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# Glenbrae Distribution BESS

438 Lobbs Road, Glenbrae

**Acoustic Report – Environmental Noise Emission Assessment**

**WMGAcoustics.com.au** | **reception@wmgacoustics.com.au**



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Author	Jordan Growcott
Client Details	<b>ACENERGY Pty Ltd</b> 502, 689 Burke Road Camberwell, VIC 3124

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## 1. Introduction

The proposal includes the construction and operation of a new battery energy storage system (BESS) facility at the site described as 438 Lobbs Road, Glenbrae.

The subject site and surrounding environment are generally vacant farm zoned land which in some instances include scattered residential premises.

The new facility will include electrical infrastructure which will generate noise emissions with the potential to impact on the acoustic amenity of the surrounding environment including at residential receptors.

In consideration of the above, Watson Moss Growcott Acoustics (WMG) has been engaged to undertake an assessment of noise emissions from the proposal and consider the outcomes relative to Victorian legislative requirements.

This report presents the findings of the assessment, and where appropriate, includes indicative noise mitigation strategies to ensure that calculated noise emissions achieve compliance with relevant criteria at sensitive receptors within proximity of the site.

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## 2. Noise Assessment Objectives

When addressing potential noise emissions associated with the proposed use, the assessment must consider the requirements of the Environmental Protection Act 2017, as well as relevant referral documentation including:

- Environment Protection Regulations 2021.
- EPA Publication 1826.4 'Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues'.
- Environmental Reference Standard.
- EPA Publication 1996 Noise Guideline – assessing low frequency noise.

In consideration of the above, the primary objective of the noise assessment is to determine whether the proposal satisfies the minimum requirements of the Environment Protection Act, and whether noise emissions comply with the requirements of the above Regulations and guideline documentation.

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### 3. Noise Assessment Terminology

Noise assessment terminology used within this report is defined within Table 1 below.

*Table 1: Noise Assessment Terminology*

Terminology	Definition
dB(A)	Decibels recorded on a sound level meter, which has had its frequency response modified electronically to an international standard, to quantify the average human loudness response to sounds of different character
$L_{eq}$	The equivalent continuous level that would have the same total acoustic energy over the measurement period as the actual varying noise level under consideration. It is the noise measure defined by the EPA as the measure of the noise to use in assessing compliance with noise limits.
$L_{90}$	The level exceeded for 90% of the measurement period, which is representative of the typical lower levels in a varying noise environment. It is the noise measure defined by the EPA as the measure of the background noise level to use in determining noise limits.
Sound Power Level ( $L_w$ )	The sound power level of a source is a measure of the amount of energy in the form of sound emitted from the source. The sound power level of a source is an inherent characteristic of that source and does not vary with distance from the source or with a different acoustic environment. The sound power level equals the sound pressure level at a distance from the source plus 10 times the logarithm (to base 10) of the measurement surface area ( $m^2$ ), and is relative to a reference sound power of 1pW, (10-12 Watts).
Sound Pressure Level ( $L_p$ )	Sound that we can hear with our ears or measure with a sound level meter is actually small variations in the pressure of the air around us. The magnitude of the pressure fluctuations vary over a very wide range from the very lowest levels we can just hear to the very high levels we need to be protected from, and for that reason sound is measured on a logarithmic scale. The sound pressure level equals 10 times the logarithm (to base 10) of the sound pressure divided by a reference pressure, which is 20 $\mu Pa$ . The sound pressure level reduces with increasing distance from a source and is influenced by the surroundings.

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## 4. Site and Surrounding Environment

The land under consideration is located at 438 Lobbs Road, Glenbrae. The site abuts Forest Road to the north, Lobbs Road to the west and farm zone land to the south and east.

The land within immediate proximity of the proposed use is generally vacant farmland which would not be considered noise sensitive in accordance with legislative or guideline criteria. The land is substantially unoccupied and does not include sensitive use, however there is an existing dwelling located within the property boundaries to the south of the proposed use.

The closest and therefore most critical sensitive uses located within proximity of the site will include:

- **R01** – 438 Lobbs Road (located within the boundaries of the subject site).
- **R02** – 425 Glenbrae School Road.
- **R03** – 1257 Jones Road.

Information regarding the location and the use at the sensitive receptors has been provided by the client.

Figure 1 below provides an aerial photo of the site and surrounds including the sensitive receptors which have been considered as part of the noise emission assessment.

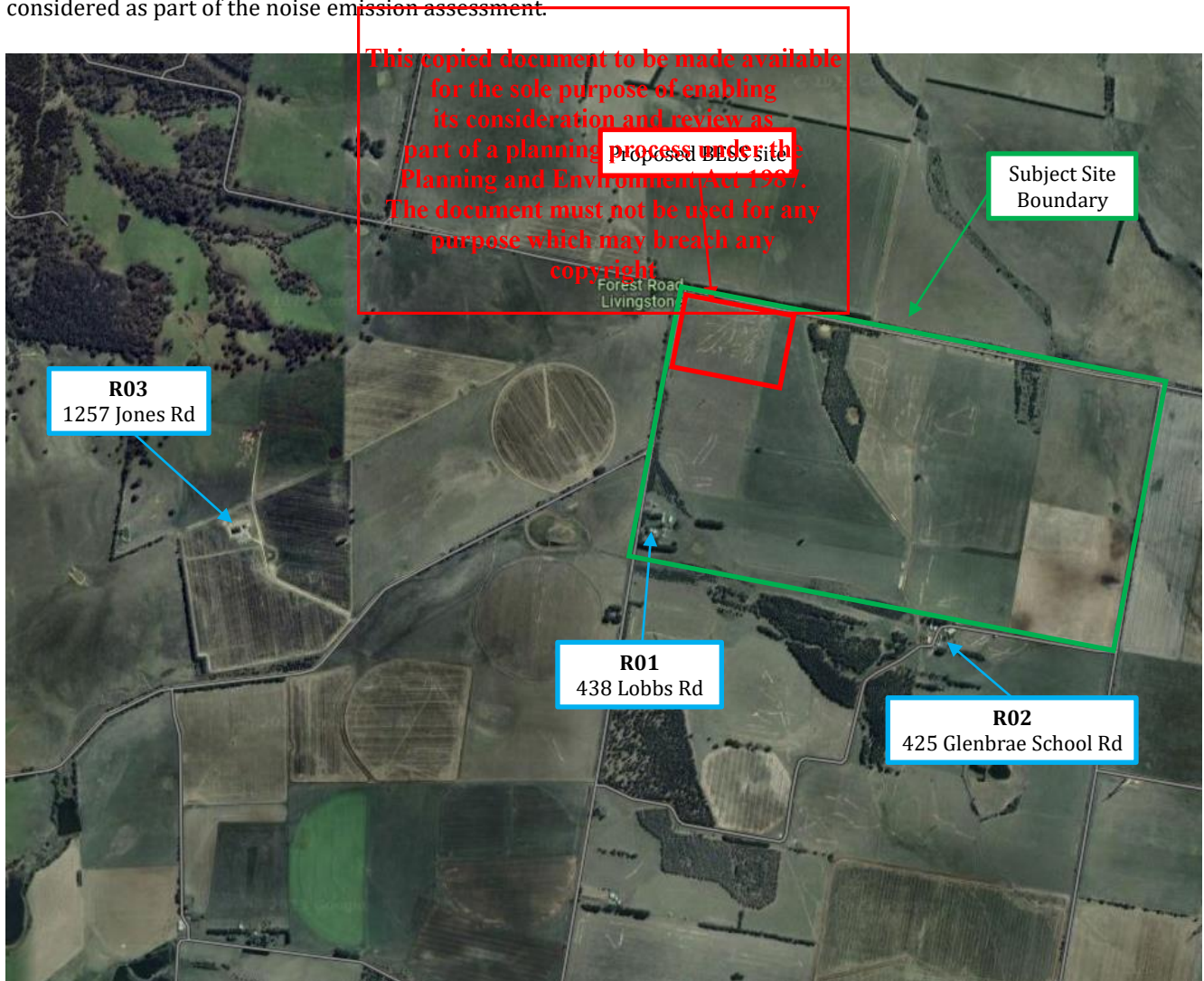


Figure 1: Aerial photo of subject site and surrounding environment

## 5. Proposed Site Layout and Operations

The client has advised that the electrical infrastructure equipment forming part of the proposed use will include:

- 88no. MVPS units.
- 264no. Battery storage containers.
- 2no. 120MVA transformers.

