in the matter of: the Resource Management Act 1991

and

in the matter of: a number of applications to take and use water from the Upper Waitaki catchment

Brief of evidence of Richard Jonathon Turner

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BRIEF OF EVIDENCE OF RICHARD TURNER

INTRODUCTION

1 My full name is Richard Jonathon Turner.

2 I am currently employed as Meridian Energy Limited's (Meridian) Planning Manager – Natural Resources. In this position I am responsible for managing Meridian's response to resource consent applications by third parties to take and use water in the Upper Waitaki and Waiau (Manapouri) Catchments. I am also responsible for co-ordinating Meridian's involvement in any national, regional or district planning documents that have the potential to impact upon the Company's existing operations, water entitlements and growth and development prospects.

3 I am authorised to present this evidence on behalf of Meridian.

4 Prior to my current role I held the position of Planner – Operations with Meridian for a period of two years. In that position I:

4.1 Managed and prepared resource consent applications associated with Meridian's existing electricity generation infrastructure; and

4.2 Managed Meridian's involvement in all third party activities (including water takes) with the potential to adversely affect the effective and efficient operation of the Company's electricity generation infrastructure.

5 Before joining Meridian I was employed by TrustPower Limited in Tauranga as a Senior Environmental Officer. This role also involved the application of the Resource Management Act 1991 (RMA) to the existing electricity generation activities and development proposals being undertaken by TrustPower.

6 I hold the qualification of Bachelor of Planning (Hons) from the University of Auckland and am a full member of the New Zealand Planning Institute. I am also a member of the International Association of Impact Assessment (IAIA).

7 In preparing this evidence I have reviewed:

7.1 The evidence of **Ms Moss**, **Dr Griffiths**, **Mr Potts**, **Mr Callander**, **Mr Ford / Mr Harris**, **Dr Ryan**, **Ms Sutherland**, **Dr Snelder**, **Mr Greenaway** and **Mr Gimblett** that is being called by Meridian;

7.2 "*Cumulative Water Quality Effects of Nutrients from Agricultural Intensification in the Upper Waitaki Catchment –*

Summary Report"; GHD on behalf of Mackenzie Water Research Limited (MWRL), August 2009;

7.3 "*Lake Benmore Water Quality: A modelling method to assist with limits for nutrient loadings*"; NIWA on behalf of Environment Canterbury (ECan), August 2009;

7.4 The evidence of **Mr McIndoe**, **Dr Coffey**, **Dr Ryder**, **Dr Robson**, **Dr Robson** and **Dr Bright** (joint brief) and **Mr Kyle** on behalf of MWRL; and

7.5 The Section 42A reports of **Ms Penman** and **Dr Freeman** on behalf of ECan.

SCOPE OF EVIDENCE

8 In this evidence I outline:

8.1 Meridian's interests in the water quality of the Upper Waitaki Catchment and the actual and potential adverse effects on the Waitaki Power Scheme associated with the proposed changes in water quality from the current resource consent applications by replacement applicants and new applicants who hold shares in Mackenzie Irrigation Company (MIC) (collectively referred to as the 'applicants');

8.2 Meridian's concerns, and areas of disagreement with, the cumulative water quality assessment that has been undertaken by MWRL;

8.3 Those aspects of the agreement between Meridian and MIC that are relevant to the current resource consent applications, including the agreed common consent conditions and the provision of off take structures to be constructed on / attached to Meridian's infrastructure;

8.4 The derogation approval process for replacement and new resource consent applications to take and use water for agricultural and horticultural activities; and

8.5 Meridian's response to the evidence on behalf of MWRL.

MERIDIAN'S INTEREST IN WATER QUALITY IN THE UPPER WAITAKI CATCHMENT

9 Meridian's interest in potential water quality changes in the Upper Waitaki Catchment as a result of irrigation development stems back to the assessment it commissioned in 2005. This assessment was entitled "*Water Quality Impacts from Irrigation Development – Upper Waitaki*". It was undertaken by Glasson Potts Fowler (GPF)

and NIWA with assistance from GNS, AgResearch, HortResearch and Landcare Research. A copy of this assessment is attached as **Annexure A** to my evidence.

10 This assessment was commissioned as up until the early 2000's there had been little demand for irrigation development and intensive agricultural land uses in the Upper Waitaki Catchment. In addition, Meridian first experienced operational issues with phytoplankton blooms in Lake Benmore in 2003.

11 The GPF assessment was largely a desktop exercise and it focussed on a range of irrigation scenarios. These included existing dryland (107,580 hectares), full development (86,000 hectares), partial development (35,500 hectares) and small scale development (10,900 hectares). While the partial development scenario is comparable in irrigated area to that identified by MWRL in the GHD Summary Report (35,500 hectares versus 35,105 hectares) the land use assumptions that were used in the GPF assessment are different to those used by GHD.

12 The GPF assessment draws a number of conclusions and made recommendations relevant to the partial development scenario. These included:

12.1 The potential adverse effects of an intensification of irrigation development would be most obvious in Lakes Benmore, Aviemore and Waitaki (with adverse effects also occurring in the river systems);

12.2 Increased nutrient inputs into these lakes would potentially result in the formation of algal blooms during mid summer;

12.3 The potential for a shift in dominant species (for phytoplankton, periphyton and macrophytes) to weedy, or undesirable, species;

12.4 The potential loss of aesthetic values and impediments to recreational activities; and

12.5 The potential for impacts on hydro-electricity generation as a result of the blocking of intakes from excessive macrophyte or periphyton growths.

13 This assessment provided Meridian with an understanding of the potential issues for the Waitaki Power Scheme associated with the intensification of irrigation development. As a result, and as outlined by **Ms Moss** in her evidence, Meridian was explicit during its negotiations with MIC in 2004 to 2006 that agreeing to an allocation of water for agricultural and horticultural activities and the provision of derogation approval did not constitute Meridian's

approval to the water quality effects associated with irrigation development. In effect, Meridian reserved its position on cumulative water quality matters pending an assessment of the actual and potential water quality effects being undertaken by resource consent applicants.

14 In 2007 and 2008 Meridian submitted in opposition to notified resource consent applications to take and use water for irrigation development (replacement and new) in the Upper Waitaki Catchment. Specifically, Meridian's submission on each set of applications noted that:

"the applicant has not provided a sufficient analysis of the effects on water quality of:

(a) the individual application[s]; and

(b) the cumulative effect that these application[s] could have when combined with other takes and discharges in the Upper Waitaki Catchment."

15 This approach was adopted by Meridian for two reasons:

15.1 Firstly, the conclusions reached in the GPF assessment regarding the potential environmental effects and impacts on hydro-electricity generation operations (i.e. intake blockages from macrophyte and periphyton growths and the associated increases in operating and maintenance costs and generating efficiency) associated with an intensification of irrigation development; and

15.2 Secondly, the lack of any cumulative or comprehensive water quality assessment in the resource consent applications that were notified, making it difficult to consider the actual and potential adverse effects of the applications on the operation of the Waitaki Power Scheme.

