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Noise Impact Assessment

Tramway Road BESS

Eku Energy

Suite 1, Level 34
360 Collins Street,
Melbourne, VIC

Prepared by:

SLR Consulting Australia

SLR Project No.: 640.031244.00001

28 April 2025

Revision: 1.1

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Revision Record

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Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Eku Energy (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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Executive Summary

This technical report is an attachment to the Tramway Road BESS Planning Application submission on behalf of Eku Energy (Eku).

SLR Consulting Pty Ltd (SLR) was engaged by Eku to provide a noise impact assessment of a proposed 300 MW / 1,200 MWh Battery Energy Storage System (BESS), located at Tramway Road, Hazelwood North.

The proposed site is located within farmland approximately 600 m south of the Hazelwood Terminal Station.

The predicted noise levels were assessed against the various requirements of EPA Victoria (EP Act, EP Regulations and Noise Protocol limits and GED).

Compliance with the Noise Protocol is expected at all sensitive receivers for all time periods for the proposed BESS with the installation of a 4.5 to 6 m wall around the north, east and south boundary of the project site.

Cumulative noise of Tramway Road BESS combined with that from other adjacent existing, proposed and approved electricity facilities was also assessed, with a potential marginal exceedance¹ of 2 dB predicted at the receiver which is the host dwelling of the Marinus Link converter station and a 1 dB exceedance at a receiver northeast of the project and southeast of other industry. It should be noted that the prediction assumes enhanced propagation, that may occur during steady downwind conditions, however, it is not possible for the receiver to be simultaneously downwind of all existing, proposed and approved electricity facilities. Furthermore, this dwelling will be removed when Marinus Link is constructed. Accordingly, the cumulative noise impact of the proposed Tramway Road BESS and surrounding existing and proposed noise emitters is considered acceptable.

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¹ Noting that the assessment of cumulative impacts was based on the conservative Rural Utilities levels of 34 dBA at night.



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Appendices

Appendix A Jeeralang Power Station Generation

Appendix B Hazelwood Terminal Station Noise Measurements

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1.0 Introduction

Eku Energy (Eku) is proposing to develop a 300 MW / 1,200 MWh Battery Energy Storage System (BESS) and substation located at Tramway Road (Lot 2\PS700402), Hazelwood North (the Project).

SLR Consulting Pty Ltd (SLR) has been engaged by Eku to undertake a noise impact assessment to support a development application.

2.0 Project Area

The proposed BESS site is located on Farming Zone (FZ) land approximately 1 km north of the town of Churchill and 600 m south of the Hazelwood Terminal Station.

The surrounding area was characterised by industry, the area is the centre of Victoria's energy industry. The now decommissioned Hazelwood and Energy Brix Power Stations and the Hazelwood opencut mine (the Hazelwood Mine Rehabilitation Project approvals are currently underway) are located within 4 km of the proposed site.

Current industry includes the Hazelwood Terminal Station and Jeeralang Power Station, 600 m and 1.5 km to the north respectively. The approved Wooreen Battery Energy Storage System² development will be constructed next to the Jeeralang Power Station and the proposed Marinus Link Hazelwood Converter Station will extend the Hazelwood Terminal Station³ into the paddock adjacent to the proposed Project.

Figure 1 shows the location of the Project with respect to surrounding existing and proposed industry.

The Proposed BESS will have a power rating of 300 MW and storage capacity of 1,200 MWh (4 hour duration) and includes:

- 294 CSI SolBank 3.0 energy storage system. Each battery is housed within a 20ft container with a 5 MWh capacity
- 98 Power Electronics PCS FP4390K inverters
- Up to 2 x 500/33/33 kV 3-winding HV transformers

The BESS is located on the eastern side of the site with the substation on the west as shown in **Figure 2**.

A preliminary design for a noise wall located on the northern, eastern and southern boundary of the BESS, with a height ranging from 4m to 5m is also shown. The wall on the northern boundary overlaps the eastern wall to allow for access to the BESS is via the north eastern corner.

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² Aurecon, 2022, Wooreen Energy Storage System (WESS) Appendix G Noise Assessment: [Appendix G.pdf](#)

³ Marshall Day, 2024, Marinus Link Environmental Impact Statement/Environmental Effects Statement Appendix T Noise and Vibration: [Marinus Link EIS/EES Technical Appendix T Noise and vibration](#)



