Marri Wind Farm

Environmental Noise Assessment

P240130RP2 Revision C

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Resonate

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Glossary

A-weighting	A spectrum adaption that is applied to measured noise levels to represent human hearing. A-weighted levels are used as human hearing does not respond equally at all frequencies.
dB	Decibel—a unit of measurement used to express sound level. It is based on a logarithmic scale which means a sound that is 3 dB higher has twice as much energy. We typically perceive a 10 dB increase in sound as a doubling of that sound level.
Frequency (Hz)	The number of times a vibrating object oscillates (moves back and forth) in one second. Fast movements produce high frequency sound (high pitch/tone), but slow movements mean the frequency (pitch/tone) is low. 1 Hz is equal to 1 cycle per second.
IEC 61400-11	IEC 61400-11 *Wind turbine generator systems – Part 11: Acoustic noise measurement techniques*, Edition 3.1 (2018).
Involved stakeholder	Noise sensitive receiver with an agreement with the wind farm to allow for increased noise criteria, for example as part of an agreement to host wind turbines.
L_{A90}	A-weighted noise level exceeded for 90% of the measurement period. The L_{90} metric is used to quantify background noise and wind farm noise at residences because it is much less susceptible to short-term extraneous noise.
L_{Aeq}	Equivalent A-weighted Noise Level. It is the energy averaged noise level over the measurement time.
Noise Regulations	*Environmental Protection (Noise) Regulations 1997*
Noise sensitive location	Noise sensitive receiver without an agreement with the wind farm to allow for increased noise criteria.
Rated power wind speed	Lowest hub height wind speed at which the WTG reaches its rated power.
SA Guidelines	*Wind Farms – Environmental Noise Guidelines, November 2021 Update* issued by the South Australia Environment Protection Authority.
Tonal audibility, ΔL_A	A measure of tonality. Values greater or equal to 0 dB indicate that the tone is detectable to the average human ear. Tonal audibility for wind farm noise is determined using the assessment method defined in IEC 61400-11.

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Executive summary

Marri WF Pty Ltd as trustee for the Marri WF Unit Trust (the Proponent), a wholly owned subsidiary of Alinta Energy Pty Ltd (Alinta Energy), is seeking approval to develop Marri Wind Farm (the Proposal) located approximately 20 kilometres (km) south of the township of Dandaragan within the Shire of Dandaragan. The Proposal, referred to herein as the Marri Project, is proposed to consist of across 82 wind turbine generators (WTGs) within a Project boundary covering areas in the settlements of Yathroo and Regans Ford in the Shire of Dandaragan in Western Australia (WA). The wind energy component will be supported by ancillary infrastructure comprising of a connection substation, wind farm substation, transmission infrastructure and a Battery Energy Storage System (BESS).

Resonate has been engaged to undertake an operational environmental noise assessment of the Marri Project to address the requirements of the WA *Environmental Protection (Noise) Regulations 1997* (Noise Regulations), and the South Australian Environment Protection Authority (EPA) *Wind Farms Environmental Noise Guidelines November 2021 update* (SA Guidelines) as per the *Position Statement: Renewable energy facilities* prepared by the Department of Planning, Land and Heritage on behalf of the Western Australian Planning Commission (WAPC).

Wind turbine noise assessment

Based on the candidate wind turbine selection and proposed 82 WTG layout, operational wind turbine noise levels were predicted against the minimum applicable noise criterion of 35 dB for non-involved noise sensitive locations that applies under the Noise Regulations and SA Guidelines. The predictions were made on the basis of the loudest WTG model identified as a potential candidate for the Marri Project.

Compliance was predicted with the applicable assessment criteria at all but one noise sensitive location where predicted wind turbine noise levels were at 37 dB, with that noise sensitive location being located within the proposed Yathroo Wind Farm boundary. Potential noise mitigation strategies have been identified including selection of a quieter WTG model, consideration of background noise levels, noise curtailment strategies and/or implementing a commercial agreement with that landowner.

A noise assessment was also carried out for involved stakeholders, being dwellings located within the defined Marri Project boundary who would have an agreement in place to host wind turbine infrastructure. A noise criterion of 45 dB was adopted for involved landowners based on the SA Guidelines, with predicted wind turbine noise levels complying with the adopted noise criterion at all involved stakeholder dwellings.

Ancillary infrastructure noise assessment

The ancillary infrastructure noise assessment was based on a typical BESS equipment model and layout, as well as typical transformer sound power levels for anticipated collector station equipment. Two wind farm substation locations were assessed.

The assessment of ancillary infrastructure noise has concluded that the Marri Project can comply with the applicable Noise Regulation assigned noise levels for all noise sensitive locations. The predicted noise levels are 8 dB or more below the applicable assigned noise levels at all noise sensitive locations outside of the Marri Project boundary. For involved stakeholder dwellings, predicted ancillary infrastructure noise levels were no higher than 30 dB and therefore well below the involved stakeholder assessment criterion of 45 dB.

Cumulative noise

The Marri Project is located in an area south of the existing Yandin Wind Farm and a proposed neighbouring wind farm called the Yathroo Wind Farm that is currently undergoing assessment by the Shire of Dandaragan.

Predicted noise levels from the existing Yandin Wind Farm at the nearest noise sensitive locations to the Marri Project are sufficiently low such as to not introduce a cumulative noise concern as defined by the Noise Regulations.

For the Yathroo Wind Farm, most neighbouring noise sensitive locations that are within the predicted 30 dB wind turbine noise contour from the Marri Project are involved stakeholders of Yathroo Wind Farm. These dwellings have a higher assessment criterion for noise from Yathroo Wind Farm, such that cumulative noise is not considered to present as long as the Marri Project is able to achieve compliance with the applicable requirements of Regulation 7 and 8 of the Noise Regulations and SA Guidelines.

One dwelling was identified to the north of the Marri Project that is outside of the Yathroo Wind Farm development area that may present a risk of cumulative noise should Yathroo Wind Farm and the Marri Project both commence operation. It is noted that the outcome at this noise sensitive location, and other noise sensitive locations within the Marri Project area, will be dependent on the final WTG selection and layout for both Yathroo Wind Farm and the Marri Project. As such, it has been recommended that cumulative noise be further assessed during detailed design with consultation with Yathroo Wind Farm to ensure cumulative compliance at receivers without any commercial agreement with either development.

Summary and recommendations

This assessment has concluded that the Marri Project has been designed, and can be constructed and operated, in such a way as to manage wind turbine and ancillary infrastructure noise emissions in accordance with applicable legislation, policies and guidelines, subject to final equipment selection and detailed design.

The assessment is based on a candidate wind turbine model, ancillary infrastructure selection and layout that may be subject to further refinement post-approval. As such, it is recommended that:

- Prior to the commencement of construction of the Marri Project, a Pre-Construction Noise Assessment be prepared that reflects the final wind turbine and ancillary infrastructure selections and design. The Pre-Construction Noise Assessment should include a cumulative noise assessment with Yathroo Wind Farm, should that Marri Project have received planning approval, and strategies to ensure that cumulative noise can achieve compliance with applicable noise assessment criteria determined in accordance with the SA Guidelines and Noise Regulations.
- Post-construction noise monitoring should be undertaken to demonstrate that wind turbine noise levels comply with the applicable noise assessment criteria.

1 Introduction

Marri WF Pty Ltd as trustee for the Marri WF Unit Trust (the Proponent), a wholly owned subsidiary of Alinta Energy Pty Ltd (Alinta Energy), is seeking approval to develop Marri Wind Farm (the Proposal) located approximately 20 kilometres (km) south of the township of Dandaragan within the Shire of Dandaragan. The Proposal, referred to herein as the Marri Project, is proposed to consist of across 82 wind turbine generators (WTGs) within a Project boundary covering areas in the settlements of Yathroo and Regans Ford in the Shire of Dandaragan in Western Australia (WA). The wind energy component will be supported by ancillary infrastructure comprising of a connection substation, wind farm substation, transmission infrastructure and a Battery Energy Storage System (BESS). Resonate has been engaged to undertake an operational environmental noise assessment of the proposed Marri Project.

The primary noise sources assessed in this Preliminary Environmental Noise Assessment involve the operational wind turbine noise. It is understood that the wind turbines will be supported by ancillary infrastructure, that would typically involve one or more transformers at a minimum.

This report presents a noise assessment of the Marri Project, including:

- identification of applicable legislation, policies and guidelines relating to noise emissions from wind farms
- wind turbine noise predictions and assessment against applicable assigned noise levels
- recommendations for noise control.

The noise assessment of the Marri Project has been conducted considering relevant guidance from WA regulatory authorities as to wind turbine noise emissions. This includes reference to:

- Regulation 7 and 8 of the Western Australian *Environmental Protection (Noise) Regulations 1997* (Noise Regulations)
- South Australian Environment Protection Authority (EPA) *Wind Farms Environmental Noise Guidelines November 2021 update* (SA Guidelines).

2 Project description

2.1 Site description

The Marri Project site is located across agricultural land coving areas in the settlements of Yathroo and Regans Ford, located in the Shire of Dandaragan. The township of Dandaragan is located approximately 20 km to the north of the Proposed Development Envelope, whilst the township of Gingin is situated approximately 42 km to the south.

The Marri Project is proposed to consist of:

- up to 82 WTGs providing a capacity of up to 550 MW
- tip height of up to 275 m above ground level
- rotor diameter of up to 182 m
- hub height of up to 184 m above ground level
- associated ancillary infrastructure including a connection substation, wind farm substation and battery energy storage system (BESS)
- access roads.

The Marri Project boundary, proposed WTG locations are shown in Figure 1. The WTG coordinates are detailed in Appendix A.

2.2 Noise-sensitive locations

Aurecon has provided information on identified noise-sensitive dwelling locations around the site as well as involved stakeholder locations (involved landowners that will have a financial agreement to host wind farm infrastructure with Marri Wind Farm) within the site as shown in Figure 1, with coordinates tabulated in Appendix B.

The noise-sensitive locations and involved stakeholder locations are all dwellings that are located within a Rural Zone as defined by the Shire of Dandaragan Planning Scheme.

2.3 Existing noise environment

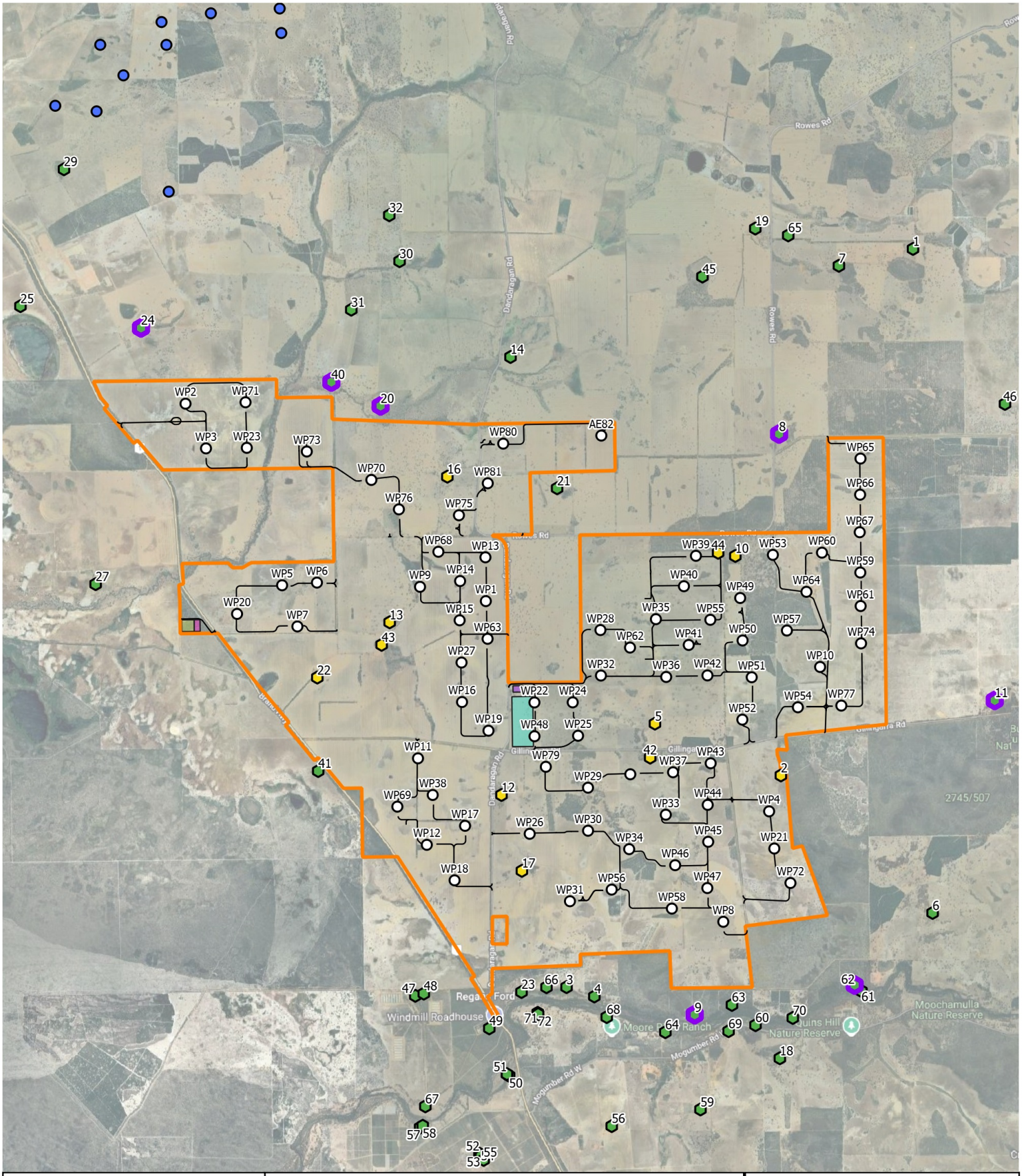
Resonate has been commissioned to undertake background noise monitoring at seven sites around the Marri Wind Farm, with the locations marked on Figure 1.

A Background Noise Monitoring Report setting out the analysis of the background noise levels is included as Appendix C. The report analyses noise levels based on:

- The method set out in the SA Guidelines.
- A method applied based on consultation with DWER as to how they would consider background noise levels when assessing wind turbine noise against the assigned noise levels under the Noise Regulations (refer Section 3.4.1).

Based on the analysis carried out in the Background Noise Monitoring Report it was observed that the background noise levels could lead to elevated noise criteria under the SA Guidelines at noise-sensitive dwellings, as background noise levels were regularly above 30 dB L_{A90} and therefore would result in noise criteria above 35 dB. However, when analysed using the method developed in consultation with DWER, the measured background noise levels were below the assigned noise levels under the Noise Regulations.

Therefore, at this stage, this environmental noise assessment has been undertaken on the conservative basis that background noise levels are sufficiently low at all wind speeds such that the minimum applicable assessment criteria must apply at all wind speeds.



Marri Wind Farm

Figure 1: Project Layout and Receiver Locations

Project Number	P240130
Drawn by	TE
Checked by	JC
Date Issued	10/2025
Client	Aurecon
Aerial Imagery	(c) Google

Legend

- Project Footprint
- WTG
- WF Substation Option A
- WF Substation Option B
- BESS
- Connection Substation
- Access Road

Receiver locations

- Involved stakeholder
- Noise sensitive location
- Background monitoring

0 2 4 km

Datum GDA2020, Projection MGA ZONE 50

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2.4 Wind turbine model

At this stage of the Marri Project, the wind turbine model that would be used has not been selected and it would be subject to a competitive tender process following planning approval. For this assessment the highest noise model has been utilised for the basis of a worst-case scenario.

Aurecon has provided a list of candidate wind turbine models being considered for the Marri Project as shown in Table 1.

Table 1 Potential wind turbine models

Turbine	Rated power	Maximum sound power level, dB L_{WA}
GE 6.0-164	6.0MW	107.8[1]
Nordex N175	7.0MW	107.7[2]
Vestas V162-6.2	6.2MW	104.8[3]

(1) Based on GE Renewable Energy *Technical Documentation – Wind Turbine Generator Systems 6.0-165-50Hz*. Inclusive of a 0.8 dB uncertainty factor as specified in the manufacturer documentation.

(2) Based on Nordex document 9003489_08_pdf_F008_278_A12_EN_R08_Nordex_N175_6.X based on WTG with serrated trailing edges (STEs). No uncertainty factor specified by manufacturer.

(3) Based on Vestas document *1/3 Octave noise emission EnVentus™ V162-6.2MW* based on WTG with STEs. No uncertainty factor specified by manufacturer, however it is understood that Vestas incorporate an uncertainty factor into their specified sound power levels.

For the purposes of this assessment, the noise emission data from the GE 6.0-164 wind turbine has been adopted as it has the loudest overall sound power level and is also the candidate WTG that results in the highest predicted noise levels at distances of 1000 m or more from a WTG.

The overall sound power levels at hub height wind speeds for the GE 6.0-164 are summarised in Table 2, inclusive of the manufacturer's specified 0.8 dB uncertainty factor.

Table 2 Wind turbine sound power levels with wind speed

Turbine	Sound power level in dB L_{WA} for hub height wind speed in m/s						
Hub height wind speed, m/s	**4**	**5**	**6**	**7**	**8**	**9**	**≥ 10**
GE 6.0-164	94.6	96.5	100.0	103.3	105.5	107.5	107.8

As is normal for modern pitch-controlled wind turbines, the sound power levels for the GE 6.0-164 wind turbine increase from the cut-in wind speed before levelling off at a wind speed close to the wind speed at which the turbines reach rated power (i.e. from 10 m/s). This assessment has been based on the maximum sound power level for the 10 m/s hub height wind speed, with the associated sound power level spectrum, presented in Table 3.