16 Meridian's engagement with applicants, and subsequently with MWRL on water quality matters commenced in December 2007. These early discussions were mainly focussed on MWRL gaining some understanding of the nature of Meridian's concerns with regard to water quality in the catchment and MWRL explaining the broad approach that its cumulative water quality assessment would take.

17 In early 2008 Meridian invited its key technical advisors (**Mr Potts**, **Mr Callander** and **Mr Norton** of NIWA) to a presentation by MWRL. An opportunity was also provided for these advisors to Meridian to provide feedback to MWRL on the proposed assessment and methodology. My records show that Meridian provided feedback

from **Mr Potts**, **Mr Callander** and **Mr Norton** to **Mr Male** of GHD on the proposed methodology in February 2008. The feedback covered a range of issues but included recommendations to consider obtaining information on the seasonal variability of nutrient generation, recommendations regarding obtaining seasonal outputs from OVERSEER, and the need to better understand the biological response of increased nutrient loads in waterbodies.

18 Meridian also made the offer to MWRL for its technical advisors to have direct discussions with **Mr Potts**, **Mr Callander** and **Mr Norton** regarding the cumulative water quality assessment. In this respect, Meridian recognised the importance of agreeing the base assumptions and methodology if there was going to be a possibility of agreement being reached on the technical outcomes of the cumulative water quality assessment. However, I understand this offer was never acted upon by MWRL.

19 Meridian also provided a large amount of data to MWRL in early 2008. This comprised hydrological and generation data associated with the operation of the Waitaki Power Scheme, as well as the then rather limited water quality data that Meridian had collected between 2002 and 2004.

20 Since early 2008 there has been limited opportunity for Meridian's technical advisors to agree the assumptions associated with the cumulative water quality assessment with MWRL. In this respect, the only technical presentation from MWRL on the progress of the cumulative water quality assessment was in October 2008, prior to it being released in draft in June 2009.

21 In May 2009, MWRL and Meridian exchanged water quality data that each party had collected. Meridian had collected water quality data in the Upper Waitaki Catchment between December 2008 and April 2009 in order to gain further understanding of the existing water quality conditions in the catchment.

22 A caucusing session between experts on behalf of MWRL, ECan and Meridian (excluding planners) was held in July 2009. **Mr Callander**, **Mr Greenaway**, **Mr Potts**, **Mr Ford**, **Dr Ryan**, **Dr Snelder** and **Ms Sutherland** attended as experts on behalf of Meridian. I understand that this session was not overly effective in resolving the differences in opinion between the parties regarding methodologies and assumptions due to the then prevailing timing pressure to finalise the cumulative water quality assessment and complete evidence.

23 Meridian and MWRL have therefore had little opportunity to resolve the current disagreement regarding methodologies and assumptions being used – something that might have been able to be achieved had MWRL sought this at the commencement of its assessment.

24 Meridian's own investigations into the potential effects of irrigation development on water quality in the last year (including the collection of base water quality data during the summer of 2008/2009), the investigations undertaken by NIWA for ECan and the provision of the draft and final cumulative water quality assessment by MWRL have all allowed Meridian to focus its issues / position in relation to the intensification of irrigation development in the Upper Waitaki Catchment. These issues can be summarised as follows and are discussed in detail in the next section of my evidence:

24.1 The change in the trophic level index (TLI) for Lake Benmore and the threshold proposed;

24.2 The nutrient loads able to be accommodated by Lake Benmore in order to retain the identified TLI threshold for the lake;

24.3 The change in the TLI for the Wairepo Arm and the implications for nuisance growths, such as didymo, in the Ohau B – C Canal;

24.4 The nutrient thresholds proposed for key sub-catchments draining into Lake Benmore, particularly the Tekapo River (including Grays River and Mary Burn) and Lower Ohau River (particularly the Twizel River), and the capacity for these sub-catchments to flush periphyton and didymo growth; and

24.5 How the discharge of nutrients to Lake Benmore from Meridian's existing hydro-electricity operations (in particular the Ohau C Tailrace) will be accounted for in any nutrient threshold or cap system that may be established for the lake.

Lake Benmore Oligotrophic State

25 The intensification of land use activities upstream of Lake Benmore will inevitably have an impact on the water quality and clarity of the lake, as described by the TLI. MWRL are proposing that Lake Benmore be managed in an oligotrophic state (Page 5 of GHD Summary Report) with a TLI threshold of 2.75.

26 On the basis of the advice received from its technical advisors Meridian is comfortable with the lake being managed so as to not exceed a TLI threshold of 2.75, provided that this threshold is established as a summer mean. Our concern with changes in water quality in Lake Benmore is based on the potential for an increase in the frequency and severity of phytoplankton blooms and the implications for water quality and periphyton communities in the downstream lakes and the Lower Waitaki River. In this respect, phytoplankton blooms (or mucilage slimes - shown in Plate 3 of **Ms Sutherland's** evidence) in Lake Benmore have partially blocked the

cooling water intakes at the Benmore Power Station in the past (2003 being the first observed occurrence). These types of blockages represent a significant risk to the maintenance of the asset, while any degradation in downstream water quality could potentially lead to increasing pressure on Meridian to provide a higher minimum flow in the Lower Waitaki River in order to mitigate a reduction in water quality and ecological conditions.

27 Meridian has received advice that as long as the 2.75 TLI threshold is not exceeded the downstream environment (including the Lower Waitaki River) should be maintained and should not result in a significant increase in the frequency of phytoplankton blooms that have the potential to block the cooling water intakes at the Benmore Power Station.

28 Subject to the other concerns I raise below, Meridian would accept a decision by you to set a TLI threshold for Lake Benmore of 2.75 or less based on a summer mean.

29 It should also be noted that the setting of the threshold is distinct from whether it is achievable on the basis outlined by MWRL. Meridian has real concerns about the ability of applicants to ensure the TLI threshold proposed by MWRL is not exceeded. In this respect, it is unclear from the GHD Summary Report if the TLI of 2.75 is an annual average (i.e. the TLI threshold could exceed 2.75 during summer), a summer mean, or an instantaneous threshold for the entire year. Meridian is also unclear on what actions are proposed by MWRL and individual applicants to determine compliance with the threshold and what occurs at the MWRL and/or farm level if the TLI threshold is exceeded. Furthermore, the discussion of lake thresholds and nutrient loads in the GHD Summary Report (Pages 60 and 61) are also ambiguous with respect to the nutrient reductions that are required. In this respect, the report simply states:

"…The required change in nitrogen and phosphorus loads to maintain the Ahuriri Arm of Lake Benmore in an Oligotrophic state is shown in Table 21.

For the Northern Arm of Lake Benmore to remain at or below Oligotrophic, no on-farm nutrient reductions are required as the predicted increases in nutrient losses in the catchments draining to the Northern Arm, although they will increase, are not sufficient to elevate the lake status above Oligotrophic."

30 In some instances in the MWRL reports there is no reference to a TLI threshold of 2.75 and there is instead a reference simply to maintaining an oligotrophic state. There is a need for greater transparency or certainty in the GHD Summary Report as to whether the proposed nutrient thresholds are in fact designed to

keep Lake Benmore at, or below, a TLI threshold of 2.75 or simply within an oligotrophic state. Clarity is also required over whether the TLI threshold is an annual average, summer mean or instantaneous threshold. **Ms Sutherland** discusses the implications of these alternative measurement approaches in her evidence.

