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Little River BESS

405-455 Sandy Creek Road, Little River, Victoria.

Acoustic Report – Environmental Noise Emission Assessment

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1. Introduction

The proposal includes the construction and operation of a new battery energy storage system (BESS) facility at the site described as 405-455 Sandy Creek Road, Little River.

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

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

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

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2. Noise Assessment Objectives

When addressing potential noise emissions associated with the noise sources under consideration, the assessment must consider the requirements of the Environmental Protection Act 2017, and referral documentation including:

- Environment Protection Regulations 2021.
- EPA Publication 1826.5 'Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues'.
- Environmental Reference Standard.
- EPA Publication 1996 Noise Guideline – assessing low frequency noise.

In consideration of the above, the primary objective of the noise assessment is to determine whether the proposed site operating conditions satisfy the minimum requirements of the Environment Protection Act, and whether noise emissions comply with the requirements of the above Regulations and guideline documentation.

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3. Noise Assessment Terminology

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

Table 1: Noise Assessment Terminology

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

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4. Measurement Equipment

As part of the assessment works, WMG has used the equipment described in Table 2 below.

Table 2: Measurement Equipment List

Equipment Designation	Use of Equipment
Rion NA27 Precision Sound Level Meter	Handheld Noise Measurements
Ngara Real Time Sound Acquisition System	Fixed Position Unattended Noise Monitoring

Field calibration of the measurement equipment was checked with a Bruel & Kjaer Type 4230 Sound Level Calibrator at commencement and completion of the noise measurements and found to be within the correct calibration range.

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5. Site and Surrounding Environment

The land under consideration is located at 405-455 Sandy Creek Road, Little River and abuts a former landfill and quarry to the north. farmland to the south and west, and Sandy Creek Road to the east.

More broadly, the site is located in proximity to the You Yangs Regional Park, which is located to the southeast of the site, as well as the existing Boral Quarries site which is located at 390 Sandy Creek Road to the east.

The land within immediate proximity of the proposed use is generally vacant farmland which would not be considered noise sensitive in accordance with legislative or guideline criteria. However, there are scattered residential properties which are primarily located to the west and south of the subject site, including within the overall site boundary.

For the purposes of this assessment, the closest and therefore most critical sensitive uses located within proximity to the site will include:

- **R01** – 405-455 Sandy Creek Road (located within the boundaries of the subject site).
- **R02** – 1720 Bacchus Marsh Road.
- **R03** – Cluster of residential dwellings at 1580–1600 Bacchus Marsh Road.

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

Figure 1 below provides an aerial image of the subject site boundary, the proposed BESS location and the surrounding environment including the sensitive receptors which have been considered as part of the noise emission assessment.

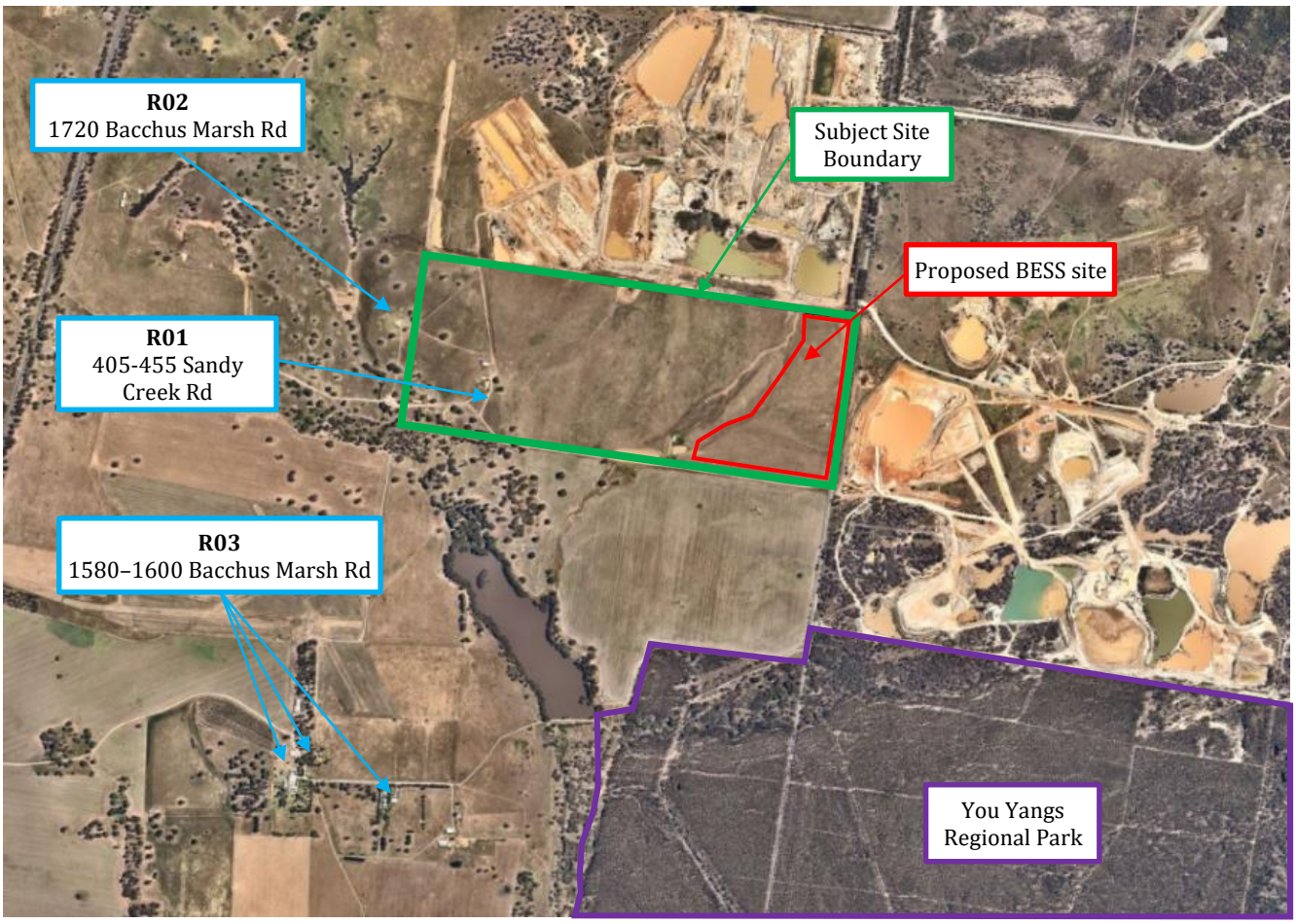


Figure 1: Aerial photo of subject site and surrounding environment

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6. Proposed Site Layout and Operations

The proposed development is a 4-hour BESS consisting of:

- 110no. MVPS units (MVPS Model: SMA MVPS 4600-S2).
- 275no. Battery storage containers (BESS Model: CATL EnerX 0.25P).
- 2no. 220MVA transformers.
- 4no. 10 MVar Harmonic filters.

The equipment will be arranged in rows adjacent to the eastern site boundary with the main site transformers located toward the southern site boundary.

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

Figure 2 below provides the site plan for the proposal.

