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WAUBRA BESS
ENVIRONMENTAL NOISE ASSESSMENT

Rp 001 R02 20250229 | 9 April 2026

Project: **WAUBRA BESS**

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Report No.: **Rp 001 R02 20250229**

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EXECUTIVE SUMMARY

Acciona Energy Australia Global Pty Ltd (Acciona Energía) propose to develop a grid-scale battery energy storage system (BESS) at 151 Troys Road, Waubra, Victoria, referred to as Waubra BESS (Project).

The Project is a grid connected 200 MW/400 MWh BESS, located opposite the existing Waubra terminal station and collector sub-station, to which the Project would be connected.

Marshall Day Acoustics (Australia) Pty Ltd (MDA) has been engaged to assess potential noise impacts from the Project, inform feasibility of the Project and support the planning permit application.

We have undertaken a predictive environmental noise assessment to address the requirements of the *Environment Protection Act 2017* and other relevant Victorian noise policies.

Our assessment has been informed by developing a candidate configuration of noise generating equipment and noise controls in consultation with Acciona Energía and considering the site layout and operational conditions provided by Acciona Energía.

The final equipment selections and noise controls will vary once the detailed design and tender stages of the Project commence, at which point another detailed noise assessment would be undertaken.

Predicted noise levels from the Project have been demonstrated to comply with the relevant noise limits for the candidate configuration adopted with some form of noise control potentially being required.

The only noise control that has been considered in the candidate configuration is the fitting of silencer kits to inverters. However, there are several relevant factors and additional noise controls which should be considered in the detailed design stage noise assessment and would inform final noise controls.

Factors such as equipment directivity and operational contextualisation have not been considered in detail in this assessment as the required information is not yet available. These factors have the potential to materially reduce the risk of harm due to noise and, once considered, will inform the efficacy of the different noise controls during the detailed design stage.

Cumulative noise from the existing electrical infrastructure has also been considered. A theoretical risk of cumulative noise between the proposed BESS and the existing Waubra Wind Farm collector and terminal station has been identified. However, this risk is manageable through several pathways post-consent as detailed in this report.

We have also undertaken a screening assessment of potential cumulative noise impacts considering concurrent operational noise from the proposed Glenbrae BESS, which found that there is a low risk of cumulative noise limit exceedance due to that site.

During the construction of the Project, a temporary concrete batching plant is proposed. Noise from the operation of this plant requires assessment against the mandatory noise limits. Detailed information regarding the concrete batching plant is not yet available. We have therefore conducted a feasibility study using high level information and a conservative set of assumptions based on our experience with similar sites.

Our feasibility study identified that the concrete batching plant can likely operate without the need for dedicated noise controls. A detailed assessment should be conducted when further details are available and the risk of harm due to noise should be minimised so far as reasonably practicable.

We have provided specific recommendations for how various items should be considered in a subsequent noise assessment once more detailed information regarding the Project is available.

The general environmental duty (GED) applies irrespective of the predicted compliance outcomes of this assessment. Therefore, during detailed design, all noise controls discussed in this report that provide a material reduction in the risk of harm due to noise and that Acciona Energía deem reasonably practicable to implement, should be investigated.

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1.0 INTRODUCTION

Acciona Energy Australia Global Pty Ltd (Acciona Energía) propose to develop a grid-scale battery energy storage system (BESS) at 151 Troys Road, Waubra, Victoria, referred to as Waubra BESS (Project).

The Project is a grid connected 200 MW / 400 MWh BESS, located adjacent to the existing Waubra terminal station and collector sub-station, to which the Project would be connected.¹ The Project also lies within the boundary of the operational Waubra Wind Farm.

The Project comprises a lithium-ion BESS, incorporating battery units with associated inverters and transformers and a range of ancillary operational infrastructure including an onsite substation.

Biosis Pty Ltd (Biosis) has engaged Marshall Day Acoustics (Australia) Pty Ltd (MDA) to provide a predicted noise assessment for the Project. Acciona Energía owns and operates the Waubra Wind Farm and are the client for the Project.

The assessment summarised in this report is based on the specific site layout and candidate equipment selections available at this stage. It contains details of the current Project layout, proposed project infrastructure and associated noise data, and evaluation of predicted noise levels against the relevant environmental noise limits.

We have also undertaken a screening assessment of potential cumulative noise impacts considering concurrent operation with the proposed Glenbrae BESS.

During the construction of the Project, a temporary concrete batching plant is proposed. Detailed information regarding the concrete batching plant is not yet available. We have therefore conducted a feasibility assessment using high level information and a conservative set of assumptions based on our experience with similar sites.

Where changes from any aspect of the assessment detailed in this report occur, the changes should be reviewed and verified for continued compliance of the Project.

A glossary of acoustic terminology used throughout this report is provided in Appendix A.

¹ The final storage capacity of the BESS may be subject to change based on outcomes of the detailed design process.

2.0 PROJECT OVERVIEW

2.1 Project description and layout

The Project is a grid-scale BESS proposed to have storage capacity of 200 MW / 400 MWh and will connect with the existing Waubra Wind Farm terminal station and collector sub-station via a 318 m long 220 kV overhead line².

The Project is located at 151 Troys Road, Waubra within the Pyrenees Shire Council local government area, approximately 2.5 km west from the centre of Waubra township and 31 km north-west of Ballarat.

The primary land use within and surrounding the Project site is agriculture. Under the Pyrenees Planning Scheme, the Project site is predominantly zoned Farming Zone (FZ).

A land zoning map is provided in Appendix B.

Equipment included in the noise assessment consists of:

- one high-voltage (HV) transformer (250 MVA)
- 90 battery units
- 60 inverters and accompanying medium voltage (MV) transformers (4.4 MVA) (collectively referred to as power stations)
- 4 auxiliary transformers (1.5 MVA).

Equipment associated with the existing infrastructure at 202 Troys Road, opposite the Project has also been considered for potential cumulative noise contributions. This has been determined based on publicly available information and includes:

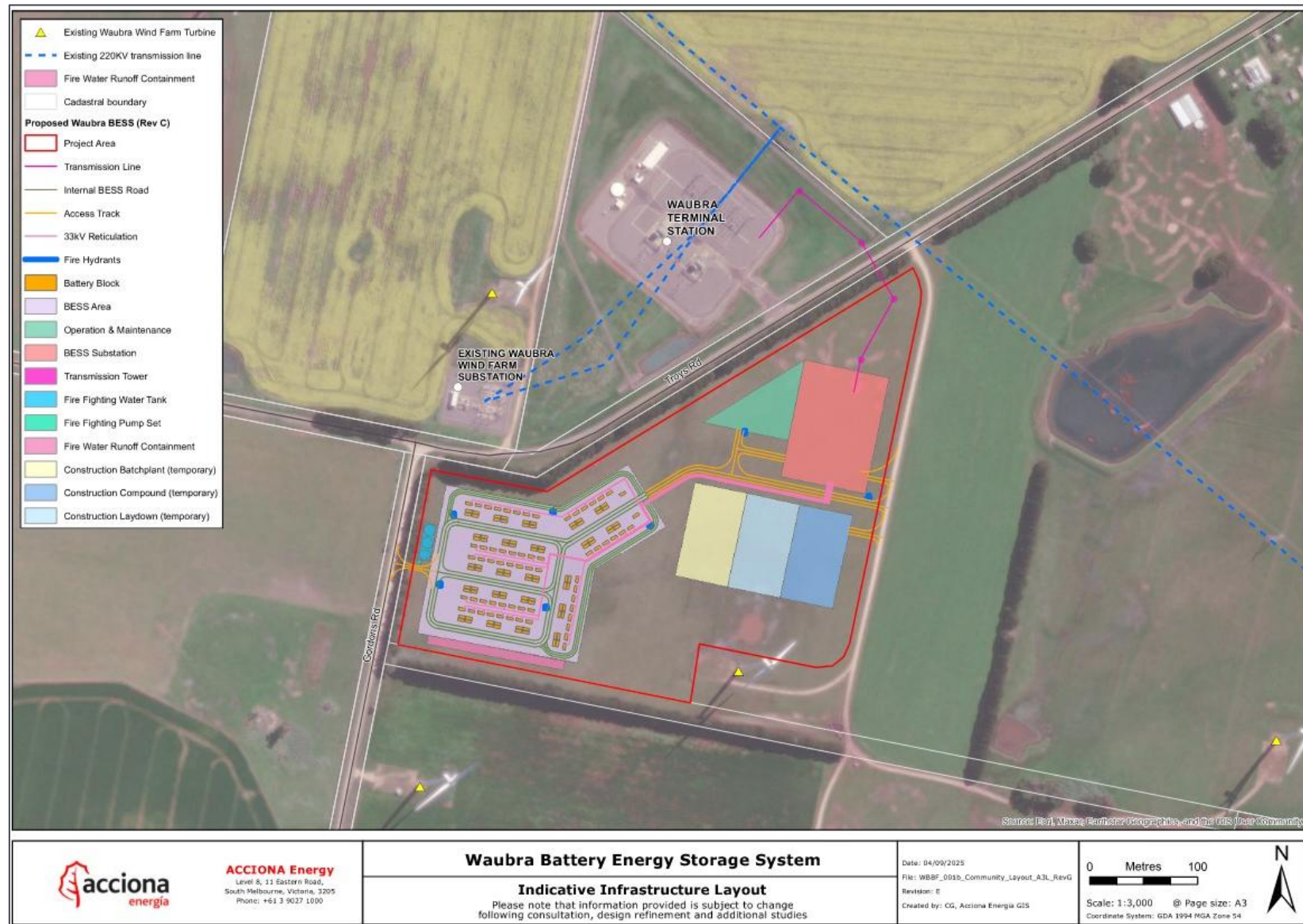
- Waubra Wind Farm collector station – one transformer (50 MVA)
- Waubra terminal station – 2 transformers (150 MVA each).

The Project layout, as provided by Acciona Energía, is presented in Figure 1.

A description and layout of the indicative temporary concrete batching plant is provided in Section 5.3.