Table 3 Wind turbine sound power level spectrum for the 10m/s hub height wind speed

Turbine	Sound power level in dB L_{WA} at octave band centre frequency in Hz									Overall
Octave band centre frequency, Hz	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dB L_{WA}**
GE 6.0-164	79.6	88.9	94.4	98.9	101.5	103.1	100.9	93.4	77.6	107.8

2.5 Yandin Wind Farm

The Marri Project site is located south of the existing Yandin Wind Farm, which consist of 51 Vestas V150-4.2 MW wind turbines, with a hub height of 105 m above ground level. Yandin Wind Farm is located near the town of Dandaragan in Western Australia. The southernmost wind turbine is approximately 4 km from the nearest section of the Marri Project boundary.

Sound power levels with hub height wind speed, operating in mode PO1, are stated in the Vestas specification document for the V150-4.2 MW model[1]. These sound power levels are based on data previously provided to Resonate for the assessment of Yandin Wind Farm. Table 4 summarises the maximum stated sound power levels for the 10m/s hub height wind speed for the Yandin WTGs.

Table 4 Yandin Wind Farm wind turbine sound power level spectrum for the 10m/s hub height wind speed

Turbine	Sound power level in dB L_{WA} at octave band centre frequency in Hz									Overall
Octave band centre frequency, Hz	31.5	63	125	250	500	1000	2000	4000	8000	dB L_{WA}
V150-4.2 MW PO	75.9	86.2	93.6	98.2	100.0	98.9	94.9	88.2	78.6	104.9

2.6 Yathroo Wind Farm

The Marri Project site is located immediately south of the proposed Yathroo Wind Farm, for which a Development Application was lodged with the Shire of Dandaragan in July 2025. Based on the publicly advertised Development Application report[2], Yathroo Wind Farm would consist of up to 65 WTGs with a maximum production capacity of up to 500 MW and associated ancillary infrastructure including BESS.

As Yathroo Wind Farm is also undergoing a development application assessment, it is understood that the turbine model and layout has not yet been finalised but that a Noise Impact Assessment (NIA) was prepared to inform the Development Application Report. The Development Application Report states that:

> Noise modelling was completed for multiple turbine layout iterations, inclusive of the BESS and other cumulative sources, with the aim of ensuring the Marri Project complies with the nominated minimal assigned noise level of 35 dB(A) at night at existing non-involved sensitive receivers. A noise level of 45dB(A) has been applied at existing involved receivers within the Marri Project Site, in consideration of commercial agreements in place with these landholders.

[1] Vestas, 30 November 2017, *Third octave noise emission – EnVentus V150-4.0/4.2 50/60 Hz*

[2] Umwelt, July 2025, *Yathroo Wind Farm – Development Application*

3 Assessment criteria

3.1 Overview

In WA, the applicable statutory requirements for noise emissions are contained within the *Environmental Protection Act 1986* (the Act) and the Noise Regulations.

The Noise Regulations require that noise emitted from any premises must comply with assigned noise levels when received at any other premises and be free of the intrusive characteristics of tonality, modulation and impulsiveness. In addition, the noise emissions must not "significantly contribute" to an exceedance of the assigned levels. A noise emission is understood to "significantly contribute" if a level of noise that exceeds a value which is 5 dB below the assigned level at the point of reception.

Historically in WA, the Noise Regulations have not been applied to wind turbine noise as measurement procedures for wind farm noise differ to normal industrial noise. Instead, in WA, it has been normal for wind turbine noise to be assessed using the SA Guidelines. Importantly, however, the base limit for wind farm noise in WA is set at 35 dB (rather than the 40 dB that normally applies in South Australia (SA)) for consistency with the Noise Regulations assigned noise levels for rural areas.

Recent advice from DWER, however, has been that consideration is required to the Noise Regulations, specifically Regulation 7 and Regulation 8, when assessing wind turbine noise. Therefore, this assessment considers both the Noise Regulations and SA Guidelines for wind turbine noise.

3.2 WAPC Position Statement

In 2020, the Department of Planning, Land and Heritage prepared a *Position Statement: Renewable energy facilities* on behalf of the Western Australian Planning Commission (WAPC). With respect to noise assessments for new wind farm proposals, the WAPC Position Statement sets out the following:

> Noise emissions from renewable energy facilities, including wind turbines, are required to meet the standards prescribed under the *Environmental Protection (Noise) Regulations 1997*. The South *Australian Environmental Protection Authority – Wind Farms Environmental Noise Guidelines (2009)* should also be referenced for assessment purposes. These guidelines acknowledge the potential for operation in the presence of higher wind-induced background noise levels.

The WAPC Position Statement is consistent with the approach adopted within this assessment to consider both the Noise Regulations and SA Guidelines.

3.3 SA Guidelines

3.3.1 Noise-sensitive locations

The SA Guidelines, as updated in November 2021 and applicable in WA, state that wind farm noise levels at noise sensitive locations must not exceed:

- 35 dB, or
- the background noise level plus 5 dB

whichever is the greater for each integer wind speed from the cut-in speed of the wind turbines to the speed at which the WTGs reach rated power.

Under the SA Guidelines, both background and wind farm noise levels are measured using the L_{A90} metric, due to the difficulties associated with accurately measuring L_{Aeq} noise levels over extended periods in windy conditions. The SA Guidelines considering that the measured L_{A90} wind farm noise levels appropriately represent the L_{Aeq} noise level. This

reflects the fact that there is only a small difference between L_{A90} and L_{Aeq} for operational wind turbine noise, being 2 dB or lower.

If wind farm noise levels at noise sensitive locations exhibit tonality, then a 5 dB penalty applies to the measured noise levels. The tonality assessment procedure is not clearly defined by the SA Guidelines, but the application of the tonal audibility measurement procedure detailed in IEC 61400-11 *Wind turbines – Acoustic noise measurement techniques* is suggested. The guidelines provide additional clarity that, in order for a 5 dB tonal penalty to be applied to the measured noise level at a given integer wind speed, an audible tone must be present for 10% of all data points in that integer wind speed bin

3.3.2 Involved stakeholders

Involved stakeholders are defined as private land whose owners have entered into an agreement with the wind farm developers. For Marri Wind Farm this is the dwellings within the defined Marri Project Boundary as shown on Figure 1.

The existence of an agreement will affect the consideration of whether noise is unreasonable in a given situation. The SA Guidelines state that it is unlikely that there will be unreasonable interference if:

- a formal agreement is documented between the parties
- the agreement clearly outlines to the landowner the expected impact of the noise from the wind farm and its effect upon the landowner's amenity
- the likely impact of exposure will not result in adverse health impacts (e.g. the level does not result in sleep disturbance or provides sufficient amenity outdoors).

For involved receivers, the SA Guidelines recommend:

- Daytime amenity is protected on the basis of the indicative noise criteria set out in the South Australian *Environment Protection (Commercial & Industrial Noise) Policy 2023* (the Noise Policy). In SA, this results in a daytime criterion of 52 dB for rural farming areas.
- A night time internal noise criterion of 30 dB based on the World Health Organization (WHO) *Guidelines for community noise (1999)*. For dwellings without specific acoustic treatment, this is typically converted to an external noise level of 45 dB to account for typical residential building acoustic performance and allowing for a window left open for ventilation.

For the purposes of this assessment, the more conservative night time criterion of 45 dB has been adopted for involved stakeholders at all times. It is noted that this is consistent with the approach taken by Yathroo Wind Farm for involved stakeholders as documented in the Yathroo Wind Farm Development Application Report.

3.4 Noise Regulations

Recent consultation with DWER has confirmed that Marri Wind Farm should also demonstrate compliance with the assigned noise levels under the Noise Regulations.

3.4.1 Noise-sensitive locations

Regulation 8 of the Noise Regulations sets out the assigned noise levels that apply. The assigned levels are specified according to the type of premises receiving the noise. There are different assigned levels for noise sensitive, commercial and industrial premises. The assigned levels for noise sensitive premises vary depending on the time of the day. The assigned noise levels always apply at the premises receiving the noise.

For noise sensitive premises, the assigned levels are adjusted by the addition of an influencing factor (IF) to account for the existing acoustic environment. The IF increases with the amount of commercial and industrial areas in the vicinity of the noise sensitive receiver as well as the presence of any major or secondary roads. This is calculated by

considering areas within 100 m and 450 m radius of the noise sensitive receiver location. Considering the location of Marri Wind Farm, no IF applies.

The table of assigned levels, shown in Table 5 shows the assigned noise levels as an L_{A10} level, measured using a 'Slow' time weighting over a representative assessment period suitable for the source. DWER has previously advised that a 4 hour assessment period would be appropriate for wind turbine noise although it is noted that this requires some interpretation as to how wind turbine noise is assessed over a 4 hour period.

Table 5 Assigned noise levels for non-involved receivers

Time of day	Assigned level in dB L_{A10}
7 am to 7 pm Monday to Saturday	45
9 am to 7 pm Sunday & public holiday	40
7 pm to 10 pm All days	40
10 pm on any day to 7 am Monday to Saturday and 9 am Sunday and public holidays	35

DWER has advised that, where the background noise levels exceed the assigned noise levels, then any assessment of wind turbine noise levels that are above the assigned noise levels could have regard to the higher background noise level. This would only apply in cases where the background noise level can be justifiably shown to be sufficiently high in accordance with procedures acceptable to DWER, which may differ from those applied under the SA Guidelines.

3.4.2 Involved stakeholders

DWER has not provided any formal advice for Marri Wind Farm with respect to involved stakeholders. While it is understood that involved stakeholders may be exposed to higher wind turbine noise levels due to their proximity to the WTGs, DWER has advised that they would still need to have regard to the Noise Regulations in the event of a complaint from an involved stakeholder.

In the absence of specific advice from DWER for Marri Wind Farm, a noise criterion of 45 dB has been adopted for involved stakeholders on the basis that:

- this is consistent with the approach under the SA Guidelines as set out in Section 3.3.2
- this is consistent with the approach taken to involved stakeholders by the Yathroo Wind Farm Development Application Report, offering consistency with the neighbouring proposed wind farm
- a level of 45 dB is consistent with the assigned noise level for daytime periods under the Noise Regulations, noting adjustments between $L_{Aeq,10min}$ and $L_{AS10,4h}$ as set out elsewhere in this assessment.

3.4.3 Intrusive or dominant characteristics

Regulation 9 of the Noise Regulations also requires that penalties are applied for intrusive or dominant characteristics, of which tonality and modulation are considered relevant to the assessment of wind turbine noise:

- Modulation – a variation in the emission of noise that:
  - is more than 3 dB L_{AFast} or is more than 3 dB L_{AFast} in any one-third octave band: and
  - is present for at least 10% of the representative assessment period; and
  - is regular, cyclic and audible.
- Tonality – the presence in the noise emission of tonal characteristics where the difference between:
  - the A-weighted sound pressure level in any one-third octave band; and
  - the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as L_{ASlow} levels.

An adjustment of +5 dB is added to the source noise level for each of the characteristics that are present at the receiver.

3.5 Cumulative noise

The SA Guidelines state the following with respect to cumulative noise from multiple wind farms:

> Separate wind farm developments in close proximity to each other may impact on the same relevant receiver.
>
> As with a staged development, any additional wind farm that may impact on the same relevant receiver as an existing wind farm should meet the criteria using the background noise levels before the original wind farm site development. The noise generated by existing WTGs from another wind farm should not be considered as part of the background noise in determining criteria for subsequent development.
>
> On an occasion where it is not possible to determine the background noise levels as they existed before the original wind farm development, the background noise criteria should not be utilised for the purposes of predicting the impact of the proposed new wind farm.

The above suggests that, while the same criteria should be used so as one wind farm cannot artificially increase the background noise to result in higher noise criteria, it may not be necessary for the cumulative noise from both wind farms to achieve compliance. It is considered good practice, however, for the cumulative noise to achieve compliance with the criteria.

The Noise Regulations require that cumulative noise from relevant noise sources achieve compliance with the assigned noise levels, with relevant noise sources being those with a noise level within 5 dB of the assigned noise level.

3.6 Summary of applicable noise criteria

The applicable noise criteria for sensitive receivers around Marri Wind Farm is set considering the following:

- Involved landowner dwellings: 45 dB
- Noise-sensitive locations: 35 dB

As discussed in Section 2.3, these criteria are based on the conservative assumption that background noise levels do not lead to an increase in the allowable level of wind turbine noise. Based on the analysis carried out in the Background Noise Monitoring Report it was observed that the background noise levels could lead to elevated noise criteria under the SA Guidelines at noise-sensitive dwellings, as background noise levels were regularly above 30 dB L_{A90} and therefore would result in noise criteria above 35 dB. However, when analysed using the method developed in consultation with DWER, the measured background noise levels were below the assigned noise levels under the Noise Regulations. Given this difference between the two methods, the more conservative approach has been adopted.

The above criteria are compared against the predicted wind farm operational noise levels, which consider the maximum sound power level at the hub height wind speed with the highest noise emission, for the worst-case wind turbine model option being considered for the Marri Project. It is noted that the SA Guidelines specify the $L_{Aeq,10min}$ metric, whereas the Noise Regulations specify the noise level as that which would represent the L_{A10} level measured using a 'Slow' time weighting over a representative assessment period of four hours. For the purposes of this assessment, predicted noise levels have been presented in a manner that is considered to provide appropriate assessment against both metrics as discussed in Section 4.1.

4 Marri Project wind turbine noise

4.1 Noise prediction methodology

To predict wind turbine noise levels from the Marri Project, an environmental noise model has been developed in SoundPlan version 9.1 environmental noise prediction software. The noise model implements the prediction algorithm for wind turbine noise set out as per ISO 9613-2:2024 *Acoustics — Attenuation of sound during propagation outdoors Part 2: Engineering method for the prediction of sound pressure levels outdoors*.

In accordance with standard prediction procedures for wind farm noise as set out in ISO 9613-2:2024, predictions have been undertaken on the basis of the following parameters:

- 10 m spaced topography for the site
- ground absorption factor of 50% representing mixed reflective and absorptive ground
- WTG and receiver locations as per the coordinates detailed in Appendix A and Appendix B
- 184 m hub height turbines with a rotor diameter of 182 m and sound power levels as per Table 3
- receivers at 4 m above ground as per the recommendations of ISO 9613-2:2024
- a +3 dB correction applied to the predicted noise levels from any wind turbine where concave topography is predicted between it and the receiver location as defined by the UK Institute of Acoustics *A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise* (Good Practice Guide)
- temperature of 10˚C and relative humidity of 80%
- topographical shielding limited to 2 dB, assessed based on the wind turbine tip height.

The prediction methodology set out above is in accordance with the SA Guidelines, which reference the earlier version of the ISO 9613-2 standard.

The noise prediction methodology adopted is expected to result in wind turbine noise predictions that are approximately 1 to 2 dB higher than would be measured when applying the wind turbine noise measurement methodology specified by the SA Guidelines. This is because:

- Our previous Australian study[3] has shown that wind turbine noise predictions using a receiver height of 1.5 m above ground accurately predict downwind noise levels for Australian sites with relatively flat topography when using the wind turbine noise measurement methods applied in Australia.
- Increasing the receiver height to 4 m as recommended by ISO 9613-2:2024 increases the predicted noise levels by approximately 1.5 dB in comparison to predictions using a receiver height of 1.5 m.
- The receiver height of 4 m is understood to be based on the recommendations of the Good Practice Guide. However, the Good Practice Guide also recommends that 2 dB be subtracted from predicted noise levels to adjust predicted L_{Aeq} noise levels to the L_{A90} noise levels that would be measured on site in accordance with the 2009 SA Guidelines. This correction has conservatively not been adopted for this assessment.

The predictions at maximum sound power output are also considered to provide an appropriate representation of noise levels for assessment against the assigned noise levels under the Noise Regulations. Due to the relatively constant nature of wind turbine noise, there is expected to be negligible difference between the $L_{Aeq,10min}$ noise level during a period where the WTGs are at or near their maximum sound power level and the L_{A10} noise level over a 4 hour period where wind conditions would typically vary such that the WTGs would not be at maximum sound power at all times.

[3] Evans T & Cooper J, 2012, *Comparison of predicted and measured wind farm noise levels and implications for assessments of new wind farms*, Acoustics Australia, vol. 40, no. 1, pp 28-36.

4.2 Predicted Marri Project wind turbine noise levels

4.2.1 Noise sensitive locations

Predicted Marri Project wind turbine noise levels for each of the total 61 noise sensitive locations are presented in Appendix B. The predicted Marri Project A-weighted noise levels at the 25 noise sensitive locations within 5 dB of noise criteria are listed in Table 6 below.

Table 6 Non-involved receivers with predicted Marri Project wind turbine noise levels within 5 dB of noise criterion

Receiver	Predicted A-weighted Marri Project noise level, dB	Compliance with minimum noise criterion: 35 dB
3	34	✓
4	33	✓
8	34	✓
9	33	✓
11	30	✓
14	32	✓
20	35	✓
21	37	×
23	32	✓
24	30	✓
40	35	✓
41	34	✓
47	30	✓
48	30	✓
49	31	✓
60	30	✓
62	33	✓
63	31	✓
64	33	✓
66	32	✓
68	31	✓
69	31	✓
70	31	✓
71	31	✓
72	32	✓

A noise contour map showing the Marri Project operational wind turbine noise predictions is presented in Figure 2.

Based on the wind turbine noise predictions from the Marri Project with the WTG model with the highest predicted noise levels, predicted noise levels comply with the 35 dB noise criterion with the exception of Receiver 21 where the wind turbine noise level is predicted to be up to 37 dB. A discussion of the predicted exceedance and considerations for management is provided in Section 4.3.

It is noted that these predictions are based on preliminary wind turbine selections that are considered to be representative of the current range of turbines, and this is reflected in the range of predicted wind farm noise levels. As the Marri Project progresses and more information becomes available on the selected wind turbine type and layout refinements, this assessment will need to be updated accordingly.