31 **Ms Sutherland's** evidence also discusses the issue of lagarospiphon and the uncertainty over whether its growth will respond to increases in nutrient inputs into Lake Benmore. The Ahuriri Arm of Lake Benmore has an infestation of lagarosiphon at the delta that has stands which are approximately 6 kilometres wide. It was first recorded in the lake in 2003.

32 Meridian currently provides $125,000 per annum to assist Land Information New Zealand (LINZ) with the management and control of lagarosiphon in Lake Benmore. Control of lagarosiphon is undertaken via application of the aquatic herbicides aquathol and diaquat. Application is either undertaken by air or by boat. Two applications have been undertaken in 2009 in February and April.

33 Meridian provides this contribution to LINZ as the infestation of lagarosiphon in the lakes represents a significant risk to the operation of the screen intakes at the Aviemore and Waitaki Power Stations if it were able to establish in these lakes. In this respect, and unlike Lake Benmore, Lakes Aviemore and Waitaki have suitably shallow locations for lagarosiphon to establish close to the intake structures of the power stations. The establishment of lagarosiphon close to these intake structures would create significant issues for these power stations in terms of the potential for blockages and requirement for remedial infrastructure. These stations do not have screen cleaners for the clearance of weed and biomass material as weed and biomass have not been an issue at these stations to date. Meridian's contribution to the management and control of lagarosiphon is also partially on the basis of maintaining the amenity of Lake Benmore for the community and other users.

34 As **Ms Sutherland** discusses in her evidence, MWRL have not considered the potential for increases in nutrient loads to stimulate the growth of lagarosiphon or other weed species in Lake Benmore and subsequently spread to the downstream lakes. **Ms Sutherland** goes on to note that there is very little information on how lagarosiphon responds to increases in nutrient loads when the increased nutrient loads occur after lagarosiphon has established in the waterbody. If lagarosiphon does respond positively to increases in nutrient loads then Meridian would have significant concerns over the current levels of resource required to manage its growth and spread and would recommend that the proposed nutrient thresholds for Lake Benmore be revisited or a requirement for the current

resource consent applicants to mitigate the effect of lagarosiphon in the lake and the downstream environment.

35 Meridian's final concern under this topic relates to the monitoring of the TLI threshold and the need for remediation or adaptive management. There is a lack of discussion in the GHD Summary Report regarding the proposed actions that will be taken if the TLI threshold for Lake Benmore (or any waterbody) is exceeded. I acknowledge that the GHD Summary Report proposes water quality monitoring in Lake Benmore on a monthly basis. However, data will only be provided to ECan and MIC on an annual basis. There is no information provided in relation to:

35.1 How the Upper Waitaki Water Quality Trust can be held responsible for monitoring the collective effects of approximately 35 consent holders;

35.2 Why the data is being reported to MIC given that it is not an applicant, does not represent applicants replacing existing consents, and it is unclear as to what delegation it has from its shareholders in relation to water quality matters;

35.3 Why data is only being reported on an annual basis and not a certain number of weeks after each data sample has been collected; and

35.4 What action is proposed by the applicants / consent holders if it is determined that the TLI threshold for Lake Benmore (or other waterbodies) is exceeded, particularly given that there is not one applicant / consent holder who can be held responsible for remediating any such effects (as is this case with other irrigation proposals).

36 The establishment of a single entity or body that takes responsibility for the off-farm monitoring that is proposed in the GHD Summary Report and was able to require consent holders (both replacement and new) to undertake remedial action / adaptive management if any of the established nutrient thresholds were breached would be supported by Meridian. Such an approach would be beneficial in ensuring the proposed monitoring is undertaken and requiring changes to land use or irrigation activities by its members if remedial action is required (for example, through an agreement between the entity and all individual consent holders). In saying this, I do appreciate that there may be limited ability to require such an approach unless all applicants are prepared to offer such a condition of consent.

37 Meridian also considers that further information is required either from MWRL or the applicants in relation to the monitoring and remedial actions that are proposed and how these actions will be

suitably robust. The evidence of **Ms Sutherland**, **Dr Snelder** and **Mr Gimblett** further discusses the monitoring and remedial actions that are considered necessary and appropriate if resource consents are granted.

Nutrient Thresholds for Lake Benmore

38 Meridian has significant concerns with the nutrient loads that are proposed by MWRL in order to retain the TLI of the lake at, or below, 2.75. Meridian's concerns with the ambiguous comments in the GHD Summary Report in relation to the appropriate nutrient loads to retain an oligotrophic state are already set out in paragraphs 29 and 30 of this evidence. Meridian's other concern is whether the nutrient loads proposed by MWRL will actually retain a TLI threshold of 2.75 as a summer mean in Lake Benmore.

39 Based on the advice provided by **Ms Sutherland** and **Dr Ryan** (and outlined in their evidence) Meridian does not agree with the nutrient loads for Lake Benmore outlined in Section 6 of the GHD Summary Report. When the MWRL figures are compared to those produced by NIWA in the Lake Benmore Water Quality Report, and reproduced in the evidence of **Ms Sutherland**, it is noticeable that there are large discrepancies between the two sets of figures. The comment on Page 61 of the GHD Summary Report that *"[NIWA] predicted a similar threshold for total nitrogen for the Ahuriri Arm at 173,000kg…"* does not provide a full picture of the differences in data collected by both NIWA and MWRL on nitrogen and phosphorus concentrations in Lake Benmore.

40 It is also unclear how MWRL are accounting for the lag of nutrients from existing consented irrigation development and consented but unimplemented irrigation development that has not yet arrived in Lake Benmore. As **Mr Callander** states in his evidence, it could be between 10 and 20 years in some sub-catchments before the full migration of nutrients through the system occurs. Any lag of nutrients that has been unaccounted for will effectively reduce the nutrient allocation amongst the current resource consent applicants. For example, in the Ahuriri Arm of Lake Benmore any unaccounted lag would result in the current resource consent applicants having to further reduce nitrogen and phosphorus leaching beyond that considered necessary by MWRL in order to achieve the proposed TLI threshold.

41 This is in addition to the concerns raised in the evidence of **Dr Ryan** regarding the fact that much of the reductions in leaching required may not be achievable, and the evidence of **Mr Ford/Mr Harris** and **Mr Potts** which considers that assumptions regarding existing land uses and nutrient inputs to waterbodies have been underestimated. In this respect, the evidence of **Dr Ryan**, **Mr Ford/Mr Harris** and **Mr Potts** suggests that the expected nutrient leaching from properties has been underestimated as a result of

overly optimistic growing scenarios / fertilizer applications by MWRL and that this will have implications for the nutrient loads that are predicted to occur in the waterbodies of the Upper Waitaki Catchment.

