

BEFORE THE BOARD OF INQUIRY

IN THE MATTER of the Resource Management Act
1991

AND

IN THE MATTER of a Board of Inquiry appointed
under section 146 of the Resource
Management Act 1991 to consider
an application by Mighty River
Power Limited for resource
consents to construct, operate,
and maintain a wind farm at
Turitea.

**MEMORANDUM OF COUNSEL FOR MIGHTY RIVER POWER LIMITED
REGARDING RESPONSE TO SUBMITTERS**

Solicitors Acting

ChanceryGreen
11 Bacons Lane Chancery Square
P O Box 106 202
Auckland Central 1143
p +64 9 357 0600
f +64 9 357 0340

Solicitors Acting: K R Price/ HC Andrews/KM Bell

Counsel Acting

Nicholas Davidson QC
Bankside Chambers
Level 22, 88 Shortland Street
Auckland 1010
PO Box 825
Christchurch 8140
p + 64 3 366 1467
f +64 3 366 7653

1. INTRODUCTION

- 1.1 The Board issued directions on 10 September 2009 regarding concerns raised by Counsel for Mighty River Power as to the Company's ability to respond to issues being raised by submitters during their representations. This memorandum has accordingly been prepared as required by those directions.
- 1.2 It is intended to address the various issues raised by submitters, as far as has been possible from a review of the transcript of proceedings, and the copies of the representations we have been provided. It is not, however, intended to address every inconsistency or minor error, but instead to address only those issues of importance, or errors that appeared in a number of presentations and/or written representations.
- 1.3 As directed, the memorandum also addresses a question raised by Commissioner Bunting in respect of IEC 61400-01, and its relevance to the Turitea Wind Farm applications.

2. SUBMITTERS

RJ and TR Buwalda (Submitters 512 and 513)

- 2.1 During their presentation to the Board, Mr and Mrs Buwalda expressed concern (at page 2208 of the transcript) regarding the crossing of the Unnamed Tributary of Kahuterawa Stream. However, as confirmed in Mr James' supplementary evidence, the need for this double culvert has now been avoided and it no longer forms part of the project.

Helen Harker (Submitter 579)

- 2.2 On page 6 of her written representation, Mrs Harker commented on the public meetings held by Mighty River Power, noting that she "*wanted to raise the issue of Mighty River Power's deliberate avoidance of holding a proper public meetings (sic)... they did have demonstrations in the foyer of the Convention Centre where people breezed in and out in their lunch hour and were dealt with individually*".
- 2.3 As discussed in Mr Henry's evidence, Mighty River Power held a number of public information sessions during the consultation period at various locations

(including the Convention Centre), and at times that included evenings and Saturday mornings. This was intended to ensure that as many people as possible could attend, and discuss issues with relevant Mighty River Power staff as necessary.

John Adams (Submitter 258)

2.4 At paragraph 2.15 of his written representation, Mr Adams states that the *“Brown’s Flat substation will drain into the Kahuterawa [Stream]. The stream that the substation drains into runs through the middle of our property and at one point passes directly below Huatau [Marae]. We consider this stream to be sufficiently pristine to drink water from it... as well as using it to collect watercress.”*

2.5 Figure CDJ05 of Mr James’ evidence in chief confirms the site drainage plan for the Brown’s Flat substation. As shown, the Brown’s Flat substation drains to the lower Turitea Stream catchment and not the Kahuterawa Stream or its tributaries (including the stream identified by Mr Adams used for drinking water and food gathering purposes). This is further confirmed in the evidence of Dr Coffey (refer his Figure 2). In addition, section 6 of Dr Coffey’s evidence confirms that there will be no potential adverse effects on surface receiving waters from the operation of the substations, so long as appropriate bunding is provided and serviced.

Peter Te Rangi (Submitter 457)

2.6 Mr Te Rangi gave an oral presentation to the Board, the details of which are recorded in the transcript. At page 2292 of the transcript, Mr Te Rangi states in relation to tangata whenua that *“there is a lack of consultation. Mighty River Power has consulted with Tane Nui Orangi [sic] O Manawatu Incorporated only.”*

2.7 Details of consultation with local iwi are recorded in the Assessment of Environmental Effects, the evidence in chief and the supplementary evidence of Mr Henry, and in the s42A report by Ms Forbes. This documentation confirms that Mighty River Power has consulted extensively with potentially affected iwi groups, including:

- Tanenuiarangi Manawatu Incorporated;

- Te Rangimarie Marae Trustees; and
- Rangitāne o Tamaki Nui a Rua.