² Options to build the transmission line underground are being explored and will be confirmed when the detailed design is established.

Figure 1: Project layout (Source: Acciona Energía)



2.2 Noise sensitive areas

Acciona Energía has provided MDA with the identified noise sensitive areas (receivers) for the Project.

The closest 13 receivers have been selected for this assessment. Compliance at these receivers will imply compliance at further receivers.

The nearest receivers from the north, east, south and west have been considered and labelled with Acciona Energía nominated IDs, as summarised in Table 1.

Table 1: Assessed receivers

Receiver – Acciona ID	Orientation from site	Approximate distance, km ^a
145	East	0.7
291	East	1.2
292	East	1.2
267	East	1.6
389	South	1.7
382	West	1.7
394	West	1.7
266	East	1.7
374	South	1.9
283	East	1.9
371	South	1.9
401	North	2
253	East	2

a As measured from the Project centroid.

The locations of the receivers in relation to the Project are depicted graphically in Figure 2.

A planning map including the identified receivers is presented in Appendix B.

Figure 2: Site boundary and receiver locations



3.0 LEGISLATION AND GUIDELINES

In Victoria, environmental noise is regulated by several different requirements, including various legislation, local laws, and Victoria's planning system.

The environmental noise assessment requirements for commercial, industrial and trade premises (CIT premises) are defined by several Victorian government documents, comprising:

- the *Environment Protection Act 2017* (EP Act)
- the *Environment Protection Regulations 2021* (EP Regulations)
- the *Environment Reference Standard* published 25 May 2021, and as amended by Environment Reference Standard No. S158 Gazette 29 March 2022 (ERS)
- EPA Publication 1826.4 Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues, published May 2021 (Noise Protocol).

The requirements and guidance of these documents is summarised below. Additional details and extracts from these documents are provided in Appendix C.

3.1 Environment Protection Act 2017

The *Environment Protection Act 2017* (EP Act) provides the overarching legislated protection of the environment in Victoria and establishes mandatory requirements for the control of environmental noise. The following key obligations apply under the EP Act:

- A person who is engaging in an activity that may give rise to risks of harm to human health or the environment has a general environmental duty (GED) to minimise the risk of harm, so far as reasonably practicable.
- A person must not, from a place or premises that are not residential premises, emit unreasonable noise or permit unreasonable noise to be emitted.

The risk of harm under the EP Act includes both health and amenity related noise impacts. The EP Act defines environmental noise as unreasonable if it is:

- prescribed to be unreasonable from an assessment against mandatory noise limits, or
- assessed to be unreasonable according to the following factors defined in the EP Act:
 - noise volume, intensity or duration
 - noise character
 - the time, place and other circumstances in which the noise is emitted
 - how often the noise is emitted.

3.2 Environment Protection Regulations 2021

The *Environment Protection Regulations 2021* (EP Regulations) give effect to the EP Act by establishing prescriptive requirements for a range of environmental considerations including noise. The noise requirements are defined according to the type of noise-generating activity under consideration. The EP Regulations also define the types of noise sensitive areas where these requirements apply and the hours of different assessment time periods (i.e. day, evening and night).

The EP Regulations specify that the prediction, measurement, analysis and assessment of operational industry noise within a noise sensitive area must be conducted in accordance with the EPA Noise Protocol. Noise from industry is prescribed by the EP Regulations to be unreasonable for the purposes of the EP Act if it exceeds the noise limit determined in accordance with the Noise Protocol.

3.3 EPA Publication 1826.4 (Noise Protocol)

The Noise Protocol defines a procedure for setting noise limits that apply to the operation of industry premises and entertainment venues in Victoria. Compliance with the noise limits is mandatory. The EPA Noise Protocol defines noise limits that are used to assess whether a noise is prescribed to be unreasonable in accordance with the EP Regulations and the EP Act.

The noise limits apply at a 'noise sensitive area', which is defined by the EP Regulations as being *within 10 metres of the outside of the external walls* of buildings including dwellings, hotels, and schools. In rural areas, noise sensitive areas also include land within the boundary of campgrounds, caravan parks and certain types of tourist establishments. In this report, noise sensitive areas are referred to as receivers.

The procedures for setting noise limits are defined separately for urban and rural areas. However, in both cases, the noise limits are defined by considering the land zoning in the area and the noise environment of the receiver. Separate noise limits are defined for the day, evening and night periods.

3.4 Environment Reference Standard

The *Environment Reference Standard* (ERS) was introduced under the EP Act and sets out environmental and human health outcomes that are sought to be achieved and maintained in Victoria. The outcomes are described by the ERS in terms of a collection of environmental values, indicators and objectives.

The ERS is mentioned here for information and completeness only and the ERS has had no further consideration in this assessment. Direct regulation takes precedence over the ERS, and all aspects of noise generated on the Project are regulated under the EP Regulations.

3.5 Related Victorian guidelines

To support the application and use of the above legislation and guidance, a range of Victorian EPA publications provide additional advice on matters of interpretation and technical assessment requirements. These publications include:

- EPA Publication 1992 *Guide to the Environment Reference Standard*, dated June 2021
- EPA Publication 1996 *Noise guideline – assessing low frequency noise*, dated June 2021
- EPA Publication 1997 *Technical guide: Measuring and analysing industry noise and music noise*, dated June 2021.

The EPA also provides online guidelines relating to noise, including:

- commerce, industry and trade noise guidelines³
- noise advice for businesses⁴
- unreasonable noise guidelines⁵.

Broader relevant industry guidance is also provided in:

- EPA Publication 1695.1 *Assessing and controlling risk for business*, dated 1 March 2019
- EPA Publication 1856 *Reasonably practicable*, dated September 2020.

³ See EPA commerce, industry and trade noise guidelines through this [weblink](#)

⁴ See EPA noise advice for business through this [weblink](#)

⁵ See EPA unreasonable noise guidelines through this [weblink](#)

4.0 ASSESSMENT METHOD

4.1 Overview

As discussed in the previous section, the overarching noise requirements for the Project are defined by the EP Act.

The cornerstone of the EP Act is the GED, which requires that the risk of harm due to noise be minimised so far as reasonably practicable. Residual noise impacts are then assessed as to whether they could constitute unreasonable noise under the EP Act.

Unreasonable noise is addressed by considering the requirements of the EP Regulations and the Noise Protocol.

The overarching approach to the assessment of noise for the Project is described in Table 2.

Table 2: Assessment method

Step	General method
Consider hazards and assess risk	Preliminary noise modelling was used to identify specific hazards which could contribute to the risk of harm. Equipment noise data was provided by Acciona Energía or derived by MDA from previous projects.
Reduce risk so far as reasonably practicable	In consultation with the Project team, controls were investigated which could reduce the risk of harm, and it was determined whether they were reasonably practicable. Noise control measures were informed by iterative noise modelling to determine whether they afforded a material reduction in noise level.
Assess residual noise impacts	Measures that were deemed reasonably practicable and feasible for consideration at this stage were incorporated into the assessment. Noise levels were predicted with measures in place to determine residual noise impacts and inform the residual risk of harm due to noise.
Check controls	GED obligations are ongoing over the life of the Project. Ways to effectively monitor and maintain compliance with the GED have been recommended.

In certain situations, the ERS can also require consideration. That is not the case for the Project as the direct regulation discussed above takes precedent over the ERS, as discussed in Section 3.4.

An instance where the ERS could require consideration for the Project is if there were any 'natural areas' surrounding the Project area. The ERS includes a specific definition for a 'natural area' and requires that consideration be given to the qualitative impacts of these areas with the objective to maintain an ambient sound environment which *'...is conducive to human tranquillity and enjoyment having regard to the ambient natural landscape'*.⁶

Our review of aerial imagery surrounding the Project has not identified any areas which would meet the description of a 'natural area' defined in the ERS and so no further consideration has been given to the ERS.

⁶ The ERS describes a natural area as *'Unique combinations of landscape, biodiversity and geodiversity. These natural areas typically provide undisturbed species habitat and enable people to see and interact with native vegetation and wildlife.'*

4.2 Noise prediction method

Noise modelling to predict operational noise levels is the primary tool utilised for this assessment.

Operational noise levels associated with the Project have been predicted using:

- noise emission data for the battery units, inverters and transformers
- a digital noise model of the Project and the surrounding environment using proprietary noise modelling software SoundPLANnoise (version 9.1)
- implementation of the environmental sound propagation method specified in International Standard ISO 9613-2: 2024 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: Engineering method for the prediction of sound pressure levels outdoors* (ISO 9613-2).

The implementation of ISO 9613-2 within proprietary noise modelling software enables multiple sound transmission paths, including reflected and screened paths, to be accounted for in the calculated noise levels. ISO 9613-2 was designed to assume conditions that favour the propagation of noise from meteorological effects, described as a slight wind (1 to 5 m/s) blowing from source to receiver, or a well-developed moderate ground-based temperature inversion.

Details of the noise model inputs and further information on the noise modelling method is presented in Appendix D. Further noise modelling contextualisation is discussed in Section 5.2.1 and Section 5.2.3.

5.0 NOISE ASSESSMENT

5.1 Noise limits

Noise limits have been derived in accordance with the rural area method of the Noise Protocol. Noise limits are expressed in terms of the effective noise level (ENL), which includes adjustments for noise character if they are considered warranted.

The noise limits for the Project, applicable to all receivers considered for assessment, are detailed in Table 3.

Table 3: Project noise limits

Period	Day of week	Times	Noise limit, dB ENL
Day	Monday to Saturday	0700 to 1800 hrs	45
Evening	Monday to Saturday	1800 to 2200 hrs	39
Evening	Sunday, Public holidays	0700 to 2200 hrs	39
Night	Monday to Sunday	2200 to 0700 hrs	34

A detailed derivation is provided in Appendix C4.

The above noise limits apply to the total noise level at a receiver from all relevant CIT premises in the area.

Under the Noise Protocol, adjustments for noise character are required if an unwanted character is present or likely. Character adjustments can apply for tonality, impulsiveness and intermittency.

It is unlikely that the Project would generate impulsive or intermittent noise, but the equipment used can generate tones.

