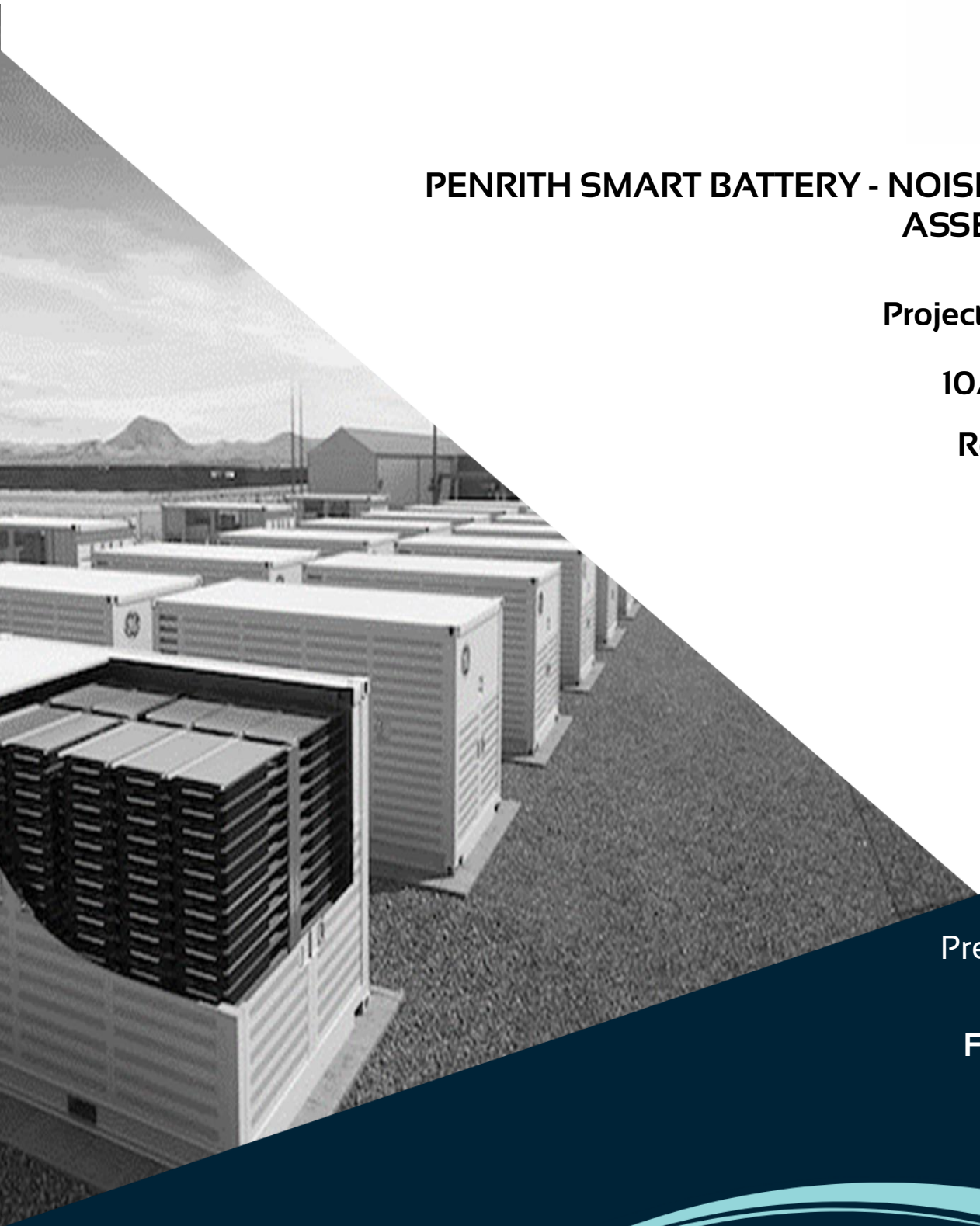

PENRITH SMART BATTERY - NOISE IMPACT ASSESSMENT

Project ID: 13688

10/03/2022

Release: R2

Prepared For:

Firm Power

Assured Environmental

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Table 1: History of Revisions

Revision	Date	Issued to	Changes
R0	8/03/2022	D. Macdonald	Initial Release
R1	10/03/2022	D. Macdonald	Comments
R2	10/03/2022	D. Macdonald	Table 12