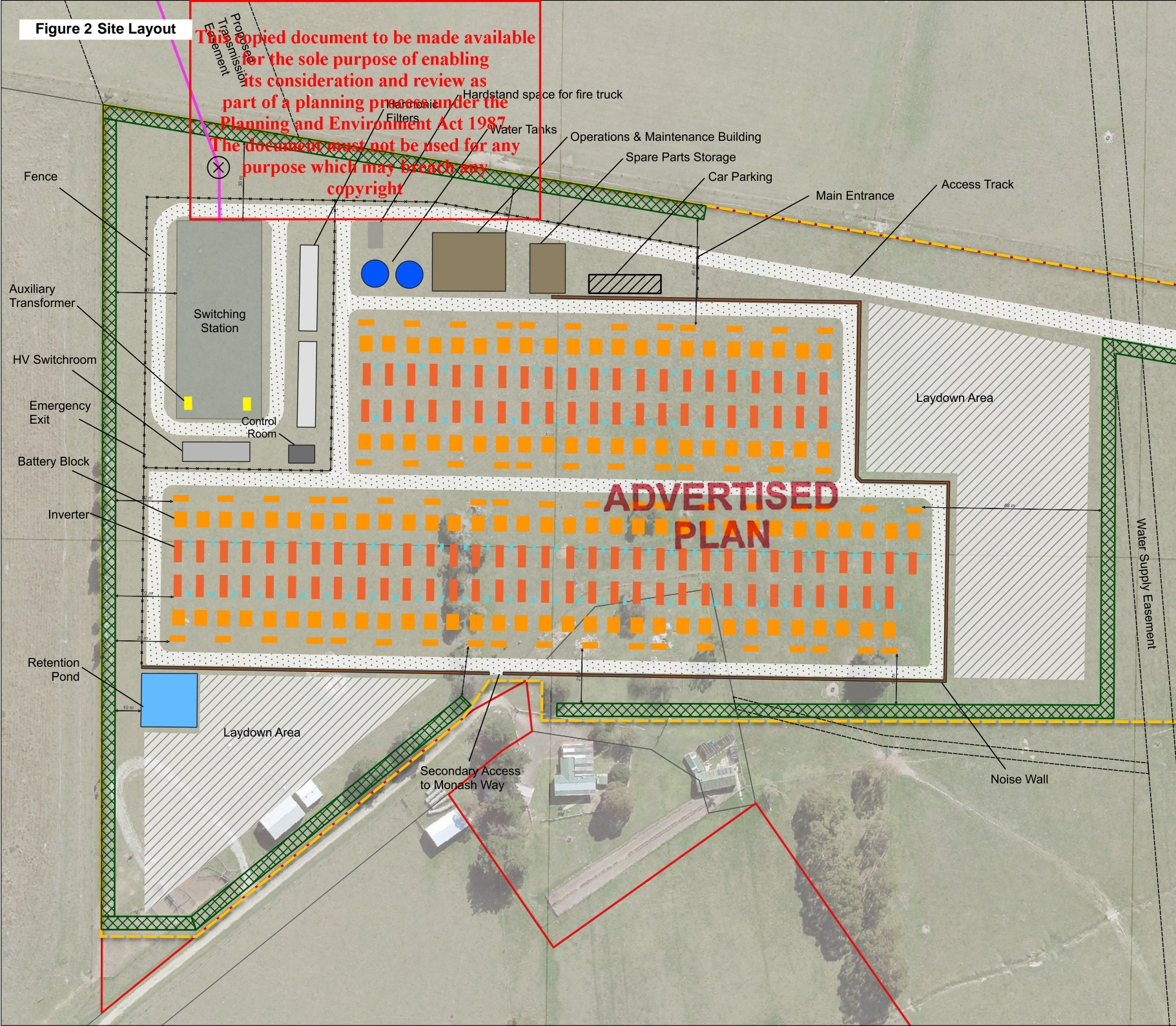
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Figure 1 Project Area



Figure 2 Site Layout

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Concept Layout Plan

2408 - Tramway Road BESS

- Development Area
- BESS Site
- 500kV Transmission Route
- Transmission Towers
- Proposed Transmission Easement
- Auxiliary Transformer
- Battery Block
- Inverter
- BMS Panel
- Operations and Maintenance
- Water Tank
- Retention Pond
- Switching Station
- Harmonic Filters
- Control Room
- HV Switching Room
- Hard Stand
- Fence
- Noise Wall
- Vegetation Screening
- Temporary Lay Down Area
- Car Parking
- Access Roads

Version: 7.1

Date: 15/04/2025

0 20 40 m

2.1 Noise Sensitive Receivers

Fifteen closest noise sensitive receivers were identified within 1.5 km of the project centroid. The majority of the closest receivers are within Farming Zones (FZ), the outskirts of Churchill (800m south of the Project) is classified as Rural Living Zone (RLZ) where representative receivers have been selected that are indicative of clusters of RLZ dwellings.

Table 1 shows the closest identified receivers and their distance to the Project centroid.

Figure 3 shows the location of the identified receivers with respect to the Project site.

Table 1 Noise Sensitive Receivers

Receiver	Address	Land Use Zone	Easting, m	Northing, m	Distance to Project Centroid (m)
R1	545 Tramway Road	FZ	450624	5762639	1220
R2	600 Tramway Road	FZ	450100	5762229	560
R3	15 Boldings Road	FZ	450296	5761800	750
R4	45 Boldings Road	FZ	450581	5761739	1040
R5	40 Boldings Road	FZ	450572	5761626	1070
R6	700 Tramway Road	FZ	449803	5761433	630
R7	16 Winchester Way	RLZ	450128	5761037	1120
R8	30 Matta Drive	RLZ	449930	5761075	1010
R9	10 Rustic Crescent	RLZ	449730	5761077	950
R10	755 Tramway Road	RLZ	449598	5761019	1000
R11	711 Monash Way	FZ	449167	5761118	990
R12	720 Monash Way	FZ	448957	5761076	1130
R13 ¹	21 Nadenbouschs Lane	FZ	448641	5761263	1200
R14	45 Nadenbouschs Lane	FZ	448595	5761466	1130
R15	633 Monash Way	FZ	448820	5761967	780

Easting and northing are relative to GDA2020 MGA Zone 55

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Figure 3 Noise Sensitive Receivers



3.0 Victorian Regulations - Project Criteria

3.1 General Environmental Duty

The general environmental duty (GED) is at the centre of the Environment Protection Act 2017 (EP Act), and it applies to all Victorians. GED states that a person who is engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste must minimise those risks, so far as reasonably practicable.

Under the 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:

- 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
- a change to the condition of the environment to make it offensive to the senses of human beings; or
- anything prescribed to be harm for the purposes of the Act or the regulations; and
- Should consider potential cumulative effect of harm arising from an activity combined with harm arising from other activities or factors.

To determine what is (or was at a particular time) reasonably practicable in relation to the minimisation of risks of harm to human health and the environment, regard must be had to the following matters:

- the likelihood of those risks eventuating,
- the degree of harm that would result if those risks eventuated,
- what the person concerned knows, or ought reasonably to know, about the harm or risks of harm and any ways of eliminating or reducing those risks,
- the availability and suitability of ways to eliminate or reduce those risks,
- the cost of eliminating or reducing those risks.

