



Winton Renewable Energy Stability and Storage Terminal (WRESST)

Noise Impact Assessment

Winton Renewable Energy Stability & Storage Terminal Pty Ltd c/o Cogency Australia

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SLR Project No.: 640.032372.00001

1 June 2026

Revision: 001

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Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
001	1 June 2026	JS	AD	AD

Basis of Report

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Winton Renewable Energy Stability & Storage Terminal Pty Ltd c/o Cogency Australia (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid. SLR may have used AI in the preparation of this document.

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Executive Summary

This technical report is an attachment to the Winton Renewable Energy Storage and Stability Terminal (WRESST) Planning Application submission on behalf of Winton Renewable Energy Stability & Storage Terminal Pty Ltd (WRESST Pty Ltd).

SLR Consulting has been engaged by WRESST Pty Ltd to provide a noise impact assessment of a proposed 400 MW / 1600 MWh battery energy storage system (BESS) located at 576 Winton-Glenrowan Road, Winton, Victoria.

The proposed site is located in Farming Zone (FZ), Transport Road Zone (TRZ3) and Special Use Zone (SUZ4). The closest sensitive receivers are approximately 500 m north west from the project boundary.

Construction noise emissions from the Site have been assessed against the relevant EPA requirements. Construction impacts are not expected to be significant and expected to be managed by scheduling construction activities to the EPA standard working hours (e.g. day period 7.00 am to 6.00 pm). Community engagement and best practice noise management controls including regular maintenance, broadband reversing beepers etc. are recommended to be implemented to minimise residual risk of harm to nearby receivers.

Noise emission data of batteries and silenced inverter units based on the preliminary original equipment manufacturers (OEM) selections were used as a basis for the operational noise assessment. The predicted noise levels were assessed against the various requirements of EPA Victoria (EP Act, EP Regulations and Noise Protocol limits and GED).

The operational noise assessment indicates that compliance can be demonstrated with the Noise Protocol when the anticipated typical BESS operations are considered.

Cumulative noise from the Glenrowan Terminal Station, other neighbouring BESSs and solar farm projects are considered in the noise assessment.

Low frequency noise was assessed in accordance with the Low Frequency Guidelines and demonstrated that the risk of problematic low frequency noise at the closest receivers is low.

Accordingly, the Project is predicted to meet the relevant Regulations and is not expected to have an unreasonable acoustic impact to the surrounding area.

All plant, equipment and design layout will be reviewed during the detailed design stage to ensure that compliance with the noise criteria, including cumulative noise, is maintained as the acoustic performance of the plant and layout is refined.

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1.0 Introduction

Winton Renewable Energy Stability & Storage Terminal Pty Ltd (WRESST Pty Ltd) is proposing to develop a utility-scale 400 MW / 1600 MWh battery energy storage system (BESS) located at 576 Winton-Glenrowan Road, Winton, VIC 3673 ('the Project'), adjacent to the Glenrowan Terminal Station. The BESS Area sits within Lot 1 and Lot 2 TP836611 (the Site).

SLR Consulting Pty Ltd (SLR) has been engaged to undertake a noise impact assessment in relation to the planning application for the Project.

2.0 Project Site & Surrounding Area

The Site is in Farming Zone (FZ), Transport Road Zone (TRZ3) and Special Use Zone (SUZ4), and is located within the Rural City of Benalla Local Government Area (LGA). The Site is located approximately 4.5 km east of Winton and to the south of Hume Freeway. There are several industries in the vicinity such as Glenrowan Terminal Station, Glenrowan West Solar Farm, Mokoan Solar Farm, Enervest BESS, Winton BESS (proposed but not approved yet), Akaysha BESS, and Winton Energy Reserve. The closest sensitive receivers are presented **Table 1** and **Figure 1**. Winton Wetlands is located approximately 2 km to the northwest of the Site. The noise impact on Winton Wetlands is also discussed in this assessment. Note that there may be more receivers further away from the Site, but the receivers identified and discussed in this report are considered sufficient to adequately assess potential noise impacts in all directions of the Site.

The project concept layout is shown in **Figure 2**.

Table 1 Noise Sensitive Receivers

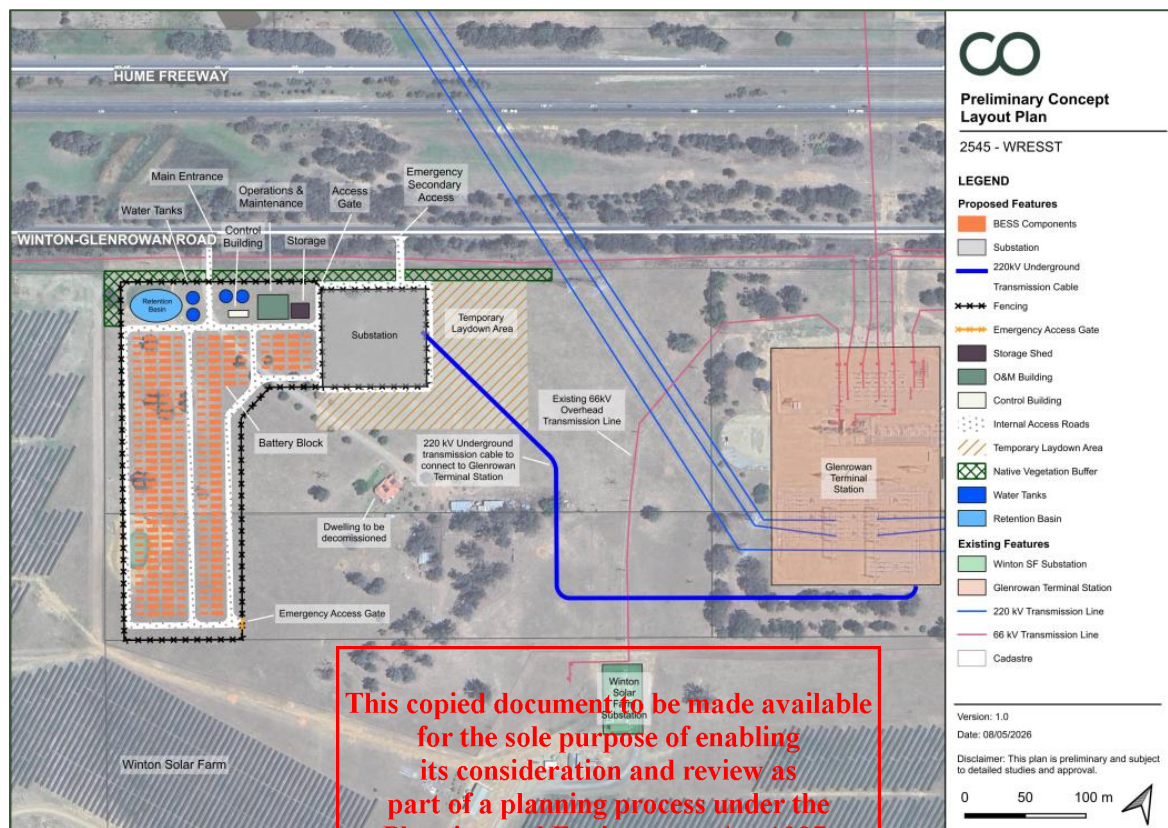
Receiver ID	Distance to BESS Centroid (m)
R2	590
R3	820
R4	870
R5	1030
R6	1600
R7	1840
R8	1990
R9	2100
R10	2170
R11	2310
R14	2830
Campground	1720
Winton Wetlands	2000



Figure 1 Sensitive Receiver and BESS Layout



Figure 2 Proposed Site Layout



3.0 Noise Monitoring

Noise monitoring was conducted across the Site and surrounding areas to establish ambient and background noise levels. Monitoring activities took place between Friday, 3 October 2025 and Sunday, 5 October 2025 at various representative locations throughout the Site. Due to limited access to sensitive receiver properties, measurements were instead obtained from suitable proxy locations that were acoustically representative of those receivers. At Receiver 2 (6 Bowers Road), unattended noise monitoring was carried out over an extended period, from 3 October to 11 October 2025, to capture a more comprehensive dataset.