The client has advised that the facility equipment will operate 24 hours per day, 7 days per week at 100% capacity.

Figure 2 below provides the site plan for the proposal.

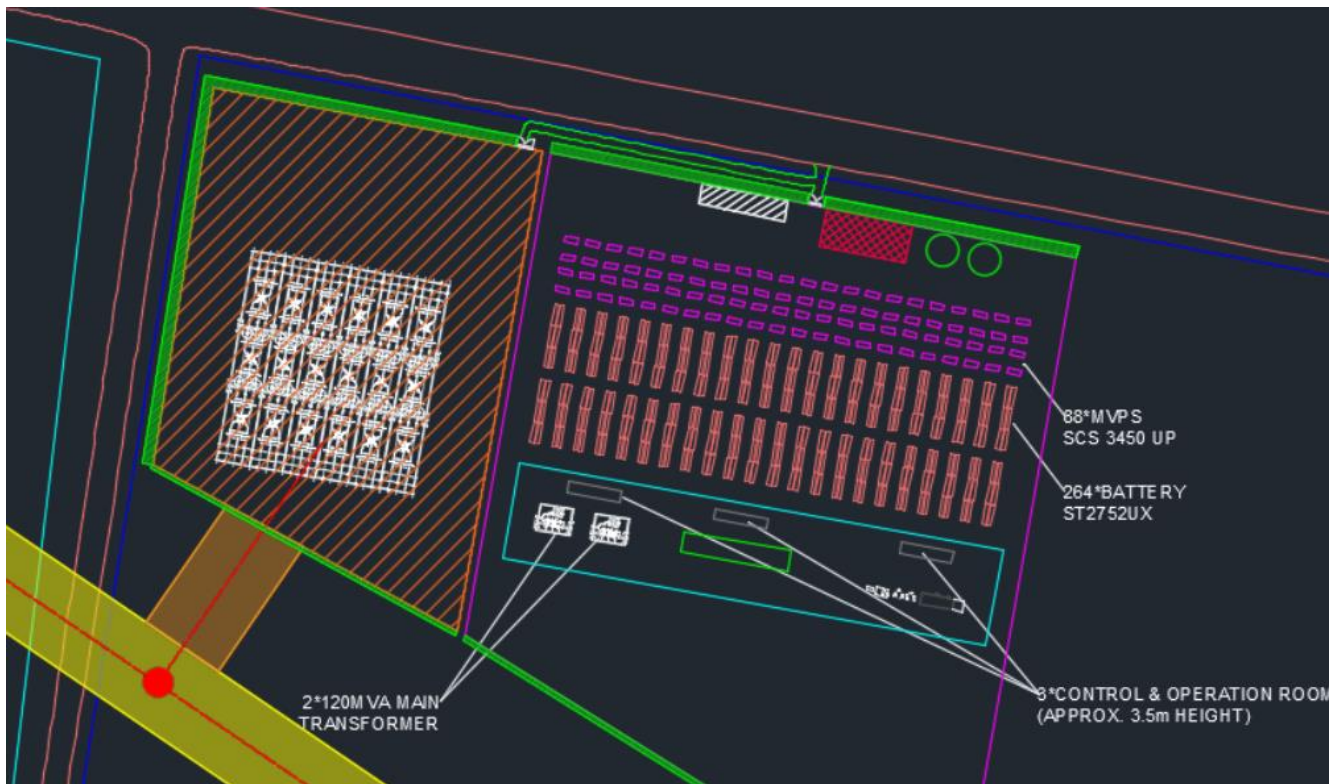


Figure 2: Proposed site plan including proposed electrical infrastructure

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## 6. Noise Assessment Criteria

Within the State of Victoria, noise emissions from commercial operations consistent with the proposal are governed by the legislative framework within the Environment Protection Act 2017 (The Act).

The approach within The Act focuses on prevention of pollution impacts rather than managing the impacts after they have occurred and is based on a person or entities General Environmental Duty (GED) for the protection of human health and the environment from pollution and waste.

The GED is explained within Part 3.2 of The Act and stipulates that 'a person who is engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste must minimise those risks, so far as reasonably practicable'.

Determining what is deemed 'reasonably practicable' is explained within EPA Publication 1856 and relates to the implementation of controls that are proportionate to the potential risk.

It relates to the potential for harm to occur, the potential impacts on the environment, and considers what controls are available to reduce the risk, and their associated costs.

It is deemed the responsibility of the operator to understand and assess the risks which their operations may pose on human health or the environment, and once understood, implement proportionate controls to mitigate or minimise the risk of harm.

The definition of harm within The Act introduces the concept of what is deemed 'unreasonable' generally, and in particular 'unreasonable noise'. The Environment Protection Regulations 2021 (The Regulations) under the Act essentially define unreasonable noise as noise that exceeds the noise limit that applies under the Noise Protocol (EPA Publication 1826.4) at the time the noise is emitted.

Methodologies, specific criteria, and guidance regarding unreasonable noise emissions are included within the following Regulations and guideline documentation referred to within The Act and provided by the Environment Protection Authority (EPA):

- The Regulations.
- Noise Protocol.
- Environmental Reference Standard (ERS).
- EPA Publication 1996 Noise Guideline – assessing low frequency noise.
- EPA Publication 1856 Reasonably practicable.

With the above considered, whilst evaluating risks and implementing reasonably practicable measures are considered as a necessity to comply with the GED, the basis for any noise emission assessment will be ensuring that noise emissions are not deemed 'unreasonable'.

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## 6.1. EPA Publication 1826.4 – Noise Protocol

### 6.1.1. General Methodologies

The subject site land and the sensitive receptors located within proximity of the subject site are **not** located within a 'major urban area' and will therefore be defined as a 'rural area' in accordance with the Noise Protocol.

In consideration of the above, relevant noise limits for addressing noise emissions from the site will be determined in accordance with Part I, A2 of the Noise Protocol referenced as the 'rural area method'.

Further to the above, the proposal will be considered as a 'utility installation' in accordance with clause 73.03 of the Victorian Planning Provisions and will therefore be subject to specific requirements in accordance with the Noise Protocol.

In consideration of the above, relevant limits will be determined in accordance with the methodologies nominated in Section 2.6 of the Noise Protocol.

The calculated 'noise limits' vary depending on the time of the day, evening, or night with the highest permitted values occurring during day periods and the lowest during night periods.

The relevant day, evening, and night assessment periods are shown in Table 2.