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GLOSSARY

A-Weighting	A response provided by an electronic circuit which modifies sound in such a way that the resulting level is similar to that perceived by the human ear.
dB (decibel)	This is the scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and the reference pressure (0.00002 N/m^2).
dB(A) or dBA	This is a measure of the overall noise level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
dB(Z)	This is a measure of the overall noise level of sound across the audible spectrum with a "Z" frequency weighting which is effectively the un-weighted signal.
Free-field	Refers to a sound pressure level determined at a point away from reflective surfaces other than the ground with no significant contribution due to sound from other reflective surfaces; generally, as measured outside and away from buildings.
Hz	Hertz. Unit of frequency of a variable parameter. Units: 1/seconds
L_{Aeq}	This is the equivalent steady sound level in dB(A) containing the same acoustic energy as the actual fluctuating sound level over the given period. Noise levels often fluctuate over a wide range with time. Therefore, when a noise varies over time, the L_{Aeq} is the equivalent continuous sound which would contain the same sound energy as the time varying sound. Many studies show that human reaction to level-varying sounds tends to relate closer to the L_{Aeq} noise level than any other descriptor.
L_{A10}, L_{A90}, L_{An}	Noise level exceeded for n% of the measurement period with A-weighted, calculated by statistical analysis - where n is between 0.01% and 99.99%. For example, L_{A10} is the noise level just exceeded for 10% of the measurement period, calculated by statistical analysis and used to determine traffic noise and L_{A90} is the noise level exceeded for 90% of the measurement period, A-weighted and calculated by statistical analysis and used to determine background noise levels.
L_{AFmax}	A-weighted, fast response, maximum, sound level.
L_{AFmin}	A-weighted, fast response, minimum, sound level.
RBL	Rating background noise level – the overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period.
SWL	Sound Power Level in decibels is ten times the logarithm of the ratio of the sound power to the sound power reference level of 1 pico Watt.

ABBREVIATIONS

BOM	Bureau of Meteorology
CONCAWE	Conservation of Clean Air and Water in Europe
EPA	Environmental Protection Authority
NPfI	Noise Policy for Industry (NSW EPA, 2017)

1 INTRODUCTION

1.1 Scope of Assessment

Assured Environmental (AE) was appointed by Firm Power Pty Ltd (Firm Power) to undertake a ambient noise monitoring and noise impact assessment to determine compliance of a battery energy storage system (BESS). This noise assessment has been undertaken in accordance with the NSW Noise Policy for Industry (EPA, 2017).

In accordance with the requirements of the above guidelines, computational modelling and first principal calculations have been undertaken to assess the potential for adverse amenity as a result of the modification.

1.2 This Report

This report summarises the methodology, results, and conclusions of the noise impact assessment.

2 DESCRIPTION OF EXISTING ENVIRONMENT

2.1 Location

The Subject Site is located within an existing substation compound at 2235-2249 Castlereagh Road Penrith on Lots 5 on DP1017480. The Subject Site is located in a primarily industrial and commercial area with some educational, recreation and residential landuses nearby. Figure 1 illustrates the site location and sensitive receptors.

2.2 Receptors

Table 2 and Figure 1 present the nearest sensitive receptors to the Subject Site and the land use as defined in the NPfI (2017).

Table 2: Sensitive Receptors

ID	Location (UTM Zone 56)		Description	Land Use
	X	Y		
R01	286460	6263464	39 Lord Sheffield Circuit (8 storeys)	Residential
R02	286478	6263497	Combewood Avenue (8 storeys)	Residential
R03	286492	6263527	1194 Combewood Ave (2 storeys)	Residential
R04	286500	6263536	Combewood Ave (2 storeys)	Residential
R05	286530	6263596	87 Thornton Dr (2 storeys)	Residential
R06	285481	6263258	706 High Street	Residential
R07	285605	6263165	688 High Street	Residential
R08	285624	6263162	686 High Street	Residential
R09	285654	6263144	682 High Street	Residential
R10	285666	6263102	Chatterbox Speech Therapy	Medical
R11	285739	6263109	672 High Street	Residential
R12	285470	6263347	The Select Inn Penrith	Hotel
R13	285663	6263333	Tennis Court	Active Recreation
R14	285725	6263315	Tennis Court	Active Recreation
R15	285810	6263275	Tennis Court	Active Recreation
R16	285635	6263353	Tennis Court	Active Recreation
R17	286307	6263440	Museum of Fire	Recreation
R18	286400	6263544	HVTC	Education
R19	286419	6263580	Productivity Bootcamp	Education
R20	286119	6263428	Bega Cheese	Industrial
R21	286260	6263673	Torino Motocross	Commercial
R22	286188	6263654	Starbucks	Commercial
R23	286197	6263688	Oporto	Commercial
R24	286206	6263707	Zambrero	Commercial
R25	286062	6263640	McDonald's	Commercial
R26	285981	6263561	Boral Concrete	Industrial
R27	285914	6263482	World Gym	Commercial
R28	285902	6263454	Zak Pak Timber	Commercial

