

Delburn Wind Farm Pty Ltd
Level 3/150 Chestnut St
CREMORNE VIC 3121

S6049C6

Attention: Peter Marriott

22 October 2020

Dear Peter,

**DELBURN WIND FARM
PEER REVIEW OF NOISE ASSESSMENT**

Introduction

A desktop review of the environmental noise assessment of the Delburn Wind Farm (the **Assessment**) has been conducted. The Assessment is described in the following Marshall Day documents:

- Delburn Wind Farm Background Noise Monitoring - Rp 002 20190463 -20 October 2020
- Delburn Wind Farm Environmental Noise Assessment - Rp 003 20190463 -20 October 2020

The Assessment concluded:

The noise assessment therefore demonstrates that the proposed Delburn Wind Farm is able to be designed and developed to achieve Victorian policy requirements for construction and operational noise, and that appropriate control mechanisms are available to ensure compliance is maintained over the life of the project.

This review compares the methodology of the Assessment against the requirements of the *Development of Wind Energy Facilities in Victoria - Policy and Planning Guidelines* (the **Guidelines**). An independent prediction of noise from the wind turbines has also been conducted for comparison with the Marshall Day predictions.

Objective Noise Criteria

The Guideline refers to New Zealand Standard 6808:2010 “Acoustics – Wind Farm Noise” (**The New Zealand Standard**) for the assessment of wind turbine noise. The New Zealand Standard defines a methodology for the measurement of background noise, the determination of objective criteria and the prediction of wind turbine noise. The New Zealand Standard does not cover the assessment of construction noise or ancillary infrastructure, such as substations and battery storage facilities.

The Assessment determines criteria for:

- wind turbines in accordance with the New Zealand Standard;
- ancillary equipment in accordance with the Noise From Industry in Regional Victoria (**NIRV**); and
- construction noise in accordance with the Noise Control Guidelines.

This is considered to be the appropriate approach in Victoria.

The New Zealand Standard includes:

As a guide to the limits of acceptability at a noise sensitive location, at any wind speed wind farm sound levels ($L_{A90(10\ min)}$) should not exceed the background noise level by more than 5 dB, or a level of 40 dB $L_{A90(10\ min)}$, whichever is greater.

and

In special circumstances at some noise sensitive locations a more stringent noise limit may be justified to afford a greater degree of protection of amenity during evening and night-time. A high amenity noise limit should be considered where a plan promotes a higher degree of protection of amenity related to the sound environment of a particular area.

The Assessment has considered the recommendations of the New Zealand Standard for high amenity areas in the context of planning policy in Victoria, taking into account the Cherry Tree Wind Farm VCAT determination and the planning panel report for Golden Plains Wind Farm. The considerations result in the following noise criteria:

Table 6: Applicable noise criteria, dB L_{A90}

Land Zoning	Noise Criteria
Farming Zone	40 dB or background L_{A90} + 5dB, whichever is higher
Rural Living Zone	35 or 40 dB(A)* or background L_{A90} + 5 dB, whichever is higher

* the applicable base noise criterion is to be based on the NPI calculation detailed in Clause C5.3.1 of NZS 6808:2010

These criteria are considered to be the most onerous which could apply in the circumstances.

Background Noise

An important part of background noise monitoring is the selection of monitoring locations. The New Zealand Standard includes:

Background sound level measurements and subsequent analysis to define the relative noise limits should be carried out where wind farm sound levels of 35 dB $L_{A90(10 \text{ min})}$ or higher are predicted for noise sensitive locations, when the wind turbines are at 95% rated power. If there are no noise sensitive locations within the 35 dB $L_{A90(10 \text{ min})}$ predicted wind farm sound level contour then background sound level measurements are not required.

When considering a group of noise sensitive locations it is acceptable to conduct background sound level measurements at a representative location.