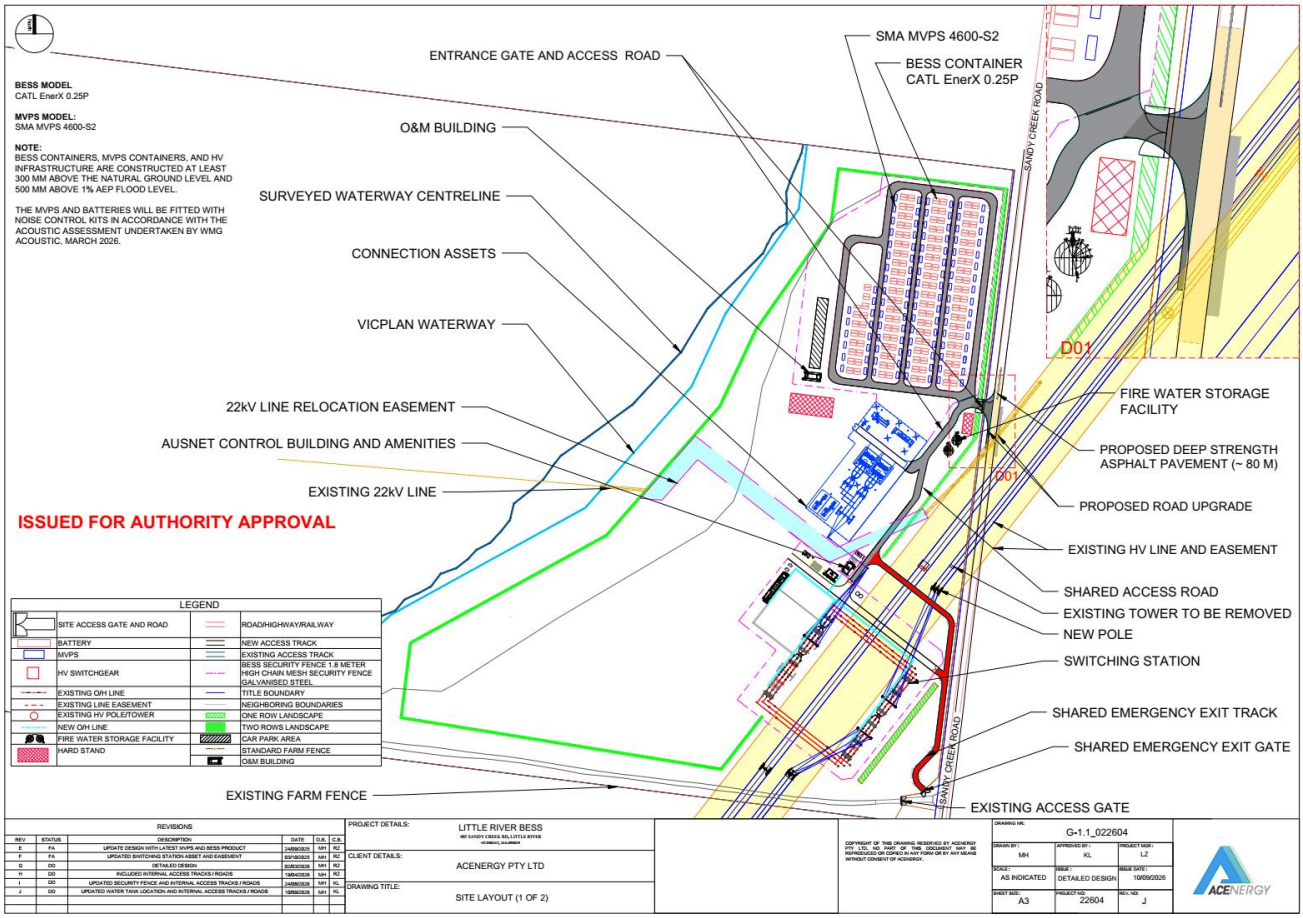


Figure 2: Proposed 4-hour BESS site plan including proposed electrical infrastructure

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7. Noise Assessment Criteria

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

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

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

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

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

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

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

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

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

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

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7.1. EPA Publication 1826.4 – Noise Protocol

7.1.1. General Methodologies

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

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

Further to the above, it is understood that the site operations will be considered as a 'utility installation' in accordance with clause 73.03 of the Victorian Planning Provisions (VPP) and will therefore be subject to specific Noise Protocol requirements. These requirements are nominated in Section 2.6 of the Noise Protocol.

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

The relevant day, evening, and night assessment periods are shown in Table 3.

Table 3: Details of EPA Assessment Periods

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

In accordance with the Noise Protocol, 'zoning levels' for commercial noise emissions are determined based on the land zoning for the 'noise generator' and the 'noise receiver'.

Where relevant, 'zoning levels' can then be adjusted based on the distance separation between the noise generating zone and the noise receivers, and by the presence of elevated 'ambient background' noise levels.

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7.1.2. Determination of Noise Protocol Noise Limits

Both the proposed BESS and the sensitive receptors (R01-R03) are located within continuous farm zone (FZ) land as shown below in Figure 3.

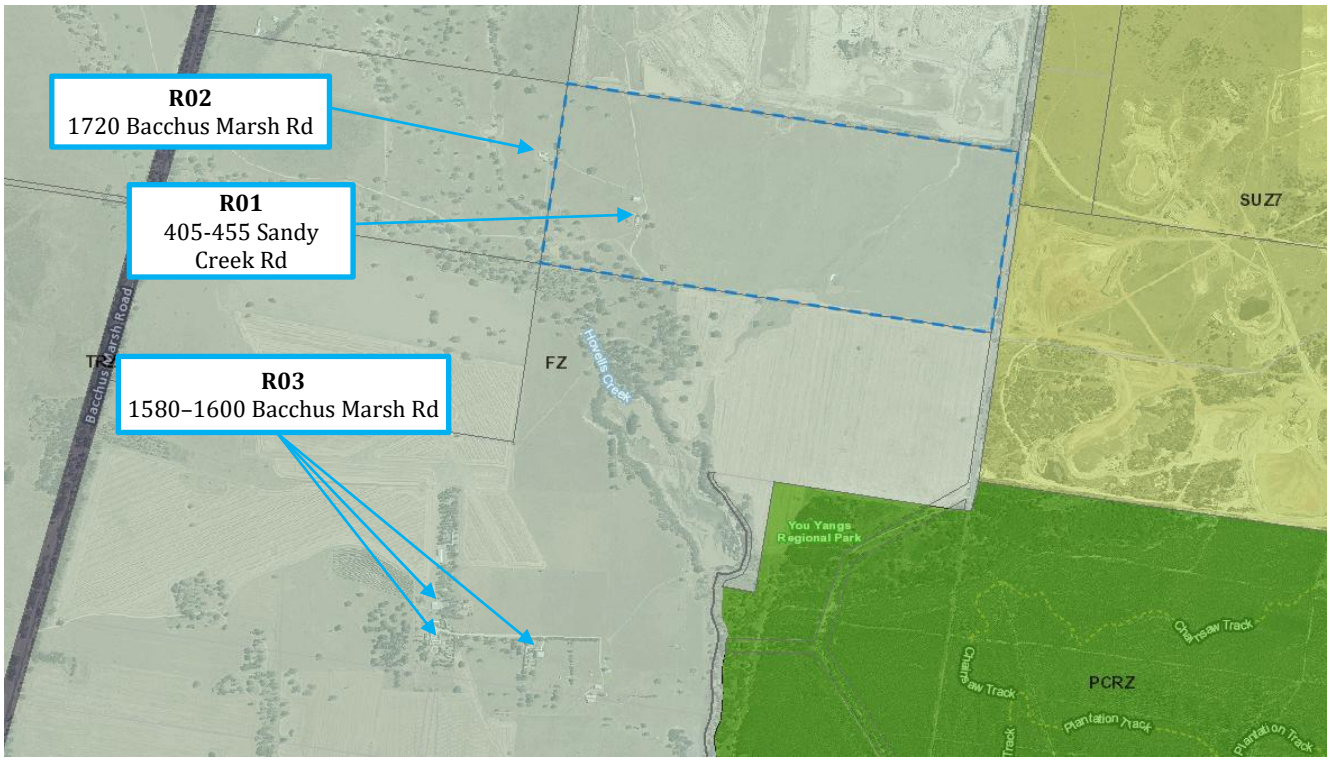


Figure 3: Land zoning of site and surrounding environment

In accordance with the methodologies nominated within the Noise Protocol, which includes consideration of the land zoning of the noise 'generating' zone and 'receiving' zone, the 'zone levels' for the nearest relevant receptors will be as summarised below in Table 4.

Table 4: Noise Protocol Zone Levels – Utility Installation

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

Due to the contiguous land zoning between the proposal and the surrounding receptors, the zone levels nominated above will be adopted as Noise Protocol noise limits. A distance adjustment will not be applicable.

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

The relevant assessment period will be 30 minutes.

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7.1.3. Cumulative Contributions from Other Noise Sources

In accordance with the guidance provided in EPA Publication 1997 *'Technical guide: Measuring and analysing industry noise and music noise'*, noise emissions associated with site operations should also consider potential contributions associated with existing or anticipated future industry.

The approach within the Publication adopts an 'equal sharing' principle whereby the noise criteria for a single use is reduced by an amount calculated from the number of premises contributing to the noise, where N is the total number of industrial premises. A value of 10 x log10(N) is subtracted from the noise limit to establish the assessment criteria.

In some instances, this approach is too simplistic, therefore, for the purposes of this assessment, WMG has considered site observations and noise measurements to determine a suitable design objective for the proposed use.

The site land is generally surrou nded by farmland to the west and south, however does abut a landfill site to the north and Special Use Zone (SUZ7) land to the east which is occupied by Boral Quarries.

The client has confirmed that the site to the north is not operational, and hence has not been considered. The Boral Quarries site however, is operational and has potential to contribute to the acoustic environment at the critical noise sensitive receptors relevant to the assessment.

The location of the quarry, and it's main operations relative to the critical receptors is included below.