42 It is Meridian's view that you should exercise a blend of common sense and caution when determining the nutrient thresholds necessary to achieve the appropriate TLI for Lake Benmore and other sub-catchment nodes. In respect of this cumulative case, you are effectively being asked to determine a nitrogen and phosphorus allocation cap for waterbodies. If the nitrogen and phosphorus allocation cap results in an exceedance of the TLI threshold for the lake and sub-catchments then it will inevitably be difficult and challenging for ECan and all water users to try and reduce the impact of irrigation to achieve the TLI threshold. As such, it is important that you gain a realistic understanding of the existing (but potentially not currently seen) nutrient loads and the proposed nutrient loads.

The Wairepo Arm

43 As outlined in the evidence of **Ms Moss**, the Wairepo Arm is an old borrow pit that is located immediately downstream of Lake Ruataniwha and is hydraulically connected to the Ohau B – C Canal. It is not hydraulically connected to Lake Ruataniwha as is illustrated in the catchment mass balance diagrams in Appendix CC of the GHD Summary Report. The surface and ground water catchment for the Wairepo Arm is outlined in Figures 4 and 5 of the GHD Summary Report.

44 **Ms Moss** has already outlined the key characteristics of the Ohau B – C Canal and the Ohau B and C Power Stations in her evidence. Of particular note is that the Ohau B – C Canal is 98 metres wide and has a depth of 10 metres. The Ohau B Canal is 2.8 kilometres long (State Highway 8 to the Ohau B Power Station), while the Ohau C Canal is 7.3 kilometres long (Ohau B Power Station to Ohau C Power Station). Both sections of canal are designed to carry a maximum flow of 560 cubic metres per second (cumecs).

45 Unlike some hydro-electric power stations, the Ohau B and C Power Stations do not have screen cleaners over the main intake screens that lead to the penstocks and generating units. Screen cleaners have not been required as the quality of water (i.e. low nutrient input from Lakes Pukaki and Ohau) being conveyed in the canal has historically always been very high, with very little biomass material causing an impediment to the intakes. I have attached photographs of the intake screens at Ohau B and C Power Stations as **Annexure B** to this evidence.

46 Importantly, the intake screens have been designed to breach if the difference in water level between the canal side and power station

side of the intake exceeds 2.8 metres due to a blockage. Such an outcome would have a major impact as the machine generating units at the power stations would require replacement due to the damage caused by the intake screens. However, this design feature is in place to ensure that the water level in the canal does not overtop the embankments as a result of a screen blockage. In effect, it is preferable to breach the intake screens and damage the generating units rather than overtop the canal embankment which is partially constructed of fill material and which could pose a serious civil safety issue. The Ohau B and C Power Stations do not have water level differential monitoring or alarm systems due to the historically low loads of biomass collecting on the intake screens. Monitoring of the differential in water level either side of the screen intake is undertaken by visual observations by Meridian staff and contractors.

47 Another feature of the Ohau B and C Power Stations is that there are intakes for cooling water purposes also located on the upstream side of the canal. As the name suggests, these intakes provide cooling water to the generating units in the power station below. These intakes would be prone to blocking by biomass due to their size and any unnoticed blockage would potentially lead to the over-heating of the generating units and the possibility of unit outages if immediate action was not taken.

48 As is explained in more detail in the evidence of **Ms Sutherland**, the Ohau B – C Canal has an infestation of didymo and elodea (oxygen weed). Didymo was first confirmed in the canal in 2007 while the quantity of elodea growth has only become obvious to Meridian's operations in the last six months.

49 On the 25th and 26th of July 2009 there was an outage at the Ohau B and C Power Stations to allow the clearing of elodea biomass from the intake screens. This outage required Meridian to reduce generation at the Ohau B and C Power Stations for up to 15 hours over the two days with generation at the Ohau C Power Station restricted to two units for a considerably period of time. For at least one hour during the outage the Ohau B – C Canal was 'parked' (i.e. a flow of 0 cumecs in the canal) in order to allow divers to work around the intake screens clearing biomass. Notification was also given to ECan of the possibility of spilling over the labyrinth weir into the Ohau River in order to reduce flows at the Ohau C Power Station; however the need for this was averted. This outage was necessary as the differential in water level either side of the intake screen had reached approximately 1.2 metres.

50 Given the operational issues that didymo and elodea present to the Ohau B and C Power Stations, and the fact that didymo in the Ohau B – C Canal responds to increases in nutrient inputs, Meridian has significant concerns regarding the effect of increases in nutrient

inputs into the Wairepo Arm as proposed by MWRL. While the GHD Summary Report states that it is proposed to maintain the Wairepo Arm in a mesotrophic state (Page 62), this statement does not provide a full picture of the changes proposed. In this respect, MWRL are actually proposing to increase the TLI threshold in the Wairepo Arm from what is purported by MWRL to be a current state of 3.18 (although this is disputed in the evidence of **Ms Sutherland**) to 3.75 (Pers Comm Email: Robson to Turner; 13 August 2009). It is also uncertain what impact any lag effects from existing irrigation development and consented, but unimplemented, irrigation development will have on the current trophic state of the Wairepo Arm.

51 As **Ms Sutherland** will discuss in her evidence, an increase in the TLI threshold for the Wairepo Arm and the subsequent increase in nutrient loads into the Ohau B – C Canal is highly likely to stimulate the production of didymo biomass in the canal. The increase in the production of didymo in the canal has the following operational implications for Meridian:

51.1 An increased likelihood of blockages in the cooling water intakes at the Ohau B and C Power Stations. The remediation of this effect would require the installation of filters. The construction and installation of these filters has been calculated by Meridian's engineers at approximately $1,100,000 plus operation and maintenance costs (given that these filters are required across 8 cooling water intakes);

51.2 An increased likelihood of blockages in the intake screens at both power stations. As outlined earlier, ensuring that there is not a substantial differential in the water level either side of the intake screen is critically important to maintaining the safe and efficient operation of the Ohau B and C Power Stations and minimising head loss (head being the height of the water above the generating unit). The installation of screen cleaners and water level differential monitoring systems at both stations has been calculated by Meridian's engineers at approximately $600,000 plus associated operation and maintenance costs. Consideration will also need to be given to how, and where, to dispose of the biomass that is collected on the intake screens; and

51.3 Blockages of the intake screens can also necessitate the need for outages to enable screening cleaning to occur. The cost of any outage is difficult to predict given the cost of the lost generation potential will vary depending on the spot market prices and prevailing hydrological conditions at the time. However, to provide some context to this impact the recent outage at Ohau B and C Power Stations for weed clearance resulted in 556 MW being unavailable for generation at its

worst and an average of 336 MW was unavailable over the entire 15 hour outage.

52 These impacts are real and of significant consequence to the Waitaki Power Scheme. In essence, Meridian will be required to undertake significant remedial works or action at the Ohau B – C Power Stations if nutrient loads into the canal from the Wairepo Arm are allowed to increase and stimulate didymo production as predicted by **Ms Sutherland** in her evidence. These effects do not appear to have been contemplated by MWRL as there is no discussion in the GHD Summary Report or in the evidence by MWRL experts on the potential implications of the increased nutrient loads on didymo production in the Ohau B – C Canal or at any locations in the Upper Waitaki Catchment.