2.8 Of these groups, Tanenuiarangi Manawatu Incorporated and Rangitāne o Tamaki Nui a Rua have presented before the Board, whilst a submission in support from Te Rangimarie Marae Trustees was declined due to lateness.

Barry Stevenson (Submitter 690)

2.9 Mr Stevenson commented to the Board (at page 2399 of the transcript) that *“The then political leaders in Palmerston North changed the reserve designation so the reserve was no longer reserve.”*

2.10 In this regard, it is noted that in changing the purpose of the Turitea Reserve, Palmerston North City Council did not remove its status as a local purpose reserve pursuant to the Reserves Act 1977. Rather, in addition to the existing two purposes for which the reserve was held (water supply and the protection of indigenous flora and fauna), an additional purpose was added (being renewable electricity generation). The legality of this change of purpose, and its consistency with the Reserves Act, was confirmed by the High Court in *Friends of Turitea Reserve Incorporated v Palmerston North City Council* [2008] 2 NZLR 661.

Helen Boleyn (Submitter 685)

2.11 In both her presentation to the Board, and her written representation, Ms Boleyn noted that her husband’s records indicate that the westerly wind has been decreasing in frequency, and that the easterly has become prevalent.

2.12 Wind monitoring has been ongoing at the Turitea site and on adjacent sites for a number of years now, and the data confirms that the strongly dominant wind condition is still a north westerly wind. This data is set out in detail in the application documents, as well as the evidence of Messrs Wong Too and Hegley.

Ross Cassells (Submitter 86)

2.13 Mr Cassells addressed the Board regarding the potential visual effects of the Turitea Wind Farm on his property, noting that *“it is the visual impact of the wind turbines that is our most urgent concern because some of the turbines will*

totally dominate our views and seriously detract from our ability to enjoy the amenity value of our property” (page 2416 of the transcript). He went on to say that “there are more than 38 turbines within 3.5 kilometres of our house and, of these, at least 29 will be highly visible” (Page 2417).

- 2.14 However, as demonstrated by photomontages RVP 4 and 5 (which were taken from Mr Cassells’ property), the potential view of turbines from the property is extremely limited, and to a large degree screened from view by an immature pine plantation.

Richard Mildon (Submitter 87)

- 2.15 At page 2437 of the transcript, Her Honour noted that Mr Wyatt’s photomontages include a red line that was being used to indicate the rural nature of the Tararua Ranges.

- 2.16 With respect, the red squares on the numbered photomontages Mr Wyatt has prepared are used to indicate the ‘wire frame’ used to model the turbine location and the topography of the background landscape, rather than the rural nature of the landscape. The use of the ‘wire frame’ is explained in more detail in Mr Wyatt’s initial assessment of effects, included in the AEE.

Jan Dixon (Submitter 388)

- 2.17 Ms Dixon read out a written representation to the Board. The text of this is recorded in the transcript. At page 2458 of the transcript she noted her understanding:

“that Massey Uni received substantial funding from MRP for research into various related areas. The catch - no Massey researcher could make a submission and identify themselves as a Massey researcher or use any of their Massey research against MRP” (sic)

- 2.18 Mighty River Power strongly refutes Ms Dixon’s statement. While Mighty River Power has undertaken to fund post-graduate avifauna research at Massey University it had not even commenced negotiations in this respect until after the period for submissions had closed. Mighty River Power notes that it is currently in negotiations with the University but no such restrictions have ever been placed on the University. Indeed, the record shows that a number of Massey University staff have presented expert evidence in front of the Board,

along with a number of submissions received, and various representations made, to this Board.