In the assessment of noise impacts with reference to GED, consideration must first be given to eliminating risks so far as reasonably practicable, and then to reducing those risks so far as reasonably practicable.

3.2 Regulated Noise Criteria

Certain types of noise within Victoria are regulated. The following sections provide an overview of how regulated noise is assessed in Victoria.

3.2.1 EP Act 2017

The EP Act prescribes that a person must not, from a place or premises that are not residential premises—

- emit an unreasonable noise; or
- permit an unreasonable noise to be emitted

Unreasonable noise means noise that—

- is unreasonable having regard to the following—



- its volume, intensity, or duration
- its character
- the time, place, and other circumstances in which it is emitted
- how often it is emitted
- any prescribed factors, or
- is prescribed to be unreasonable noise

For the purposes of the above definition, ‘frequency spectrum’ is a prescribed factor.

The EP Act prescribes that, noise emitted from commercial, industrial and trade premises is prescribed to be aggravated noise if:

- in the case of noise emitted during the day period, the effective noise level exceeds the lower of the following:
 - 75 dBA
 - the noise limit plus 15 dB, and
- in the case of noise emitted during the evening period, the effective noise level exceeds the lower of the following:
 - 70 dBA
 - the noise limit plus 15 dB, and
- in the case of noise emitted during the night period, the effective noise level exceeds the lower of the following—
 - 65 dBA
 - the noise limit plus 15 dB.

3.2.2 EP Regulations and Noise Protocol 2021

The Environmental Protection Regulations 2021 (EP Regulations) support the EP Act by providing clarity and further detail for duty holders on how to fulfil their obligations. Regulations are used to deal with matters in detail and may contain their own penalties for breaches.

In Victoria, noise emissions from commercial, industrial and trade premises are not permitted to be unreasonable or aggravated, and are subject to the provisions of the Regulations, and the *“Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues”*, EPA Publication 1826.4 (the Noise Protocol).

The Noise Protocol presents the methodology for determining the noise limit (maximum allowable level of noise emitted from a premise) when measured in a noise sensitive area. Noise sensitive areas are defined in the Regulations as that part of the land within the boundary of a parcel of land that is within 10 m of the outside of the external walls of a place where people generally sleep (homes, dormitories, hotels, hospitals, correctional facilities etc.), schools (including childcare centres) and tourist establishments in rural areas (campgrounds, caravan parks, etc.).

Table 2 presents the assessment periods prescribed by the Regulations.



Table 2 Definitions of Day, Evening and Night (Environmental Protection Regulations 2021)

Period	Day	Time
Day	Monday to Saturday (except public holidays)	7:00 am – 6:00 pm
Evening	Monday to Saturday Sunday and public holidays	6:00 pm – 10:00 pm 7:00 am – 10:00 pm
Night	Monday to Sunday	10:00 pm – 7:00 am

Rural Method – Noise Limits

With regards to the Tramway Road BESS site, all noise sensitive receivers are located outside of the Major Urban Area, therefore the determination of noise criteria follows the Rural Method.

The Noise Protocol noise limits for receivers in a rural environment normally takes into consideration both influence of the zoning map categories (and changes in zoning categories), the background noise, and the distance between the zoning boundary and receiver (where different zones apply). Special consideration applies for utilities.

Noise Limits in Rural Areas for Utilities

Section 2.6 of the Protocol defines the method for determining noise limits in rural areas for utilities, which include electricity infrastructure, which is an appropriate classification for the BESS facility.

Paragraph (31) states that if the utility is located in a Farming Zone (FZ) and the distance adjustment is 0 dB (receiver is also in FZ), then the distance-adjusted level for each period is:

- Day: 45 dBA
- Evening: 39 dBA
- Night: 34 dBA

3.3 Project Specific Noise Limits

Receivers R1 to R6 and R11 to R14 are located in a Farming Zone, therefore the project specific noise limits for these receivers are the Utility base levels. Receivers R7 to R10 are located at the edge of a Rural Living Zone (RLZ). Table B.1 in the Noise Protocol gives Zone Levels for rural areas. The most exposed receivers in RLZ are located within 100 m of the RLZ – FZ interface, therefore the distance adjustment is 0 dB and the project specific noise criteria for these receivers are the Zone Levels. **Table 3** summaries the project specific noise limits for the assessed receivers.

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Table 3 Project Specific Noise Limits

Receiver	Zone	Zone Level, dBA	Distance Adjustment	Noise Criteria
R1 to R6, R11 to R14	Farming Zone ¹	Day: 45 Evening: 39 Night: 34	N/A	Day: 45 Evening: 39 Night: 34
R7 to R10	Rural Living Zone	Day: 45 Evening: 38 Night: 33	0	Day: 45 Evening: 38 Night: 33

1: Utilities Noise Limits for Farming Zone to Farming Zone

Note from **Table 2**, Sunday 7 am to 10 pm is classified as Evening; Sunday operations are more stringent than other day times, therefore the Evening and Night criteria are critical to day and occasional early morning operations.

4.0 Noise Modelling

A 3D noise model was constructed within the modelling software SoundPLAN 8.2 to predict noise levels at the nearby sensitive receivers.

Noise modelling was conducted using the ISO 9613-2⁴ algorithms incorporated in the noise modelling software. The ISO 9613-2 algorithm predicts the A-weighted sound pressure levels under meteorological conditions favourable to propagation from sources of known sound power levels. This enhanced propagation is equivalent to downwind propagation or a moderate ground-based temperature inversion. The model also includes attenuation due to air absorption, ground attenuation and shielding.

