

Kojonup BESS

Environmental Noise Assessment

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1 INTRODUCTION

An environmental noise assessment has been conducted for the proposed *Battery Energy Storage System (BESS)* to be established at Kojonup, Western Australian (the **Project**).

The Project will comprise batteries, inverters and transformers with an indicative rating of 100 MW and a total storage capacity of 800 MWh.

This assessment considers noise from the Project based on manufacturer's data for the major noise-generating components, and compares the predicted noise levels with the noise criteria established by the *Environment Protection (Noise) Regulations 1997* (the **Regulations**).

An overview of the subject site and the surrounding locality (showing the location of nearby existing noise sources (substation) and identified noise sensitive receivers (dwellings)) is provided in Figure 1 below.

The assessment has been based on the following:

- Batteries, inverters and fencing locations provided in shapefile format via zip archive ("20260317_KOJ_MINT_Sonus-D40"), received 17 March 2026.
- Attended and unattended measurements of noise from the existing substation conducted between 3 June 2025 and 17 June 2025.
- Provided sound power level data for the proposed battery enclosures and inverters.



Figure 1: Subject site and surrounding locality

2 CRITERIA

2.1 Environment Protection (Noise) Regulations 1997

In accordance with the Regulations, a dwelling in a rural area is considered to be a *highly sensitive area* within a *noise sensitive premises*¹. The Regulations require that the noise from the Project must not “significantly contribute” to a level of noise which exceeds the assigned levels shown in Table 1.

Table 1: Noise Criteria

Type of premises receiver noise	Time of day		Assigned level (dB)		
			L _{A10}	L _{A1}	L _{Amax}
Noise sensitive premises: highly sensitive area	Day	0700 to 1900 hours Monday to Saturday	45 + influencing factor	55 + influencing factor	65 + influencing factor
		0900 to 1900 hours Sunday and Public Holidays	40 + influencing factor	50 + influencing factor	65 + influencing factor
	Evening	1900 to 2200 hours all days	40 + influencing factor	50 + influencing factor	55 + influencing factor
	Night	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	35 + influencing factor	45 + influencing factor	55 + influencing factor
Noise sensitive premises: any area other than highly sensitive area	All hours		60	75	80

The *influencing factor* is based on land use in the vicinity of each dwelling and is likely to be zero for the most critical dwellings.

For continuous noise sources, such as a BESS, the L_{A10} assigned level is the most relevant, as the L_{A1} and L_{Amax} are more relevant to short term noise events. For a BESS, when the L_{A10} assigned level is achieved, the L_{A1} and L_{Amax} assigned levels will inherently be achieved.

¹ Under the Regulations, the definition of a *highly sensitive area* also includes any part of the premises within 15 metres of a dwelling.

For noise sources which produce continuous, steady-state noise (such as a BESS), the L_{Aeq} descriptor (which is more commonly used in other jurisdictions and manufacturer’s noise data) is equivalent to the L_{A10} descriptor and has therefore been used in this assessment.

Under the Regulations, where the noise characteristics of tonality, impulsiveness or modulation are present, additions are required to be made to the noise (to a maximum of 15 dB(A)).

For tonality, the Regulations require a 5 dB(A) addition. The tonal characteristic is defined by the Regulations as being present where there is a difference of greater than 3 dB between:

- (a) The A-weighted sound pressure level in any one-third octave band; and,
- (b) The arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands.

The applicability of a 5 dB(A) addition for tonality is discussed in the Assessment section below. As the noise from the Project (and other existing noise sources in the vicinity) will generally be steady state in character no additions apply for impulsiveness or modulation.

2.2 Draft Guideline: Assessment of environmental noise emissions

The Draft Guideline: Assessment of environmental noise emissions (the **Guideline**) was released by the Department of Water and Environmental Regulation (the **Department**) for public comment in June 2021. The Guideline has not yet been approved, however provides insight as to how the Department believes assessments against the Regulations should be made.

The guidelines recommend the use of the CONCAWE noise modelling algorithm, with the following meteorological conditions.