The details of noise monitoring equipment are provided in **Table 2**.

The unattended monitoring locations and results are presented in **Figure 3** and **Table 3** respectively. Further noise monitoring results are also presented in **Appendix A**.

The attended monitoring locations and results are presented in **Figure 4** and **Table 4**.

The monitoring period was deliberately scheduled over a weekend, as experience from similar studies undertaken by SLR has shown that weekends typically represent the worst-case (i.e., lowest) background noise conditions. Establishing limits under these quieter circumstances provides a conservative basis for assessment and ensures that any future operational noise is evaluated against stringent criteria.

Audio recordings and subsequent data analysis identified that insect noise contributed significantly to measured sound levels during several evening and night-time hours. Although such insect activity is typical for the area, these periods were excluded from the statistical analysis to maintain a conservative approach, on the assumption that insect noise may be seasonally variable.



Similarly, the early-morning period (approximately 5:30 am – 7:00 am) was affected by bird chorus calls associated with sunrise. While this is characteristic of the local environment, short intervals showing abnormally elevated noise levels—likely due to birds calling in close proximity to the monitoring equipment—were also excluded from the dataset to avoid overestimating ambient conditions.

It was further observed that background noise levels during the daytime were lower than those recorded during the evening and night-time periods. This trend is not unusual for the area, as Saturday daytime conditions are typically the quietest of the week, whereas evening and night-time levels are more consistent with the region's normal acoustic environment.

Table 2 Noise Logging Equipment Details

Location	Monitoring Period	Equipment
Terminal Station	3 rd October – 5 th October 2025	ARL NGARA S/N 878093
Glenwest Lane	3 rd October – 5 th October 2025	ARL NGARA S/N 8780DB
54 Eleven Mile Creek Rd	3 rd October – 5 th October 2025	ARL NGARA S/N 8781BE
6 Bowers Rd	3 rd October – 11 th October 2025	ARL NGARA S/N 8781DF

Figure 3 Noise Logger Location



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Table 3 Noise Logger Results

Location	Representative of receptor location	Day L90, dBA	Evening L90, dBA	Night L90, dBA	Day Leq, dBA	Evening Leq, dBA	Night Leq, dBA
Terminal Station	N/A	48	46	37	57	54	54
Glenwest Lane*	R4, R10	35	37*	34*	47	46*	45*
54 Eleven Mile Creek Rd*	R5, R6, R7, R8, R9	36	37*	35*	53	51*	49*
6 Bowers Rd (R1)	R2, R3	51	55	40	61	64	63

* Location has periods where noise data are influenced by insect and bird noises. Such periods, whilst may be typical in the environment, are excluded from the presented results to remain conservative.

Figure 4 Attended Measurement Location

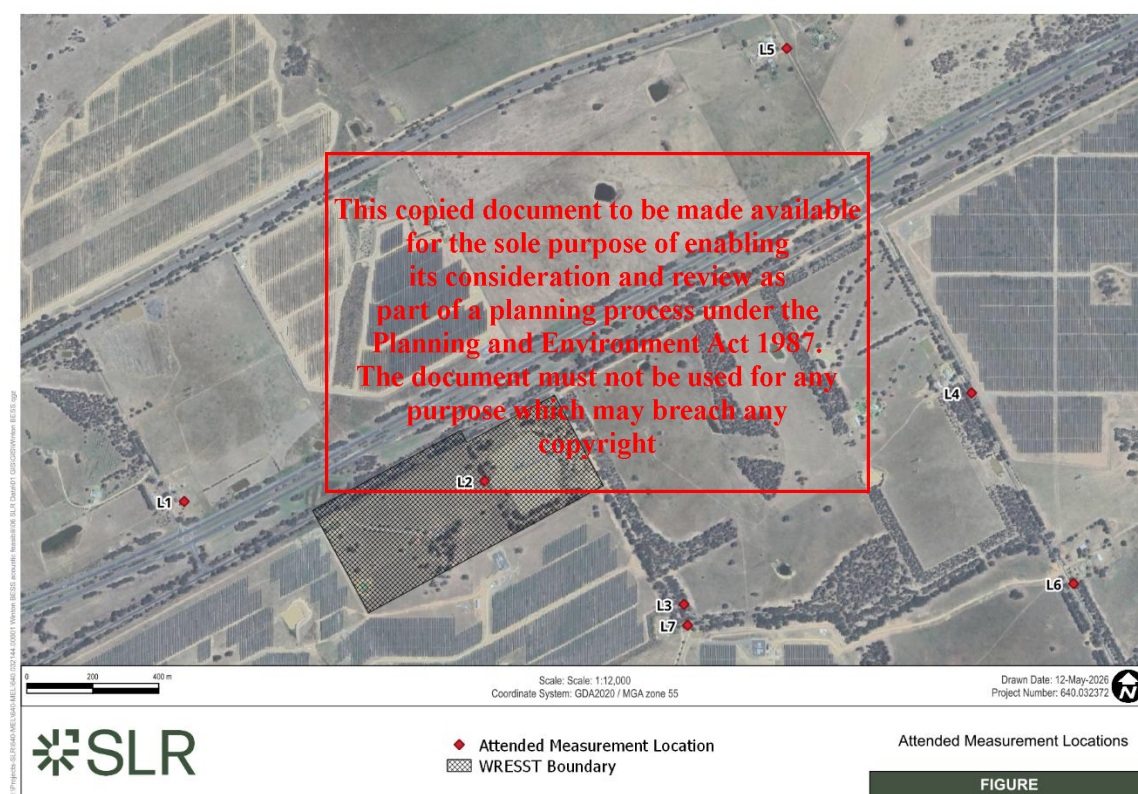


Table 4 Attended Measurement Results

Location	Measurement Number	Date & Time	L90, dBA	Leq, dBA	Comments
L1	001	3 rd October 2025 12:40 – 12:55 PM	57	62	-Road traffic from Hume Fwy dominant -Little to no local traffic along Bowers Rd -Typical bird noises -Owner doing property labour works

Location	Measurement Number	Date & Time	L90, dBA	Leq, dBA	Comments
L2	002	3 rd October 2025 01:45 – 2:00 PM	56	60	-Road traffic from Hume Fwy dominant -Typical bird noises -Terminal stations inaudible -Solar farms inaudible
	003	4 th October 2025 08:25 – 08:40 AM	42	48	-Road traffic from Hume Fwy dominant -Typical bird noises -Terminal stations very faint electrical buzzing -Solar farms inaudible
	004	5 th October 2025 07:45 – 08:00 AM	46	51	-Road traffic from Hume Fwy dominant -Typical bird noises -Terminal stations very faint electrical buzzing -Solar farms inaudible
L3	005	3 rd October 2025 03:32 – 03:47 PM	37	44	-Distant Hume Fwy traffic -Typical bird noises -Terminal stations and solar farms inaudible
	006	5 th October 2025 08:17 – 08:32 AM	38	45	-Distant Hume Fwy traffic -Typical bird noises -Intermittent insect noise -Solar farm inverter not audible. Likely not operating. Large part of the visible solar panels seems to be covered by cloud.
L4	007	3 rd October 2025 04:11 – 04:26 PM	41	53	-Local traffic dominant ~5 vehicles passed at this time of visit over 20 minutes. -Distant Hume Fwy traffic -Typical bird noises -Solar farms inaudible
	008	4 th October 2025 07:08 – 07:23 AM	35	51	-No local traffic passby -Distant Hume Fwy traffic -Typical bird noises -Solar farm audible. Electrical buzzing/humm sound from inverter throughout measurement
	009	4 th October 2025 05:20 – 05:35 PM	37	56	-4 local vehicle passby -Distant Hume Fwy traffic -Typical bird noises