Brian Green (Submitter 344)

- 2.19 Mr Green appeared on behalf of his company, Mid-City Holdings Limited. His representation focused on potential effects of the Turitea Wind Farm on his property interests in and around Palmerston North. At page 2486 of the transcript, he commented that land his company owns *“is within 550 to 700 metres of the southwestern boundary of the Waters’ property and so any development on this land would have a major impact on us.”*
- 2.20 While it is true Mr Green lives in close proximity to the Waters’ land, the relevant portion of the Waters’ property is not, and was not at the time of the statement being made by Mr Green, to have turbines located upon it. Indeed, as currently proposed, the nearest turbines are more than 2km away – and this distance will potentially increase as a result of the design refinement process.
- 2.21 Further, at page 2491 of the transcript, Mr Green notes that he does not believe that any wind farms were in existence in 2000. The Tararua 1 wind farm was constructed by TrustPower in 1999 and was commissioned in the same year, so would have been in existence when he purchased his land.

Robert and Maggie Stewart (Submitter 283)

- 2.22 At page 2525 of the transcript, Mr and Mrs Stewart note their concern that no photomontage was prepared from which they could assess the potential visual impact of the Turitea Wind Farm.
- 2.23 While the production of a photomontage from the Stewarts’ house was contemplated, this was not considered necessary as the house is surrounded by a double shelter belt of trees, screening any possible view of the turbines.

Dr Ian Fuller (Submitter 48)

- 2.24 During questioning by Commissioner Bunting, Dr Fuller noted that on his reading of the evidence, the sediment and erosion controls proposed for the Turitea Wind Farm have been designed for a two-year rain event.
- 2.25 However, as stated in Mr Levy’s evidence, the erosion and sediment controls for Turitea have been designed to accommodate a 1% event, that is, a one in one hundred year weather event, not a one in two year event.

2.26 Further details as to the predicted rainfall in the vicinity of the Turitea Wind Farm are included in the evidence of Dr Salinger.

Harvey Jones (Submitter 189)

2.27 Mr Jones noted in his representation that the visitor turbine at the Te Apiti Wind Farm is de-rated to comply with Vestas' operational manual. However, Mighty River Power understands that the turbine is operated in the same way as all other turbines in the Wind Farm and is not de-rated in any way.

Lee Huffman and Graham Devey (Submitters 317 and 644)

2.28 Ms Huffman presented a PowerPoint presentation as her family's representation. At slide 38, she used the numbered montage to demonstrate the turbines that may be visible from their house. While the numbered montages are an important component of the visual assessment toolbox, they must be read in the correct context. They are used to familiarise oneself with the layout of the Wind Farm. They may include turbines not fully visible, where those turbines are almost entirely hidden by vegetation or topography etc. An accurate representation of the project's potential visual effects can only be gained by viewing the actual (unnumbered) photomontages attached to Mr Wyatt's evidence in chief.

Kevin Kelliher (Submitter 672)

2.29 Mr Kelliher noted at page 2604 of the transcript that the:

“previous city council, without any prior consultation and behind closed doors, saw fit to change the permitted uses in the reserve to allow wind farm development and then announce to the citizens what it had done.”

2.30 As noted in Mr C. Shaw's evidence, the addition of the extra purpose for Turitea Reserve and the changes to the Turitea Reserve Management Plan were undertaken by Palmerston North City Council in accordance with the Reserve Act 1977, which specifically requires consultation. The adequacy of that consultation was confirmed in High Court judicial review proceedings before Justice Baragwanath.

John Rounce (Submitter 571)

2.31 Mr Rounce presented a representation to the Board on 12 October 2009. During this presentation he noted that he and his wife had recently begun to invest in race horses that might be grazed at their property.

2.32 The issue with race horses has been raised in previous wind farm cases, and was a specific issue discussed in *Genesis Power Ltd v Franklin District Council* [2005] NZRMA 541. In that case evidence was given regarding the potential for horses to be adversely affected by a wind farm, and it was determined “*that the potential for aversive stimuli is unlikely with proper management to cause effects which are more than minor*”.

Kenneth Tippett (Submitter 700)

2.33 In his representation to the Board, Mr Tippett raised concerns regarding the potential for oil leakage and fire risks arising out of the development of the Turitea Wind Farm. These matters have been discussed in a separate memorandum of counsel, which was provided to the Board on Wednesday 14 October 2009.

2.34 At page 2673 of the transcript, Mr Tippett noted that his property is 1.2km from the nearest turbine. However, based on the present turbine layout (i.e. prior to any potential design refinement), Mr Tippett’s property is approximately 1.9km from the nearest turbine (turbine 82).

