in the Haldon Zone, requiring that the combined nitrogen loss calculation for those properties does not exceed the sum of the Nitrogen Headroom associated with those properties¹³;
- (g) Where properties are part of a NUG located within the Haldon or Lake Zone, the sharing of nitrogen only occurs from the Lake Zone to the Haldon Zone, or occurs entirely within either zone, and the combined nitrogen loss calculation does not exceed the aggregated consented nitrogen loss rate of all the properties forming the NUG¹⁴;

Lake Zone

- (h) Avoiding the granting of any resource consent that will allow nitrogen losses from a farming activity to exceed the Baseline GMP Loss Rate¹⁵;
 - (i) Restricting sharing of nitrogen losses to properties forming part of a NUG¹⁶;
 - (j) Where the NUG properties are located within the Haldon or Lake Zone, the sharing of nitrogen only occurs from the Lake Zone to the Haldon Zone, or occurs entirely within either zone¹⁷, and:
 - (i) The combined nitrogen loss calculation does not exceed the aggregated consented nitrogen loss rate of all the properties forming the NUG¹⁸; and
 - (ii) The amount of nitrogen shared by properties within the Lake Zone is not more than the Nitrogen Headroom associated with the area of those properties¹⁹.
- 31 For the Haldon Zone, the nitrogen load limit specified to achieve water quality outcomes and limits²⁰ was not fully utilised by existing activities prior to 13 February 2016²¹. This means there is a portion of the

¹³ Policy15B.4.21(c)

¹⁴ Policy 15B4.21(d)(i) & (ii)

¹⁵ Policy 4.37(a)

¹⁶ Policy15B.4.21(a)

¹⁷ Policy 15B4.21(d)(i)

¹⁸ Policy 15B4.21(d)(ii)

¹⁹ Policy 15B4.21(d)(iii)

²⁰ Table 15B(f)

²¹ PC5 public notification date

nitrogen load limit available to enable further intensification of activities within this zone.

- 32 The approach in PC5 is that the nitrogen load limit, including the unutilised portion, has been “allocated” to activities. For aquaculture in the Haldon Zone, the unutilised portion of the aquaculture nitrogen load limit is available on a “first-come first-served basis”, provided the total aquaculture nitrogen load limit²² is not exceeded²³. For farming activities in the Haldon Zone, the unutilised agricultural portion of the total in-lake nitrogen load limit²⁴ has been converted to a land-based nitrogen load (available for agricultural intensification)²⁵. This is termed the Nitrogen Headroom which is available to be apportioned on a per hectare (or per property) basis, rather than “first-come first-served”.
- 33 Mr Ellwood has described the methodology used to calculate the available Nitrogen Headroom and the apportionment of this on a per hectare/property basis²⁶. The tool within PC5 to calculate this apportionment is Schedule 27.
- 34 Meridian, in its submission, stated that it is not opposed to the identification of the Headroom nor did it have any interest in how any available headroom is to be distributed or allocated amongst potential users, provided the total in-lake nitrogen load limit for each zone is not exceeded. To achieve this, its submission sought changes to a number of provisions to ensure that:
- (a) All existing, or likely future, land-based nitrogen losses were correctly accounted for within the Nitrogen Headroom calculations; and
 - (b) The provisions would operate so as to ensure that the in-lake or in-river nitrogen load limits would not be exceeded as a result of any individual, or combination of, land-based nitrogen losses.
- 35 The evidence of Mr Ellwood is that all of the necessary nitrogen losses from land uses have not been accounted for within the nitrogen load calculations which determine the Nitrogen Headroom.

²² Table 15B(h)

²³ Rule 15B.5.3

²⁴ Table 15B(f)

²⁵ Schedule 27

²⁶ Evidence of Mr Ellwood, paragraphs 16-18

- 36 Mr Ellwood's evidence states that he has identified an error in the future allocation method for E1 in Schedule 27 - the 66 t N/yr unutilised portion of the Haldon Zone Nitrogen Load Limit (as at 13 February 2016)²⁷. He considers an adjustment to the available unutilised portion is required, to account for farming activities which exceed the property allocation loss of 1.6 kg N/ha/yr and which have a consent application in progress or where consent has been granted between 1 December 2013 and 13 February 2016. He has calculated the potential adjustment required to be 14 - 32 % in unutilised nitrogen load available for allocation, which in his view is significant.
- 37 Because of the way the PC5 provisions are drafted for the Haldon Zone, the achievement of the outcomes and limits for waterbodies is reliant on the headroom calculations and apportionments being correct. This is because the relevant policies and rules reference the Upper Waitaki Nitrogen Headroom (in kgN/ha/yr), rather than the overall nitrogen load limit for the zone which the headroom has been calculated to achieve.
- 38 Any inaccuracy in accounting for existing or likely future on-farm nitrogen loss is important because, for farming activities, Nitrogen Headroom is allocated via Schedule 27 on a per hectare per property basis, not a cumulative total basis. If the initial nitrogen loss is not correctly accounted for, there is potential through Schedule 27 for more nitrogen loss to be allocated to individual properties than is unutilised and available within the Haldon Zone Nitrogen Load Limit. It is the potential for any over allocation of nitrogen to occur (with the consequence that the associated water quality outcomes might not be achieved) that Meridian has sought to address in its submissions.
- 39 In order for the policies and rules applying to the Haldon Zone to be considered the most appropriate way to achieve the freshwater quality management objectives of the CLWRP²⁸, I consider that any potential for over-allocation of nitrogen needs to be addressed. This is supported by the evidence of Dr James²⁹, who has identified that the major threat to water quality in the Upper Waitaki is enhanced nutrient runoff to surface and groundwater from agricultural land-use intensification and other

²⁷ Evidence of Mr Ellwood, paragraph 8

²⁸ In particular, Objectives 3.1, 3.2, 3.6, 3.7, 3.8 and 3.12 (refer to Appendix 1 to my evidence)

²⁹ Evidence of Dr James, paragraph 47

activities such as salmon farms; and that such effects will be most obvious in Lake Benmore, as the major receiving water body in the catchment³⁰.