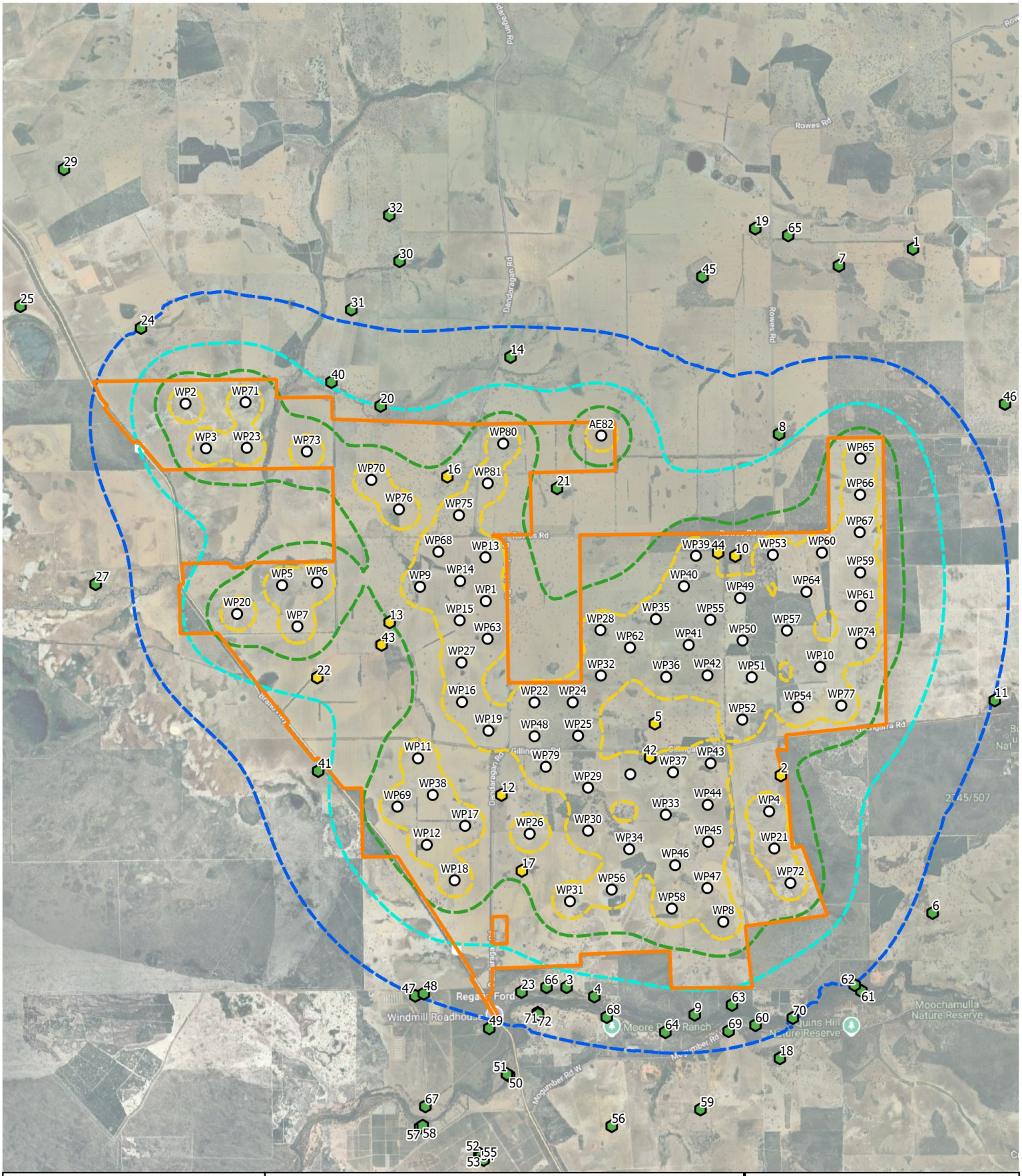
4.2.2 Involved stakeholders

The predicted Marri Project wind turbine noise levels at involved stakeholder dwellings are shown in Table 7, and compared against the noise criterion of 45 dB for involved stakeholders.

Table 7 Predicted Marri Project wind turbine noise levels at involved stakeholders

Receiver	Predicted A-weighted Marri Project noise level, dB	Compliance with minimum noise criterion for involved stakeholders: 45 dB
2	41	✓
5	43	✓
10	43	✓
12	42	✓
13	40	✓
16	42	✓
17	41	✓
22	37	✓
42	45	✓
43	38	✓
44	45	✓

Based on the wind turbine noise predictions from the Marri Project with the WTG model with the highest predicted noise levels, predicted noise levels comply with the 45 dB noise criterion at all involved stakeholder dwellings.



Marri Wind Farm

Figure 2: Predicted Project wind turbine noise levels

Project Number	P240130
Drawn by	TE
Checked by	JC
Date Issued	09/2025
Client	Aurecon
Aerial Imagery	(c) Google

Legend

- Project Footprint
- WTG

Predicted noise level LAeq,10

- 30 dB
- 35 dB
- 40 dB
- 45 dB

Receiver locations

- Involved stakeholder
- Noise sensitive locatio

0 2 4 km

Datum GDA2020, Projection MGA ZONE 50

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4.3 Predicted noise levels at Receiver 21

The predicted wind turbine noise levels at Receiver 21 exceed the minimum applicable criterion of 35 dB by up to 2 dB based on the WTG model with the highest predicted noise levels.

It is noted that Receiver 21 is located within the Yathroo Wind Farm area and may therefore be subject to wind turbine noise levels of up to 45 dB from Yathroo Wind Farm based on the Yathroo Wind Farm Development Application Report. In this context, predicted noise levels of 37 dB from the Marri Project may not noticeably increase the noise levels at Receiver 21 if both Yathroo Wind Farm and the Marri Project were to be operating. Despite this, however, it is considered desirable for noise levels from the Marri Project to not exceed 35 dB at Receiver 21 to ensure compliance with the Noise Regulations, including in the event that Yathroo Wind Farm is not constructed.

Options to address the predicted exceedance at Receiver 21 are as follows:

- The use of alternative WTG models. It is noted that the predictions are based on the loudest considered WTG option and a quieter WTG may be selected. The Vestas V162-6.2MW is expected to result in predicted noise levels approximately 2 dB lower than the GE164-6.0 for example, which would remove the predicted exceedance.
- Undertaking background noise monitoring at Receiver 21 to understand if higher background noise levels could allow for higher wind turbine noise levels.
- Considering noise curtailment for selected WTGs that influence wind turbine noise levels at Receiver 21 to achieve 35 dB during the Night period when the lower assigned noise level applies. This would be subject to detailed design and final WTG selection, however an indicative noise curtailment scheme is shown in Table 8 based on the standard noise reduction modes listed in the GE technical documentation for the GE164-6.0 WTG.

Table 8 Indicative noise curtailment scheme for Receiver 21

WTG	Wind direction	Indicative curtailment during hours of 10 pm on any day to 7 am Monday to Saturday and 9 am Sunday and public holidays		
Hub height wind speed, m/s		**≤ 8**	**9**	**≥ 10**
WP13	180 – 330º	n/a	NR106	NR106
WP75	180 – 330º	n/a	NR106	NR106
WP80	180 – 90º	n/a	NR104	NR104
WP81	180 – 90º	n/a	NR100	NR100
AE82	180 – 90º	n/a	NR104	NR100
All other WTGs	n/a	n/a	n/a	n/a

- Implementing an agreement with the landowner of Receiver 21 to allow for higher Marri Project wind turbine noise levels, subject to the agreement of the landowner.

4.4 Tonality and intrusive characteristics

In accordance with normal procedures for wind turbine noise predictions, no penalties have been applied in the predictions for tonality under the SA Guidelines or intrusive characteristics under the Noise Regulations.

In the relatively unusual event that characteristics are detectable at residences, the occurrence will also involve a complex relationship between the wind turbine noise and the background noise environment that is best assessed

through measurements. Special audible characteristics from wind farms at residences are, in our experience, a relatively uncommon occurrence in Australia and, where they have occurred, they have generally occurred infrequently, typically much less than 10% of the time, and under specific conditions. As such, it is considered reasonable to assume that they will not occur for the purposes of this predictive noise assessment.

It is recommended that the risk of intrusive characteristics be assessed through post-construction noise monitoring for Marri Wind Farm.

This approach is consistent with regulatory advice from other jurisdictions, with EPA Victoria Publication 3011 *Wind Energy Facility Turbine Noise – Technical Guideline* advising that no penalties need to be applied for tonality or modulation at the predictive stage, however noting that these characteristics should be assessed during post-construction noise monitoring.

4.5 Contingency measures

In the event of a non-compliance through post-construction noise monitoring due to a difference in assumptions that have been input into this assessment and/or the presence of intrusive characteristics, then there are contingency measures available for wind turbine noise control that could be implemented.

Available options to address a non-compliance in the event it arises could include one or more of the following:

- Operating one or more turbines in a derated or curtailed mode, such that they produce a lower noise level under the conditions under which the exceedance occurs. Modern WTGs, such as those that would be installed at Marri Wind Farm, have multiple noise reduced modes that can be programmed into the wind farm SCADA system to occur automatically when the conditions arise with consideration of factors such as:
  - time of day
  - hub height wind speed
  - wind direction.
- Switching off turbines under the unfavourable conditions under which the exceedance occurs. This can be programmed into the wind farm SCADA system to occur automatically when the conditions arise in the same manner as the noise-reduced modes described above.
- Undertake turbine inspection(s) to determine if there is a fault or maintenance issue that has arisen, and if so, undertake repairs.
- Undertaking maintenance activities or works to the turbine to reduce noise emissions or to remove the occurrence of tonality. For example, isolation of mechanical components from the structure.
- Reaching an agreement with the affected landowner in accordance with that allows an increase in the noise criteria and/or assigned noise levels. This would be subject to the approval of the affected landowner. For example, landowners may agree to be compensated to cease utilising a dwelling.

5 Ancillary infrastructure

5.1 Noise sources

The Marri Project will include ancillary infrastructure including a central BESS, and substations at connection and wind farm substations, with two options (Option A and Option B) under consideration for the wind farm substation as shown in Figure 1.

As with the wind turbines, selections for the ancillary infrastructure, including BESS, has not been made at this stage of the Marri Project. Therefore, we have made assumptions based on prior experience for wind farms of similar size and scale.

For both of the connection and wind farm substations, we have assumed two main transformers, assumed to have a rating of 300 MVA each, supported by associated smaller earthing transformers and switchgear. The transformer models have not been selected at this stage, so a sound power level aligned with the standard level specified in AS/NZS 60076.10:2023 *Power transformers – Determination of sound levels* has been adopted for the main 300 MVA transformers, with other associated equipment expected to be significantly quieter based on previous experience. The sound power level for the transformer is shown in Table 9 with a typical transformer noise spectrum based on previous Resonate measurements. It is noted that transformers with a lower MVA rating would have a lower permissible sound power level under AS/NZS 60076.10:2023.

Table 9 Octave band sound power levels for 300 MVA transformer

Transformer	Sound power level in dB L_{WA} at octave band centre frequency in Hz								Overall
Octave band centre frequency, Hz	31.5	63	125	250	500	1000	2000	4000	dB L_{WA}
Per 300 MVA transformer	75.1	79.9	87.9	95.4	97.8	90	87.2	80	100.7

For the BESS model, this assessment has been based on a candidate battery module being the Tesla Megapack 2 XL and a total overall sound power level as set out in Table 10. These are based on Megapacks operating at typical operating scenarios during the critical night (40%) period. Based on the Marri Project's proposed scale, this assessment has been based on a total of 250 megapacks for the BESS site.

Table 10 BESS sound power levels

BESS unit	Sound power level in dB L_{WA} at octave band centre frequency in Hz								Overall
Octave band centre frequency, Hz	31.5	63	125	250	500	1000	2000	4000	dB L_{WA}
250 Megapacks at 40% Typical worst case night operation	77.8	91.0	96.3	106.7	105.8	107.9	107.6	104.6	113.8

It is noted that additional equipment would generally be installed at a BESS site including smaller capacity transformers that support the batteries. Based on prior experience, the sound power levels of these transformers are significantly lower than (more than 10 dB below) those of the battery units and the noise emissions from the BESS will be controlled by the Megapacks. As such, this noise assessment has been based on noise emissions from the Megapacks controlling the overall noise emissions from the BESS.

It is noted that the assumed sound power levels above are considered typical of the higher sound power levels that would be anticipated for ancillary infrastructure.

5.2 Noise prediction methodology

To predict wind turbine noise levels from the Marri Project, an environmental noise model has been developed in SoundPlan version 9.1 environmental noise prediction software. The noise model implements the ISO 9613-2:2024 prediction algorithm.

In accordance with standard prediction procedures for wind farm noise as set out in ISO 9613-2:2024, predictions have been undertaken on the basis of the following parameters:

- 10 m spaced topography
- ground absorption factor of 0% around the BESS and substation site representing reflective ground such as paving or concrete
- ground absorption factor of 70% representing 70% absorptive and 30% reflective ground, considered typical of rural grassland and farming areas
- ancillary infrastructure sites as shown on Figure 1, with both Option A and Option B assessed for the wind farm substation
- noise-sensitive locations as per the coordinates detailed in Appendix B
- sound power levels for ancillary infrastructure as per Table 9 and Table 10
- transformers located centrally within each collector station modelled at a height of 4 m above ground level
- battery packs distributed across the BESS area and modelled at a height of 3.3 m above ground level based on the Tesla Megapack 2XL recommendations
- sensitive receivers at 1.5 m above ground
- temperature of 10˚C and relative humidity of 70%
- sound propagating downwind, meteorological correction C_{met} = 0
- a +5 dB penalty for a tonal intrusive characteristic has been applied to all transformer noise predictions with consideration of previous experience of tonal noise from electrical infrastructure.

Considering the relatively constant nature of ancillary infrastructure noise, the predicted L_{Aeq} noise level has been considered representative of the L_{A10} noise level for the purposes of comparison against the assigned noise levels.

5.3 Predicted noise levels

5.3.1 BESS and wind farm substation Option A

The proposed BESS and wind farm substation Option A are located centrally within site. Table 11 presents the highest predicted noise levels from these ancillary infrastructure sites at any involved stakeholder dwelling and any non-involved noise-sensitive location without an involvement in the Marri Project.

Table 11 Highest predicted noise levels for BESS and wind farm substation Option A

Highest predicted noise levels	Assigned noise level, dB
Involved stakeholder, Receiver ID 12: 30 dB L_{A10}	45
Non-involved noise sensitive location, Receiver ID 41: 18 dB L_{A10}	35

From Table 11 it is apparent that the predicted noise levels from the BESS and wind farm substation Option A are comfortably below the applicable assigned noise level, being at least 15 dB below at the nearest involved stakeholder location (Receiver 12) and at least 17 dB below at the nearest noise sensitive location (Receiver 41).

5.3.2 Connection substation and wind farm substation Option B

The proposed connection substation and wind farm substation Option B are located on the western boundary of the site. Table 12 presents the highest predicted noise levels from these ancillary infrastructure sites at any involved stakeholder dwelling and any non-involved noise-sensitive location without an involvement in the Marri Project.

Table 12 Highest predicted noise levels for connection substation and wind farm substation Option B

Highest predicted noise levels	Assigned noise level, dB
Involved stakeholder, Receiver ID 22: 22 dB L_{A10}	45
Non-involved noise sensitive location, Receiver ID 27: 27 dB L_{A10}	35

From Table 12 it is apparent that the predicted noise levels from the connection substation and wind farm substation Option B are comfortably below the applicable assigned noise level, being at least 8 dB below at the nearest noise sensitive location (Receiver 22).

6 Cumulative noise

6.1 Yandin Wind Farm

The locations of the Yandin Wind Farm WTGs are shown on Figure 3 alongside the Marri Project WTGs and Marri Project predicted wind turbine noise contours. The noise sensitive location within the predicted 30 dB contour from the Marri Project, which represents the area within which cumulative noise from the Marri Project requires consideration as pre the Noise Regulations, is Receiver 24.

Using the noise model described in Section 4.1 and the sound power levels for Yandin WTGs in Section 2.5, the predicted wind turbine noise level from Yandin Wind Farm at Receiver 24 is 24 dB, resulting in a cumulative noise level of 31 dB on the conservative assumption that Receiver 24 could be downwind of both Yandin Wind Farm and the Marri Project at the same time.

Based on this assessment, cumulative noise from Yandin Wind Farm is not considered to present a risk of the Marri Project complying with the applicable assessment criteria.