Section B3.4 of the Noise Protocol provides a mechanism by which the characteristics of a noise source, such as tonality, may attract the application of an adjustment if deemed to meet the prescribed criteria. The Noise Protocol states:

(82) *The following adjustments apply –*

- a. *when the tonal character of the noise is just detectable then $A_{tone} = +2$ dB.*
- b. *when the tonal character of the noise is prominent then $A_{tone} = +5$ dB.*

(83) *When a tone is present, but observations do not provide certainty with regards to the value to apply for the tonal adjustment, the adjustment may be determined using the objective tonal method in accordance with Annex C.*

Further discussion on tonality is provided in Section 5.2.3 and Appendix E.

5.2 Waubra BESS noise assessment

5.2.1 Input information

Detailed information regarding the noise model inputs and method is provided in Appendix D.

There are several relevant contextual points relating to assumptions and inputs that contribute to the outcomes of this planning stage assessment, including:

- the inclusion of noise controls in the assessment
- the selection of representative noise emission data for equipment
- the selection of equipment operational duty
- application of character adjustments
- cumulative noise from existing electrical infrastructure.

Each of these points have an important impact on the level of uncertainty associated with the predicted outcomes and are discussed in the following sections. For items where MDA has used our discretion, we consider the decisions made are generally conservative.

The final equipment selections would be nominated after a tender process to procure the supply of batteries, inverters and transformers. The final selection would be based on a range of design requirements including achieving compliance with the noise limits at surrounding receivers.

Accordingly, to assess the potential noise impacts at this stage of the Project, MDA has assessed a candidate configuration of noise generating equipment and noise controls that are representative of the size and type of equipment being considered.

Noise controls

The GED requires that the risk of harm be reduced so far as reasonably practicable. We have considered the available risk controls for noise and discussed these with the Project team.

As discussed in Section 5.2.1, due to the early planning stage of the Project, there are several important points which will require more detailed assessment once the relevant information becomes available. This process has implications for whether a given noise control is reasonably practicable.

We have therefore evaluated the available noise controls and adopted a set of candidate noise controls for the purpose of this assessment. Table 4 presents discussion of these items.

Final noise controls will differ based on the detailed design stage assessment.

Table 4: Noise control evaluation

Noise control	Discussion
Selection of low noise emission equipment	Final equipment selections are not available at this stage. Representative noise data for candidate equipment has been utilised for this planning assessment. Selection of low noise emission equipment will be considered during detailed design, including consideration of plant items such as the batteries, inverters and transformers.
Consideration of operational duty and fan speed	During detailed design, further consideration should be given to the required fan speed of equipment and the impact on equipment noise levels. This assessment has conservatively assumed high fan speeds.

Noise control	Discussion
Consideration of noise character	During procurement, priority should be given to selecting equipment that does not emit tonal noise character, so far as reasonably practicable.
Equipment layout and distribution	Most battery noise comes from the fans and cooling systems. This leads to noise emissions from batteries being higher from certain sides of the battery. This is referred to as directivity. This effect has not been accounted for in this assessment as the information required to undertake the level of detailed noise modelling is not available at this stage. During detailed design, we recommend Acciona consider arranging batteries to maximise directivity benefits so far as reasonably practicable.
Battery and inverter silencer kits	Inverters are commonly fitted with noise reduction kits which can yield meaningful reductions in noise levels. These kits are primarily silencers fitted to the cooling/ventilation paths to the reduce fan noise. Considering the large number of inverters, adopting these kits comes with notable increase in cost, and whether they are reasonably practicable depends on the inherent risk of harm (i.e. potential noise impacts without them). During the preliminary noise modelling, the inverters were identified as being a key noise source at the nearest receiver. Accordingly, and as it is a common measure, the noise data for the silenced version of the inverter was implemented in the noise model. Silencer kits should be revisited for all relevant equipment during detailed design when the actual noise emissions of equipment are known and the other points discussed above have been resolved.
Noise barriers	Noise barriers can provide useful noise reduction when they are placed very close to a noise source or receiver but are generally not an effective measure for BESS projects, primarily due to the large number of noise sources spread over a large area, and increased distance between sources and the barrier. As such, noise barriers have not been included at this stage of the Project and we recommend they only be considered in detailed design if required to further control residual noise after all other controls have been investigated.

Noise emission data

As discussed in Section 5.2.1, at this stage of the Project equipment selections have not been conclusively determined and final selections will be established during detailed design and tender. Candidate equipment selections detailed in this report have been used for the purpose of noise assessment and have been reviewed by Acciona Energía and approved as being representative.

Where available, Acciona Energía has provided detailed third octave noise data from the corresponding manufacturer. Where this data is not available MDA has established approximations or assumptions based on comparable data or existing acoustic literature.

Due to commercial sensitivities the specific inverter and battery unit manufacturer and model is not detailed in this report. Descriptions of the source of various noise data are presented in Table 5.

Table 5: Noise data descriptions

Item	Description
Inverters and MV transformers (Power stations)	Manufacturer third octave band sound power levels measured in accordance with ISO 9614-2:2016 have been provided by Acciona Energía.⁷ Extensive specific operating conditions for the equipment were described in the supplied datasheet, including operation with and without a manufacturer designed and provided attenuation kit. For the purposes of this assessment, noise data associated with 4600 kVA and 100% fan speed with the noise attenuation kit has been adopted. This corresponded to the operational load with the highest sound power level of in the provided datasheet. There are also 4.4 MVA MV transformers packaged with the inverters to form power stations. We have estimated the overall sound power levels utilising the method described in AS 60076-10:2023.⁸
Battery unit	We have utilised battery noise data from an equivalent sized (5 MWh) battery from a previous MDA project. The test data for this battery detailed one-third octave band sound pressure levels and derived sound power levels measured in accordance with ISO 3744:2010 and included a calculated uncertainty of 5 dB.⁹ The highest sound power level and associated spectra in the provided datasheet was adopted.
Auxiliary/HV transformers	Acciona Energía has advised that the transformers would have a capacity of up to 250 MVA for the HV transformer and 1.5 MVA for the auxiliary transformers. Noise data has been provided for the nominated HV transformer in the form of a single overall A-weighted sound power level (octave bands not provided). In line with common practice, we have also estimated the overall sound power levels for the given power ratings utilising the method described in AS 60076-10:2023. The 'reduced maximum' sound power level indicated in the standard has been adopted for both the HV and auxiliary transformers. Spectral data for each transformer was then estimated by averaging and normalising the spectral levels of several similar transformers as well as the Bies & Hansen corrections from Table 11.27, (Location 1a for outdoor transformer noise).¹⁰

⁷ ISO 9614-2:2016 *Acoustics – Determination of sound power levels of noise sources using sound intensity – Part 2: Measurement by scanning*

⁸ AS 60076-10:2023 *Power transformers – Part 10: Determination of sound levels*

⁹ ISO 3744:2010 *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering methods for an essentially free field over a reflecting plane*

¹⁰ Bies, D. H. & Hansen, C. H. (2009). *Engineering noise control: theory and practice (Fourth edition.)*. p. 601

The adopted sound power levels for individual equipment items are detailed in Table 6.

The data presented includes measurement uncertainty (as provided by the respective manufacturer) and have been converted from third octave to octave bands where applicable for simplicity. The data is provided as un-weighted (linear) octave band spectra and A-weighted overall sound power levels.

Table 6: Sound power levels for the Project equipment items, per unit, dB L_w

Item	Octave band centre frequency, Hz								L _{WA}
	63	125	250	500	1000	2000	4000	8000	
Inverter (includes silencer kit)	88	87	82	75	70	74	82	78	86
MV transformer ^a (within power stations)	65	75	71	66	56	49	44	40	67
Battery unit	87	83	85	84	83	79	79	76	88
Auxiliary transformer ^a	58	68	64	60	50	42	38	33	60
HV transformer ^a	89	99	96	91	81	73	69	64	92

a Derived based on the 'reduced maximum' as defined in AS 60076-2010:2023.

The maximum effective sound power level associated with each individual battery and inverter unit in Table 6 has been selected (i.e. maximum fan duty due to the most significant charge/discharge conditions and/or elevated ambient temperature), aligning with the typical worst-case operating conditions for the Project. As such, overall noise levels at receivers will therefore generally be lower than those predicted in this assessment.

Noise associated with the operation of batteries, inverters and transformers has the potential to be tonal in nature. Further discussion on this point is provided in Section 5.1, Section 5.2.3 and Appendix E.

As discussed in Section 5.2.1, relevant decisions, equipment selections and associated noise data would be nominated at detailed design, after which additional noise modelling and assessment should be conducted to verify continued compliance.

5.2.2 Predicted noise levels

Operational noise at the identified receivers has been predicted based on the method detailed in Section 4.0, the Project design described in Section 2.0, and the operational noise source information detailed in Section 5.2.1.

To determine whether the predicted noise levels are prescribed to be unreasonable, we have compared them to the night period noise limits. The night period noise limits are the most stringent limits, and as the operational assumptions are the same during all periods, compliance with the night period noise limits implies compliance during all periods.

The predicted noise levels and compliance outcomes are presented in Table 7.

The results presented relate solely to the noise from the Project and do not include cumulative noise.

No character adjustments have been included in the ENLs presented, based on a review of the predicted one-third octave band noise levels, as described in Appendix E. Further discussion on tonality is provided in Section 5.2.3.

Table 7: Predicted noise levels at the surrounding receivers during the night period (2200 to 0700 hrs)

Receiver	Predicted noise level, dB ENL	Noise limit, dB ENL
145	34	34
291	28	34
292	28	34
389	25	34
382	26	34
394	25	34
267	12	34
374	24	34
266	21	34
401	22	34
253	18	34
283	22	34
371	22	34

Predicted noise levels associated with the Project meet the night noise limit at all receivers and therefore also compliant with the day and evening noise limits.

The results therefore indicate it is feasible for the Project to comply with the noise limits.

It is important to consider these results in the broader context of the assessment uncertainty and availability of information available at the time of this report. Discussion is provided in Section 5.2.3.

