

BEFORE THE PALMERSTON NORTH CITY COUNCIL

UNDER The Resource Management Act
1991 (RMA)

AND

IN THE MATTER of a review under s 128(1)(c) of the
conditions of consent applying to
the TRH, North Range Road,
Palmerston North

SECTION 42A REPORT BY NIGEL ROBERT LLOYD

Dated: 18 August 2017

Terms

TRH	Te Rere Hau Windfarm operated by NZWL, consented in 2005.
TRHE	The Eastern extension of the Te Rere Hau Windfarm located in the Tararua District, consented in November 2009.
NZWL	New Zealand Windfarms Ltd, the consent holder.
Turitea Windfarm	Approved windfarm consent on the Turitea Reserve. Presently not constructed.
MDA 2014	Marshall Day Acoustics Report 2014 - RP008R03 2011 095W. The windfarm noise data collection specification compiled for NZWL.
PNCC	Palmerston North City Council
PNDP	Palmerston North City District Plan
PC15 A-H	Plan Changes 15 A-H as part of the sectional review of the PNDP.
WTGs	Wind Turbine Generators
SACs	Special Audible Characteristics

Introduction

[1] My name is Nigel Robert Lloyd. I have been an acoustic consultant with Acousafe Consulting & Engineering Ltd since 1985. I hold a degree in Mechanical Engineering from the University of Wales, University College Cardiff received in 1976.

- [2] My previous work experience includes five years as the noise control engineer with the New Zealand Department of Labour and three years with the Industrial Acoustics Company in the United Kingdom. Including my time spent with Acousafe as an acoustical consultant this is a total of forty years direct involvement with noise control and acoustical related work.
- [3] I have assisted various Councils with noise reviews of information for different wind farms including:
- (a) Wellington City Council on noise matters regarding the West Wind Wind Farm at Makara in Wellington (involving Meridian) both at the Council hearing and before the Environment Court;
 - (b) PNCC for the Te Rere Hau (NZ Windfarms), Tararua 3 (TrustPower), Motorimu (Allco) and Turitea Wind Farms (involving Mighty River Power);
 - (c) Clutha District Council on the Mahinerangi Wind Farm near Dunedin (involving TrustPower) and Mt Stuart Wind Farm (Pioneer Generation Ltd);
 - (d) Gore District Council on the Kaiwera Downs Wind Farm (Involving TrustPower);
 - (e) Long Gully (involving Mighty River Power) Wind Farm in Wellington;
 - (f) Te Rere Hau Extension (involving NZ Windfarms) and Waitohora Wind Farm near Dannevirke (involving Contact Energy) for Tararua District Council and PNCC; and
 - (g) South Taranaki District Council for Waverley Wind Farm (involving Tararua Wind Power Ltd).

- [4] I advised PNCC on noise matters relating to the original application for TRH.
- [5] I confirm that I have read and am familiar with the Code of Conduct for expert witnesses in the Environment Court Consolidated Practice Note (2014). I agree to comply with this Code. The evidence I give is within my area of expertise and I am not aware of any material facts that would alter or detract from my opinions.

Previous involvement in compliance issues relating to TRH

- [6] I was an expert witness in relation to the Environment Court proceedings initiated by the Council in relation to compliance with the conditions of consent for the TRH. The first decision [2012] NZEnvC 133¹ identified that the TRH was operating significantly outside the predictions made in the original assessment procedure in NZS6808:1998². It also confirmed the acoustic emissions, including sound power levels of the WTGs, were materially different from those originally certified in the Noise Impact Assessment Report provided by New Zealand Windfarms.
- [7] The second decision identified as [2015] NZEnvC 70³ declared that the WTGs of TRH possessed SACs.
- [8] In the second hearing that led to the 2nd suite of declarations at [2015] NZEnvC 70⁴, the Council called evidence from Mr Gustaf Reutersward⁵, an experienced acoustic consultant from SLR Consulting Australia Pty Ltd. Mr Reutersward and I consulted in relation to evidence on matters relevant to that second proceeding.

¹ CB Part 1, No. 1.3, p 213.