- 40 Mr Ellwood³¹ has set out his assessment of the additional on-farm nitrogen losses from recently granted irrigation consents, which he considers have not been accounted for in the modelling undertaken to support the available nitrogen load in Schedule 27. He also refers to current water permit applications by Rosehip Orchards NZ Limited and High Country Rosehip Orchards Limited (“**Rosehip**”) (subject to appeal to the Environment Court against the decline of these consents) which seek to exceed the allocation allowed for in Schedule 27.
- 41 The Section 42A report does not acknowledge the concerns expressed by Mr Ellwood regarding some consents granted between December 2013 and 2016. However, the report acknowledges that the Rosehip applications seek to increase nitrogen losses from their operations by more than the PC5 interim allowance of 1.6 kg N/ha/yr, even when the full farm area is taken into account. The report states that, if the water permits are granted (and the associated land use is classified as permitted), the PC5 Nitrogen Headroom would need to be recalculated, resulting in a reduction of the allocation available to other properties on a per hectare basis (of 8%³²), in order to ensure that the available nitrogen load in the Haldon Zone would not become over-allocated³³. The Section 42A report also identifies a further application in process lodged in February 2016³⁴.
- 42 The Section 424A report states that the permitted activity Rule 15B.5.6 (for the use of land for farming, subject to a water permit granted prior to 13 February 2016) does not provide for these three consents, as they were not granted prior to 13 February 2016. The report goes on to refer to the requirement of the NPSFWM for regional plans to ensure water quality is managed to avoid over allocation, concluding that it is inappropriate for PC5 to provide for the use of land for farming by these proposals as a permitted activity³⁵. As a result, the Rosehip proposals (if

³⁰ Evidence of Dr James, paragraph 46

³¹ Evidence of Mr Ellwood, paragraph 23

³² Approximately 8%, Section 42A report, Appendix G page 89

³³ Section 42A report, Appendix G page 89

³⁴ Benmore Irrigation Company Limited, Section 42A report, Appendix G, page 88

³⁵ Section 42A report, Paragraph 22.80, page 313

their water permits are granted) would be subject to further consent application requirements for the use of their land for farming. These would be subject to the PC5 nutrient management requirements, which include conditions restricting nitrogen loss to 1.6kgN/ha/yr in the interim³⁶, and (once PC5 is operative) to not exceeding the Upper Waitaki Nitrogen Headroom available to those properties³⁷. In terms of the notified PC5 provisions, any application to exceed a nitrogen loss of 1.6kgN/ha/yr in the interim would be a non-complying activity³⁸; whereas, once operative, exceeding the Nitrogen Headroom would be prohibited³⁹.

- 43 Despite the hurdles facing the Rosehip applications, there remains the possibility that these could be granted with nitrogen losses exceeding 1.6 kg N/ha/yr. I understand the water permits are currently before the Environment Court and the outcome cannot be known. If the water permits are granted prior to PC5 becoming operative, Rosehip can apply for land use consents for farming with the same nitrogen loss as allowed by the water permits. These applications would face the gateway test of a non-complying activity, including the strong policy direction contained in notified Policy 15B.4.22(a) to restrict nitrogen losses to no more than 1.6 kg N/ha/yr. However, in my opinion, Rosehip could advance some plausible arguments that may persuade a decision-maker to grant these land use consents. Such arguments could refer to water quality effects having already been accepted and established through the Court process; consistent management of land and water in accordance with the Court's decision; and fairness compared with those applications that happened to have been decided prior to February 2016.
- 44 Further, I note that, if granted as applied for, the Benmore Irrigation Company ("**BIC**") discharge consent application would result in those properties receiving water as part of the BIC scheme not requiring land use consent⁴⁰. In the event that the BIC consent were to provide for nutrient losses in excess of 1.6kgN/ha/yr limit, the same issue arises. Given the stage this application is in its process, I assess this to be somewhat unlikely.

³⁶ Rule 15B.5.18B

³⁷ Rule 15B.5.20

³⁸ Rule 15B.5.18C

³⁹ Rule 15B.5.23

⁴⁰ Rule 5.60

- 45 If the Rosehip applications were granted⁴¹, as stated in the Section 42A report, the PC5 Nitrogen Headroom would need to be recalculated to ensure the Haldon Zone does not become over-allocated. As described in the evidence of Mr Ellwood⁴², this could be achieved through an amendment to Schedule 27 to account for both consented and future land uses that post-date the underlying calculations for Schedule 27 but are not subject to the 1.6kgN/ha/yr limit. This could account for any Rosehip consents, as well as the granted consents referred to by Mr Ellwood. He estimates this could result in a 14 - 32% reduction in the unutilised and, therefore, available portion of the Haldon Nitrogen Load Limit⁴³.
- 46 Such an amendment could ensure that, once PC5 is operative, the calculation of available headroom for other properties takes into account the additional nitrogen loss already allocated. Prior to PC5 becoming operative, other properties could continue to apply for land use intensification at a nitrogen loss of 1.6 kg N/ha/yr. However, the associated risk to the environment is smaller due to the shorter timeframe involved⁴⁴, the limited number of properties likely to take up this option, and the small % increase in nitrogen loss.
- 47 In order to address the potential for over-allocation of nutrients within the Haldon Zone, I support making the changes to Schedule 27 recommended by Mr Ellwood, as follows (refer also to Appendix 2 to my evidence)⁴⁵:

Amend the formula for calculating E1 in Schedule 27 (with an associated formula X included) as follows:

*E1 = 66 tonnes N/yr (the unutilised portion of the Haldon Zone Limit in Table 15(f) ~~as at 13 February 2016~~ as at 1 December 2013) * Z*

*Z = 1 - (the amount of on-land based agricultural N load allocated in excess of 1.6 /kg/ha via resource consent granted after 1 December 2013 but before the Rules 5.53A, 5.54A, 15B5.19 to 15B.5.23 become operative) / (66 tonnes * G)*

⁴¹ Or the BIC application is granted in a manner not anticipated.

⁴² Evidence of Mr Ellwood, paragraphs 24-30

⁴³ Evidence of Mr Ellwood, paragraphs 28-29

⁴⁴ Until PC5 is operative

⁴⁵ Evidence of Mr Ellwood, paragraph 30

- 48 Having addressed the issues raised by Meridian with the Haldon Zone Nitrogen Headroom calculations, I have considered whether any further changes are needed to the provisions that implement the nutrient load limits within the relevant zones. My focus has been on ensuring that the PC5 provisions are effective.
- 49 Meridian in its submission sought changes to a number of policies and rules⁴⁶ to ensure that cumulative nitrogen losses from all activities, including farming activities, do not result in the nitrogen load limits in the Ahuriri, Haldon and Lakes Zones being exceeded. I understand these submissions were lodged as a consequence of Meridian wanting to ensure that the Nitrogen Headroom and allocation per property had accurately accounted for all existing or likely future on-farm nitrogen loss and that the allocation per property approach remained part of PC5.
- 50 I have considered whether the changes sought are necessary. My view is that, if there is confidence in the Nitrogen Headroom calculation and subsequent apportionment of that (per kgN/ha/yr), then further changes to the provisions are not necessary to ensure that total nitrogen load limits are not to be exceeded.
- 51 I have only identified one rule where I consider there is an inconsistency of approach that might lead to an undermining of the PC5 approach to firm application of the Nitrogen Headroom, as the basis for ensuring the Haldon Zone Nitrogen Load Limits (and associated water quality outcomes) are not exceeded. This relates to Rule 15B.5.8 for the discharge of nutrients onto or into land on a property that is part of an irrigation scheme.
- 52 Rule 15B.5.8 requires a full discretionary activity consent for the discharge of nutrients as part of an irrigation scheme. For properties in the Haldon Zone, there is no condition requiring the Nitrogen Headroom not to be exceeded on properties within irrigation schemes. The implementation of the Haldon Zone Nitrogen Headroom is dependent on a decision-maker implementing Policy 15B.4.18 which requires any discharge permit to be subject to conditions that restrict total nitrogen loss to the applicable headroom. Exceeding the Nitrogen Headroom for an

⁴⁶ Policies 15B4.16, 15B4.18, 15B4.20, 15B4.21, 15B4.22 and Rules 15B.5.8, 15B.5.9, 15B.5.10, 15B.5.20 and 15B.5.21

irrigation scheme does not result in any change in activity status – it remains to be considered as a discretionary activity.

