Friday, 1 August 2025

Project number: M250262
Reference: M250262LT2

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Dear Ryan,

Springvale Energy Hub
Acoustic Design Advice

1 Introduction

Volta Energy Group (Volta Energy) is progressing plans for a Battery Energy Storage System (BESS) located between Westall Road and Clarke Road in Springvale South. Stage 1 of the project is being lodged under a separate application, and the latest acoustic design advice for this stage is documented in M250262LT1C.

Volta Energy has now engaged Resonate Consultants to undertake a preliminary environmental noise assessment or Stages 2 and 3 of the Springvale Energy Hub to support compliance with all relevant environmental noise criteria.

This environmental noise assessment has been conducted in accordance with the *Environment Protection Regulations* (the Regulations) and supporting Environment Protection Authority (EPA) Victoria Noise Protocol[1] to assess potential noise impacts on nearby residential dwellings. It:

- summarises relevant legislation, policy and guidelines.
- establishes applicable noise limits.
- presents predicted noise levels considering alternative layout arrangements.
- discusses noise mitigation measures.
- presents the results of background noise monitoring at areas representative of the nearest noise sensitive receivers.

The assessment is based on the following design documentation:

- Layout '20250722 Progress Power SEH- Stage 2' and *'20250722 Progress Power SEH- Stage 3*', received 28 May 2025
- Battery container. CATL (CAIT-VI-250139) in 90% fan speed operation (the maximum) for Day and Evening and 40% fan speed at Night from CATL noise test report data "*EnerX 0.25P 40kw cooling unit- SWL Test Report*" for SWL derived from 1 m envelope surface.
- SMA MVPS 4600kVA Inverter. The SMA Sunny Central (SCS UP-S) was used as a candidate with test data from SMA noise test report "*20250520 SCS UP-S Noise Performance*". Operating at maximum fan speed for Day Evening and Night.
- 2 x 146MVA Substation Transformer. Overall sound power was estimated based on AS/NZS 60076-10 *Power transformers Part 10: Determination of sound levels*.
- 5 m ground elevation data obtained through Elvis database on 29 April 2025.

[1] EPA Victoria Publication 1826.4, *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues*

- Noise sensitive area (NSA) locations based on arial assessment using google earth imagery, 2025 Airbus © Earth observation and geographical data obtained through Geoscape on 29 April 2025.

Any updates to the design of the site will require further modelling to ensure that the noise limits are met at all receivers.

2 Proposed development

2.1 Project location

The proposed development site is located in a Green Wedge Zone (GWZ) within the Greater Dandenong Council local government area on Clarke Road in Springvale South and is nearby to the following existing / proposed industrial facilities, businesses, public spaces and noise sensitive receivers:

- Residential NSRs to the south along Rowans Road (GRZ1),
- Residential NSRs to the east along Clarke Road (GRZ1),
- Residential NSRs along Spring Road Reserve (PPRZ),
- Residential NSRs within the Cambodian Buddhist Association of Victoria (CBAV) (GRZ1),
- Calvary Kingston Gardens Ages Care facility (CKG) (GRZ1),
- Various other businesses towards the east (GRZ1).

Figure 1 shows the BESS site and surrounding noise sensitive receivers.

Figure 1 Aerial of site and surrounding NSAs.

2.2 Proposed Springvale Energy Hub

2.2.1 Stage 2 site layout

A layout for the Springvale Energy Hub site is presented in Figure 2 is proposed to have the following noise generating systems:

- 96 x CATL Battery containers,
- 32 x SMA MVPS 4600kVA Inverters,
- 2 x 146 MVA Power Transformer.

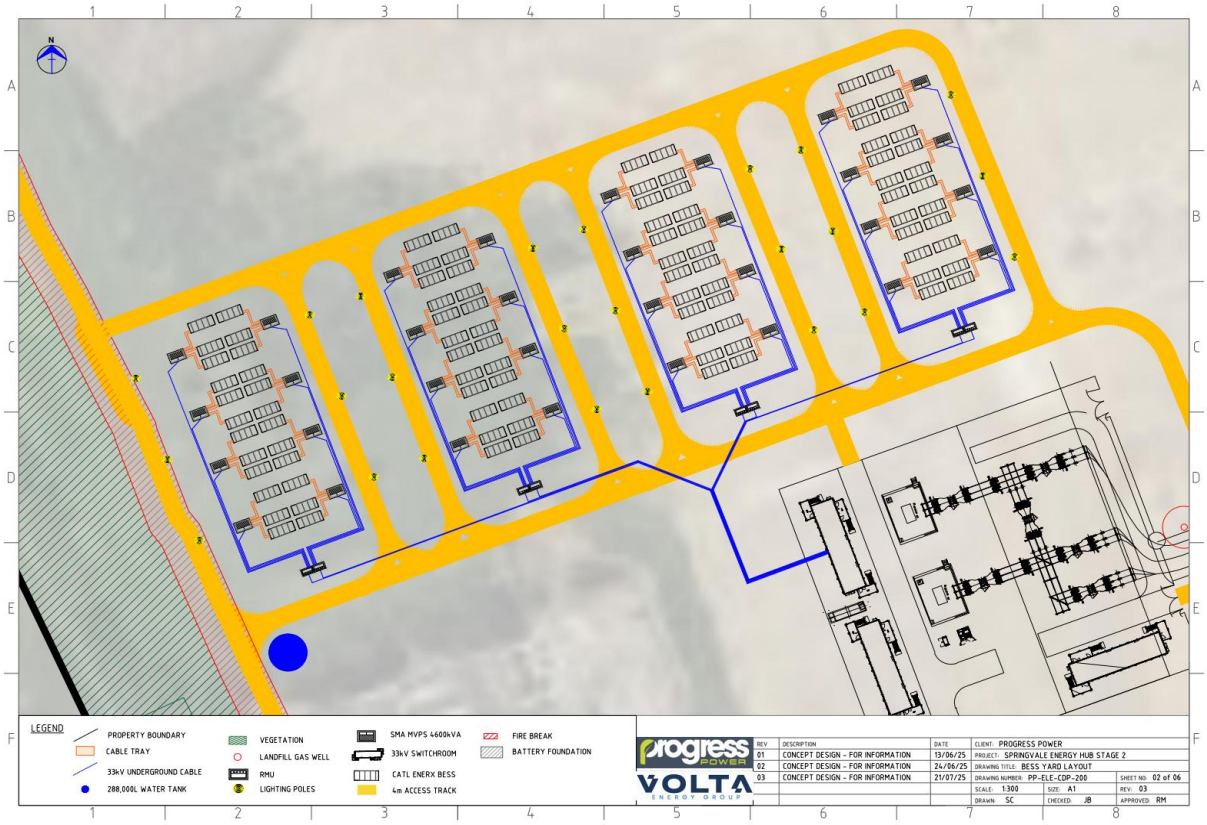

Figure 2 SEH Stage 2 BESS Site layout

2.2.2 Stage 3 site layout

A layout for the Springvale Energy Hub site is presented in Figure 3 and is proposed to have the following noise generating systems:

- 3 x CATL Battery containers,
- 1 x SMA MVPS 4600kVA Inverters

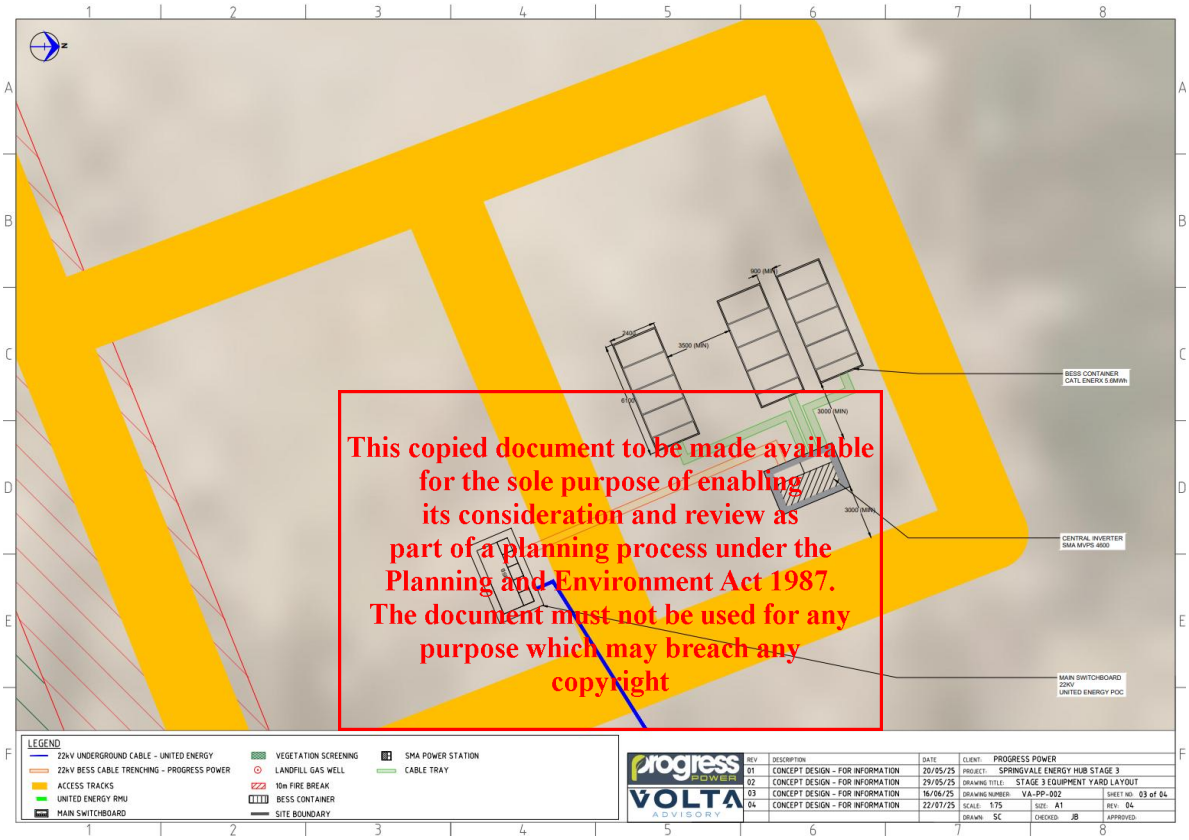

Figure 3 SEH Stage 3 Site layout

2.2.3 Duty Cycles

This preliminary noise assessment has for noise generating equipment has been modelled with consideration of the operational profiles under conservative assumptions to ensure the noise modelling captures peak acoustic emissions in accordance with environmental noise policy, while still acknowledging diurnal variation in thermal and power demands for the battery systems.

Battery Containers (CATL – EnerX 0.25P 40kW Cooling Unit)

Units are assumed to operate at 90% fan speed during the Day and Evening time periods, representing near-peak thermal management load and providing a conservatively high estimate of operational noise under typical high-demand conditions. For the Night period Volta Energy expects that operation is to be scaled down to 40% fan speed, reflecting reduced thermal load expectations during cooler ambient conditions and lower grid demand. This variable duty cycle accounts for diurnal temperature variation and load-driven cooling demand, while ensuring worst-case noise emissions are captured during more noise-sensitive night hours.

The Sound Power Level (SWL) for each battery unit was derived from the manufacturer's test report conducted at a 1 m envelope surface, referencing the "*EnerX 0.25P 40kW cooling unit – SWL Test Report*".

Inverters (SMA MVPS 4600kVA – Sunny Central SCS UP-S)

Noise data was provided by the client from "*SMA's "20250520 SCS UP-S Noise Performance*" test report. The inverters are modelled at maximum fan speed operation continuously across Day, Evening, and Night periods. According to the test report this represents a worst-case duty cycle condition, suitable for compliance assessment, ensuring the maximum potential acoustic impact is assessed regardless of actual power draw or load-following inverter modulation.

2.3 Nearby Representative NSAs

There are 14 residential properties identified around the proposed facility chosen to represent the nearest NSAs to the site. The NSAs have been identified based on a review of aerial photography, Geoscape data and zoning of the surrounding area.

Table 1 describes the approximate distance from each sensitive receiver to the facility boundary.