² CB Part 3, No. 3.24, p 546.

³ CB Part 1, No. 1.4, p 257.

⁴ CB Part 1, No. 1.4, p 257.

⁵ CB Part 7. No. 7.76, p 1626.

[9] I confirm the opinions expressed in my affidavit dated 28 July 2014⁶.

Scope of report

[10] The scope of this report is to:

- (a) Provide historical context for the management of wind farm noise in Palmerston North;
- (b) Provide context for the Council's review of its District Plan, through PC15B;
- (c) Make comment in relation to the recommendations of Council in relation to this review where appropriate.

[11] Mr Tom Evans has provided independent advice to the Council in relation to the proposed revised conditions for the TRH. This was provided in the context of a Memorandum of Understanding between NZWL that provided for a completely fresh set of eyes to look the appropriate set of conditions for TRH⁷. I support the independent review process but have had no involvement in it. I have however read the reports by Resonate Acoustics.

Historical context for the management of wind farm noise in Palmerston North

[12] There was extensive development of wind farm powered electricity generation in the Tararua Ranges from 2000 but the appetite for wind powered generation reduced considerably after the Global Financial Crisis of 2007-2008. The consented, but not yet developed, wind farm facility known as Turitea Wind Farm was the most recent project. If Turitea is constructed then it will complete a continuous

⁶ CB Part 7, No. 7.77, p 1636.

⁷ CB Part 3, No. 3.22, p 501.

pattern of wind farm development between Wharite Peak to the north and Brown Flat to the south⁸.

[13] I have been involved in most of the major wind farm development projects in the lower North Island. In each project I have acted as a peer reviewer for the regulatory authorities. I have general knowledge of the impacts of emissions of wind farm noise and the management of risk to amenity and health. The area of acoustic science has seen development and evolution over time and I have remained abreast of the current thinking and science in relation to these issues.

[14] I was involved in the Makara Wind Farm in Wellington (also known as West Wind) where issues of tonality were causing annoyance for the neighbouring community. These were extensively investigated by the manufacturers of the Vesta WTG and the source identified as a particular gearbox frequency and tower harmonic. These were corrected by the manufacturer but ongoing complaints were received subsequent to this time. No issues have been identified with Mill Creek wind farm to the north of Makara.

[15] I consider the TRH represents a regrettable example of poor environmental impact assessment. By that I mean:

- (a) The failure of the AEE to predict the actual adverse effects (due to many reasons) in terms of the prediction method prescribed by NZS6808:1998 which did not provide Council or the community with accurate information to enable a proper assessment to be undertaken or allow the community the opportunity to effectively participate in the resource consent process; and

⁸ CB Part 6, No. 6.68, p 1614.

- (b) A significant sub-population of Palmerston North in the receiving environment has subsequently experienced noise over a significant period.

[16] In that regard, I note the extensive affidavit evidence by locals that Council called in the Environment Court that was essentially unchallenged by NZWL. The local affidavit evidence coincides with my own discussions with residents over an extended period of time. The experiences of TRH noise described by people within the local community are sufficiently diverse, intelligent and consistent, combined with my own experience of the noise (albeit at times of less severity), to support the conclusion they are being exposed to noise that, at times, they clearly find distressing.

[17] This history has largely come about because:

- (a) The Noise Impact Assessment Report supplied as part of the application for resource consent was materially inaccurate in relation to the acoustic performance of the WTGs;
- (b) The Noise Impact Assessment Report supplied as part of the application for resource consent was deficient in its selection of receiver locations and significantly under-predicted the extent of the adverse effects (stating that “*nil adverse effects*” would be experienced);
- (c) The TRH was situated in an area that had, at the time of consent, already experienced significant Rural-Residential development. Consequently, there was a large receiver population in existence at the time the proposal was consented. We now know that many more dwellings are within the 35 dBA contour for assessment of noise effects (and assessment of background sound) than the three that were originally predicted to be inside the 35 dBA contour

(with one of those, Hargreaves, having provided written consent for the wind farm); and

- (d) To my knowledge, since construction of the various stages of TRH, there have been no documented noise control measures employed by NZWL to mitigate the effects from individual WTGs identified as causing annoyance.