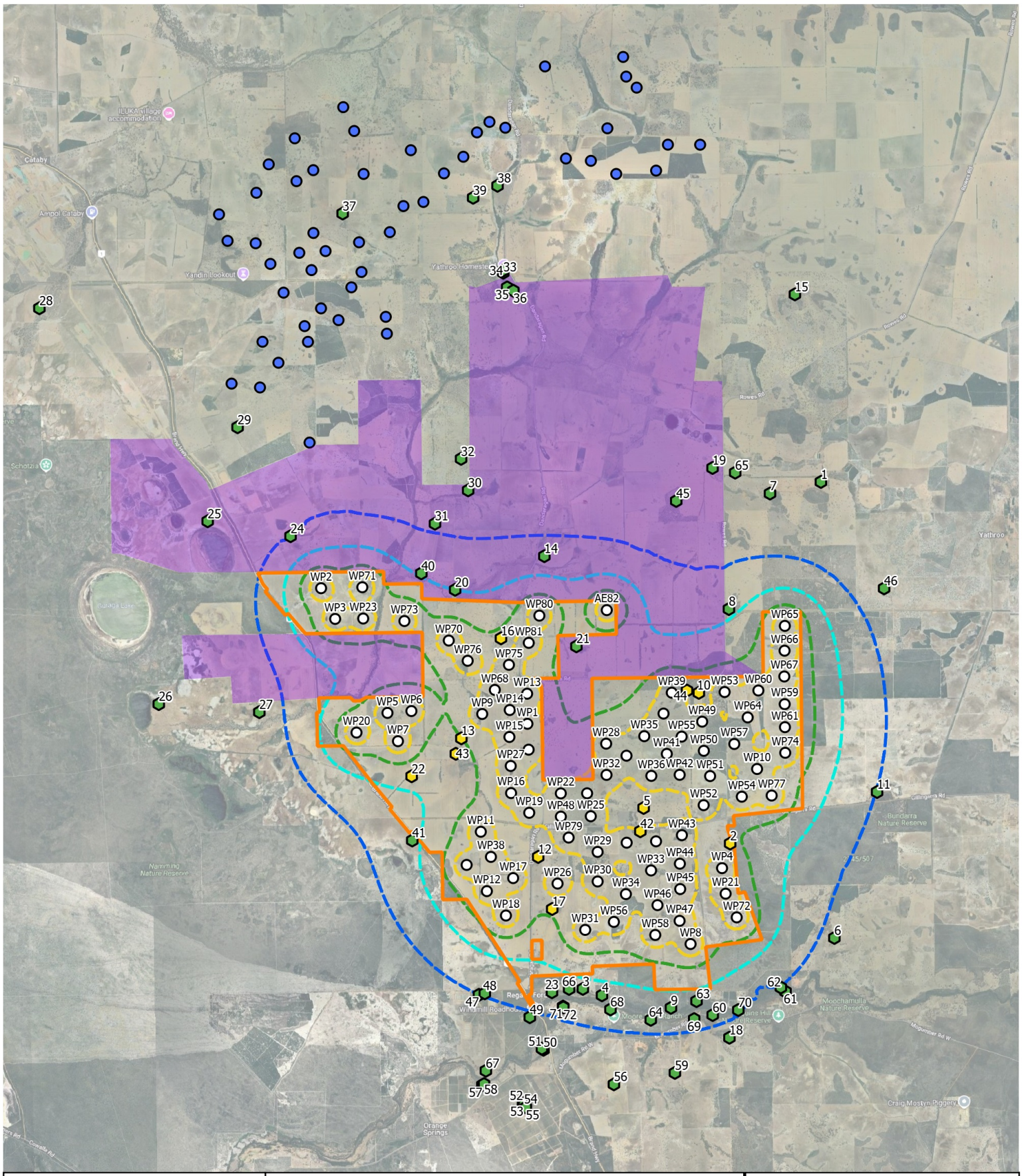
6.2 Yathroo Wind Farm

The proposed Yathroo Wind Farm development area is shown on Figure 3 alongside the Marri Project WTGs and Marri Project predicted wind turbine noise contours.

The majority of noise sensitive locations within the predicted 30 dB contour from the Marri Project, which represents the area within which cumulative noise from the Marri Project requires consideration as pre the Noise Regulations, are within the Yathroo Wind Farm development area and are therefore assumed to be involved stakeholders of Yathroo Wind Farm. For each of these locations, cumulative noise is not considered to be a concern on the basis that the Yathroo Wind Farm Development Application Report has adopted a noise criterion of 45 dB for involved stakeholders and the predicted noise levels from the Marri Project are generally 35 dB or lower. With predicted noise levels less than 10 dB below the adopted noise criteria for Yathroo Wind Farm, the Marri Project would not lead to a cumulative exceedance of 45 dB at any Yathroo Wind Farm involved stakeholder location. The one exception to this is Receiver 21 with a predicted Marri Project noise level of 37 dB, but for which noise control options to achieve 35 dB are discussed in Section 4.3.

The three nearest noise sensitive locations outside of the Yathroo Wind Farm development area that are within the predicted Marri Project 30 dB noise contour are:

- Receiver 8: The predicted Marri Project noise level at Receiver 8 is 34 dB. Based on the Yathroo Wind Farm Development Application Report, the nearest Yathroo WTG would be approximately 2 km from Receiver 8. Cumulative noise effects at Receiver 8 may require further consideration through consultation with Yathroo Wind Farm during detailed design as the risk of a cumulative noise exceedance would depend on the final WTG selections and layouts for both Yathroo Wind Farm and the Marri Project.
- Receiver 20: The predicted Marri Project noise level at Receiver 20 is 35 dB. Based on the Yathroo Wind Farm Development Application Report, the nearest Yathroo WTG would be approximately 2 km southwest of Receiver 20. Cumulative noise effects at Receiver 20 may require further consideration through consultation with Yathroo Wind Farm during detailed design as the risk of a cumulative noise exceedance would depend on the final WTG selections and layouts for both Yathroo Wind Farm and the Marri Project.
- Receiver 41: The predicted Marri Project noise level at Receiver 41 is 34 dB. Based on the Yathroo Wind Farm Development Application Report, the nearest Yathroo WTG would be approximately 5 km from Receiver 41. At this distance, the risk of cumulative noise effects from Yathroo Wind Farm and the Marri Project is considered to be low.



Marri Wind Farm

Figure 3: Cumulative considerations

Project Number	P240130
Drawn by	TE
Checked by	JC
Date Issued	09/2025
Client	Aurecon
Aerial Imagery	(c) Google

Legend

- Project Footprint
- WTG
- Yandin WF WTG
- Yathroo WF Area

Predicted noise level LAeq,10

- 30 dB
- 35 dB
- 40 dB
- 45 dB

Receiver locations

- Involved stakeholder
- Noise sensitive locatio

0 3 6 km

Datum GDA2020, Projection MGA ZONE 50

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6.3 Ancillary infrastructure

As shown in Section 5.3, predicted noise levels from ancillary infrastructure at Yandin Wind Farm are 8 dB or more below the assigned noise levels. As such, cumulative noise from Marri Project wind turbine and ancillary infrastructure noise is considered capable of complying with the applicable assessment criteria.

7 Conclusion

This report presents an environmental noise assessment of the Marri Wind Farm.

This assessment has concluded that the Marri Project has been designed, and can be constructed and operated, in such a way as to manage wind turbine and ancillary infrastructure noise emissions in accordance with applicable legislation, policies and guidelines, subject to final equipment selection and detailed design.

The assessment is based on a candidate wind turbine model, ancillary infrastructure selection and layout that may be subject to further refinement post-approval. As such, it is recommended that:

- Prior to the commencement of construction of the Marri Project, a Pre-Construction Noise Assessment be prepared that reflects the final wind turbine and ancillary infrastructure selections and design. The Pre-Construction Noise Assessment should include a cumulative noise assessment with Yathroo Wind Farm, should that Marri Project have received planning approval, and strategies to ensure that cumulative noise can achieve compliance with applicable noise assessment criteria determined in accordance with the SA Guidelines and Noise Regulations.
- Post-construction noise monitoring should be undertaken to demonstrate that wind turbine noise levels comply with the applicable noise assessment criteria.

Appendix A – Wind turbine layout coordinates

Table A1 Assessed Marri Project preliminary WTG locations

Turbine	Coordinates (GDA2020 MGA Zone 50)		Turbine	Coordinates (GDA2020 MGA Zone 50)	
ID	Easting (m)	Northing (m)	ID	Easting (m)	Northing (m)
WP1	375880	6580830	WP30	378114	6575812
WP2	369318	6585145	WP31	377718	6574271
WP3	369765	6584168	WP32	378396	6579204
WP4	382071	6576236	WP33	379813	6576163
WP5	371429	6581177	WP34	379013	6575410
WP6	372190	6581235	WP35	379597	6580436
WP7	371763	6580276	WP36	379821	6579173
WP8	381069	6573822	WP37	379971	6577090
WP9	374443	6581143	WP38	374720	6576594
WP10	383184	6579392	WP39	380471	6581820
WP11	374398	6577395	WP40	380209	6581156
WP12	374591	6575505	WP41	380314	6579872
WP13	375872	6581788	WP42	380723	6579207
WP14	375318	6581269	WP43	380793	6577286
WP15	375308	6580411	WP44	380729	6576378
WP16	375360	6578625	WP45	380739	6575571
WP17	375426	6575920	WP46	380017	6575059
WP18	375197	6574728	WP47	380720	6574560
WP19	375938	6577998	WP48	376944	6577877
WP20	370445	6580551	WP49	381438	6580899
WP21	382184	6575424	WP50	381491	6579970
WP22	376942	6578616	WP51	381690	6579167
WP23	370657	6584180	WP52	381486	6578240
WP24	377779	6578618	WP53	382153	6581842
WP25	377896	6577888	WP54	382699	6578510
WP26	376839	6575745	WP55	380786	6580422
WP27	375350	6579488	WP56	378630	6574526
WP28	378385	6580198	WP57	382459	6580188
WP29	378113	6576753	WP58	379946	6574111

Turbine	Coordinates (GDA2020 MGA Zone 50)		Turbine	Coordinates (GDA2020 MGA Zone 50)	
ID	Easting (m)	Northing (m)	ID	Easting (m)	Northing (m)
WP59	384063	6581455	WP71	370629	6585176
WP60	383225	6581889	WP72	382537	6574670
WP61	384071	6580723	WP73	371968	6584100
WP62	379031	6579815	WP74	384080	6579907
WP63	375919	6580007	WP75	375293	6582707
WP64	382886	6581033	WP76	373981	6582835
WP65	384067	6583946	WP77	383648	6578547
WP66	384059	6583157	WP78	379037	6577047
WP67	384050	6582336	WP79	377192	6577209
WP68	374844	6581909	WP80	376260	6584272
WP69	373947	6576339	WP81	375923	6583406
WP70	373379	6583479	AE82	378404	6584448

Appendix B – Receiver coordinates and predicted noise levels

Table B1 Involved Stakeholder receiver locations and predicted Marri Project wind turbine noise level

Receiver	Coordinates (GDA20 MGA Zone 50)		Nearest Marri Project wind turbine		Predicted A-weighted Marri Project operational wind farm noise level, dB
ID	Easting (m)	Northing (m)	ID	Distance (m)	GE164-6.0
2	382327	6577021	WP4	826	41
5	379576	6578153	WP36	1049	43
10	381332	6581817	WP53	821	43
12	376223	6576594	WP17	1044	42
13	373779	6580367	WP9	1021	40
16	375040	6583550	WP75	880	42
17	376669	6574936	WP26	827	41
22	372198	6579160	WP7	1198	37
42	379471	6577410	WP78	566	45
43	373604	6579875	WP9	1520	38
44	380956	6581887	WP39	489	45

Table B2 Non-involved receiver locations and predicted Marri Project wind turbine noise level

Receiver	Coordinates (GDA20 MGA Zone 50)		Nearest Marri Project wind turbine		Predicted A-weighted Marri Project operational wind farm noise level, dB
ID	Easting (m)	Northing (m)	ID	Distance (m)	GE164-6.0
1	385214	6588528	WP65	4723	22
3	377644	6572395	WP31	1878	34
4	378252	6572190	WP31	2149	33
6	385643	6574016	WP72	3174	29
7	383596	6588159	WP65	4239	24
8	382289	6584483	WP65	1858	34
9	380445	6571791	WP8	2125	33
11	387001	6578660	WP74	3176	30
14	376420	6586166	WP80	1901	32
15	384387	6594496	WP65	10555	16

Receiver	Coordinates (GDA20 MGA Zone 50)		Nearest Marri Project wind turbine		Predicted A-weighted Marri Project operational wind farm noise level, dB
ID	Easting (m)	Northing (m)	ID	Distance (m)	GE164-6.0
18	382305	6570840	WP8	3228	29
19	381768	6588973	WP65	5528	25
20	373581	6585096	WP70	1630	35
21	377438	6583297	AE82	1503	37
23	376661	6572288	WP31	2248	32
24	368347	6586800	WP2	1919	30
25	365711	6587277	WP2	4190	23
26	364157	6581457	WP3	6229	22
27	367354	6581201	WP20	3158	28
28	360359	6594055	WP2	12635	15
29	366662	6590268	WP2	5770	21
30	373996	6588260	WP71	4566	27
31	372940	6587199	WP71	3071	29
32	373771	6589264	WP71	5156	25
33	375112	6595187	WP71	10969	18
34	375103	6595256	WP71	11028	18
35	375236	6594718	WP80	10496	18
36	375433	6594612	WP80	10373	19
37	370004	6597071	WP71	11911	18
38	374930	6597953	WP71	13481	17
39	374154	6597572	WP71	12887	17
40	372506	6585618	WP73	1610	35
41	372218	6577118	WP69	1897	34
45	380614	6587923	AE82	4118	26
46	387224	6585140	WP65	3375	27
47	374339	6572206	WP18	2664	30
48	374525	6572253	WP18	2565	30
49	375956	6571494	WP31	3289	30
50	376390	6570457	WP31	4039	28
51	376342	6570493	WP31	4021	28

Receiver	Coordinates (GDA20 MGA Zone 50)		Nearest Marri Project wind turbine		Predicted A-weighted Marri Project operational wind farm noise level, dB
ID	Easting (m)	Northing (m)	ID	Distance (m)	GE164-6.0
52	375741	6568755	WP31	5860	25
53	375757	6568729	WP31	5879	25
54	375773	6568707	WP31	5895	25
55	375832	6568618	WP31	5960	24
56	378631	6569357	WP58	4932	26
57	374445	6569326	WP18	5454	25
58	374501	6569364	WP18	5409	25
59	380571	6569722	WP8	4131	27
60	381773	6571563	WP8	2366	31
61	384088	6572308	WP72	2826	29
62	383941	6572439	WP72	2636	30
63	381258	6572005	WP8	1827	33
64	379803	6571411	WP58	2703	31
65	382488	6588824	WP65	5127	24
66	377206	6572393	WP31	1947	33
67	374559	6569790	WP18	4979	25
68	378522	6571740	WP31	2656	32
69	381184	6571433	WP8	2392	31
70	382588	6571721	WP8	2593	31
71	377014	6571831	WP31	2540	31
72	377023	6571805	WP31	2562	31

Appendix C – Background noise monitoring report

Marri Wind Farm

Background Noise Assessment

P240130RP3 Revision A

Wednesday, 15 October 2025

Resonate

Document Information

Project	Marri Wind Farm
Client	Aurecon Australasia Pty Ltd
Report title	Background Noise Assessment
Project Number	P240130

Revision Table

Report revision	Date	Description	Author	Reviewer
0	13 October 2025	For Issue	Alec Kuoch	Tom Evans
A	15 October 2025	Minor Amendments	Alec Kuoch	Tom Evans

Glossary

A-weighting	A spectrum adaption that is applied to measured noise levels to represent human hearing. A-weighted levels are used as human hearing does not respond equally at all frequencies.
dB	Decibel—a unit of measurement used to express sound level. It is based on a logarithmic scale which means a sound that is 3 dB higher has twice as much energy. We typically perceive a 10 dB increase in sound as a doubling of that sound level.
Frequency (Hz)	The number of times a vibrating object oscillates (moves back and forth) in one second. Fast movements produce high frequency sound (high pitch/tone), but slow movements mean the frequency (pitch/tone) is low. 1 Hz is equal to 1 cycle per second.
IEC 61400-11	IEC 61400-11 *Wind turbine generator systems – Part 11: Acoustic noise measurement techniques*, Edition 3.1 (2018).
Involved stakeholder	Noise sensitive receiver with an agreement with the wind farm to allow for increased noise criteria, for example as part of an agreement to host wind turbines.
L_{A90}	A-weighted noise level exceeded for 90% of the measurement period. The L_{90} metric is used to quantify background noise and wind farm noise at residences because it is much less susceptible to short-term extraneous noise.
L_{Aeq}	Equivalent A-weighted Noise Level. It is the energy averaged noise level over the measurement time.
Noise Regulations	*Environmental Protection (Noise) Regulations 1997*
Noise sensitive location	Noise sensitive receiver without an agreement with the wind farm to allow for increased noise criteria.
Rated power wind speed	Lowest hub height wind speed at which the WTG reaches its rated power.
SA Guidelines	*Wind Farms – Environmental Noise Guidelines, November 2021 Update* issued by the South Australia Environment Protection Authority.
Tonal audibility, ΔL_A	A measure of tonality. Values greater or equal to 0 dB indicate that the tone is detectable to the average human ear. Tonal audibility for wind farm noise is determined using the assessment method defined in IEC 61400-11.

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1 Introduction

Marri WF Pty Ltd as trustee for the Marri WF Unit Trust (the Proponent), a wholly owned subsidiary of Alinta Energy Pty Ltd (Alinta Energy), is seeking approval to develop Marri Wind Farm (the Proposal) located approximately 20 kilometres (km) south of the township of Dandaragan within the Shire of Dandaragan. The Proposal, referred to herein as the Marri Project, is proposed to consist of across 82 wind turbine generators (WTGs) within a Project boundary covering areas in the settlements of Yathroo and Regans Ford in the Shire of Dandaragan in Western Australia (WA). The wind energy component will be supported by ancillary infrastructure comprising of a connection substation, wind farm substation, transmission infrastructure and a Battery Energy Storage System (BESS).

Resonate has been commissioned to undertake background noise monitoring at seven sites around the Marri Project.

This report presents a background noise assessment of the Marri Project, including:

- identification of applicable legislation, policies and guidelines relating to noise emissions from wind farms
- measured background noise levels
- implications for applicable noise criteria.

The background noise assessment of the Marri Project has been conducted considering relevant guidance from WA regulatory authorities as to wind turbine noise emissions. This includes reference to:

- Regulation 7 and 8 of the Western Australian *Environmental Protection (Noise) Regulations 1997* (Noise Regulations)
- South Australian Environment Protection Authority (EPA) *Wind Farms Environmental Noise Guidelines November 2021 update* (SA Guidelines).

It is noted that, at the time of this revision, background noise monitoring has been completed at six of the seven background noise monitoring sites. A future revision will be issued once background noise monitoring and analysis has occurred at the seventh site.