*Table 2: Details of EPA Assessment Periods*

EPA Assessment Period	Relevant Days	Relevant Time Periods
Day	Monday to Saturday	7:00am to 6:00pm
Evening	Monday to Saturday	6:00pm to 10:00pm
	Sunday, Public Holidays	7:00am to 10:00pm
Night	All Days	10:00pm to 7:00am

Where relevant, the determined 'zoning levels' for the site operations can then be adjusted further based on a distance separation adjustment between the noise generating zone and the noise receiver, and by the presence of elevated 'ambient background' noise levels.

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## 6.1.2. Determination of Noise Protocol Noise Limits

Both the proposed BESS and the closest R01 and R02 receptors are located within farm zone (FZ) land, however the R03 receptor is located in rural conservation zone (RCZ) land as shown below in Figure 3.

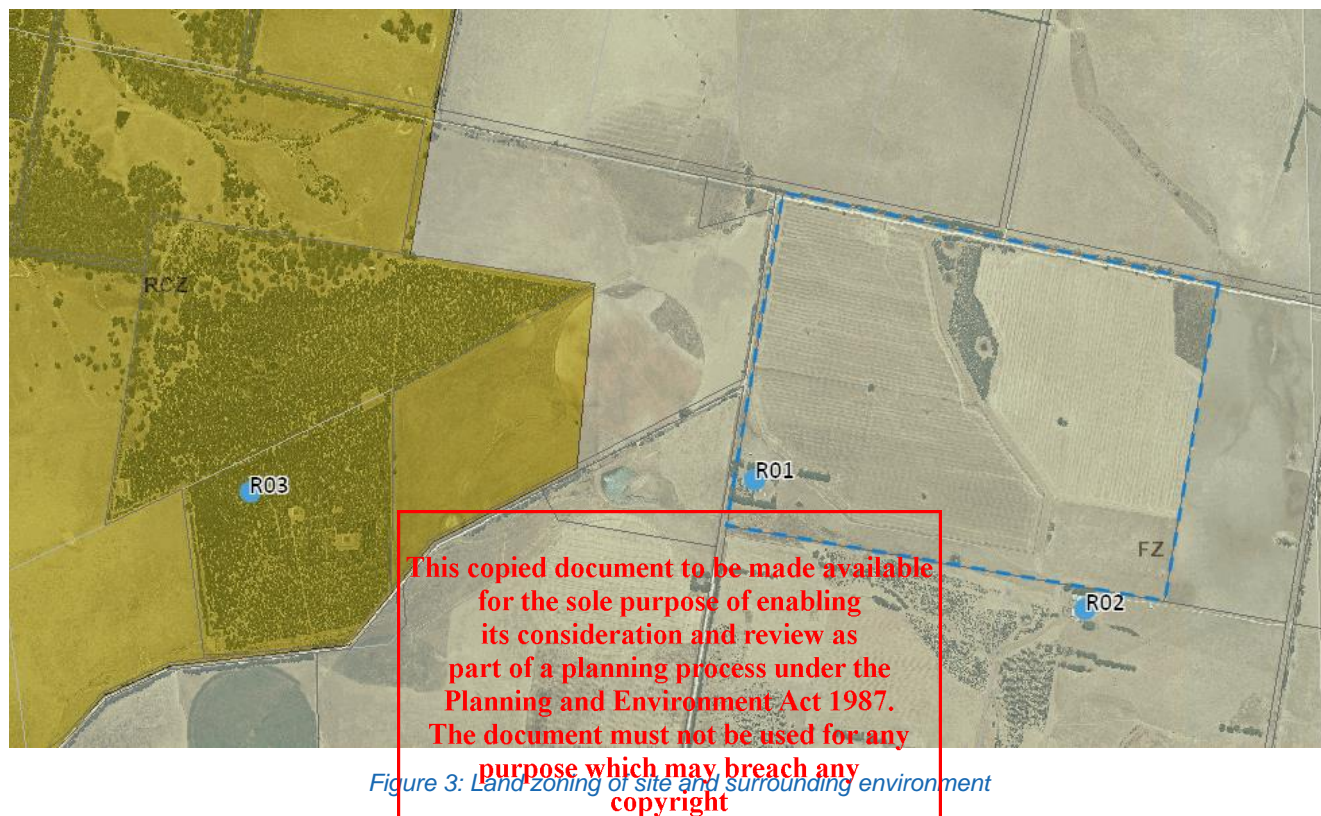


Figure 3: Land zoning of site and surrounding environment

In accordance with the methodologies nominated within the Noise Protocol, which includes consideration of the land zoning of the noise 'generating' zone and 'receiving' zone the 'zone levels' for the nearby receptors will be as shown below in Table 3.

Table 3: Noise Protocol Zone Levels

EPA Assessment Period	Relevant Days	Time Periods	Noise Protocol Zone Levels	
			R01 & R02	R03
Day	Monday to Saturday	7:00am to 6:00pm	45 dB(A) $L_{eq}$	45 dB(A) $L_{eq}$
Evening	Monday to Saturday	6:00pm to 10:00pm	39 dB(A) $L_{eq}$	38 dB(A) $L_{eq}$
	Sunday, Public Hols.	7:00am to 10:00pm		
Night	All Days	10:00pm to 7:00am	34 dB(A) $L_{eq}$	33 dB(A) $L_{eq}$

Due to the contiguous land zoning between the proposed BESS and receptor R01 and R02, the zone levels nominated above will be adopted as Noise Protocol noise limits for the R01 and R02 receptors.

As R03 is located within different land zoning to the proposed BESS, the 'zone levels' will be subject to a Noise Protocol distance adjustment.

Based on the distance separation between the zone where the noise generator is located and the noise receiver, the distance adjustment would be in the order of -4 dB(A).

The described adjustment would reduce the zone levels below the Noise Protocol base noise limits for rural areas and would therefore trigger that the base noise limits be applied for the assessment.

In consideration of the above, the Noise Protocol noise limits for each of the critical receptors will be as shown below in Table 4.

*Table 4: Noise Protocol Noise Limits*

EPA Assessment Period	Relevant Days	Time Periods	Noise Protocol Noise Limit	
			R01 & R02	R03
Day	Monday to Saturday	7:00am to 6:00pm	45 dB(A) $L_{eq}$	45 dB(A) $L_{eq}^*$
Evening	Monday to Saturday	6:00pm to 10:00pm	39 dB(A) $L_{eq}$	37 dB(A) $L_{eq}^*$
	Sunday, Public Hols.	7:00am to 10:00pm		
Night	All Days	10:00pm to 7:00am	34 dB(A) $L_{eq}$	32 dB(A) $L_{eq}^*$

*\*Note: Noise Protocol base noise limit for rural area.*

The noise limits must be met within a 'noise sensitive area', which for this site will be within the boundary of any of the nearby sensitive receptors, and within 10 metres of the outside of the external walls of the dwelling or building.

The relevant assessment period will be 30 minutes.

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### 6.1.3. Cumulative Contributions from Other Noise Sources

The Noise Protocol includes provisions to ensure that cumulative noise contributions from multiple commercial uses combine to comply with overall Noise Protocol noise limits determined for sensitive receptors.

Generally, the land surrounding the subject site is vacant farmland, however it is noted that the subject site is located in proximity to the existing Waubra wind farm operation.

To confirm a position on how noise due to the wind farm should be considered within the assessment, WMG contacted the EPA during October 2022. The EPA provided a response which indicated the following:

- Noise due to the wind farm should not be considered when assessing cumulative noise impacts.
- Noise due to the wind farm should not be included when determining ambient background noise levels.

In consideration of the above, WMG did not consider noise due to the wind farm further within the assessment.