NZS6808:1998 and NZS6808:2010

[18] At the time TRH was constructed, the governing Standard was NZS6808:1998. At the time of the consent for TRH there was no reference in the PNDP to this Standard (it was inserted in the Plan several years later) but it was agreed at the hearing that NZS6808:1998 was the most appropriate Standard to use being written solely for the purpose of controlling wind farm noise. The noise from more recent wind farms, such as Turitea Wind Farm and Mill Creek, have been controlled and monitored using the more recent Standard; NZS6808:2010. I have supported the application of that Standard since its promulgation by giving evidence on behalf of a number of regulatory authorities⁹.

Turitea Wind Farm consent conditions

[19] The Turitea Wind Farm noise conditions represent the most recent suite of conditions imposed on a wind farm in the Manawatu. These were imposed by Board of Inquiry following an extensive one-stop process provided for by amendments to the Resource Management Act.

[20] The following is an extract from the executive summary of the Board's report (CB Part 10, No. 10, pp 2070-2071).

⁹ For example in relation to the Turitea Wind Farm.

On 1 March 2010, just prior to the commencement of the resumed hearing, the new version of the New Zealand Standard Acoustics – Wind Farm Noise, NZS6808:2010 was released. This has been accepted as the Standard which should apply for Turitea.

In considering the operational noise of the wind farm, the Board has been guided by the Foreword to NZS6808:2010 which states:

- wind farm sound may be audible at times at noise sensitive locations, and this Standard does not set limits that provide absolute protection for residents from audible wind farm noise.

The Standard also states at Section 1.2:

- the noise limits in the Standard provide a reasonable rather than an absolute level of protection of health and amenity.

Mr Lloyd also made the point that:

- the purpose of NZS6808 is to protect amenity to the degree when a great majority of people are not annoyed. But it will allow for a small percentage of people [to be] more sensitive to noise. Some annoyance will remain but the aim is, on the Bell curve, to pick up in 80% or 90% of the population and ensure they are not severely annoyed’.

While the Board acknowledges that it is not bound by what NZS6808:2010 (or Mr Lloyd) say, the point remains that different individuals have different noise sensitivities. Irrespective of the noise conditions which may be imposed at Turitea, noise from the wind farm will be audible to varying degrees in the surrounding environs.

We also acknowledge Mr Lloyd’s description of the special nature of the location of the Turitea:

- the location is next to the currently quiet Tararua Ranges and the majority of surrounding areas are remote from significant roads or significant industrial activity;
- people come to such areas to escape from the close confines of residential or urban living; these people appreciate the aural amenity that is generally the quietness and peacefulness of the area (given that rural noise can be high from time to time);
- wind farm noise is different from all other noisy activities in that it is generated over a wide area and spreads over a wide area of the surroundings – it is difficult to escape from.

- [21] In the case of the Turitea Wind Farm, I contended for a secondary noise limit (otherwise known as a high amenity threshold) for reasons set out in [101] of the Turitea Board of Inquiry Report¹⁰.
- [22] The Applicant's experts resisted this secondary noise limit on the basis that the PNDP did not identify areas adjacent to wind farm as high amenity areas. This is something that triggers the threshold (although it is not an exclusive trigger) in NZS6808:2010. I did not accept that argument since the PNDP was developed prior to the release of NZS6808:2010 and NZS6808:1998 made no reference to identification of high amenity areas. Therefore, it is not realistic for a Standard to be applied that refers to provisions in planning instruments that have not been developed with an eye to that new Standard.
- [23] In the end, the Board did not accept the Applicant's approach and did apply a secondary limit. The overall approach of the Board is summarised at [102], which notes:
- Creating an environment when wind farm noise will be clearly noticeable at times of quiet background sound levels is not an option we condone, especially where large numbers of large residents are affected. Energy operations in New Zealand will have to learn not to place wind farms so close to residential communities if they are not prepared to accept constraints on noise limits under such conditions.
- [24] The secondary noise limit in the Turitea Wind Farm only applies at wind speeds below 6m/s.
- [25] This threshold is only a recommendation in NZS6808:2010. The setting of the threshold should, in my opinion, be informed by the approach adopted by the Board as quoted in [102] which is to avoid clearly noticeable noise when there is low background sound. In the end, the Standard does not seek to achieve unnoticeable sound, but

¹⁰ CB Part 10, No. 10.87, p 2047.

it does seek to ensure that the wind farm operates as a good neighbour.