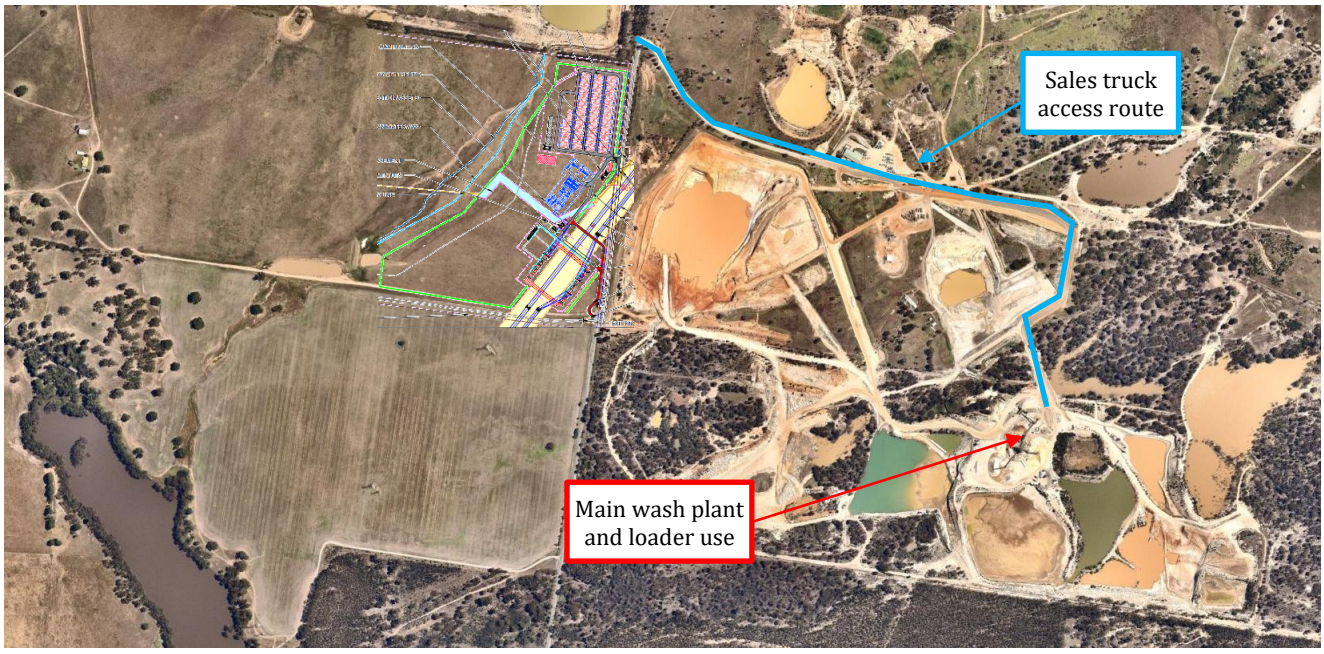


Figure 4: Quarry site and main areas of operation

At the direction of the client, WMG engaged with the quarry manager, and was able to understand, and measure noise emissions associated with their typical operations.

As part of the discussions, the quarry manager advised that from an operational perspective the site is small, and the activities which occur there are limited. The operating hours of the quarry were advised to be as follows:

- Monday to Friday – 6:00am to 6:00pm.
- Saturday – 6:00am to 2:00pm.
- Sunday – no operations.

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Due to the proposed 24-hour operation of the BESS site, it will be the EPA night period between 10:00pm and 7:00am which will provide the limiting criteria for the assessment. During other times, the constant noise emissions from the BESS facility will be 5 dB(A) lower than the evening limit and 11 dB(A) lower than the day limit.

In consideration of the above, the proposed BESS operations can allow for quarry operations to be dominant during the day and evening, however, may need to allow for contributions during the morning between 6:00am and 7:00am.

This period has therefore formed the basis for the assessment.

During the critical early morning period, the quarry manager advised that the typical operations would include:

- Continuous operation of the main wash plant including an associated front-end loader.
- Up to two trucks may enter and exit the site during an assessable 30-minute period.

It was noted that the quarry was also occupied by other equipment including a dredge, however the quarry operator advised that other equipment would not operate during the early morning period, and hence has not been considered.

In order to consider noise emissions associated with the quarry site, WMG undertook attended and unattended noise monitoring during the following dates and times:

- Attended monitoring during the period 8:30am to 4:30pm Monday 11th September 2023.
- Attended monitoring during the period 5:30am to 3:00pm Monday 18the September 2023.
- Unattended monitoring during the period Monday 11th to Monday 18th September 2023.

During the monitoring periods, noise measurements were undertaken at the locations shown below.

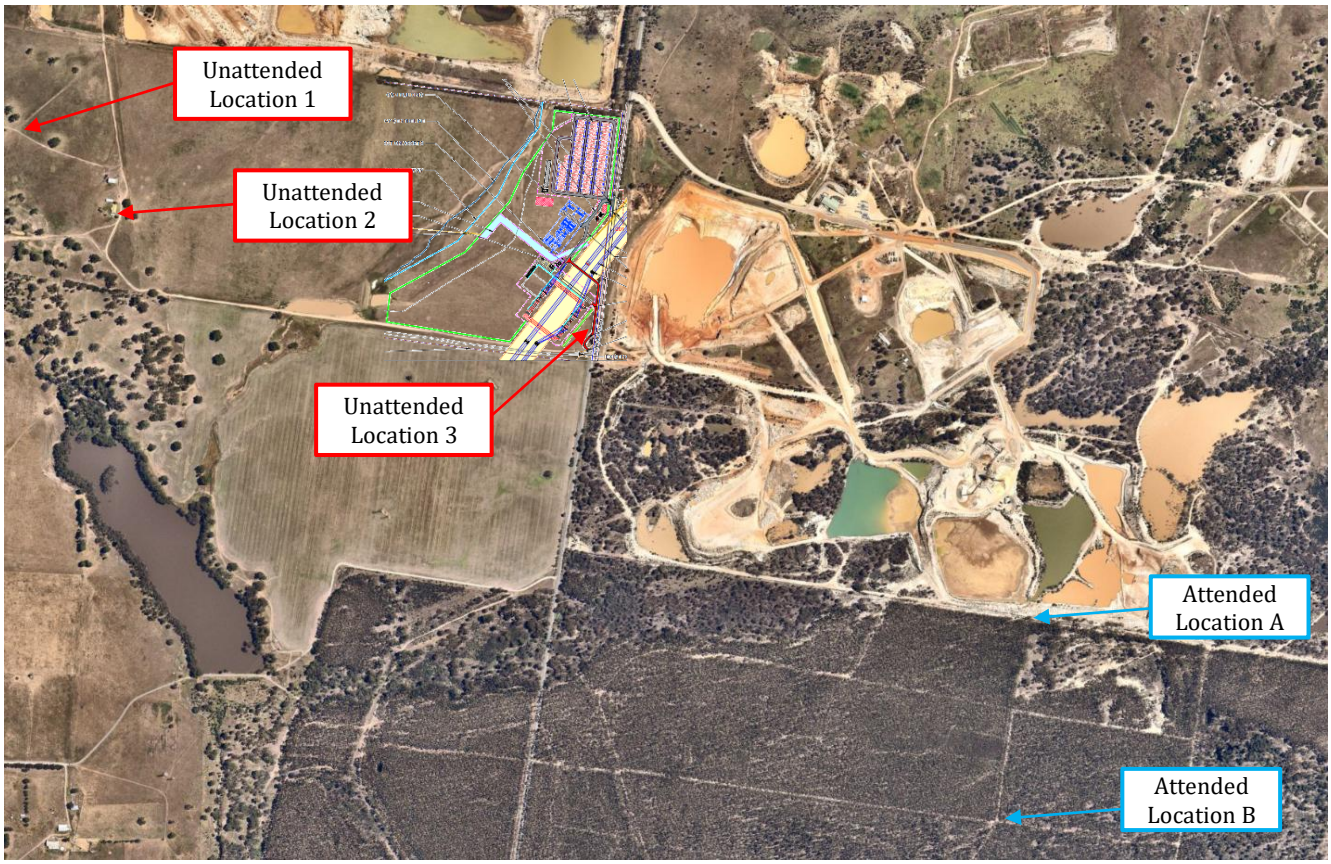


Figure 5: Site noise monitoring locations

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The site testing conducted during the early morning on Monday 18th September was chosen to align with forecasted weather conditions including light easterly breezes assisting propagation of noise from the quarry to the critical R01 and R02 receptors. Upon arriving at site, the breeze conditions included a northerly component and gradually shifted to be an easterly later in the morning.

During the northerly breeze conditions, WMG undertook measurements at Attended Location A and B (Figure 5) to capture residual noise associated with the main wash plant and mobile loader equipment at approximately 370m-870m under assisting breeze conditions.