Location	Measurement Number	Date & Time	L90, dBA	Leq, dBA	Comments
					-Solar farm inaudible. Sunny but most likely not operating since no electrical buzzing sound.
	010	5 th October 2025 08:42 – 08:57 AM	42	55	-Distant Hume Fwy traffic -Typical bird noises -Solar farm inaudible. Likely not operating though appears to have sufficient sun
L5	011	4 th October 2025 05:59 – 06:14 AM	49	56	-Hume Fwy traffic dominant -Typical bird noises
	012	4 th October 2025 06:15 – 06:30 AM	48	56	-Sun is sufficiently up at this time
L6	013	4 th October 2025 06:52 – 07:07 AM	37	55	-Distant Hume Fwy traffic -Lots of bird noises
	014	4 th October 2025 07:08 – 07:23 AM	35	51	-Solar farm inaudible
L7	015	4 th October 2025 08:00 – 08:15 AM	33	42	-Distant Hume Fwy traffic -Typical bird noises. -Occasionally audible solar farm inverter noises

Note: All measurements are 15 minutes period.

4.0 Victorian Regulations – Project Criteria

4.1 General Environmental Duty

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

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

- an adverse effect on the amenity of a place or premises that unreasonably interferes with or is likely to unreasonably interfere with enjoyment of the place or premises; or
- a change to the condition of the environment to make it offensive to the senses of human beings; or
- anything prescribed to be harm for the purposes of the Act or the regulations; and
- Should consider potential cumulative effect of harm arising from an activity combined with harm arising from other activities or factors.

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



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

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

4.2 Noise Criteria

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

4.2.1 EP Act 2017

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

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

Unreasonable noise means noise that

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

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

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

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



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

4.2.2 EP Regulations and Noise Protocol 2021

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

In Victoria, noise emissions from commercial, industrial and trade premises are not permitted to be unreasonable or aggravated, and are subject to the provisions of the Regulations, and the “Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues”, EPA Publication 1826.4 May 2021 (the Noise Protocol).

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

Table 5 presents the assessment periods prescribed by the Regulations.

Table 5 Definitions of Day, Evening and Night Periods

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

Rural Method – Noise Limits

With regard to the Project site, all noise sensitive receivers are located outside of the Major Urban Area, therefore the determination of noise criteria follows the Rural Method. Due to significant levels of background noise in the area, the noise limits have been determined using the ‘noise limits based on background level’ section of the Rural Method.

The calculation of noise limits based on the background level assessment is as follows:

- For the day period, the noise limit is the greater of:
 - The distance adjusted level or base noise level, or
 - The day background level plus 8 dB
- For the evening period, the noise limit is the greater of:
 - The distance adjusted level or base noise level, or
 - The evening background level plus 5 dB



- c. For the night period, the noise limit
- i. Is the greater of –
1. The distance adjusted or base noise level, or
 2. The night background plus 5 dB
- ii. Must not be greater than 55 dBA.

Cumulative Noise Impacts

Regulation 119 of the EP Regulations states that the noise contributions from all commercial, industrial and trade premises must not exceed the noise limit for a noise sensitive area. Therefore noise from all commercial and industrial operations are required to cumulatively comply with the identified noise limits.

In establishing the noise limits for the Project, consideration was given to the presence and influence of neighbouring industrial operations, including existing solar farms, Battery Energy Storage Systems (BESSs), and other energy facilities within the surrounding area. **Figure 5** shows the location of the surrounding energy facilities in the area.

The following key factors and observations informed the assessment.

Solar Farms

Noise emissions from solar farms primarily originate from inverters and power conversion systems. These units are relatively limited in number across the region and are generally spatially well distributed, such that any given receiver is typically influenced by only one nearby inverter. On-site observations and audio recordings indicated that inverter activity begins early in the morning around sunrise—potentially before 7:00 am—although the equipment is unlikely to be operating at full capacity at that time. A faint “hum” was noted within approximately 300 m of certain inverters, particularly when the sound was not masked by Freeway traffic, which dominates noise conditions even at receivers located further from the Freeway.

During the day and evening periods, inverters are expected to operate at full load, and field observations confirmed that their noise emissions may be audible up to 600 m from the source. Accordingly, the assessment conservatively assumes that solar farms can be considered contributing industrial noise sources up to 600 m during day and evening periods, and up to 300 m during night-time when operational activity and background levels are generally lower.

BESSs and Energy Facilities

A number of receivers are located within the region of interest, each situated at varying distances from planned future BESS and energy facilities. While the closest receivers to each facility represent the critical assessment points for compliance purposes, receivers located further away from that facility will inherently experience lower noise exposure. As a result, not all facilities contribute equally to the overall noise environment at each receiver location.

For each receiver,

- The anticipated background noise levels, detailed in **Table 3**, for the respective representative receivers, was used to evaluate base noise limits based on background relevant areas or utilities in Farming Zone, and

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- the number and proximity of potentially contributing facilities were evaluated individually, considering their respective compliance obligations and distance-based attenuation to determine the resulting cumulative noise limits.

Figure 5 Other nearby facilities



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The noise limits, summarised in **Table 6**, were established in accordance with EPA Publication 1826.5 Noise Protocol. It is noted that the proposed Winton BESS has not been included in the cumulative noise assessment for R2, as should it receive approval, R2 would no longer exist at the time of operation and would consequently be demolished. Similarly, the proposed Glenrowan (Akysha) BESS has not been included for R4, as should it receive approval, R4 would no longer exist at the time of operation and would consequently be demolished.

Table 6 Cumulative Noise targets and Compliance Status

Receiver ID	Noise Target		
	Day	Evening	Night
R2	55 Cumulative Industries: 1. Project 2. Winton Energy Reserve $55 - 3 = 52$	50 Cumulative Industries: 1. Project 2. Winton Energy Reserve $50 - 3 = 47$	45 Cumulative Industries: 1. Project 2. Winton Energy Reserve $45 - 3 = 42$
R3	55 Cumulative Industries: 1. Winton BESS 2. Project 3. Winton Energy Reserve $55 - 5 = 50$	50 Cumulative Industries: 1. Winton BESS 2. Project 3. Winton Energy Reserve $50 - 5 = 45$	45 Cumulative Industries: 1. Winton BESS 2. Project 3. Winton Energy Reserve $45 - 5 = 40$
R4	45 Cumulative Industries: 1. Enervest BESS 2. Project 3. Winton Energy Reserve $45 - 5 = 40$	42 Cumulative Industries: 1. Enervest BESS 2. Project 3. Winton Energy Reserve $42 - 5 = 37$	39 Cumulative Industries: 1. Enervest BESS 2. Project 3. Winton Energy Reserve $39 - 5 = 34$
R5	45 Cumulative Industries: 1. Winton BESS 2. Project 3. Mokoan Solar Farm 4. Enervest BESS $45 - 6 = 39$	42 Cumulative Industries: 1. Winton BESS 2. Project 3. Mokoan Solar Farm 4. Enervest BESS $42 - 6 = 36$	40 Cumulative Industries: 1. Winton BESS 2. Project 3. Mokoan Solar Farm 4. Enervest BESS $40 - 6 = 34$
R6	45 Cumulative Industries: 1. Enervest BESS 2. Project 3. Glenrowan West Solar Farm 4. Akaysha BESS $45 - 6 = 39$	42 Cumulative Industries: 1. Enervest BESS 2. Project 3. Glenrowan West Solar Farm 4. Akaysha BESS $42 - 6 = 36$	40 Cumulative Industries: 1. Enervest BESS 2. Project 3. Akaysha BESS $40 - 5 = 35$

