
In the matter of: the Resource Management Act 1991

and

In the matter of: resource consent applications CRC050565, CRC050566
and CRC050567 for the purposes of a hydro-electricity
scheme

applicant: Clarkesfield Holdings (1996) Limited

submitter: Meridian Energy Limited

Brief of evidence of Nicholas Charles Eldred

Dated: August 2008

BRIEF OF EVIDENCE OF NICHOLAS CHARLES ELDRED

QUALIFICATIONS AND EXPERIENCE

- 1 My full name is Nicholas Charles Eldred. I am the Water Infrastructure Development Manager with Meridian Energy Limited (*Meridian*). I have worked in the Growth and Development Directorate of Meridian for 4 years and my team and I are responsible for identifying, securing and development new hydro electric power schemes, irrigation projects and other water related infrastructure.
- 2 I have the following qualifications:
 - 2.1 Bachelor of Science (1987, University of London, Queen Mary College, Engineering Geomorphology (Hons));
 - 2.2 Master of Science (1988, University of London, Queen Mary College, Geomaterials).
- 3 I have the following experience relevant to my role:
 - 3.1 The majority of my 19 years of professional experience has been involved in the design and construction of major infrastructure projects including several tunnels and hydro electric power schemes.
 - 3.2 Prior to joining Meridian in 2004 I worked as a consultant engineering geologist in the UK, New Zealand and many other countries.
 - 3.3 My experience also includes the investigation of groundwater issues for both engineering and environmental projects and I have been involved with numerous resource consent applications since moving to New Zealand in 1992.
- 4 Other roles I have fulfilled at Meridian include responsibility for investigating and identifying hydro development opportunities and as the Project Manager for the North Bank Tunnel Project; an 1100 to 1400 GWh hydro proposal on the lower Waitaki River.
- 5 Examples of some of my other experience specifically relevant to hydro development includes: tunnel design and construction supervision of the Second Manapouri Tailrace Tunnel; construction supervision of the Matahina Hydro Electric dam reconstruction

project; tunnel design for the Channel Tunnel, Jubilee Underground railway line extension and London water supply ring main in the UK; and road and rail tunnels in Hong Kong, Spain, Australia and Singapore.

- 6 Immediately prior to joining Meridian I was involved as a Project Manager at URS Ltd in both the engineering geology and groundwater aspects of Project Aqua and was responsible for preparing technical reports on the effects associated with groundwater. I was also responsible for the design and supervision of the geotechnical investigations for Project Aqua.
- 7 In preparing my evidence I have reviewed:
 - 7.1 The Clarkesfield application for a hydro energy scheme.
 - 7.2 Meridian's applications for water consents and land use consents for the North Bank Tunnel and the associated Assessment of Environment Effects (AEE);
 - 7.3 Relevant evidence and technical advice of others, including Ms Sioban Hartwell

APPLICATION

- 8 Clarkesfield Holdings (1996) Limited (*Clarkesfield*) have a consent application (CRC050566) for a hydro development on Clarkesfield Station located on the north bank of the Waitaki River between Waitaki Dam and Black Point opposite and immediately upstream from the township of Duntroon. The application is to divert up to 4.2 m³/sec from the Waitaki River to generate electricity through a canal system. The water is diverted from the river for a distance of approximately 3km.
- 9 The Clarkesfield submission on NBTC discusses the provision of water for the proposed on-farm hydro if NBTC is granted consents. Meridian requested that **Sioban Hartwell** investigate this issue as part of the water balance study for NBTC. **Ms Hartwell** presented evidence on the water balance study at the NBTC hearing and will present a summary of the findings relevant to the Clarkesfield application at these hearings.
- 10 In this evidence I consider two different scenarios:
 - 10.1 Operation of the Clarkesfield hydro with NBTC

10.2 Operation of the Clarkesfield hydro either before NBTC is commissioned or in the event that NBTC does not proceed.

OPERATION IN CONJUNCTION WITH NBTC

- 11 Table 1 below shows the mean and medium flows that **Mr Henderson** calculated for the Waitaki River immediately below Waitaki Dam with NBTC operating. This was included in his evidence presented at the NBTC hearings. The data shows that mean and medium flows will be higher than the proposed NBTC minimum flow conditions. This is due to high flow and flood flow events that cannot be accommodated by NBTC.
- 12 It should be noted that these values do not include any additional releases by Meridian for downstream users (including Horticultural and Agricultural purposes), as proposed in the NBTC draft conditions of consent, or flushing flow releases.