Table 1 Distance between NSAs and BESS facility

Receiver as shown in Appendix B	Receiver Group	Address	Approximate distance to proposed BESS facility (m)
R1	Clarkes Road	188 Clarke Rd, Springvale South VIC 3172 (CBAV)	230
R4	Clarkes Road	566-568 Springvale Rd, Springvale South VIC 3172	470
R5	Clarkes Road	215 Clarke Rd, Springvale South VIC 3172	480
R6	Clarkes Road	217 Clarke Rd, Springvale South VIC 3172	500
R7	Clarkes Road	221 Clarke Rd, Springvale South VIC 3172	550
R8	Clarkes Road	224 Clarke Rd, Springvale South VIC 3172	520
R10	Rowans Road	1 – 21 Kabi Cct, Springvale South VIC 3172	690
R11	Rowans Road	9 Rowan Rd, Springvale South VIC 3172	670
R12	Rowans Road	1 Rowan Rd, Springvale South VIC 3172	670
R13	Rowans Road	2 Golden Grove, Springvale South VIC 3172	670
R14	Rowans Road	19-31 Rowan Rd, Springvale South VIC 3172	650
R15 (rural area)	Clarkes Road	92 - 102 Clarke Rd, Springvale South VIC 3172	440
R16	Clarkes Road	102 Spring Rd, Springvale South VIC 3172	530
R17	Spring Road	26 Jaffna Pl, Springvale South VIC 3172	360

2.1 Land zoning

The proposed development site is located within a Green Wedge Zone (GWZ), outside the defined Major Urban Area of Melbourne, Victoria. The nearest Spring Road, Clarkes Road and Rowans Road noise-sensitive receivers are situated within a General Residential Zone (GRZ), located within the Major Urban Area (excluding R15).

Although the source is in a rural zone, the Noise Protocol requires that assessment be based on the zoning of the receivers. As such, urban noise limits have been applied at the GRZ receivers, rather than rural limits, to reflect their increased sensitivity and ensure appropriate protection. This approach aligns with the intent of the protocol to safeguard amenity in urban residential areas, regardless of the zoning of the noise source.

A Planning Property Report confirming the zoning and Urban areas of the proposed development site and surrounding areas is provided in Appendix A.

3 Cumulative Noise

3.1 Springvale Energy Hub Stage 1

Stage 1 of the project is being lodged under a separate application, to Stage 2 and 3 however it must be considered as part of the cumulative noise sources in the area. Upon review and discussion with Volta there are no other noise generating industrial sites nearby to the proposed development location. A layout for the Springvale Energy Hub site is presented in Figure 4 and is proposed to have the following noise generating systems:

- 64 x Tesla Megapack 2XL 2-hour 9 fan configurations Battery containers,
- 16 x Step-up transformers (146MVA)

The predicted levels from the site were based on the following design documentation:

- Layout '*WiP_Site_Layout_01_ WiP Site Layout Rev.A*', received 28 May 2025
- Battery container. Tesla Megapack 2XL with 2-hour 9 fan configuration at 100% fan speed for Day and Evening operation and 40% fan speed at Night from Tesla noise test report data in Resonates database.
- 146MVA Substation Transformer. Overall sound power was estimated based on AS/NZS 60076-10 *Power transformers Part 10: Determination of sound levels*.
- 5 m ground elevation data obtained through Elvis database on 29 April 2025.
- Noise sensitive area (NSA) locations based on arial assessment using google earth imagery, 2025 Airbus © Earth observation and geographical data obtained through Geoscape on 29 April 2025.

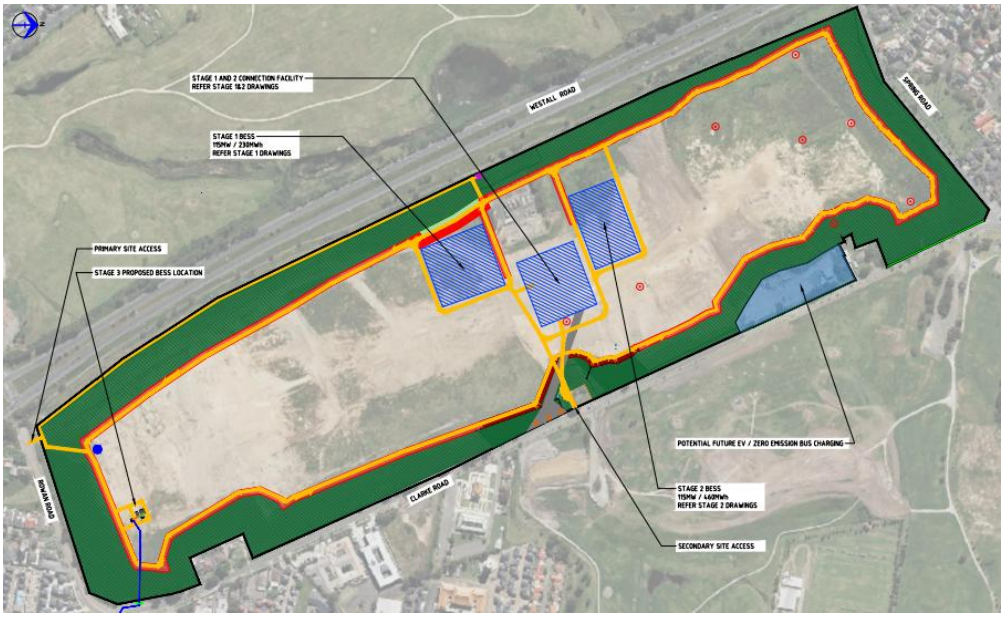

Figure 4 SEH Stage 1 Site Location

4 Legislation, policy and guidelines

4.1 Environment Protection Act 2017

4.1.1 General Environmental Duty

The *Environment Protection Act 2017* (the Act) sets out environmental obligations and protections for Victorians. The cornerstone of the Act is the General Environmental Duty (GED), which states:

> 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.

In the context of the Act, 'reasonably practicable' measures mean putting in controls to eliminate the risk of harm to human health and the environment so far as reasonably practicable. If eliminating the risk of harm is not reasonably practicable, then the risk of harm must be reduced so far as reasonably practicable. A number of matters must be considered in deciding what is reasonably practicable in the circumstances:

- 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.

EPA Victoria Publication 1856: *Reasonably practicable* explains that, when dealing with a common risk or harm, it is possible to demonstrate that the risk has been reduced so far as reasonably practicable if well-established effective practices or controls have been adopted to eliminate or manage risk. Where well-established practices or controls do not exist, then it is necessary to show that effective controls have been assessed and adopted.

4.1.2 Unreasonable noise

The Act also prohibits the emission of unreasonable noise and aggravated noise. The Act provides a definition for 'Unreasonable noise' in two parts. Section 3(1)(a) states that 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 factor.

Section 3(1)(b) states that noise is unreasonable noise if it is prescribed to be so. Under the *Environment Protection Regulations*, noise that exceeds the noise limits established in accordance with EPA Victoria Publication 1826.4 *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues* (Noise Protocol) is prescribed to be unreasonable noise.

Unreasonable noise occurs if noise meets the requirements of Section 3(1)(a) and/or Section 3(1)(b) of the Act.

4.2 Environment Protection Regulations

The *Environment Protection Regulations* (the Regulations) are subordinate legislation that support the Act. Under the Regulations, the assessment of noise from commercial, industrial and trade premises at noise sensitive areas must be carried out in accordance with the Noise Protocol, both in terms of establishing noise limits as noise sensitive areas and in terms of the measurement of noise from the subject premises.

The noise limits set under the Regulations apply generally to noise emitted from the proposed BESS facility. The noise limits are not applicable to noise that may arise from the following sources that may be relevant to the site:

- construction works
- intruder, emergency or safety alarms or sirens
- equipment used in relation to an emergency
- non-commercial vehicles (except for maintenance activities).

The GED still applies to noise arising from the above sources but compliance with the noise limits set under the Regulations is not mandatory.

Noise sensitive areas are defined in the Regulations as:

- The area within 10 m of the external walls of dwellings (including residential care facilities but excluding caretaker's houses), residential buildings and noise sensitive residential uses.
- The area within 10 m outside the external walls of any dormitories, wards, bedrooms and living rooms of caretaker's houses, hospitals, hotels, motels, residential hotels specialist disability accommodation, corrective institutions, tourist establishments, retirement villages and residential villages.
- The area within 10 m outside the external walls of classrooms or other rooms in which learning occurs at childcare centres, kindergartens, primary schools and secondary schools.

Within the boundary of tourist establishments, campgrounds and caravan parks that are located in rural areas.

The Regulations also define Day, Evening and Night periods for the assessment of noise, reproduced in Table 2.

Table 2 Applicable time periods

Time period	Details
Day	Monday to Saturday, 7 am to 6 pm
Evening	Monday to Saturday, 6 pm to 10 pm Sundays and public holidays, 7 am to 10 pm
Night	10 pm to 7 am any day

The Regulations define:

- Unreasonable noise as noise from commercial, industrial and time periods that exceeds the applicable noise limits from the Noise Protocol.
- Aggravated noise as noise commercial, industrial and time periods that exceeds:
  - 75 dB $L_{Aeq,30m}$ or the Noise Protocol noise limit by more than 15 dB during the day
  - 70 dB $L_{Aeq,30m}$ or the Noise Protocol noise limit by more than 15 dB during the evening
  - 65 dB $L_{Aeq,30m}$ or the Noise Protocol noise limit by more than 15 dB during the night.

The Regulations also define frequency spectrum as a prescribed factor for the purposes of establishing unreasonable noise under Section 3(1)(a) of the Act but do not provide specific guidance on assessment frequency spectrum. EPA Victoria Publication 1996 Noise guidelines: Assessing low frequency noise (EPA Victoria Publication 1996) provide detailed guidance on the assessment of low frequency noise for the purposes of establishing whether unreasonable noise is being produced. EPA Victoria Publication 1996 is discussed further in Section 3.4.3.

4.3 Noise Protocol

EPA Victoria has prepared the Noise Protocol to specify methodologies for establishing noise limits for operational noise sources and for assessing noise levels against the noise limits. Compliance with the noise limits defined by the Noise Protocol is required by Regulations and is expected to assist with meeting the GED during the operational phase of the Project.

4.3.1 Urban Areas

The Noise Protocol defines different procedures for establishing noise limits depending on whether the noise sensitive receiver is located within a major urban area or rural areas. Major urban areas are defined as those locations within Melbourne's urban growth boundary or within defined areas around major regional centres, such as Ballarat.

The Project is located in an urban area. For urban areas, the Noise Protocol defines noise limits dependent on the following:

- Time of day. Different noise limits apply for the different time periods of Day, Evening and Night.
- Land zoning used to determine the Zoning Level.
- The measured background noise levels in the area in the absence of noise due to commercial, industrial or trade premises used to determine the Background Level.

To determine the applicable noise limits under the Noise Protocol:

- The Zoning Level is determined for each time period through review of the planning scheme and application of Part I, Clause 1.1 of the Noise Protocol.
- The Background Level is determined for each time period through measurement and application of Part 4 of the Noise Protocol. The Background Level is classified as:
  - **Low:** where it is more than 12 dB below the Day Zoning Level or more than 9 dB below the Evening or Night Zoning Level.
  - **High:** where it is less than 6 dB below the Day Zoning Level or less than 3 dB below the Evening or Night Zoning Level, including if it is at or above the Zoning Level for any time period.
  - **Neutral:** for all other cases.
- The noise limit is determined as follows:
  - Where the Background Level is Low, the noise limit is set at a fixed level above the average of the Background Level and Zone Level, being 4.5 dB above during the Day and 3 dB above during the Evening and Night.
  - Where the Background Level is Neutral, the noise limit is set at the Zoning Level.
  - Where the Background Level is High, the noise limit is set at a fixed level above the Background Level being 6 dB above during the Day and 3 dB above during the Evening and Night. The noise limit at Night is not permitted to exceed 55 dB $L_{Aeq,30min}$ regardless of the Background Level.

4.3.2 Rural Areas

For rural areas, the Noise Protocol primarily defines noise limits dependent on the following:

- Time of day. Different noise limits apply for the different time periods of Day, Evening and Night.
- Land zoning of both the noise source and noise sensitive receiver used to determine the Zone Level.
- A distance adjustment is applied to the Zone Level where a noise sensitive receiver is in a different zone to a noise source.
- Type of noise source. Specific limits are set for certain noise sources, such as utilities and earth resources.