Brielle Rosa (Submitter 65)

2.35 Ms Rosa presented her submission and made a PowerPoint presentation to the Board. During this presentation, Ms Rosa mentioned the quiet nature of her property. While not questioning Ms Rosa’s appreciation of her property, it is necessary to clarify that Ms Rosa’s property is located on Turitea Road, almost immediately facing the ‘Rifle Rod and Gun Club’, which operates a number of shooting ranges and regular shooting events at that site.

Susan Cassells (Submitter 329)

2.36 At page 2721 of the transcript, Dr Cassells noted that her family’s property will be significantly affected by the dominating effect of turbines within 1.5km. However, as noted in respect of Mr Ross Cassells’ representation to the Board, (and as indicated by Residential Viewpoints 4 and 5, which were taken from the property) while some turbines under the present layout will be partially

visible from the Cassells' property, such views are largely screened by existing immature pine plantation.

2.37 Also at page 2721, Dr Cassells stated that she is concerned with potential strobe effects from the turbines. These effects are dealt with in Dr Black's evidence, and were also discussed when he appeared before the Board. In his opinion, the turbines will not affect the amount of light perceived to the extent necessary to create a flicker effect.

2.38 Following her representation where she described herself as an expert in environmental economics, Dr Cassells responded to a question from Ms Price regarding the efficiency of electricity generated from wind. These comments have been referred to Dr Layton for comment. His reply is included in the response to those parts of her response that require comment.

2.39 At page 2724 of the transcript, Dr Cassells noted that:

"In terms of wind turbines, no, I do not feel they are economically efficient"

2.40 In this context, it is evident that by efficiency Dr Cassells means productive efficiency; i.e. she is claiming that she does not feel that wind turbines are a relatively low cost means of providing electricity. However, Dr Layton provided evidence to the Board of Inquiry to show that electricity from Turitea is cost competitive with other potential sources. In response to Dr Cassells, he has commented that overseas, where conditions for wind turbines are not generally anywhere near as favourable as Turitea, subsidies are provided for many wind turbines, but are not required in NZ at very favourable sites like Turitea. Of course, the generators would accept them if offered.

2.41 Dr Cassells also notes that:

"In some cases wind turbines gain more economically by the carbon credits they offset by selling to, say Denmark, than from the energy produced from that wind turbine"

2.42 In response to this comment, Dr Layton has noted that the long run marginal cost (LRMC) of energy in NZ is currently around \$80/MWh or \$80,000/GWh excluding any carbon charge. He has further commented that a coal-fired plant produces 900 tonnes of CO₂-equivalent per GWh, and that this means

that the carbon price per tonne would have to be \$88.89 (\$80,000/900) for this statement to be correct. He also notes that the current price of carbon in the EU is around \$NZ30/tonne, meaning that the statement is “clearly well wide of the mark”. Also, and as Ms Price noted in opening submissions, no carbon credits are available to new wind farm developers in New Zealand.

2.43 Dr Cassells also stated that:

"it uses much more energy to make and transport a wind turbine than it ever does the energy produced from that wind turbine"

2.44 Dr Layton’s response to this statement is as follows: *“This is obviously wrong. Given that a 3 MW wind turbine at a 40% load factor (Turitea is estimated to operate at 45%) [it] would produce 3MW x 24 x 365 x 40% = 10.512 GWh of electricity per year. At, say, \$80/MWh the annual output is worth \$840,960. Turbines can produce for many years. The energy input to produce a wind turbine would have to be incredibly large and incredibly expensive compared with electricity in New Zealand for Dr Cassells’ claim to be true.”*

2.45 In response to Dr Cassells’ comment that: *"if the exchange rate from the New Zealand dollar point of view falls too low then it is not even viable to go ahead to import these wind turbines and put them in place, so that would make me question them"*, Dr Layton has noted that:

“virtually all the costs of a windfarm are incurred up front at the time of purchase of the equipment. This contrasts with a fossil fuel plant for which much of the cost is incurred in the form of fuel over the life of the plant. Much of the cost of a windfarm is in imported equipment. It should be no surprise that the economics of a windfarm depends on the exchange rate. This is not a reason to question them. It is a reason to ensure that the lapsing period of the consent is as long as possible.”