- [26] The noise conditions of the Turitea Wind Farm also contained specific controls in the near field (close to the wind farm) to ensure that the wind farm was installed so that it met the assumptions contained in the original Noise Impact Assessment Report. This included a condition to ensure that the sound power level of the WTGs was the level assumed for the Noise Impact Assessment Report¹¹. In addition, a certificate had to be issued by the consent holder demonstrating that SACs were not emitted from the WTGs¹². This would be assessed in accordance with IEC61600.

Te Rere Hau Eastern Extension

- [27] I provided expert evidence on behalf of the Tararua District Council and PNCC in respect of the Te Rere Hau Eastern Extension. The geographic location is materially different from that at TRH, with most of the wind farm located on the eastern flanks of the Tararua Ranges. In addition, there is no significant population of sensitive receiving locations on that side of the ranges.

- [28] The assessment of appropriate noise conditions is intensely factual and case specific. NZS6808:2010 provides guidelines, but requires the users to apply their discretion when determining the levels and controls to be set. The appropriate conditions must be assessed on a case by case basis.

Plan Change 15B – Palmerston North District Plan

- [29] PNCC has undertaken a sectional review of its District Plan. This review addresses sections of the existing Operative Plan individually with the goal of completely reviewing the Plan at the end of that

¹¹ CB Part 10, No. 10.88, Condition No. 26, p 2583.

¹² CB Part 10, No. 10.88, Condition No. 26, p 2583.

process so that there is a fully reviewed second generation Palmerston North District Plan.

- [30] PC15B was part of a suite of plan changes (PCs 15A-H) notified in December 2014. PC15B related specifically to “Windfarms and Landscapes”, but was notified with changes to the Rural Zone section of the Plan in PC15A. This was because wind farms are identified as appropriate in the Rural Zone and this is where major wind farm infrastructure is located.
- [31] The technical report for PC15B regarding rural noise (including wind farm noise) was prepared by me and is referenced on PNCC’s website as “Appendix 4 – 15B: Technical Document 5 – Rural Noise Report (2014) – Acousafe Noise Control Solutions”.¹³
- [32] The noise provisions in PC15B aimed at management of wind farms is part of a forward-looking approach to the assessment, control and management of wind farms. It was not specifically designed to address the unique circumstances of the review of TRH noise conditions. The provisions were aimed at the control of new wind farms and repowering of existing wind farms.
- [33] Nevertheless, the experience of TRH has informed the content of some of the provisions. For example, Rule 9.8.6 governing wind farms contains an assessment criteria (g) that provides for safeguards and contingencies that have been identified as necessary as a result of the TRH experience (and others). Assessment criteria (g) is set out below:

- (g) The provisions for safeguards and contingencies, particularly concerning:
 - (i) The model and proposed location of the wind turbine;

¹³ <http://www.pncc.govt.nz/yourcouncil/consultations/section-district-plan-review/plan-change-15a-h/plan-change-15a-h-notification/>.

- (ii) Specifying compliance with turbine manufacturer's noise emission levels stated in the application;
- (iii) The early identification and remediation of any special audible characteristics that arise during operation of the Wind Farm;
- (iv) Effective noise monitoring programmes to demonstrate compliance beyond the commissioning stage;
- (v) Procedures for addressing turbine malfunctions;
- (vi) Community liaison and methods for dealing with complaints;
- (vii) Reporting these matters to Council.