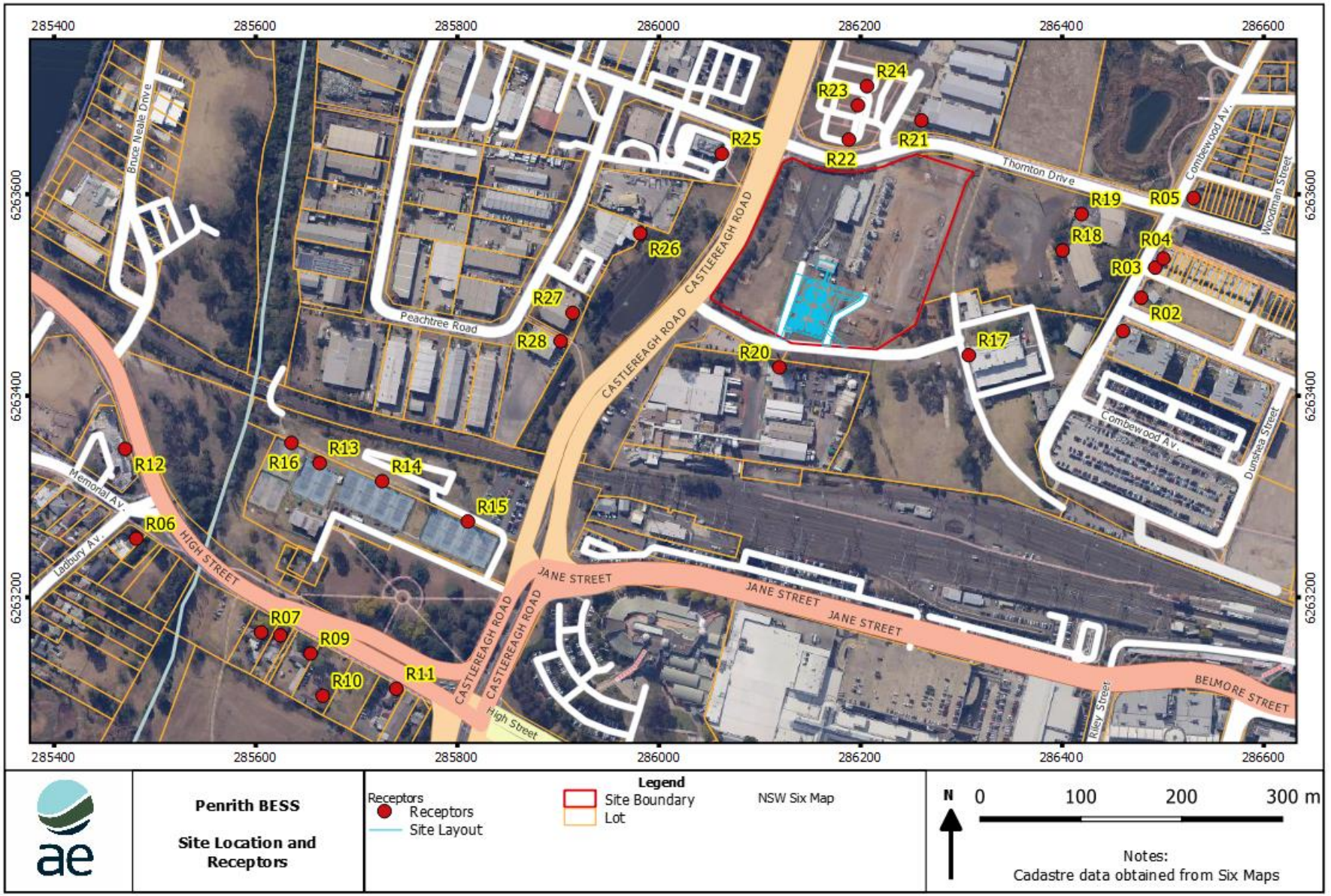


Figure 1: Site Location, Receptors and Surrounding Land Use

3 EXISTING ACOUSTIC ENVIRONMENT

3.1 Methodology

Noise measurements were undertaken in accordance with the requirements of Australian Standard AS 1055-2018 *'Acoustics – Description and measurement of environmental noise'* and the NPfI (EPA, 2017). The instrument was situated in a free-field position and a sampling time of 15-minutes was adopted for the monitoring. The microphone was positioned at a height of 1.5 metres above ground level and fitted with a windshield throughout the measurements.