4.1 General Modelling Assumptions

The following general assumptions are made based on best-practice modelling method to suit the project:

- The reflection-order of other buildings was set to three (3), indicating that the noise model allowed for three (3) reflections off façades.
- Source heights were set according to the source item.
- Receivers were set in the free field, 1.5 m above ground level.
- All equipment is assumed to be in operation for the entire 30 minute assessment period.
- Ground topography within 3 km of the proposed site was sourced from publicly available 5 metre digital elevation data from Geoscience Australia.
- Ground absorption is modelled by a single number parameter between 0 (hard – reflective) and 1 (soft – absorptive). The substation and BESS infrastructure was

⁴ ISO 9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*



modelled as hard ground, all other ground surfaces were modelled with a ground absorption parameter of 0.6, suitable for rural farmland.

4.2 Noise Sources

Sound power levels (SWL) and quantities of noise producing equipment shown in **Table 4** are based on OEM data and conversations about reduced load operations. The batteries and inverters have been designed to operate at lower cooling loads (i.e. fan speeds) at the expense of decreased charging/discharging rates. To compensate for this, additional batteries and inverters are required, the quantities of equipment shown in **Table 4** takes into account the load locking of the equipment.

Up to two high voltage transformers may be installed in the substation. The modelled SWL of the single unit is considered conservative. The addition of a second transformer will contribute significantly to overall levels predicted at the receivers.

All equipment items are assumed to be in operation for the entirety of a 30 minute assessment period. Noise emissions of the BESS equipment is typically dominated by cooling noise sources, which can be variable depending on the percentage of maximum power (charge/discharge) and the subsequent temperatures, both ambient and that being generated by the equipment.

Table 4 Equipment and Sound Power Levels

Qty	Item	Sound Power Level (SWL), per unit L _{eq} 15 min, dBA
276	Battery Container	74
107	Inverter	87
1	High Voltage Transformer	92

4.3 Noise Assessment

4.3.1 Noise Characteristics

The Noise Protocol contains provisions for adjustments for undesirable noise characteristics such as tonality, impulsiveness and intermittency. If one or more of these characteristics are present at the receiver, then an adjustment is applied to the overall level.

The following outlines the noise characteristics and discusses whether the adjustments are relevant to this assessment.

Tonality

Data provided by the OEM suggests that the battery fans do have tonal characteristics. Tonality is judged (subjectively) at the receiver in context with the ambient environment.

Given the propagation distances to the receivers (of the order of 800 m) and the fact that the cooling plant of the batteries and inverters operate independently with varying speeds and noise spectra at any given moment, combined with local ambient noise, it is expected that tonal characteristics of the BESS will not be distinguishable at the closest noise sensitive receivers.

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Impulsiveness

The impulsiveness characteristic refers to a dominant sudden pressure peak, or series of peaks, or a single burst with multiple pressure peaks whose amplitude decays with time or a sequence of bursts. Noise due to cooling the BESS is not impulsive in nature.

Intermittency

Intermittency is present when the noise increases in level rapidly, and by at least 5 dB, on at least two occasions during a 30 minute period and maintains the higher level for at least one-minute.

The cooling fans are expected to cycle up and down as required to cool the batteries and power electronics. However the duty cycle period exceeds 30 minutes and is not considered intermittent. Therefore, no characteristic adjustments have been applied to the following results.

4.3.2 Low Frequency Noise

Low frequency noise contains significant acoustic energy in one-third octave bands ranging from 10 Hz to 160 Hz. The OEM provided noise spectra for their units between 100 Hz to 10 kHz. Depending on the duty cycle, the cooling fans of the battery units contain significant acoustic energy in the mid-frequencies; 250 Hz to 400 Hz.

The Noise Guidelines: *Assessing Low Frequency Noise* (Publication 1996) adopts a low frequency threshold level as a screening tool to identify the potential risk of problematic low frequency noise. Given the incomplete supplier data and limitations of modelling low frequency noise with ISO9613 algorithm, exceedances of the 100, 125 and 160 Hz frequency bands were not identified at any receivers in the modelling and since the acoustic energy of the sources are most dominant around the mid-frequencies, low frequency noise is not expected to be problematic for this project.

4.4 Assessment Results

The predicted noise levels at the identified representative sensitive receivers, assessed against the most stringent night-time criterion. **Table 5** shows the predicted noise levels and margin of compliance with the relevant night criteria. Demonstrating compliance at night ensures compliance during the day and evening periods as well. The noise contour plot for this scenario is shown in **Figure 4**.

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Table 5 Predicted Noise Levels from BESS Operations