Background noise levels may be taken into account in establishing noise limits in rural areas where the noise sensitive receiver is located within a 'background relevant area.' Background relevant areas are those rural areas where background levels may be higher than usual and include areas where road traffic is a significant audible source. If a

noise sensitive receiver is located in a background relevant rural area, then the noise limits are set at the higher of the noise limit determined using the land zoning methodology above or:

- The background noise level plus 8 dB for the Day period
- The background noise level plus 5 dB for the Evening period
- The background noise level plus 5 dB for the Night period.

The background noise measurement methodology for rural areas is the same as that for urban areas.

4.3.3 EPA Victoria Publication 1996

EPA Victoria Publication 1996 provides guidance on the assessment of low frequency noise from commercial, industrial and trade premises. As frequency spectrum is a separate prescribed factor under the Act, operational sources with the potential to produce a higher relative level of low frequency noise should be separately assessed against this guidance in addition to the noise limits applicable under the *Environment Protection Regulations*.

EPA Victoria Publication 1996 defines low frequency noise as that occurring between the frequency range of 10 Hz and 160 Hz. It provides noise thresholds, in one-third octave bands, with levels above the threshold indicating a potential risk of problematic low frequency noise that would require further consideration, investigation and potentially mitigation.

Table 3 presents the low frequency noise thresholds for predictions and measurements conducted outdoors. The outdoor threshold levels are based on indoor thresholds with an assumed façade noise reduction, as specified by EPA Victoria Publication 1996. For the purposes of this assessment, the outdoor thresholds have been adopted but, should a risk of exceedance be identified, further investigation of the specific building façade could be undertaken.

Table 3 Outdoor low frequency noise thresholds

Outdoor noise level in dB L_{eq} at one-third octave band centre frequency in Hz												
10	**12.5**	**16**	**20**	**25**	**31.5**	**40**	**50**	**63**	**80**	**100**	**125**	**160**
92	89	86	77	69	61	54	50	50	48	48	46	44

EPA Victoria Publication 1996 notes that not all of the one-third octave bands listed above need to be considered as part of a low frequency noise assessment. Table 4 identifies those one-third octave bands that are relevant based on the predicted C-weighted noise level at a noise sensitive receiver.

Table 4 C-weighted noise level below which stated one-third octave bands can be discarded for assessment

C-weighted noise level at noise sensitive receiver, dB L_{Ceq}	One-third octave bands which can be discarded
> 76 dB	None
≤ 76	10 Hz only
≤ 71	10 Hz and 12.5 Hz
≤ 66	10 Hz to 16 Hz
≤ 60	10 Hz to 20 Hz
≤ 54	10 Hz to 25 Hz

5 Noise survey

5.1 Unattended noise measurements

Unattended noise monitoring was conducted at the two locations shown in figure 5 between 16 – 23 February 2025 to determine the background noise level at relevant areas around the site. The measurements have been conducted and analysed in general accordance with EPA Victoria Publication 1997 *Technical guide: Measuring and analysing industry noise and music noise*.

Measurement location A and B are considered to be a relevant background area to the NSAs on Clarke Road and Rowen's Road respectively. NSAs in the North have been assessed using the zoning level. We note that using zoning levels is more stringent than assessing NSAs with background noise level.

The background noise environment at location A and B was observed to be controlled by local activities, birds, and road traffic noise from Westall Road, with noise levels lower during the Evening and Night periods when less traffic occurs.

Figure 6 shows noise monitoring locations.

Figure 6 Noise monitoring locations

The measured background noise levels and ambient noise levels during the Day, Evening and Night periods at all measurement locations are presented in Table 5.

Table 5 Measured background levels and ambient noise levels

Location	Background Level, dB L_{A90}			Ambient noise level, dB L_{Aeq}	
	Day	Evening	Night	6 am – 10 pm	10 pm – 6 am
Location A (Svan)	44	45	42	55	47
Location B (Rion)	50	49	42	56	51

Details on the noise measurements are included in Appendix C, including photographs of the monitoring locations, details on the noise measurement equipment used and additional information on the results.

5.2 Equipment

A list of the equipment used in the noise survey is provided in Table 6.

Table 6 Instruments used for noise measurements

Instrument	Model and location	Serial number	Laboratory calibration valid to
Sound level meter	Svan 977 (Location A)	SN99041	11 May 2025
Sound level meter	Rion NL – 42 (Location B)	SN00946979	19 August 2025
Acoustical calibrator	Bruel & Kjaer Type 4231	SN2385016	January 20 2026

All items of equipment carry a current certificate of calibration from a National Association of Testing Authorities accredited laboratory. Field calibrations conducted before and after the measurement period deemed the measurements valid.

6 Environmental noise limits

6.1 Urban Area Noise limits

The following sections provide information regarding the relevant noise limits applicable to environmental noise emissions from the project under the Environment Protection Regulations. Noise emissions subject to the Environment Protection Regulations that exceed the applicable noise limits are prescribed to be unreasonable noise as defined under the Environment Protection Act.

The determination of noise limits for this project has been undertaken under the urban area method, since this project is located in a major urban area, as defined by the Environment Protection Regulations.

The environmental noise limits that apply at noise sensitive area, such as residential areas, with respect to noise due to commercial, industrial and trade operations are dependent on:

- Zoning Levels, which are determined based on the planning scheme zoning types within 70 m and 200 m radii of the noise sensitive receiver.
- The time of day, with different limits applying for different time periods.
- The Background Level at the noise sensitive area, in the absence of noise due to commercial, industrial or trade operations.

For the purposes of this assessment and in the absence of background noise measurements for receivers on Spring Road, the Background Level has been assumed to be "Neutral", meaning that the noise limits are equivalent to the defined Zoning Levels. We note that this approach is generally conservative for the assessment of environmental noise in urban areas of metropolitan Melbourne. It also provides protection against the potential for background noise levels to change between locations or times of year.

The noise limits at the nearest noise sensitive receivers have been calculated and are presented in Table 7.

Table 7 Environmental noise limits for normal operation

Noise sensitive area	Time period	Zoning Level	Background Level	Classification	Noise Limit
		dB L_{Aeq}	dB L_{A90}		dB L_{Aeq}
Clarke Road Receivers (excluding R15)	Day	50	44	High	50
	Evening	44	45	High	48
	Night	39	42	High	45
Rowans Road Receivers	Day	50	50	High	56
	Evening	44	49	High	52
	Night	39	42	High	45
Spring Road Receivers	Day	53	See note (1)	Neutral	53
	Evening	46	See note (1)	Neutral	46
	Night	41	See note (1)	Neutral	41

(1) The receivers along Spring Road have been assessed as neutral in the absence measured background noise.

6.1 Rural Area Noise limits

The determination of noise limits for this receiver 15 has been undertaken under the rural area method, since this project is located outside of a major urban area, as defined by the Environment Protection Regulations.

The environmental noise limits that apply at noise sensitive area, such as residential areas, with respect to noise due to commercial, industrial and trade operations are dependent on:

- Zone Levels, which are determined based on the land zoning of the noise source and noise sensitive receiver.
- Distance adjustment, which is dependent on changes in land zoning between the noise source and noise sensitive receiver, and distances to zone boundaries.
- The type of noise source, with different processes applied to establish noise limits for utilities and earth resources.
- The time of day, with different limits applying for different time periods.

The Background Level at the noise sensitive area, in the absence of noise due to commercial, industrial or trade operations, may also affect the applicable noise limit. However, in rural areas, the Background Level is only used where the area can be described as a background relevant area. Background relevant areas are those where background levels may be higher than usual due to a consistently higher noise source, such as freeway or highway traffic, or coastal areas where background levels are influenced by the sound of surf. Given that the properties proximity to Westall Road we have assessed R15 (92 – 102 Clark Road) as a background relevant area.

The noise limits at the nearest noise sensitive receivers have been calculated and are presented in Table 8.

Table 8 Environmental noise limits for normal operation

Noise sensitive area	Time period	Zone Level	Distance adjustment	Background Level	Background relevant area?	Noise Limit
		dB L_{Aeq}	dB	dB L_{A90}		dB L_{Aeq}
R15 (92 – 102 Clark Road)	Day	45	0	44	Yes	52
	Evening	38	0	45	Yes	50
	Night	33	0	42	Yes	47

7 Environmental noise assessment

7.1 Noise prediction methodology

An environmental noise model for noise emissions generated by the proposed BESS site was developed using a proprietary noise modelling software package, SoundPLAN version 9.0.

The environmental noise prediction methodology provided in the international standard ISO 9613-2 was adopted for the prediction model. The methodology takes the following into considerations:

- geometrical divergence (for source descriptions refer to section 7.2)
- atmospheric absorption
- ground effect *(*G = 0.5 for typical suburban area with 50 % grass covered and 50% hard surface*)*
- reflection from surfaces
- screening by obstacles.

The ISO 9613-2 methodology provides a prediction representative of conditions where the receiver is downwind of the source in a light breeze or under a moderate ground-based temperature inversion.

The NSA locations were determined from aerial photography as shown in Appendix B.

7.2 Noise sources

CATL – EnerX 0.25P 40kW Cooling Unit

Noise modelling for the site has been assessed with all equipment listed above operating simultaneously with the CATL battery containers running at full mode (90%) for Day and Evening time periods and 40% mode at Night 7 days per week. CATL battery containers were represented as point sources 0.5 m at the centroid of the fan exhaust side of an 6.058 m x 2.438 m, 2.896 m high solid structure (height of source 2 m).

The A-weighted sound power spectra for 90% and 40% fan speed modes of operation are presented in Table 9 (refer to section 2.3 for detail). The data used in our assessment was adopted from EnerX 0.25P 40kW cooling unit – SWL Test Report provided by Volta Energy.

Inverters (SMA MVPS 4600kVA – Sunny Central SCS UP-S)

The SMA MVPS 4600kVA inverters were assumed to operate at maximum fan speed (100%) during all assessment periods (Day, Evening, and Night) 7 days per week. Each inverter was represented as a point source 0.5 m above the centroid of its physical footprint.

The A-weighted sound power spectrum for full-speed fan operation is presented in Table 9 (refer to section 2.3 for detail). The data used in our assessment was adopted from the SMA Sunny Central SCS UP-S Noise Performance Report (dated 2025/05/20) as provided by Volta Energy.

Table 9 Sound power spectrum for equipment adopted for assessment

Equipment	Sound power level in dB L_{WA} at octave band centre frequency (Hz)								Overall L_{WA}
	63	125	250	500	1000	2000	4000	8000	dB L_{WA}
CATL Battery 90%	59	80	79	82	86	82	76	73	90
CATL Battery 40%	48	61	64	69	71	72	68	65	77
SMA Inverter (maximum load)	65	70	72	74	73	74	79	81	85

Substation transformers

No candidate transformer has been selected at this stage however it has been confirmed that one large substation 146 MVA transformer will reside within the site.

Table 10 presents the sound power spectra for a 146 MVA transformer estimated based on AS/NZS 60076-10 *Power transformers Part 10: Determination of sound levels*. The profile of the sound power spectrum was estimated based on previous measurements by Resonate.

Table 10 146 MVA transformer sound power spectrum

Equipment	Sound power level in dB L_{WA} at octave band centre frequency (Hz)								Overall
	63	125	250	500	1000	2000	4000	8000	dB L_{WA}
146 MVA transformer	76	95	81	82	80	76	69	63	96

Other equipment

It is noted that additional equipment would be installed at a BESS site including smaller capacity transformers that support the batteries. Based on prior experience, the sound power levels of these transformers are significantly lower than (more than 10 dB below) those from total of the battery units and the noise emissions from the BESS will be controlled by the equipment identified in the sections above.

7.3 Noise character adjustments

According to the Noise Protocol, a measured or predicted noise level needs to be adjusted for noise characteristics to derive the Effective Noise Level for the assessment. The Effective Noise Level, with noise character adjustment, is then assessed against the noise limit.

Potential duration and noise character adjustments are discussed below:

- **Duration adjustment (potential reduction):** When the noise emission is not audible over the whole of a continuous 30-minute period, then a duration adjustment based upon the total amount of time for which the noise is audible over that continuous 30-minute period shall be determined in accordance with Item 3.3 of Noise Protocol.