Correspondence with the EPA is included in Appendix 1.

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#### 6.1.4. Noise Protocol Assessment Adjustments

When considering noise impacts on residential receptors, the Noise Protocol methodology includes relevant adjustment factors which account for the potential for the noise source to impact on the acoustic amenity of the noise sensitive receptor. The relevant adjustments include:

- Tonal Adjustment
- Impulsive Adjustment.
- Intermittency Adjustment.
- Reflection Adjustment.
- Duration Adjustment.

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Clarification regarding each of the adjustments is shown below in Table 5.

*Table 5: Noise Protocol Assessment Adjustments*

Relevant Adjustment	Description
Tonal Adjustment	<p>When the noise is tonal in character then an adjustment shall be made as follows:</p> <ul style="list-style-type: none"> <li>▪ When the tonal character of the noise is just detectable then + 2 dB(A).</li> <li>▪ When the tonal character of the noise is prominent then + 5 dB(A).</li> </ul>
Impulsive Adjustment	<p>When the noise is impulsive in character then an adjustment shall be made as follows:</p> <ul style="list-style-type: none"> <li>▪ When the impulsive character of the noise is just detectable then + 2 dB(A).</li> <li>▪ When the impulsive character of the noise is prominent then + 5 dB(A).</li> </ul>
Intermittency Adjustment	<p>An intermittency adjustment applies when the noise increases in level rapidly by at least 5 dB, on at least two occasions during a 30-minute period and maintains the higher level for at least one minute duration. The relevant intermittency adjustments applicable include:</p> <ul style="list-style-type: none"> <li>▪ When the level increase is &gt;10 dB during the day period, then apply an adjustment of +3 dB(A).</li> <li>▪ When the level increase is 5-10 dB during the night period, then apply an adjustment of +3 dB(A).</li> <li>▪ When the level increase is &gt;10 dB during the night period, then apply an adjustment of +5 dB(A).</li> </ul>
Reflection Adjustment	<p>When the measurement point is located outdoors and the microphone is located from 1 to 2 metres from an acoustically reflecting surface, an adjustment of -2.5 dB shall be made.</p>
Duration Adjustment	<p>When the noise emissions do not occur over the whole of a continuous 30-minute period, then a duration adjustment based upon the total amount of time for which the noise occurs over that continuous 30-minute period shall be determined.</p>

Where applicable, the adjustments are applied to the measured / predicted values at noise sensitive receptor locations to determine the 'effective' noise level impacting on the receptor.



## 6.2. Environment Reference Standard

The ERS provides environmental values which have been developed to reflect the ambient soundscape associated with different land use settings, from highly urbanised areas to natural environments.

Through consideration of land zoning types, and varying assessment periods for the day and night, it is understood that the ERS intends to provide consideration of noise levels which may impact on:

- Sleep during the night.
- Domestic and recreational activities.
- Normal conversation.
- Child learning and development.
- Human tranquility and enjoyment outdoors in natural areas.
- Musical entertainment.

Whilst being included within the Act, the ERS is not a compliance standard and clearly states that 'the objectives for each land use category are typical ambient sound level values and are neither noise limits nor noise design criteria'.

It is understood that the primary function of the ERS is to provide environmental assessment benchmarks to assist 'decision makers' with evaluating noise emissions within areas not already captured within the Regulations and Noise Protocol.

The ERS will not require consideration when addressing noise emissions to the nearby residential premises as these are captured by the Noise Protocol.

Further to the above, it is understood that the land surrounding the proposed use is generally vacant farmland which would not be considered noise sensitive in accordance ERS as it is unoccupied private land which does not include sensitive use.

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### 6.3. EPA Noise Guideline – Assessing Low Frequency Noise

As defined in the Act, a person must not, from a place or premises that are not residential premises emit an unreasonable noise or permit an unreasonable noise to be emitted.

Within the Regulations, unreasonable noise is based on exceedances determined in accordance with the Noise Protocol, however, the Regulations also include consideration of the frequency spectrum associated with a noise emission.

To provide some basis for addressing low frequency noise emissions and determining whether the noise emission is deemed 'unreasonable' the EPA released Publication 1996 Noise Guideline – assessing low frequency noise.

The guideline document provides 'threshold levels for assessing low frequency noise' which are not set limits, but levels that indicate a potential risk of problematic low frequency noise.

The threshold levels for indoor and outdoor measurements are included within Table 6 below.

*Table 6: Indoor and outdoor measurement one-third octave band noise level thresholds*

Measurement Location	One-third octave band noise levels Hz												
	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Indoor noise dB $L_{eq}$	92	87	83	74	64	56	49	43	42	40	38	36	34
Outdoor noise dB $L_{eq}$	92	89	86	77	69	61	54	50	50	48	48	46	44

Whilst Publication 1996 is presented as a guideline, WMG has been involved with projects requiring approval from the EPA whereby low frequency noise was one of the main focuses of the assessment, and any non-compliances were considered to be a major issue requiring consideration.

Previous experience has shown that electrical infrastructure can generate tonal noise emissions at low frequency and will therefore require consideration as part of the assessment.

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## 7. Operational Noise Emission Assessment

### 7.1. Noise Prediction Methodology

Modelling of operational noise emissions from the site has been conducted using DataKustik CadnaA environmental noise modelling software.

Relevant information regarding site elevations, site buildings and the surrounding environment has been provided by the client and sourced from online databases including Nearmaps, VicMaps and topography from the ANZLIC Committee on Surveying and Mapping.

With the utilisation of the above, the model has been developed and configured with sufficient detail for appropriate noise emission calculations to be undertaken.

For this assessment, the modelling software has implemented the calculation procedures defined within International Standard ISO 9613-2: 1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO 9613).

The described standard has been considered and approved as part of many previous projects requiring noise emission assessment works.

Through implementation of the Standard using CadnaA, the noise emission modelling considers the following attenuation measures:

- Geometrical spreading.
- Atmospheric absorption.
- Ground attenuation.
- Meteorological effects.
- Source / Receiver height effects.
- Attenuation due to the surrounding environment including existing buildings / structures.

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The noise modelling input parameters also incorporate assessment methodology requirements of EPA Victoria including:

- Residual noise levels at noise sensitive receptor locations have been considered when weather conditions assist with propagation of emissions in the direction of the relevant receptor.
- Predicted values have been considered within 10 metres of the noise sensitive external facades.

The critical receptors located in proximity of the site are understood to be single level dwellings, therefore an assessment height of 1.5m has been adopted as the basis for the noise model.

Predicted values at receptor locations have been calculated in the 'free-field', which do not include reflections from localised surfaces other than the ground.

It is important to note that the noise source has been modelled with omnidirectional noise emissions. There may be the potential for the asset to include directivity, particularly if the primary noise source is located on one faces of the unit, and therefore shielded in a particular direction.

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## 7.2. Site Configuration and Relevant Noise Sources

When considering noise emissions associated with the proposed use, the client has advised that the relevant noise sources will include the following:

- 88no. MVPS units.
- 264no. Battery storage containers.
- 2no. 120MVA transformers.

Figure 4 below provides a site plan for the proposal including the relevant equipment locations.