The Assessment includes a figure (Figure 1 in the Background Noise Monitoring report) showing preliminary noise prediction contours and the locations at which background noise monitoring has been conducted. In addition, Appendix C shows the Preferred Noise Monitoring Locations and includes locations where permission was not granted for access to place loggers. On the basis of the figures, it is considered that the selected noise monitoring locations are appropriate as each noise sensitive location inside the 35 dB(A) contour is well represented by one or more noise monitoring locations.

The equipment, placement and length of measurement are described in the Assessment. Each of these meets or exceeds the minimum requirements of the New Zealand Standard.

The Assessment includes additional filtering. In particular, data points are excluded where the characteristics indicate that bird or insect noise may be present. The filtering results in lower (more onerous) criteria than would otherwise apply. On this basis, it is considered that the measured background noise levels provide a conservative method of determining criteria and describing the existing noise environment. It is noted that there is the potential for the filtering to result in difficulties demonstrating compliance.

Noise Predictions

The Assessment includes predictions for three candidate turbine types; the Vestas V162-5.6MW, the GE 5.5-158 and the Siemens Gamesa SG 6.0-170. The predictions are based on the ISO9613-2 noise prediction model, in accordance with the New Zealand Standard. A comparison of the recommended inputs in the New Zealand Standard and those used in the Assessment are summarised in the table below:

Parameter	NZS recommendations	Used in Assessment
Temperature	10°C	10°C
Relative Humidity	70%	70%
Ground Softness	0.5	0.5
Barrier Attenuation	No limit	Limited to 2 dB(A)
Sound Power Level	In accordance with IEC61400-11	Specified plus uncertainty

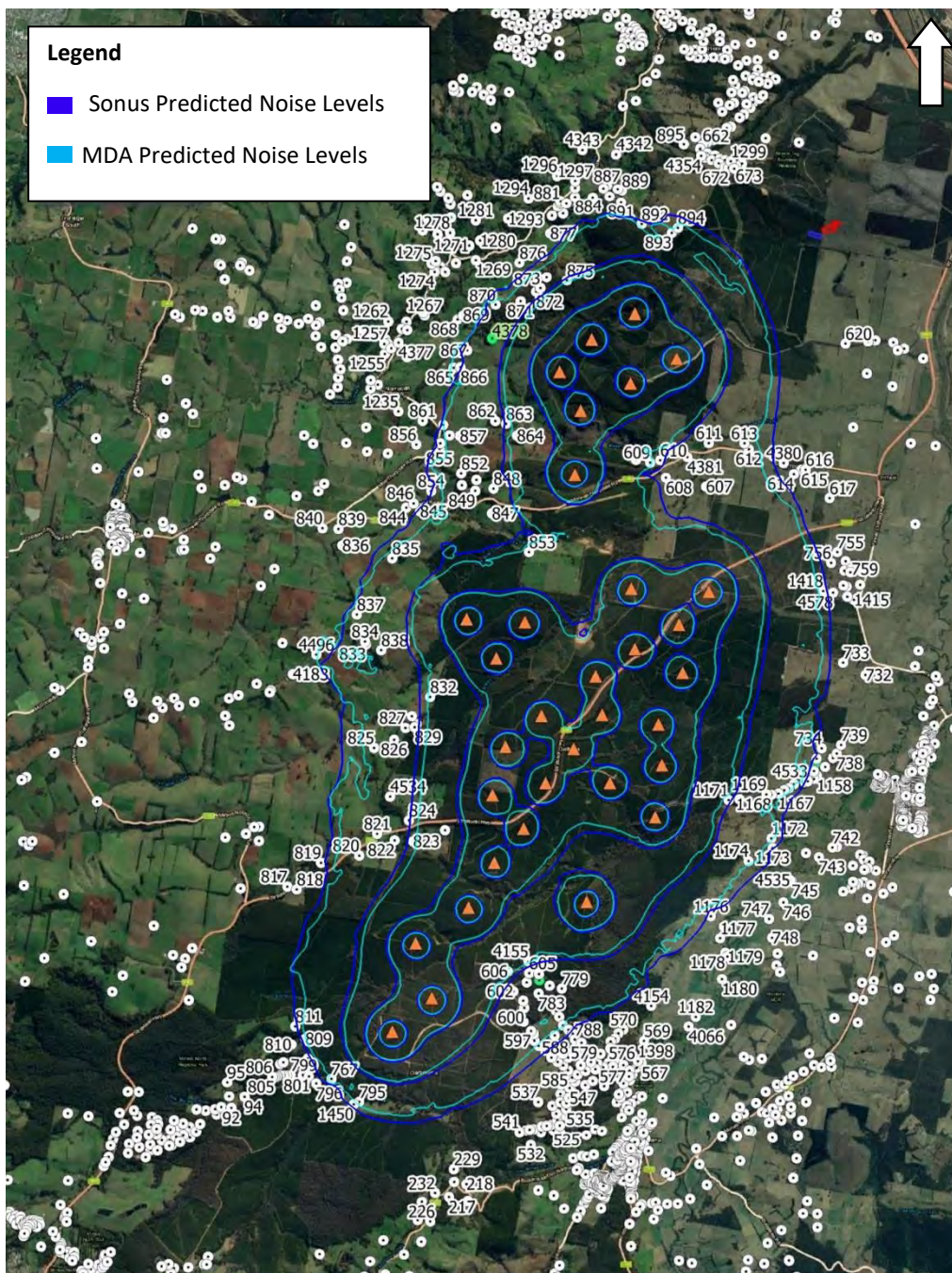
The potential result of the variation from the recommendations in the New Zealand Standard is described below:

