Noise Impact Assessment Report

Waubra Wind Farm

The Dean Report

Executive Summary and References

July 2010

NOISE MEASUREMENT SERVICES

EXECUTIVE SUMMARY

Findings

Mr and Mrs Dean have requested a Report providing an assessment of the potential for adverse effects due to activity from the Waubra wind farm while living in their residences and while working on their farms.

My research to date for this investigation indicates “ordinary” wind has a laminar or smooth infrasound and low-frequency flow pattern when analysed over short periods of time. Wind farm activity appears to create a “pulsing” infrasound and low-frequency pattern. These patterns are illustrated in sonograms in this Report. My hypothesis at this stage is that wind farm sound has an adverse effect on individuals due to this pulsing nature, as well as audible noise due to the wind turbines. These effects may be cumulative. Research into this hypothesis is described further in this Report.

It is concluded, from the information presented, that Mr Dean has been and is currently adversely affected by the presence and activity of the Waubra wind farm. The effects stated by Mr Dean as affecting his health and statutory declarations from his family and residents in the vicinity of the wind farm attest to adverse health effects. Adverse health effects such as sleep disturbance, anxiety, stress and headaches are, in my view, a health nuisance and are objectionable and unreasonable.

Evidence

The evidence presented in the Chapters to this Report has been submitted as expert evidence to different wind farm hearings; Turitea (Board of Inquiry, New Zealand); Berrybank, Mortlake, Stockyard Hill and Moorabool (Panel Hearings, Victoria); as well as being part of submissions for other parties in New Zealand, New South Wales and Victoria. At no time has the evidence been significantly challenged or rebutted by the wind farm applicant, the consultants or the legal practitioners employed by the applicant(s). Some evidential detail has changed between hearings; critique from earlier hearings has been addressed in subsequent evidence. This report is the final in the Victorian evidential series.

In summary, it appears that the individual developers and their advocates have chosen to take the stance that the New Zealand wind farm standard NZS6808 (either the 1998 or 2010

versions) is both adequate and acceptable. For reasons stated in this Report this stance is neither valid nor credible.

The Report is presented in three parts:

(a) A sound level survey Report presenting measured sound levels at the Dean's properties and assessment of effects;

(b) Human perception and potential adverse effects of wind farm activity; and

(c) A series of Chapters to explain the potential effects of wind farm activity in relation to the measured sound characteristics.

Wind farm sound analysis presents three distinct issues:

- The identification of sound that can be directly attributed to the sound of the wind farm/turbines, measured as a background sound level, compared to the sound of the ambient environment without the presence of the wind turbines;
- The sound of any special audible characteristics of the wind farm/turbines, such as distinct tonal complexes and modulation effects (amplitude and frequency) that may affect human health through sleep disturbance, for example; and
- The presence of any sound characteristics that may affect human health.

Wind has audible and sub-audible character. That is, measurement of wind sound will always present sound levels in the audible, low-frequency and infrasonic frequencies. Sound in the low frequencies and infrasound frequencies can be heard if the sounds are loud enough. The sounds, however, may be perceptible rather than heard at relatively lower levels of "loudness".

Evidence produced in New Zealand concerning the West Wind and Te Rere Hau wind farms indicate that the adverse effects of wind farm noise are well documented. West Wind has recorded 906 complaints over a 12 month period. Te Rere Hau has recorded 378 complaints over an 11 month period. Waubra has a less well documented complaint history but my observations and the statutory declarations as to effect are sufficient to identify issues.

The research recorded in this Report is in addition to the peer-reviewed evidential text *Sound, Noise, Flicker and the Human Perception of Wind Farm Activity* presented at the proposed Turitea Wind Farm Board of Inquiry Hearing, Palmerston North New Zealand, March 2010.

In June 2010 the Australian Government National Health and Medical Research Council released a Paper entitled *"Wind Turbines and Health: A Rapid Review of the Evidence".* The NHMRC paper does not identify its author(s), is not peer-reviewed, and is superficial in comparison to this Report. In my view the NHMRC paper has no standing.

Conclusions

It is concluded that wind farm noise prediction, as implemented under NZS6808 (the New Zealand wind farm standard) is not adequate in assessing potential adverse effect and implementation of the standard does not and will not provide an acceptable level of amenity. Application of the standard does not provide a conservative assessment of sound levels that may be experienced under different meteorological conditions. The reasons for this conclusion are presented in this Report.

It is concluded that, during the term of the survey, for the reasons given in this report it can not be clearly proven or not proven that the wind farm exceeded at the H41 residence the compliance criteria of 40 dB(A) measured as the background level, LA95, or the 'background plus 5dB' sound level, whichever is the greater. This is due to the failure of the approval conditions to provide clear and specific methodologies to measure wind farm sound under compliance testing conditions or under complaint conditions.

It is concluded from the survey that "background" compliance monitoring is not sustainable as there is no proven methodology to accurately measure wind turbine sound, complaints especially, in the presence of ambient sound.

It is concluded that, during the term of the survey, the wind farm exhibited special audible characteristics that can be described as modulating sound or as a tonal complex. The inclusion of the penalty for special audible characteristics may bring the wind farm into non-compliance, for the reasons stated in this Report.

It is concluded that compliance monitoring must include real-time measurement of special audible characteristics such as modulating sound in accordance with the Permit Conditions.

It is concluded that meteorological conditions, wind turbine spacing and associated wake and turbulence effects, vortex effects, turbine synchronicity, tower height, blade length, and power settings all contribute to sound levels heard or perceived at residences.

It is concluded that noise numbers and sound character analyses are meaningless if they are not firmly linked to human perception and risk of adverse effects.

Recommendations

It is recommended that a longer–term observed study be completed at 377 Stud Farm Road and the near locale in order to verify wind farm sound levels and sound character under varying weather conditions and wind farm operational activity.

It is recommended that an attitudinal and health risk assessment study be undertaken to assess health effects due to wind farm exposure (Waubra locale) and non-exposure (well away from any wind farms) using both objective and subjective measures.

Peer Review

The Report addresses critiques presented by Dr D. Shepherd and Dr H. Bakker.

Signed

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DISCLAIMER

Recommended Reading

In addition to the references in the Report the following are recommended reading to the issue of sound, noise, human perception, adverse effects and wind farm activity

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