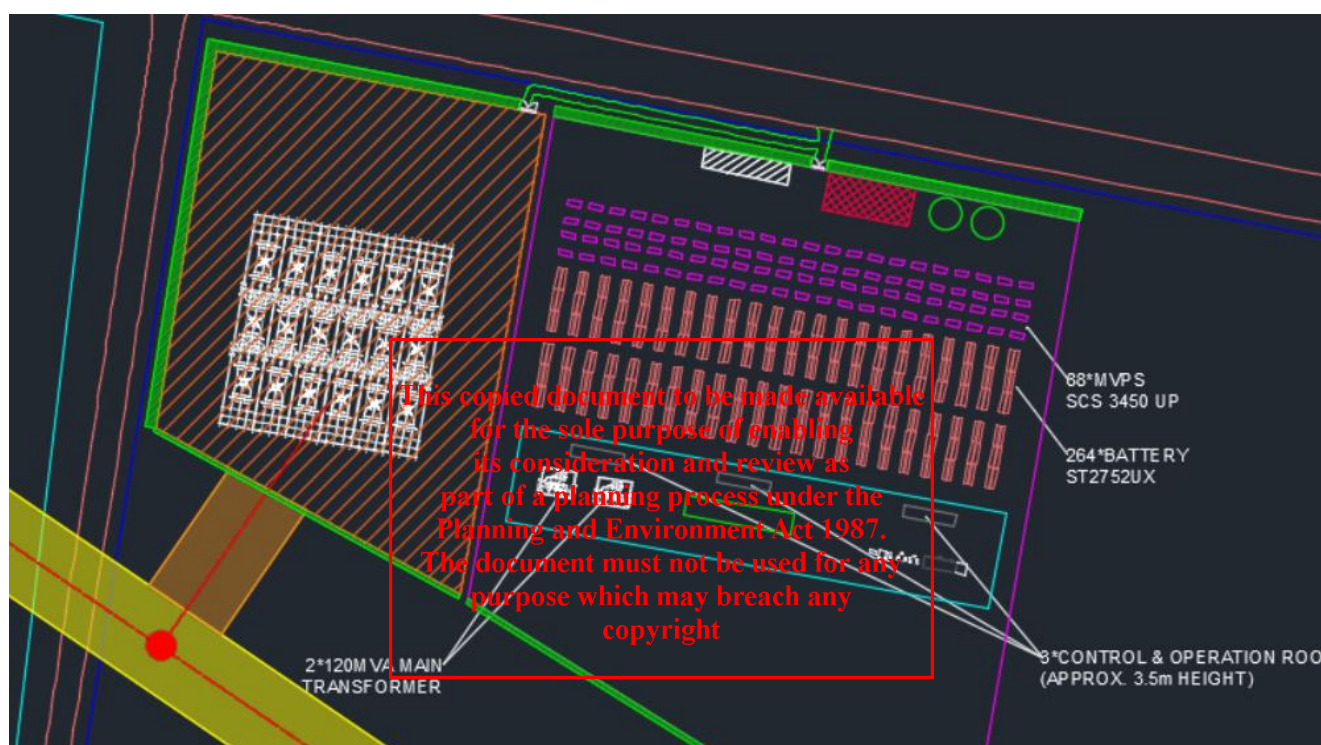


Figure 4: Site plan including relevant noise sources

For the purposes of this assessment, WMG has considered source noise data provided by the inverter and battery unit manufacturers combined with input from the client.

A summary of the sound power levels adopted for each item of equipment is included within Table 6.

Table 7: Adopted source sound power levels

Noise Source	Source Description	Adopted Sound Power Level
MVPS inverter unit – fitted with noise reduction kit.	SMA 4000-S2 (1no. SCS 3450 UP unit)	90 dB(A) – per unit
MVPS Transformer	5MVA unit	65 dB(A)
Battery cabinet liquid cooling unit	Sungrow ST2752UX	79 dB(A) – per unit*
Main transformer	120MVA – per unit	86 dB(A) – per unit

\* Based on input from client.

Once commissioned, the electrical infrastructure which forms part of the facility will operate continuously 24 hours per day, 7 days per week.

The assessment must therefore consider emissions during the day, evening, and night assessment periods.

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## 7.3. Predicted Noise Levels

### 7.3.1. Tonal Character Adjustment

Due to the tonal character which is expected to be associated with electrical infrastructure noise sources forming part of the proposed use, a prominent tonal factor adjustment of + 5dB is generally applied to the predicted noise impacts at sensitive receptor locations within proximity of the site.

This approach aligns with the conservative noise prediction assessment requirements nominated by the EPA when it is unclear what adjustment will be required for future operations.

In practice, with this sites distance separation between the electrical infrastructure and the sensitive receptors, there is potential that residual tonal noise may be either 'just detectable' warranting a lesser adjustment of plus 2 dB, or not present and therefore not requiring an adjustment.

In consideration of the above, WMG has provided assessment outcomes, including necessary noise control treatments for each potential tonal penalty for the project.

### 7.3.2. Acoustic Barrier Configuration

The results of preliminary noise modelling have indicated that, in the absence of noise control, predicted noise levels at the R01 receptor have the potential to be higher than the Noise Protocol noise limit during the critical night period.

The margin for potential exceedance is based primarily on the tonal character adjustment applied to the assessment as shown below in Table 8, 9 and 10.

Table 8: Noise Protocol Assessment – No noise control, plus 5dB(A) tonal character adjustment

Assessment Location	Predicted Noise Level	Noise Protocol Adjustments	Effective Noise Level	Noise Protocol Noise Limit dB(A) Leq		
		Tonal		Day	Evening	Night
R01	34 dB(A) Leq	+5 dB(A)	39 dB(A) Leq	45	39	34
R02	29 dB(A) Leq	+5 dB(A)	34 dB(A) Leq	45	39	34
R03	24 dB(A) Leq	+5 dB(A)	29 dB(A) Leq	45	37	32

Table 9: Noise Protocol Assessment – No noise control, plus 2dB(A) tonal character adjustment

Assessment Location	Predicted Noise Level	Noise Protocol Adjustments	Effective Noise Level	Noise Protocol Noise Limit dB(A) Leq		
		Tonal		Day	Evening	Night
R01	34 dB(A) Leq	+2 dB(A)	36 dB(A) Leq	45	39	34
R02	29 dB(A) Leq	+2 dB(A)	31 dB(A) Leq	45	39	34
R03	24 dB(A) Leq	+2 dB(A)	26 dB(A) Leq	45	37	32



Table 10: Noise Protocol Assessment – No noise control, 0 dB(A) tonal character adjustment

Assessment Location	Predicted Noise Level	Noise Protocol Adjustments	Effective Noise Level	Noise Protocol Noise Limit dB(A) $L_{eq}$		
		Tonal		Day	Evening	Night
R01	34 dB(A) $L_{eq}$	0 dB(A)	34 dB(A) $L_{eq}$	45	39	34
R02	29 dB(A) $L_{eq}$	0 dB(A)	29 dB(A) $L_{eq}$	45	39	34
R03	24 dB(A) $L_{eq}$	0 dB(A)	24 dB(A) $L_{eq}$	45	37	32

The results indicate that if the residual noise character at the sensitive receptors does not include a tone, predicted noise levels will be compliant with the Noise Protocol noise limits during all periods.

If a tone is 'just detectable' or 'prominent' at the R01 receptor, then a tonal character adjustment would be applicable, and predicted values at the receptor would be non-compliant with the Noise Protocol noise limit during the critical night period.

The noise model has identified that the dominant noise sources forming part of the proposal includes the MVPS units and the two main transformers.

In consideration of the above, WMG has updated the noise model to include dedicated acoustic barriers around these items as shown below in Figure 5 to provide a compliant outcome under all circumstances.