2.46 It is also clear that Dr Cassells has been provided with incorrect information about the current and former energy policies. She stated that she was informed by a TrustPower staff member that: *"the previous Labour government wanted to work towards 15 percent renewable energy"*. This is incorrect. The previous government introduced (via the NZES and NZEECS) a goal of achieving 90% of electricity being generated from renewable sources by 2020,

from a currently existing level of approximately 65%. The current government has retained the 90% goal, but has chosen to remove the moratorium on additional thermal generation.

2.47 Dr Cassells also noted that the TrustPower staff member also said that they:

"certainly would not go the way of, you know, trying to have the majority of the energy being wind because there's problems with it. If the wind does not blow you do not have it, so it is not – you know, it has got problems in that way and they certainly would not be looking towards producing anything like even half of their electricity via wind. That is because it is not economically viable, it is not totally reliable."

2.48 It is incorrect to equate economic viability with predictability of output. The issue of the reliability and predictability of wind electricity generation is discussed in detail in the evidence of Drs Heffernan and Layton. In particular, Dr Heffernan's evidence details the importance of a diverse generation portfolio to avoid the risk of an electricity shortfall during the so-called 'dry years', and the natural complement between hydro-electricity generation, and wind generation. His evidence also recognises that while there is a limit to the amount of wind generation that can be operated safely within a system, that limit is estimated to be approximately 20% of the total electricity supply, and that such a level is far from being met in New Zealand. For example, in 2008, 1,047 GWh of electricity was produced by wind, compared to a total electricity production of 42,246 GWh. Accordingly, wind-generated electricity contributed a little under 2.5% of the total electricity generated in New Zealand for the year (Ministry of Economic Development, *Energy Data File, 2009*, Table G.2d).

Anthony Stewart (Submitter 478)

2.49 During his presentation (as recorded at page 2749 of the transcript), Mr Stewart provided the Board with a copy of a brief of evidence presented in the United States by Peter Goldberg that discusses the use of an IEC standard. This issue is dealt with in more detail below.

2.50 Mr Stewart also mentioned at page 2752 of the transcript that he had not been visited by a representative from Mighty River Power. However, Mighty River Power's records indicate that Mr Omer visited the property on 21 March 2006. He records that he spoke to Mr Stewart's daughter, and left a brochure with

her, along with an invitation for Mr Stewart to contact him, though no call was received.

Angela Grassick (Submitter 533)

2.51 Ms Grassick noted in both her written representation and oral presentation to the Board that she and her husband had purchased their home a little over two years ago, inferring that they were not aware of the Turitea Wind Farm proposal. However, Mighty River Power and Palmerston North City Council signed the relevant contractual arrangements regarding the project in 2005, with a subsequent variation in 2006. Further, by 2007, the community had been supplied with various consultation documents regarding the resultant Reserve purpose change. A representative from Mighty River Power also visited Ms Grassick's family to discuss the wind farm in March 2008.

2.52 Ms Grassick also noted (as recorded at page 2811 of the transcript) that:

"I also note that Mr Wheeler mentioned that there was a public meeting held by Mighty River to go through the proposed sites."

2.53 As correctly recorded by Mr Wheeler in his presentation, Mighty River Power did hold optimisation meetings with experts to agree upon an acceptable layout and to eliminate potential turbine locations from consideration where their effects were considered to be unacceptable. However, these meetings were held 'in-house' and not open to the public.

Brent Barrett & Julie Dalziel (Submitters 227)

2.54 Mr Barrett and Ms Dalziel presented a joint submission to the Board. One of the issues they canvassed in their representation was the status of Turitea Reserve as a reserve, and their contention that the construction and operation of a wind farm would be inconsistent with this purpose.

2.55 The status of the Turitea Reserve as a local purpose reserve, and the purposes for which it is retained as a reserve pursuant to the Reserves Act 1977, include the generation of electricity from renewable sources. As previously noted, the legality of this purpose and the confirmation that the generation of electricity within a local purpose reserve was a proper purpose under the Reserves Act was fully tested in the High Court.

2.56 This issue is also not within the Board's jurisdiction in the context of the present proceedings. The legality of the change in reserve purpose has been confirmed by the High Court and is now beyond challenge. This hearing is to assess the applications for resource consent for the construction, operation, and maintenance of the Turitea Wind Farm, and to consider whether granting consent would best achieve the sustainable management purpose of the Act.