3.2 Monitoring Locations

Baseline noise monitoring was conducted in June 2021 prior to the development of the Battery Energy Storage System (BESS) at two locations:

- Boundary noise measurements to determine the boundary noise levels in order to determine the noise limit for the assessment criteria as detailed in the Assessment Report
- Background monitoring location which is a site representative of the relevant noise environment at sensitive receivers.

Figure 2 presents the noise monitoring locations.

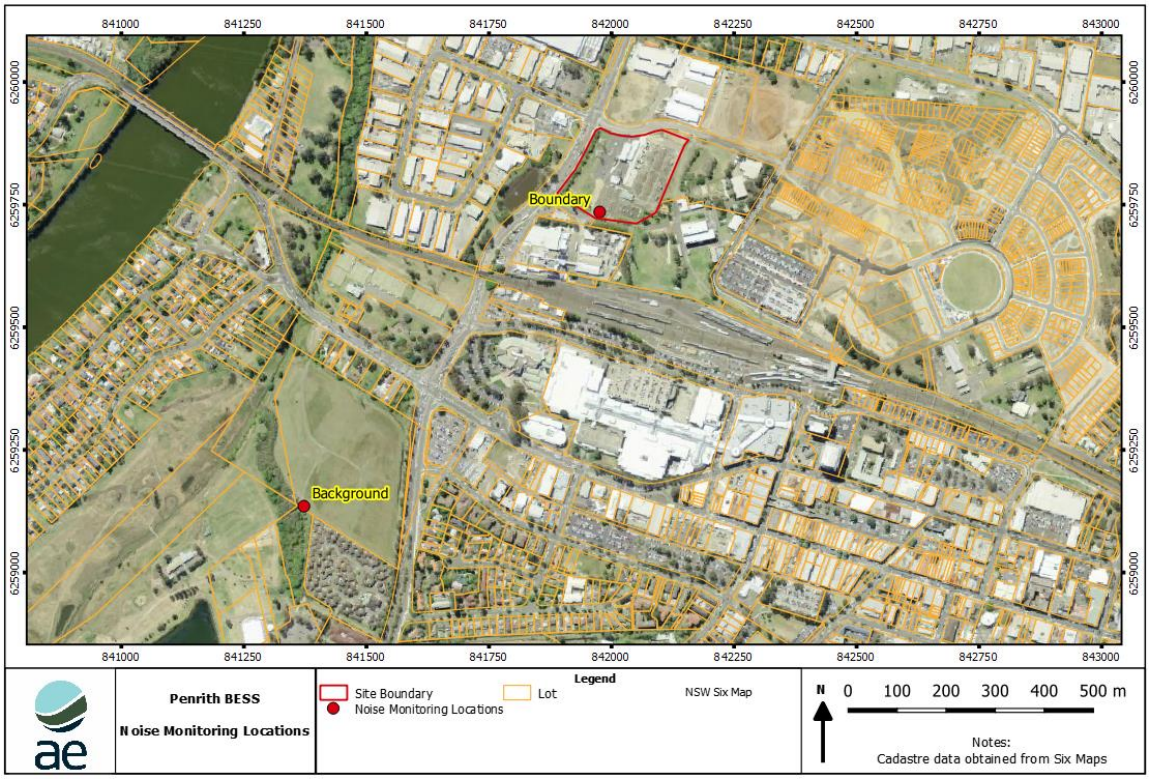


Figure 2: Noise Measurement Locations

3.3 Weather Affected Bias

Wind and rainfall data from the nearest Bureau of Meteorology (BOM) Penrith Station (067113) indicates approximately 25 hours of noise data were potentially affected by winds above 5 m/s or rainfall. To avoid weather-related bias, noise measurements associated with wind or rain-affected periods have not been considered.

3.4 Equipment

The serial numbers and calibration information for the sound monitoring instrument used are presented in Table 3.

Table 3: Equipment Information

Instrument	Serial No.	Monitoring Dates	NATA Calibration Current to:	Pre-/Post Calibration (dB)
Background: Rion	00877035	08-06-21 to 17-06-21	02-08-21	93.6 / 93.5
Boundary: Norsonic	1392800	04-06-21 to 21-06-21	06-01-2023	93.7 / 93.4
Pulsar 106	79636	-	11-02-2022	-

3.5 Boundary Monitoring Location Data

Table 4 below provides a summary of noise levels at the boundary noise monitoring location for each period for a variety of statistical noise parameters.