- 53 The situation I have just described for discharges from irrigation schemes is different from that applied to other forms of farming – as individual farming activities, or as part of a NUG. This may have arisen because the land use aspects of farming as part of an irrigation scheme continue to be managed through Rules 5.60 and 5.61 of the CLWRP. These are not subject to PC5 and are not conditional on the Upper Waitaki Nitrogen Headroom. Whereas for NUG and farming activities, the land use rules of PC5 contain conditions requiring the Upper Waitaki Nitrogen Headroom not be exceeded⁴⁷, with exceedance being a prohibited activity⁴⁸.
- 54 I have some concern regarding the potential implications of this difference in activity status. Prohibited activity status, or even non-complying combined with the strong policy direction of 15B.4.18, provide a clear and certain direction that Nitrogen Headroom is not to be exceeded. This is consistent with the important role of the headroom tool in implementing the Nitrogen Load Limits in Lake Benmore, in order to maintain its freshwater quality. Whereas discretionary activity status allows a wide range of matters to be taken into account.
- 55 In order to apply the same approach to irrigation schemes as to NUG and farming activities, and to avoid a different activity status indicating a different strength of direction in relation to headroom exceedance, I suggest a condition could be added to Rule 15B.5.8 along the following lines, with non-complying or prohibited activity status not to comply with this condition (refer also to Appendix 2 of my evidence.):

The aggregated nitrogen loss calculation for all properties supplied with water by the irrigation scheme or principal water supplier and located with the Haldon or Mid-Catchment Zone does not exceed the aggregate of the Upper Waitaki Headroom available for those properties⁴⁹.

I consider this would be more effective than the notified approach in achieving the freshwater outcomes for Lake Benmore.

⁴⁷ Rule 15B.5.10 (for NUG) and Rule 15B.5.20 (for farming activities)

⁴⁸ Rule 15B.5.11 (for NUG) and Rule 15B.5.23 (for farming activities)

⁴⁹ Similar to Rule 15B.5.10(5)

Water Quality Outcomes and Limits

Waitaki Catchment Water Quality

- 56 Dr James has addressed water quality outcomes and limits necessary to ensure that water quality in the UWFMU is appropriately managed. From a planning perspective, I address three matters consequential upon, and relying on, the evidence of Dr James. These are:
- (a) Providing for better recognition of natural processes and variability (new policy and amendments to Tables 15B(a) and 15B(b));
 - (b) Revising water quality outcomes and setting new water quality limits for Wairepo Arm and Kellands Pond; and
 - (c) Setting new water quality outcomes and limits for Lake Ruataniwha.

Natural processes and variability

- 57 Meridian's submission raised concerns that the natural characteristics and variability of water quality in the Upper Waitaki Catchment had not been appropriately recognised in the setting of water quality outcomes. The concern is that, irrespective of the effects of any activities, the water quality outcomes could not be met in some waterbodies.
- 58 Dr James in his evidence has identified concerns that the current outcomes specified in Tables 15B(a)-(b) do not take into account the special attributes of water bodies in the Upper Waitaki namely⁵⁰:
- (a) Glacial flour, which impacts on aesthetics, optical properties, phytoplankton, macrophytes and periphyton, and sediment cover; and
 - (b) Didymo, which has spread throughout the Waitaki Catchment and impacts on periphyton biomass and macroinvertebrate populations.
- 59 His concern is that, given these characteristics, the water quality outcomes set in Tables 15B(a)-(b) will not be able to be met, even by natural water. He considers that these characteristics should be recognised in setting the outcomes for the UWFMU.
- 60 In several instances, Appendix G of the Section 42A report accepts the concerns addressed by Dr James, for example:

⁵⁰ Evidence of Dr James, paragraph 65

- (a) That monitoring DO throughout a day (including the night) would require revision of the minimum outcome⁵¹ in Table 15B(a); and
- (b) That alpine rivers should not be subject to the requirement for fine sediment cover⁵²:

However, the need for any change to the table is not considered to be the most reasonable option, on the basis that “*scrutiny of this data is going to be made in the assessment of plan efficacy rather than compliance*”⁵³.

- 61 Appendix G of the Section 42A report also addresses submissions on outcomes and limits more generally. In considering how the water quality outcomes are to be applied within the context of the CLWRP, it states⁵⁴:

“Comparison of measured data to Table 15B(a) helps to inform plan efficacy review by providing a benchmark against which to determine the state of streams in the zone rather than strict compliance for consent holders.

Table 15B(a) is not envisaged to provide a pass/fail threshold for plan implementation. Rather the attribute values represent a way to appraise progress towards the intended outcomes of the Plan over its duration. Therefore, Table 15B(a) provides a benchmark against which to compare the environment in order to review the efficacy of the Waitaki Sub-region Section of the CLWRP”.

- 62 A similar statement is made in the Section 42A report, as part of its discussion of the new policy sought by Meridian referring to natural water quality variability. The report states⁵⁵ that “*No amendments were recommended in relation to Tables 15B(a) and 15B(b), as naturally occurring processes will be able to be determined through scrutiny of monitoring data*”.
- 63 In my opinion, these statements in Section 42A report do not accurately reflect the approach specified in the existing policies of the CLWRP that are unchanged by PC5, in particular Policies 4.1 and 4.2 of the CLWRP. These policies are:

⁵¹ Section 42A report, Appendix G, page 96

⁵² Section 42A report, Appendix G, page 97

⁵³ Section 42A report, Appendix G, page 97

⁵⁴ Section 42A report Appendix G pages 94-95

⁵⁵ Section 42A report, paragraph 24.29, page 415

4.1 Lakes, rivers, wetlands and aquifers will meet the fresh water outcomes set in Sections 6 to 15 within the specified timeframes. If outcomes have not been established for a catchment, then each type of lake, river or aquifer should meet the outcomes set out in Table 1 by 2030.