2 Project description

2.1 Site description

The Marri Project site is located across agricultural land coving areas in the settlements of Yathroo and Regans Ford, located in the Shire of Dandaragan. The township of Dandaragan is located approximately 20 km to the north of the Proposed Development Envelope, whilst the township of Gingin is situated approximately 42 km to the south.

The Marri Project is proposed to consist of:

- up to 82 WTGs providing a capacity of up to 550 MW
- tip height of up to 275 m above ground level
- rotor diameter of up to 182 m
- hub height of up to 184 m above ground level
- associated ancillary infrastructure including a connection substation, wind farm substation and battery energy storage system (BESS)
- access roads.

The Marri Project boundary, proposed WTG locations are shown in Figure 1. The WTG coordinates are detailed in Appendix A.

2.2 Noise-sensitive locations

Aurecon has provided information on identified noise-sensitive dwelling locations around the site as well as involved stakeholder locations (involved landowners that will have a financial agreement to host wind farm infrastructure with Marri Project) within the site as shown in Figure 1, with coordinates tabulated in Appendix B.

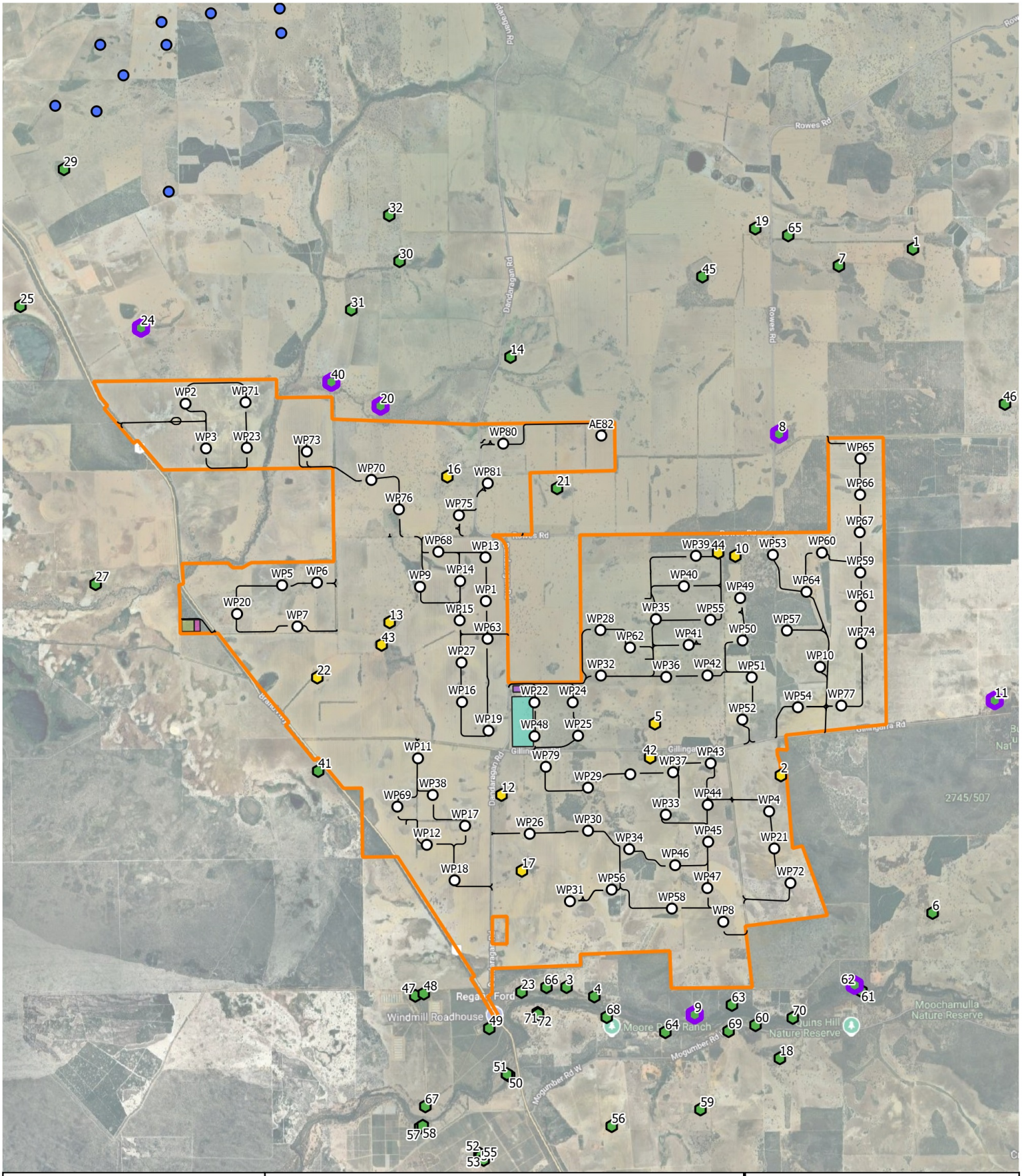
The noise-sensitive locations and involved stakeholder locations are all dwellings that are located within a Rural Zone as defined by the Shire of Dandaragan Planning Scheme.

2.3 Background noise monitoring locations

Based on a review of the site, the nearest noise-sensitive uses and landowner consultation carried out by the Proponent, seven background noise monitoring locations were nominated as per Table 1 and as shown on Figure 1.

Table 1 Background noise monitoring locations

Location	Coordinates in UTM GDA2020 MGA Zone 50	
	Easting	Northing
8	382288	6584482
9	380445	6571791
11	387001	6578660
20	373581	6585096
24	368346	6586800
40	372506	6585618
62	383940	6572439



Marri Wind Farm

Figure 1: Project Layout and Receiver Locations

Project Number	P240130
Drawn by	TE
Checked by	JC
Date Issued	10/2025
Client	Aurecon
Aerial Imagery	(c) Google

Legend

- Project Footprint
- WTG
- WF Substation Option A
- WF Substation Option B
- BESS
- Connection Substation
- Access Road

Receiver locations

- Involved stakeholder
- Noise sensitive location
- Background monitoring

0 2 4 km

Datum GDA2020, Projection MGA ZONE 50

Resonate

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3 Assessment criteria

3.1 Overview

In WA, the applicable statutory requirements for noise emissions are contained within the *Environmental Protection Act 1986* (the Act) and the Noise Regulations.

The Noise Regulations require that noise emitted from any premises must comply with assigned noise levels when received at any other premises and be free of the intrusive characteristics of tonality, modulation and impulsiveness. In addition, the noise emissions must not "significantly contribute" to an exceedance of the assigned levels. A noise emission is understood to "significantly contribute" if a level of noise that exceeds a value which is 5 dB below the assigned level at the point of reception.

Historically in WA, the Noise Regulations have not been applied to wind turbine noise as measurement procedures for wind farm noise differ to normal industrial noise. Instead, in WA, it has been normal for wind turbine noise to be assessed using the SA Guidelines. Importantly, however, the base limit for wind farm noise in WA is set at 35 dB (rather than the 40 dB that normally applies in South Australia (SA)) for consistency with the Noise Regulations assigned noise levels for rural areas.

Recent advice from DWER, however, has been that consideration is required to the Noise Regulations, specifically Regulation 7 and Regulation 8, when assessing wind turbine noise. Therefore, this assessment considers both the Noise Regulations and SA Guidelines for wind turbine noise.

3.2 WAPC Position Statement

In 2020, the Department of Planning, Land and Heritage prepared a *Position Statement: Renewable energy facilities* on behalf of the Western Australian Planning Commission (WAPC). With respect to noise assessments for new wind farm proposals, the WAPC Position Statement sets out the following:

> Noise emissions from renewable energy facilities, including wind turbines, are required to meet the standards prescribed under the *Environmental Protection (Noise) Regulations 1997*. The South *Australian Environmental Protection Authority – Wind Farms Environmental Noise Guidelines (2009)* should also be referenced for assessment purposes. These guidelines acknowledge the potential for operation in the presence of higher wind-induced background noise levels.

The WAPC Position Statement is consistent with the approach adopted within this assessment to consider both the Noise Regulations and SA Guidelines.

3.3 SA Guidelines

3.3.1 Noise-sensitive locations

The SA Guidelines, as updated in November 2021 and applicable in WA, state that wind farm noise levels at noise sensitive locations must not exceed:

- 35 dB, or
- the background noise level plus 5 dB

whichever is the greater for each integer wind speed from the cut-in speed of the wind turbines to the speed at which the WTGs reach rated power.

Under the SA Guidelines, both background and wind farm noise levels are measured using the L_{A90} metric, due to the difficulties associated with accurately measuring L_{Aeq} noise levels over extended periods in windy conditions. The SA Guidelines considering that the measured L_{A90} wind farm noise levels appropriately represent the L_{Aeq} noise level. This

reflects the fact that there is only a small difference between L_{A90} and L_{Aeq} for operational wind turbine noise, being 2 dB or lower.

If wind farm noise levels at noise sensitive locations exhibit tonality, then a 5 dB penalty applies to the measured noise levels. The tonality assessment procedure is not clearly defined by the SA Guidelines, but the application of the tonal audibility measurement procedure detailed in IEC 61400-11 *Wind turbines – Acoustic noise measurement techniques* is suggested. The guidelines provide additional clarity that, in order for a 5 dB tonal penalty to be applied to the measured noise level at a given integer wind speed, an audible tone must be present for 10% of all data points in that integer wind speed bin

3.3.2 Involved stakeholders

Involved stakeholders are defined as private land whose owners have entered into an agreement with the wind farm developers. For the Marri Project this is the dwellings within the defined Project Boundary as shown on Figure 1.

The existence of an agreement will affect the consideration of whether noise is unreasonable in a given situation. The SA Guidelines state that it is unlikely that there will be unreasonable interference if:

- a formal agreement is documented between the parties
- the agreement clearly outlines to the landowner the expected impact of the noise from the wind farm and its effect upon the landowner's amenity
- the likely impact of exposure will not result in adverse health impacts (e.g. the level does not result in sleep disturbance or provides sufficient amenity outdoors).

For involved receivers, the SA Guidelines recommend:

- Daytime amenity is protected on the basis of the indicative noise criteria set out in the South Australian *Environment Protection (Commercial & Industrial Noise) Policy 2023* (the Noise Policy). In SA, this results in a daytime criterion of 52 dB for rural farming areas.
- A night time internal noise criterion of 30 dB based on the World Health Organization (WHO) *Guidelines for community noise (1999)*. For dwellings without specific acoustic treatment, this is typically converted to an external noise level of 45 dB to account for typical residential building acoustic performance and allowing for a window left open for ventilation.

For the purposes of this assessment, the more conservative night time criterion of 45 dB has been adopted for involved stakeholders at all times. It is noted that this is consistent with the approach taken by Yathroo Wind Farm for involved stakeholders as documented in the Yathroo Wind Farm Development Application Report.

3.4 Noise Regulations

Recent consultation with DWER has confirmed that the Marri Project should also demonstrate compliance with the assigned noise levels under the Noise Regulations.

3.4.1 Noise-sensitive locations

Regulation 8 of the Noise Regulations sets out the assigned noise levels that apply. The assigned levels are specified according to the type of premises receiving the noise. There are different assigned levels for noise sensitive, commercial and industrial premises. The assigned levels for noise sensitive premises vary depending on the time of the day. The assigned noise levels always apply at the premises receiving the noise.

For noise sensitive premises, the assigned levels are adjusted by the addition of an influencing factor (IF) to account for the existing acoustic environment. The IF increases with the amount of commercial and industrial areas in the vicinity of the noise sensitive receiver as well as the presence of any major or secondary roads. This is calculated by

considering areas within 100 m and 450 m radius of the noise sensitive receiver location. Considering the location of the Marri Project, no IF applies.

The table of assigned levels, shown in Table 2 shows the assigned noise levels as an L_{A10} level, measured using a 'Slow' time weighting over a representative assessment period suitable for the source. DWER has previously advised that a 4 hour assessment period would be appropriate for wind turbine noise although it is noted that this requires some interpretation as to how wind turbine noise is assessed over a 4 hour period.

Table 2 Assigned noise levels for non-involved receivers

Time of day	Assigned level in dB L_{A10}
7 am to 7 pm Monday to Saturday	45
9 am to 7 pm Sunday & public holiday	40
7 pm to 10 pm All days	40
10 pm on any day to 7 am Monday to Saturday and 9 am Sunday and public holidays	35

DWER has advised that, where the background noise levels exceed the assigned noise levels, then any assessment of wind turbine noise levels that are above the assigned noise levels could have regard to the higher background noise level. This would only apply in cases where the background noise level can be justifiably shown to be sufficiently high in accordance with procedures acceptable to DWER, which may differ from those applied under the SA Guidelines. Further discussion on this is provided in Section 3.4.4.

3.4.2 Involved stakeholders

DWER has not provided any formal advice for the Marri Project with respect to involved stakeholders. While it is understood that involved stakeholders may be exposed to higher wind turbine noise levels due to their proximity to the WTGs, DWER has advised that they would still need to have regard to the Noise Regulations in the event of a complaint from an involved stakeholder.

In the absence of specific advice from DWER for the Marri Project, a noise criterion of 45 dB has been adopted for involved stakeholders on the basis that:

- this is consistent with the approach under the SA Guidelines as set out in Section 3.3.2
- this is consistent with the approach taken to involved stakeholders by the Yathroo Wind Farm Development Application Report, offering consistency with the neighbouring proposed wind farm
- a level of 45 dB is consistent with the assigned noise level for daytime periods under the Noise Regulations.

3.4.3 Intrusive or dominant characteristics

Regulation 9 of the Noise Regulations also requires that penalties are applied for intrusive or dominant characteristics, of which tonality and modulation are considered relevant to the assessment of wind turbine noise:

- Modulation – a variation in the emission of noise that:
  - is more than 3 dB L_{AFast} or is more than 3 dB L_{AFast} in any one-third octave band: and
  - is present for at least 10% of the representative assessment period; and
  - is regular, cyclic and audible.
- Tonality – the presence in the noise emission of tonal characteristics where the difference between:
  - the A-weighted sound pressure level in any one-third octave band; and
  - the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as L_{ASlow} levels.

An adjustment of +5 dB is added to the source noise level for each of the characteristics that are present at the receiver.

3.4.4 Background noise analysis

Through consultation with DWER, information on their expectations with respect to background noise levels that could be considered when assessing against the assigned noise levels under the Noise Regulations was obtained. DWER has advised that any background noise analysis for these purposes generally follow the processes as listed in the SA Guidelines with the exception that the analysis should:

- only consider periods between the hours of 7 pm and 7 am the following day
- determine the representative background noise level in each wind speed bin as the lowest 10th percentile of the broadband $L_{A90,10min}$ noise data.

It is noted that this will result in lower background noise levels than under the SA Guidelines, which consider average background noise levels as determined over all 24 hours within a day.

4 Monitoring details

4.1 Monitoring equipment

Table summarises the details of the noise monitoring equipment used at the site. The noise monitor utilised was a Class 1 sound level meter, suitable for the assessment of wind farm noise under the SA Guidelines. The monitor was setup to record noise levels, including L_{A90} levels as required by the SA Guidelines, in 10-minute intervals. The sound level meter also recorded an audio signal to assist with identification of noise sources, where necessary.

Table Noise monitoring equipment details

Location	Equipment	Serial number	Dates	Last calibration date
Sound Level Meters				
8[1]	Svantek 977	167962	16 September - TBC	11 June 2025
9	Svantek 977	98082	23 July – 16 September 2025	3 July 2025
11	Svantek 977	168040	23 July – 23 August 2025[2]	11 June 2025
20	Svantek 977	98808	23 July – 16 September 2025	7 February 2024
24	Svantek 977	99039	23 July – 16 September 2025	31 July 2024
40	Svantek 977	167964	23 July – 16 September 2025	11 June 2025
62	Svantek 977	59621	23 July – 16 September 2025	2 July 2025
Calibrator				
All	GRAS	42AG	23 July – 16 September 2025	14 May 2025

(1) Location 8 noise monitoring is currently being undertaken

(2) Noise monitor experienced a power failure

The noise monitors were fitted with 150 mm diameter windshields to reduce wind-induced noise across the microphone. Photographs of the noise monitoring equipment installed on site are included in Appendix B.

The monitor carries current calibration certificates from a National Association of Testing Authorities (NATA) accredited laboratory. The calibration of the monitor was field checked at the start and conclusion of the monitoring and no significant drift in calibration (0.5 dB or more) was observed. Copies of the calibration certificates for the noise monitor and acoustic calibrator are available upon request.

4.2 Wind data

Wind speed and direction data for the monitoring period was provided by the Proponent at the time of noise monitoring for the site meteorological mast. The data was measured in 10-minute intervals at the 121 m mast installed at the site, which has anemometers at 60 m, 80 m, 110 m, 116m and 121m above ground. Wind directional vanes were also installed at 60 m, 80 m and 116 m, with direction obtained at 116 m used where required in the analysis.

In order to obtain hub height wind data as required by the SA Guidelines, the wind speeds measured at the different heights have been used to determine wind shear values for each 10-minute period. An average wind shear coefficient was determined based on the wind shear values calculated between 60 and 116 m. Wind shear describes the change in wind speed with height above ground and the wind shear value (α) relates wind speed at one height (V_{h1}) to wind speed at a second height (V_{h2}) according to the following relationship:

$$V_{h1} = V_{h2} \times \left(\frac{h1}{h2}\right)^{\alpha}$$

The wind shear value determined for each 10-minute period was used to convert the measured 60 m height wind speed for that period to a 184 m hub height wind speed. This data was used in the analysis of the measured background noise levels at each residence.

4.3 Background noise monitoring results

4.3.1 Data points and data exclusion

Collected noise data was excluded for each residence where:

- Rain was recorded at the Bureau of Meteorology monitoring site at Lancelin Defence (009280)
- Data was obviously affected by extraneous noise such as bird or insect noise.
- The hub height wind speed fell outside of the wind speed range of 3 to 14 m/s, which was selected as the typical range of wind speeds from cut-in to rated power.