It is likely that once further information is available, predicted noise levels would be lower than those presented.

5.2.3 Results contextualisation

There are several important contextual points which should be considered when interpreting the outcomes of this assessment.

The noise modelling undertaken has incorporated several assumptions and decisions which could have a material impact on the predicted noise levels.

Calculating uncertainty is a complex task, particularly for the range of considerations relevant for this assessment. Attempts to quantitatively determine uncertainty would imply a greater level of understanding than is currently available.

While it is not possible to calculate overall uncertainty or generate error bars for our assessment, Table 8 presents our approximations of typical effects based on our observations and review of the equipment data supplied.

Table 8: Modelling contextualisation

Item	Discussion
Operational duty	This assessment assumes full fan and compressor speed active 24 hours per day for batteries and inverters. This is highly unlikely to be the case during the night, when ambient temperatures are lower. Reviewing the noise data for various batteries indicates notable decreases in noise emission level with reductions in fan speeds. <u>Potential effect: ~-5 dB to battery noise sources.</u>
Directivity	Most battery noise comes from the fans and cooling systems, making them a directional noise source. As discussed in Section 5.2.1, we have not accounted for this in the assessment and have therefore modelled the batteries as omnidirectional noise sources. Review of various battery noise emission datasets indicates that inclusion and considered implementation of battery orientations could materially reduce noise levels experienced at the nearest noise sensitive receivers. <u>Potential effect: ~-5 dB to battery noise sources if orientated away from receivers.</u>
Tonality	Tonality has been evaluated by reviewing the predicted third-octave band noise levels at the subject receivers in the context of the objective method detailed in Annex C of the Noise Protocol. Further details on the evaluation of tonality are provided in Appendix E. For the representative battery chosen for this assessment, this evaluation indicated there is not predicted tonality at the nearest receivers. Accordingly, given the already multi-factored considerations for uncertainty and conservatism made in this assessment, we have not included an adjustment of tonality to the predicted noise levels. As this equipment is prone to tonality, this item needs to be reconsidered at the detailed design stage when equipment is being selected. <u>Potential effect: 0 to +5 dB to the overall noise level.</u>

- a UK Institute of Acoustics (IoA) *A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise* (May 2013)

Considered individually, the items discussed in Table 8 could increase or decrease predicted noise levels related to the Project, but each item is a separate consideration which warrants further investigation during detailed design when more detailed information is available.

5.2.4 Cumulative noise

Waubra Wind Farm collector station and terminal station

The noise limits apply to the total noise level at a receiver from all relevant CIT premises in the area.

The only existing or proposed CIT premises close to the Project identified by Biosis and Acciona Energía are the existing Waubra Wind Farm collector and terminal stations, which are located across Troys Road from the Project.

The Waubra Wind Farm itself does not require consideration for potential cumulative impacts as it is not a CIT premises and is assessed under separate provisions within the EP Act and EP Regulations.

The Waubra Wind Farm collector station is owned and operated by Acciona Energía and the terminal station is owned and operated by Ausnet. We have been advised that the major noise sources at these sites comprise:

- 1 x 50 MVA transformer at the collector station.
- 2 x 150 MVA transformers at the terminal station

We have conducted a screening assessment of potential noise from the above equipment, to inform the risk of cumulative noise impacts for the Project.

Sound power levels have been derived for the existing transformers using the approach described in AS 60076-10:2009, which allows for derivation of both 'standard maximum' sound power levels and a 'reduced maximum' sound power level. In our experience transformer noise levels are usually between these 2 noise levels and typically closer to the 'reduced maximum'. This is supported by information detailed in factory acceptance tests for transformers on other MDA projects.

To inform the screening assessment, we have derived the range of potential noise emission levels and total predicted noise levels at the nearest receiver during the night period.

The range of sound power levels for the existing transformers are:

- Collector station: 82 to 90 dB L_{WA} .
- Terminal station: 88 to 96 dB L_{WA} .

The resulting cumulative predicted noise levels at the nearest dwelling, ID 145, from the existing and proposed noise sources during the night period are:

- Based on 'reduced maximum': 35 dB L_{Aeq} total noise level (1 dB increase due to existing transformers).
- Based on 'standard maximum': 36 dB L_{Aeq} total noise level (2 dB increase due to existing transformers).

These results indicate a theoretical risk of cumulative noise levels to increase above the night period noise limits, when potential noise from existing transformers are considered.

As noted at several points throughout this report, a range of conservative assumptions have been incorporated to demonstrate Project feasibility based on the preliminary design. The assumptions would be refined during detailed design and likely result in lower noise levels.

During detailed design, we recommend the following:

- Investigating and implementing contextual items described in Section 5.2.3. If batteries of the sound power level utilised in this assessment were adopted, then careful incorporation of some or all of the contextual items is likely to result in predicted cumulative compliance.

- Confirming the sound power level of the existing terminal station transformers with a noise survey. If the noise levels are in line with the 'reduced maximum' described above, then the extent of additional noise controls would be reduced.
- If required, noise reduction kits could be fitted to the batteries to reduce their noise contribution by 2 to 8 dB (based on review of available noise reduction kit data). The upper end of this reduction would allow for predicted compliance regardless of transformer noise level. The lower end would allow for predicted compliance if the transformer noise level were closer to 'reduced maximum'.
- If required, noise barriers could be investigated. Our predictions indicate that a noise barrier at the terminal station could provide a material reduction in cumulative noise levels. Barriers on the Project site, however, are predicted to be less effective due to the distribution of noise sources. We only recommend on-site barriers be considered if final marginal improvements are required for compliance.

Ultimately, all CIT premises operators are responsible for cumulative compliance with the noise limits of the Noise Protocol.

Through consideration of one or a combination of the above items, cumulative noise levels from the Project and existing infrastructure can be designed to comply with night period noise limits.

Glenbrae BESS

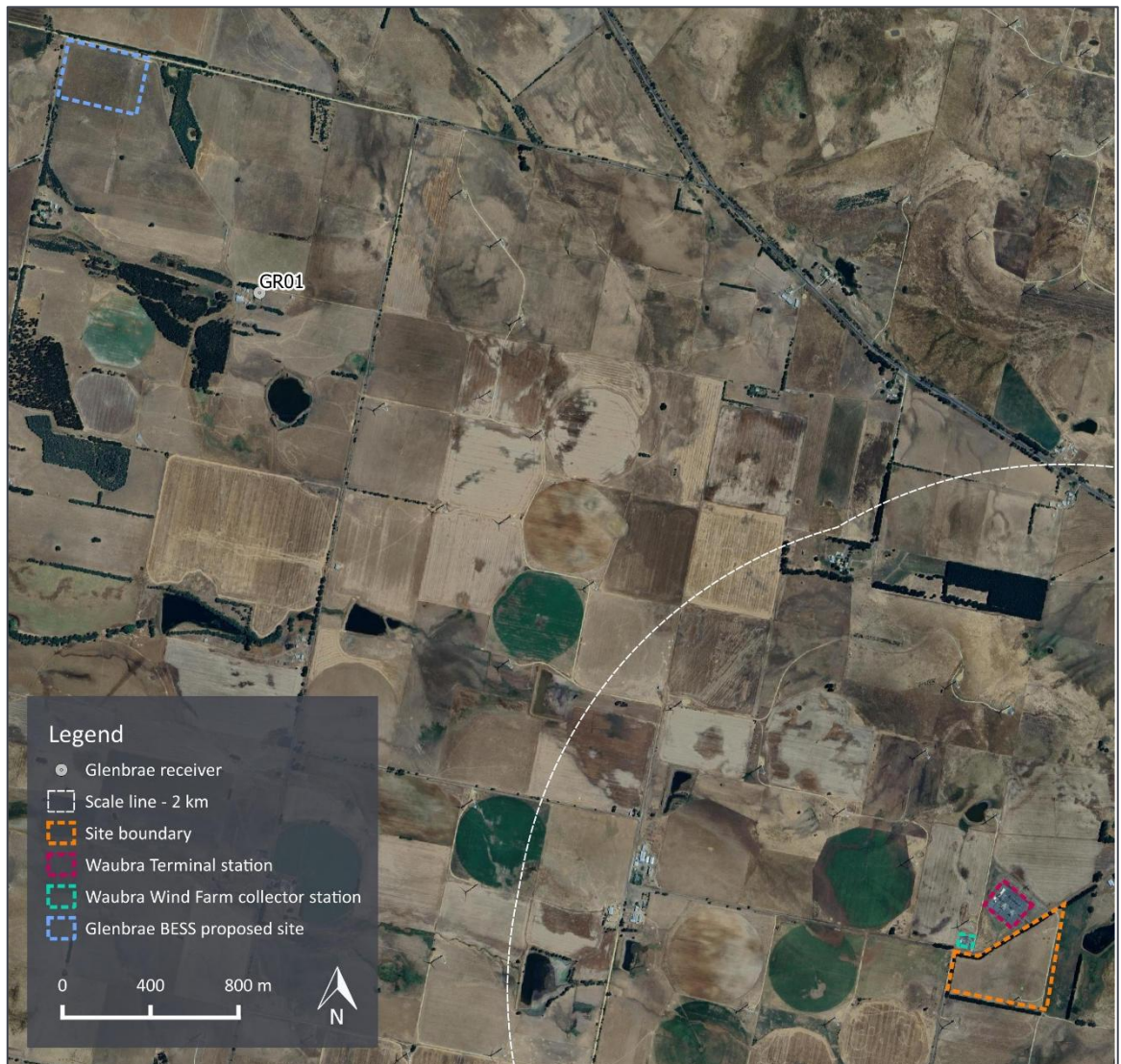
Glenbrae BESS is a proposed BESS facility located at 438 Lobbs Road, Glenbrae, approximately 5.8 km northwest from the proposed Waubra BESS.

We have undertaken a screening assessment to consider whether there is a risk of cumulative noise due to the current operations of Glenbrae BESS and Waubra BESS.

To do this, we have considered cumulative noise levels at an intervening receiver located nearest to Glenbrae BESS in the direction of Waubra BESS.