4.2 The management of lakes, rivers, wetlands and aquifers will take account of the fresh water outcomes, water quantity limits and the individual and cumulative effects of land uses, discharges and abstractions will meet the water quality limits set in Sections 6 to 15 or Schedule 8 and the individual and cumulative effects of abstractions will meet the water quantity limits in Sections 6 to 15.

64 The relationship of these policies with the catchment-specific policies is described in the CLWRP⁵⁶ as:

“The Policies of this Plan implement the Objectives in Section 3 and must be read in their entirety and considered together.

Where the Plan contains Policies in Section 4 and in the relevant sub-region Section on the same subject matter, the more specific sub-region Policy will take precedence, except in relation to Policies 4.2 to 4.9. Policy 4.1 will also take precedence unless catchment specific outcomes are specified in the sub-region Section.”

65 Although the focus of the PC5 provisions is on the management of nutrients, it is through this plan change that the Waitaki-specific, sub-regional, freshwater outcomes and water quality limits are being set. These have significance in the context of the wider CLWRP provisions, for a range of activities that are not specifically the focus of Part B of PC5.

66 My interpretation of Policies 4.1 and 4.2 is that the outcomes specified in Tables 15B(a)-(b) have a wider role than simply providing a benchmark against which to compare the environment, in order to review the efficacy of the Waitaki sub-region section of the CLWRP (as expressed in the Section 42A report)⁵⁷. Whilst Policy 4.1 is written as stating long-term outcomes for lakes, rivers, wetlands and aquifers, Policy 4.2 is focussed on *“the management”* of those waterbodies. In my opinion, the

⁵⁶ CLWRP Section 4 Policies page 52

⁵⁷ Section 2.6 2)(c) of the CLWRP states that resource consents are required where the Council has determined that a case-by-case assessment is required to assess whether the objectives and the in-stream fresh water outcomes sought by the Plan will be achieved.

“*management*” focus in Policy 4.2 could readily be interpreted as applying to the consideration of resource consents, whether or not to grant consents and the appropriate conditions to impose.

- 67 I consider it would be reasonable for a consent authority to take account of the water quality outcomes in Tables 15B(a)-(b) when considering consent applications to take, dam and divert water, and the associated discharges. Although “*scrutiny of monitoring data*” may be able to determine that “*naturally occurring processes*” are resulting in the outcomes not being met for some waterbodies, this is not reflected in the wording of Policy 4.2. I consider there could be no certainty in a consent situation that these ‘naturally occurring processes’ would be taken into account, or how much weight would be put on them when determining applications or setting consent conditions.
- 68 By way of a possible example, one of Meridian’s resource consents is the discharge of natural flood water from the managed Lake Ohau into the Upper Ohau River⁵⁸. This discharge constitutes the full flow of the river. I understand from Dr James’ evidence that the water would not always meet the fine sediment standard in Table 15B(a) for lake-fed rivers in the Upper Waitaki, due to its natural glacial flour⁵⁹. Policy 4.2 could be interpreted as requiring the management of the Upper Ohau River (by way of this discharge consent) to achieve, or at least assist in achieving, the freshwater outcomes, including for fine sediment. From my understanding, this would not be possible.
- 69 Current examples of freshwater outcomes being implemented directly through conditions of consent can be found in the suite of consents granted over recent years for irrigation in the Upper Waitaki⁶⁰. Several of these include environmental trigger conditions which refer to the TLI in Wairepo Arm. This attribute is only included in Table 15B(b) as a freshwater outcome, and not in Table 15B(d) as a water quality limit. Similarly, other irrigation consents include environmental triggers relating to Chlorophyll a (periphyton) in downstream rivers (only specified as an outcome for rivers), and the discharge consent for Mt Cook Alpine Salmon includes a requirement for a macrophyte management plan for Lake Benmore (more aligned with the lake outcomes than the limits).

⁵⁸ CRC905332

⁵⁹ Evidence of Dr James, paragraph 66

⁶⁰ Evidence of Mr Page, Appendix 1

- 70 As part of the full package of provisions addressing water quality in the CLWRP, including PC5, I consider it important that the natural characteristics of the waterbodies, and the implications of these for the achievement of the water quality outcomes, be acknowledged. The most appropriate place to do this is within the Waitaki-specific, sub-regional provisions introduced as part of PC5. This will provide an Upper Waitaki catchment-specific context to the achievement of Objectives⁶¹ 3.8 (safeguarding the life supporting capacity of ecosystems and ecosystem processes) and 3.16 (maintaining freshwater bodies and their catchments in a healthy state) by recognising natural water characteristics which can exceed the specified water quality outcomes in Tables 15(a)-(b).
- 71 The changes to Tables 15B(a) and 15B(b) necessary to address the concerns of Dr James are shown in Appendix 2.
- 72 I acknowledge that, if the attributes in the outcomes tables are amended, these could apply to water quality effects of “non-natural” activities, caused or produced by human activity. However, Dr James considers⁶² that the specific natural conditions of the upper Waitaki waterbodies are significant enough to be incorporated into their attributes in the outcome tables.
- 73 However, if amending the tables is not considered the most appropriate way to achieve the objectives, particularly 3.8 and 3.16, I consider the freshwater outcomes tables could remain unchanged and the variability associated with natural characteristics addressed by way of a policy. A new policy could be inserted which specifically recognises the influence of naturally occurring processes on freshwater quality within the Waitaki sub-region. This could provide important policy context to the implementation of Policies 4.1 and 4.2 within the Waitaki sub-region. Having solely a policy approach and not amending the tables would overcome concern expressed in the Section 42A report regarding the inappropriate wider application of amended freshwater outcomes.
- 74 I consider an appropriate policy is (refer also to Appendix 2):

⁶¹ Refer to Appendix 1 to my evidence.

⁶² Evidence of Dr James, Paragraph 81

Within the Waitaki sub-region Freshwater Management Units, when implementing Policies 4.1 and 4.2 to take into account that the existing freshwater quality in the lakes and rivers is influenced by naturally occurring processes, including the glacial origin of the water, and natural variation.

- 75 I support the insertion of this policy. It provides for specific, sub-regional natural processes and variations in water quality to be considered. However, the wording of the new policy is not determinative as to any particular freshwater outcome, rather, it will enable implications of natural variations to be considered on a case-by-case basis alongside the other policies within the CLWRP, including the predominant requirements of Policies 4.1 and 4.2.