As the breeze shifted to include an easterly component, the attending consultant moved to the R01 receptor location and undertook attended noise measurements and observations of the acoustic environment.

A summary of the measured noise levels under each of the breeze conditions is included below.

Table 5: Summary of measured noise levels

Measurement Location	Measured Noise Level	Observations & Comments
Attended Location A	50 dB(A) L_{eq}	Measured under northerly breezes. Noise due to quarry wash plant audible and dominant. Mobile plant including loader audible due to low frequency character.
Attended Location B	37 dB(A) L_{eq}	Measured under northerly breezes. Noise due to quarry wash plant was audible. Also, audible contributions from vehicle movements along nearby roads.
Receptor R01	30 dB(A) L_{eq}	Measured under easterly breezes. The acoustic environment dominated by noise due to birds, and distant traffic during lulls in bird noise. Noise due to quarry was perhaps just detectable on occasion, however not definitively measurable above background.

Due to the dominant contributions from birds and traffic at the R01 receptor, WMG has used the above measurements to calibrate a noise model and predict residual noise impacts at the R01 receptor.

The noise model has included a source sound power level of 109 dB(A) for the main wash plant and associated loader operating continuously, and 104 dB(A) for each sales truck travelling along the access road at the site.

The results of the noise model indicate that noise contributions due to the operation of the quarry site are expected to be in the order of 27 dB(A) L_{eq} during the critical morning period between 6:00am and 7:00am Monday to Saturday.

In consideration of the above, predicted quarry noise contributions have been included when assessing the potential cumulative noise impacts at the R01-R03 receptors in proximity to the subject site.

Due to the variation in land zoning for the subject site and the quarry, each of the sensitive receptors in proximity to the site will be subject to two different noise limits. The BESS site operations will be subject to the values nominated in Table 4, whereas noise emissions from the quarry will be subject to the limits nominated in Table 6 below.

Table 6: Earth Resources Noise Limits

EPA Assessment Period	Relevant Days	Time Periods	Earth Resources Noise Limits
Day	Monday to Saturday	7:00am to 6:00pm	46 dB(A) L_{eq}
Evening	Monday to Saturday	6:00pm to 10:00pm	41 dB(A) L_{eq}
	Sunday, Public Hols.	7:00am to 10:00pm	
Night	All Days	10:00pm to 7:00am	36 dB(A) L_{eq}

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This is a unique situation, however, for the purposes of this assessment, WMG's approach will be as follows:

- Noise emissions due to subject site operations must comply with the derived noise limits (Table 4).
- Cumulative noise impacts due to the subject site operations, and quarry operations must comply with the higher of the noise limits referenced in Table 4 and Table 6.

7.1.4. Noise Protocol Assessment Adjustments

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

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

Clarification regarding each of the adjustments is shown below in Table 7.

Table 7: Noise Protocol Assessment Adjustments

Relevant Adjustment	Description
Tonal Adjustment	When the noise is tonal in character then an adjustment shall be made as follows: ▪ When the tonal character of the noise is just detectable then + 2 dB(A). ▪ When the tonal character of the noise is prominent then + 5 dB(A).
Impulsive Adjustment	When the noise is impulsive in character then an adjustment shall be made as follows: ▪ When the impulsive character of the noise is just detectable then + 2 dB(A). ▪ When the impulsive character of the noise is prominent then + 5 dB(A).
Intermittency Adjustment	An intermittency adjustment applies when the noise increases in level rapidly by at least 5 dB, on at least two occasions during a 30-minute period and maintains the higher level for at least one minute duration. The relevant intermittency adjustments applicable include: ▪ When the level increase is >10 dB during the day period, then apply an adjustment of +3 dB(A). ▪ When the level increase is 5-10 dB during the night period, then apply an adjustment of +3 dB(A). ▪ When the level increase is >10 dB during the night period, then apply an adjustment of +5 dB(A).
Reflection Adjustment	When the measurement point is located outdoors and the microphone is located from 1 to 2 metres from an acoustically reflecting surface, an adjustment of -2.5 dB shall be made.
Duration Adjustment	When the noise emissions do not occur over the whole of a continuous 30-minute period, then a duration adjustment based upon the total amount of time for which the noise occurs over that continuous 30-minute period shall be determined.

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

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7.2. Environment Reference Standard

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

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

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

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

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

Potential noise impacts at residential properties will be captured by the Noise Protocol, and hence the ERS will not require consideration at these receptors. However, it is noted that the You Yangs Regional Parkland is situated in the order of 600m to the southeast of the subject site.

In consideration of the above, WMG has provided commentary regarding predicted noise levels within the parkland relative to the values nominated within the ERS.

7.3. EPA Noise Guideline – Assessing Low Frequency Noise

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

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

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

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

The threshold levels for indoor and outdoor measurements are included within Table 8 below.

Table 8: Indoor and outdoor measurement one-third octave band noise level thresholds

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

Whilst Publication 1996 is presented as a guideline, it is understood that the EPA will require reasonably practicable measures to be considered where values are measured or predicted to be higher than the thresholds.

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

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7.4. Greater Geelong Planning Scheme

Clause 13.05-1S of the Greater Geelong Planning Scheme includes requirements relating to noise management and ensuring development does not adversely impact upon amenity and human health.

The **objective** of Clause 13.05-1S seeks to assist the management of noise effects on sensitive land uses.

The **Key Strategies** of the Clause are to:

- Ensure that development is not prejudiced, and community amenity and human health is not adversely impacted by noise emissions.
- Minimise the impact on human health from noise exposure to occupants of sensitive land uses (residential use, child care centre, school, education centre, residential aged care centre or hospital) near the transport system and other noise emission sources through suitable building siting and design (including orientation and internal layout), urban design and land use separation techniques as appropriate to the land use functions and character of the area.

The relevant documentation applicable under the Clause for this project includes:

- Environment Protection Regulations under the Environment Protection Act 2017.
- Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues (Publication 1826, Environment Protection Authority, May 2021).
- Environment Reference Standard.

Consideration of potential noise impacts relative to the criteria described in Section 7.1-7.3 is expected to adequately address the requirements of the Planning Scheme.

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8. Operational Noise Emission Assessment

8.1. Noise Prediction Methodology

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

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

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

For this assessment, the modelling software has implemented the calculation procedures defined within International Standard ISO 9613. The described standard has been considered and approved as part of previous projects requiring noise emission assessment works.

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

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

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

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

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

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

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8.2. Site Configuration and Relevant Noise Sources

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

- 110no. MVPS units (MVPS Model: SMA MVPS 4600-S2).
- 275no. Battery storage containers (BESS Model: CATL EnerX 0.25P).
- 2no. 220MVA transformers.
- 4no. 10 MVar Harmonic filters.
- 10no. 1.6MVA auxiliary transformers.

The client has selected MVPS and battery equipment which has been fitted with effective noise control options hence significantly reducing noise emissions relative to previous site assessments.

For the purposes of this assessment, WMG has considered source noise data provided by the inverter and battery unit manufacturers combined with input from the client. A summary of the sound power levels adopted for each item of equipment is included within Table 9.

Table 9: Adopted source sound power levels

Noise Source	WMG Adopted Sound Power Level
MVPS inverter unit – fitted with silencer (MVPS Model: SMA MVPS 4600-S2)	86 dB(A) – per unit
MVPS Transformer – 5MVA	68 dB(A) – per unit
Battery cabinet liquid cooling unit (BESS Model: CATL EnerX 0.25P)	80 dB(A) – per unit
Main transformer – 225 MVA	91 dB(A) – per unit
Harmonic Filter – 10 MVar	76 dB(A) – per unit
Auxiliary Transformers – 1.6MVA	61 dB(A) – per unit

For the purposes of the assessment, the noise sources have been modelled as follows:

- MVPS inverter units and MVPS transformer – As an omnidirectional noise source. There may be the potential for the MVPS to include directivity which may reduce noise emissions in some directions pending orientation.
- Battery units – As an enclosure with a point source for the chiller facing east and the inlet facing north to reflect the orientation of the battery enclosure. The chiller unit is the dominant noise source for the BESS container.
- Main transformers, auxiliary transformers and harmonic filters – As an omnidirectional noise source.

Once commissioned, the electrical infrastructure which forms part of the facility will operate continuously 24 hours per day, 7 days per week. The assessment therefore considers emissions during the day, evening, and night periods.

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

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

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

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8.3. Predicted Noise Levels

8.3.1. Noise Protocol Assessment at Residential Receptors

The results of the noise model are presented below in Table 10-12.