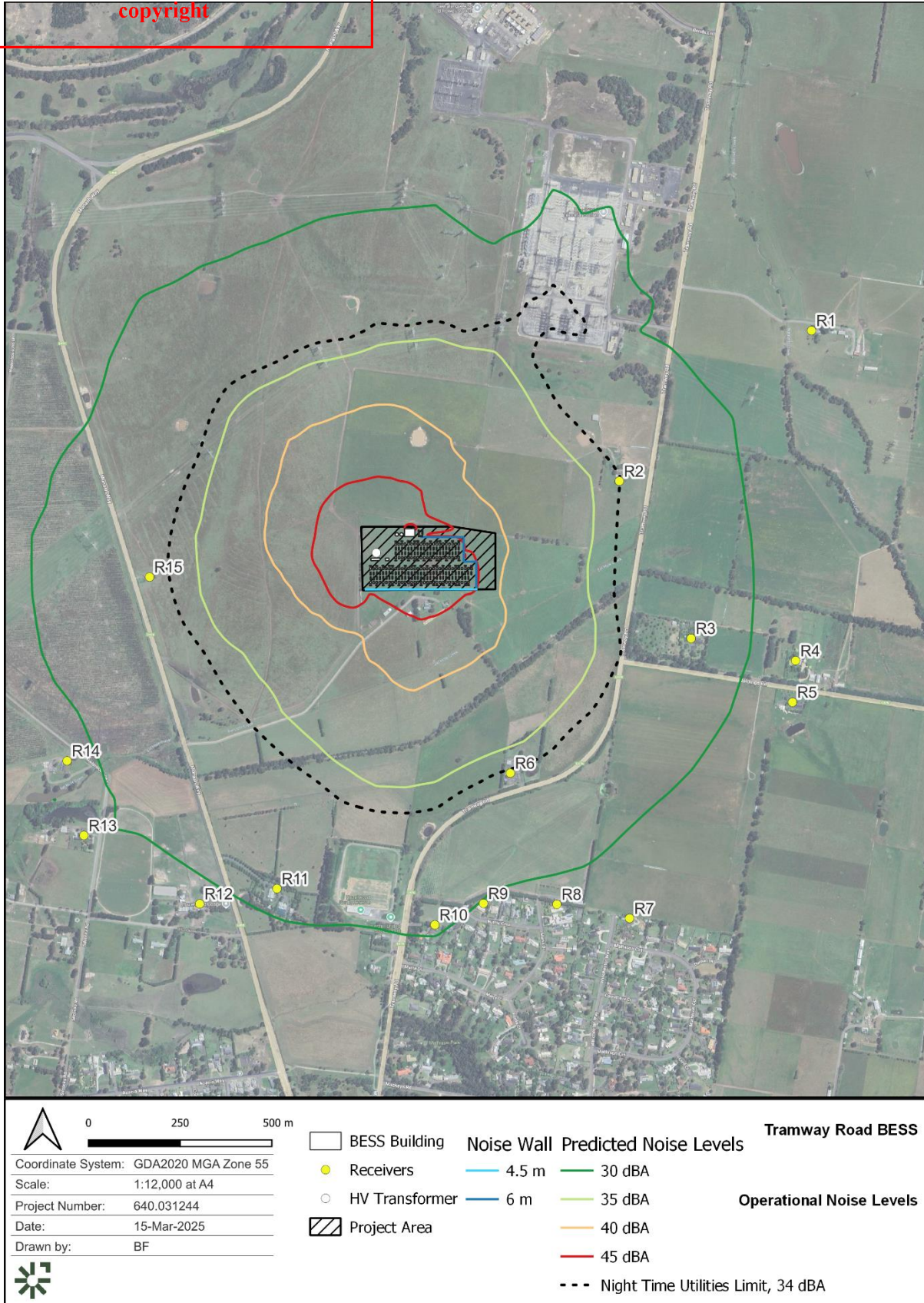
Receiver	Predicted Noise Level, dBA	Night-Time Criterion, dBA	Margin of Compliance dBA
R1	27	34	7
R2	34	34	0
R3	32	34	2
R4	29	34	5
R5	29	34	5
R6	34	34	0
R7	28	33	6
R8	29	33	5
R9	30	33	4
R10	30	33	4
R11	31	34	3
R12	29	34	5
R13	29	34	5
R14	29	34	5
R15	33	34	1

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Figure 4 Operational Noise Contours



4.4.1 Cumulative Noise

It was noted in **Section 2.0** that there are several other existing and planned (approved and proposed) industry in the surrounding project area. Of particular note to the relevant receivers on Tramway Road and Boldings Road (R1 to R6) are the:

- existing Hazelwood Terminal Station
- existing Jeeralang Power Station
- approved future Wooreen BESS
- proposed future Marinus Link Hazelwood Converter Station.

Project Specific Noise Criteria

The Hazelwood Terminal Station is located in a Special Use Zone (SUZ1) – Brown Coal (Group D) zone and receivers R1 to R6 are all located in Farming Zones (FZ). **Table 6** shows the distance adjusted levels for the Hazelwood Terminal Station. These levels assume that the receivers are not located within a “background relevant area”. All night-time criteria, except for R6 exceeds the Utilities limit of 34 dBA.

Table 6 Noise Criteria for the Hazelwood Terminal Station

Receiver	Zone Level Day/Evening/Night	Distance Adjustment	Distance Adjusted Level, D/E/N
R1	53/48/43	-3	50/45/40
R2	53/48/43	-2	51/46/41
R3	53/48/43	-6	47/42/37
R4	53/48/43	-7	46/41/36
R5	53/48/43	-8	45/40/35
R6	53/48/43	-9 ¹	45 ² /38/34
1: -9 dB is the maximum distance adjustment (Noise Protocol Clause 20a)			
2: The minimum allowable noise limit is 45/37/32 dBA (Regulation 118(2)(b))			

Background monitoring was undertaken at receiver R1 during 2021 for the Noise Impact Assessment of Wooreen BESS project (WESS)⁵, with background levels measured to be 40/40/37 dBA $L_{90, 1 \text{ hr}}$ and noise limits of background +8 dB for day and background + 5 dB for evening and night were applied for that project. Noise levels for the WESS were assessed against 48/45/42 dBA for day/evening/night respectively. The other receivers further south of R1 were not assessed.

The Marinus Link Hazelwood Converter Station will be constructed in FZ; therefore, the Utilities limits were applied⁶ giving a distance adjusted level of 45/39/34 dBA (D/E/N) for R1 to R6. These criteria are identical to those applied for this Project.