Table 3 summarises the total, excluded and resulting valid data points for each location. The overall number of data points captured under all wind directions is presented, as well as those captured under the worst-case wind direction. This represents the wind direction bin 45 degrees either side of the direction when the monitoring location will be downwind of the nearest WTG or group of WTGs. The captured downwind data is not analysed for the purposes of establishing background noise levels for criteria but may need to be used when assessing compliance of operational noise levels from the site.

Table 3 Data points for each residence

Location	Worst-case (downwind) direction, Degrees	Number of data points			
		Total	Valid	Valid down-wind	Excluded[1]
8	288	-[2]	-[2]	-[2]	-[2]
9	199	4151	2997	1891	1545
11	113	3145	1988	572	1157
20	8	4152	3163	1226	989
24	269	4152	3454	1267	914
40	19	4145	2987	947	1158
62	148	4145	3006	705	1139

(1) Excluded due to rain or extraneous bird or insect noise, or outside the relevant wind speed range.

(2) Monitoring at location 8 is currently being conducted

It can be seen that the SA Guidelines minimum requirement of 2,000 data points was significantly exceeded for each location and that at least 500 data points were obtained at each site for the worst-case wind direction sector, as is required by the SA Guidelines.

5 Measured noise levels for SA Guidelines

This section presents the A-weighted measured background noise levels for each monitoring location alongside the average background noise levels determined by bin analysis for each integer wind speed bin from 3 to 14 m/s in accordance with the SA Guidelines.

5.1 Location 9

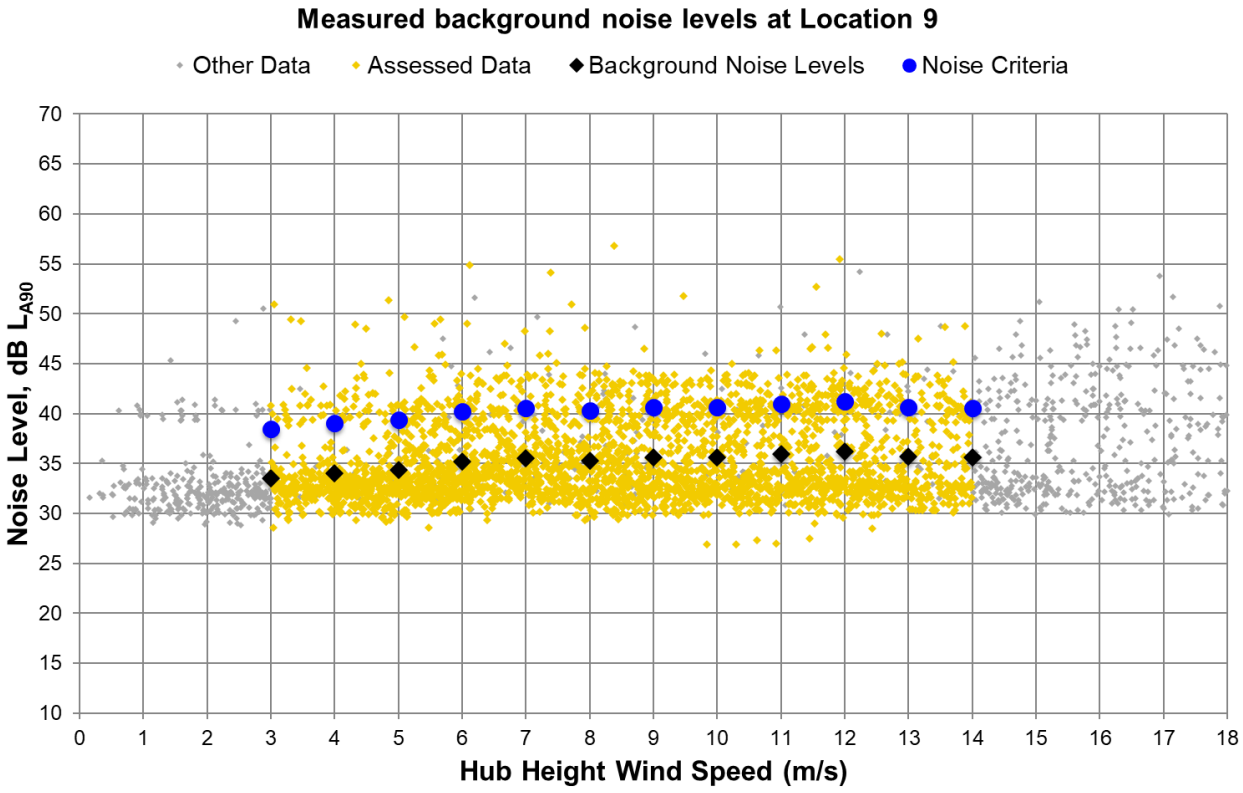

Figure 2 Measured background noise level at Location 9

Table 4 Measured background noise levels and noise criteria at Location 9

Location 9	**Measured background noise level in dB L_{A90} at hub height wind speed in m/s**											
	3	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Non-involved												
Background	33	34	34	35	36	35	36	36	36	36	36	36
Noise criteria (SA Guidelines)	**38**	**39**	**39**	**40**	**41**	**40**	**41**	**41**	**41**	**41**	**41**	**41**

5.2 Location 11

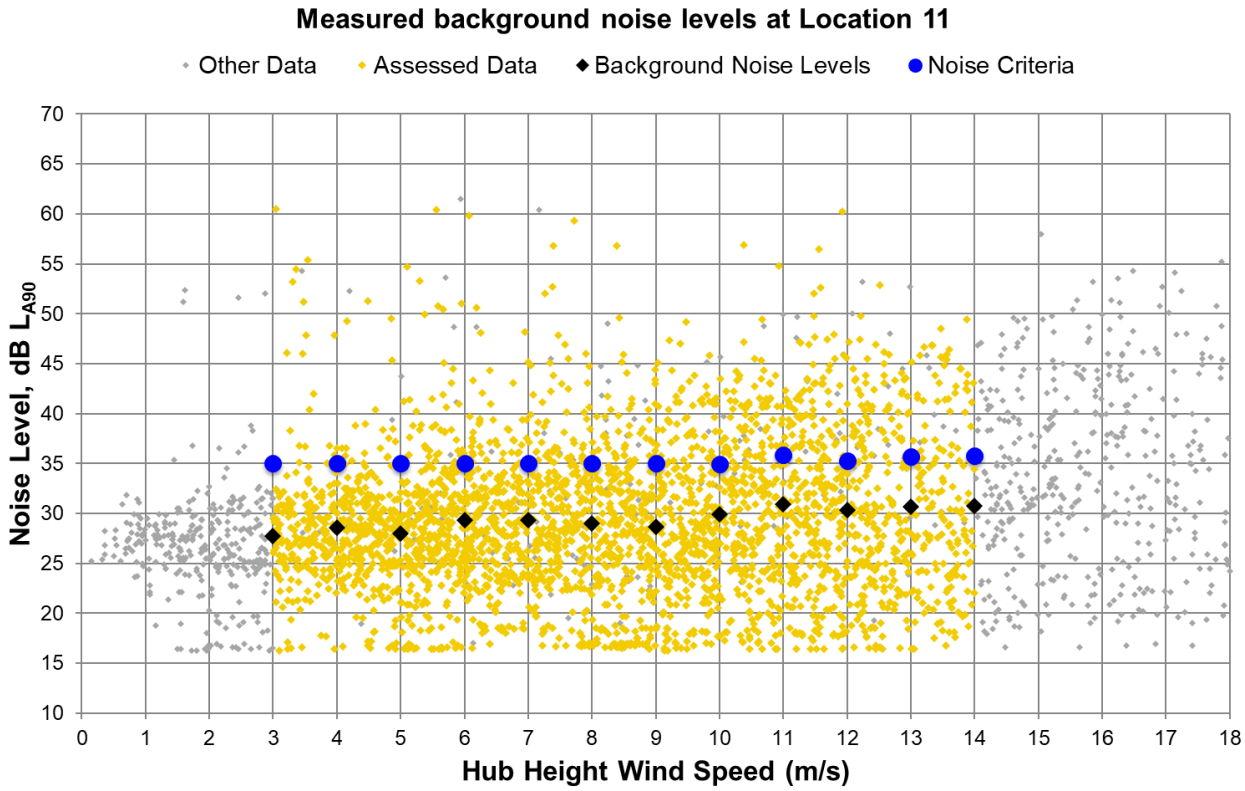

Figure 3 Measured background noise level at Location 11

Table 5 Measured background noise levels and noise criteria at Location 11

Location 11	Measured noise level in dB L_{A90} at hub height wind speed in m/s											
	3	4	5	6	7	8	9	10	11	12	13	14
Non-involved												
Background	28	29	28	29	29	29	29	30	31	30	31	31
Noise criteria (SA Guidelines)	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**36**	**35**	**36**	**36**

5.3 Location 20

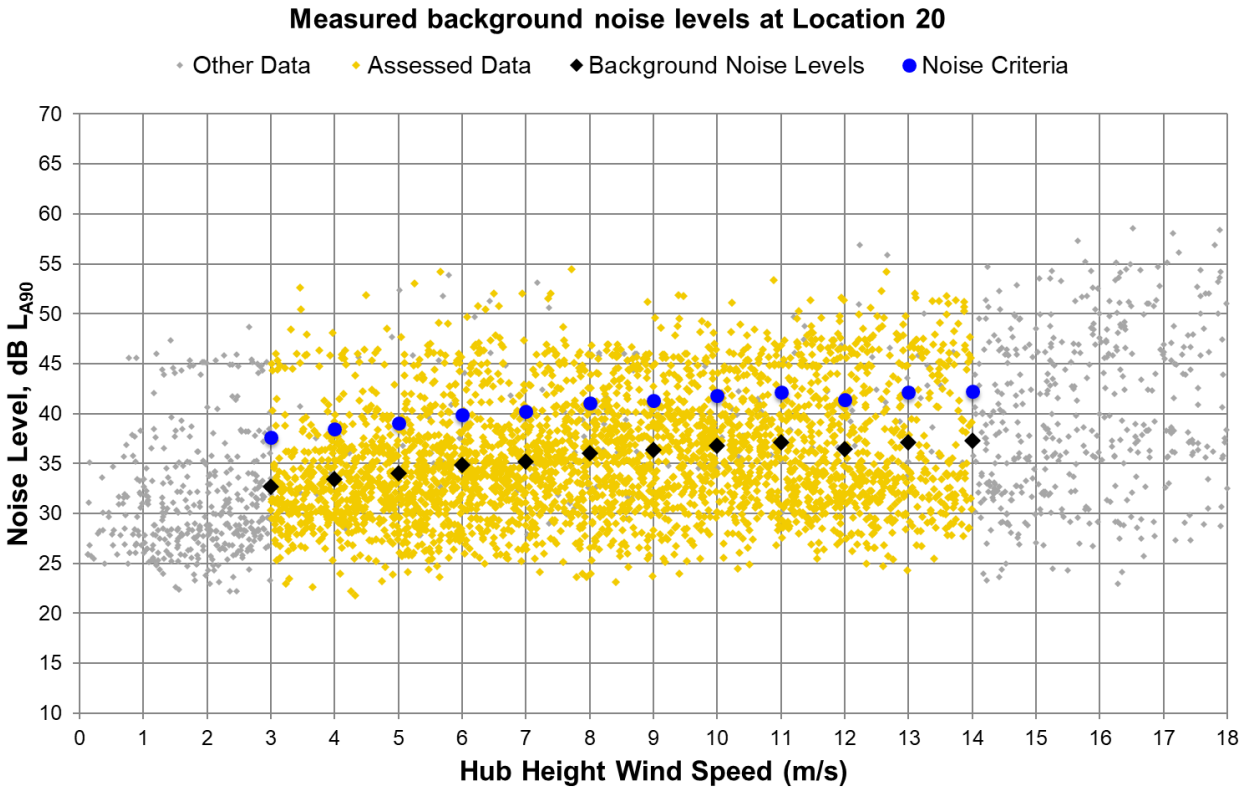

Figure 4 Measured background noise level at Location 20

Table 6 Measured background noise levels and noise criteria at Location 20

Location 20	Measured noise level in dB L_{A90} at hub height wind speed in m/s											
	3	4	5	6	7	8	9	10	11	12	13	14
Non-involved												
Background	33	33	34	35	35	36	36	37	37	36	37	37
Noise criteria (SA Guidelines)	**38**	**38**	**39**	**40**	**40**	**41**	**41**	**42**	**42**	**41**	**42**	**42**

5.4 Location 24

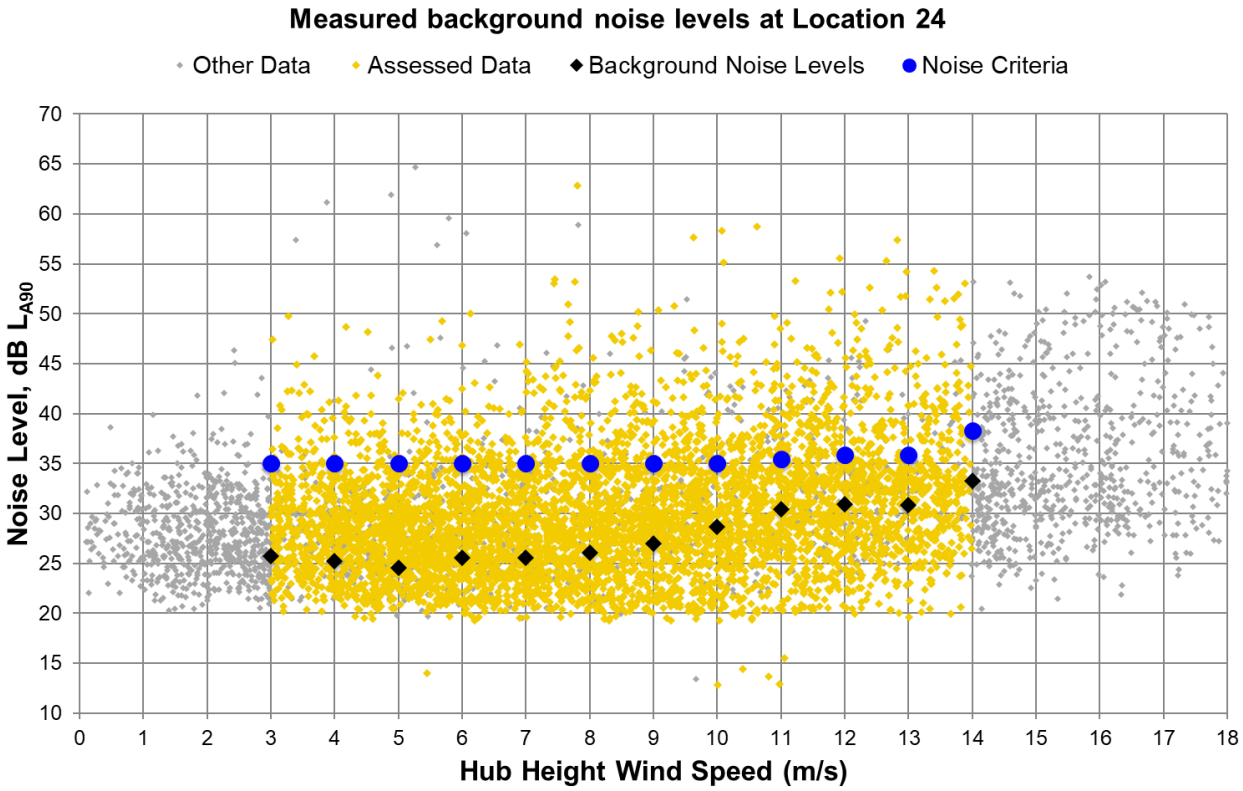

Figure 5 Measured background noise level at Location 24

Table 7 Measured background noise levels and noise criteria at Location 24

Location 24	Measured noise level in dB L_{A90} at hub height wind speed in m/s											
	3	4	5	6	7	8	9	10	11	12	13	14
Non-involved												
Background	26	25	25	26	26	26	27	29	30	31	31	33
Noise criteria (SA Guidelines)	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**36**	**36**	**38**