- **Impulsive adjustment (potential increase):** When the noise emission is impulsive in character, then any impulse noise emission event shall be considered to be audible for 10 seconds after the occurrence of the event for the purposes of determining the duration adjustment. Then, an adjustment shall be made as follows:
  - When the impulsive character of the noise is just detectable then the adjustment of +2 dB.
  - When the impulsive character of the noise is prominent then the adjustment of +5 dB.
- **Intermittency adjustment (potential increase)**: When the noise emission is intermittent or variable and the noise emission, when measured by a sound level meter set to F time-weighting and A frequency weighting, increases in level rapidly on at least two occasions during a 30-minute period and maintains the level for at least a one-minute duration, then an adjustment determined shall be made in accordance with Item 3.4 of Noise Protocol.
- **Tonal adjustment (potential increase):** 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 a tonal adjustment of +2 dB applies.
  - When the tonal character of the noise is prominent then a tonal adjustment of +5 dB applies.

In accordance with Schedule 2 of Noise Protocol, the Effective Noise Level is then derived by applying any determined character adjustments to the measured or predicted L_{Aeq} noise level for assessment against the noise limits.

For the current assessment we note that:

- Duration: It has been assumed that the proposed BESS site would operate continuously over a 30-minute period. Therefore, no duration adjustment has been applied.
- Impulse: The noise from the site is expected to be steady in nature. Therefore, no adjustment has been applied for impulsive noise.
- Intermittency: The noise from the site is expected to be steady in nature and not intermittent over a 30-minute assessment period. Therefore, no adjustment has been applied for intermittency.
- Tonality: Tonal characteristics are predicted from transformer noise. A tonality penalty has been applied at Spring Road receivers for the Day, Evening, and Night periods, and at all other NSAs during the Night period. The penalty is based on predicted transformer noise being within 10 dB of the cumulative noise level, with a 5 dB(A) adjustment where it is within 5 dB, representing conditions where tonal character of the noise is prominent. Although CATL battery data shows tonal components, spectral analysis indicates these are not perceptible at the NSAs, so no penalty has been applied for the batteries.

7.4 Predicted noise level Day and Evening periods

Table 11 presents the predicted cumulative noise levels from all industrial noise sources at the NSAs during the Day and Evening periods. A breakdown of noise contributions at each representative receiver is provided in Appendix D.

Table 11 Highest predicted noise levels at NSA Groups against Day and Evening limits, dB L_{Aeq}

Receiver Group	SEH Stage 3	SEH Stage 2	SEH Stage 1	SEH Substation	Total	Compliance Day/ Evening
R15 (rural area)	<10	46	43	31	47	✓ / ✓
Clarkes Road	20	41	46	30	47	✓ / ✓
Rowans Road	29	35	45	28	46	✓ / ✓
Spring Road	<10	39	42	35	44	✓ / ✓

A noise map for the BESS is provided in Appendix A.

7.4.1 Tonality adjustment

Table 12 presents the predicted cumulative noise levels from all industrial noise sources at the NSAs during the Day and Evening periods, assessed against the applicable noise limits with a tonality adjustment applied.

Table 12 Highest predicted noise levels at NSA Groups with tonality penalty against Day and Evening limits, dB L_{Aeq}

Receiver Group	Total	Tonal adjustment, dB	Effective noise level, dB LAeq	Noise Limit Day/ Evening, dB L_{Aeq}	Compliance Day/ Evening
R15 (rural area)	47	0	47	52 / 50	✓ / ✓
Clarkes Road	47	0	47	50 / 48	✓ / ✓
Rowans Road	46	0	46	56 / 52	✓ / ✓
Spring Road	44	2	46	53 / 46	✓ / ✓

From the table above it can be seen that the predicted noise levels from the battery storage facility with a tonality adjustment applied is within the Day and Evening noise limits at all locations.

7.5 Predicted noise level for Night-time period

Table 13 presents the predicted cumulative noise levels from all industrial noise sources at the NSAs during the Night period against the applicable noise limits. A breakdown of noise contributions at each representative receiver is provided in Appendix D.

Table 13 Highest predicted noise levels at NSA Groups against Night-time limits, dB L_{Aeq}

Receiver Group	SEH Stage 3	SEH Stage 2	SEH Stage 1	SEH Substation	Total	Noise Limit Night, dB L_{Aeq}	Compliance Night
R15 (rural area)	<10	37	32	31	39	47	✓ / ✓
Clarkes Road	24	32	37	30	38	45	✓ / ✓
Rowans Road	29	31	33	28	37	45	✓ / ✓
Spring Road	<10	36	33	35	40	41	✓ / ✓

From the table above it can be seen that the predicted noise levels from the battery storage facility is within Night-time noise limits at all locations.

A noise map for the BESS is provided in Appendix A.

7.5.1 Tonality adjustment

Table 14 presents the predicted cumulative noise levels from all industrial noise sources at the NSAs during the Day and Evening periods, assessed against the applicable noise limits with a tonality adjustment applied.

Table 14 Highest predicted noise levels at NSA Groups with tonality penalty against Night limits, dB L_{Aeq}

Receiver Group	Total	Tonal adjustment, dB	Effective noise level, dB LAeq	Noise Limit Day/ Evening, dB L_{Aeq}	Compliance Night
R15 (rural area)	39	2	41	47	✓
Clarkes Road	38	2	40	45	✓
Rowans Road	37	2	39	45	✓
Spring Road	40	5	45	41	×

The table above shows that predicted noise levels from the battery storage facility, with a 5 dB(A) tonality penalty applied, exceed the Night period noise limits at the Spring Road NSAs by up to 4 dB(A). As the final transformer model has not yet been selected, this assessment adopts a precautionary approach based on indicative data. To achieve compliance during the Night period, a transformer with an overall sound power level no greater than 92 dB(A) should be specified, accounting for the applied tonality adjustment.

8 Conclusion

An environmental noise assessment for the proposed Springvale Energy Hub site has been conducted.

The predicted noise level from Springvale Energy Hub was assessed in general accordance with the *Environment Protection Regulations* and Noise Protocol. As per Noise Protocol the assessment has considered residential dwellings only.

Noise monitoring was conducted between 16 – 23 April 2025 to determine the background noise level at relevant areas and establish noise limits at each receiver as per the rural and urban method. The measurement results demonstrated that measured background levels were higher than Zone Levels at NSAs so adjustments from background noise levels were applied to applicable noise limits.

Predicted noise levels from the proposed BESS, including Stages 2 and 3, comply with the Noise Protocol limits during all time periods, provided a transformer with an overall sound power level no greater than 92 dB(A) is selected to account for the applied tonality penalty, and the battery containers operate at 90% fan speed during the Day and Evening, and 40% fan speed during the Night.

Please let me know if you have any queries or wish to discuss the above.

Yours sincerely,

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Appendix A – Noise Maps

Springvale Energy Hub

Predicted cumulative noise level for Stage 2 and 3 for Day and Evening time periods.

PROJECT NUMBER	M250626
DRAWN BY	ACH
CHECKED BY	XL
DATE ISSUED	30/07/25
CLIENT	Volta Energy Group
BATTERIES	CATL
RECEIVER HEIGHT	1.5m
IMAGERY	(c) Google

Legend

- BESS Stage 1, 2 and 3
- Stage 1 and 2 Transformers

Predicted noise level dB(A)

- < 30 dB(A)
- 30 - 35 dB(A)
- 35 - 40 dB(A)
- 40 - 45 dB(A)
- >50 dB(A)

100 200 m

Datum WGS 84, Projection UTM ZONE 55S

Resonate

www.resonate-consultants.com

Springvale Energy Hub

Predicted cumulative noise level for Stage 2 and 3 for Night time periods.

PROJECT NUMBER	M250626
DRAWN BY	ACH
CHECKED BY	XL
DATE ISSUED	30/07/25
CLIENT	Volta Energy Group
BATTERIES	CATL
RECEIVER HEIGHT	1.5m
IMAGERY	(c) Google

Legend

- BESS Stage 1, 2 and 3
- Stage 1 and 2 Transformers

Predicted noise level dB(A)

- < 30 dB(A)
- 30 - 35 dB(A)
- 35 - 40 dB(A)
- 40 - 45 dB(A)
- >50 dB(A)

100 200 m

Datum WGS 84, Projection UTM ZONE 55S

Resonate

www.resonate-consultants.com

Springvale Energy Hub

Predicted cumulative noise level for Stage 1, 2 and 3 for Day and Evening time periods.

PROJECT NUMBER	M250626
DRAWN BY	ACH
CHECKED BY	XL
DATE ISSUED	30/07/25
CLIENT	Volta Energy Group
BATTERIES	CATL
RECEIVER HEIGHT	1.5m
IMAGERY	(c) Google

Legend

- BESS Stage 1, 2 and 3
- Stage 1 and 2 Transformers

Predicted noise level dB(A)

- < 30 dB(A)
- 30 - 35 dB(A)
- 35 - 40 dB(A)
- 40 - 45 dB(A)
- >50 dB(A)

100 200 m

Datum WGS 84, Projection UTM ZONE 55S

Resonate

www.resonate-consultants.com

Springvale Energy Hub

Predicted cumulative noise level for Stage 1, 2 and 3 for Night time periods.

PROJECT NUMBER	M250626
DRAWN BY	ACH
CHECKED BY	XL
DATE ISSUED	30/07/25
CLIENT	Volta Energy Group
BATTERIES	CATL
RECEIVER HEIGHT	1.5m
IMAGERY	(c) Google

Legend

- BESS Stage 1, 2 and 3
- Stage 1 and 2 Transformers

Predicted noise level dB(A)

- < 30 dB(A)
- 30 - 35 dB(A)
- 35 - 40 dB(A)
- 40 - 45 dB(A)
- >50 dB(A)

100 200 m

Datum WGS 84, Projection UTM ZONE 55S

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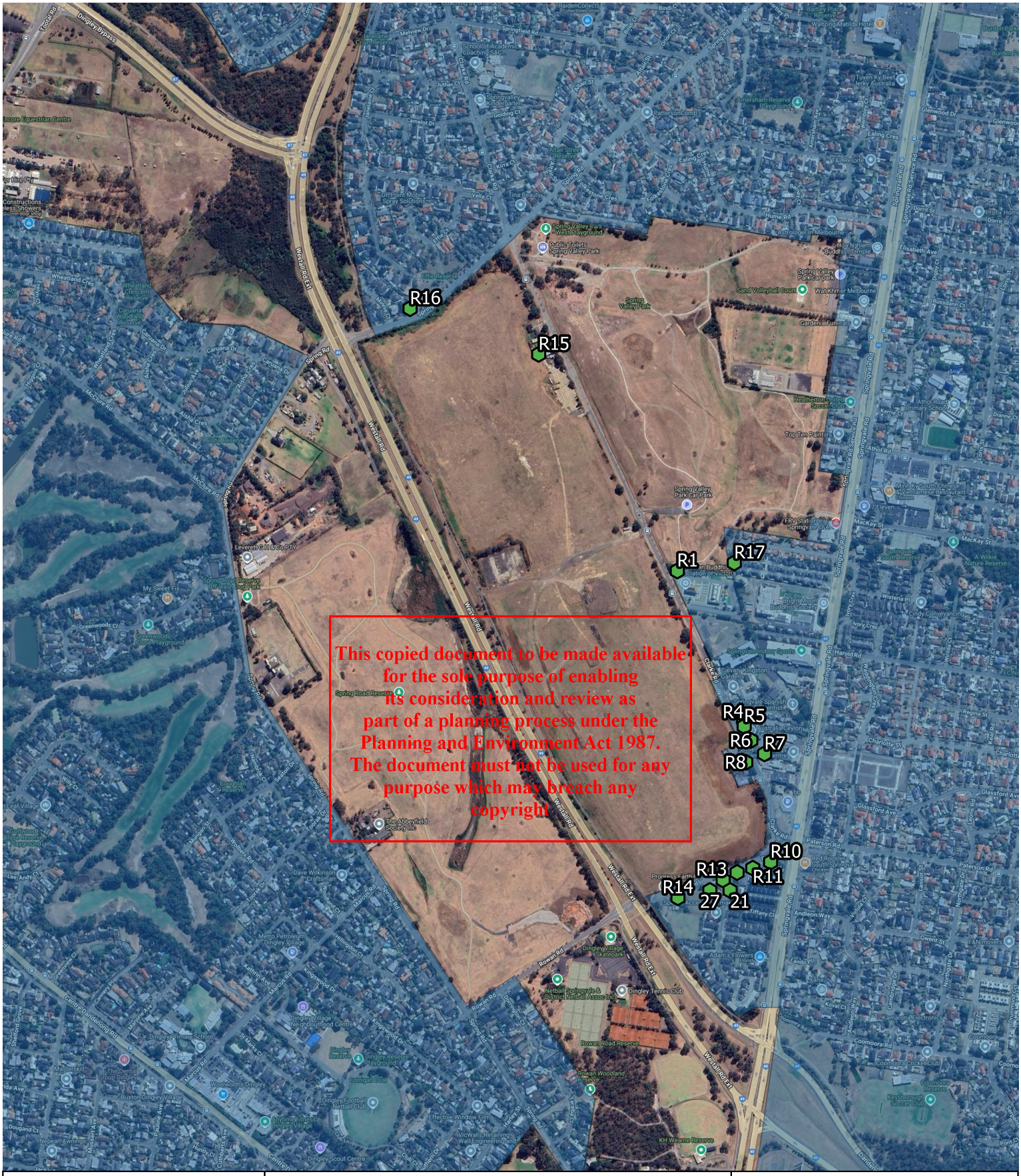
Appendix B – Vic reports