The Hazelwood Terminal Station, Jeeralang Power Station, the Marinus Link Hazelwood Terminal Station and the WESS project all result in different noise criteria for each receiver. It is proposed to assess cumulative noise impacts by considering their predicted noise

⁵ Aurecon, 2022, Wooreen Battery Energy Storage System (WESS) Desktop Noise Impact Assessment

⁶ Noise Protocol Clause 31



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Jeeralang Power Station

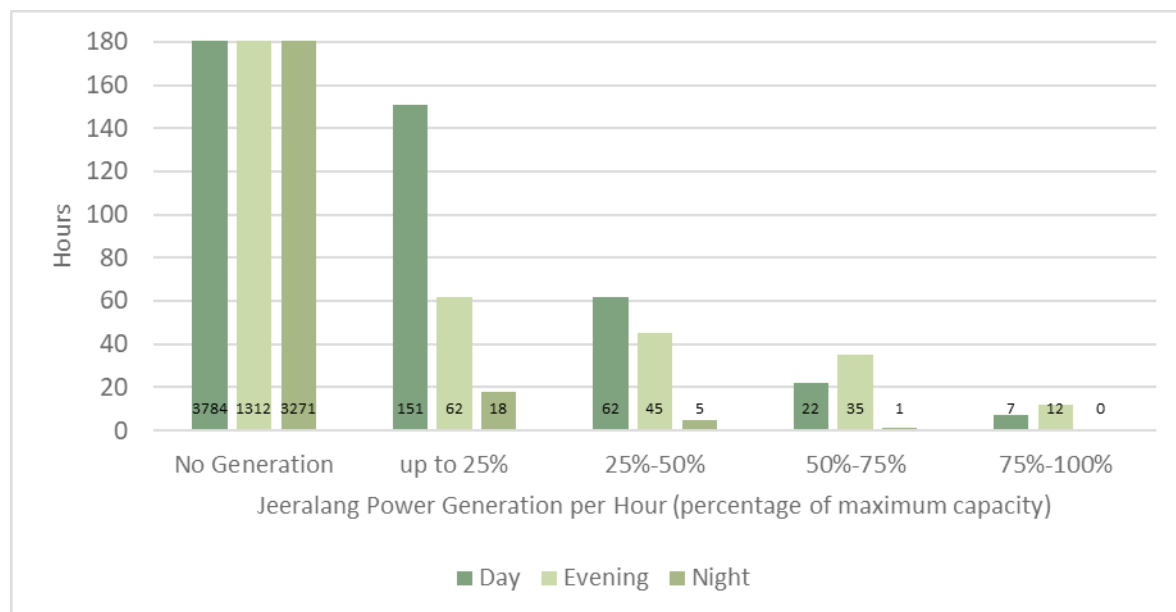
Noise emissions from Jeeralang are difficult to quantify due to the infrequency of operation and large range of operating conditions. Monitoring for the Marinus Link or Wooreen BESS projects failed to capture Jeeralang operations.

National Electricity Market (NEM) data for November 2023 to November 2024 was accessed to quantify its likely period of operation.

Overall the power station operated for 420 hours of the 12 month period analysed (4.8% of the year): 242 hours (2.8%) during the day period, 154 hours (1.7%) during the evening and 24 hours (0.3%) during the night period. **Appendix A** presents the breakdown of Jeeralang power generation by day and month, based on data from the National Electricity Market (NEM).

Figure 5 shows the power generation for the 12 month period for the day, evening and night assessment period. Jeeralang operation during the night period is rare and given the low generation reported in the NEM. Based on this it is expected that noise emissions during the night period would be low. Peak demand is during the evening period when noise limits are more relaxed. On this basis, Jeeralang Power Station has been excluded from the night period cumulative noise assessment.

Figure 5 Jeeralang Generation per Assessment Period – Nov 23 to Nov24



Hazelwood Terminal Station

It should be noted that neither of the Marinus Link or Wooreen BESS assessments considered noise from the Hazelwood Terminal Station or Jeeralang Power Station.

SLR completed a site visit on 29 November 2024 and completed a series of attended noise measurements in the adjoining paddock to the west of the terminal station, to quantify noise from the high voltage transformers and associated cooling plant (measurement details and results are produced in **Appendix B**). The noise measurements were used to calibrate these



noise sources in the SoundPLAN noise model and predict Hazelwood Terminal Station to all receivers. Jeeralang Power Station was not operational during the site visit.

Cumulative Noise Assessment

Noise from the WESS to receivers R2 to R6 were extrapolated from the receiver R1 value presented in the WESS noise impact assessment.

Table 7 shows the predicted individual contributions to receivers R1 to R6 of this Project, Marinus Link, WESS and Hazelwood Terminal Station, assessed against the night period Rural Utilities limit of 34 dBA.

Table 7 Predicted Cumulative Noise Level from this Project, Marinus Link and WESS – Night Time Operations

Receiver	Predicted Noise Contribution from Individual Projects				Cumulative Predicted Noise Level, dBA
	Tramway Rd BESS	Marinus Link ¹	WESS ²	Hazelwood Terminal Station	
R1	27	22	32	28	35
R2	34	- ³	(27)	30	36
R3	32	25	(24)	23	33
R4	29	22	(24)	22	31
R5	29	22	(22)	22	30
R6	34	22	(21)	21	34

1: Marinus Link, Appendix T, 2024, Marshall Day, Marinus Link – Victoria Terrestrial & Coastal Processes Technical Noise and Vibration Report.

2: Aurecon, 2022, Wooreen Battery Energy Storage System (WESS) Desktop Noise Impact Assessment. Receivers R2 to R6 were not assessed. Predicted level shown in parentheses have been extrapolated from the Aurecon assessment.

3: Receiver R2 is project involved with Marinus link and will cease to be a residence

The cumulative assessment indicates potential marginal 1 dB and 2 dB exceedances of the night-time FZ utilities limit predicted at receiver R1 and R2 respectively. Compliance is predicted at all other receivers. It should be noted that the prediction assumes enhanced noise propagation, that may occur during steady downwind conditions, however, it is not possible for the receivers to be simultaneously downwind of all existing, proposed and approved electricity facilities. Accordingly, the marginal exceedances at R1 and R2 should be treated as a worst-case, conservative estimate.

Furthermore, receiver R2 is also the project host for the Marinus Link and it will cease to be a noise sensitive receiver once Marinus Link is constructed.

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5.0 Conclusions

This Noise Impact Assessment was prepared to support a Planning Application for the Tramway Road BESS at Tramway Road (Lot 2\PS700402), Hazelwood North. This report presents applicable noise criteria, assessment methodology, and results including a cumulative noise impact assessment, to demonstrate the compliance with the noise limits as proscribed by the Noise Protocol.