53 Given the predicted significant impacts of increased nutrient loads in the Ohau B – C Canal and the fact that **Ms Sutherland** believes the Wairepo Arm is already degraded, Meridian considers that the TLI threshold for the Wairepo Arm should not be allowed to increase beyond the current state (whether this is 3.18 or some other number). While I appreciate that such an outcome may mean that resource consent applications in the Wairepo Arm sub-catchment need to be declined, I do not consider that Waitaki Power Scheme should be placed in the situation whereby its operations, and the benefits and service it provides to the region and nation, are put at risk or require infrastructural modification to accommodate the development activities of other parties.

Nutrient Thresholds for Key Sub-Catchments

54 **Ms Moss** has already explained which river systems in the Upper Waitaki Catchment are hydrologically influenced by Meridian's operations. **Dr Griffiths** will also discuss this point in detail in his evidence, while **Dr Snelder** and **Mr Greenaway** discuss the various values that exist in the Tekapo River.

55 The two river catchments that Meridian is particularly interested in with regard to the nutrient thresholds being set for key sub-catchments / nodes are the Tekapo River (including the Grays River and Mary Burn) and the Lower Ohau River (particularly around its confluence with the Twizel River). Our interest relates to the fact that both of these rivers are dammed by structures associated with the Waitaki Power Scheme and the relevant consents (being CRC905301 and CRC905335) authorising these activities do not require Meridian to provide a minimum flow or environmental flushing flows.

56 Meridian would generally only spill water from Lake Ruataniwha into the Lower Ohau River, and subsequently diverting water away from

the Ohau B and C Power Stations in a major flood event or if some emergency condition occurred. By way of example, the last spill event from Lake Ruataniwha into the Lower Ohau River (other than nominal flows associated with gate testing) was in 1995.

57 **Ms Moss** has already explained the infrastructure associated with the Tekapo Lake Control, Lake George Scott and the Tekapo A Power Station / Tekapo Canal and the ability for water released at the Tekapo Lake Control to be diverted back into the Tekapo Canal in her evidence. Meridian only spills water from Tekapo Lake Control in the following circumstances:

57.1 To give effect to the conditions of consent CRC905301 relating to recreational flow releases and the stakeholder agreement we have with the New Zealand Recreation Canoeing Association, which requires recreational releases down the kayak course between October and April of each year. The water from these recreational releases is normally diverted back into the Tekapo Canal downstream of Tekapo A via Lake George Scott;

57.2 If there was an outage at the Tekapo A Power Station which meant water could not be abstracted via the intake in Lake Tekapo (located to the west of Tekapo township). Releasing water through Tekapo Lake Control would enable water to be diverted back into the Tekapo Canal to enable generation at the Tekapo B Power Station (and supplementing flows into Lake Pukaki);

57.3 In the event that the level of Lake Tekapo exceeded the maximum level specified on resource consent CRC905302. During the summer of 2008 / 2009 inflows into Lake Tekapo were well above average and Meridian spilled water through Tekapo Lake Control during January and February 2009 (as well as continuing to take water via the intake for the Tekapo A Power Station); and

57.4 In the event of gate testing at Tekapo Lake Control, although in these circumstances water would also generally be diverted back into the Tekapo Canal via Lake George Scott.

58 **Dr Griffiths** provides data on the average spill event down the Tekapo River in his evidence.

59 The issue of minimum flows in the Tekapo River was a significant issue during the development of the Waitaki Catchment Water Allocation Regional Plan (WRP). The draft WRP had proposed a requirement for a minimum flow of 3 cumecs in the Tekapo River in order to provide apparent environmental benefits. Meridian submitted in opposition to the requirement for a minimum flow in

the Tekapo River on the basis that the supposed environmental benefits would not be generated by a flow of 3 cumecs and that impacts on hydro generation were significant. In this respect, evidence was presented to the Waitaki Catchment Water Allocation Board (WAB) by **Mr Sergeant** on behalf of Meridian that requiring a minimum flow of 3 cumecs would have a generation impact on Meridian of 75 gigawatt hours per annum. The final version of the WRP did not require a minimum flow in the Tekapo River.

60 Meridian's concern with the MWRL nutrient thresholds in the sub-catchments is that the thresholds have been determined on an artificial basis with little, or no, consideration for the actual environmental and physical characteristics of these waterbodies. In this respect, the GHD Summary Report notes on Page 58 that the periphyton thresholds for all sub-catchments has been based on a 25% increase of calculated periphyton above existing conditions. The report goes on to comment that:

"The 25 percent increase threshold has been adopted as this level of increase would not be perceptible to casual users or constitute a significant adverse effect above current conditions (B Coffey, 2008, pers comm.)".

61 The evidence of **Dr Snelder** outlines his concerns with establishing a cumulative nutrient threshold in such an arbitrary manner, while **Mr Gimblett** will discuss the basis for undertaking a cumulative effects assessment in his evidence. As such, Meridian does not agree that nutrient thresholds in sub-catchments such as the Tekapo River and Lower Ohau River / Twizel River should be set based on the approach devised by Mr Coffey.

62 I note that MWRL have not undertaken an assessment that discusses the aquatic or recreational effects of the nutrient thresholds proposed. As such, Meridian is concerned that the nutrient thresholds will lead to conditions in the Tekapo River and tributaries that will see a significant growth in periphyton and didymo biomass. There is also some concern that localised effects at the river mouths (algal blooms) in Haldon Arm may result in the need for flushing flows. This issue is discussed further in the evidence of **Ms Sutherland**.

63 If these conditions do eventuate Meridian expects that pressure will be placed on it by the local community, fishermen and environmental agencies to provide a flushing flow at times to 're-set' the river system. This pressure could manifest through the seven year review of stakeholder agreements (as explained in the evidence of **Ms Moss**), general community lobbying (as occurs from time to time with the local community in Tekapo over the levels of the lake), negotiations over other projects Meridian may undertake in the Upper Waitaki Catchment, at the next review of the WRP, or

upon expiry of Meridian's resource consents for the Waitaki Power Scheme in 2025.

64 Meridian would not accept the responsibility for the mitigation of effects associated with further irrigation development and the establishment of arbitrary nutrient thresholds in the sub-catchments. To put this in context, one flushing flow of 80 cumecs down the Tekapo River for 24 hours would result in the loss of 5.5 gigawatt hours per flush from the Waitaki Power Scheme. The financial implications of such a flushing flow would be dependent on the spot price and hydrological conditions at the time of the flush. I have been advised by my colleagues that the average Benmore forward price contract for the period 2010 to 2012, as sourced from the Australian Securities Exchange (ASX), is $75/MWh. Based on this price the financial impact to Meridian of one flush would be $412,500.

65 Given this, I recommend the approach outlined in the evidence of **Dr Snelder** as an appropriate methodology for determining cumulative nutrient thresholds in the sub-catchments of the Upper Waitaki Catchment. Furthermore, the nutrient thresholds in hydrologically controlled river systems should be established at a level that does not rely on hydro releases that are not required by existing conditions on resource consents held by third parties such as Meridian. That is, reliance should not be placed on a hydro event flushing the system on the balance of probabilities or historical spill patterns.