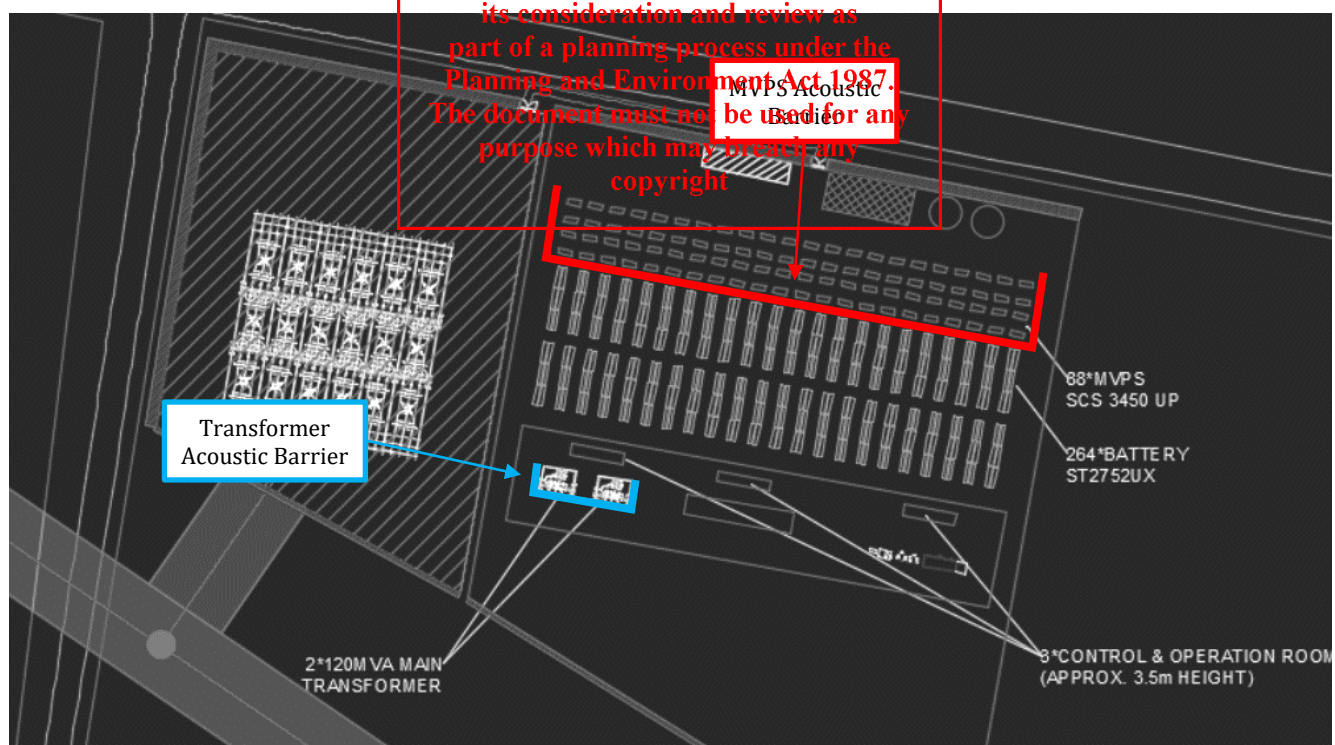


Figure 5: Proposed Acoustic Barrier Configuration

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## 7.3.3. Noise Protocol Assessment at Residential Receptors

### 7.3.3.1. Scenario 1 – Including ‘Prominent’ Plus 5dB Tonal Character Adjustment

For scenario 1, WMG has considered an assessment scenario including a plus 5dB tonal character adjustment.

The barrier heights included within the noise model are as shown below in Figure 6.

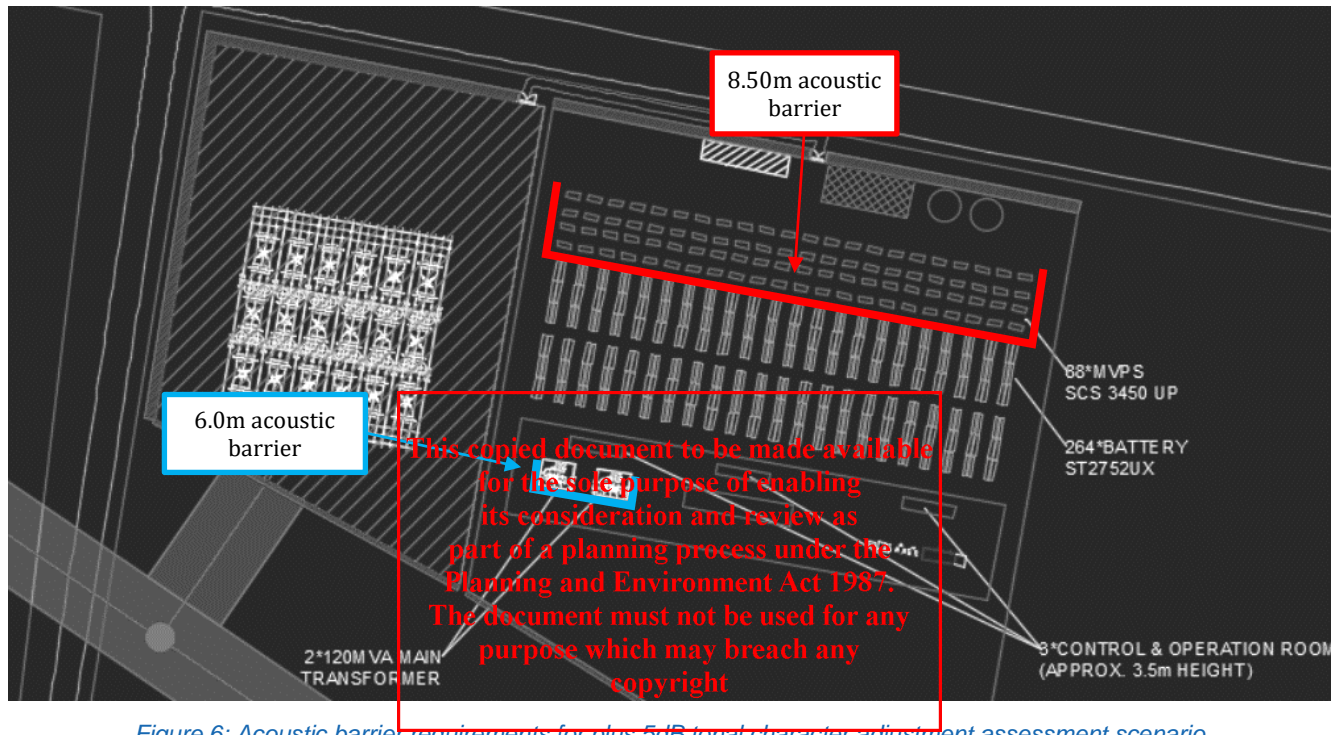


Figure 6: Acoustic barrier requirements for plus 5dB tonal character adjustment assessment scenario

The results of the noise model are presented below in Table 11.

Table 11: Noise Protocol Assessment

Assessment Location	Predicted Noise Level	Noise Protocol Adjustments	Effective Noise Level	Noise Protocol Noise Limit dB(A) $L_{eq}$		
		Tonal		Day	Evening	Night
R01	29 dB(A) $L_{eq}$	+5 dB(A)	34 dB(A) $L_{eq}$	45	39	34
R02	26 dB(A) $L_{eq}$	+5 dB(A)	31 dB(A) $L_{eq}$	45	39	34
R03	22 dB(A) $L_{eq}$	+5 dB(A)	27 dB(A) $L_{eq}$	45	37	32

The findings of the assessment indicate that with the proposed acoustic barriers, predicted values at the sensitive receptors are equal or below the Noise Protocol noise limits during the day, evening and night periods.