Table 10: Noise Protocol Assessment (R01)

Descriptor	Noise Level
Predicted noise contributions from BESS site	29 dB(A) L_{eq}
Noise Protocol tonal character adjustment	+ 5dB(A)
Effective noise level at receptor	34 dB(A) L_{eq}
Noise Protocol noise limit – critical night period	34 dB(A) L_{eq}
Cumulative contribution from existing Quarry	27 dB(A) L_{eq}, and hence + 2dB(A)
Cumulative noise level at receptor	36 dB(A) L_{eq}
Cumulative noise limit – critical night period	36 dB(A) L_{eq}

Table 11: Noise Protocol Assessment (R02)

Descriptor	Noise Level
Predicted noise contributions from BESS site	27 dB(A) L_{eq}
Noise Protocol tonal character adjustment	+ 5dB(A)
Effective noise level at receptor	32 dB(A) L_{eq}
Noise Protocol noise limit – critical night period	34 dB(A) L_{eq}
Cumulative contribution from existing Quarry	25 dB(A) L_{eq}, and hence + 2dB(A)
Cumulative noise level at receptor	34 dB(A) L_{eq}
Cumulative noise limit – critical night period	36 dB(A) L_{eq}

Table 12: Noise Protocol Assessment (R03)

Descriptor	Noise Level
Predicted noise contributions from BESS site	22 dB(A) L_{eq}
Noise Protocol tonal character adjustment	+ 5dB(A)
Effective noise level at receptor	27 dB(A) L_{eq}
Noise Protocol noise limit – critical night period	34 dB(A) L_{eq}
Cumulative contribution from existing Quarry	25 dB(A) L_{eq}, and hence + 5dB(A)
Cumulative noise level at receptor	32 dB(A) L_{eq}
Cumulative noise limit – critical night period	36 dB(A) L_{eq}

The findings of the assessment indicate that noise emissions from the proposed use are predicted to comply with the Noise Protocol noise limits at the noise sensitive receptors.

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8.3.2. Consideration of Low Frequency Noise Emissions

In order to provide a basis for understanding low frequency noise emissions from the proposal, WMG has considered one-third octave band values which have been provided by the equipment manufacturers.

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

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

As is discussed within EPA Publication 1996, predicting low frequency noise at sensitive receptors can be problematic and of limited accuracy. WMG has therefore used the results of the noise model as a screening tool to assess the risk of low frequency noise from the proposal.

It must be noted that the noise model does not provide predicted noise levels between 10Hz and 20Hz which are included within the low frequency guideline. Based on analysis of noise levels measured at the independent site with similar electrical infrastructure, it is unlikely that the source will include significant low frequency noise at these frequencies.

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8.3.3. Consideration of ERS

The You Yangs Regional Parkland occupies public conservation and resource zone (PCRZ) land which, in accordance with the ERS would be classified as 'Category IV'. However, due to the nature of the use, the park could be considered 'natural areas' which 'typically provide undisturbed species habitat and enable people to see and interact with native vegetation and wildlife'.

For PCRZ land, the ERS nominates ambient sound environment objectives of 35 $L_{Aeq\ (8h)}$ between 10:00pm and 6:00am, and 40 $L_{Aeq\ (16h)}$ between 6:00am and 10:00pm. Despite the above, it would be expected that only the day values would be considered due to the unlikely occupation of PCRZ land during the night period.

For 'natural areas', the ERS nominates a qualitative objective described as 'a sound quality that is conducive to human tranquility and enjoyment having regard to the ambient natural soundscape'.

The parkland is somewhat unique, as it is located immediately adjacent to the existing Boral Quarries site and hence is already subjected to elevated noise levels associated with the quarry during the day period.

Based on the results of the noise model, WMG has predicted residual noise levels due to the operation of the BESS to be in the order of 34-35 dB(A) L_{eq} within the boundaries of the parkland. This assumes continuous 100% noise output from the subject site over the relevant period between 6:00am and 10:00pm and 10:00pm to 6:00am and would be reduced if there were periods of lesser operation.

The predicted values are below the ambient sound environment objectives for the day period when the parkland may be occupied, and equal to the objectives during the night period when it is unlikely that the parkland will be occupied.

Furthermore, due to the nature of the surrounding use, it is expected that noise emissions associated with the quarry and vehicle movements along Sandy Creek Road are already resulting in similar noise levels within the areas of the parkland closest to the subject site.

In consideration of the above, it would be anticipated that the predicted noise levels will not significantly impact on the existing acoustic environment within the boundaries of the parkland.

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9. General Environmental Duty and Design Review

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

With the implementation of reasonably practicable measures including fitting the MVPS and batteries with effective noise control 'kits', WMG has determined compliance with Noise Protocol noise limits at nearby sensitive receptors.

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

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

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

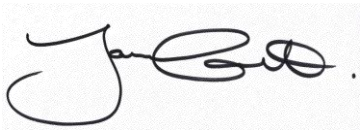
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10. Conclusion

WMG has carried out an acoustic assessment to address potential noise emissions from the operation of a new battery energy storage system (BESS) facility at the site described as 405-455 Sandy Creek Road, Little River.

The assessment has included attendance at the subject site to consider the existing acoustic environment including potential noise contributions from surrounding commercial operations.

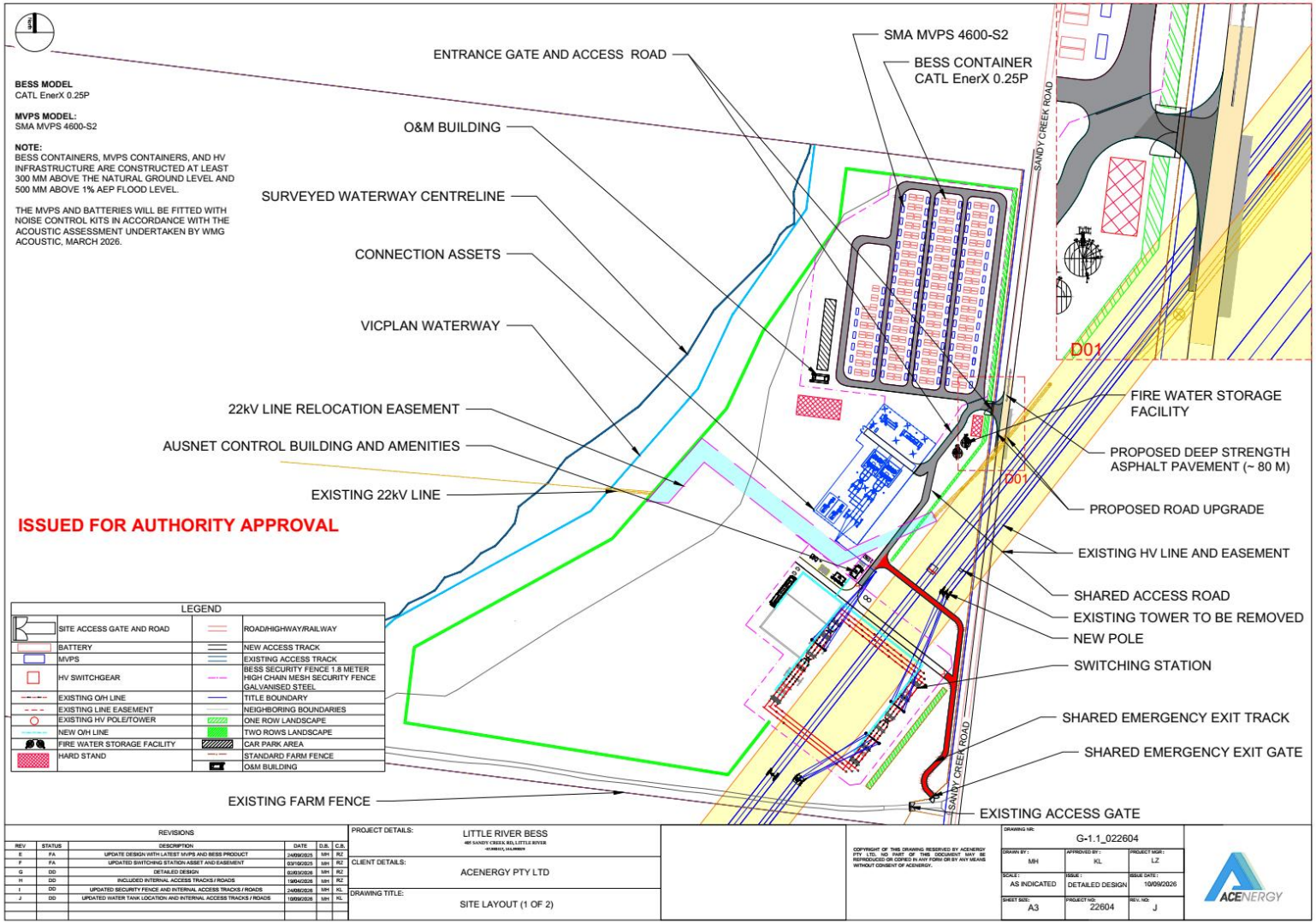
The findings of the assessment have concluded that with the implementation of reasonably practicable measures, which include noise control 'kits' to the MVPS and battery units, noise emissions associated with the proposal comply with the Noise Protocol noise limits at the nearby sensitive residential receptors.



