

30 November 2017

Berrybank Development Pty Ltd
Suite 4 Level 3
24 Marcus Clarke Street
Canberra ACT 2600
AUSTRALIA

Attention: Shaq Mohajerani

Dear Shaq,

BERRYBANK WIND FARM – OFF-SITE SUBSTATION NOISE ASSESSMENT

The Berrybank Wind Farm is an approved development located near the township of Berrybank, Victoria. The planning permits for the wind farm allow for the construction of wind turbines and an on-site substation, which will include a 220kV power transformer for the site.

It is understood that a separate planning application is being made for an off-site substation that is proposed to be located outside of the development site and would incorporate ancillary plant associated with the wind farm. This letter presents an assessment of noise associated with the proposed off-site substation.

PROPOSED DEVELOPMENT

Two location options are presently being considered for the proposed off-site substation; both are indicated in the site plan in Figure 1.

It is understood the plant within the off-site substation for the Berrybank project comprises 220kV switchgear (including circuit breakers, associated busbars, and protection and control instruments) and small auxiliary transformers for power to the substation.

Typically, the dominant noise source(s) associated with a wind farm's substation are the main power transformers which handle the power output from the wind farm and prepares it to join the main grid. In this case, the main transformers for the Berrybank wind farm are to be located within the on-site substation. The transformers to be located in the off-site substation are limited to small auxiliary transformers to meet the requirements of the plant within the off-site substation and are therefore not expected to generate significant noise.

Figure 1: Berrybank Wind Farm proposed off-site substation locations



ASSESSMENT CRITERIA

In rural Victoria, noise from commercial and industrial noise sources is assessed using guidance in EPA publication 1411 titled *Noise from Industry in Regional Victoria – Recommended maximum noise levels from commerce, industry and trade premises in regional Victoria* (NIRV). These guidelines are applicable to the assessment of noise from ancillary equipment such as transformers and switchgears to be located in the off-site substation associated with the proposed amended Berrybank Wind Farm.

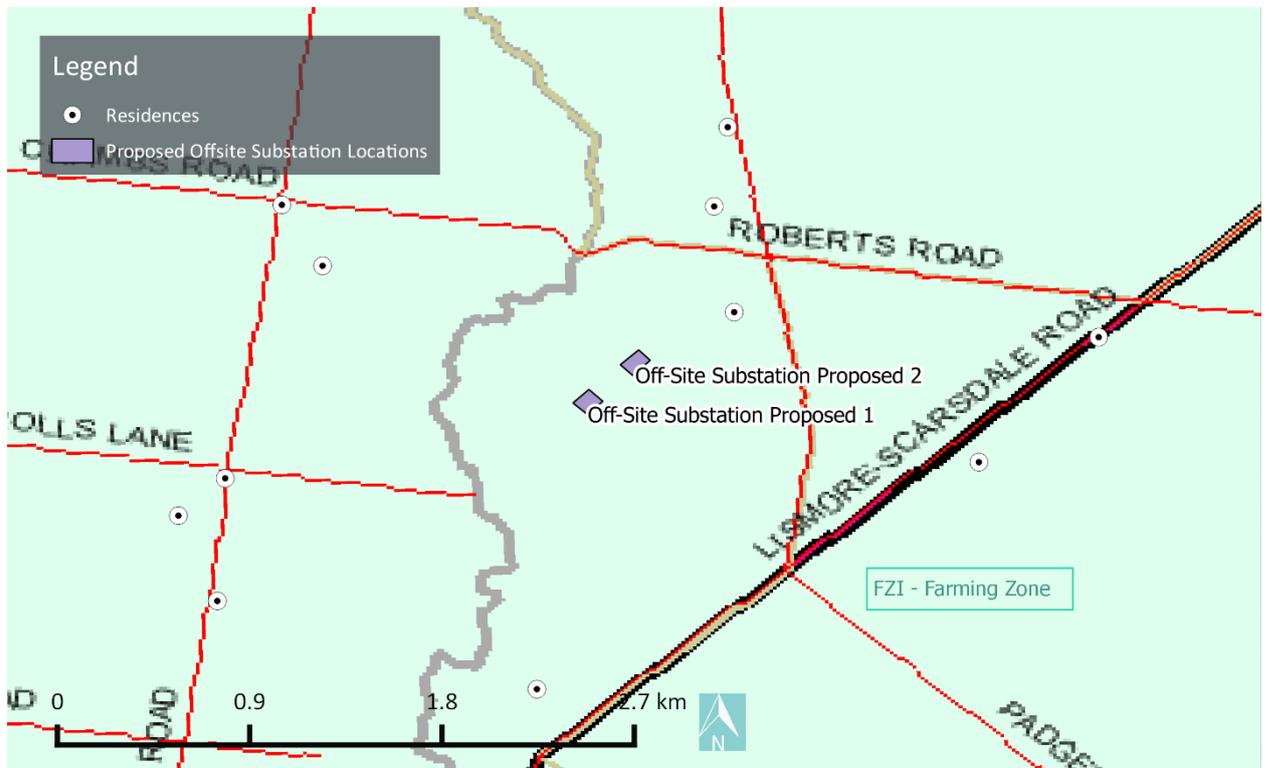
The procedure for determining the recommended maximum noise levels (recommended levels) according to NIRV depends on whether the noise source or the receivers are located in a rural or major urban area.