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Receiver ID	Noise Target		
	Day	Evening	Night
R7	45 Cumulative Industries: 1. Enervest BESS 2. Project 3. Glenrowan West Solar Farm 4. Akaysha BESS 45 – 6 = 39	42 Cumulative Industries: 1. Enervest BESS 2. Project 3. Glenrowan West Solar Farm 4. Akaysha BESS 42 – 6 = 36	40 Cumulative Industries: 1. Enervest BESS 2. Project 3. Glenrowan West Solar Farm 4. Akaysha BESS 40 – 6 = 34
R8	45 Cumulative Industries: 1. Enervest BESS 2. Project 45 – 3 = 42	42 Cumulative Industries: 1. Enervest BESS 2. Project 42 – 3 = 39	40 Cumulative Industries: 1. Enervest BESS 2. Project 40 – 3 = 37
R9	45 Cumulative Industries: 1. Enervest BESS 2. Project 45 – 3 = 42	42 Cumulative Industries: 1. Enervest BESS 2. Project 42 – 3 = 39	40 Cumulative Industries: 1. Enervest BESS 2. Project 40 – 3 = 37
R10	45 Cumulative Industries: 1. Enervest BESS 2. Project 3. Glenrowan West Solar Farm 4. Akaysha BESS 45 – 6 = 39	42 Cumulative Industries: 1. Enervest BESS 2. Project 3. Glenrowan West Solar Farm 4. Akaysha BESS 42 – 6 = 36	39 Cumulative Industries: 1. Enervest BESS 2. Project 3. Akaysha BESS 39 – 5 = 34
R11	45 Cumulative Industries: 1. Enervest BESS 2. Project 3. Akaysha BESS 45 – 5 = 40	39 Cumulative Industries: 1. Enervest BESS 2. Project 3. Akaysha BESS 39 – 5 = 34	34 Cumulative Industries: 1. Enervest BESS 2. Project 3. Akaysha BESS 34 – 5 = 29
R14	45 Cumulative Industries: 1. Enervest BESS 2. Project 3. Akaysha BESS 45 – 5 = 40	39 Cumulative Industries: 1. Enervest BESS 2. Project 3. Akaysha BESS 39 – 5 = 34	34 Cumulative Industries: 1. Enervest BESS 2. Project 3. Akaysha BESS 34 – 5 = 29
Campground	46 Cumulative Industries: 1. Winton Energy Reserve 2. Project 3. Winton BESS 4. Enervest BESS 46 – 6 = 40	41 Cumulative Industries: 1. Winton Energy Reserve 2. Project 3. Winton BESS 4. Enervest BESS 41 – 6 = 35	36 Cumulative Industries: 1. Winton Energy Reserve 2. Project 3. Winton BESS 4. Enervest BESS 36 – 6 = 30

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4.2.3 Low Frequency Noise Guidelines

EPA Publication 1996 “Noise guidelines: Assessing low frequency noise” (LFNG) provides guidance for acoustic consultants and other qualified professionals who assess low frequency noise (10Hz – 160Hz).

Frequency spectrum is a prescribed factor under the EP Act and subordinate legislation. The assessment of frequency spectrum applies to noise from commercial, industrial and trade premises only.

Low frequency noise emitted from commercial, industrial and trade premises should be assessed by comparing its frequency spectrum to the relevant threshold levels. Specifically, Z-frequency weighted (unweighted or linear) measurements in one-third octave bands from 10 Hz to 160 Hz are compared with low frequency threshold levels.

The threshold levels are not set limits. Rather, they are levels that indicate a potential risk of problematic low frequency noise. The disturbance from low frequency noise depends on the:

- noise level,
- characteristics that can increase annoyance with the noise, for example, tonality, frequency modulation,
- baseline noise levels in the absence of the noise of concern.

Table 7 details the outdoor low frequency noise threshold levels, which would apply for levels measured outdoors and based on the assumed facade noise reductions given in Downey and Parnell (2017).

Table 7 Outdoor Low Frequency Noise Threshold Levels

Outdoor 1/3 Octave Low Frequency Noise Threshold Levels													
Freq, Hz	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Leq, dB	92	89	86	77	69	61	54	50	50	48	48	46	44

4.3 Construction Noise Criteria

The *Civil construction, building and demolition guide* (EPA Publication 1834 November 2020) adopts a primary mechanism of reducing noise and vibration impacts through limiting the times of operation of noisy equipment, vehicles and operations. Whilst EPA Publication 1834 November 2020 does not establish objective noise goals or limits for works conducted during Normal Working Hours, it states that construction noise should be minimised as far as possible in any situation and that a noise impact assessment may be used to inform the risk assessment process for construction works and to inform plans for the management of noise generated during construction.

Table 8 presents the EPA construction noise guidelines.

Table 8 EPA Publication 1834 November 2020 Construction Noise Guidelines

Time of day	Construction noise guidelines
Normal working hours: 7 am – 6 pm Monday to Friday 7 am – 1 pm Saturday	Minimise as far as possible in any situation
Weekend/evening work hours: 6 pm – 10 pm Monday to Friday	Noise level at any residential premises not to exceed background noise (L90) by:



Time of day	Construction noise guidelines
1 pm – 10 pm Saturday 7 am – 10 pm Sunday and Public Holidays	10 dBA or more for up to 18 months 5 dBA or more after 18 months
Night period: 10 pm – 7 am Monday to Sunday	Noise inaudible within a habitable room of any residential premises

EPA Publication 1834 November 2020 details that whilst projects should aim to constrain works to normal working hours, where necessary, works or activities outside normal working hours may occur for:

- **Low-noise impact works** – these are inherently quiet or unobtrusive, for example, manual painting, internal fitouts, and cabling. Low-noise works do not have intrusive characteristics such as impulsive noise or tonal movement alarms.
- **Managed-impact works** – works where the noise emissions are managed through actions specified in a noise and vibration management plan (may be part of a broader environmental management plan), to minimise impacts on sensitive receivers. Managed-impact works do not have intrusive characteristics such as impulsive noise or tonal movement alarms.
- **Unavoidable works** – are works which pose an unacceptable risk to life or property or a major traffic hazard and can be justified. Includes an activity which has commenced but cannot be stopped. A project would need to demonstrate that planned unavoidable works cannot be reasonably moved to normal work hours. This requires additional consideration of potential noise and vibration generating activities and controls to minimise noise and vibration. These can be recorded within the noise and vibration management plan (may be part of a broader environmental management plan).

It is anticipated that most construction activities related to the Project will be able to be completed during EPA normal working hours, with the exception of unavoidable works (if required) and low-noise impact works.

5.0 Noise Assessment

A 3D noise model was constructed within the modelling software SoundPLAN 9.1 to predict noise levels at the nearby sensitive receivers.

Noise modelling was conducted using the algorithms of ISO 9613-2¹, which predicts the A-weighted sound pressure levels under meteorological conditions favourable to propagation from sources of known sound power levels. This enhanced propagation is equivalent to downwind propagation or a moderate ground-based temperature inversion. The model also includes attenuation due to air absorption, ground attenuation and shielding.

5.1 General Modelling Assumptions

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

- A reflection-order of three (3).

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¹ ISO 9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*



- Source height were set according to the source item.
- Receivers are in the acoustic free field, 1.5 m above ground level.
- All equipment is assumed to be in operation for the entire 30 minute assessment period.
- Ground topography was sourced from publicly available 10 meters digital elevation data from VIC Government.
- Ground absorption is modelled by a single number parameter between 0 (hard – reflective) and 1 (soft – absorptive). The BESS substation and BESS infrastructure area are expected to have loose gravel bases, so a ground absorption factor of 0.5 was applied. Glenrowan Terminal Station, Hume Freeway, and Winton-Glenrowan Road were modelled as hard ground (GF 0), all other ground surfaces were modelled with a ground absorption parameter of 0.6 considering the grass cover and farming nature of the terrain.