Table 4: Daily Noise Monitoring Data at Boundary Location

Date	Period	L_{max}	L_1	L_{10}	L_{90}	L_{eq}	ABL
4/06/2021	Day	-	-	-	-	-	-
	Evening	83.1	64.7	60.3	56.4	59.4	55.8
	Night	91.3	61.6	58.9	56.2	58.0	55.0
5/06/2021	Day	97.6	63.0	59.7	56.1	59.6	54.3
	Evening	79.4	60.9	58.9	55.9	57.6	55.7
	Night	84.7	59.7	57.0	54.4	56.1	53.2
6/06/2021	Day	78.9	60.8	57.7	53.5	56.1	52.6
	Evening	79.9	60.9	58.3	54.6	57.2	52.4
	Night	78.4	61.9	59.5	56.8	58.5	55.0
7/06/2021	Day	80.8	63.6	60.5	56.8	59.4	54.7
	Evening	77.5	62.3	59.4	55.5	57.9	54.8
	Night	84.7	62.4	58.9	55.4	57.9	53.6
8/06/2021	Day	80.7	64.4	61.2	57.2	59.8	55.8
	Evening	-	-	-	-	-	-
	Night	78.7	61.1	58.3	55.2	57.2	53.8
9/06/2021	Day	83.1	64.7	61.6	57.3	60.1	56.5
	Evening	79.6	62.1	59.2	55.4	57.7	54.6
	Night	84.4	61.0	57.3	53.8	56.1	52.6
10/06/2021	Day	-	-	-	-	-	-
	Evening	-	-	-	-	-	-
	Night	80.0	61.7	57.9	54.6	57.0	52.4
11/06/2021	Day	83.0	63.2	59.4	55.1	58.3	53.7

Date	Period	L_{max}	L_1	L_{10}	L_{90}	L_{eq}	ABL
	Evening	86.9	61.9	58.9	55.6	57.7	54.3
	Night	79.4	61.4	58.4	55.6	57.5	54.0
12/06/2021	Day	81.6	62.0	58.8	54.9	57.6	53.2
	Evening	84.1	61.3	58.0	54.0	57.1	53.7
	Night	76.4	59.0	55.8	53.1	54.7	51.8
13/06/2021	Day	78.6	59.6	55.5	50.4	53.9	49.1
	Evening	79.6	61.3	58.0	53.7	56.8	50.4
	Night	88.0	60.0	57.8	55.7	57.0	54.5
14/06/2021	Day	85.2	62.0	57.5	54.1	56.8	52.6
	Evening	77.3	60.4	56.9	53.9	55.7	53.1
	Night	80.0	61.3	59.2	56.9	58.4	56.2
15/06/2021	Day	86.7	62.7	58.8	54.9	57.9	53.2
	Evening	86.3	62.0	57.4	53.2	57.0	51.8
	Night	78.5	60.7	57.6	54.2	56.4	53.1
16/06/2021	Day	83.0	62.0	58.8	55.2	57.7	54.0
	Evening	69.6	61.7	59.1	56.1	57.9	55.0
	Night	76.4	62.1	59.2	55.5	57.9	53.8
17/06/2021	Day	79.0	63.0	60.1	55.9	58.6	54.2
	Evening	86.3	62.0	59.0	54.4	57.9	53.5
	Night	78.8	60.4	57.4	53.9	56.3	52.4
18/06/2021	Day	80.1	62.4	58.6	54.5	57.3	53.3
	Evening	68.8	61.8	58.9	55.8	57.6	54.5
	Night	74.8	59.8	56.6	53.2	55.6	51.7
19/06/2021	Day	77.1	60.9	58.1	54.4	56.6	53.7
	Evening	76.2	59.4	56.4	53.5	55.4	53.2
	Night	78.0	57.3	54.7	52.1	53.7	50.6
20/06/2021	Day	83.3	61.5	56.8	51.3	56.0	50.1
	Evening	73.9	59.6	57.0	53.8	56.1	50.2
	Night	74.9	59.8	57.4	54.3	56.2	52.2
21/06/2021	Day	86.6	63.7	59.6	55.5	58.9	54.9
	Evening	-	-	-	-	-	-
	Night	-	-	-	-	-	-

The time history of noise measurements at the boundary is presented in Figure 3. It is clearly identifiable that the baseline noise level is relatively static and is heavily influenced by the electricity station.