Wairepo Arm and Kellands Pond

- 76 Meridian's submission regarding Wairepo Arm and Kellands Pond has sought tighter water quality outcomes in Table 15B(b) and new water quality limits in Table 15B(d). Dr James has addressed water quality in these water bodies in his evidence. He has identified that both Kellands Pond and Wairepo Arm have direct hydrological linkages to Lake Benmore⁶³ and outcomes and limits should be set in Tables 15B(b) and 15B(d) for these waterbodies to protect both them and Lake Benmore downstream⁶⁴. He has recommended that the appropriate limits should be set at the existing TLI of 3.2, TP <10 mg/m³ and annual median and maximum chlorophyll a of <2 and <10 mg/m³.
- 77 The Section 42A report recommendation⁶⁵ is that a TLI of 3.7 be set for Kellands Pond and a TLI of 4.0 apply to Wairepo Arm. Dr James evidence explains why different outcomes and limits should be set.
- 78 Within the Section 42A report⁶⁶, emphasis is placed on the introductory statement to Table 15B(b) "*Where existing water quality is better than the outcome, the outcome is to maintain that water quality*". I understand the Officer to be expressing the view that it is reasonable for the TLI in Table 15B(b) for Wairepo Arm to be greater than (more liberal than) the existing water quality because the effect of the introductory

⁶³ Evidence of Dr James, paragraphs 18 and 84

⁶⁴ Evidence of Dr James, paragraph 84

⁶⁵ Section 42A report page 235

⁶⁶ Para 15.45

statement is to over-ride the Table's specific attribute values by setting a management outcome to maintain existing water quality. I have carefully considered this interpretative approach and cannot support it. In practical terms, this interpretative approach mean there could be no available headroom for nitrogen allocation in the Haldon Arm of Lake Benmore.

- 79 In Appendix 2, I show the changes to Tables 15B(b) and 15B(d) necessary to address the water quality matters for Wairepo Arm and Kellands Pond, as set out in the evidence of Dr James.
- 80 I support these changes and consider they would positively contribute towards the effective implementation of policies, in particular Policy 4.37. This policy seeks that "*freshwater quality is improved within the Lake Zone and Red Nutrient Allocation Zone*" through managing nitrogen losses. The location of Wairepo Arm and Kellands Pond within a sensitive Lake Zone supports specifically recognising both Kellands Pond and Wairepo Arm within Tables 15B(b) and 15B(d).
- 81 I consider that making these changes are most appropriate way to achieve the objectives in the CLWRP, in particular Objectives 3.8 and 3.16. In supporting these changes I have assumed that Meridian's submission provides the necessary scope to allow the changes to be made. In particular I have noted that Meridian's submission makes reference to a TP limit of <20 "or better (stricter water quality limits)" and does not specify the TP <10 limit recommended by Dr James. I understand the question of scope will be addressed by counsel.

Lake Ruataniwha

- 82 Meridian has sought water quality outcomes in Table 15B(b) and water quality limits in Table 15B(d) for Lake Ruataniwha. Dr James has addressed this in his evidence. He has identified Lake Ruataniwha as an artificial lake on-river, and a critical link between the upper lakes (Pukaki and Ohau) and Lake Benmore and the lower lakes⁶⁷. He considers that limits should be set for Lake Ruataniwha and be at least equivalent to those of the Haldon Arm (TLI 2.7) into which the water from Lake Ruataniwha discharges. In recognising the high quality of the

⁶⁷ Evidence of Dr James, paragraphs 18 and 69

feeder lakes, he considers TLI should be measured near the outlet as this location accounts for attenuation within the lake.

- 83 The Section 42A report has not recommended including limits for Lake Ruataniwha⁶⁸. The rationale is that it is difficult to model and therefore difficult to set TLI limits. I note that prior to the notification of PC5 the freshwater outcomes for Canterbury Lakes were as specified in Table 1b of the CLWRP⁶⁹. These outcomes applied to water bodies classified within specified management units. One of the management units is “Artificial lakes-on river”, which would apply to Lake Ruataniwha. For this management unit, Table 1(b) set a TLI index of 3. Therefore, prior to the notification of PC5, Lake Ruataniwha was already subject to a TLI of 3. I consider the inclusion of freshwater outcomes and limits for Lake Ruataniwha within the Waitaki-specific tables in PC5 is consistent with the approach that existed prior to the notification of PC5.
- 84 Dr James in his evidence has considered whether appropriate TLI limits for Lake Ruataniwha can be set and he considers they can. He has recognised that Lake Ruataniwha is under pressure from nutrient loss increases⁷⁰. In order for water quality to be maintained to a high level, reflecting the high quality of waters entering the lake, he considers it is appropriate for a TLI to be applied while more sampling is carried out. He states that not including a provisional TLI for Lake Ruataniwha would mean the cumulative inputs from land-use intensification and aquaculture may not be appropriately managed to ensure the health of water bodies further down the Waitaki⁷¹, in particular the Haldon Arm of Lake Benmore. He has recommended setting levels that are less stringent than those sought in the submission of Meridian.
- 85 In Appendix 2, I have shown the changes to Tables 15B(b) and 15B(d) relating to Lake Ruataniwha.
- 86 I support making these changes. Setting outcomes and limits for Lake Ruataniwha will contribute to the effective implementation of Policy 4.38, which is to: *“Require the adoption of the best practicable options to minimise the loss of nutrients from farming activities in areas where*

⁶⁸ Section 42A report paragraph 15.70 Page 244

⁶⁹ CLWRP Table 1b Freshwater Outcomes for Canterbury Lakes Page 57

⁷⁰ Evidence of Dr James, paragraph 70

⁷¹ Evidence of Dr James, paragraph 72

region-wide water quality outcomes are at risk of not being met, that are shown by an Orange⁷² colouring on the Series A Planning Maps.”

- 87 Similarly to my consideration of Wairepo Arm and Kellands Pond, I consider that making these changes are the most appropriate way to achieve the objectives in the CLWRP, in particularly Objectives 3.8 and 3.16.

Adaptive Management (or Monitoring and Response)

- 88 Adaptive management (or monitoring and response) is addressed in Policy 15B.4.20(d) in the context of maintaining freshwater quality in the UWFMU.

- 89 Meridian lodged a submission supporting policy recognition for adaptive management approaches in the context of the UWFMU and sought additional matters be included within clause 15B.4.20(d). As notified, the clause reads:

15B.4.20 Freshwater quality is maintained in the Upper Waitaki Freshwater Management Unit by:

.....

- (d) applying to any resource consent granted for the use of land for a farming activity, or any permit granted for a discharge associated with an aquaculture operation or community wastewater activity, adaptive management conditions in accordance with the water quality limits set out in Tables 15B(c), 15B(d) and 15B(e)*

- 90 Meridian sought this be amended to refer not only to water quality limits but also outcomes, and to provide more detail as to the type of matters that may be considered in any adaptive management approach. The policy in Meridian’s submission is:

15B.4.20 Freshwater quality is maintained in the Upper Waitaki Freshwater Management Unit by:

.....