Table 2: Recommended Weather Conditions

Parameter	‘Day’ 0700 – 1900	‘Night’ 1900 – 0700
Wind Speed	4 m/s	3 m/s
Temperature inversion lapse rate	0 °C /100 m	2 °C /100 m
Pasquill stability	E	F
Temperature	20 °C	15 °C
Relative humidity	50%	50%

The conditions correspond to CONCAWE weather category 6, which are the worst-case weather conditions for the propagation of noise. These conditions have been used throughout the assessment, as recommended by the Guideline.

3 ASSESSMENT

3.1 Noise Sources

The predictions consider the following indicative unit quantities:

- 228 x battery units
- 40 x Inverters (with noise reduction kit)
- 1 x 120MVA Transformer

The sound power levels have been determined for each of the periods (day, evening and night) based on the proposed inverter cooling fan speeds and the manufacturer’s noise data for indicative representative models of inverters and batteries. The sound power levels assumed by this assessment are summarised in Table 3.

Table 3: Sound Power Levels

Supplier	Inverter fan Speed	Unit Sound Power Level	Total Sound Power Level
Day and Evening	100%	Battery Units: 76 dB(A) Inverters: 93 dB(A) 120MVA Transformer: 87 dB(A)	Battery Units: 100 dB(A) Inverters: 109 dB(A) 120MVA Transformer: 87 dB(A) Site: 110 dB(A)
Night	60%	Battery Units: 76 dB(A) Inverters: 85 dB(A) 120MVA Transformer: 87 dB(A)	Battery Units: 100 dB(A) Inverters: 101 dB(A) 120MVA Transformer: 87 dB(A) Site: 106 dB(A)

The above assumed unit quantities and sound power levels are expected to be adequately representative of the Project. However, in the event that unit quantities, locations or sound power levels change during the procurement or detail design process, it is recommended that an updated environmental noise assessment be conducted based on the final configuration to confirm that compliance with the Regulations is achieved.

3.2 Existing Substation Noise

The noise produced by the existing Western Power substation has been quantified through continuous measurements conducted at the site between 3 June 2025 and 17 June 2025. The aim of the monitoring was to find the maximum noise output from the substation, enabling modelling of the cumulative noise from the Project and the substation.

Noise from substations is typically very directional. To find the location around the border of the substation where the greatest noise could be measured during the measurement period, a number of short duration noise measurements were taken at potential monitoring locations to find where the highest noise could be measured. Based on the short duration measurements, the long-term monitoring was conducted at the highest noise location.

Following the long-term monitoring, the highest measured noise level which could be attributed to the substation has been used to calibrate a noise model.

It is noted that the noise from the substation has been found to be highly tonal. As a result, any cumulative assessment is unlikely to avoid an addition of 5 dB(A) for tonality.

3.3 Assessment Methodology

Environmental noise predictions have been made using the CONCAWE noise propagation model within the SoundPLAN noise modelling software, using the worst-case weather conditions (weather category 6) as defined by the Guidelines. The predictions assume that the site surface will be crushed rock at least 200 mm deep for drainage purposes, consistent with other similar projects.

The predictions consider the cumulative noise impact from the existing substation and the Project (at the locations shown in Figure 1 above) based on the measured noise from the substation and the provided sound power level data for the inverters, transformers and battery enclosures to be installed as part of the Project.

Under the Regulations, a 5 dB(A) addition is required when the noise characteristic of tonality is present. Based on the definition provided by the Regulations, the cumulative noise emission from the indicative representative battery enclosures and the existing substation will be tonal and a 5 dB(A) addition has therefore been included in the predictions on this basis.

3.4 Results

Based on the above, the following cumulative noise levels (including a 5 dB(A) addition for tonality) are predicted from operation of the Project and the existing substation.