Discharge of Nutrients from Ohau C Tailrace

66 The final water quality issue for Meridian that I wish to discuss relates to the establishment of nutrient thresholds for Lake Benmore and the implications for Meridian's operational discharges, particularly the discharge from the Ohau C Tailrace.

67 The Ohau C Tailrace contributes a large load of nutrients to the Haldon Arm of Lake Benmore but in low concentrations. This is the result of the flow from the Ohau C Tailrace effectively being a combination of all inflows into Lake Tekapo, Lake Pukaki and Lake Ohau. As a result, any nutrient loads from surrounding land uses that discharge into these waterbodies will eventually be discharged into Lake Benmore via the Ohau C Tailrace.

68 While **Mr Gimblett's** evidence will outline the current state of Chapter 4 of the Proposed Natural Resources Regional Plan for Canterbury (PNRRP), it needs to be recognised I think that these resource consent hearings are effectively setting a nutrient allocation cap for Lake Benmore via the cumulative water quality effects assessment. Given this, Meridian is particularly interested in ensuring that the discharges from all its structures which contribute to Lake Benmore and primarily the Ohau C Tailrace are not held

accountable for any possible future exceedance of the nutrient thresholds established via these resource consent hearings. In this respect, we are seeking certainty that the operational discharges associated with the Waitaki Power Scheme do not need to be modified so as to ensure that any nutrient thresholds for Lake Benmore or the sub-catchments are not breached when flows are discharged via the tailrace or Lakes Pukaki, Tekapo or Ruataniwha.

69 Proposed Variation 5 to the Proposed Waikato Regional Plan relates to the establishment of nutrient caps in Lake Taupo in order to respond to the gradual decline of water quality in the lake. The Proposed Variation has now passed through the Environment Court and is an operative component of the Proposed Regional Plan. The Proposed Variation made a specific exclusion for the discharge from the tailrace of the Tokaanu Power Station into Lake Taupo, which forms part of the Tongariro Power Scheme (TPS). The rationale for this exclusion was that the TPS only provided low concentrations of nutrients and these could not be reduced further.

70 Meridian considers that a similar type of provision is required for the discharge from the Waitaki Power Scheme, be that through a plan development process or via these current resource consent hearings. Meridian is not responsible for the generation of the nutrients conveyed and discharged via it operations. Such an outcome is considered appropriate and necessary so as to ensure that if there is any future breach of the nutrient thresholds that are established for the lake, the responsibility to remedy this issue rests with those land users who are producing nutrient run off that contributes to the receiving environment for Lake Benmore.

AGREEMENT WITH MACKENZIE IRRIGATION COMPANY

71 As **Ms Moss** has outlined in her evidence, Meridian entered an agreement with MIC in 2006 in order to give effect to a historical obligation for water to be available for potential irrigation development. As I have already stated in relation to the agreement, Meridian reserved its position in relation to any potential environmental effects associated with such development.

72 The MIC – Meridian Agreement has various provisions that are relevant to the current resource consent applications by new applicants (i.e. the agreement does not apply to applications for irrigation development where an applicant is replacing an existing consent on a like for like basis). These provisions relate to:

72.1 Geographic and time limits placed on where water may be abstracted from in the Upper Waitaki Catchment (tranching);

72.2 A requirement that all applications by MIC shareholders are made on terms seeking an expiry on the 30th of April 2025

(the expiry date of Meridian's consents for the Waitaki Power Scheme);

72.3 A requirement to agree common consent conditions for applications by MIC shareholders; and

72.4 Controls around the location and design of off take structures for irrigation where these are proposed to be attached to Meridian's infrastructure.

73 I will elaborate on each of these topics in more detail as they are relevant to the current resource consent applications being heard.

Geographic and Time Tranching

74 The MIC – Meridian Agreement restricts the abstraction of up to 150 million cubic metres per annum for new irrigation development in two ways. Firstly, the agreement controls the geographic locations from which water may be abstracted. The agreement treats the Upper Waitaki Catchment as having 8 zones and specifies how much water can be taken and therefore how much irrigation development might occur in each zone. The 8 zones are effectively defined as follows:

74.1 Lake Tekapo;

74.2 The Tekapo Canal;

74.3 Lake Pukaki and Lake Ohau;

74.4 Lake Ruataniwha;

74.5 Ohau B – C Canal;

74.6 Lake Benmore (including Omarama and Ahuriri);

74.7 Lake Aviemore; and

74.8 Lake Waitaki.

75 A map outlining the boundaries of the 8 zones has been provided as Figure 1 in the evidence of **Mr McIndoe** for MWRL. The allocation of water to specific parts of the Upper Waitaki Catchment in the agreement means that not all of the water can be taken from Lake Tekapo. This feature moderates the potential for large amounts of water to be abstracted higher in the catchment where the impact on the Waitaki Power Scheme would be greatest from an allocation/electricity generation perspective. The electricity generation potential of water decreases as it moves downstream of Lake Tekapo.

76 Irrigation development is also restricted by virtue of time tranches specified in the agreement. The time tranches were designed to stagger the generation and financial impact of the 150 million cubic metres per annum on Meridian. The agreement allowed for water to be abstracted from 2006, with the total allocation of 150 million cubic metres per annum being available from 2013. The available allocation expires on the 30th of April 2025.

77 A schedule outlining the time and geographic allocation of water to MIC is attached as **Annexure C** to this evidence. The time tranching parameters are specified on the derogation approvals that have been provided to ECan and MIC applicants and in the common consent conditions that have been agreed with MIC and are being requested by the individual applicants who are seeking resource consents to establish new takes of water for irrigation. The geographic zone tranching is determinable based on the location of take that is specified in the derogation approval and in the common consent conditions.

Common Consent Conditions

78 The MIC – Meridian Agreement requires that applications by MIC shareholders be made on terms requiring the inclusion of common consent conditions that have been agreed by MIC and Meridian. The common consent conditions are essentially designed to ensure some of the key resource management and water allocation provisions of the MIC – Meridian Agreement can be given effect to on any resource consents granted.

79 The common consent conditions have been developed by **Mr Kemble**, on behalf of MIC, and I. These conditions have been agreed to by all MIC applicants and there are several versions of the conditions. These versions cover the following:

79.1 Applicants seeking to renew existing consents but with a larger annual volume than previously consented (and hence requiring MIC shares for the additional amount of water);

79.2 MIC applicants seeking water for irrigation but not seeking a specific volume of water for stockwater;

79.3 MIC applicants seeking to use their MIC water shares for irrigation and stockwater; and

79.4 MIC applicants seeking specific individual resource consents for stockwater.

80 A copy of each version of the common consent conditions is provided in **Annexure D** of this evidence. The relevant version of the common consent conditions will have been provided to ECan by the MIC applicants as an amendment / further information to their

application. They should also be adopted by each of the individual MIC applicants in their evidence as part of these resource consent hearings.

