

REPORT No. 001 R01 2008485

PROJECT: STOCKYARD HILLS WIND FARM
TERMINAL STATION NOISE ASSESSMENT REPORT

CLIENT: Stockyard Hill Windfarm Pty Ltd
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DATE: 23 January 2009

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1.0 INTRODUCTION

Marshall Day Acoustics Pty Ltd (MDA) has been commissioned by Stockyard Hill Windfarm Pty Ltd to assess noise emission from a proposed terminal station which is to be built as part of the Stockyard Hill Windfarm development. The terminal station is located in the Berrybank area of rural Victoria.

We understand that the most significant noise source at the terminal station will be a transformer, which is assessed in accordance with the EPA publication N3/89 *Interim guidelines for control of noise from industry in country Victoria*. Details of the transformer, including noise emission data, were not available for the preparation of this report. In lieu of the information, maximum allowable transformer noise emission levels are presented.

Acoustic terminology used throughout this report is presented in Appendix A.

2.0 SITE DESCRIPTION

The subject site is located remotely from the Stockyard Hill Windfarm site, near Lake Struan in the Berrybank area of rural Victoria. We understand that Collins Road runs adjacent to the site's eastern property boundary. The terminal station will be installed at the western end of the site, as illustrated in Figure 1 below.

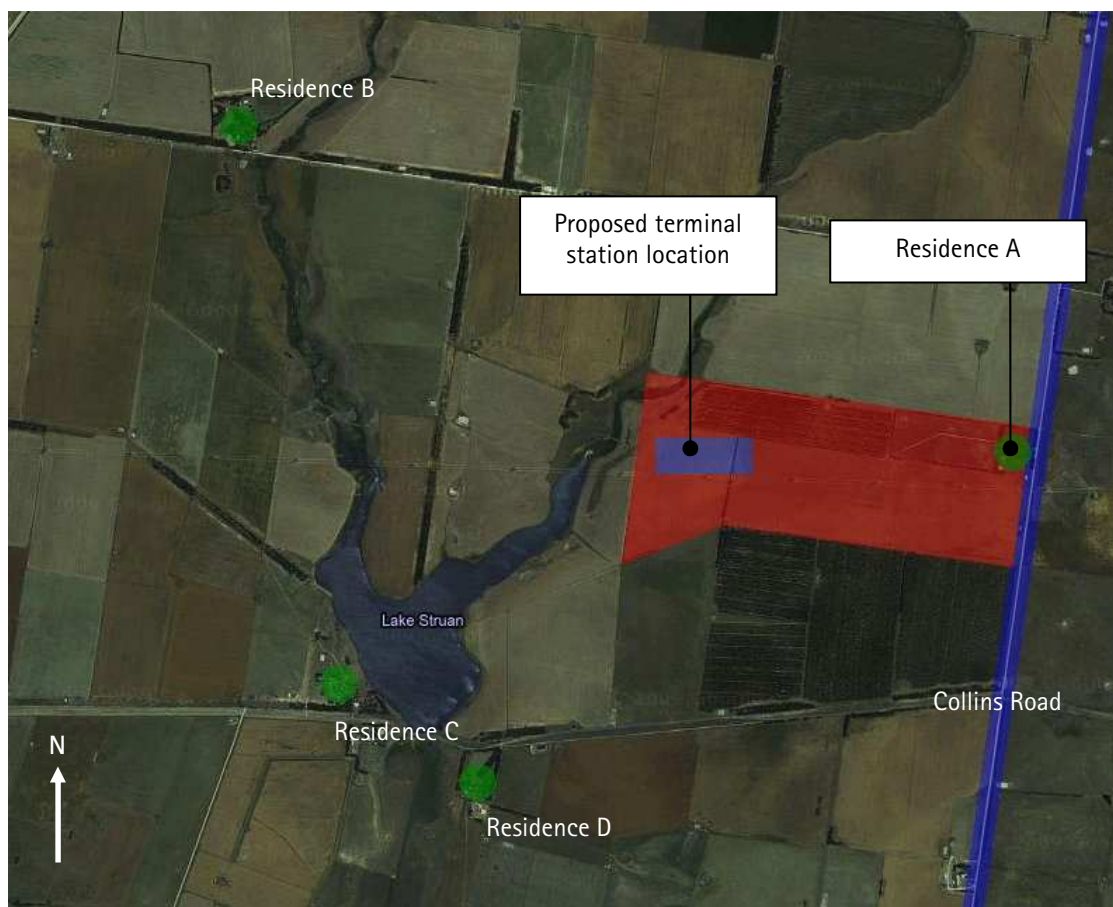


Figure 1: Terminal station site location

There are four residential dwellings located around the terminal station site. The closest dwelling is Residence A, which is located approximately 1,500m from the proposed terminal station location, as shown in Figure 2 below.