Donald Kerr on behalf of the Manawatu Branch of the Royal Forest and Bird Protection Society (Submitter 656)

2.57 Mr Kerr appeared before the Board on behalf of the Manawatu branch of the Royal Forest and Bird Protection Society. During his presentation (as recorded at page 2910 of the transcript), he noted that the Turitea Reserve was an "existing nature reserve".

2.58 Turitea Reserve is not a nature reserve under section 20 of Reserves Act 1977. Rather, it is vested in Palmerston North City Council as a 'local purpose reserve', pursuant to section 23 of the same Act. It is important to recognise the distinction between these two types of reserve, as one is certainly not synonymous with the other.

2.59 Mr Kerr further noted that *"this application will set a precedent of whether nature preservation and the development of a wind farm are compatible"*. As previously noted, the compatibility of the use of a local purpose reserve for renewable electricity generation has been accepted by the High Court as being consistent with the Reserves Act 1977.

2.60 At page 2911 of the transcript, Mr Kerr stated that the Forest and Bird Society is concerned that by placing turbines within Turitea Reserve, the already limited public access will be curtailed further. This is not true. Neither Palmerston North City Council (which will retain ultimate control of the Reserve), nor Mighty River Power, have ever indicated that further restrictions shall be placed on access to the Turitea Reserve as a result of the operation of the Turitea Wind Farm. While there may be some restrictions placed on access during construction for safety reasons, these are all to be temporary measures. To the contrary, the construction and operation of the Turitea Wind Farm, and the revenue it will provide for the development of an Eco-Park, will likely increase recreation opportunities within the Palmerston North area.

2.61 Mr Kerr also commented on the status of Brown's Flat, and whether it is forms part of the Turitea Reserve. He noted (at page 2920 of the transcript), that he understood that it does not have a separate title and is included within the main title for the Turitea Reserve.

2.62 Appendix A to Mighty River Power's Assessment of Environmental Effects for the Turitea Wind Farm sets out the legal descriptions of the land involved in the Turitea Wind Farm. It indicates that the legal description for the Turitea Reserve is Sec 2 SO 37039, with the Certificate of Title being WN373/131. Browns Flat is comprised of a number of pieces of land, which are included on two Certificates of Title, being WNB2/710 and WNF4/549.

Alan Mason (Submitter 558)

2.63 Mr Mason appeared before the Board on 14 September 2009. During his presentation, he noted (at page 2923 of the transcript) that:

"I have heard today that the detailed engineering plans and specifications have not been prepared for road works, therefore we have not had the opportunity to assess yet the extent of the damage of the earthwork

The location of sites for the purpose of the placement of surface excavated material is not specified in the application of Mighty River Power, such dumping within the Turitea Reserve which has not been excluded from the application"

2.64 Detailed engineering drawings and plans have been provided to the Board and all parties as appendices to Mr Chris James' rebuttal evidence. These engineering drawings have been prepared to a scale of 1:2000, and are extremely detailed. Additional detailed drawings and refinement of the spoil disposal sites also took place at the commencement of the hearing, with the parties' experts undertaking caucusing to agree on a new set of consolidated spoil disposal sites. A further set of drawings to the same scale will be provided by Mighty River Power when the refined proposal is released.

2.65 Mr Mason also commented on his understanding that persons entering the Turitea Reserve are required to have medical check-ups prior to being permitted to enter. Medical checks were required for a number of years, but have subsequently been replaced by a system where applicants for an access

permit to the Reserve are required to give Council approval to access health database records. Council is then able to check the health status of applicants to ensure that they do not pose a public health risk to the water supply.

3. IEC 61400-11 ISSUE

3.1 On 14 October 2009 (and as recorded at page 2898 of the transcript), Commissioner Bunting requested information about IEC 61400-11, and its applicability to the Turitea Wind Farm project.

3.2 As indicated, Mighty River Power has now received further advice on this issue from its acoustic experts, Messrs Hegley and Day. They have confirmed that IEC 61400-11 is a standard used for determining the sound power and tonality of wind turbines. The resulting data is then used to predict noise levels for specific residences, and consider whether turbines are likely to exhibit any special audible characteristics (rather than being a standard for assessing noise effects itself).