Figure 3 shows the 2 BESS sites and the intervening receiver – labelled 'GR01'.

Figure 3: Cumulative projects layout



Glenbrae BESS must comply with the night period noise limit of 34 dB ENL at GR01. If Glenbrae BESS was emitting noise right up to this level, it would mean that Waubra BESS must contribute less than 24 dB ENL at GR01 to remove the risk of a cumulative exceedance.

Glenbrae BESS must also comply with the GED, and reduce the risk of noise related harm so far as reasonably practicable, and this could result in noise from Glenbrae BESS being lower than the noise limit, and the risk of cumulative noise reduced even further.

To inform the potential Waubra BESS noise levels at GR01, we have undertaken a conservative screening calculation to extrapolate noise levels from our noise modelling. The screening calculation

is conservative as it considers the spreading of sound due to distance only, and does not consider ground effect, terrain effects or atmospheric attenuation, which would reduce noise levels further.

GR01 is located approximately 1.4 km South East of Glenbrae BESS and 4.5 km North West of Waubra BESS.

The anticipated cumulative noise level at GR01 is summarised in Table 9.

Table 9: GR01 cumulative noise levels – screening assessment

Receiver	Waubra BESS (inclusive of the collector and transformer stations), dB ENL	Glenbrae BESS, dB ENL	Cumulative noise level, dB ENL	Noise limit, dB ENL
GR01	17	34	34	34

The estimated noise level contribution from Waubra BESS is more than 10 dB below the predicted noise level contribution from Glenbrae BESS. Therefore, when added together, the cumulative noise level from both BESS' remains 34 dB ENL and indicates that Glenbrae BESS is the dominant noise source at GR01.

The conservative screening assessment demonstrates there is a very low risk of cumulative noise levels exceeding the noise limit due to the concurrent operations of the Waubra BESS and Glenbrae BESS.

Notwithstanding the screening assessment outcome, the GED to reduce risk of harm from noise so far as reasonably practicable applies to both sites.

5.2.5 Recommendations

The above assessments indicate the Project is acoustically feasible. There are several important contextual factors which require further assessment when detailed information becomes available.

We recommend a post-consent noise assessment be conducted (pre-construction) to consider the level of noise controls which may ultimately be required for the Project, based on the final equipment selections.

The aim of the post-consent noise assessment would be to demonstrate that the GED has been addressed and residual predicted noise levels comply with the noise limits. Therefore, the post-consent noise assessment should be conducted prior to installation of major plant items.

Specific items we recommend be considered in the post-consent noise assessment include:

- Equipment selections: the quietest equipment reasonably practicable should be selected and incorporated into the updated assessment.
- Equipment silencers: the effect of silencers should be investigated as part of the equipment selection process, to assist with determining whether their application is reasonably practicable and/or required to comply with the noise limits.
- Cumulative noise: on-site measurements should be conducted to determine noise levels of existing CIT premises and consider implications on the types of noise controls which may be required as described in Section 5.2.4.
- Tonality: equipment should be selected to minimise the risk of tonality experienced at receivers and a predictive assessment of tonality in one-third octave bands should be conducted based on final equipment selections (utilising the method described in Appendix E). The on-site measurements undertaken for cumulative noise should also consider whether a tonality adjustment is relevant for the existing noise sources (based on measurements and observations conducted at the nearest receiver).

- Noise predictions: updated predictions should be undertaken to inform the overall noise impacts and assess compliance with the noise limits. Consideration should be given to operational duty and noise source directivity when/if appropriately detailed information is available.

5.3 Temporary concrete batching plant feasibility study

To construct the Project, Acciona Energía would operate a temporary concrete batching operation on the subject site at the location shown in Figure 4.

Noise from the concrete batching operations must also comply with the mandatory noise limits and other obligations of the EP Act.

Details of the proposed operations are not yet finalised. We have therefore conducted an acoustic feasibility study for the proposed concrete batching operations, based on a conservative set of assumptions.

The concrete batching operations would only occur during the construction of the Project and so cumulative considerations with the Project are not necessary.

5.3.1 Input information

Detailed information regarding the noise model inputs and method is provided in Appendix D.

At this stage, specific equipment selections and operational details are not available. Acciona Energía have provided a preliminary schedule based on a small capacity concrete batching plant that can produce 30 m³ of concrete per hour.

MDA has used inputs for the model based on this information and experience on previous projects.

The proposed site operation times are 0700 to 1800 hours, Monday to Friday.

The relevant assessment period under the EP Regulations is 30 minutes.

During a typical worst-case 30 minute period, Acciona Energía expect the following movements through the site may be required:

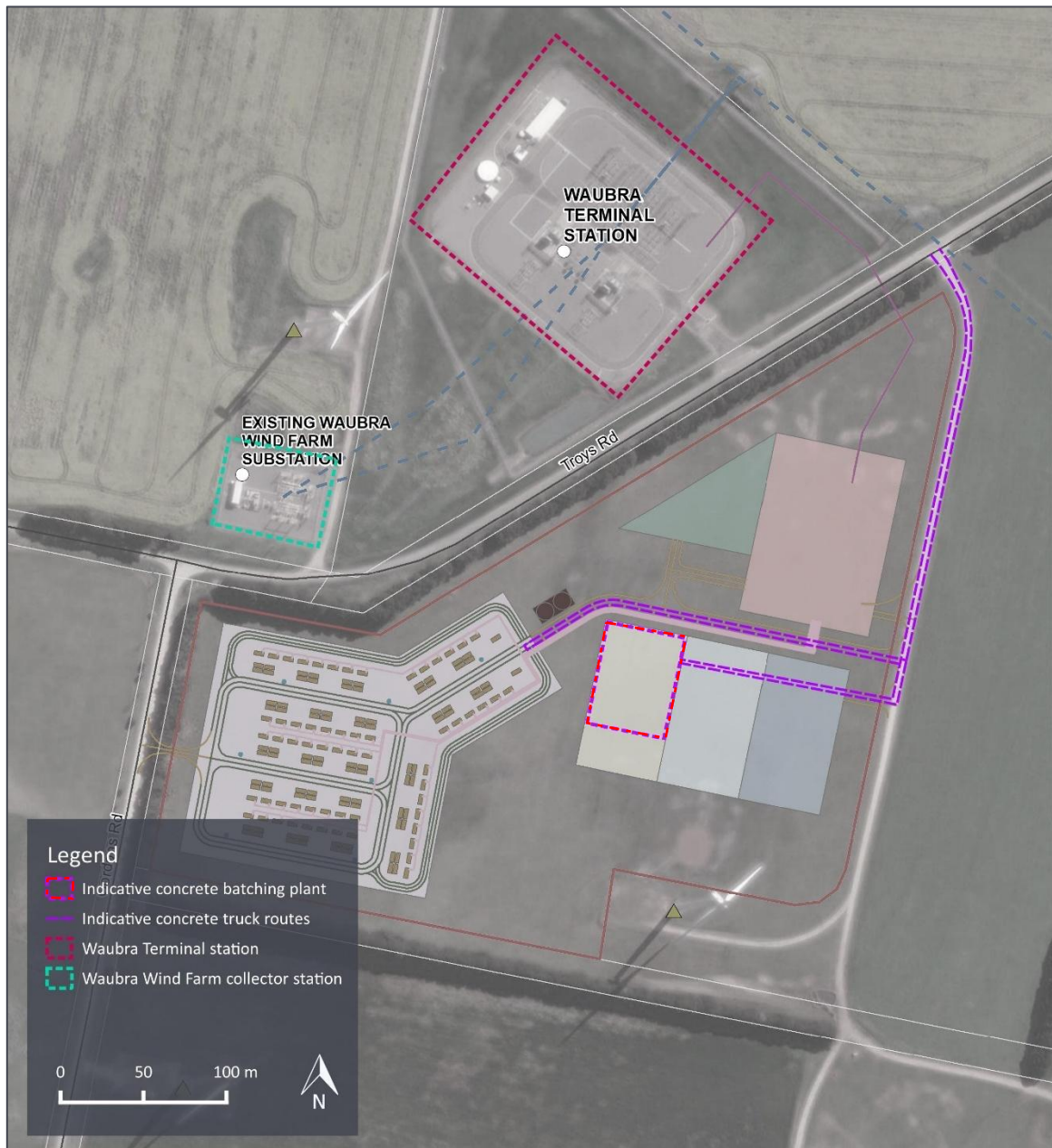
- 3 – 5 concrete agitator trucks operating
- 2 truck-and-trailer aggregate deliveries

Based on previous MDA projects and the above descriptions, we have assumed the concrete batching facility comprises:

- one loading area and loading stand
- 2 slump stands
- one washout stand.

The temporary concrete batching site and truck movement paths considered in our assessment are shown in Figure 4.

Figure 4: Temporary concrete batching plant indicative layout



5.3.2 Predicted noise levels

Operational noise at the identified receivers has been predicted based on the method detailed in Section 4.0 and indicative inputs detailed in Section 5.3.1.

As the concrete batching operations are proposed to operate from 0700 to 1800 hours, Monday to Friday, it is only relevant to compare predicted noise levels to the day period noise limit.

The predicted noise levels and compliance outcomes are presented in Table 10.

Predictions include both concrete batching plant operations and the existing Waubra Wind Farm collector station and the Waubra terminal station. Noise emission data of the collector and terminal stations are detailed in Section 5.2.4.

Adjustments for noise character have not been applied to the predicted noise levels as they are not anticipated to be warranted for the proposed concrete batching operations.

Table 10: Predicted noise levels at the surrounding receivers during the day period (0700 – 1800 hrs)

Receiver	Predicted noise level, dB ENL	Noise limit, dB ENL
145	44	45
291	37	45
292	36	45
389	32	45
382	31	45
394	31	45
253	30	45
374	30	45
283	29	45
371	29	45
266	28	45
401	27	45
267	19	45

Predicted noise levels associated with the concrete batching plant meet the day noise limit at all receivers, with the smallest compliance margin of 1 dB at the nearest receiver.