5.2 Construction Noise Assessment

The following standard construction hours are proposed for the Project:

- Monday to Friday - 7 am to 6 pm.
- Saturday – 7 am to 1 pm.
- Sunday and Public Holidays – No works to be undertaken.
- No works are proposed to be undertaken outside of the standard construction hours.

5.2.1 Construction Activities

Representative scenarios have been developed to assess the likely impact from the various construction phases of the proposal. These scenarios are shown in **Table 9**.

The sound power levels for the construction equipment used in each scenario are presented in **Appendix B**.

Table 9 Construction Scenarios and Equipment

Scenario	Works Activity	Equipment
W.01	Vegetation Clearing	Chainsaw, chipper, excavator, front end loader, dump truck, water truck
W.02	Earthworks	Dozer, excavator, front end loader, vibratory roller, dump truck, water truck, rockbreaker
W.03	Construction of pads, hardstands and driveways	Concrete pump, concrete truck/agitator, concrete vibrator
W.04	Equipment installation	Elevated working platform, flatbed truck, hand tools, mobile crane

5.3 Operational Noise Assessment

5.3.1 Noise Sources

All equipment items are assumed to be in operation for the entirety of a 30-minute assessment period. Noise emissions of the BESS equipment are typically dominated by



cooling equipment, which can be variable depending on the percentage of maximum power (charge/discharge) and the subsequent temperatures, both ambient and that being generated by the equipment.

Sound power levels (SWL) and quantities of noise producing equipment are shown in **Table 10**. The sound power levels are based on the performance of currently available containerised battery and inverter models including OEM developed attenuation packages.

The SWL for the Glenrowan Terminal Station transformers shown in **Table 11** were adopted from AS 60076.10:2009 reduced maximum (125 & 150 MVA rating).

Table 10 Equipment Sound Power Levels – BESS & HV Transformer

Qty	Item	Sound Power Level (SWL), per unit L _{eq} 30 min, dBA
128	Battery Container	88 86 (Reduced cooling load assumed)
128	Inverter	92 ¹ 88 ²
2	High Voltage Transformer	91 ³
Notes: 1: SWL and spectrum based on a charging Inverter operating at 100% fan speed with noise reduction kit. 2: SWL and spectrum based on a charging Inverter operating at 80% fan speed with noise reduction kit. 3: Based on AS 60076.10:2009 reduced maximum (250 MVA rating).		

Table 11 Equipment Sound Power Levels – Glenrowan Substation Transformers

Qty	Item	Sound Power Level (SWL), per unit L _{eq} 30 min, dBA
1 x 125 MVA 1 x 150 MVA	Glenrowan Substation Transformers	87 88

The following are the operation scenarios considered in this assessment:

- Scenario 1: Day Operation – Battery @ 88 dBA SWL, Inverter @ 92 dBA SWL (100% fan speed – Attenuated)
- Scenario 2: Evening Operation – Battery @ 86 dBA SWL, Inverter @ 92 dBA SWL (100% fan speed – Attenuated)
- Scenario 3: Night Operation – Battery @ 86 dBA SWL, Inverter @ 88 dBA SWL (80% fan speed – Attenuated)

The OEM noise levels for the Day, Evening and Night scenarios have been assumed based on the ambient temperatures and expected performance of the batteries and inverters. Where ambient temperatures are lower (e.g. evening and night periods), the chillers and fans are not expected to run at rated full duties (to minimise self-power consumption) as the cooling requirements are lower in comparison to day periods, especially in summer months. As such, the assumed fan loads are considered typical for the BESS's proposed operations without compromising the charging/discharging power capacity.

Detailed OEM noise datasheets including noise spectra can be provided upon request.

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5.3.2 Noise Characteristics

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

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

Tonality

BESS sources may exhibit tonal characteristics. The tonal adjustment will be determined by examining the predicted noise level spectrum at sensitive receivers in accordance with the Noise Protocol Section 3.4 and Annex C. See **Section 6.2**.

Impulsiveness

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

Intermittency

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

The cooling fans are expected to cycle up and down as required to cool the batteries and power electronics. However, the duty cycle period typically exceeds 15-30 minutes and is not considered intermittent. Therefore, no characteristic adjustments have been applied to the following results.

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6.0 Assessment Results

6.1 Construction Noise Assessment

Table 12 presents the construction noise results for the modelled scenarios. It is anticipated that construction works would occur during the EPA normal working hours (day) only.

Table 12 Construction Assessment Results

Receiver	W.01 Vegetation Clearing	W.02 Earthworks	W.03 Construction of pads, hardstands & driveways	W.04 Equipment installation
R2	53	52	44	45
R3	49	48	40	41
R4	48	47	39	40
R5	47	46	38	39
R6	42	41	33	34
R7	39	38	30	31
R8	40	39	31	32
R9	39	38	30	31
R10	38	37	29	30



Receiver	W.01 Vegetation Clearing	W.02 Earthworks	W.03 Construction of pads, hardstands & driveways	W.04 Equipment installation
R11	30	29	21	22
R14	35	34	26	27
Campground	41	40	32	33

Construction of the BESS facility may be audible for several receivers from time to time, however noise impacts are minimised due to the distance to receivers and works being temporary and conducted during EPA normal working hours (day period) only.

The Australian Standard AS2436-2010 *Guide to Noise Control on Construction, Maintenance and Demolition Sites* sets out numerous practical recommendations to assist in taking all reasonable and practicable measures to prevent or minimise noise impacts.

Noise control strategies to be considered are listed below:

- Ensure construction works to occur during normal working hours:
 - Weekdays: 7 am to 6 pm,
 - Saturday: 7 am to 1 pm.
- Incorporate clear signage at the Site including relevant contact numbers for community enquiries.
- The lowest noise emitting plant and equipment that can economically and efficiently undertake the work should be selected where possible.
- Maintain regular maintenance of equipment to keep it in good working order and operating at the lowest feasible noise level.
- Use less intrusive broadband reversing beepers on mobile plant where possible.
- Equipment operators are to be made aware of noise impacts and techniques to minimise emissions through training/instruction, examples include:
 - Avoid dropping materials from height into bins, trucks and receptacles.
 - Operate mobile plant and power tools in a quiet, efficient manner where possible.
 - Switch plant off when not in use.
- Machines/tools found to produce excessing noise compared with industry best practice should be removed from service until repairs or modification can be made, or the machine/tool is replaced.
- Where possible avoid tonal reversing/movement alarms on machinery and replace with broadband (non-tonal) alarms or ambient noise-sensing alarms.
- Use dampened bits on impulsive tools (e.g. ratchet drivers) to avoid 'ringing' noise.

6.2 Operational Noise Assessment

The predicted noise levels at the sensitive receivers were assessed against the established cumulatively adjusted noise criteria detailed in **Section 4.2.2**. The predicted noise level at each receiver for each operating scenario is presented in **Table 13**. Note that a 2 dB tonal



adjustment factor has been applied to the predicted noise level at each receiver for all scenarios as the noise level spectrum at the receivers are predicted to exhibit minor tonality.

Table 13 EPA Noise Protocol Assessment Results

Receiver	Noise Target (D/E/N), dBA	Predicted Noise Level with 2 dB Tonal adjustment, dBA			Compliance?
		Scenario 1: Day	Scenario 2: Evening	Scenario 3: Night	
R2	52/47/42	43	43	40	Yes
R3	50/45/40	39	39	36	Yes
R4	40/37/34	37	37	34	Yes
R5	39/36/34	36	36	33	Yes
R6	39/36/35	31	31	28	Yes
R7	39/36/34	28	28	25	Yes
R8	42/39/37	29	29	26	Yes
R9	42/39/37	28	27	25	Yes
R10	39/36/34	27	27	24	Yes
R11	40/34/29	20	20	18	Yes
R14	40/34/29	24	24	21	Yes
Campground	40/35/30	31	30	28	Yes

The results indicate that compliance with the EPA Noise Protocol limits is expected to be achieved at all receivers with the modelled operational scenarios.