[34] PC15B contemplates that noise assessment, measurement and control carried out in accordance with NZS6808:2010. Assessment criteria (d) in Rule 9.8.6 provides:

- (d) The assessment, measurement and control of noise in accordance with New Zealand Wind Farm Noise Standard (NZS 6808:2010 Acoustics – Wind Farm Noise).

[35] As part of PC15A-H, PNCC identified locations where rural-residential development is appropriate in the Rural Zone. This is identified by means of an overlay called the Rural-Residential Overlay¹⁴. These areas were selected based on multiple criteria including existing patterns of development, soil quality, landscape and proximity to existing wind farms. A significant part of Palmerston North's Rural Residential Overlay is located in the foothills of the Tararua's immediately adjacent to the TRH and the Turitea Wind Farm. I recommended that the Rural Residential Overlay be specifically identified as an area that qualifies as a high amenity area for the purposes of NZS6808:2010. This then immediately engages the secondary noise limit in NZS6808:2010. This was achieved by a new definition in Chapter 4 of the Plan that reads as follows:

High Amenity Area means for the purpose of NZS6808:2010, any area identified in the District Plan as a

¹⁴ See Maps in CB Part 6, No. 6.71 – 6.75, pp 1620 – 1624.

rural-residential area, or within the Rural Residential Overlay (as shown on the planning maps).¹⁵

- [36] The rationale for the definition is contained in Section 4.10 of my technical report which contains the following text:

Section 5.3 of NZS6808 recognises that there may be special circumstances at some noise sensitive locations. An example is where evening and night time noise limits in the plan for general sound sources are more stringent than 40dBA LAeq (15 min) or 40dBA L10. A high amenity noise limit should not be applied in any location where background sound levels are already affected by other specific sources, such as road traffic sound.

The night-time noise limits for general activities in the District Plan have been 40dBA L₁₀ applied at the rural or residential site boundary and these are proposed as 40dB LAeq (15 mins) in the review. These moderately strict limits provide a basis for a High Amenity Area to be established.

Examination of the District Plan Maps indicates that the High Amenity Area is likely to mostly coincide with the Rural Residential Areas/Subdivision Overlay in the Plan, and this is where rural subdivision and rural residential amenity expectations are expected to be highest. Consequently then, it is recommended that the rural residential area be afforded a High Amenity Area categorisation in terms of NZS6808. This only relates to wind farm noise and is compatible with the Board of Inquiry's decision on the Turitea Windfarm.

- [37] The decisions version of planning maps includes much of the Rural Residential Overlay contained in planning maps at the time of notification of PC15B. This includes all residences on the southern side of Ridge View Road¹⁶ and properties near the Pahiatua Track¹⁷.

- [38] In order to manage reverse sensitivity effects on wind farms, PNCC made subdivision of rural-residential allotments in the Rural Zone a non-complying activity if they are within 1.5km of an existing wind farm. That is referred to as the 1.5km "setback".

¹⁵ Decisions Version, Section 4, PNDP 4-13.

¹⁶ Maps in CB Part 6, No. 6.71 – 6.74.

¹⁷ Maps in CB Part 6, No. 6.71 – 6.74.

- [39] A small area originally included in PC15B as Rural Residential Overlay near TRH was removed in the decisions version of the Rural Residential Overlay because it was within the 1.5km setback. As I understand it, from a policy point of view, it was determined to be inappropriate to identify land as suitable for rural-residential development (by means of the Rural Residential Overlay) when at the same time specifying that such activities were non-complying by reason of being within the 1.5km setback
- [40] That determination does not alter the fact that properties not within the Rural Residential Overlay, existing at the present time or existing at the time TRH was consented, may qualify as high amenity areas that should benefit from a level of protection by means of a secondary noise limit, such as was determined to be appropriate in the Turitea Wind Farm case. This assessment should be based on the level of effect and the circumstances that influenced the Turitea Board of Inquiry at [102] of its decision.
- [41] For example, I expect dwellings on the northern side of Ridge View Road to experience the same background sound conditions (in the absence of TRH) as those on the southern side of Ridge View Road, and therefore should enjoy the same level of protection.

Dated: 18 August 2017



Nigel Robert Lloyd