Urban Areas Map

Springvale Energy Hub

PROJECT NUMBER	M250626
DRAWN BY	ACH
CHECKED BY	XL
DATE ISSUED	05/05/25
CLIENT	Volta Energy Group
IMAGERY	(c) Google

Legend

MAajor Urban Area

ADVERTISED PLAN

200 400 m

Datum WGS 84, Projection UTM ZONE 55S

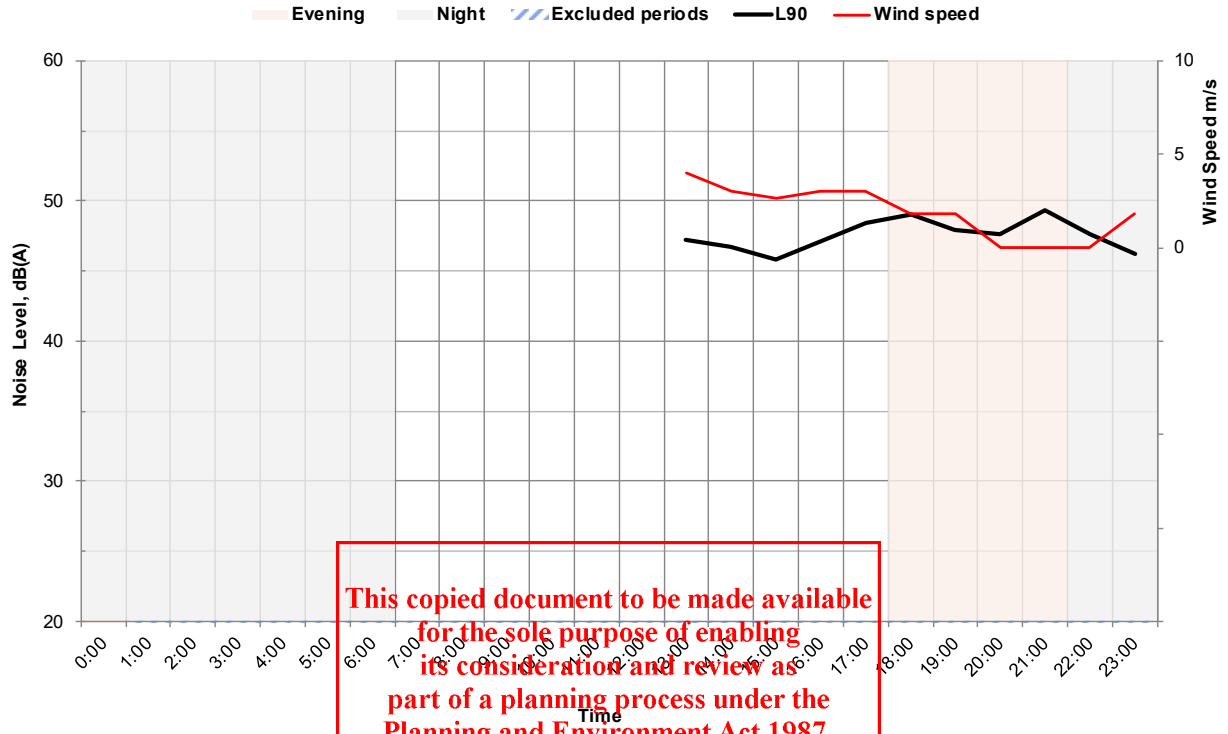
Resonate

www.resonate-consultants.com

Appendix C – Noise Measurements

Springvale Energy Hub Location A	
Photograph of noise monitor	
	
Details	
Noise logging dates	16/04/2025 – 23/04/2025
Equipment type and serial number	Svan 977 SN99041
Calibration details	Laboratory calibration valid until 11 May 2025. Field check passed at 94 dB post-logging.

Wednesday - 16 April



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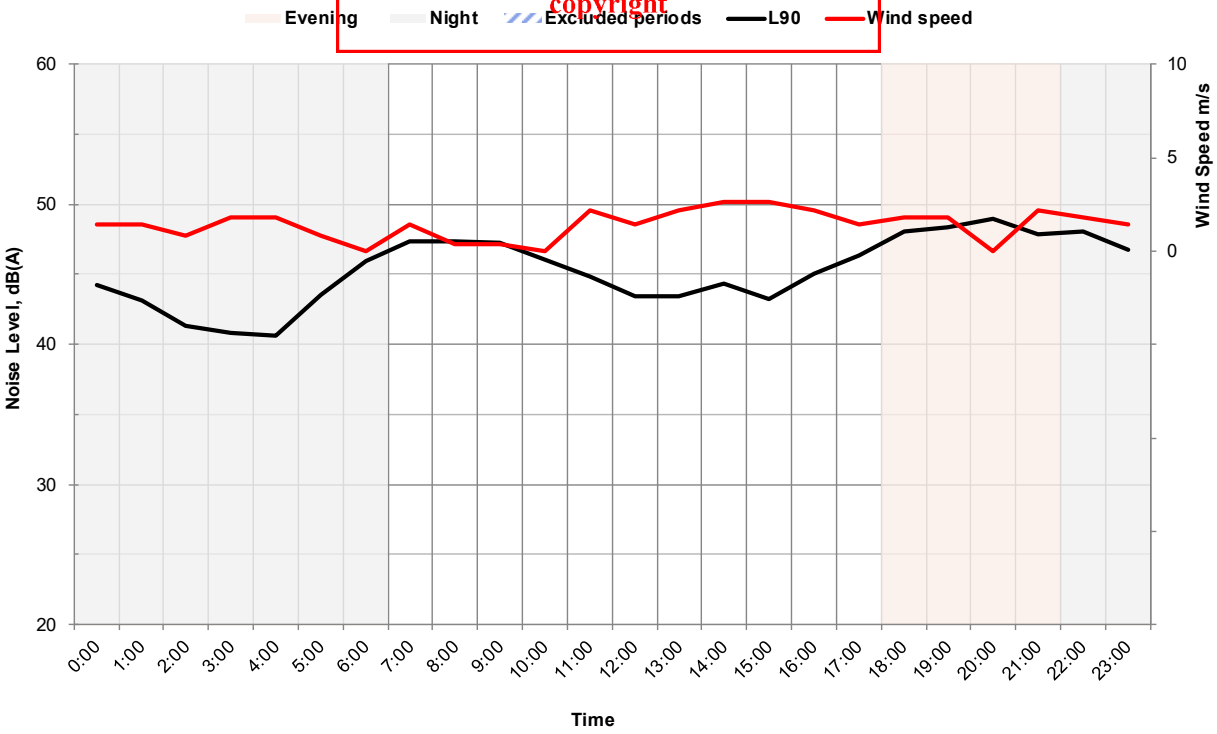
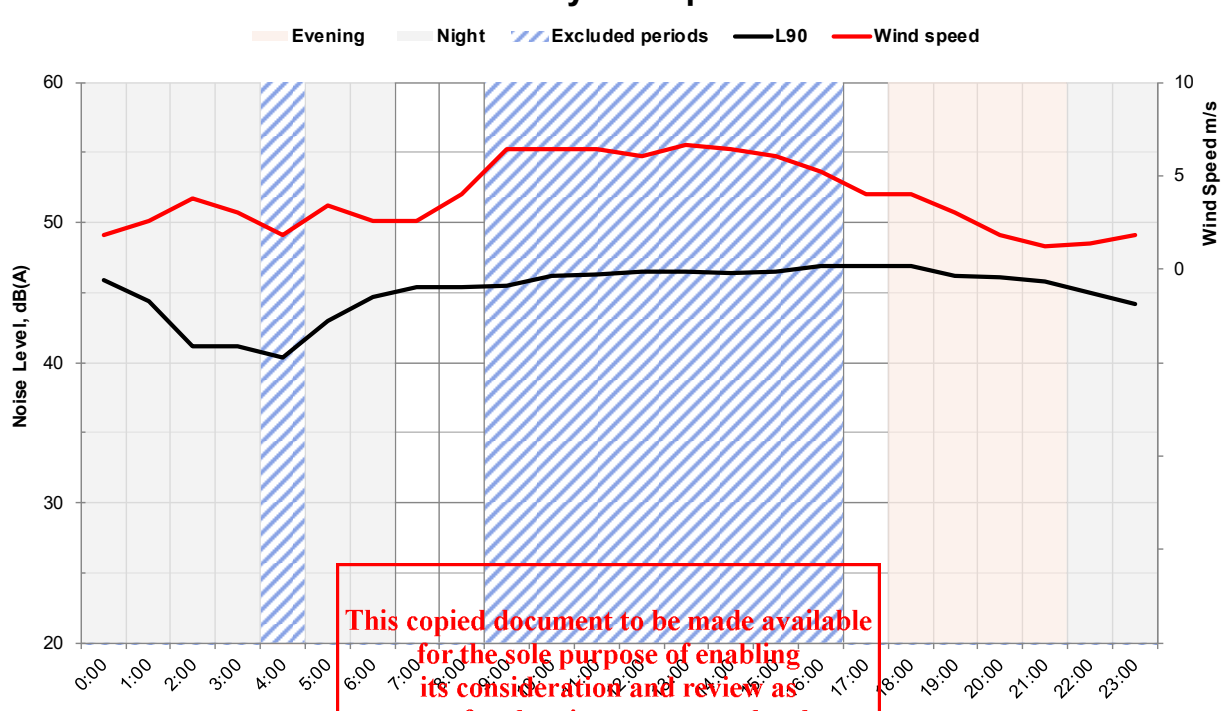
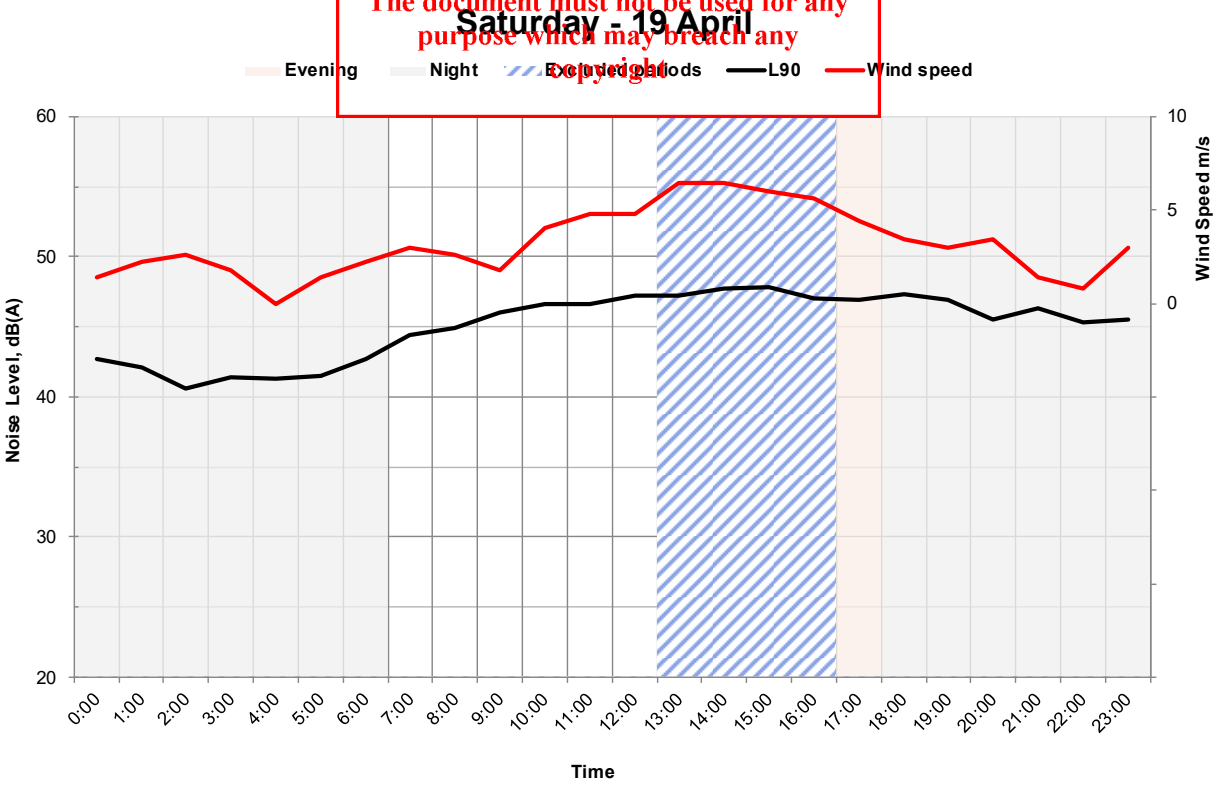
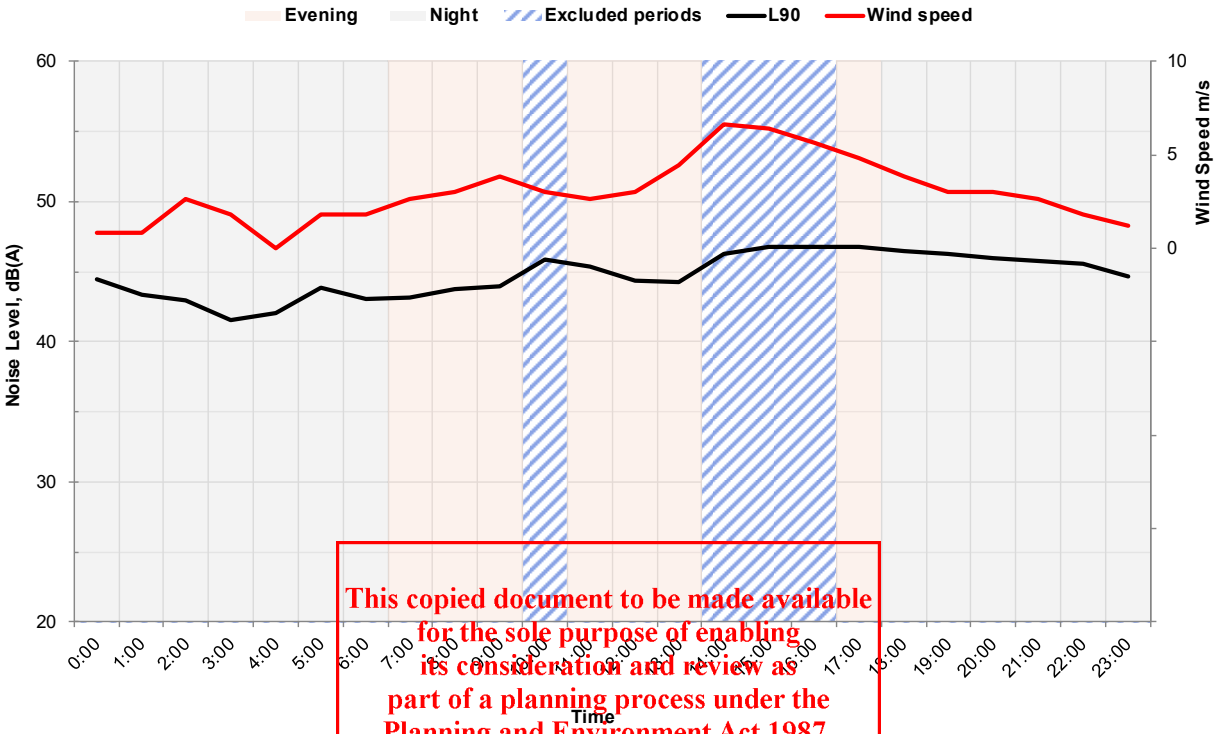