Furthermore, the results indicate that residual one-third octave band noise levels at each of the residential receptors will be below the outdoor threshold values nominated in EPA Publication 1996.

In consideration of the above, the calculated values indicate that noise emissions from the proposal does not present a ‘potential risk of problematic low frequency noise’.

## 7.3.3.2. Scenario 2 – Including ‘Just Detectable’ Plus 2dB Tonal Character Adjustment

For scenario 2, WMG has considered an assessment scenario including a plus 2dB tonal character adjustment.

The barrier heights included within the noise model are as shown below in Figure 7.

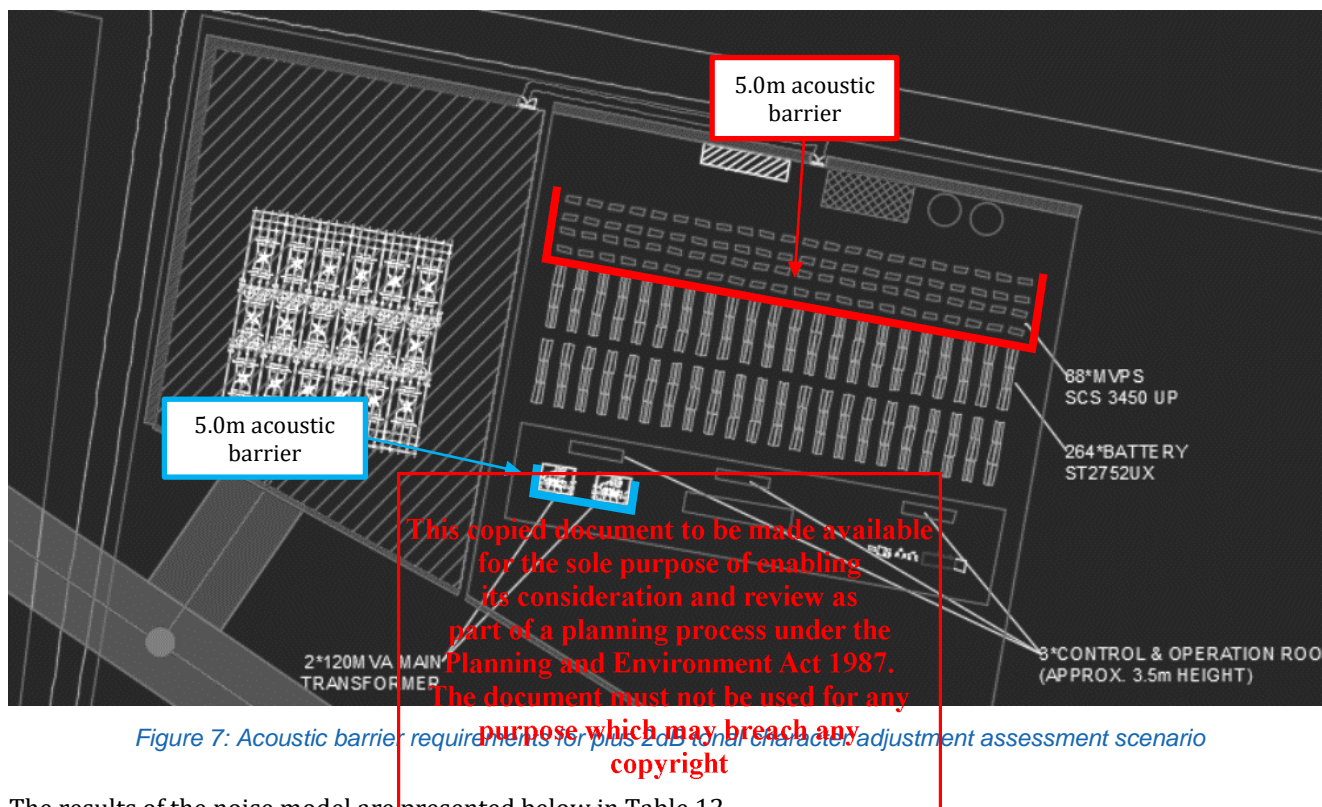


Figure 7: Acoustic barrier requirements for plus 2dB tonal character adjustment assessment scenario

The results of the noise model are presented below in Table 12.

Table 12: Noise Protocol Assessment

Assessment Location	Predicted Noise Level	Noise Protocol Adjustments	Effective Noise Level	Noise Protocol Noise Limit dB(A) $L_{eq}$		
		Tonal		Day	Evening	Night
R01	32 dB(A) $L_{eq}$	+2 dB(A)	34 dB(A) $L_{eq}$	45	39	34
R02	28 dB(A) $L_{eq}$	+2 dB(A)	30 dB(A) $L_{eq}$	45	39	34
R03	23 dB(A) $L_{eq}$	+2 dB(A)	25 dB(A) $L_{eq}$	45	37	32

The findings of the assessment indicate that with the proposed acoustic barriers, predicted values at the sensitive receptors are equal or below the Noise Protocol noise limits during the day, evening and night periods.

Furthermore, the results indicate that residual one-third octave band noise levels at each of the residential receptors will be below the outdoor threshold values nominated in EPA Publication 1996.

In consideration of the above, the calculated values indicate that noise emissions from the proposal does not present a ‘potential risk of problematic low frequency noise’.

## 8. Acoustic Barrier Construction

In order to provide the required noise reducing properties, the acoustic barrier must be constructed as follows:

- Manufactured from materials weighing at least 12 kg/m<sup>2</sup>.
- Suitable materials will include 25mm thick timber, 6mm thick glass, 15mm thick polycarbonate, 9mm thick cement sheet, or 3 layers of 0.48mm thick Colorbond steel sheeting. Masonry options including brickwork and precast concrete will also be acceptable. Other materials must be reviewed prior to approval.
- If constructed from timber / plywood, be stable so that the materials do not crack or warp (thus potentially creating gaps between panels) during the life of the fence.
- Installed in a manner that does not allow gaps between panels, and between the fence panels and the ground below. This will typically require the installation of a barge board partially buried in the ground. For timber fences, gaps should be overlapped with timber cover pieces, glued and screwed. For glazed elements, gaps should be sealed using resilient mastic eg: Sikaflex Pro.
- A common acoustic paling fence will be constructed from a minimum of 25 mm thick 150 mm wide treated vertical timber boards, butted together and with 50 mm cover strips. The fencing will include a barge board partially buried in the ground.
- If access doors are to form part of acoustic barrier fences, then the doors must be constructed as per the fence and include an overlapping section to minimise the gaps around the perimeter of the openable section. Rubber seals must also be included to eliminate gaps between the openable section and the adjoining panels / ground.
- The location of the barriers must align with site boundaries which typically have the highest ground elevation to maximise the noise reduction provided by the barrier.

In addition to the above, the acoustic barrier must be lined on the MVPS side of the barrier using 100mm thick sound absorbing materials which achieve a Noise Reduction Coefficient (NRC) not less than 0.9.

Suitability of the materials for external applications, and for installation within proximity of the proposed equipment must be considered and approved by others. Suitable suppliers of the materials can include Megasorber or an equivalent alternative.

Fibrous insulation faced with perforated metal may also be a suitable alternative, however, would require a specific detail to ensure it was suitable for outdoor applications and could prevent rain ingress.

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## 9. General Environmental Duty and Design Review

The results of the noise model have indicated that the presence of a tonal character will have a significant impact on whether noise emissions from the proposed use will comply with Noise Protocol noise limits at the nearby sensitive residential receptors.