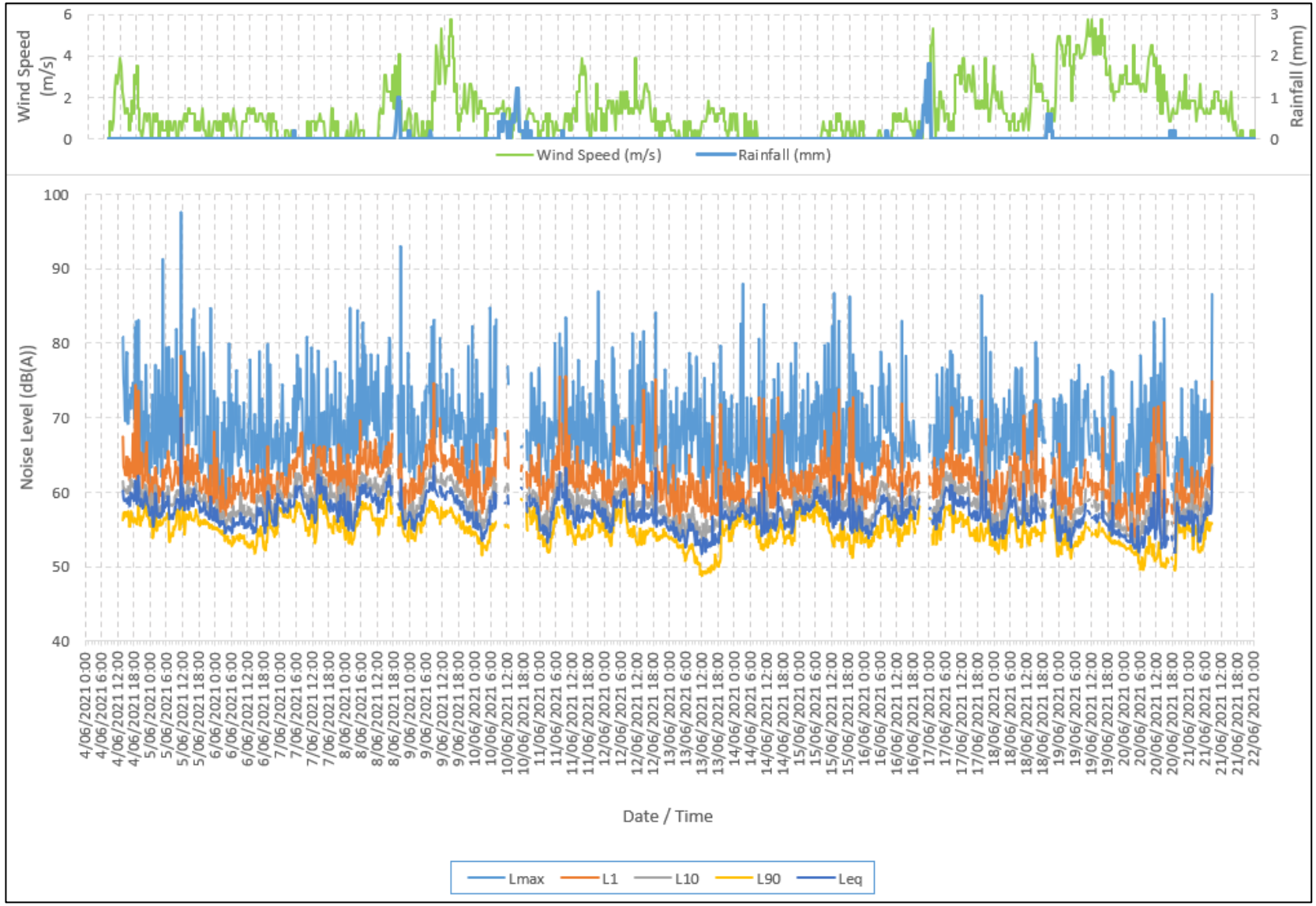


Figure 3: Time History at Boundary Monitoring Location

3.6 Background Noise Measurements

Table 5 below provides a summary of noise levels at the background noise monitoring location for each period for a variety of statistical noise parameters.