Table 4: Cumulative Predicted Noise Levels – With Tonal Adjustment

Receiver	Day / Evening Period				Night Period		
	Predicted [L _{A10} , dB(A)]	Criteria [L _{A10} , dB(A)]		Complies?	Predicted [L _{A10} , dB(A)]	Criteria [L _{A10} , dB(A)]	Complies?
		Day	Evening				
1	< 20	45	40	Y	< 20	35	Y
2	33			Y	29		Y
3	35			Y	31		Y
4	33			Y	29		Y
5	34			Y	30		Y
6	31			Y	27		Y
7	29			Y	24		Y
8	27			Y	22		Y
9	28			Y	24		Y
10	27			Y	23		Y
11	< 20			Y	< 20		Y
12	27			Y	23		Y
13	< 20			Y	< 20		Y
14	27			Y	23		Y
15	28			Y	24		Y
16	< 20			Y	< 20		Y
17	< 20			Y	< 20		Y
18	25			Y	20		Y
19	23			Y	< 20		Y
20	25			Y	20		Y
21	23			Y	< 20		Y
22	22			Y	< 20		Y
23	25			Y	21		Y
24	26			Y	22		Y
25	27			Y	22		Y
26	27			Y	23		Y
27	28			Y	23		Y
28	27			Y	23		Y
29	32			Y	28		Y
30	27			Y	23		Y
31	24			Y	< 20		Y
32	39			Y	35		Y

Based on the above, predicted cumulative noise from the Project and the existing substation is predicted to achieve the criteria applicable under the Regulations at all nearby dwellings during all time periods (including a 5 dB(A) addition for tonality).

Under the Regulations, the *Noise sensitive premises: highly sensitive area* criteria apply at nearby dwellings and any other areas within 15 metres of the dwelling (on the same premises). In addition, the Regulations also require that noise from the Project achieve the criterion for *Noise sensitive premises: any area other than a highly sensitive area* at any other point on adjoining noise sensitive premises which is more than 15 metres from a dwelling (including rural premises). In effect, noise from the Project must therefore achieve 60 dB(A) at any time of the day or night at the boundary of the landholding in which the Project will be constructed.

Based on the above predictions for 100% inverter fan speed, 60 dB(A) will be readily achieved at the property boundary (including a 5 dB(A) addition for tonality).

It is noted that the above is based on indicative unit quantities and indicative equipment selections installed at the location shown in Figure 1 above. In the event that unit quantities or the location of the Project change as part of the final design, or if equipment with higher sound levels is selected it is recommended that a final noise assessment be conducted which confirms that compliance is achieved by the final Project design.

3.5 Construction Noise

At the planning application stage of a project, details of the construction methodology and schedule are often not yet available in sufficient detail to adequately assess potential noise impacts. As such, a *Noise Management Plan (NMP)* will be developed in accordance with Regulation 13 of the Regulations and AS 2436-2010 *Guide to noise and vibration control on construction, maintenance and demolition sites* and submitted for approval prior to commencement of construction works at the site.

4 CONCLUSION

An environmental noise assessment has been conducted for the proposed *Battery Energy Storage System (BESS)* facility to be established at Kojonup, Western Australian (the **Project**).

The Project will comprise batteries, inverters and transformers with an indicative rating of 100 MW and a total storage capacity of 800 MWh.

This assessment considers noise from the Project based on manufacturer's data for an indicative equipment selection, and compares the predicted noise levels with the noise criteria established by the *Environment Protection (Noise) Regulations 1997* (the **Regulations**).

Based on the assessment, cumulative noise from the existing substation and the Project is predicted to achieve the noise limits at all dwelling locations, including a 5 dB(A) addition for tonality in accordance with the Regulations. The assessment also indicates that noise levels for *Noise sensitive premises: any area other than highly sensitive area* will also be achieved at the boundary of the landholder's land.

It is noted that the above outcome is based on indicative unit quantities and indicative equipment selections installed at the location shown in Figure 1 of this report. In the event that unit quantities or the location of the Project change as part of the final design, or if equipment with higher sound levels is selected it is recommended that a final noise assessment be conducted which confirms that compliance is achieved by the final Project design.