This assessment indicates that the proposed concrete batching plant is feasible from an acoustic perspective, based on a set of conservative assumptions around the operational intensity.

During detailed design, opportunities to reduce the risk of harm due to noise should be investigated further.

We recommend a post-consent noise assessment be conducted for the temporary concrete batching plant to consider the level of noise controls necessary once detailed equipment selections and operational schedules are available.

6.0 CONCLUSION

The noise assessment conducted for the temporary concrete batching plant and ongoing Project indicates that predicted noise levels for the candidate equipment and noise controls are below the Noise Protocol noise limits.

There is a theoretical risk of cumulative noise when the existing Waubra Wind Farm collector station and Waubra terminal station are considered for the ongoing Project, but this risk is manageable as there are noise controls and investigations available to allow predicted compliance.

An updated noise assessment is required during detailed design, once final equipment selections have been determined, to inform the ultimate set of noise controls that may be required for the Project to address the GED and to demonstrate compliance with the noise limits.

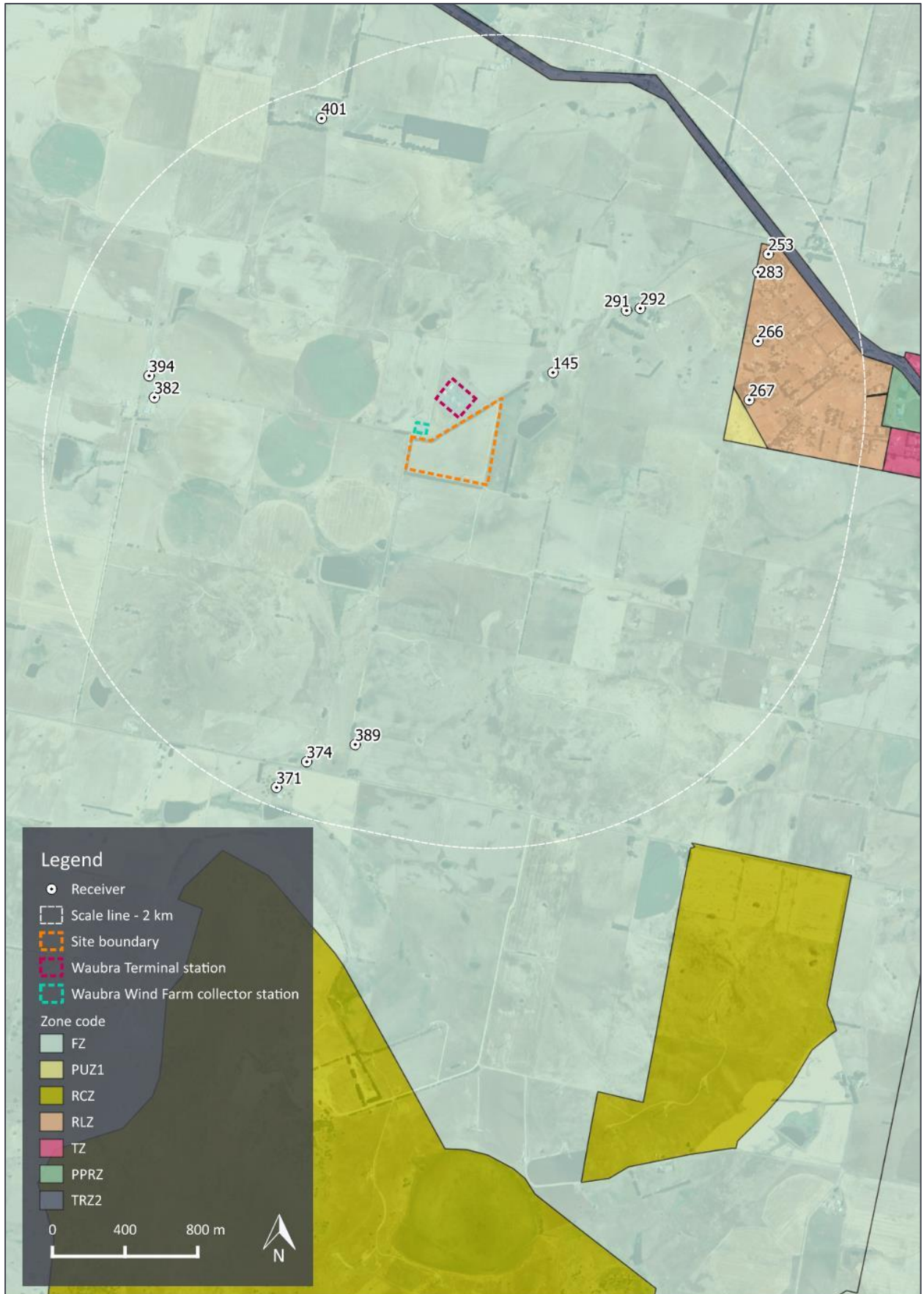
APPENDIX A GLOSSARY OF TERMINOLOGY

Term	Definition
A-weighting	A set of frequency-dependent sound level adjustments that are used to better represent how humans hear sounds. Humans are less sensitive to low and very high frequency sounds. Sound levels using an “A” frequency weighting are expressed as dB L _A .
Background sound	The sound that is continuously present in a room or outdoor location. Often expressed as the A-weighted sound level exceeded for 90 % of a given time period i.e. L _{A90} .
dB	Decibel. The unit of sound level.
Frequency	Sound occurs over a range of frequencies, extending from the very low (e.g. thunder) to the very high (e.g. mosquito buzz). Measured in units of Hertz (Hz). Humans typically hear sounds between 20 Hz and 20 kHz. High frequency acuity naturally reduces with age most adults can hear up to 15 kHz.
Hertz (Hz)	The unit of frequency, named after Gustav Hertz (1887-1975). One hertz is one pressure cycle of sound per second. One thousand hertz – 1000 cycles per second – is a kilohertz (kHz).
L _{Aeq}	The equivalent continuous A-weighted sound level. Commonly referred to as the average sound level and is measured in dB.
L _w	Sound Power Level. The calculated level of total sound power radiated by a sound source. Usually A-weighted i.e. L _{WA} .
Octave band	The interval between one frequency and its double. Sound is divided into octave bands for analysis. The typical octave band centre frequencies are 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, and 4 kHz.
Third octave band	One-third of an octave band. Used for more detailed analysis of sound frequency.
ENL	The effective noise level from commercial, industrial or trade premises determined in accordance EPA Publication 1826.4 Noise limit and assessment protocol for the control of noise from commercial, industry and trade premises and entertainment venues. This is the L _{Aeq} noise level over a 30-minute period, adjusted for the character of the noise. Adjustments are made for tonality, intermittency and impulsiveness.

The basic quantities used within this document to describe noise adopt the conventions outlined in ISO 1996 1:2016 *Acoustics - Description measurement and assessment of environmental noise – Basic quantities and assessment procedures*. Accordingly, all frequency weighted sound pressure levels are expressed as decibels (dB) in this report. For example, sound pressure levels measured using an “A” frequency weighting are expressed as dB L_A.

Alternative ways of expressing A-weighted decibels such as dBA or dB(A) are therefore not used within this report, unless included in a direct quote of external documentation.

APPENDIX B ZONING MAP



APPENDIX C NOISE LEGISLATION AND GUIDELINES

C1 Environment Protection Act 2017

The following key concepts and definitions are reproduced from the *Environment Protection Act 2017* (EP Act).

General environmental duty (Section 25(1)):

A person who is engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste must minimise those risks, so far as reasonably practicable.

Harm (EP Act Section 4(1)):

In this Act, harm, in relation to human health or the environment, means an adverse effect on human health or the environment (of whatever degree or duration) and includes—

- (a) an adverse effect on the amenity of a place or premises that unreasonably interferes with or is likely to unreasonably interfere with enjoyment of the place or premises; or*
- (b) a change to the condition of the environment so as to make it offensive to the senses of human beings; or*
- (c) anything prescribed to be harm for the purposes of this Act or the regulations*

Minimising harm (EP Act Section 6(1)):

A duty imposed on a person under this Act to minimise, so far as reasonably practicable, risks of harm to human health and the environment requires the person—

- (a) to eliminate risks of harm to human health and the environment so far as reasonably practicable; and*
- (b) if it is not reasonably practicable to eliminate risks of harm to human health and the environment, to reduce those risks so far as reasonably practicable.*

Prohibition of unreasonable noise (EP Act Section 166):

A person must not, from a place or premises that are not residential premises—

- (a) emit an unreasonable noise; or*
- (b) permit an unreasonable noise to be emitted*

Unreasonable noise definition (EP Act Section 3):

unreasonable noise means—

- (a) noise that is unreasonable having regard to the following—*
 - (i) its volume, intensity or duration;*
 - (ii) its character;*
 - (iii) the time, place and other circumstances in which it is emitted;*
 - (iv) how often it is emitted;*
 - (v) any prescribed factors; and*
- (b) noise that is prescribed to be unreasonable noise; and*
- (c) does not include noise prescribed not to be unreasonable noise*

C2 Environmental Protection Regulations 2021

The EP Act does not specify noise limit values or technical aspects of environmental noise but sets out legal requirements to comply with the described below. Clause 166 of the EP Act essentially places the onus of achieving compliance with noise limits on the commercial premises.

The *Environmental Protection Regulations 2021* (EP Regulations) are made under Section 465 of the EP Act and impose obligations in relation to environmental protection, including noise. The EP Regulations state that a person who conducts a prediction, measurement, assessment, or analysis of noise within a noise sensitive area must do so in accordance with the Noise Protocol. In particular, noise from CIT premises or entertainment venues or events is prescribed as unreasonable if it exceeds a noise limit or alternative criterion determined in accordance with the Noise Protocol.

Key matters addressed in the EP Regulations include:

- definition of commercial, industrial and trade premises, which is essentially any premises that is not a residential premises, a road, or a railway. It is noted that noise from common building services equipment (such as shared condensing units and kitchen exhaust fans) is assessable
- definition of an indoor music entertainment venue
- definition of noise sensitive areas where the noise limits are assessed, which broadly include:
 - a residential building
 - temporary accommodation
 - hospital corrective institution
 - retirement or residential village
 - A room for learning in a childcare centre, kindergarten, or school
 - A tourist establishment, campground, or caravan park
- assessment time periods
- noise sources that must not be taken into account
- minimum noise limit values
- management of cumulative noise from multiple premises.