Table 5: Daily Noise Monitoring Data at Background Monitoring Location

Date	Period	L_{max}	L_1	L_{10}	L_{90}	L_{eq}	ABL
8/06/2021	Day	-	-	-	-	-	-
	Evening	-	-	-	-	-	-
	Night	72.8	51.3	46.2	39.4	45.8	35.8
9/06/2021	Day	96.6	56.0	50.9	46.0	52.8	44.0
	Evening	71.5	56.8	51.1	46.2	49.6	44.8
	Night	71.5	54.1	49.9	44.3	48.4	41.6
10/06/2021	Day	-	-	-	-	-	-
	Evening	-	-	-	-	-	-
	Night	68.9	50.4	45.4	39.3	44.9	35.8
11/06/2021	Day	74.9	56.4	51.6	45.6	50.5	43.3
	Evening	72.4	56.8	51.3	46.4	49.7	45.0
	Night	78.2	54.7	49.1	42.6	48.0	40.1
12/06/2021	Day	84.7	56.0	49.9	45.0	50.7	42.7
	Evening	96.4	58.9	52.6	46.6	62.9	45.6
	Night	71.5	50.9	45.7	41.2	45.0	38.6
13/06/2021	Day	72.6	52.9	47.8	42.9	46.9	39.7
	Evening	96.4	58.8	51.9	45.4	63.5	43.8
	Night	67.4	50.1	44.7	39.6	44.8	37.2
14/06/2021	Day	106.9	56.2	48.8	42.2	56.1	40.0
	Evening	66.1	50.4	46.7	43.4	45.5	41.9
	Night	63.0	49.2	43.7	37.8	43.1	34.1
15/06/2021	Day	91.2	56.8	48.7	42.5	51.7	39.5
	Evening	82.8	56.1	48.6	44.4	51.3	43.3
	Night	63.6	52.2	47.2	41.5	45.7	39.2
16/06/2021	Day	97.6	58.2	50.1	43.1	56.9	40.3
	Evening	-	-	-	-	-	-
	Night	-	-	-	-	-	-

The time history of noise measurements at the background noise monitoring location is presented in Figure 4. It can be seen that the baseline noise level reflects a typical diurnal pattern in the absence of industrial noise.