- (d) applying to any resource consent granted for the use of land for a farming activity, or any permit granted for a discharge associated with an aquaculture operation or community wastewater activity, adaptive management conditions in accordance with the water quality limits and outcomes set out in Tables 15B(a), 15B(b), 15B(c), 15B(d) and 15B(e) and to achieve the Waitaki Nitrogen load limits in Tables 15B(f)-(h), which include:*
(i) ensuring appropriate monitoring of the receiving environment

⁷² Evidence of Dr James, paragraph 70 is that Lake Ruataniwha falls within the Haldon Arm (orange) zone.

- (ii) imposing early warning triggers, where appropriate
- (iii) achieving consistency across all consents within the same environment
- (iv) identifying responsibilities and actions if exceedances occur.

- 91 Mr Ellwood has given examples of changes in farm management practices that can be encouraged, or required, through adaptive management conditions, and which will result in reductions in nitrogen losses⁷³.
- 92 In my experience, applying an adaptive management approach, typically through the imposition of conditions of consent, enables consents to be granted and activities undertaken in circumstances where some uncertainty remains as to the potential effects of the activity. This can allow sustainable management, to be promoted, when otherwise consents may need to be declined because of uncertainty of effects. Dr James in his evidence has addressed his concerns regarding the potential effect of various lag times before the impact of nutrient discharges are evident in waterbodies⁷⁴. There are also inherent uncertainties in the modelling and analysis undertaken to establish the Nitrogen load limits and Nitrogen Headroom to achieve the freshwater quality outcomes⁷⁵. This type of uncertainty can potentially be managed through consideration of adaptive management approaches. I understand this has been the approach applied to existing consents for irrigation water in the Upper Waitaki.
- 93 I am aware that Meridian has participated in many of the Upper Waitaki irrigation water permit (s14 of the RMA) applications⁷⁶, in order to seek that only appropriate irrigation is consented and that there is a monitoring and response regime required on the relevant consents if water quality further and unacceptably degrades.
- 94 I have reviewed the conditions of consent on a number of these applications. Attached to Mr Page's evidence is a table with numerous examples of resource consent applications that have been granted in the UWFMU and have adaptive management conditions imposed. He has

⁷³ Evidence of Mr Ellwood, paragraphs 40-50.

⁷⁴ Evidence of Dr James, paragraph 60

⁷⁵ Evidence of Dr James, paragraph 68

⁷⁶ Starting with the determination of those consent applications 'called in' through Schedule 2 of the Resource Management (Waitaki Catchment) Amendment Act 2004

also attached a copy of a Consent Order of the Environment Court⁷⁷ for Five Rivers Limited, which provides an example of the detailed adaptive management conditions imposed. The conditions of relevance are Conditions 95-123. These specify the monitoring required to ensure water quality is appropriately managed and the responses needed if water quality monitoring shows nutrient trigger levels are exceeded.

95 In summary, the approach on the approved water permits is as follows. Water quality conditions are imposed that consist of:

- (a) Efficient use of water for spray irrigation, including through the specification of an annual volume;
- (b) Setting of a maximum permissible nutrient loading in the form of a Nutrient Discharge Allowances (NDA) for Nitrogen and Phosphorous for the property (not just the irrigated area subject to the water permit.);
- (c) Management of that NDA on an annual basis via OVERSEER (including the management of OVERSEER version changes);
- (d) Requiring Farm Environmental Management Plans (FEMP) and compliance therewith, which capture mitigations that are not part of OVERSEER considerations;
- (e) Setting of environmental water quality triggers, including early warning triggers and environmental standard triggers, for downstream rivers and lakes (including Lake Benmore);
- (f) Environmental monitoring in the December to April period of each year;
- (g) Response if the triggers are exceeded, including:
 - (i) Reporting and/or independent investigation into the exceedance, with 'relief' from (ii) below applying where the investigation finds the trigger exceedance is unlikely to be caused in whole or part by the nutrient loss associated with the water permit;

⁷⁷ An appeal pursuant to section 120 of the Act between Five Rivers Limited and Canterbury Regional Council (ENV-2011-CHC-136)

- (ii) Preparation and implementation of Remedial Action Plan where triggers are exceeded, with recommended actions required to be incorporated into the relevant FEMP;
 - (iii) Year on year reductions in the permissible NDA until the monitoring demonstrates the triggers are no longer exceeded;
- 96 As I understand it, the above approach performs two functions:
- (a) Firstly, it provides for nutrient reductions at source if the receiving environment is unacceptably affected; and
 - (b) Secondly, it creates a collective “responsibility” for those contributing to the discharge of nutrients to address the adverse effects.
- 97 In considering this approach, I recognise that it is not without its difficulties as the relationships between the farming system, nutrient loss, contaminant pathway and lake (or river) response are subject to scientific uncertainty, as has been described by Dr James, and are likely to involve nutrient losses from several properties.
- 98 While not perfect, without an adaptive management approach similar to that I have outlined above, in my view the options are that either:
- (a) The resulting effects on the environment be accepted for some time, as the necessary response would be to initiate a Plan Change after the nutrient trigger levels have been exceeded and then, once operative, initiate a review of individual consent conditions. Experience has shown that such an approach can take years to action; or
 - (b) Resource consents for the discharge of nutrients are not granted until such time as improved knowledge is available to address matters such as lag time for nutrient transfer or to provide better understanding between nutrient loss, attenuation and lake response, if indeed certainty can realistically be achieved.
- 99 Given the above, I consider that retaining the ability to apply adaptive management conditions to resource consents is important to the achievement of water quality outcomes for the UWFMU. In my opinion,

it is also important that a consistent approach is able to be applied across either the whole UWFMU, or the zone.

- 100 The Section 42A⁷⁸ report has recommended a change be made to this clause and has attributed this to the submissions lodged by Meridian and Genesis. The recommended change to Clause (d) is:

15B.4.20 Freshwater quality is maintained in the Upper Waitaki Freshwater Management Unit by:

.....

(d) applying to any resource consent granted for the use of land for a farming activity, or any permit granted for a discharge associated with an aquaculture operation or community wastewater activity, monitoring and response conditions which accords with the water quality limits set out in Tables 15B(c), 15B(d) and 15B(e) and relates specifically to the effects caused by the activity.