Table 1: mean and medium flows under NBTC

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean river flow in m³/s	212	191	218	155	136	122	135	142	149	145	169	210
Median flows in m³/s	148	158	151	129	122	112	112	112	125	131	138	148

- 13 These mean and median values increase further down the river as tributary flows enter the river. In her NBTC evidence **Ms Hartwell** used **Mr Henderson's** information as an input to her Water Balance model. For example, her NBTC evidence shows that at Duntroon, approximately 30 km from Waitaki Dam, the flows are predicted to have increased due to these inflows to:
- 13.1 a mean annual flow of approximately 177 m³/s;
- 13.2 a median annual flow of approximately 151 m³/s; and
- 13.3 monthly mean and median flows as set out in table 2

Table 2 Predicted Mean and Median Flows at Duntroon

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean flows at Duntroon in m³/s	216	196	226	160	142	131	144	152	158	154	175	216
Median flows at Duntroon in m³/s	152	161	158	134	127	117	120	123	133	138	144	152

- 14 I understand that **Ms Hartwell** has considered releases for irrigation and other uses in her Water Balance model.
- 15 I would like to emphasis here that while this increase in flow below the Waitaki Dam has been identified and quantified in **Ms Hartwell's** evidence, its effects have not been considered by any of the other scientists who presented evidence at the NBTC or HDI hearings. Therefore, this additional water could be abstracted without compromising the conclusions reached by these scientists regarding the effects associated with NBTC or HDI.
- 16 With this in mind, Meridian requested **Sioban Hartwell** to use the Water Balance model to investigate if NBTC and the Clarkesfield hydro scheme could be operated simultaneously without compromising the proposed minimum Waitaki flow conditions for NBTC between the Clarkesfield scheme intake and outfall.
- 17 **Ms Hartwell's** evidence demonstrates that for the period of hydrological record analysed (1 July 1979 to 31 December 2005) sufficient additional water was available to allow both projects to operate simultaneously without contravening the AFR (NBTC) minimum flow regime.
- 18 Therefore, Meridian and Clarkesfield have agreed that the issue of priority between the two schemes is not relevant and there is sufficient base flow in the Waitaki River to avoid any need for the proposed NBTC scheme to provide additional flow via Waitaki Dam for the Clarkesfield hydro scheme.
- 19 This is only applicable where Clarkesfield is granted and made subject to the same AFR flow regime as NBTC. Clarkesfield is actually seeking a 100 cumec minimum flow in the Waitaki River for

its consents. Once NBTC is operational there are a number of options for how the conditions of consent could address the altered flow regime. This evidence has been primarily prepared on the basis of both schemes being subject to the AFR however it is acknowledged that this is not the only option.

OPERATION WITHOUT NBTC

- 20 In the event that NBTC is not built, or the Clarkesfield hydro scheme commences operation before NBTC, the Waitaki River will be subject to a different flow regime.
- 21 On the basis of that notified in relation to Clarkesfield and almost all other irrigation takes in the lower Waitaki River, it is possible that total restriction events will be based on a flow of 100 cumecs at the Kurow recorder. This is likely to also entail 'ramping down' from 190 cumecs as flows in the river reduce.
- 22 Under these circumstances I understand that Clarkesfield propose a minimum flow condition of 100 cumecs at the Kurow Recorder with no sharing regime as this take is non consumptive and does not effect the reliability of supply of any irrigator upstream or downstream of the stream. In addition, as I have already described earlier, the tributary flows will also provide sufficient water above the any flow recorded at the Kurow to allow the scheme to operate at all times.
- 23 As discussed above, this additional flow was not considered in the scientific evidence presented at the Hunter Downs Irrigation hearing and the further evidence Meridian will present as a submitter in support in relation to the current hearing process.
- 24 Therefore, these tributary flows and the non-consumptive nature of the activity mean that the Clarkesfield scheme can operate under either of the proposed flow regimes (NBTC AFR or the 100 cumec minimum flow proposed by HDI and other irrigators).

Dated: August 2008

Nicholas Charles Eldred