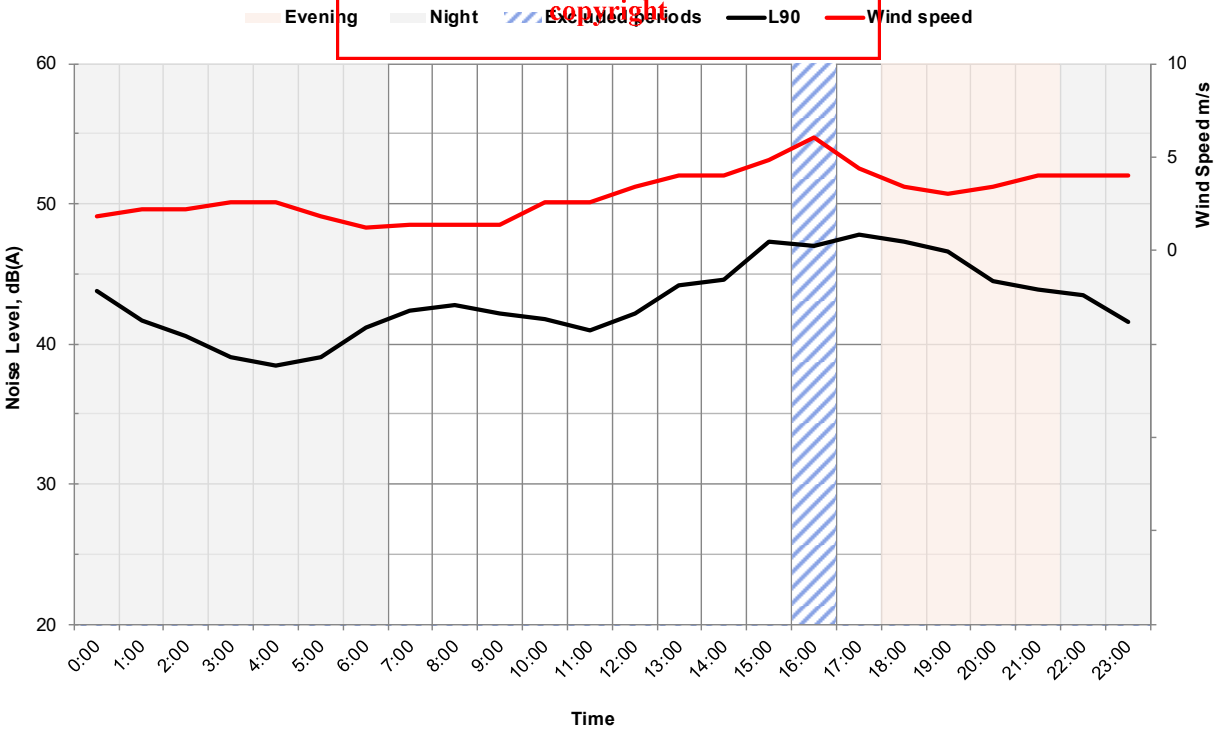




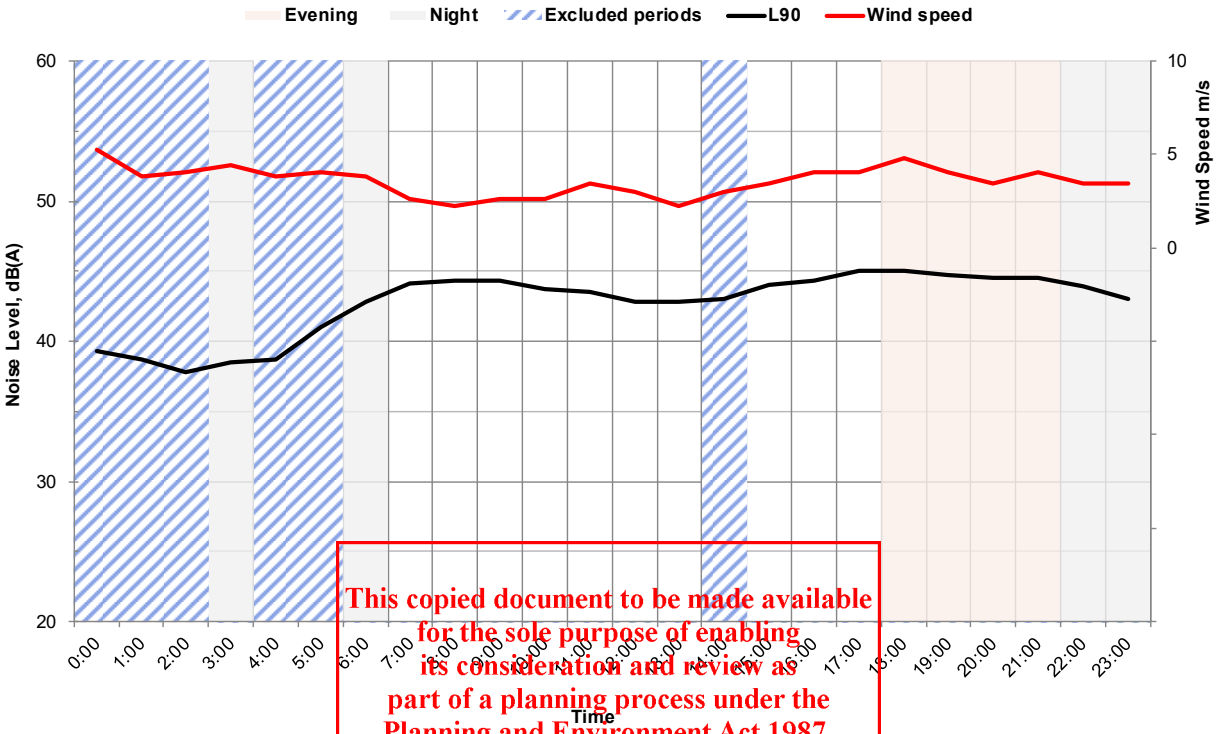
Sunday - 20 April



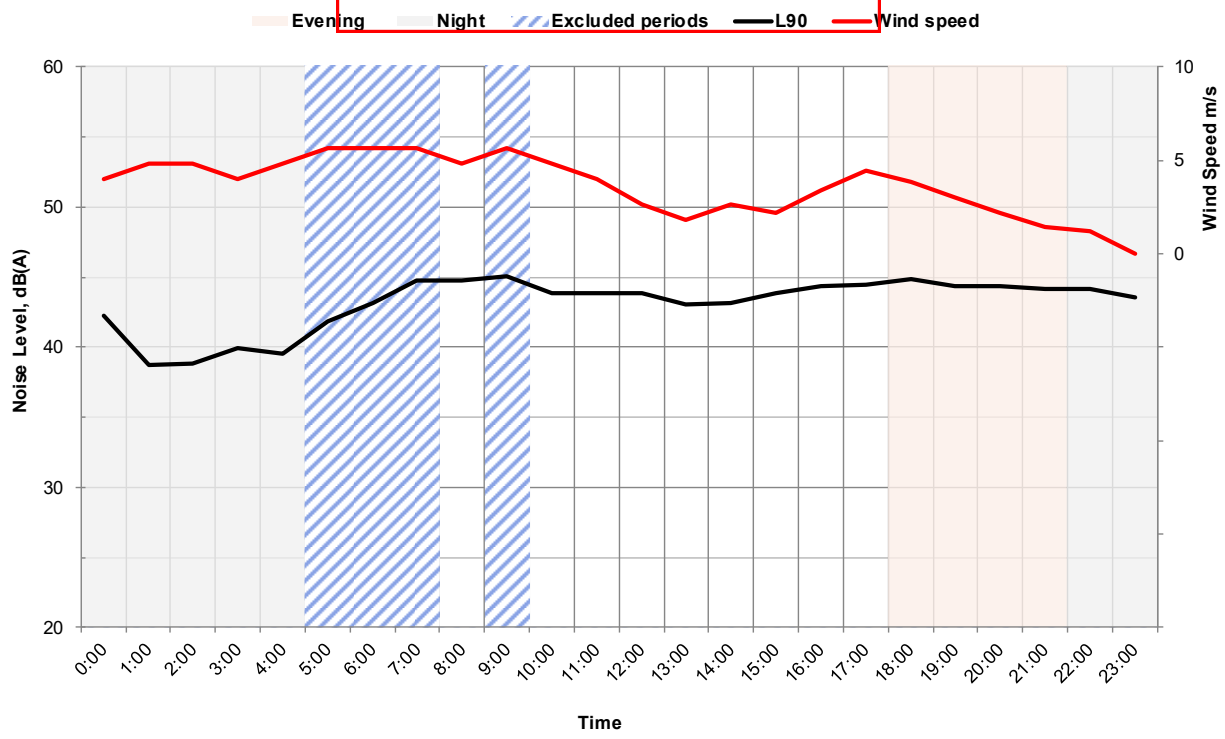
Monday - 21 April



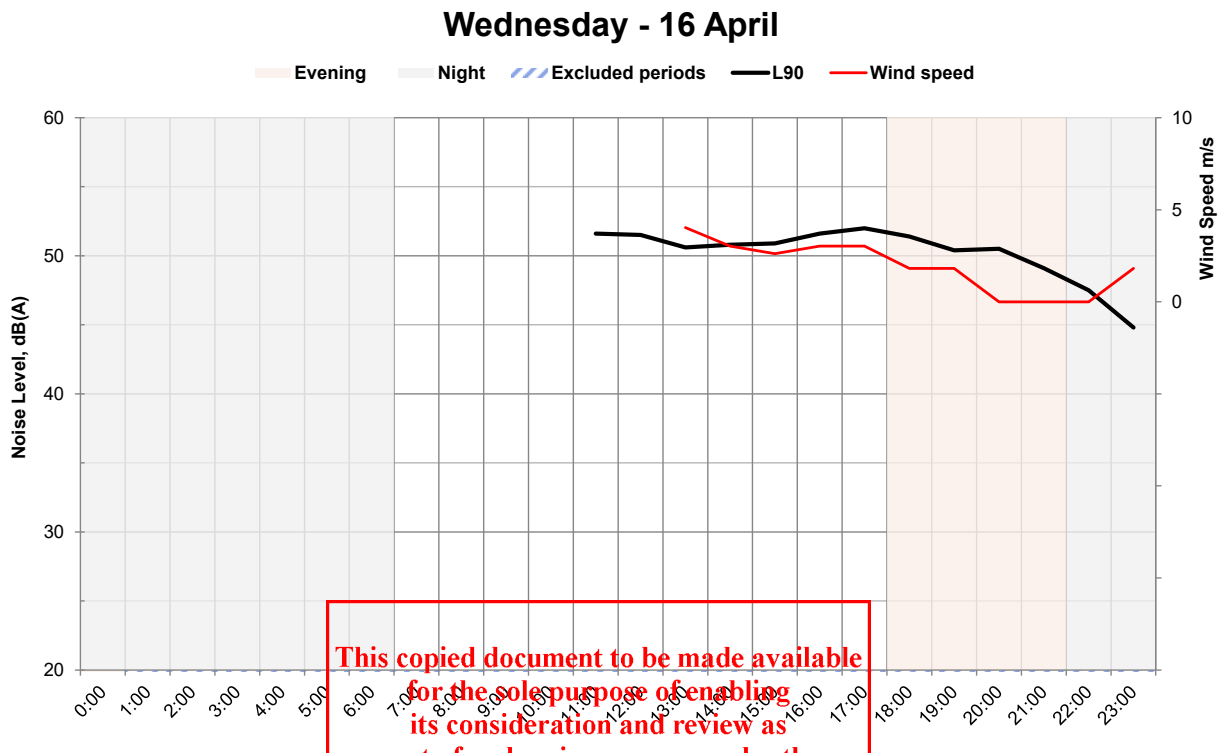
Tuesday - 22 April

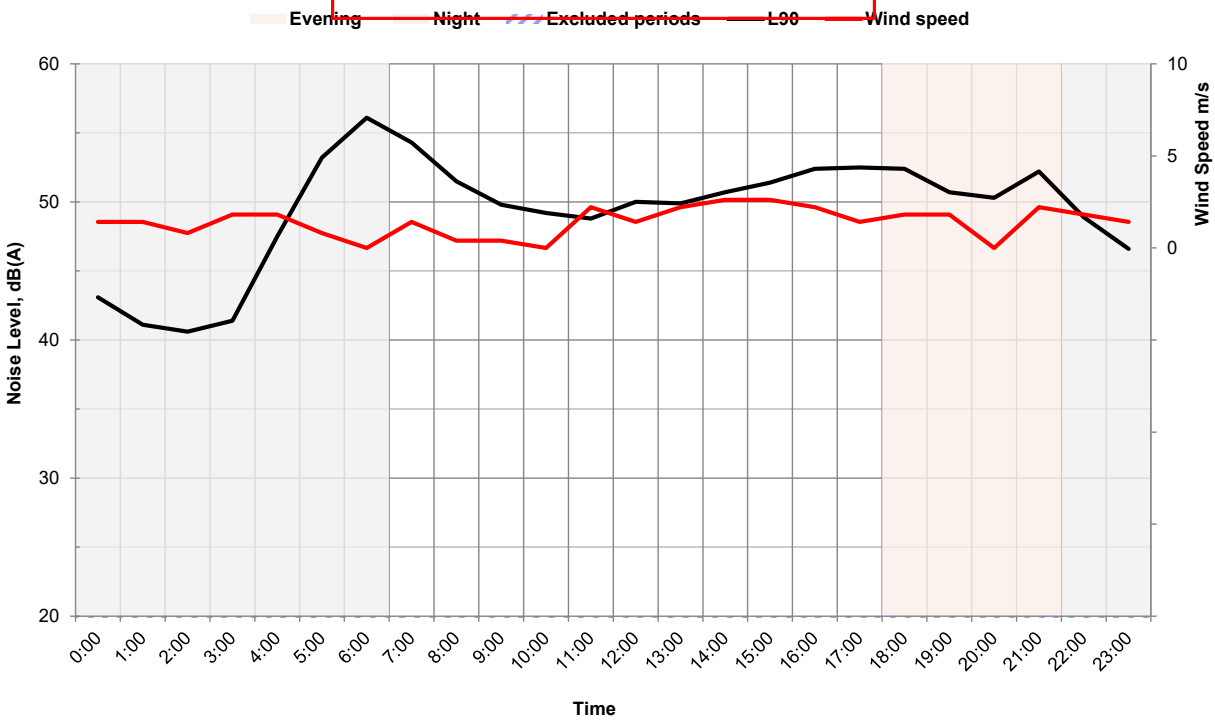


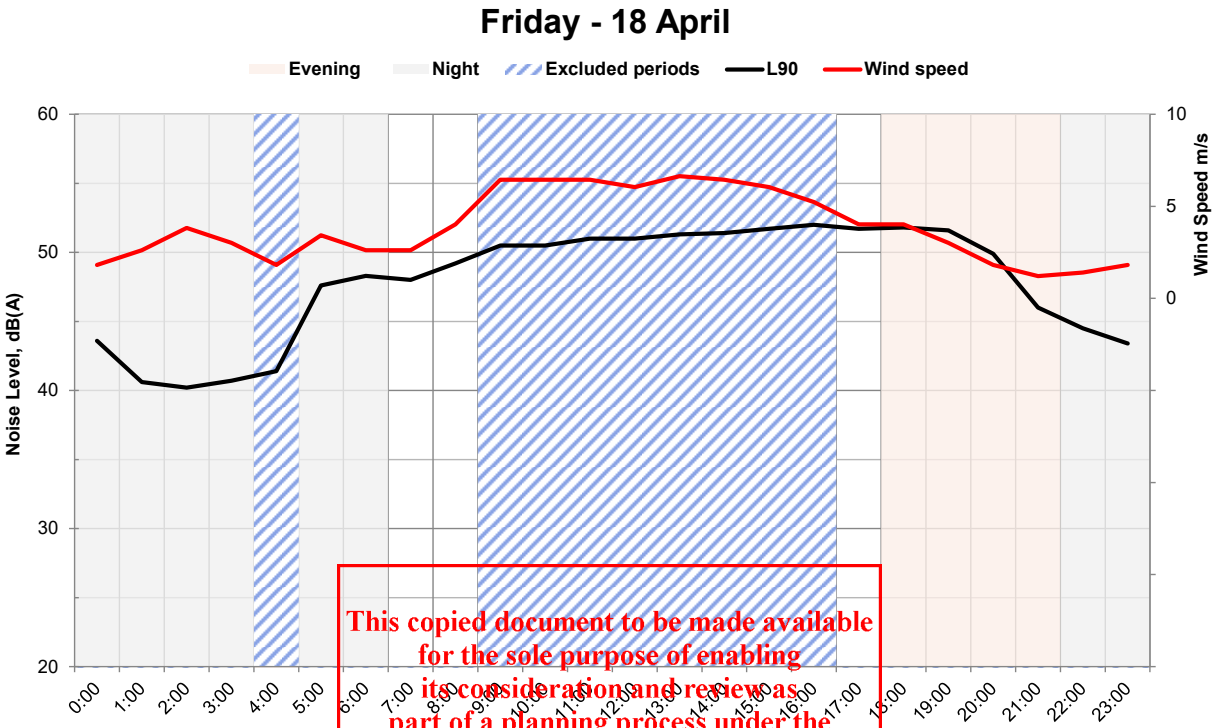
Wednesday - 23 April

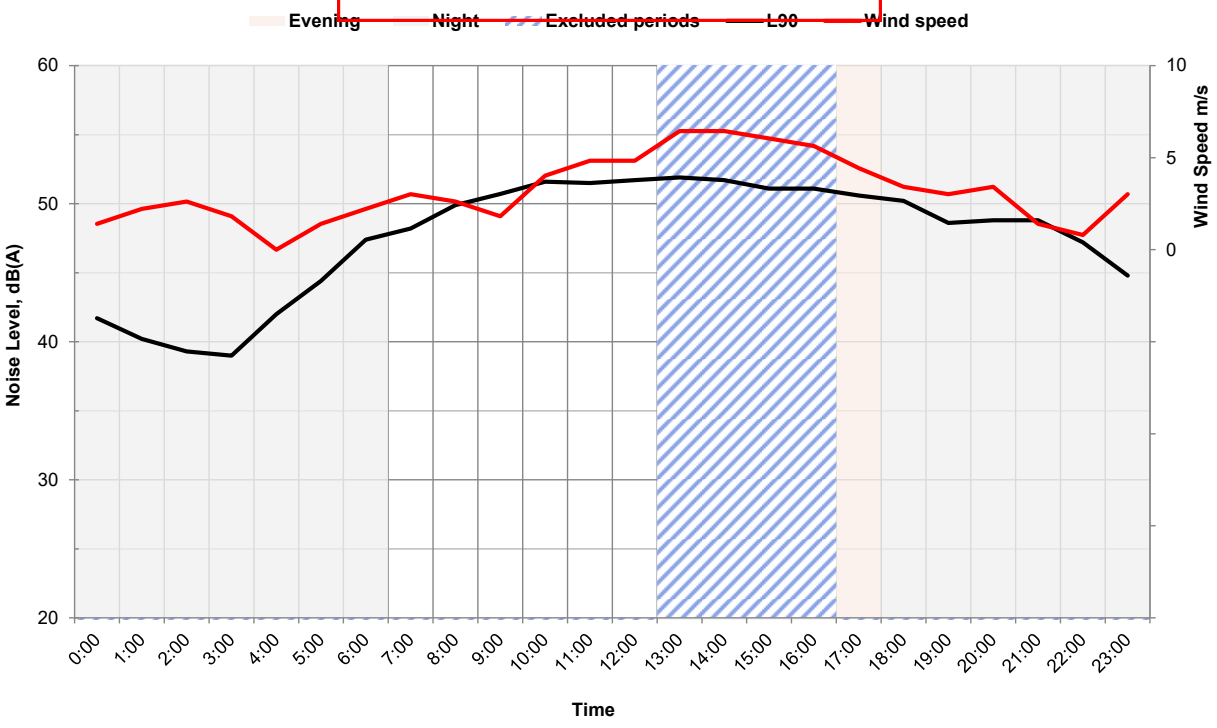


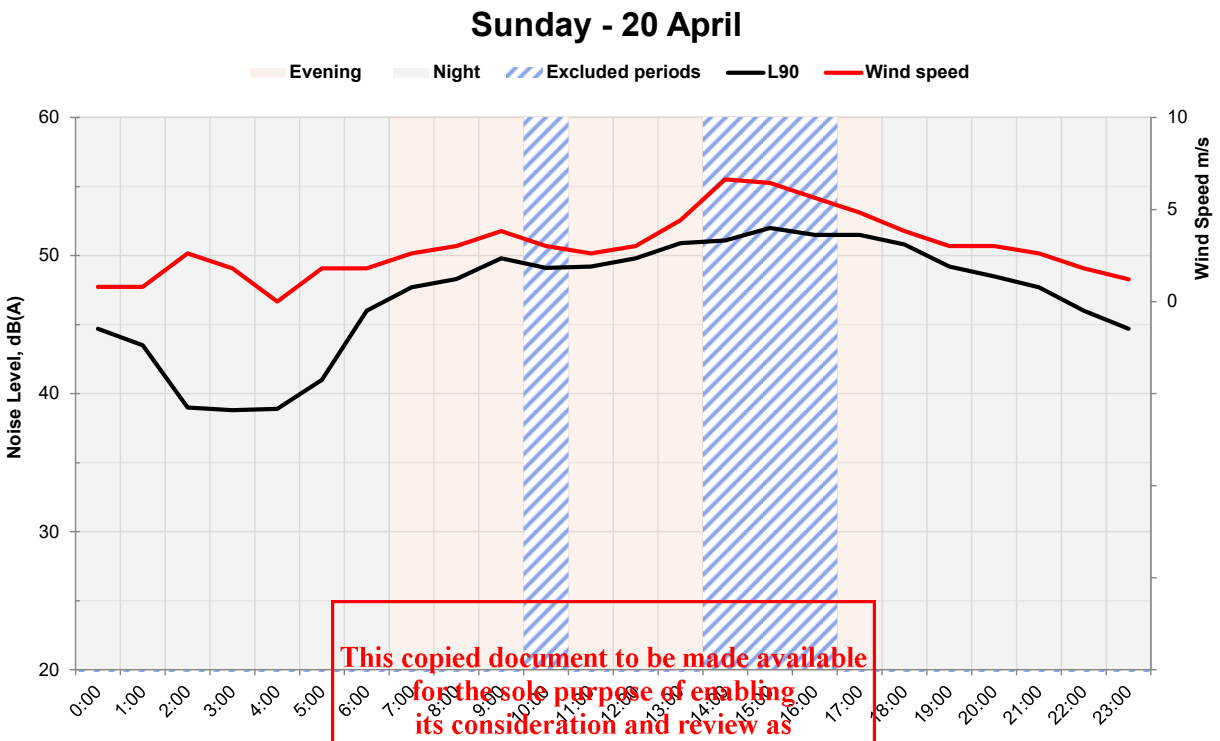
Springvale Energy Hub Location B	
Photograph of noise monitor	
	
Details	