6.3 Winton Wetlands

Winton Wetlands is considered to be ecologically and culturally sensitive due to the presence of fauna in the area. The noise limits under the Noise Protocol do not apply to this area as the Wetlands does not have any residential or accommodation spaces. Nonetheless, based on the noise emissions predicted at the Campground, BESS operational noise levels are expected to be less than 30 dBA during day, evening and night periods at the wetlands. These anticipated noise emissions from the BESS are unlikely to be audible at the Winton Wetlands.

Construction activities are proposed to be undertaken during standard construction hours only. The predicted levels within the Wetlands are anticipated to be less than 40 dBA for all assessed construction stages. Such levels of noise are considered insignificant and are unlikely to be intrusive to any humans visiting the Wetlands or to fauna in the area.

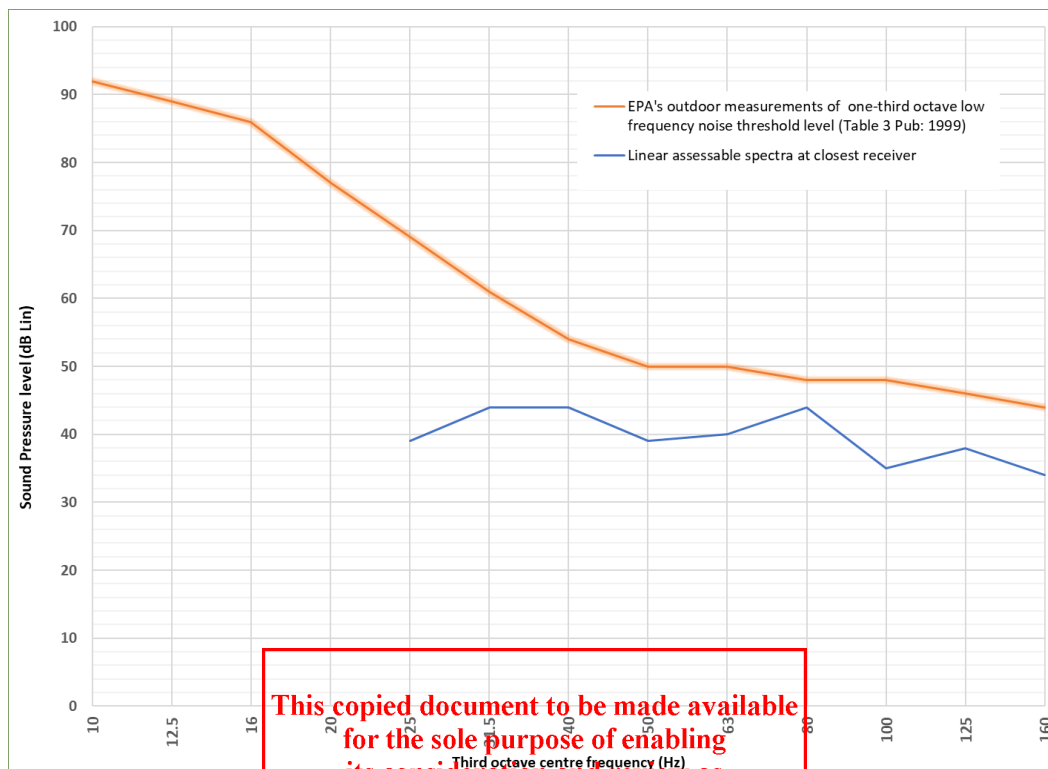
6.4 Low Frequency Noise

The Noise Guidelines: *Assessing Low Frequency Noise* (Publication 1996 June 2021) adopts a low frequency threshold level as a screening tool to identify the potential risk of problematic low frequency noise. Notwithstanding the limitations of modelling low frequency noise with ISO9613 algorithm, exceedances of the frequency bands between 25 and 160 Hz were not observed at any assessed receiver throughout all assessed scenarios. **Figure 6** shows the predicted low frequency noise at the closest receiver (R2 for the night scenario).

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Figure 6 Low frequency noise predictions



7.0 Conclusion

This Noise Impact Assessment was prepared to support a Planning Application for the Winton Renewable Energy Storage and Stability Terminal (WRESST) project. This report presents applicable noise criteria, assessment methodology and results to demonstrate the compliance with the noise limits as proscribed by the Noise Protocol.

Construction noise impacts are controlled by limiting works to day periods and a combination of training/equipment maintenance and community engagement.

Cumulative noise was considered from the project together with the existing industries in the vicinity of the Project. With the modelled operating fan duties, operational noise levels (with applied 2 dB tonal adjustment factor applied) are expected to comply with the noise limits at all receivers throughout the Day, Evening and Night periods.

Low frequency noise was assessed in accordance with the Low Frequency Guidelines and demonstrated that the risk of problematic low frequency noise at the closest receivers is low.

The Project meets the relevant Regulations and is not expected to negatively impact the surrounding areas from an acoustic perspective. The noise impact to Winton Wetlands is also expected to be negligible.

All plant, equipment and design layout will be reviewed during the detailed design stage to ensure that compliance with the noise criteria, including cumulative noise, is maintained as the acoustic performance of the plant and layout is refined.

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Appendix A Noise Monitoring Results

Winton Renewable Energy Stability and Storage Terminal (WRESST)

Noise Impact Assessment

Winton Renewable Energy Stability & Storage Terminal Pty Ltd c/o Cogency Australia