- 101 I do not support the recommended change in the Section 42A report. In particular, I consider the addition of the words “*and relates specifically to the effects caused by the activity*” to be unnecessary and that they do not assist in the effective implementation of the policy, which is to maintain freshwater quality in the UWFMU.
- 102 Further, the inclusion of these words does not appear consistent with the adaptive management approach that has been applied on many of the water permits issued for irrigation activities in the Upper Waitaki identified by **Mr Page**. Although the Section 32 report⁷⁹ states that the management of localised effects by way of adaptive management conditions would align with the approach taken in previous consents in the Upper Waitaki, that is not my understanding of the full effect of the conditions applied in those consents.
- 103 Those consents require that monitoring of water quality in surface water bodies take place downstream of the water take and irrigation activity. The consents generally have conditions requiring monitoring of water quality (including TLI) in the downstream lakes at relevant locations, depending on waterbodies potentially affected. The majority of the Upper Waitaki consents have a monitoring point specified at Lower Lake Benmore, as the downstream point of all of the UWFMU zones (Lakes, Haldon and Ahururi). This goes well beyond the monitoring of localised

⁷⁸ Section 42A report paragraph 19.32 page 278, and s42A Report Errata, page 1

⁷⁹ Section 32 report, page 13-24

effects directly caused by the particular irrigated land use activity, and includes an ability to examine the cumulative or collective aspect I referred to above.

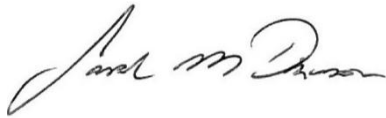
- 104 The monitoring and response approach in the conditions of these consents enables the sensitivity of the lake and river receiving environments to any underestimated effects of consented nutrient loads to be firstly monitored. Then if an unanticipated effect occurs, the conditions require a response from consent holders to decrease the amount of nutrients being discharged. This adaptive management approach provides the ability to implement remedial actions resulting from nutrient discharges without having to delay any response until a Plan Change and consent review process and timeframe has been gone through.
- 105 While not perfect, the adaptive management mechanism enables the cause of any unanticipated nutrient load effects to be investigated and determined on either an individual or collective basis. As consistent conditions have now been imposed on a large number of consents, if water quality trigger levels are exceeded, remedial actions including nitrogen loss reduction, can be enforced across contributing properties.
- 106 I have considered whether it is necessary to specify the additional clauses sought by Meridian, which describe the type of adaptive management approaches that may be applied. Whilst these provide additional guidance and reflect the adaptive management approaches that have been used for water consents in the Upper Waitaki, I do not consider it necessary to specify this additional level of detail.
- 107 However, I do support the inclusion of reference to “*outcomes*” and “*Tables 15B(a) and 15B(b)*”. As I explained earlier in my evidence, many, if not most, of the consents granted over recent years for irrigation in the Upper Waitaki, include conditions based on freshwater outcomes and limits. This reflects the approach within these consents to achieving freshwater outcomes for the FMU.
- 108 Having reconsidered the additions to this policy sought by Meridian, as well as the new clause recommended in the Section 42A report, I have come to the view that the following wording is the most appropriate. It will assist in the effective implementation of the policy to maintain freshwater quality in the UWFMU. It is more efficient to retain some

flexibility in the wording of the policy, without the addition of unnecessary detail.

15B.4.20 Freshwater quality is maintained in the Upper Waitaki Freshwater Management Unit by:

.....

- (d) applying to any resource consent granted for the use of land for a farming activity, or any permit granted for a discharge associated with an aquaculture operation or community wastewater activity, adaptive management conditions in accordance with the water quality limits and outcomes set out in Tables 15B(a), 15B(b), 15B(d) and 15B(e).*



Sarah Margaret Dawson

22 July 2016

Appendix 1

Canterbury Land and Water Regional Plan Objectives (referred to in the evidence)

Objective 3.1 Land and water are managed as integrated natural resources to recognise and enable Ngai Tahu culture, traditions, customary uses and relationships with land and water.

Objective 3.2 Water management applies the ethic of ki uta ki tai – from the mountains to the sea - and land and water are managed as integrated natural resources recognising the connectivity between surface water and groundwater, and between freshwater, land and the coast.

Objective 3.5 Land uses continue to develop and change in response to socio-economic and community demand.

Objective 3.6 Water is recognised as essential to all life and is respected for its intrinsic values.

Objective 3.7 Freshwater is management prudently as a shared resource with many instream and out-of-stream values.

Objective 3.8 The quality and quantity of water in fresh water bodies and their catchments is managed to safeguard the life-supporting capacity of ecosystems and ecosystem processes, including ensuring sufficient flow and quality of water to support the habitat and feeding, breeding, migratory and other behavioural requirements of indigenous species, nesting birds and , where appropriate, trout and salmon.

Objective 3.10 Water is available for sustainable abstraction or use to support social and economic activities and social and economic benefits are maximised by the efficient storage, distribution and use of the water made available within the allocation limits or managing regimes which are set in this Plan.

Objective 3.11 Water is recognised as an enabler of the economic and social wellbeing of the region.

Objective 3.12 When setting and managing within limits, regard is had to the community outcomes for water quality and quantity.

Objective 3.16 Freshwater bodies and their catchments are maintained in a healthy state, including through hydrological and geomorphic processes such

as flushing and opening hapua and river mouths, flushing algae and weed growth and transporting sediment.

Appendix 2

Amendments sought to PC5

15B.4 Policies:

Amend **Policy 15B.4.20(d)** as follows:

15B.4.20 Freshwater quality is maintained in the Upper Waitaki Freshwater Management Unit by:

.....

(d) applying to any resource consent granted for the use of land for a farming activity, or any permit granted for a discharge associated with an aquaculture operation or community wastewater activity, adaptive management conditions in accordance with the water quality limits and outcomes set out in Tables 15B(a), 15B(b), 15B(d) and 15B(e).

Add the following **new policy**:

Within the Waitaki sub-region Freshwater Management Units, when implementing Policies 4.1 and 4.2 to take into account that the existing freshwater quality in the lakes and rivers is influenced by naturally occurring processes, including the glacial origin of the water, and natural variation.

15B.5 Rules:

Add the following as **Condition 2. to Rule 15B.5.8**, with non-complying or prohibited activity status not to comply with this condition:

15B.5.8 The discharge of nutrients onto or into land where the property is supplied with water by an irrigation scheme of principal water supplier is a discretionary activity, provided the following conditions are met:

.....

2. The aggregated nitrogen loss calculation for all properties supplied with water by the irrigation scheme or principal water supplier and located with the Haldon or Mid-Catchment Zone does not exceed the aggregate of the Upper Waitaki Headroom available for those properties.

Schedule 27:

Amend the formula for calculating **E1 in Schedule 27** (with an associated formula X included) as follows:

$$E1 = 66 \text{ tonnes N/yr (the unutilised portion of the Haldon Zone Limit in Table 15(f) ~~as at 13 February 2016~~ as at 1 December 2013) * Z}$$

$$Z = 1 - \frac{\text{(the amount of on-land based agricultural N load allocated in excess of 1.6 /kg/ha via resource consent granted after 1 December 2013 but before the Rules 5.53A, 5.54A, 15B5.19 to 15B.5.23 become operative) / (66 tonnes*G)}}{66 \text{ tonnes*G}}$$

Tables 15B(a) and 15B(b):

Amend Tables 15B(a) and 15B(b) in accordance with the following tables.