- The New Zealand Standard does not limit barrier attenuation, whereas the Assessment limits the potential attenuation to no more than 2 dB(A). This has the potential for the predictions in the Assessment to be higher than the recommendations of the New Zealand Standard.
- The New Zealand Standard recommends that sound power levels should be determined in accordance with an International Standard based on measurements. That is, based on the measurement of an individual turbine. The Assessment determines sound power levels based on the manufacturer's specified level with an additional margin for uncertainty to account for the variation between turbines. The approach in the Assessment will result in higher predicted noise levels.

Based on the above, the approach in the Assessment is conservative compared with the New Zealand Standard, as it will result in higher predicted noise levels.

As a method of verifying the predictions in the Assessment, Sonus has independently predicted the noise from the Vestas V162-5.6MW turbines using the ISO9613-2 noise model and the inputs of the UK's Institute of Acoustics recommendations. A comparison with the predictions in the Assessment are shown in Figure 1.

Figure 1: Sonus and Marshall Day Predicted Noise Level Contours for Vestas V162 WTG at 9m/s Hub Height Wind Speed using ISO Noise Model.



The figure demonstrates a very close correlation between predictions.

Ancillary Equipment

The Assessment includes predictions of the noise from the proposed terminal station and battery energy storage system (BESS).

Predictions of the noise have been made based on reasonable assumptions regarding sound power levels and the application of penalties for tonality.

The predictions result in noise levels, which are well below the objective criteria determined in accordance with the NIRV.

Construction Noise

A summary of the potential noise associated with construction is provided within the Assessment and a recommendation is made that a Construction Environment Management Plan (CEMP) be prepared prior to construction. The approach is considered to be appropriate at the application stage of the project.

Conclusion

Marshall Day has prepared a Background Noise Monitoring report and an Environmental Noise Assessment for the Delburn Wind Farm.

A desktop review has been conducted to compare the methodology of the Assessment against the requirements of the *Development of Wind Energy Facilities in Victoria - Policy and Planning Guidelines*. Independent predictions of the noise from the wind turbines have also been made.

On the basis of the review and predictions, it is concluded that the Assessment has been conducted in accordance with the *Policy and Planning Guidelines* and the assessed layout will achieve the objective requirements.

Yours faithfully
Sonus Pty Ltd

A handwritten signature in black ink, appearing to read 'Chris Turnbull', written in a cursive style.

Chris Turnbull
Principal

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