3.3 With respect to sound power levels, MRP's currently proposed conditions appropriately provide as follows:

"Prior to installation of any turbine the Consent Holder shall provide Palmerston North City Council's Principal Planner with an AER (Acoustic Emissions Report) for each type of turbine to be used. The AER shall be in accordance with IEC 61400-11, Wind Turbine Generator Systems Part 11, Acoustic Noise Measurement Techniques and shall include A-weighted sound power levels, spectra and tonality for each type of turbine to be installed. If any turbines are required to be operated in a different operating mode to comply with the noise limits then the AER shall include the noise data for those different modes."

3.4 This is also consistent with clause 6.2 of the latest publicly available version of the proposed revision to NZS6808 (which is DZ6808 v2.5), which provides that *"the sound power levels of a wind turbine used for predicting sound levels should be obtained from the wind turbine manufacturer. For the purposes of this Standard it is recommended that wind farm sound level predictions be based on the apparent sound power and tonality values for the nominated wind turbine model, determined in accordance with IEC 61400-11"*.

- 3.5 In terms of tonality issues, the current version of NZS6808 references IEC 61400 as the objective method for determining whether a sound exhibits a tonal character (and therefore whether there is a need to apply a penalty for special audible characteristics). However, IEC 61400 goes on to reference the Joint Nordic Method. Thus, the current version of NZS6808 states “*The objective method for determining whether a sound exhibits a tonal character shall be that used in IEC DIS 1400-11 (IEC 61400-11 was a draft at that time) for assessing wind turbine tonal character close to the turbine, i.e. the Joint Nordic Method*”.
- 3.6 As we understand it, this is why Mr Michael Miklin Halstead’s evidence for the Te Rere Hau extension application states (at paragraph 7) that “*tonality has been assessed as required in NZS6808:1998 but using the techniques of the Joint Nordic Method as incorporated in the relevant international standard IEC 61400-11*”. He goes on to state (at paragraph 42) that “*the more general Joint Nordic Method is referenced by the NZS6808:1998 as an appropriate means for establishing the presence of tonality at an assessment position, typically a residence*”.
- 3.7 The main difference between the two methods is that IEC 61400-11 requires measurement to take place at a distance from the base of the turbine that is equal to the turbine mast height plus the turbine rotor radius, while (as already noted) the Joint Nordic Method states that the measurements should be taken at the notional boundary of a particular dwelling.
- 3.8 Following the current version of NZS6808, clause 5(l) of the Te Rere Hau conditions requires tonality values to be assessed in accordance with IEC 61400-11. However, as Mr Halstead notes (at paragraph 44 of his evidence), given the entirety of clause 5 relates to measurement of noise received at a residential site, he has interpreted clause 5(l) as requiring use of the Joint Nordic Method. To do otherwise would potentially require imposing a penalty for tonality being present within 100m of the turbine, when it does not meet the threshold for tonality at the relevant residence.
- 3.9 Perhaps in recognition of such issues, NZS6808 v2.5 proposes that tonality be assessed in accordance with Annex C to ISO 1996-2:2007. For the Turitea Wind Farm, Mr Lloyd (on behalf of Palmerston North City Council) originally

proposed that tonality be assessed in accordance with the Joint Nordic Method. However, following caucusing, all acoustic experts agreed this should now be amended to refer Annex C to ISO 1996-2:2007, consistent with DZ6808 v2.5.

- 3.10 Finally, in reference to the document provided by Mr Stewart, Mr Guldberg's evidence appears to be criticising the relevant noise assessment because it is based on incomplete sound power data, and in particular does not include any tonality analysis (amongst other things). While he may be correct in saying that this omission seriously undermines the basis of the relevant noise assessment undertaken in respect of that proposal, there is nothing in his evidence to suggest that IEC 61400-11 itself is an appropriate standard for undertaking an assessment of environmental noise effects.

4. CONCLUSION

- 4.1 We trust the above is of assistance to the Board. As previously noted, this memorandum is not intended to address every inconsistency raised by submitters, but instead to comment on the most pertinent issues, or those that are representative of common themes raised by submitters. In light of the design refinement process, we have also not provided significant comment on matters that are possibly subject to change.



KR Price
Counsel for Mighty River Power Limited

17 November 2009