5.5 Location 40

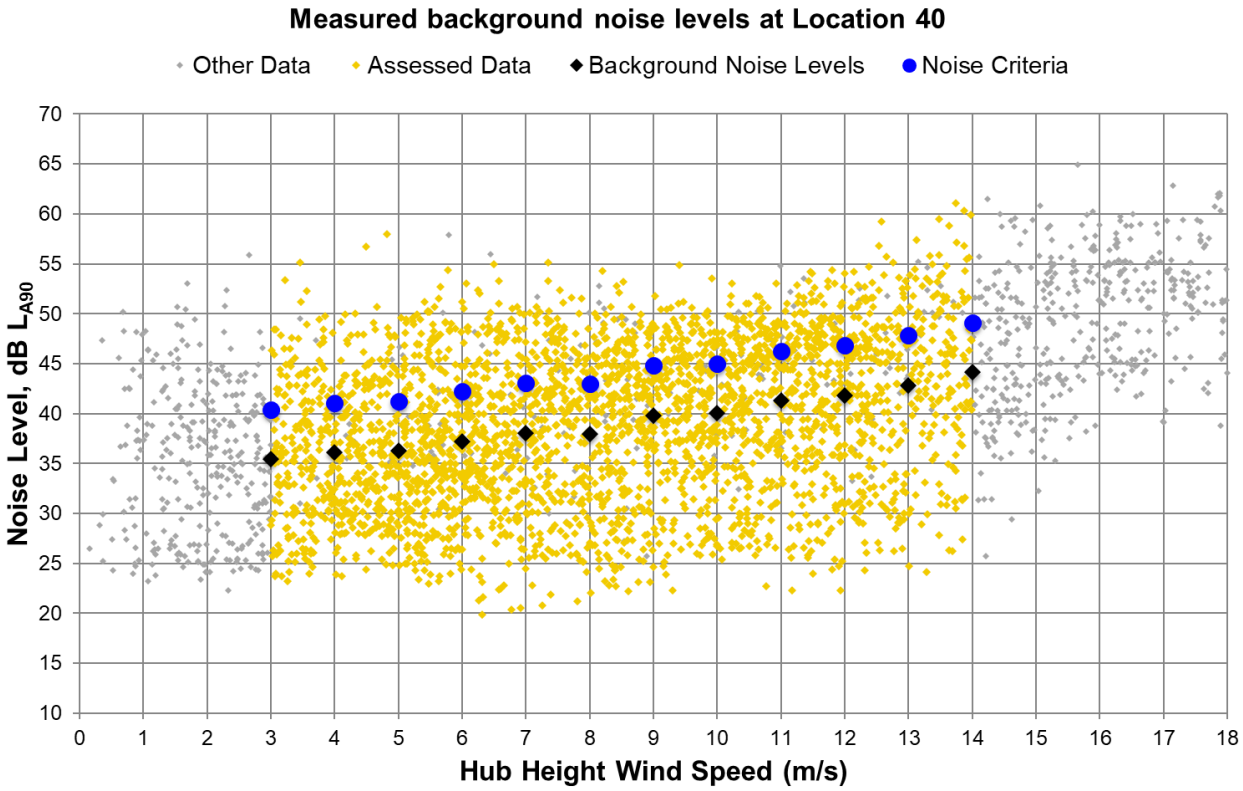

Figure 6 Measured background noise level at Location 40

Table 8 Measured background noise levels and noise criteria at Location 40

Location 40	Measured noise level in dB L_{A90} at hub height wind speed in m/s											
	3	4	5	6	7	8	9	10	11	12	13	14
Non-involved												
Background	35	36	36	37	38	38	40	40	41	42	43	44
Noise criteria (SA Guidelines)	**40**	**41**	**41**	**42**	**43**	**43**	**45**	**45**	**46**	**47**	**48**	**49**

5.6 Location 62

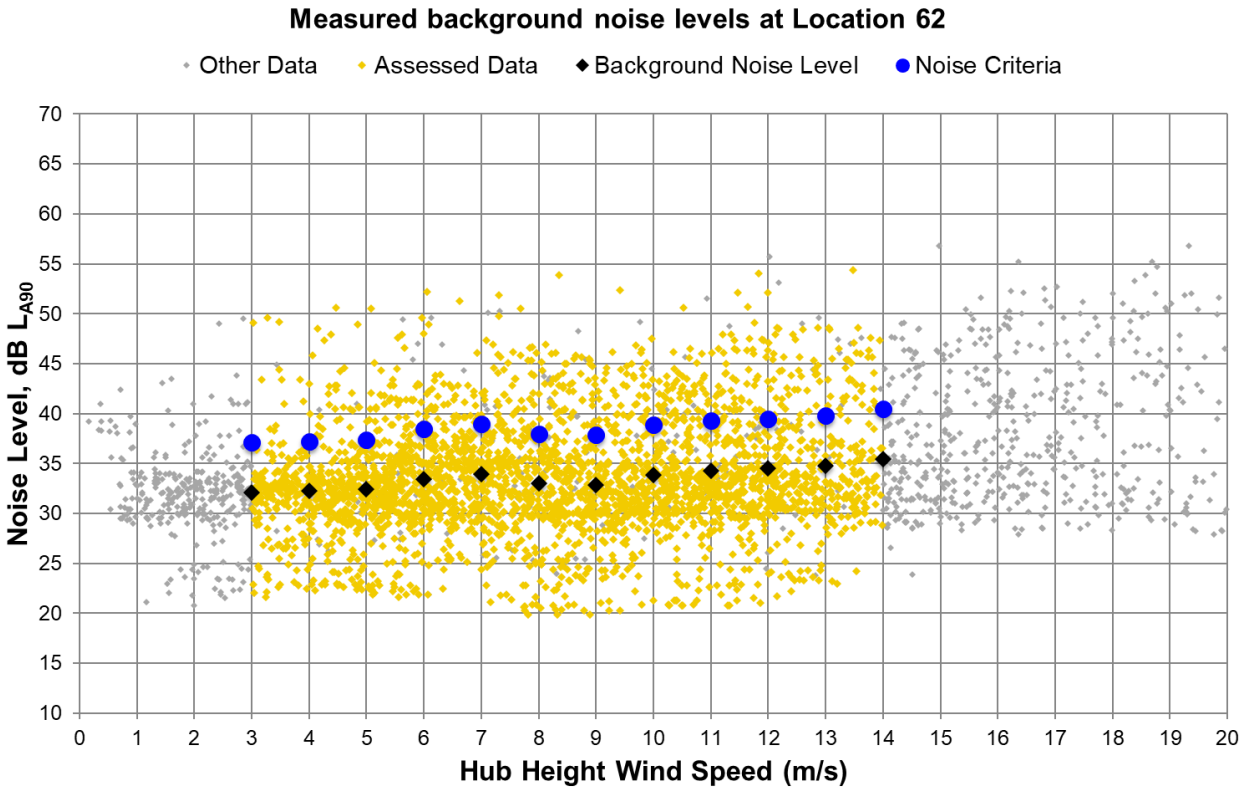

Figure 7 Measured background noise level at Location 62

Table 9 Measured background noise levels and noise criteria at Location 62

Location 62	Measured noise level in dB L_{A90} at hub height wind speed in m/s											
	3	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Non-involved												
Background	32	32	32	33	34	33	33	34	34	34	35	35
Noise criteria (SA Guidelines)	**37**	**37**	**37**	**38**	**39**	**38**	**38**	**39**	**39**	**39**	**40**	**40**

6 DWER background noise level analysis

This section presents an additional analysis of background noise levels as per the procedures in Section 3.4.4. Note that, in this section, “night-time” refers to the period from 7 pm to 7 am each day.

6.1 Location 9

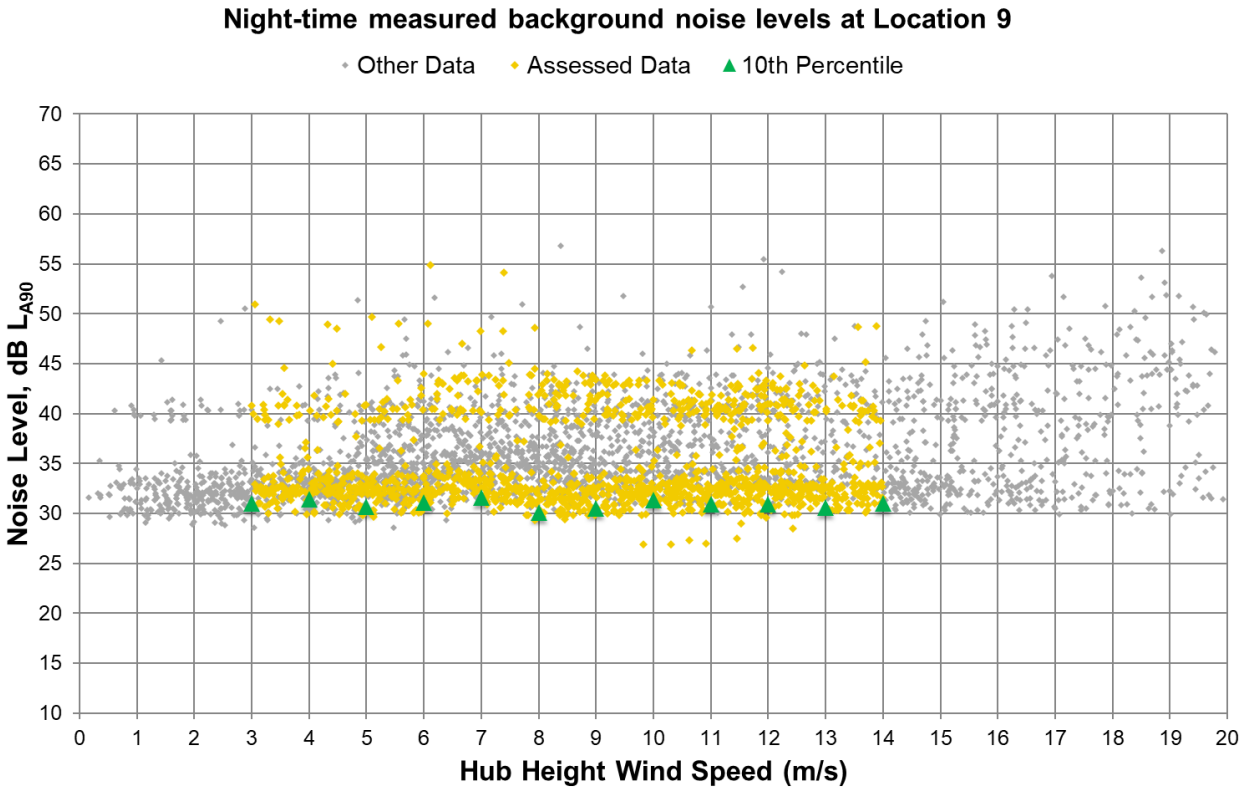

Figure 8 Night-time measured background noise level & 10th percentile levels at Location 9

Table 10 Measured night-time noise levels and 10th percentile levels at Location 9

Location	Measured night-time noise level in dB L_{A90} at hub height wind speed in m/s											
	3	4	5	6	7	8	9	10	11	12	13	14
10th percentile of $L_{A90,10min}$	31	31	31	31	32	30	31	31	31	31	31	31
Valid Data Points	*54*	*107*	*115*	*102*	*120*	*119*	*131*	*153*	*162*	*171*	*113*	*58*

6.2 Location 11

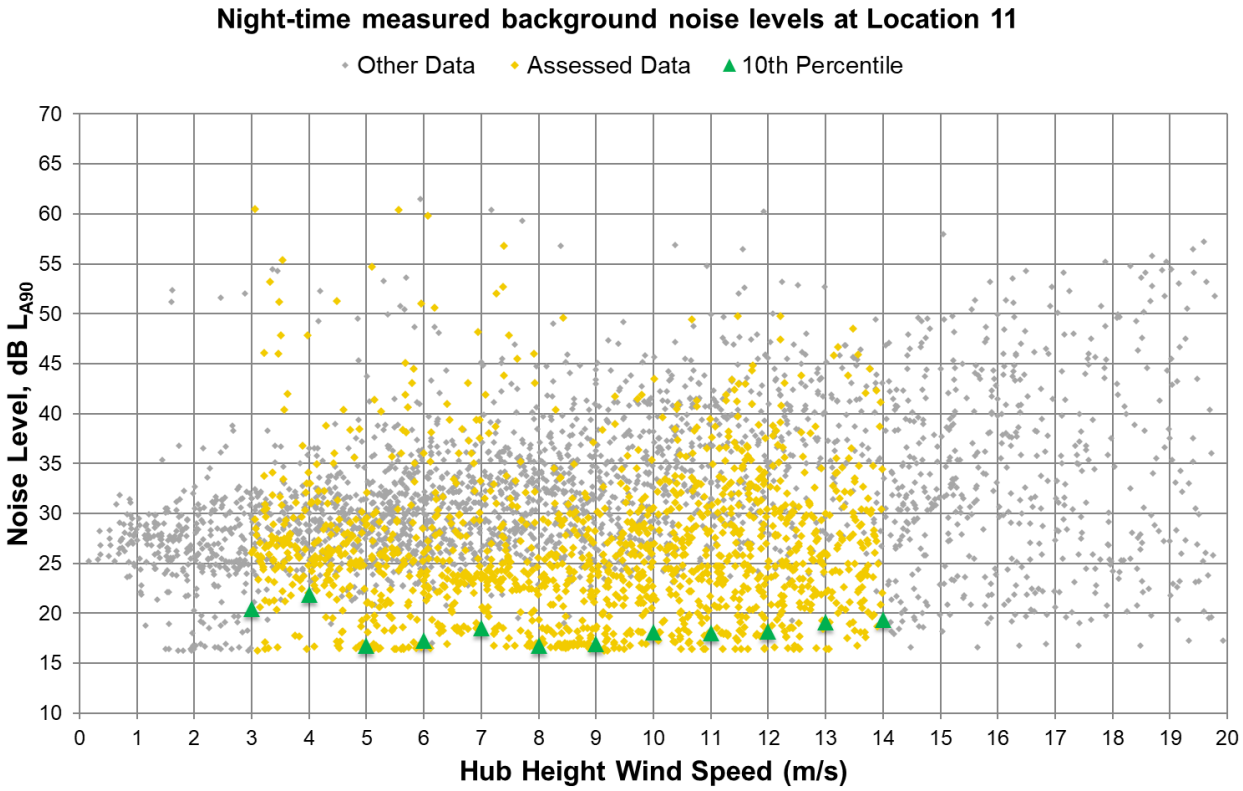

Figure 9 Night-time measured background noise level & 10th percentile levels at Location 11

Table 11 Measured night-time noise levels and 10th percentile levels at Location 11

Location	Measured night-time noise level in dB L_{A90} at hub height wind speed in m/s											
	3	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
10th percentile of $L_{A90,10min}$	20	22	17	17	19	17	17	18	18	18	19	19
Valid Data Points	*54*	*107*	*115*	*103*	*122*	*121*	*131*	*153*	*162*	*171*	*113*	*58*

6.3 Location 20

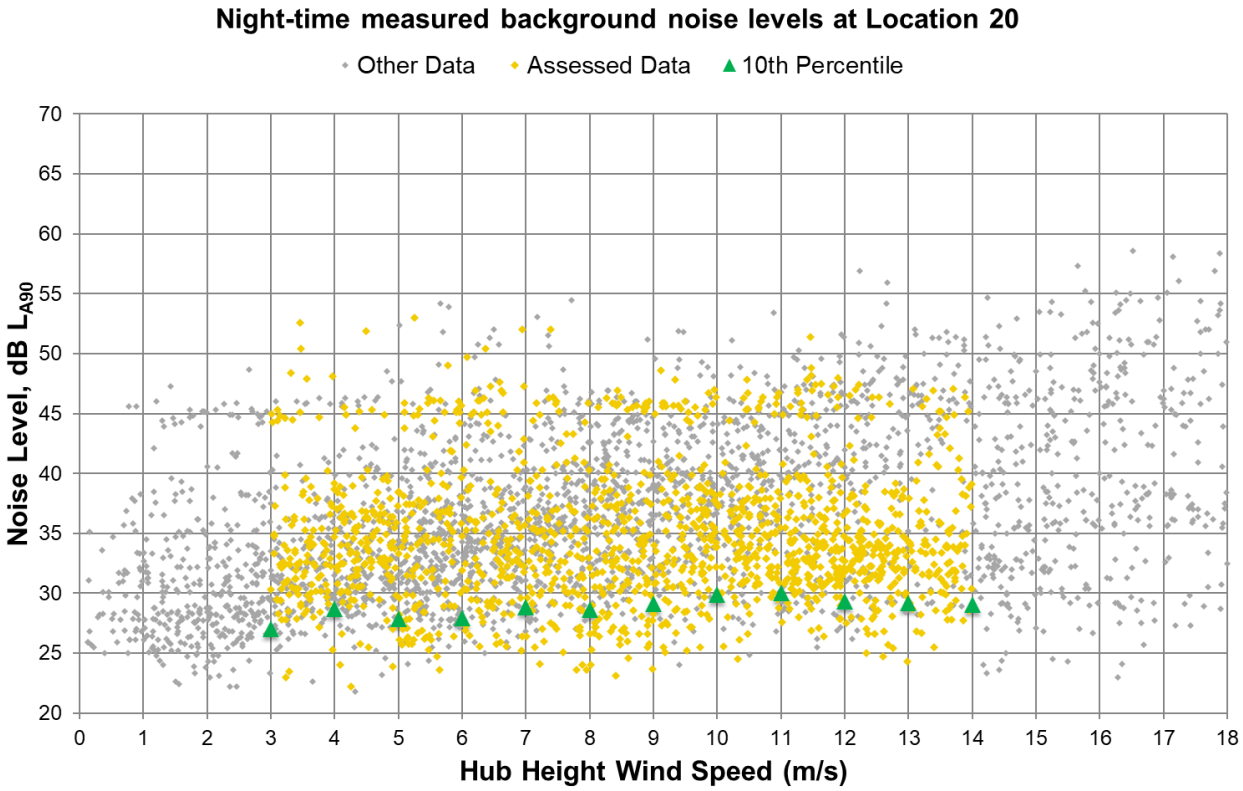

Figure 10 Night-time measured background noise level & 10th percentile levels at Location 20

Table 12 Measured night-time noise levels and 10th percentile levels at Location 20

Location	Measured night-time noise level in dB L_{A90} at hub height wind speed in m/s											
	3	4	5	6	7	8	9	10	11	12	13	14
10th percentile of $L_{A90,10min}$	27	29	28	28	29	29	29	30	30	29	29	29
Valid Data Points	*54*	*107*	*115*	*103*	*122*	*121*	*131*	*153*	*162*	*171*	*113*	*58*