SLR Project No.: 640.032372.00001

1 June 2026

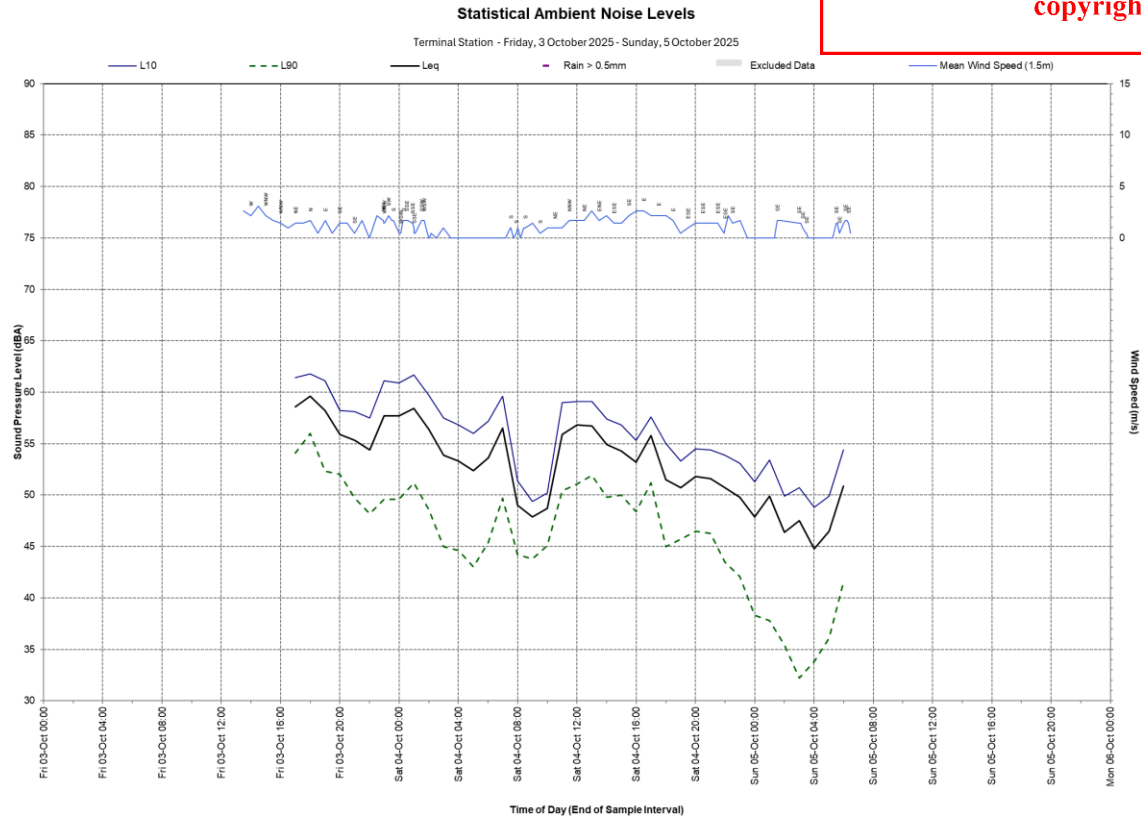
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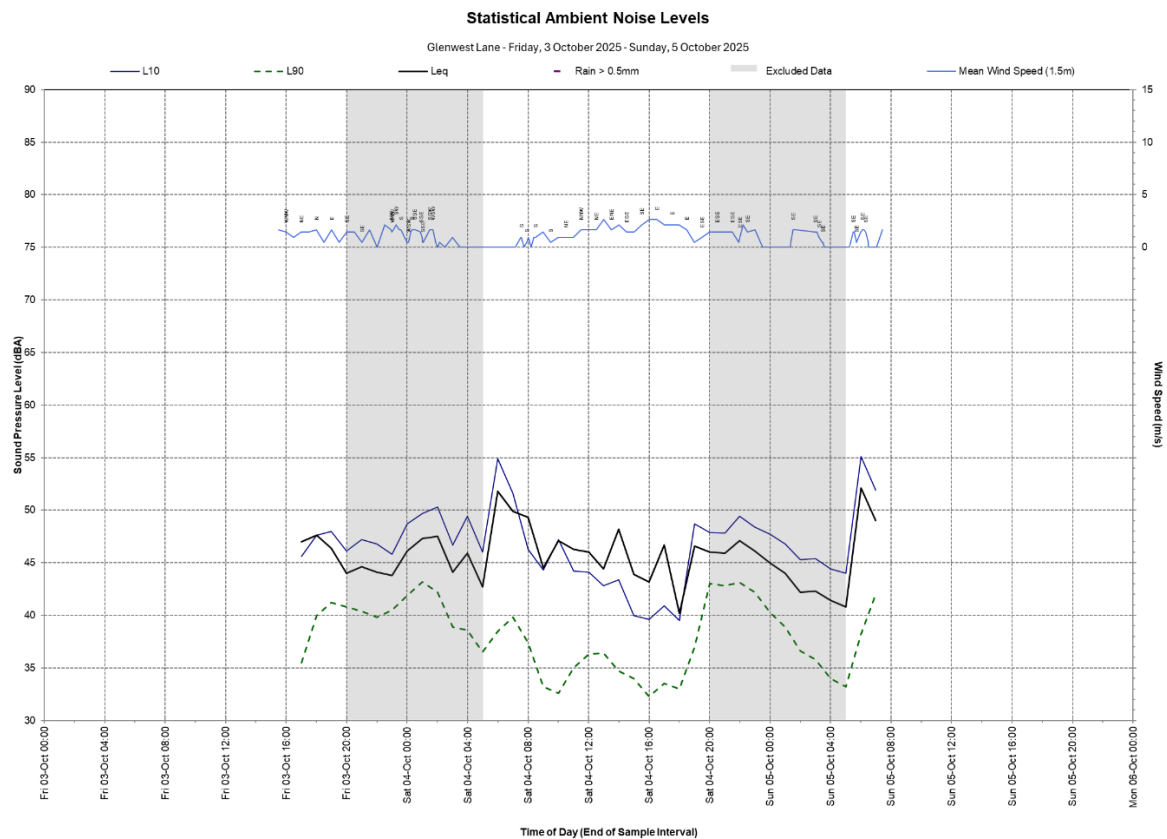
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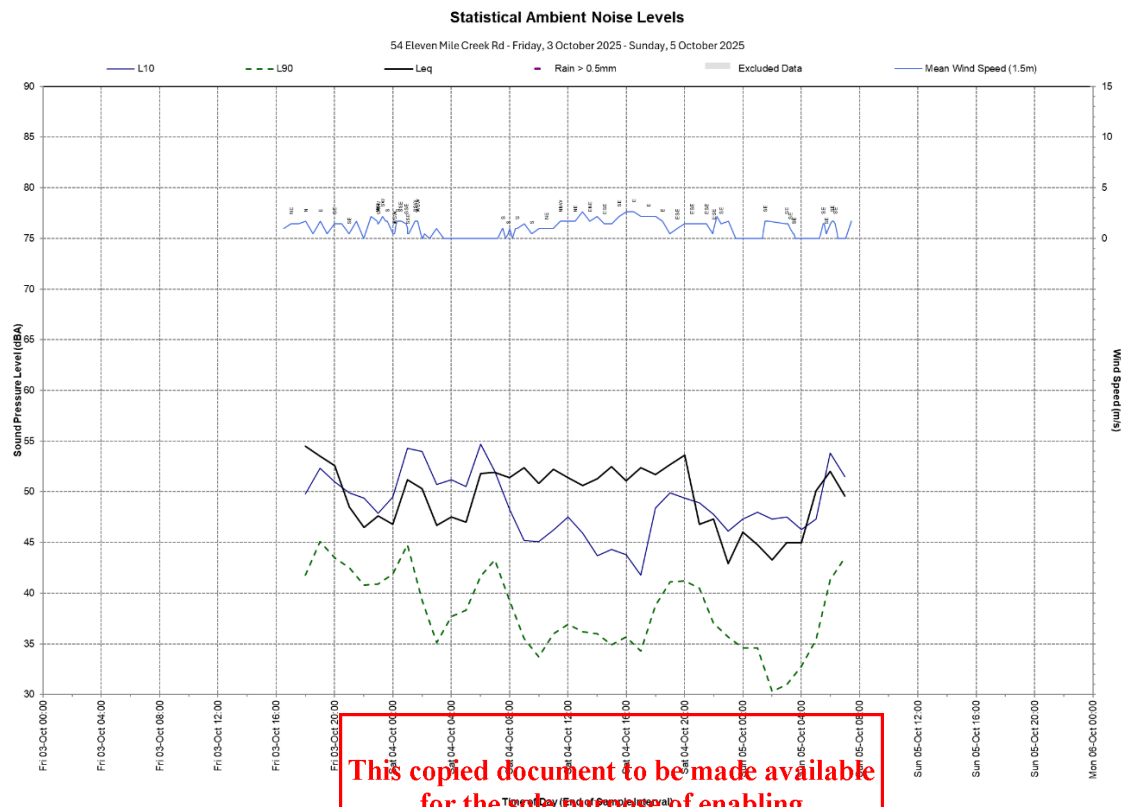
Terminal Station Graph