Part 5.3 of the EP Regulations specifically address noise. Table 11 presents a summary of the relevant Divisions and EP Regulations from this section.

Table 11: Summary of Part 5.3 - Noise

Section	Description
Division 1, Regulation 113	States that <i>a person who conducts a prediction, measurement, assessment, or analysis of noise within a noise sensitive area for the purposes of the Act or these Regulations, must conduct the prediction, measurement, assessment, or analysis in accordance with the Noise Protocol.</i>
Division 3	Applies to noise from CIT premises
Regulation 116	Defines the day, evening and night period as follows: - Day: 0700 to 1800 hrs, Monday – Saturday - Evening: 1800 to 2200 hrs, Monday – Saturday 0700 to 2200 hrs, Sunday, and Public Holidays - Night: 2200 to 0700 hrs the next day, Monday – Sunday.
Regulation 117	In this Division, when the level of noise emitted from CIT premises is assessed, the following sources of noise that could be expected at the proposed facility must not be taken into account: - voices - construction or demolition activity on building sites - intruder, emergency or safety alarms or sirens - equipment used in relation to an emergency - non-commercial vehicles (except for maintenance activities) - wind turbines at wind energy facilities - lawnmowing - livestock
Regulation 118	Defines noise as being unreasonable if it exceeds the Noise Protocol limits or the alternative assessment criteria that apply at an alternative assessment location. Defines the lowest base noise limits as follows: Major urban area: Day: 45 dB ENL Evening: 40 dB ENL Night: 35 dB ENL Rural area: Day: 45 dB ENL Evening: 37 dB ENL Night: 32 dB ENL The noise limit for CIT premises for the night period must not exceed 55 dB ENL.
Regulation 119	If multiple existing or proposed premises emit noise that contributes to the effective noise level at a noise sensitive receiver, all reasonable steps must be taken by the premises' management to ensure the combined noise level does not exceed the noise limit.
Regulation 120	This regulation essentially identifies that tonal aspects of noise must be considered when considering unreasonable noise for Section 3(1)(a)(v) of the EP Act. The Noise Protocol provides a method of assessing tonal characteristics of noise from CIT premises, with additional guidance on low frequency noise available in EPA Publication 1996 <i>Noise guideline – assessing low frequency noise</i> .

Section	Description
Regulation 121	Noise emitted from CIT premises is prescribed to be aggravated noise if it exceeds the noise limits by more than 15 dB, or the following if lower: • 75 dB ENL during the day; • 70 dB ENL during the evening; or • 65 dB ENL during the night.

C3 EPA Publication 1826.4 (Noise Protocol)

During the assessment process, EPA Publication 1826.4, published May 2021, was the current version. EPA Publication 1826.5 has since been published and is applicable as of 5 September 2025. There are no material differences between assessment procedures of each document.

EPA Publication 1826.4 *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues*, dated May 2021 (Noise Protocol) sets noise limits that apply to CIT premises and entertainment venues within Victoria. Compliance with the noise limits is mandatory under the EP Act.

The EP Act defines a 'commercial, industrial and trade premises' as:

Any premises except the following –

- (a) residential premises (other than common plant under the control of an owners corporation);*
- (b) a street or road, including every carriageway, footpath, reservation and traffic island on any street or road;*
- (c) a railway track used by rolling stock in connection with the provision of a freight service or passenger service—*
 - (i) while travelling on a railway track or tramway track; or*
 - (ii) while entering or exiting a siding, yard, depot, or workshop;*
- (d) a railway track used by rolling stock in connection with the provision of a passenger service, while in a siding, yard, depot, or workshop and is—*
 - (i) powering up to commence to be used in connection with the provision of a passenger service; or*
 - (ii) shutting down after being used in connection with the provision of a passenger service;*
- (e) the premises situated at Lower Esplanade, St Kilda and known as "Luna Park" and being the whole of the land more particularly described in Certificate of Title Volume 1204 Folio 109;*

The EP Act defines an 'entertainment venue' as

Any premises or place where music is performed or played but does not include residential premises or a place of worship.

Based on the above the Project is considered to be a CIT premises.

The Noise Protocol prescribes the method and measurement procedure used to determine applicable noise limits and assessment of compliance.

The EP Act requires that proposed CIT premises be designed to comply with Noise Protocol noise limits and that premises have an ongoing obligation to meet the noise limits.

A 'noise sensitive area' is defined in the EP Regulations as:

- (a) that part of the land within the boundary of a parcel of land that is—*
 - (i) within 10 metres of the outside of the external walls of any of the following buildings—*
 - (A) a dwelling (including a residential care facility but not including a caretaker's house);*
 - (B) a residential building;*
 - (C) a noise sensitive residential use; or*
 - (ii) within 10 metres of the outside of the external walls of any dormitory, ward, bedroom or living room of one or more of the following buildings—*

- (A) a caretaker's house;*
- (B) a hospital;*
- (C) a hotel;*
- (D) a residential hotel;*
- (E) a motel;*
- (F) a specialist disability accommodation;*
- (G) a corrective institution;*
- (H) a tourist establishment;*
- (I) a retirement village;*
- (J) a residential village; or*

(iii) within 10 metres of the outside of the external walls of a classroom or any room in which learning occurs in the following buildings (during their operating hours)—

- (A) a childcare centre;*
- (B) a kindergarten;*
- (C) a primary school;*
- (D) a secondary school; or*

(b) subject to paragraph (c), in the case of a rural area only, that part of the land within the boundary of—

- (i) a tourist establishment; or*
- (ii) a campground; or*
- (iii) a caravan park; or*

(c) despite paragraph (b), in the case of a rural area only, where an outdoor entertainment event or outdoor entertainment venue is being operated, that part of the land within the boundary of the following are not noise sensitive areas for the purposes of that event or venue—

- (i) a tourist establishment;*
- (ii) a campground;*
- (iii) a caravan park;*

The assessment of non-music noise from a subject site under the Noise Protocol is based on the calculation of a noise limit at a noise sensitive area, considering the background noise level and a zoning noise level derived from the land zoning types in the surrounding area.

Noise limit derivation is contingent on 2 separate methods:

- the rural method for receivers outside a major urban area
- the urban method for receivers within a major urban area.

Major urban areas applicable in Victoria are set out in Table A.3 of the Noise Protocol.

Once a noise limit is established, the noise level $L_{Aeq, 30 \text{ min}}$ due to the CIT premises is measured or predicted. If necessary, the $L_{Aeq, 30 \text{ min}}$ noise level is adjusted for noise character and duration to give the effective noise level (ENL). If the ENL exceeds the noise limit, then remedial action is required.

C4 Noise limit derivation

The Noise Protocol outlines the EPA's required approach to the determination of noise limits and to the measurement, prediction and analysis of noise.

Part I Section A – Determining noise limits for commercial, industrial and trade premises

The Noise Protocol provides 2 methods for deriving the relevant noise limits, the urban area method and the rural area method.

All receivers for the Project are located outside the major urban areas as defined in the Regulations. Therefore, the rural area method for determining noise limits applies.

The noise limits are separately defined for the day, evening and night periods. The time periods are defined in the EP Regulations and summarised in Table 12.

Table 12: EP Regulations time periods

Period	Day of week	Start time, hrs	End time, hrs
Day	Monday-Saturday	0700	1800
Evening	Monday-Saturday	1800	2200
	Sunday, Public holidays	0700	2200
Night	Monday-Sunday	2200	0700

Under the rural area method, zoning levels are first determined based on the land zoning of the generating zone and the receiving zone. For the Project, the generating zone is Farming Zone (FZ) and there are 2 receiving zones depending on the location of the receiver (FZ or Rural Living Zone (RLZ)).

Refer to Figure 5 for a land zoning map. The applicable zoning levels are shown Figure 5 for the above 2 scenarios.

The Noise Protocol then requires consideration of additional calculation steps or application of variations to determine the final noise limits.

The only other relevant additional factor for the Project is that the Project is defined as being a 'utility' and is located within a Farming Zone with a distance adjustment of 0 dB, for which different noise limits apply.¹¹

The noise limits for the are derived in Table 13 and Table 14.

¹¹ EPA Publication 1997 provides the following definition for 'utility': 'Utility installation' as defined in the Victoria Planning Provisions and includes infrastructure used for telecommunications; to transmit or distribute gas or oil; to transmit, distribute or store power, including battery storage; to collect, treat, transmit, store, or distribute water; or to collect, treat, or dispose of storm or flood water, sewage, or sullage.