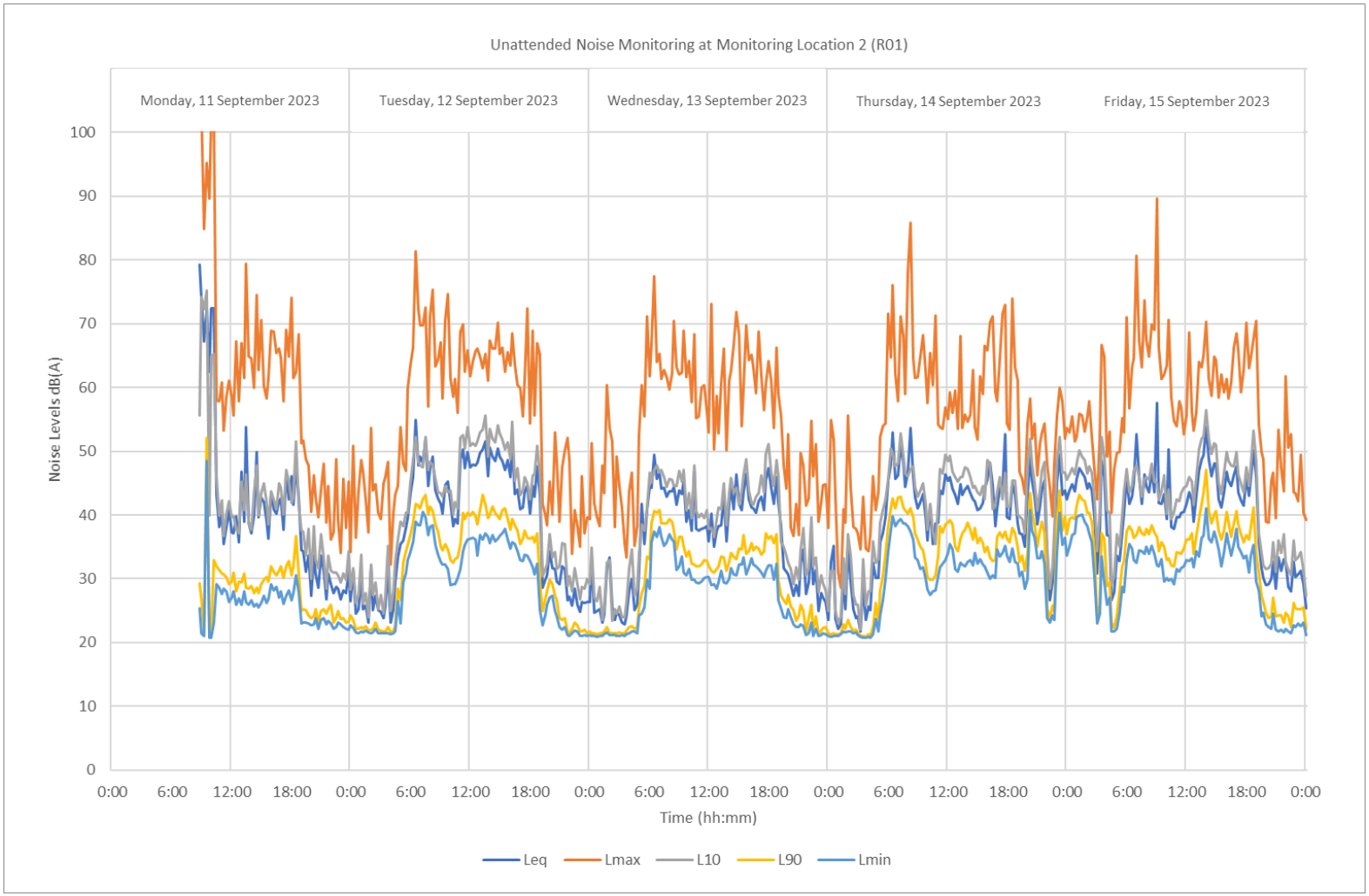
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ACOUSTICS PTY LTD

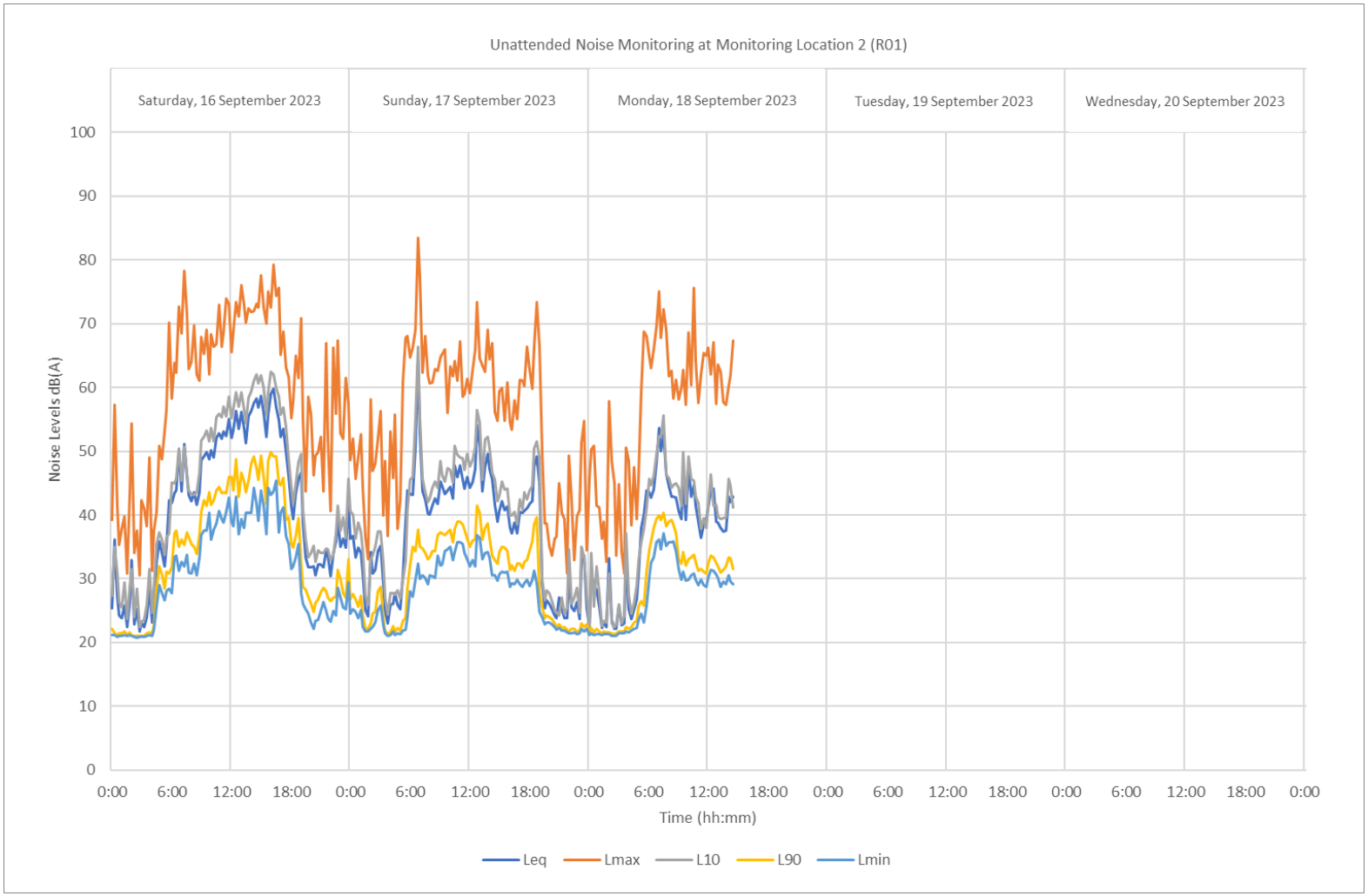
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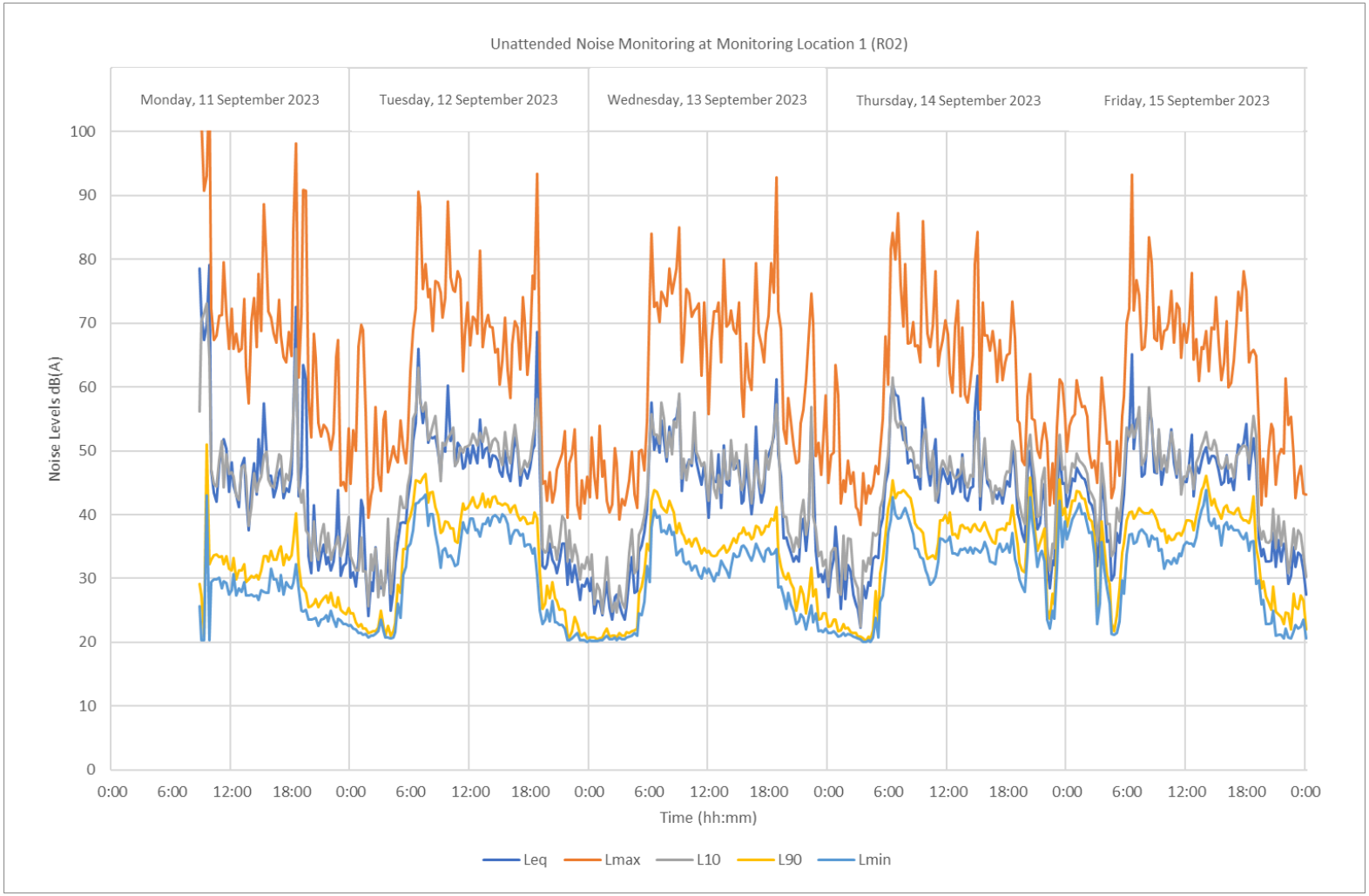
Appendix 1 – Project Site Plan