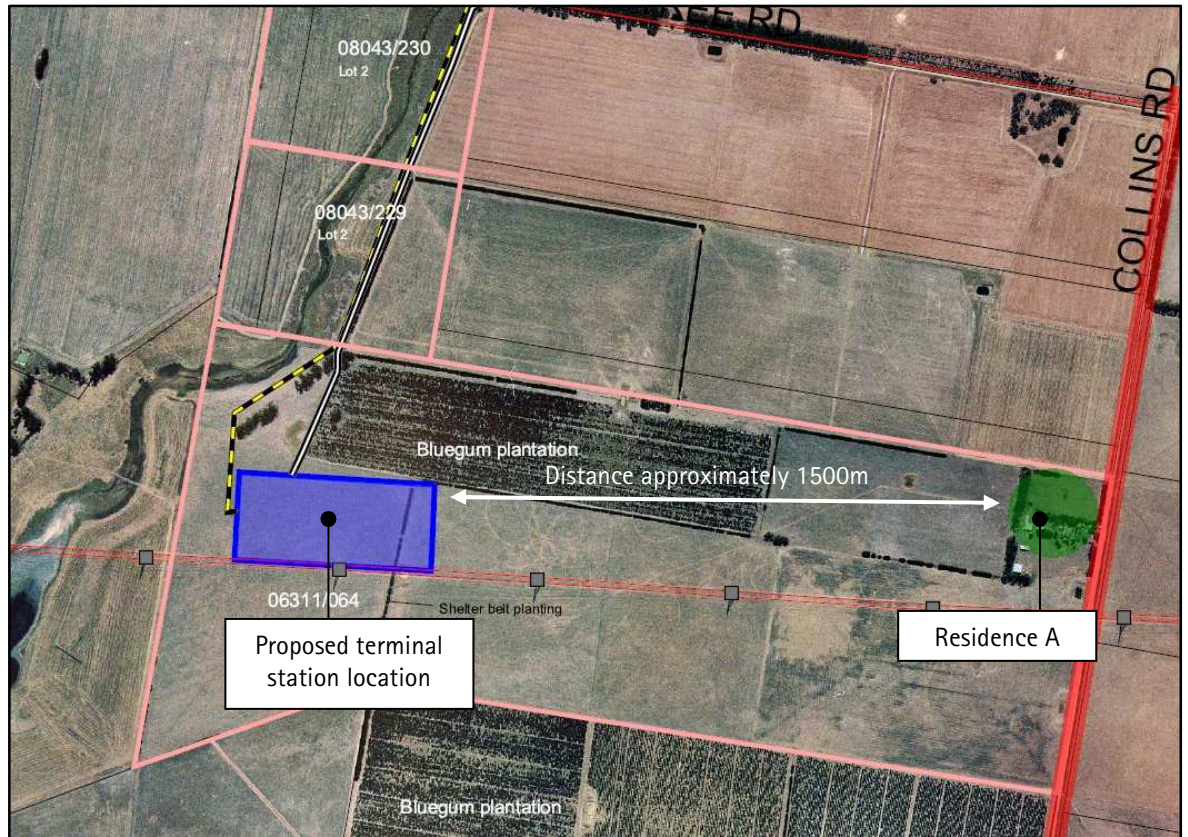


Figure 2: Terminal station arrangement

We understand that the substation operates continuously 24 hours per day, 7 days per week.

3.0 SITE VISIT

A site visit was made on 1 January 2009, between 1200-1400hrs, to view the proposed site and the location of the nearest residential dwellings. The site and surroundings are characterised by open fields and Bluegum plantations.