Operational compliance can be achieved at all times with the installation of a 4.5 m to 6 m noise wall on the northern, eastern and southern boundary of the BESS. The battery and inverter cooling units were modelled as running at reduced capacity with additional plant to compensate.

Cumulative noise was considered from the project together with existing Hazelwood Terminal Station and future Marinus Link and WESS projects, and are predicted to comply with the more conservative FZ Utilities noise limits at all receivers except for R1 and R2. It is noted that R2 will be vacated for the Marinus Link project, and R1 is situated northeast of Tramway Rd BESS project and southeast of the proposed WESS. It is extremely unlikely that R1 will be downwind of both industries simultaneously as the worst-case noise modelling assumes. Furthermore, cumulative noise would comply with a larger margin of compliance to the SUZ distance adjusted limits applicable to the Hazelwood Terminal Station.

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Appendix A Jeeralang Power Station Generation

Noise Impact Assessment

Tramway Road BESS

Eku Energy

SLR Project No.: 640.031244.00001

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This section discusses the infrequent operation of Jeeralang Power Station.

Jeeralang is a 460 MW peaking facility consisting of seven gas fired turbines that are used sporadically during periods of peak demand.

National Electricity Market (NEM) data for 2023 was accessed to quantify its likely period of operation. **Figure 6** shows the power generation by hour and month. The majority of power generation is during the peak evening period: 6 pm to 8 pm and generally during the cooler months, particularly June.

Overall the power station operated at least one turbine for 4.8% the 12 month period analysed: 2.8% during the day period, 1.7% during the evening and 0.3% of the night period.

Figure 6 Jeeralang Power Station Generation by Hour – Nov. 2023 to Nov. 2024.

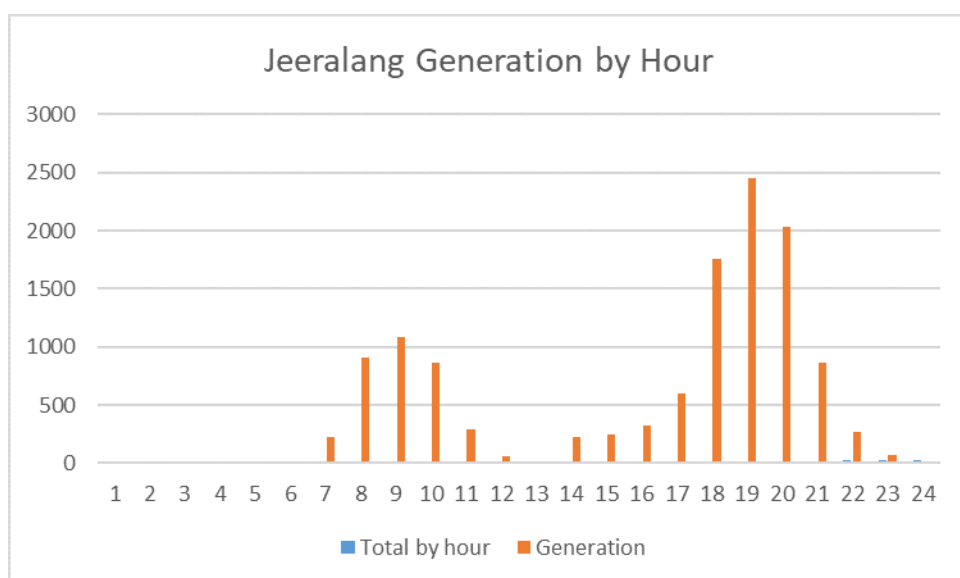
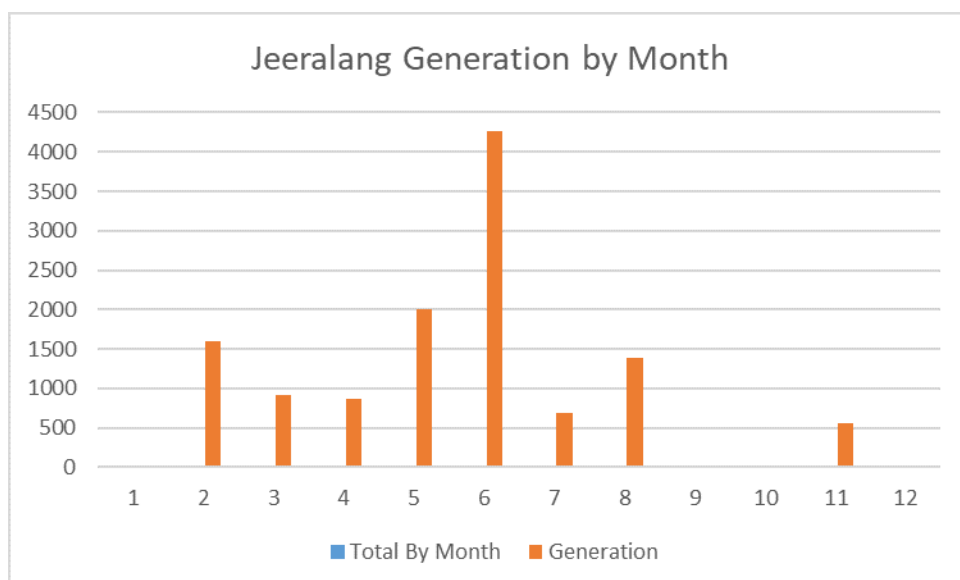


Figure 7 Jeeralang Power Station Generation by Month – Nov 2023 to Nov 2024.