In the event that the residual noise character at the nearby sensitive receptors includes a tone, WMG has concluded that an acoustic barrier would be required to reduce noise emissions from the proposed use to comply with Noise Protocol noise limits. If a tonal character is not present at the receptors, then the assessment has concluded that an acoustic barrier would not be required to comply with Noise Protocol noise limits.

In accordance with the requirements of the general environmental duty, the client must consider the potential risks associated with the proposed use and reduce these risks as far as reasonably practicable.

In consideration of the above, it is recommended that as a minimum, the site is configured to allow for the construction of the acoustic barriers nominated in this report and that further investigations are undertaken during detailed design for the project to confirm the assessment outcomes.

Further to the above, and in accordance with the requirements of The Act, the client would be deemed to be in breach of the GED if they fail to do any of the following in the course of conducting the business or the undertaking so far as reasonably practicable:

- use and maintain plant, equipment, processes and systems in a manner that minimises risks of harm to human health and the environment from pollution and waste;
- use and maintain systems for identification, assessment and control of risks of harm to human health and the environment from pollution and waste that may arise in connection with the activity, and for the evaluation of the effectiveness of controls;
- use and maintain adequate systems to ensure that if a risk of harm to human health or the environment from pollution or waste were to eventuate, its harmful effects would be minimised;
- ensure that all substances are handled, stored, used or transported in a manner that minimises risks of harm to human health and the environment from pollution and waste;
- provide information, instruction, supervision and training to any person engaging in the activity to enable those persons to comply with the general environmental duty.

The described items will likely be internal processes involving training and documentation to address any potential emissions from the site in the event that they occur.

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## 10. Conclusion

WMG has carried out an acoustic assessment to address potential noise emissions from the operation of a new battery energy storage system (BESS) facility at the site described as 438 Lobbs Road, Glenbrae.

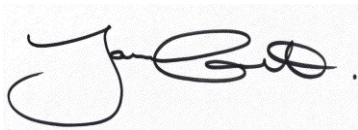
The findings of the assessment have concluded that the presence of a tonal character will have a significant impact on whether noise emissions from the proposed use will comply with Noise Protocol noise limits at the nearby sensitive residential receptors.

In the event that the residual noise character at the nearby sensitive receptors includes a tone, WMG has concluded that an acoustic barrier would be required to reduce noise emissions to comply with Noise Protocol noise limits.

If a tonal character is not present at the receptors, then the assessment has concluded that an acoustic barrier would not be required to comply with Noise Protocol noise limits.

Given the preliminary nature of the assessment, it is recommended the site configuration allow for the construction of acoustic barriers as nominated within this report, and that further investigations and noise assessment works are undertaken during detailed design to confirm that calculated noise emissions from the site continue to comply with relevant noise criteria.

This would logically include a review of the finalised design including equipment selections and locations and may include site investigations to measure the proposed equipment and confirm the source sound power levels adopted for the basis of any future assessment.



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## Appendix 1 – EPA Correspondence re: Wind Farm Noise

### Jordan Growcott

**From:** Will Mosley <Will.Mosley@epa.vic.gov.au>  
**Sent:** Monday, 7 November 2022 11:19 AM  
**To:** Jordan Growcott  
**Cc:** Elaine Just; Marc Buret  
**Subject:** RE: Enquiry - Allowance for wind farm contributions

UNOFFICIAL

Hello Mr Growcott,

In response to your question of how noise from wind turbines should be treated during an assessment of commercial industrial and trade premises noise assessed under Division 3 of Part 5.3 (Division 3) of the Environment Protection Regulations 2021 (the Regulations), EPA provides the following response. Please note that the definitions of the following terms are key in understanding this response:

- **Wind turbine** - means a device that is used for extracting kinetic energy from the wind (other than for domestic or rural use of the land) and includes the— (a) components comprising the device, such as the blades, gearbox and generator; and (b) associated equipment in the immediate vicinity of the device, such as the transformer at its base;
- **Wind turbine noise** - means the noise produced by the wind turbines at a wind energy facility;
- **Wind energy facility** - means one or more wind turbines that are— (a) owned or operated by the same person or entity; and (b) installed in close proximity to each other (whether or not located on the same premises); and (c) electrically connected to a common grid;
- **Commercial industrial and trade premises noise** – means noise that can be assessed as prescribed unreasonable noise under Division 3 of Part 5.3 of the Regulations by determining the applicable noise limit and effective noise level as per publication 1826 (the Noise Protocol).
- **Noise from commercial, industrial and trade premises** – means any noise associated with commercial, industrial and trade activities at a commercial, industrial and trade premises (including activities that might otherwise be excluded from assessment under Division 3 of Part 5.3 by regulation 117. For the purpose of wind turbine noise in this response, this may also be referred to as **industry noise**.

In Division 3, Regulation 119(1) (cumulative noise) states:

*If 2 or more commercial, industrial and trade premises (whether existing or proposed) emit, or are likely to emit, noise that contributes to the effective noise level, a person in management or control of one or more of those premises must take all reasonable steps to ensure that the contribution from each of the premises, when combined, does not exceed the noise limit for the noise sensitive area[...]*

However, Regulation 117(1)(a)(xiv) (Noise sources that must not be taken into account in Division 3) excludes from assessment under Division 3:

*wind turbines at wind energy facilities (used to generate electricity by wind force)[...]*

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As such, noise from a wind turbine (other than those used solely for domestic or rural use of the land) at a wind energy facility (one or more wind turbines owned by the same person or entity in close proximity and which is connected to a common electrical grid), is not taken into account when determining a cumulative contribution towards compliance with noise limits under Division 3.

However, background level, as used when determining noise limits under Part I of the Noise Protocol is defined in the Noise Protocol as;

***Background level for the purpose of Part I (Commercial, Industrial and trade premises)***

*The arithmetic average of the hourly LA90 levels that represents the background sounds in a noise sensitive area, in the absence of noise from any commercial, industrial or trade premises which appears to be intrusive at the point where the background level is measured, when measured according to Part I, section A4.*

This means that wind turbines noise should be excluded from the assessment of any background level assessment.

As it is excluded from assessment under Division 3, any noise from wind turbines at wind energy facilities must also be excluded when determining the effective noise level which is compared against the noise limit or alternative assessment criterion for the purpose of Regulation 118.

I also note that part 3.1.5. of publication 1997 (the Technical Guideline) goes on to advise:

*The measured background level used to determine the noise limit must:*

- *be measured outdoors within the noise sensitive area, or at a background equivalent location*
- *include all noise sources except industry noise which appears to be intrusive at the measurement point*
- *exclude data affected by rain or windy weather and atypical or extraneous noise events, such as nearby construction activities or insect noise*

This supports the way background level is defined in the Noise Protocol as well as establishes that windy weather (measured using the Beaufort scale) should also be excluded from the background level.

Essentially, with the exception of noise from a wind turbine(s) that is used for domestic or rural use of the land or is not connected to a common electrical grid, wind turbine noise should not be included in the cumulative contribution to the effective noise level for the purposes of determining compliance with the noise limit. Instead, wind turbine noise should be excluded from the both the background level measurement and the effective noise level assessment.

Kind regards,

Will Mosley  
Senior Policy Officer  
Water, Air & Noise Policy & Regulation



E Will.Mosley@epa.vic.gov.au  
P 1300 372 842 (1300 EPA VIC) M 0459877330  
A 200 Victoria St, Carlton

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## Appendix 2 – Aerial Site Plan Layout