Background noise level measurements were not able to be carried out during this visit due to high wind speeds. However, no significant noise sources have been observed in the surrounding area and given the isolated rural position of the site, ambient noise levels are expected to be very low in the absence of wind generated noise.

4.0 ENVIRONMENTAL NOISE CRITERIA

4.1 EPA publications

There are no legislative controls governing noise emission in country Victoria. Noise limits in country Victoria are set by the Environment Protection Authority Victoria (EPA), with reference to the following two documents:

- EPA Publication *N3/89 Interim Guidelines for Control of Noise from Industry in Country Victoria*
- EPA Draft Publication *Noise from industry in regional Victoria: Draft recommended maximum community noise levels for commerce industry and trade premises in regional Victoria*, dated 16 October 2000.

The EPA Draft Publication is intended to supersede the EPA N3/89 guidelines; however, this document is still in draft form and may be subject to future modification. It is therefore considered appropriate to use the EPA N3/89 guidelines to determine noise limits for the terminal station. These guidelines set minimum noise limits for country Victoria and specify methodologies for calculating noise limits for the following two situations:

- Where background noise levels are comparable to metropolitan Melbourne, the noise limits should be determined using the procedures of *State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1 (SEPP N-1)*
- Where background levels are very low, that is, less than 25dBA at night, the minimum noise limits from EPA N3/89 should be applied.

4.2 Noise level limits

As discussed in Section 3.0, ambient noise levels at the site and in the surrounding area are expected to reach very low levels during periods with no significant wind generated noise. We therefore consider it appropriate to assess noise emission from the terminal station using the minimum noise limits from EPA N3/89.

Minimum noise level limits are detailed in Table 1 below.

Table 1
N3/89 minimum noise level limits

Time period	Noise limit
Night	32dBA
Evening	37dBA
Day	45dBA

We understand that the terminal station, including the transformer, will operate 24 hours per day, 7 days per week. Therefore, noise emissions must comply with the N3/89 night-time noise limit. Compliance with this night-time noise limit will ensure compliance with N3/89 noise limits during other periods.

The night-time noise limit at residential dwellings adjacent to the substation is 32dBA.

5.0 ASSESSMENT

Compliance with the N3/89 noise level limit should be assessed in general accordance with SEPP N-1. The assessment should be at the nearest affected residence, which in this case is Residence A, with adjustments made for any special characteristics of the noise emission, such as tonality. Noise emission from transformers is generally tonal in character and we therefore consider that a correction of +5dBA should be applied to noise emission.

The area between the terminal station and Residence A is generally flat and there are no significant barriers to the propagation of sound. Also, as noted above we understand that the transformer will be the only significant noise source at the terminal station. On this basis we consider that to comply with the 32dBA noise level limit, with a 5dB adjustment for tonality, the sound power level (L_w) of the transformer should be not more than 95dBA.

The transformer sound power level should be measured in accordance with Australian Standard AS2374.6 1994: *Power transformers Part 6 – Determination of transformer and reactor sound levels* (AS2374.6).

In the case that the proposed transformer has a sound power level which exceeds 95dBA, mitigation measures should be implemented, as required, to achieve the noise level limit at adjacent residential properties. Mitigation options include installing a barrier around the terminal station equipment or enclosing it in a roofed structure.

Proposed installation details, including the sound power level noise emission of the transformer in accordance with AS2374.6, should be reviewed prior to installation on site.

APPENDIX A

ACOUSTIC TERMINOLOGY

Ambient The ambient noise level is the noise level measured in the absence of the intrusive noise or the noise requiring control. Ambient noise levels are frequently measured to determine the situation prior to the addition of a new noise source.

dB Decibel. The unit of sound level.

dBA A-weighted decibel. The A-weighting approximates the response of the human ear.

L_w (or SWL) Sound Power Level. The level of total sound power radiated by a sound source.

Noise is often not steady. Traffic noise, music noise and the barking of dogs are all examples of noises that vary over time. When such noises are measured, the noise level can be expressed as an average level, or as a statistical measure, such as the level exceeded for 90% of the time.

L_{A90} The noise level exceeded for 90% of the measurement period, measured in dBA. This is commonly referred to as the background noise level.

L_{eq} The equivalent continuous sound level. This is commonly referred to as the average noise level.