Figure 5: Zoning levels for rural area method for commercial, industrial and trade premises

Receiving zone → Generating Zone ↓	Green Wedge A GWAZ, Rural Conservation RCZ, Rural Living RLZ Group E CDZ, SUZ & UGZ (*)	Low Density Residential LDRZ Public Conservation and Resource PCRZ Public Park and Conservation PPCZ Public Use 2 & 5 PUZ2 & PUZ5 Urban Floodway UFZ	Farming Zone FZ Green Wedge GW General Residential Zone GRZ Neighbour Residential Zone NRZ Residential Growth Zone RGZ, Rural Activity Zone RAZ, Township Zone TZ Urban Growth Zone before an incorporated precinct structure plan UGZ Group B CDZ, SUZ & UGZ (*)	Commercial 1 Zone C1Z B1Z B2Z B5Z Commercial 3 Zone C3Z Mixed use Zone MUZ Activity Centre Zone ACZ Public Use Zone 1,3,4,6&7 PUZ1 PUZ3 PUZ4 PUZ6 & PUZ7 Road RD21 RD22 Group A CDZ, SUZ & UGZ (*)	Industrial 3 IN3Z Group C CDZ, SUZ & UGZ (*)	Commercial 2 Zone C2Z B3Z B4Z Group D CDZ, SUZ, UGZ (*)	Industrial 2 Zone IN2Z Industrial 1 Zone IN1Z
Low Density Residential LDRZ Public Conservation and Resource PCRZ Public Park and Conservation PPCZ Public Use 2,5 PUZ2 & PUZ5 Urban Floodway UFZ Group E CDZ, SUZ & UGZ (*)	Day 45 Evening 37 Night 32	Day 45 Evening 39 Night 34	Day 45 Evening 40 Night 35	Day 47 Evening 42 Night 37	Day 48 Evening 43 Night 38	Day 50 Evening 45 Night 40	Day 53 Evening 48 Night 43
Farming FZ (*) Green Wedge GWZ, Green Wedge A GWAZ Public Use 2 & 5 PUZ2, PUZ5 Rural Activity RAZ Rural Conservation RCZ Rural Living RLZ Urban Growth Zone before an incorporated precinct structure plan (UGZ) Group B CDZ, SUZ & UGZ (*)	Day 45 Evening 38 Night 33	Day 45 Evening 40 Night 35	Day 46 Evening 41 Night 36	Day 48 Evening 43 Night 38	Day 50 Evening 45 Night 40	Day 52 Evening 47 Night 42	Day 54 Evening 49 Night 44
Commercial 1 C1Z B1Z B2Z B5Z Mixed Use MUZ Activity Centre Zone ACZ Public Use 1,2,3,4,6 & 7 PUZ1 PUZ3 PUZ4 PUZ6 PUZ7 Group A CDZ, SUZ & UGZ (*)	Day 45 Evening 40 Night 35	Day 47 Evening 42 Night 37	Day 48 Evening 43 Night 38	Day 50 Evening 45 Night 40	Day 52 Evening 47 Night 42	Day 53 Evening 48 Night 43	Day 55 Evening 50 Night 45
Industrial 3 IN3Z Group C CDZ, SUZ & UGZ (*)	Day 46 Evening 41 Night 36	Day 49 Evening 44 Night 39	Day 50 Evening 45 Night 40	Day 52 Evening 47 Night 42	Day 53 Evening 48 Night 43	Day 55 Evening 50 Night 45	Day 56 Evening 51 Night 46
Commercial 2 C2Z, B3Z, B4Z Commercial 3 C3Z	Day 48 Evening 43 Day 38	Day 50 Evening 45 Night 40	Day 52 Evening 47 Night 42	Day 54 Evening 49 Night 44	Day 55 Evening 50 Night 45	Day 56 Evening 51 Night 46	Day 57 Evening 52 Night 47
Industrial 1, 2 IN1Z IN2Z Group D CDZ, SUZ & UGZ (*)	Day 50 Evening 45 Night 40	Day 52 Evening 47 Night 42	Day 53 Evening 48 Night 43	Day 55 Evening 50 Night 45	Day 56 Evening 51 Night 46	Day 57 Evening 52 Night 47	Day 58 Evening 53 Night 48

(*) For Comprehensive Development Zone (CDZ), Special Use Zone (SUZ) and Urban Growth Zone (UGZ) refer to Table B.2.

Table 13: Derivation of Noise Protocol zoning noise limits – Rural area method – FZ to FZ

Step	Description		Day	Evening	Night
Zone levels	Generating Zone: FZ Farming	Receiving Zone: FZ Farming	46	41	36
Distance adjusted levels	Distance from receiver to generating zone boundary: n/a	Distance adjustment: 0 dB	46	41	36
Utilities	Clause 31 applies - Utility is in a Farming Zone, Rural Activity Zone or Green Wedge Zone		45	39	34
Check against EP Regulations base limits & maximum night limits	EP Regulations maximum night limit		-	-	55
	EP Regulations base limits		45	37	32
NP Rural method limits	Effective Noise Level limit		45	39	34

Table 14: Derivation of Noise Protocol zoning noise limits – Rural area method – FZ to RLZ

Step	Description		Day	Evening	Night
Zone levels	Generating Zone: FZ Farming	Receiving Zone: RLZ Rural Living	45	38	33
Distance adjusted levels	Distance from receiver to generating zone boundary: n/a	Distance adjustment: 0 dB	45	38	33
Utilities	Clause 31 applies - Utility is in a Farming Zone, Rural Activity Zone or Green Wedge Zone		45	39	34
Check against EP Regulations base limits & maximum night limits	EP Regulations maximum night limit		-	-	55
	EP Regulations base limits		45	37	32
NP Rural method limits	Effective Noise Level limit		45	39	34

APPENDIX D NOISE MODELLING

D1 Noise prediction method

A computer model was created in the environmental noise modelling program SoundPLANnoise v9.1 to predict noise levels from the proposed development to relevant noise-affected receivers in the vicinity of the subject site. The noise model has been used to calculate noise levels at the nearest noise-affected premises in accordance with ISO 9613-2:2024 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: Engineering method for the prediction of sound pressure levels outdoors* (ISO 9613-2).

This standard has recently superseded the standard ISO-9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*. The revised standard has recently been adopted by the latest version of the sound prediction software used by MDA (SoundPLANnoise v9.1). MDA has also adopted the revised ISO 9613-2 after careful consideration and assessment of the updates to the standard. Notably, the core elements of the 2 versions are similar and the relevant calculation formulae for this Project have not materially changed.

The noise model enables the calculation of noise levels over a wide area, and accounts for key considerations including site arrangement, terrain, and atmospheric conditions.

The ISO 9613-2 standard specifies an engineering method for calculating noise at a known distance from a variety of sources under meteorological conditions that are favourable to sound propagation. The standard defines favourable conditions as downwind propagation where the source blows from the source to the receiver within an angle of ± 45 degrees from a line connecting the source to the receiver, at wind speeds between approximately 1 m/s and 5 m/s, measured at a height of 3 m to 11 m above the ground.

Equivalently, the method accounts for average propagation under a well-developed moderate ground based thermal inversion.

Accordingly, predictions based on ISO 9613-2 account for the instances when local atmospheric conditions at the site favour the propagation of sound to surrounding receptor locations. Under alternative atmospheric conditions, such as when the wind is blowing from a receiver location to the development site, the noise levels would be lower than calculated.

To calculate far-field noise levels according to the ISO 9613-2, the noise levels of each source are firstly characterised in the form of octave band frequency levels. A series of octave band attenuation factors are then calculated for a range of effects including:

- geometric divergence
- air absorption
- reflecting obstacles
- screening
- ground reflections.

The octave band attenuation factors are then applied to the noise data to determine the corresponding octave band and total calculated noise level at relevant receiver locations.

D2 Noise model configuration

The parameters detailed in Table 15 were utilised to develop the noise model.

Table 15: Noise model configuration

Feature	Description
Terrain data	One metre terrain contours were provided by Acciona Energía which was used to generate a digital ground model (DGM).
Environmental ground conditions	Ground conditions on the Project site and adjacent Waubra Wind Farm collector and terminal stations were assigned a ground factor of $G = 0$ representing hard ground. The surrounding area has been assigned a ground factor of $G = 1$, representing soft ground associated with farming land.
Atmospheric conditions	Temperature 10 °C and relative humidity 70%. These represent conditions which result in relatively low levels of atmospheric sound absorption, resulting in slightly higher predicted noise levels.
Site layout	Provided by Acciona Energía.
Dwelling heights	Assumed to be single storey (based on aerial observations).
Receiver heights	1.5 m above ground.
Noise calculation method	Noise model calculated according to International Standards Organization ISO 9613-2:2024 <i>Attenuation of sound during propagation outdoors – Part 2: Engineering method for the prediction of sound pressure levels outdoors</i> (ISO 9613-2).
Noise data for all equipment	As detailed in Section 5.2.1 and Appendix D2. Noise data has been derived based on: • candidate manufacturer data provided by Acciona Energía • empirical standards • previous noise data from MDA's library.
Operating duration	All equipment has been modelled considering maximum operational duty during all time periods. This is a significant conservative assumption.

D3 Concrete batching plant noise emission data

We have nominated noise emission data for the relevant activities from our internal noise database, based on previous projects of similar size.

The sound power levels applied in the digital noise model are presented in Table 16.

Table 16: Concrete batching plant equipment input sound power levels per unit, dB L_{Aeq}

Item	Octave band centre frequency, Hz							L _{WA}
	63	125	250	500	1000	2000	4000	
Agitator truck slumping	107	107	107	108	103	102	97	109
Agitator truck loading	109	108	102	106	102	100	97	108
Agitator truck washout	105	103	104	104	99	98	93	106
Pulse filter	91	101	100	96	95	93	88	100
Agitator truck driving - 10 km/h	107	109	102	102	101	103	99	108
Agitator truck driving - 40 km/h	109	111	104	104	103	105	101	110
Aggregate truck driving	117	111	107	104	102	100	96	108
Front end loader	111	106	106	108	105	105	99	111

Duration corrections were applied to truck noise data to account for their anticipated operational intensity within a 30 minute period.

APPENDIX E TONALITY EVALUATION

Noise associated with the operation of inverters, batteries and HV transformers has the potential to be tonal in nature, as these equipment items can exhibit tonal characteristics at source.

There is no documented or recognised method for the prediction of tonality, pre-construction. To evaluate risk associated with potential tonality, noise predictions at receivers have been repeated using one-third octave band sound power level data for noise sources. The resultant one-third octave band predictions at receivers have then been treated as effective measurements, with analysis for tonality was then conducted per the objective method detailed in Annex C of the Noise Protocol.

Validation of the ISO 9613-2 method is limited to octave band data, therefore when using one-third octave band noise data the modelling software assumes the same attenuation factors for the adjacent 2 bands. This is a limitation of the method and may result in a minor variation in the results where one-third octave band data is used.

Based on evaluation of the predicted one-third octave band noise levels at receivers for inverters and batteries, a character adjustment for tonality has not been found to be applicable.

At this stage of the Project, one-third octave band sound power levels for the transformers are not available, and an objective assessment similar to the above is not feasible.

Tonality remains a potential characteristic which should be addressed during the detailed design stage utilising the best available noise data for proposed equipment and measurement data of existing transformers at the adjacent terminal station and collector station.