According to the maps of the urban centres available on the EPA website, accessed on 29 November 2017, neither the subject site nor the nearby residential receivers fall within any of these areas. The recommended levels in this instance are therefore determined on the basis of the procedures defined for rural areas.

The procedures for rural areas are based on determining the zone levels according to the land zoning of the area in which the noise source and receivers are located. These zone levels are then adjusted, where appropriate, for a range of factors.

The zone levels are determined on the basis of the substation and the nearest residential receivers being located on land designated as Farming Zone (FZ) (see land zoning map in Figure 2).

Figure 2: Zoning Map



Adjustments for separating distance are not applicable in this instance as the land zoning is continuous between the substation and the receivers. In addition, adjustments for ‘background relevant areas’ are not warranted in this instance, as the background noise levels during the relevant assessment conditions for the substation (i.e. low wind speeds) are relatively low; adjustments for background noise levels are therefore not warranted.

Adjustments that apply to the recommended levels for utilities are applicable here as substations are defined as utilities in the Victorian Planning Provisions.

Based on the above, the applicable recommended levels are summarised in Table 1.

Table 1: NIRV time periods and recommended levels, L_{eff}^1 dB

Period	Day of week	Start time	End time	Recommended levels
Day	Monday-Friday	0700hrs	1800hrs	45
	Saturday	0700hrs	1300hrs	
Evening	Monday-Friday	1800hrs	2200hrs	39
	Saturday	1300hrs	2200hrs	
	Sunday, Public holidays	0700hrs	2200hrs	
Night	Monday-Sunday	2200hrs	0700hrs	34

¹ L_{eff} is the effective noise level of commercial or industrial noise determined in accordance with SEPP N-1. This is L_{Aeq} noise level over a half-hour period, adjusted for the character of the noise. Adjustments are made for tonality, intermittency and impulsiveness.

As the substation is proposed to operate 24 hr a day and 7 days a week, compliance with the NIRV recommended level of 34 dB L_{eff} at night would allow compliance during all other time periods.

ASSESSMENT

Given the nature of the ancillary equipment to be included in the off-site substation, and the fact that the nearest receiver is over 550 m away, the noise emissions from the off-site substation are likely to be insignificant at the nearest receiver location and therefore compliant with the recommended levels.

Notwithstanding the above, it is recommended that the planning permit for the proposed off-site substation includes a condition establishing compliance with NIRV as a requirement for the project. It is also recommended that compliance with NIRV is reviewed and verified as part of finalising the equipment layout and selections for the substation.

If you have any questions or concerns regarding this assessment, please don't hesitate to contact us.

Yours faithfully

MARSHALL DAY ACOUSTICS PTY LTD



Justin Adcock

Associate