81 The key aspects of the common consent conditions that have been developed and agreed by Meridian and MIC can be summarised as follows:

81.1 Any resource consents granted to MIC applicants are to have an expiry date of the 30th of April 2025 to reflect the expiry of the consents for the Waitaki Power Scheme and the terms of MIC - Meridian Agreement;

81.2 The expression of the available allocation of water as a rate of take and as an annual volume;

81.3 A clear description of the source of the allocation of water to ensure the geographic tranching arrangements of the MIC – Meridian Agreement are complied with by applicants;

81.4 A clear description of what allocation of water is available in each irrigation season through to the 2013/14 season when the entire 150 million cubic metres per annum allocation is available to MIC shareholders;

81.5 A defined irrigation season of 1 September through to the following 30th of April to reflect the defined irrigation season in the MIC - Meridian Agreement;

81.6 A requirement for MIC applicants to register an encumbrance over their properties and to only irrigate land that is covered by the encumbrance;

81.7 A requirement for metering and monitoring of all water abstracted by MIC applicants with the data to be provided to ECan;

81.8 A requirement for MIC applicants who have off take structures attached to Meridian's canals, dams or other infrastructure to cease taking water for a period required by Meridian if maintenance or other works are required to ensure the structural integrity, safety, or to avoid risk or compromise to the operation of the Waitaki Power Scheme; and

81.9 A requirement for MIC applicants who are taking water from the Tekapo Canal, Pukaki Canal, Ohau Canal or Ohau B – C Canal cease the taking or diverting of water whenever Meridian ceases to take, divert or discharge water into the applicable canal, unless the applicant has the express written

permission of Meridian to continue taking. This condition addresses two potentially circumstances:

(a) first, it will ensure that if flows in the canals are parked that irrigation takes can not continue to lower the level of the canal and risk the safety and structural integrity of the canal structures (the canals are not designed to dry out); and

(b) secondly, it will ensure that Meridian is not put into the situation of having to provide water for irrigators along the canals if hydrological conditions upstream are restricting the taking, diversion or discharge of water into the canals.

81.10 Meridian will be seeking similar conditions on those applications by replacement applicants who have off takes located on any of the canals mentioned above as in 2001 Meridian was required to continue provide water for irrigators who would not cease taking water when the flow in the Tekapo Canal was otherwise stopped due to low levels in Lake Tekapo. This issue will be further discussed in Meridian's evidence on individual resource consent applications.

82 As mentioned by **Ms Appleyard** in her opening submissions, it is the opinion of Meridian that these common consent conditions serve a resource management purpose and are appropriate for incorporation on any resource consents you may chose to grant; particularly given these conditions represent part of the applications being made of MIC applicants.

83 Any issues Meridian may have in relation to consent conditions being advanced (or not being sought) by individual resource consent applicants, replacement and new, will be addressed in Meridian's evidence on individual resource consent applications.

84 I should also note that as outlined earlier in this evidence Meridian has not, at the time of drafting this evidence, reached agreement with any applicants over appropriate consent conditions in relation to the avoidance, remediation or mitigation of individual or cumulative water quality effects. If agreement with any individual applicants is reached during the course of the hearings, any agreed outcomes will also be presented in Meridian's evidence on individual resource consent applications.

Off Take Structures

85 The MIC – Meridian Agreement makes a qualified allowance for MIC applicants to attach their off take structures to Meridian's canal and dam infrastructure. There are specific conditions in the agreement around the design, construction, operation and maintenance of

these off take structures, some of which are relevant to these resource consent hearings.

86 In particular, the agreement specifies that Meridian will construct, own and control the operation of any off take structures that are attached to its canal and dam infrastructure. This is to ensure that the structures are constructed and operated in a manner that does not impinge on the integrity or safety of Meridian's infrastructure. For example, Meridian will not agree to off take structures that require trenches to be dug in the downward section of a canal embankment that is constructed of fill material.

87 In addition, the agreement allows Meridian to restrict access to its infrastructure if it considers the location and design of a proposed off take structure will put Meridian's infrastructure at risk or compromise the structural integrity of the Waitaki Power Scheme. This is to recognise that some locations along the canals and on the dams are not appropriate locations for off take structures to be constructed due to safety or operational reasons.

88 Meridian has been actively working with the engineer engaged on behalf of MIC and applicants to resolve concerns regarding the location and design of off takes proposed. At the time of writing this evidence there was only one application where Meridian did not agree with proposed location and design of the off take (Rosehip Orchards). If these issues are not resolved, Meridian's evidence on individual resource consent applications will address the outstanding matters of concern and the decision we seek be made in relation to the applications.

DEROGATION APPROVAL PROCESS

89 As **Ms Appleyard** and **Ms Moss** have already explained the requirement for applicants to gain Meridian's derogation approval stems from the decision in the *Aoraki Water Trust* proceedings. **Ms Moss** has also explained the current position of Meridian's Board in relation to providing derogation approval to various types of activity in the Upper Waitaki Catchment.

90 One of my tasks for Meridian has been to give effect to the Board's position on both replacement and new resource consent applications for agricultural and horticultural activities. For replacement resource consent applications this role has involved reviewing the annual volumes being sought by applicants to ensure that what being applied for is 'actual and reasonable'.

91 The assessment of what annual volumes are actual and reasonable has involved the review of the consent that has expired, or is expiring, the type of irrigation that is occurring (i.e. border dyke versus spray etc) and whether other uses were also being taken

under the consent (i.e. stockwater) which have an impact on the possible annual volume. This exercise was necessary as the effect of an annual volume for replacement resource consent application would be very different and adverse if simply calculated by multiplying the take rate by 24 hours a day and 365 days per year.

92 **Mr Potts** undertook the technical assessment for Meridian of what is actual and reasonable for replacement applications. Through the course of discussions with applicants some finer grained analysis of what is actual and reasonable did occur, generally at the request of applicants. In some instances this involved the review of data from different monitoring stations due to climatic conditions at the applicant's property. In some instances the annual volumes specified on the derogation approval was less than what was applied for in the applications, while in one circumstance (the Upper Waitaki Community Irrigation Company take) the agreed annual volume was higher than what had been included in the allocation figures presented to the WAB. This was the result of the actual and reasonable analysis that had been undertaken by **Mr Potts**.

93 The derogation approvals for replacement resource consent applications set conditions on take rates, annual volumes and requirements to cease takes at certain times (mainly in relation to water takes from hydro lakes and canals). As **Ms Appleyard** outlines in her legal submissions the conditions of any derogation approval will need to be reflected on any resource consents that are granted in order for the derogation approval to be complied with.

94 In relation to derogation approvals for applications by MIC shareholders, an assessment of whether the annual volume being sought was actual and reasonable was not necessary. In this regard, the terms of the MIC – Meridian Agreement and the shares available to MIC subscribers ensure the annual volumes being sought are efficient uses of water.

95 The derogation approvals issued to MIC applicants also include conditions in relation to the use of water. The most significant difference from the approvals provided to replacement applications is that the derogation approvals to MIC applicants include conditions relating to when the water may be used. This is to give effect to the tranching arrangements I described earlier in my evidence. As with the replacement applications, these conditions also need to be reflected on any resource consents that may be granted to MIC applicants in order to give effect to the derogation approval.