Noise logging dates	16/04/2025 – 23/04/2025
Equipment type and serial number	Rion NL-42 SN00946979
Calibration details	Laboratory calibration valid until August 2026. Field check passed at 94 dB post-logging.

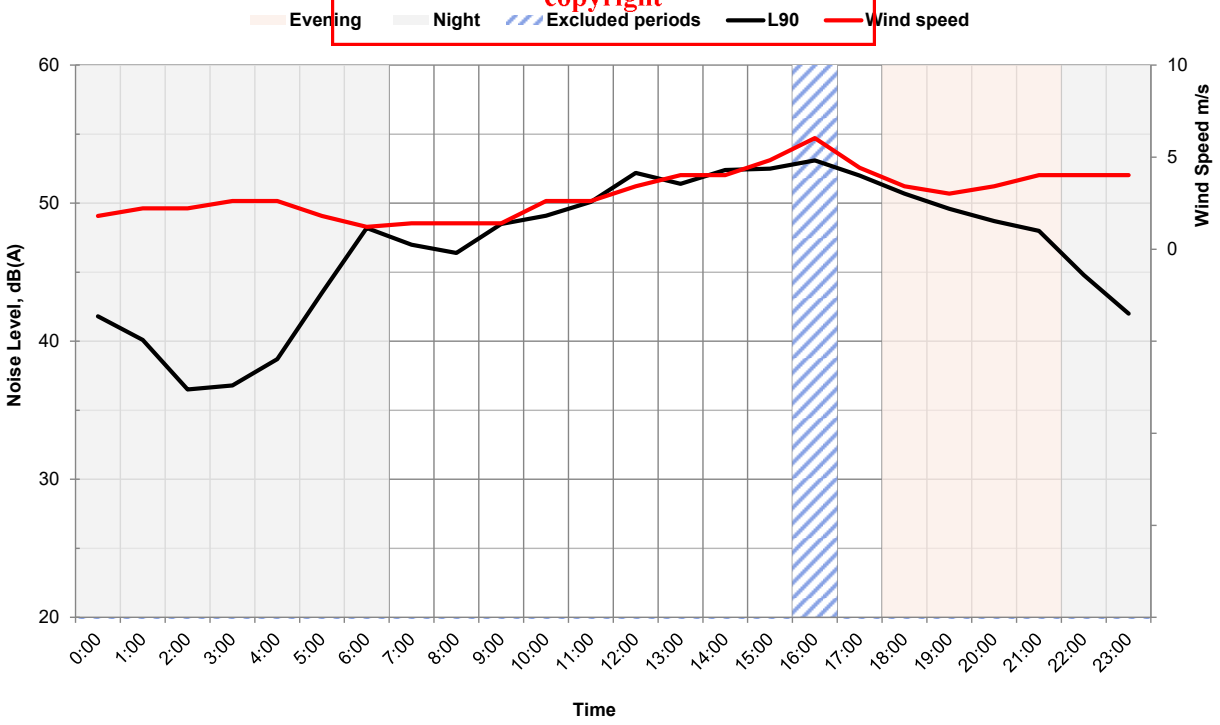




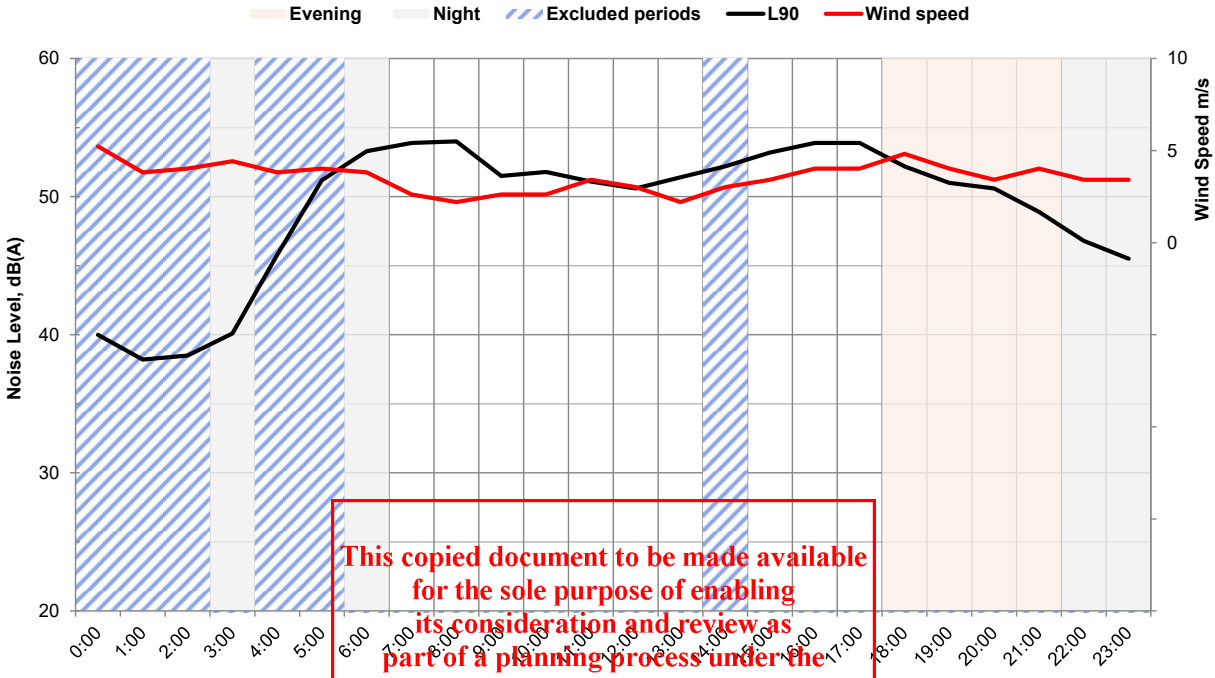








Tuesday - 22 April



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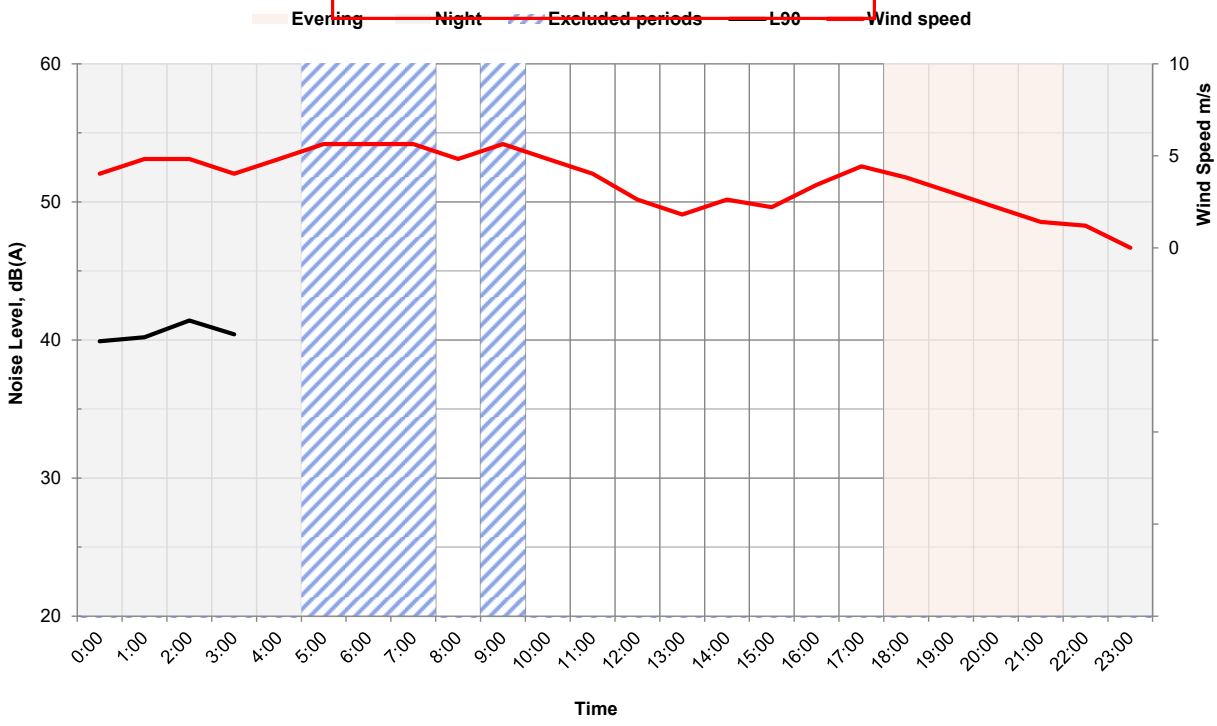

Appendix D

Stage 1 predicted noise levels

Table 15 Predicted noise levels at NSAs against Day and Evening limits (Cumulative SEH Stage 1,2 and 3)

Noise sensitive area	Predicted noise level, dB L_{Aeq}	Day / Evening limit, dB L_{Aeq}	Compliance Day / Evening
R15 (rural area)	47	52 / 50	✓ / ✓
R1	47	50 / 48	✓ / ✓
R5	46	50 / 48	✓ / ✓
R2	46	50 / 48	✓ / ✓
R8	46	50 / 48	✓ / ✓
R14	45	56 / 52	✓ / ✓
R4	45	50 / 48	✓ / ✓
R11	44	50 / 48	✓ / ✓
R17	44	50 / 48	✓ / ✓
R7	44	50 / 48	✓ / ✓
R6	44	50 / 48	✓ / ✓
R16	43	49 / 44	✓ / ✓
R13	43	56 / 52	✓ / ✓
R12	43	50 / 48	✓ / ✓
R10	42	50 / 48	✓ / ✓