Table 15B(a) : Freshwater Outcomes for Rivers in the Upper Waitaki Freshwater Management Unit to be achieved by 2030¹

Freshwater Management Unit	River Type	Ecological Health Attributes			Macrophyte Attributes		Periphyton Attributes		Siltation Attribute	Human Health for Recreation Attributes			Tangata Whenua Attribute				
		QMCi ² (min score)	Dissolved oxygen (min saturation [%]) - Daily median or equivalent	Temp. (Max) [degrees C] 90 th percentile for daily max assessed on an annual basis	Emergent macrophytes [max bed cover of [%]]	Total macrophytes [max cover of [%]]	Chlorophyll a [mg chl-a/m2] ⁵	Filamentous Algae >20mm [max cover of bed]	Fine sediment <2mm diameter [max cover of bed] [%] <u>Excludes rivers naturally influenced by glacial flour</u>	Cyano-bacteria mat cover [%]	SFR G3	E.Coli [E.coli/100ml]					
Natural State	Rivers are maintained in a natural state												Annual Median	95th Percentile			
Upper Waitaki	Alpine-upland	6	90	20-19	No Values Set	No Values Set	50	10	10	20	Good	<260	Freshwater mahinga kai species sufficiently for abundant customary gathering, water quality is suitable for their safe harvesting, and they are safe to eat				
	Hill-fed upland								15								
	Hill-fed lower								200					30	50	Good to Fair	<540
	Lake-fed ¹								10					50 [†]	Good		
Spring-fed upland	20	30	50	10	20	Good											
Valley and Tributaries	Hill-fed lower	5	70 80	20-19	No Values Set	No Values Set	200	30	15	50	Good to Fair	<260					
	Lake-fed								10					Good			
	Spring fed plains								20					No Value Set			
Hakataramea	Hill-fed lower	6	90	20-19	No Value Set	No Value Set	200	30	15	50	Good to Fair	<540					
	Spring-fed lower basin	5							10					Fair			
Northern Fan Catchment	Hill-fed lower	6	70 80	20-19	No Value Set	No Value Set	200	30	15	50	Good to Fair	<540					
	Spring-fed plains	5							20					No Value Set			

¹ Note shaded text indicates recommended changes recommended in S42A report

Table 15B(b) : Freshwater Outcomes for Lakes in the Upper Waitaki Freshwater Management Unit to be achieved by 2030²

Lake Type	Lakes	Ecological Health Attribute			Eutrophication Attribute	Visual Quality Attribute	Human Health for Recreation Attribute			Tangata Whenua Attribute	
		Dissolved Oxygen (min saturation) [%]	Temp. (max) [° C]	Lake SPI ¹ [min grade]	TLI ² [max. annual average]	Colour	Cyanobacteria [either mm ³ /L or cells/mL] [80 th percentile]	SFRG	E. coli [E.Coli/100mL]		
									Annual median		95 th percentile
Natural state	Dumb-bell Lake Tasman Lake Blue Lake Hooker Lake	Lakes are maintained in a natural state									
Large High Country Lakes	Lake Tekapo/Takapo Lake Ōhau Lake Pukaki	70% - hypolimnion/ 90% epilimnion	19	Excellent Excludes lakes naturally influenced by glacial flour	1.7 for all lakes	Lakes are maintained in a natural state	<0.5mm ³ /L biovolume equivalent for all cyanobacteria or <500 cells/mL of total cyanobacteria	Good	<260	Freshwater mahinga kai species sufficiently abundant for customary gathering, water is suitable quality for their safe harvesting, and they are safe to eat.	
Small to medium sized high country lakes	Lake Alexandrina Lake McGregor Lake Middleton			High	Lake Alexandrina 3.1 Lake McGregor 3.2 Lake Middleton 3.6						
Artificial lakes - on-river	Lake Benmore Lake Aviemore Lake Waitaki <u>Lake Ruataniwha</u>				Lake Benmore at Haldon Arm 2.7 Lake Benmore at Ahuriri Arm 2.9 Lake Benmore at Dam 2.7 <u>Lake Ruataniwha at Dam 2.7</u>						
Artificial Lakes Other	Kellands Pond Wairepo Arm	20% hypolimnion	Suitable for the purpose of the Lake	Suitable for the purpose of the Lake	4 for all Lakes - Kellands Pond 3.7 3.2 <u>Wairepo Arm 4</u> <u>Wairepo Arm 3.2</u>	Natural colour of the lake is not degraded by more than 5 Munsell Units	Good-Fair	<260	<540		

² Note shaded text indicates recommended changes recommended in S42A report

15.7.2 Water Quality Limits for Lakes

Table 15B(d): Water Quality Limits for Lakes in the Upper Waitaki Freshwater Management Unit³

Lake Type	Lake Name and measurement location	TLI ¹ [maximum annual average]	Total Phosphorus (TP) concentration [mg/m ³] [annual median]	Total Nitrogen concentration [mg/m ³] [annual median]	Chlorophyll a concentration (mg/m ³)		Ammoniacal Nitrogen Concentration (mg/L) ²	
					Annual median	Annual maximum	Annual median	Annual maximum
Large high country lakes	Lake Tekapo: map reference 2311557 5694042	1.7 for all lakes	<10	<160 (seasonally stratified) for all lakes	<2	<10	<0.03	<0.05
	Lake Ohau: map reference 2292672 5653482							
	Lake Pukaki: map reference 2285797 5675254							
Small to medium sized High Country lakes	Lake Alexandrina: map reference 2305600 5694000	3.0	<20	<350 (seasonally stratified)				
	Lake McGregor: map reference 2306958 5693747	3.2						
	Lake Middleton: map reference 22585000 5654000	3.6						
Artificial lakes - on-river	Lake Benmore Ahuriri Arm: map reference 2280270 5626670	2.9	<10	<160 (seasonally stratified)	<5			
	Lake Benmore Haldon Arm: map reference 2288092 5636130	2.7						
	Lake Benmore at Dam: map reference 2287977 5623571	2.7						
	Lake Aviemore: map reference 2295464 5615958	2.0						
	Lake Ruataniwha map reference (at Dam)	2.7						
Artificial lakes – on-river	Kellands Pond 2275898-5652428 1365979 5090899 ⁴	4.0 3.7 3.2		<500 (polymictic) <350				
	Wairepo Arm 1366937 5090850 ⁵	3.2						

³ Note shaded text indicates recommended changes recommended in S42A report

⁴ NZTM Grid Reference

⁵ NZTM Grid Reference