6.4 Location 24

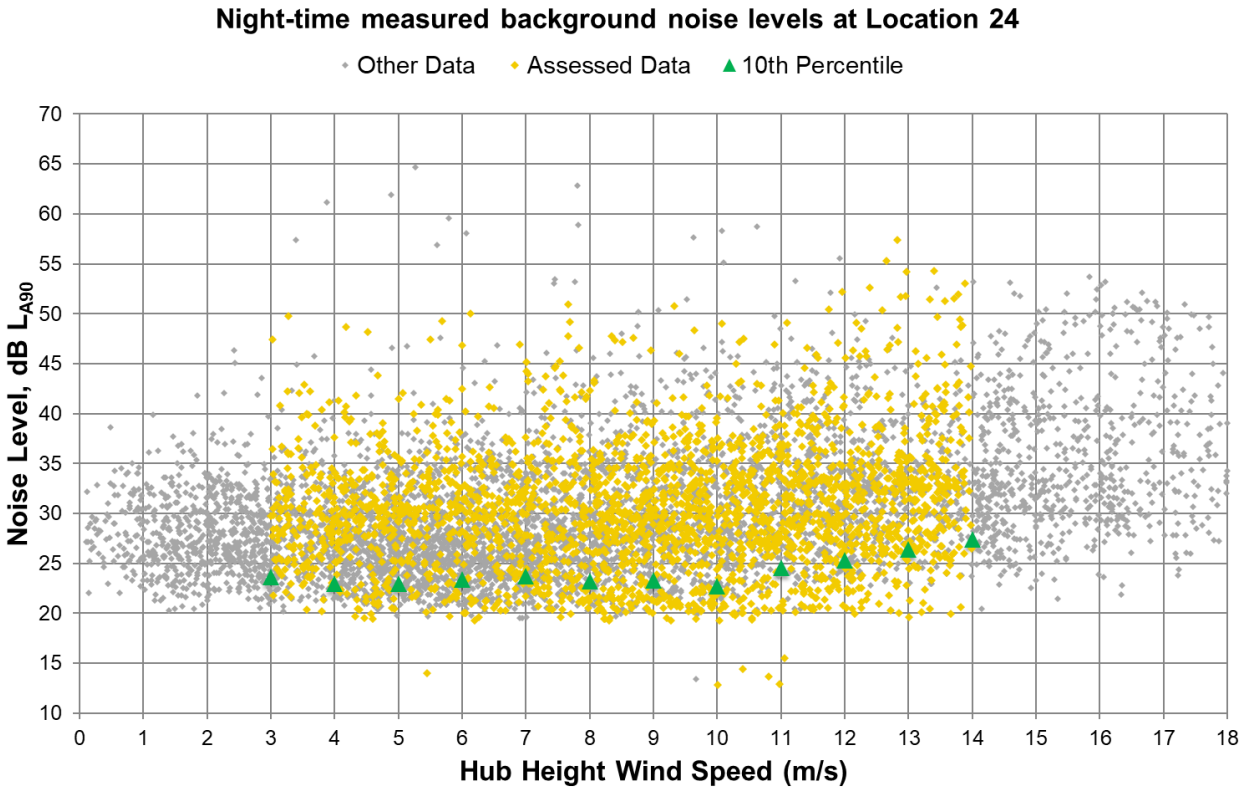

Figure 11 Night-time measured background noise level & 10th percentile levels at Location 24

Table 13 Measured night-time noise levels and 10th percentile levels at Location 24

Location	Measured night-time noise level in dB L_{A90} at hub height wind speed in m/s											
	3	4	5	6	7	8	9	10	11	12	13	14
10th percentile of $L_{A90,10min}$	24	23	23	23	24	23	23	23	25	25	26	27
Valid Data Points	*58*	*110*	*146*	*135*	*107*	*128*	*122*	*114*	*131*	*112*	*63*	*39*

6.5 Location 40

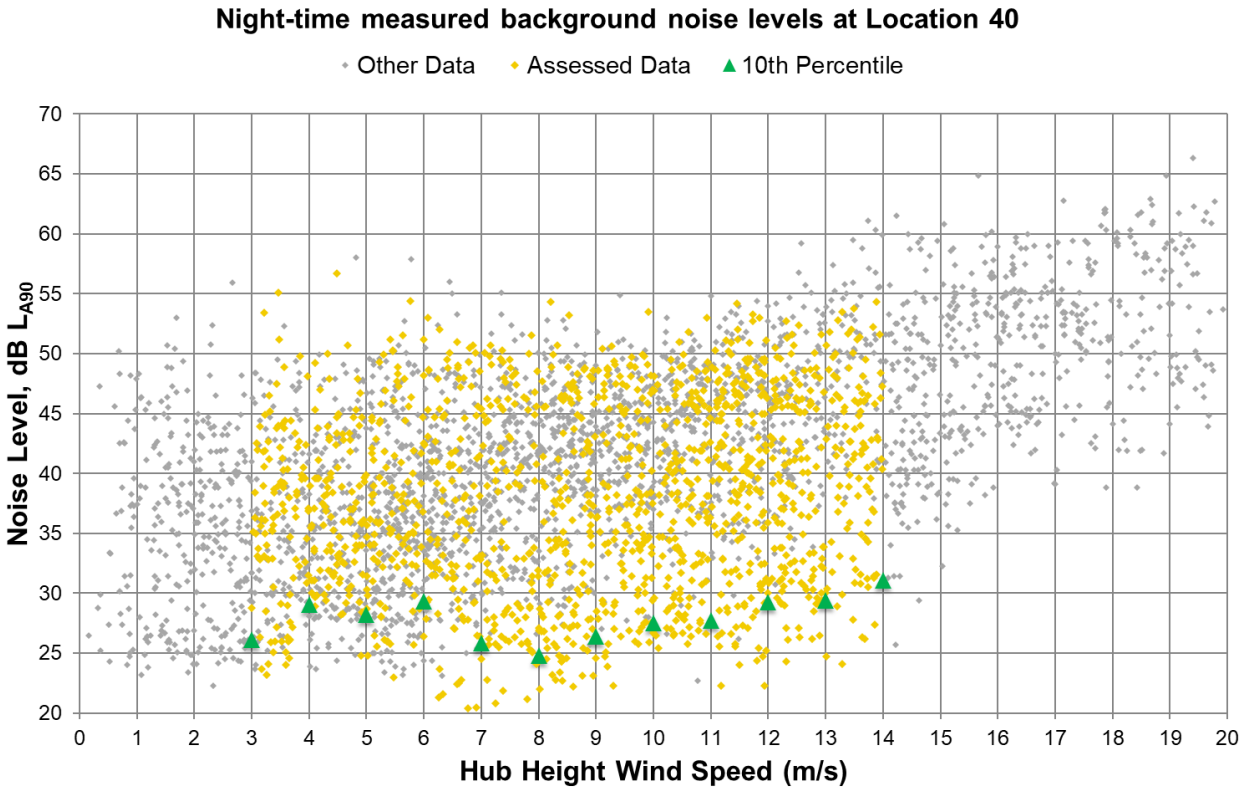

Figure 12 Night-time measured background noise level & 10th percentile levels at Location 40

Table 14 Measured night-time noise levels and 10th percentile levels at Location 40

Location	Measured night-time noise level in dB L_{A90} at hub height wind speed in m/s											
	3	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
10th percentile of $L_{A90,10min}$	26	29	28	29	26	25	26	28	28	29	29	31
Valid Data Points	*54*	*107*	*115*	*103*	*122*	*121*	*131*	*153*	*162*	*171*	*113*	*58*

6.6 Location 62

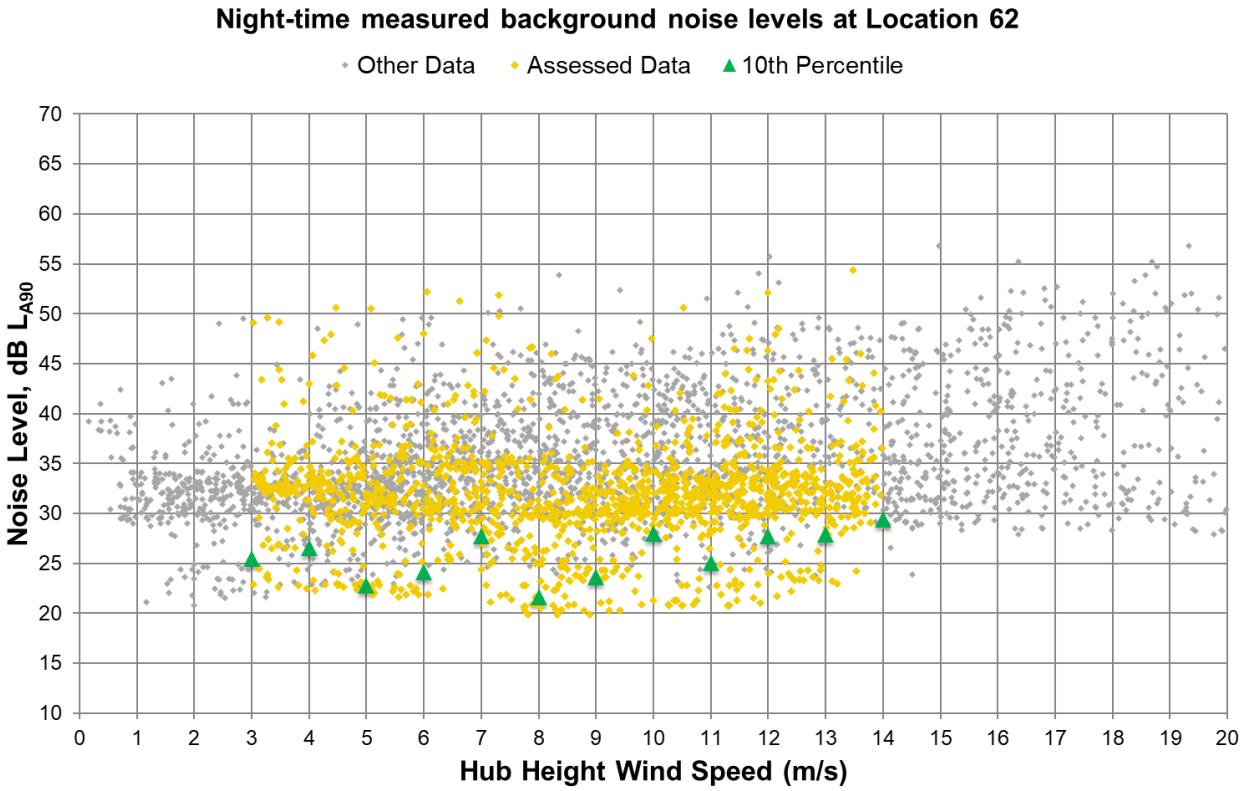

Figure 13 Night-time measured background noise level & 10th percentile levels at Location 62

Table 15 Measured night-time noise levels and 10th percentile levels at Location 62

Location	Measured night-time noise level in dB L_{A90} at hub height wind speed in m/s											
	3	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
10th percentile of $L_{A90,10min}$	26	27	23	24	28	22	24	28	25	28	28	29
Valid Data Points	*56*	*102*	*122*	*102*	*119*	*127*	*130*	*157*	*172*	*166*	*113*	*45*

7 Conclusion

This report presents the outcomes of background noise monitoring conducted at locations around the proposed Marri Project. Background noise monitoring was conducted between the 23 July to 16 September 2025, with an additional monitoring location current being undertaken for which results will be presented in an updated revision of this report.

The background noise levels measured during the monitoring period have been analysed based on both the SA Guidelines, which are typically used to assess wind farm noise in Western Australia, as well as using an alternative method based on advice from DWER when considering assessment against the Noise Regulations.

The measured background noise levels and applicable noise criteria determined using the methods set out in the SA Guidelines are shown in Table 16.

Table 16 Summary of measured background noise levels measured as per SA Guidelines

Location	Measured background noise level in dB L_{A90} at hub height wind speed in m/s											
	3	4	5	6	7	8	9	10	11	12	13	14
Location 9												
Background	33	34	34	35	36	35	36	36	36	36	36	36
Noise criteria	*38*	*39*	*39*	*40*	*41*	*40*	*41*	*41*	*41*	*41*	*41*	*41*
Location 11												
Background	28	29	28	29	29	29	29	30	31	30	31	31
Noise criteria	*35*	*35*	*35*	*35*	*35*	*35*	*35*	*35*	*36*	*35*	*36*	*36*
Location 20												
Background	33	33	34	35	35	36	36	37	37	36	37	37
Noise criteria	*38*	*38*	*39*	*40*	*40*	*41*	*41*	*42*	*42*	*41*	*42*	*42*
Location 24												
Background	26	25	25	26	26	26	27	29	30	31	31	33
Noise criteria	*35*	*35*	*35*	*35*	*35*	*35*	*35*	*35*	*35*	*36*	*36*	*38*
Location 40												
Background	35	36	36	37	38	38	40	40	41	42	43	44
Noise criteria	*40*	*41*	*41*	*42*	*43*	*43*	*45*	*45*	*46*	*47*	*48*	*49*
Location 62												
Background	32	32	32	33	34	33	33	34	34	34	35	35
Noise criteria	*37*	*37*	*37*	*38*	*39*	*38*	*38*	*39*	*39*	*39*	*40*	*40*

The measured background noise levels determined using the method applied following consultation with DWER are summarised in Table 17.

Table 17 Summary of measured background noise levels measured based on DWER method

Location	Measured background 10th percentile noise level in dB L_{A90} at hub height wind speed in m/s											
	3	4	5	6	7	8	9	10	11	12	13	14
Location 9												
Background 10th percentile L_{A90}	31	31	31	31	32	30	31	31	31	31	31	31
Location 11												
Background 10th percentile L_{A90}	20	22	17	17	19	17	17	18	18	18	19	19
Location 20												
Background 10th percentile L_{A90}	27	29	28	28	29	29	29	30	30	29	29	29
Location 24												
Background 10th percentile L_{A90}	24	23	23	23	24	23	23	23	25	25	26	27
Location 40												
Background 10th percentile L_{A90}	26	29	28	29	26	25	26	28	28	29	29	31
Location 62												
Background 10th percentile L_{A90}	26	27	23	24	28	22	24	28	25	28	28	29

Appendix A – Wind turbine layout coordinates

Table 18 Marri Project WTG locations

Turbine	Coordinates (GDA2020 MGA Zone 50)		Turbine	Coordinates (GDA2020 MGA Zone 50)	
ID	Easting (m)	Northing (m)	ID	Easting (m)	Northing (m)
WP1	375880	6580830	WP30	378114	6575812
WP2	369318	6585145	WP31	377718	6574271
WP3	369765	6584168	WP32	378396	6579204
WP4	382071	6576236	WP33	379813	6576163
WP5	371429	6581177	WP34	379013	6575410
WP6	372190	6581235	WP35	379597	6580436
WP7	371763	6580276	WP36	379821	6579173
WP8	381069	6573822	WP37	379971	6577090
WP9	374443	6581143	WP38	374720	6576594
WP10	383184	6579392	WP39	380471	6581820
WP11	374398	6577395	WP40	380209	6581156
WP12	374591	6575505	WP41	380314	6579872
WP13	375872	6581788	WP42	380723	6579207
WP14	375318	6581269	WP43	380793	6577286
WP15	375308	6580411	WP44	380729	6576378
WP16	375360	6578625	WP45	380739	6575571
WP17	375426	6575920	WP46	380017	6575059
WP18	375197	6574728	WP47	380720	6574560
WP19	375938	6577998	WP48	376944	6577877
WP20	370445	6580551	WP49	381438	6580899
WP21	382184	6575424	WP50	381491	6579970
WP22	376942	6578616	WP51	381690	6579167
WP23	370657	6584180	WP52	381486	6578240
WP24	377779	6578618	WP53	382153	6581842
WP25	377896	6577888	WP54	382699	6578510
WP26	376839	6575745	WP55	380786	6580422
WP27	375350	6579488	WP56	378630	6574526
WP28	378385	6580198	WP57	382459	6580188
WP29	378113	6576753	WP58	379946	6574111

Turbine	Coordinates (GDA2020 MGA Zone 50)		Turbine	Coordinates (GDA2020 MGA Zone 50)	
ID	Easting (m)	Northing (m)	ID	Easting (m)	Northing (m)
WP59	384063	6581455	WP71	370629	6585176
WP60	383225	6581889	WP72	382537	6574670
WP61	384071	6580723	WP73	371968	6584100
WP62	379031	6579815	WP74	384080	6579907
WP63	375919	6580007	WP75	375293	6582707
WP64	382886	6581033	WP76	373981	6582835
WP65	384067	6583946	WP77	383648	6578547
WP66	384059	6583157	WP78	379037	6577047
WP67	384050	6582336	WP79	377192	6577209
WP68	374844	6581909	WP80	376260	6584272
WP69	373947	6576339	WP81	375923	6583406
WP70	373379	6583479	AE82	378404	6584448

Appendix B - Photographs of noise monitor

Location 9 monitoring location

Table 19 Location 9 dwelling and noise monitor coordinates

Location	Coordinates in GDA2020 MGA Zone 50	
	Easting	Northing
Dwelling 9	380445	6571791

Table 20 Location 9 monitoring installation photos

Photo 1	Photo 2
	
Photo 3	
	

Location 11 monitoring location

Table 21 Location 11 dwelling and noise monitor coordinates

Location	Coordinates in GDA2020 MGA Zone 50	
	Easting	Northing
Dwelling 11	380445	6571791

Table 22 Location 11 monitoring installation photos

Photo 1	Photo 2
	
Photo 3	
	

Location 20 monitoring location

Table 23 Location 20 dwelling and noise monitor coordinates

Location	Coordinates in GDA2020 MGA Zone 50	
	Easting	Northing
Dwelling 20	373581	6585096

Table 24 Location 20 monitoring installation photos

Photo 1	Photo 2
	
Photo 3	
	

Location 24 monitoring location

Table 25 Location 24 dwelling and noise monitor coordinates

Location	Coordinates in GDA2020 MGA Zone 50	
	Easting	Northing
Dwelling 24	368346	6586800

Table 26 Location 24 monitoring installation photos

Photo 1	Photo 2
	
Photo 3	
	

Location 40 monitoring location

Table 27 Location 40 dwelling and noise monitor coordinates

Location	Coordinates in GDA2020 MGA Zone 50	
	Easting	Northing
Dwelling 40	372506	6585618

Table 28 Location 40 monitoring installation photos

Photo 1	Photo 2
	
Photo 3	**Photo 4**
	

Location 62 monitoring location

Table 29 Location 62 dwelling and noise monitor coordinates

Location	Coordinates in GDA2020 MGA Zone 50	
	Easting	Northing
Dwelling 62	383940	6572439

Table 30 Location 62 monitoring installation photos

Photo 1