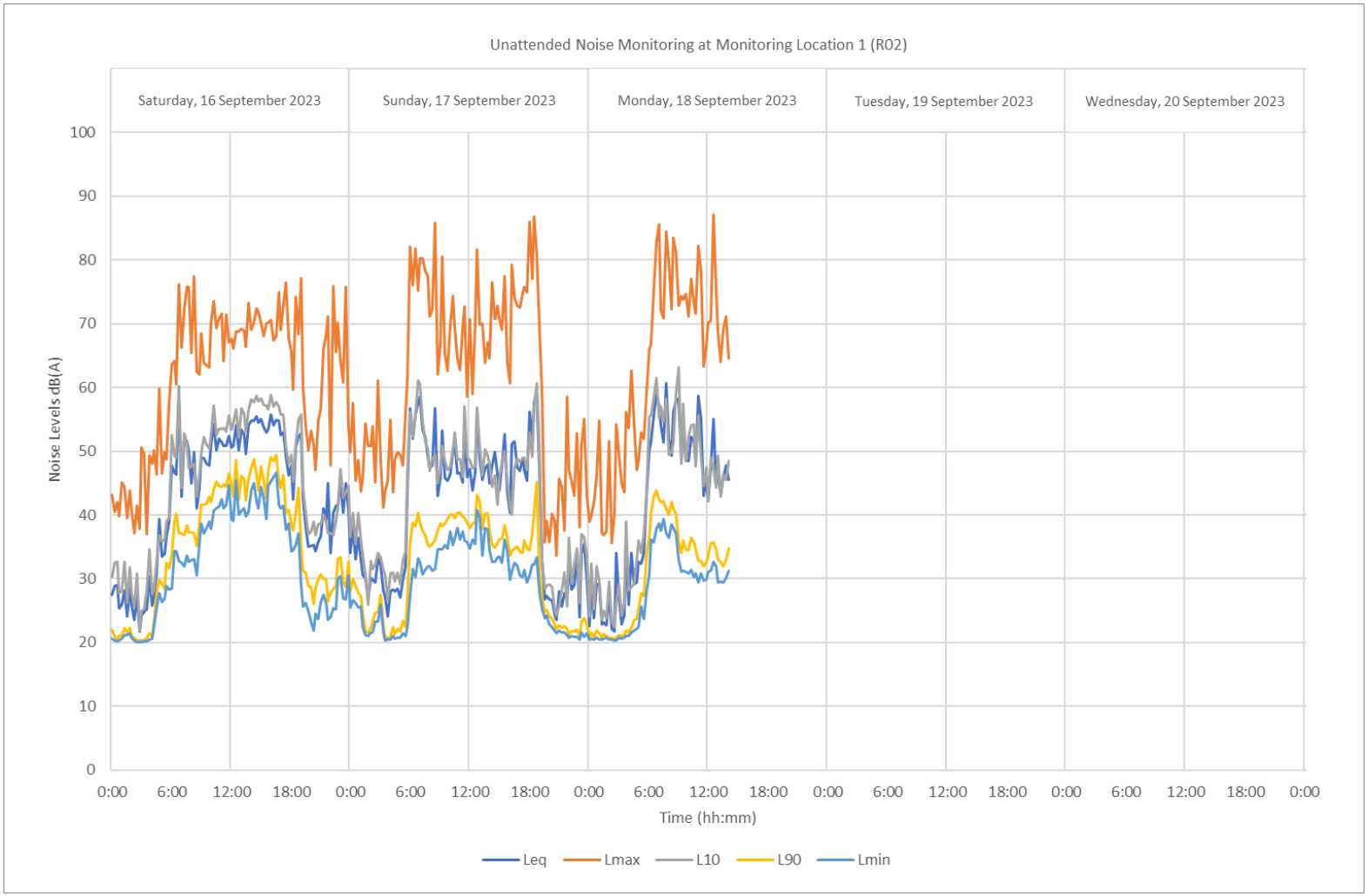


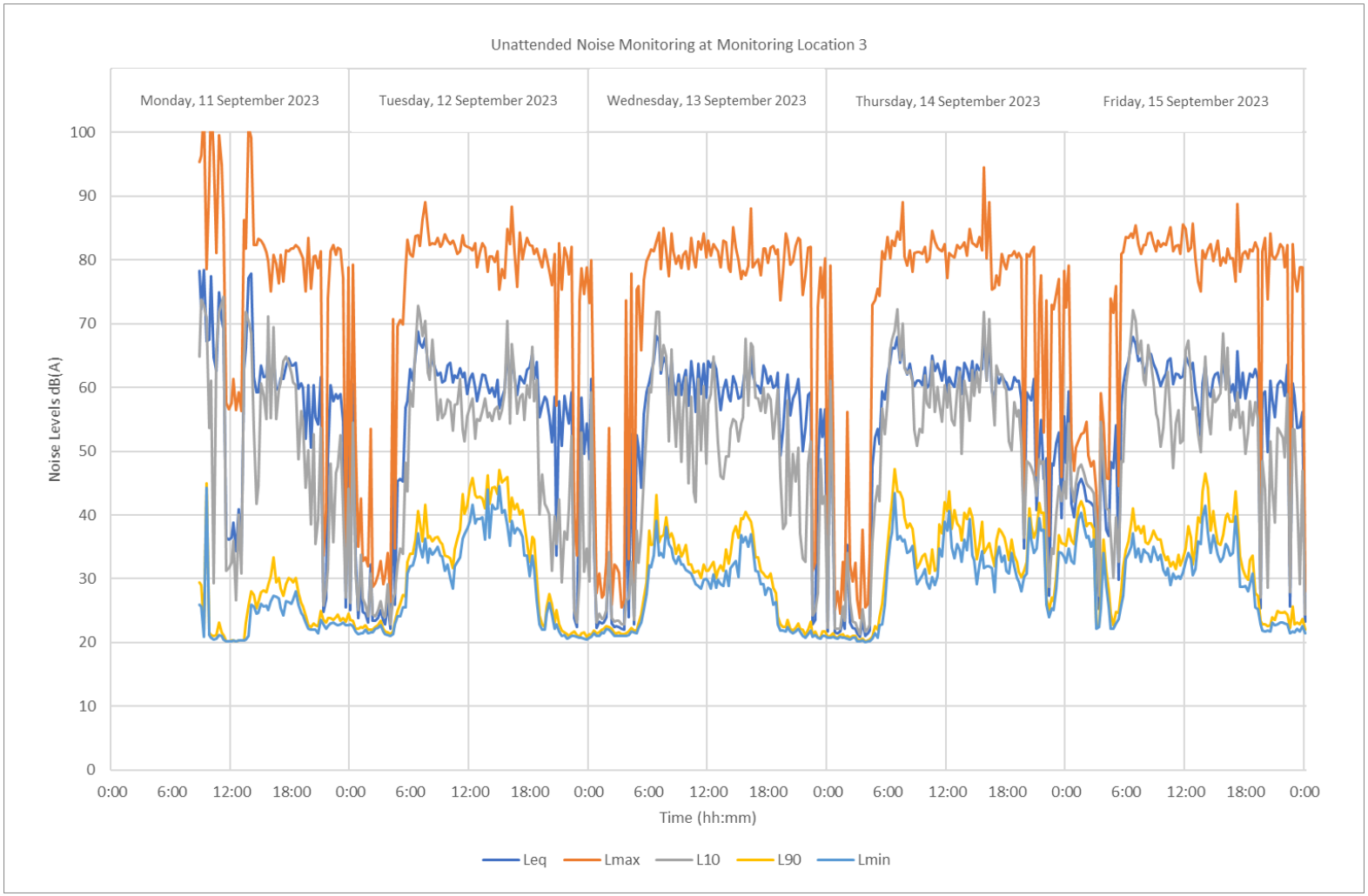
Appendix 2 – Unattended Noise Monitoring Results

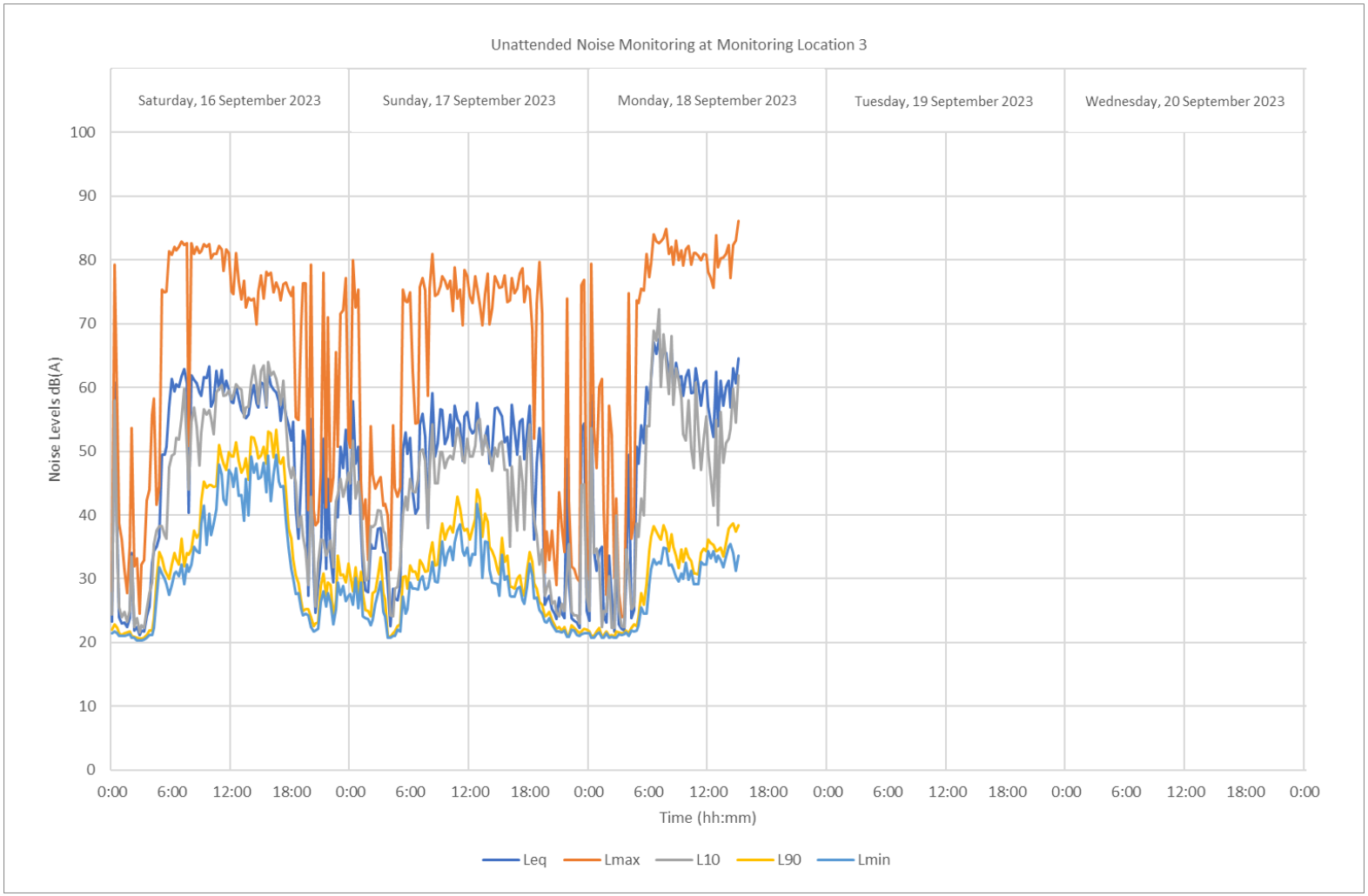



Unattended Noise Monitoring at Monitoring Location 2 (R01)
Saturday, 16 September 2023
Sunday, 17 September 2023
Monday, 18 September 2023
Tuesday, 19 September 2023
Wednesday, 20 September 2023
Noise Levels dB(A)
100
90
80
70
60
50
40
30
20
10
0
0:00 6:00 12:00 18:00 0:00 6:00 12:00 18:00 0:00 6:00 12:00 18:00 0:00 6:00 12:00 18:00 0:00 6:00 12:00 18:00 0:00
Time (hh:mm)
Leq
Lmax
L10
L90
Lmin


Unattended Noise Monitoring at Monitoring Location 1 (R02)
Monday, 11 September 2023
Tuesday, 12 September 2023
Wednesday, 13 September 2023
Thursday, 14 September 2023
Friday, 15 September 2023
Noise Levels dB(A)
100
90
80
70
60
50
40
30
20
10
0
0:00
6:00
12:00
18:00
Time (hh:mm)
Leq
Lmax
L10
L90
Lmin


Unattended Noise Monitoring at Monitoring Location 1 (R02)
Saturday, 16 September 2023
Sunday, 17 September 2023
Monday, 18 September 2023
Tuesday, 19 September 2023
Wednesday, 20 September 2023
Noise Levels dB(A)
100
90
80
70
60
50
40
30
20
10
0
0:00
6:00
12:00
18:00
Time (hh:mm)
Leq
Lmax
L10
L90
Lmin


Unattended Noise Monitoring at Monitoring Location 3
Monday, 11 September 2023
Tuesday, 12 September 2023
Wednesday, 13 September 2023
Thursday, 14 September 2023
Friday, 15 September 2023
Noise Levels dB(A)
100
90
80
70
60
50
40
30
20
10
0
0:00
6:00
12:00
18:00
Time (hh:mm)
Leq
Lmax
L10
L90
Lmin



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