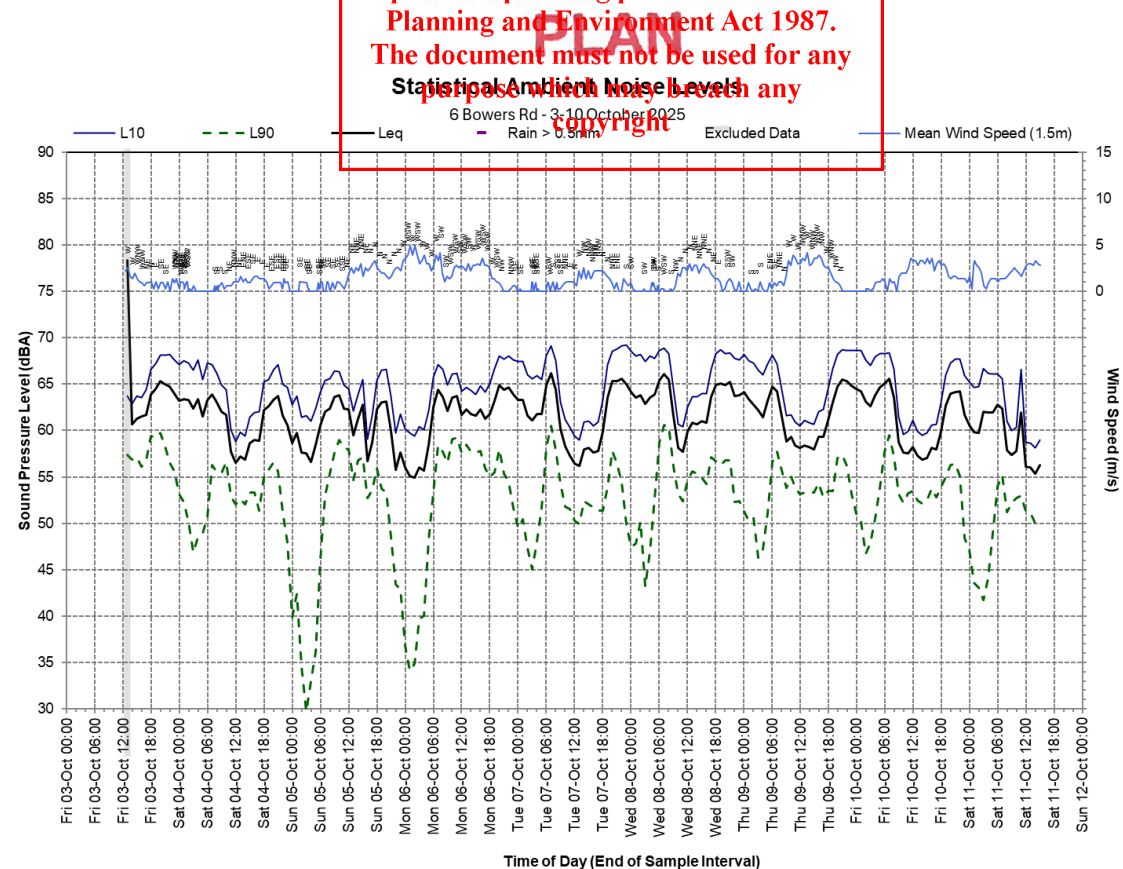
Glenwest Lane Graph



54 Eleven Miles Creek Rd Graph



6 Bowers Street Graph



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Appendix B Construction Noise Sources

Winton Renewable Energy Stability and Storage Terminal (WRESST)

Noise Impact Assessment

**Winton Renewable Energy Stability & Storage Terminal Pty Ltd c/o Cogency
Australia**

SLR Project No.: 640.032372.00001

1 June 2026

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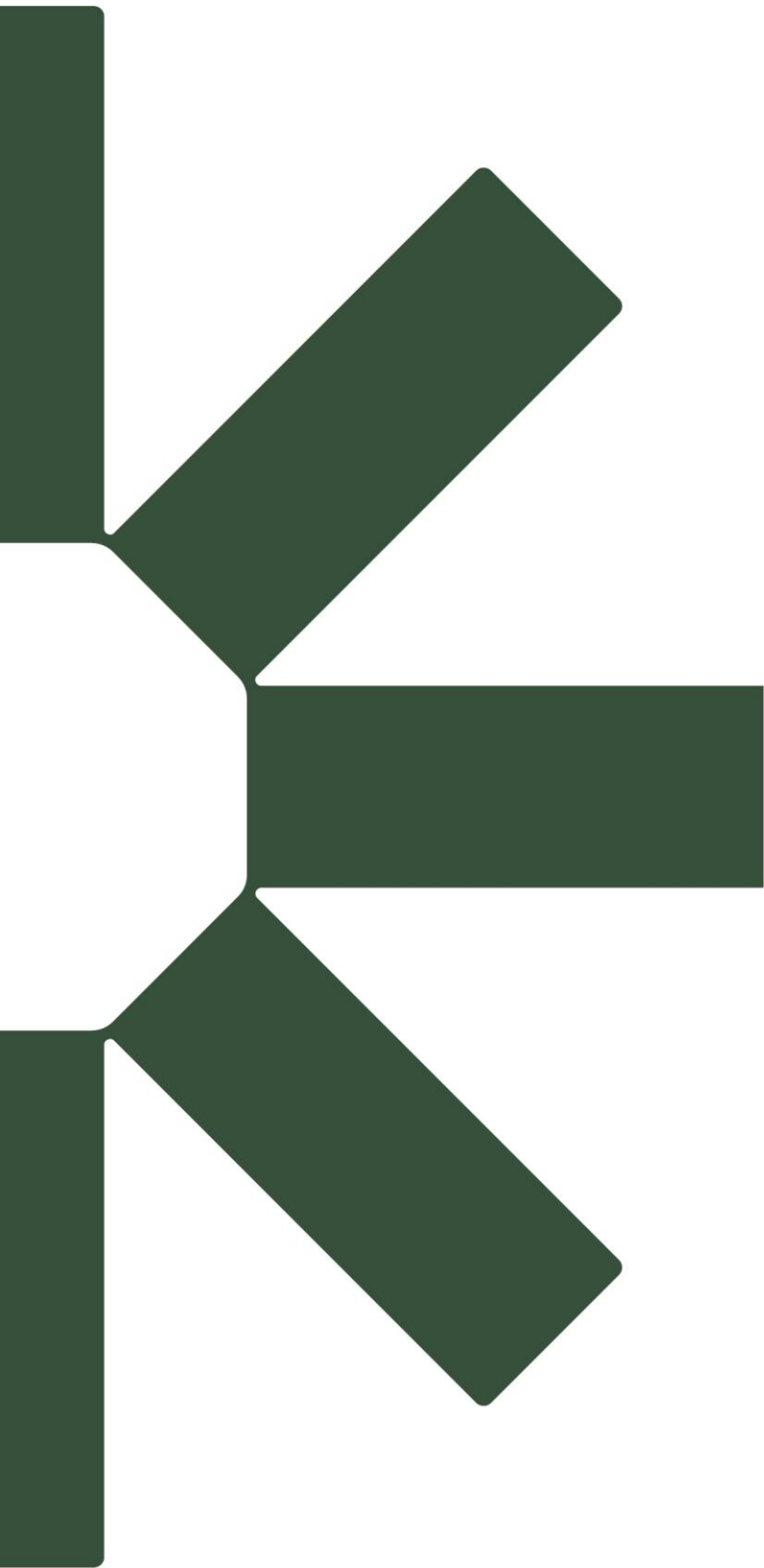


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Equipment	Total SWL	Chainsaw	Chipper	Concrete Pump	Concrete Truck	Concrete Vibrator	Crane - Mobile (100t)	Dozer	Elevated Working Platform	Excavator (20t)	Front End Loader	Hand Tools	Roller - Vibratory	Rockbreaker	Truck - Dump	Truck - Flatbed	Water Truck	Bored Piling Rig
Sound Power Level¹		119	120	109	109	113	113	116	97	105	112	104	114	117	110	103	107	116
Estimated on-time in any 15 minutes		5	15	10	15	5	15	10	15	10	10	15	15	10	10	10	10	15
<u>Scenario</u>																		
W.01 Vegetation clearing	122	X	X							X	X				X		X	
W.02 Earthworks	121							X		X	X		X	X	X		X	
W.03 Construction of pads, hardstands & driveways	113			X	X	X												
W.04 Equipment installation	114						X		X			X				X		

Note 1: Sound power level data is taken from the DEFRA Noise Database, TfNSW Construction and Vibration Guideline and TfNSW Construction Noise and Vibration Strategy.



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