COMMENTS ON EVIDENCE ON BEHALF OF MWRL

Evidence of Mr McIndoe

96 At paragraph 44 of his evidence, **Mr McIndoe** makes comment that it is his understanding that Meridian would only provide derogation

approval to replacement applications for an amount based on reasonable use, in the manner calculated by McIndoe/Potts and accepted by the WAB. He then goes on to comment on the annual volume provided in the derogation approval for the Upper Waitaki Community Irrigation Company (UWCIC) and that, in his opinion, it would fail to meet a reasonable and efficient test.

97 I have already provided comment in paragraphs 91 and 92 on the process that Meridian went through to agree annual volumes with replacement consent applicants. In summary, the determination of what was actual and reasonable required a greater level of analysis of information than what was calculated previously. **Mr Potts** discusses the specific example of the UWCIC and the justification for the annual volume agreed in his evidence.

98 At paragraph 53 **Mr McIndoe** states that the most recent estimate of actual irrigated area in the Upper Waitaki Basin is 8,850 hectares (GHD, 2009). While I don't dispute this figure, I do note that **Dr Coffey** considers at paragraph 2.1 of this evidence that the estimate of actual irrigated area is 8,159 hectares (GHD, 2009C),while **Dr Bright** and **Dr Robson** consider at paragraph 7.21 of their joint brief that the figure is 8,990 hectares. Meridian considers that a key input of determining the existing effects of irrigation development in the Upper Waitaki Catchment is to clearly determine the existing level of irrigation development. At present there is apparently a 10% difference in the estimates of existing irrigation development by the MWRL witnesses. Meridian considers that confirmation of what figure is appropriate for nutrient modelling is required prior to nutrient thresholds being established.

Evidence of Mr Kyle

99 At paragraph 7.3 **Mr Kyle** refers to Conditions 1 to 15 of Appendix C of his evidence having been agreed by Meridian, MIC and the applicants. I wish to clarify that these conditions have only been agreed for MIC applicants and that no common consent conditions have been agreed with replacement applicants.

Evidence of Dr Coffey

100 At paragraphs 60 and 61 I noted Meridian's concerns regarding the arbitrary way in which nutrient thresholds for sub-catchments have been determined in the GHD Summary Report; particularly the justification that a 25% increase in periphyton biomass across every sub-catchment would not be perceptible to the casual observer or constitute a significant adverse effect above current conditions.

101 From reviewing paragraph 7.15 of **Dr Coffey's** evidence, it is now less clear what the actual justification for the 25% increase was and what level of effect this will cause. In this respect, **Dr Coffey** now states that the increase would 'probably not' be noticeable to the casual observer and that the effect would be minor relative to

current conditions. It seems **Dr Coffey** is no longer confident that the change in biomass won't be noticeable to casual observers, while his assessment of the degree of effect has gone from not being significant to now being minor. Meridian would like to understand the rationale for the change in conclusion from **Dr Coffey**. In addition, I note that at paragraph 6.19 of their joint evidence, **Dr Bright** and **Dr Robson** state that the nutrient thresholds are set at the level at which the natural capacity to assimilate nutrients without significant adverse effects is exhausted. This appears to not be consistent with the evidence of **Dr Coffey** and as such it is difficult to have confidence in the related conclusions reached by **Dr Coffey**, **Dr Bright** and **Dr Robson** and to understand what MWRL consider the predicted level of effect would be in the sub-catchments.

102 Relevant information on the effects of biomass increases is discussed in the evidence of **Dr Snelder,** while the legal submissions of **Ms Appleyard** and the planning evidence of **Mr Gimblett** discusses the degree of effects for a cumulative water quality assessment.

103 At paragraphs 7.19 and 7.20 **Dr Coffey** appears to state that the 25% increase in biomass in sub-catchments should not apply where didymo is present and that an approach of monitoring nutrient concentrations should apply. This approach appears to be based on the recommendation of **Dr Ryder** who states at paragraph 4.6 of this evidence that the 25% increase in biomass threshold should exclude didymo. However, no assessment is provided by **Dr Ryder** or **Dr Coffey** on the potential effects of increased nutrient loads on didymo growth in the sub-catchments and what the implications of increased didymo growth in the sub-catchments will mean for the ecological and recreational values of the various waterbodies. Given this I remain concerned, as I express at paragraphs 63 and 64 of this evidence, that pressure will be put on Meridian to provide flushing flows if the ecological and recreational values in the Tekapo River are degraded.

104 **Dr Coffey** also comments at paragraph 7.24 that contingency plans should be put in place to respond to any trends that indicate the trophic state of Lake Benmore is going to shift over the oligotrophic /mesotrophic boundary. Meridian considers this statement somewhat uncertain given that MWRL are proposing a TLI of 2.75 for Lake Benmore. It would seem appropriate to Meridian that contingency plans are put in place to ensure that trophic state in the lake does not exceed 2.75 as a summer mean and if trends are observed that the TLI is approaching 2.75. This issue is discussed in more detail in the evidence of **Ms Sutherland**.

CONCLUSION

105 The Waitaki Power Scheme is a significant infrastructure asset in New Zealand and provides local, regional and national services and benefits. Therefore, any proposed changes in land use which impact on water quality in the Upper Waitaki Catchment represent a material issue for the Waitaki Power Scheme and Meridian's operations.

106 Irrigation development in some sub-catchments is of greater concern to Meridian than others; most notably the Tekapo River, Lower Ohau River, Wairepo Arm and Lake Benmore. In addition, we do not consider that third parties should have to undertake remedial action or mitigation (such as flushing flows) in the future to address or respond to the effects associated with irrigation development.

107 While Meridian is comfortable with the TLI proposed by MWRL for Lake Benmore provided it is not exceeded as a summer mean, it does not support the analyses and nutrient loads calculated by MWRL to achieve this threshold. We appreciate that there are potential consequences for the resource consent applicants in terms of reducing nutrient loads to achieve these thresholds and that some applications may need to be declined given the thresholds that may be required.

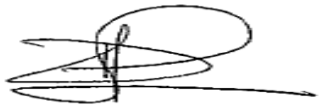
108 With regard to the Wairepo Arm, the Tekapo River and the Lower Ohau River nodes, Meridian considers that in establishing a nutrient threshold you need to specifically consider the existing environmental values and physical resources in these locations and the potential impacts of increased nutrient loads on these values and resources. The establishment of thresholds across the Upper Waitaki Catchment on the basis that casual observers won't notice the change and the effects won't be significant above the status quo is not, in our view, a robust approach to setting cumulative limits. Consideration needs to be given to whether these sub-catchments and surrounding physical resources can even support additional nutrient loads in the system (particularly in the case of the Wairepo Arm). If these sub-catchments can not support additional nutrient loads then applications will need to be declined.

109 Meridian has an agreement with MIC that make allocation of water available for new irrigation development. This agreement is in relation to allocation matters and does not prejudice Meridian's involvement in water quality matters. The agreement places a number of obligations on both parties.

110 Meridian and MIC have developed common consent conditions that have been adopted as part of the applications by MIC shareholders. It is appropriate that these conditions be accepted on any resource consents that you may choose to grant to MIC applicants.

111 Specific concerns with individual applications, be they replacement or new, will be addressed in Meridian's evidence on individual applications which will follow.

Dated: 16 September 2009



Richard Turner