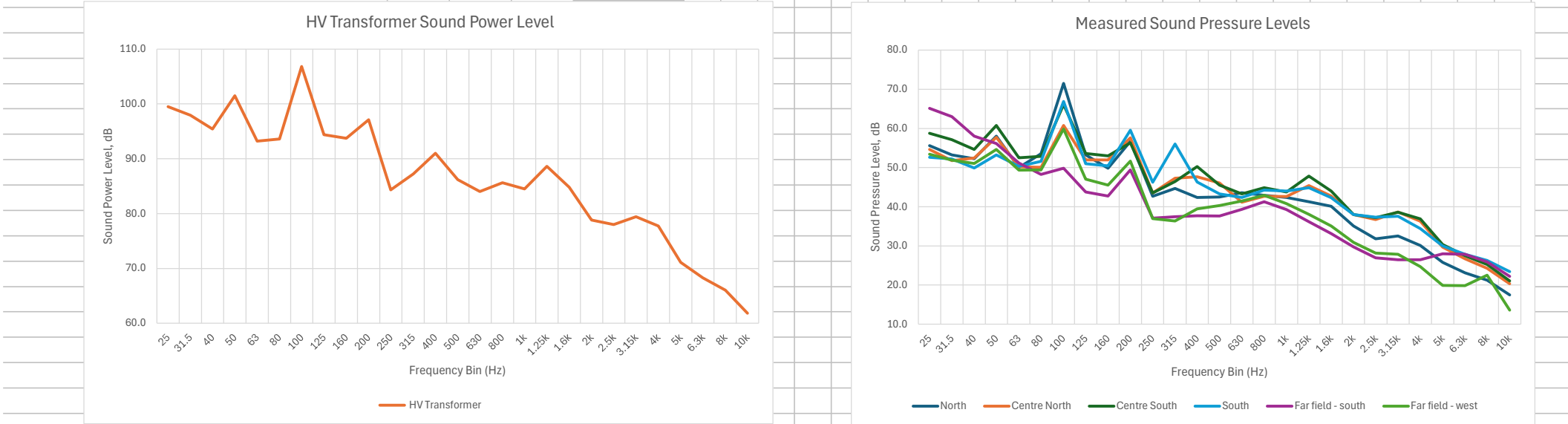




Job No.		Job Title			
Date Created	By	Date Revised	Rev	Sheet	
29 Nov 2024	BF	03 Dec 2024	0	1	
Date Reviewed	By	Review Type	Review Status		

Hazelwood Terminal Station - Measurement Results

Item / Description	Distance to Source	Rating/Broadband/Input			1/3 Octave Band Centre Frequency, Hz																											
		Rating	dB	dB(A)	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	
Measred Results																																
North	55			55.2 (A)	55.6	53.3	52.2	58.0	50.0	53.6	71.5	53.2	49.8	56.7	42.7	44.6	42.4	42.5	43.6	42.9	42.4	41.3	40.1	35.0	31.8	32.5	30.1	25.8	23.1	21.3	17.5	
Centre North	45			54.2 (A)	54.6	51.8	52.5	57.7	50.1	50.1	60.8	52.0	52.0	57.6	43.5	47.3	47.6	46.1	41.1	42.7	42.6	45.4	42.8	38.0	36.7	38.7	36.3	29.7	26.7	24.3	20.3	
Centre South	45			55.6 (A)	58.8	57.1	54.6	60.8	52.5	52.9	66.1	53.6	53.0	56.3	43.5	46.4	50.3	45.5	43.3	44.8	43.7	47.9	44.0	38.0	37.2	38.6	36.9	30.3	27.5	25.3	21.1	
South	45			56.1 (A)	52.6	52.2	49.9	53.2	50.3	51.6	66.9	51.0	50.5	59.5	46.2	56.0	46.3	43.3	42.4	44.3	44.0	44.8	42.3	38.0	37.3	37.6	34.4	30.0	27.9	26.3	23.4	
Far field - south	170			47.4 (A)	65.1	63.0	58.0	56.1	51.2	48.3	49.8	43.7	42.7	49.4	37.1	37.4	37.7	37.6	39.4	41.2	39.3	36.2	33.2	29.7	26.9	26.4	26.4	28.0	27.9	25.9	22.2	
Far field - west	180			49.5 (A)	53.4	51.9	51.0	54.6	49.3	49.4	59.8	47.0	45.6	51.7	37.0	36.4	39.5	40.3	41.5	42.9	40.8	38.0	35.1	30.9	28.1	27.9	24.7	19.9	19.8	22.5	13.6	
Calculated Sound Pressure Level																																
HV Transformer				96.4 (A)	99.5	97.9	95.4	101.5	93.2	93.6	106.8	94.4	93.7	97.1	84.3	87.2	91.0	86.2	84.0	85.6	84.5	88.6	84.8	78.8	78.0	79.4	77.7	71.1	68.3	66.0	61.8	



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Appendix B Hazelwood Terminal Station Noise Measurements

Noise Impact Assessment

Tramway Road BESS

Eku Energy

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This section presents noise measurement results from Hazelwood Terminal Station (HTS). SLR attended the paddock to the west of the terminal station on 29 November to quantify the Terminal Station's noise contributions to nearby receivers.

Figure 8 shows the location of the four high voltage transformers on the western boundary of HTS and the attended measurement locations. **Figure 9** and **Figure 10** shows the sound level meter at the South and Far Field West measurement locations.

All transformers were audible during the site visit. Forced cooling noise could be heard from the Centre South transformer (refer to **Figure 8**). The transformers had a clear tonal characteristic at 100 Hz, with harmonics in the 200 and 315 Hz frequency bins. No other noise sources were identified in the HTS.

Weather conditions were moderately windy during the site visit, a clear measurement of the HTS was not possible from the Far Field South location. Extraneous wind noise masked tonal qualities of the transformer. Aeolian noise was observed from the overhead high voltage lines at times.

The following table shows the measured noise results and calculated sound power level of a single HV transformer.

Figure 8 Attended Measurement Locations



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Figure 9 Measurement Location South



Figure 10 Measurement Location Far Field West



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