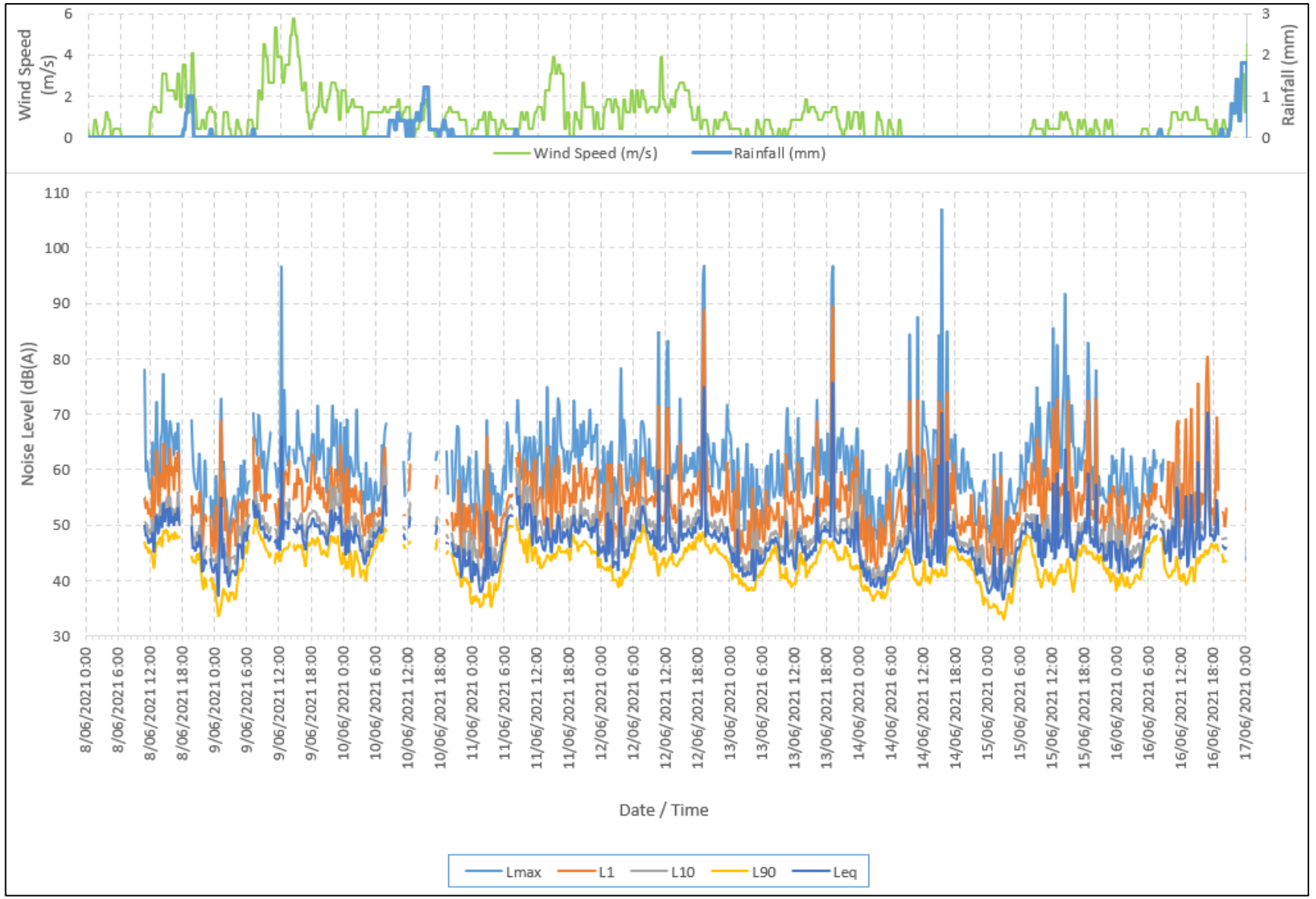


Figure 4: Time History at Background Monitoring Location

3.7 Summary of Results

A summary of the noise monitoring data by period art both location is presented in Table 6.

Table 6: Overall Noise Measurement Data

Location	Period	L_{max}	L_1	L_{10}	L_{90}	L_{eq}	RBL
Site Boundary	Day	98	62	59	55	58	54
	Evening	87	61	58	55	57	53
	Night	91	61	58	55	57	54
Background Site	Day	107	56	50	44	52	40
	Evening	96	56	50	45	54	44
	Night	78	52	46	41	46	38

4 ASSESSMENT CRITERIA

4.1 Operational Assessment Criteria

The acoustic assessment has been completed in accordance with the procedure identified in the NPfI. The NPfI recognises that scientific literature has identified that both the increase in noise level above background levels (that is, intrusiveness of a source), as well as the absolute level of noise are important factors in how a community will respond to noise from industrial sources.

In response to this, the NPfI establishes two separate noise criteria to meet environmental noise objectives: one to account for intrusive noise and the other to protect the amenity of particular land uses. These two criteria are then used to determine project trigger levels against which the proposed development will be assessed. The project noise trigger level is a level that, if exceeded, would indicate a potential noise impact on the community, and so 'trigger' a management response.

The derivation of the two sets of criteria are presented below. For residential dwellings, the noise criteria are assessed at the most-affected point (i.e. highest noise level) on or within the property boundary. Where the property boundary is more than 30 m from the house, then the criteria applies at the most-affected point within 30 m of the house.

4.1.1 Intrusiveness Noise Criteria

The project intrusiveness noise level is intended to protect against significant changes in noise levels as a result of industrial development. To achieve this, the NPfI describes intrusive noise as noise that exceeds background noise levels (as defined by the Rating Background Level or RBL) by more than 5 dB.

Table 7 presents the derivation of the intrusiveness criteria based on the noise monitoring undertaken at the Subject Site.

Table 7: Derived Intrusiveness Noise Criteria

Receptor	Intrusiveness $L_{Aeq,15\text{-minute}}$ Criteria		
	Day	Evening	Night
Subject Site Boundary [a)]	54 + 5 = 59	53 + 5 = 58	54 + 5 = 59
Other receptors [a) b)]	40 + 5 = 45	44 + 5 = 49	38 + 5 = 43

a) Measured background noise level established by the NPfI 2017 + 5 dB.
b) Receptor noise criteria applied at a location 30 m from the dwelling façade.

4.1.2 Amenity Criteria

The project amenity noise level seeks to protect against cumulative noise impacts from industry and maintain amenity for particular land uses. Review of the surrounding area has identified that there are other industrial noise sources in the area, and that future industrial development in the area is likely. As such, 5 dB have been subtracted from the project amenity noise levels to the indicative noise amenity area total industrial noise levels presented in Table 8.

Table 8: NPfI Amenity Noise Levels

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended L_{Aeq} Noise Level (dB(A))	
			Total Industrial Noise	Project Specific
Residence	Urban	Day	60	55
		Evening	50	45
		Night	45	40
Hotel	All	Day	5 dB(A) above recommended amenity noise levels for a residence	60
		Evening		50
		Night		45
Active recreation (i.e. tennis)	All	When in use	55	55
Industrial premises	All	When in use	70	70
Commercial premises	All	When in use	65	65
Museum	All	When in use	Internal – 40 External - 55	Internal – 40 External - 55
Education facilities	All	Noisiest 1-hour period when in use	Internal - 35	Internal - 35

4.1.3 Project Noise Trigger Levels

The Project Noise Trigger Level (i.e. the noise criteria considered by the assessment) is the lower value of the project intrusiveness noise level and the project amenity level, after the conversion to $L_{Aeq,\ 15\ min}$ dB(A) equivalent level. Table 9 presents the standardised intrusiveness noise level and the project amenity level as derived by adding 3 dB(A) to each period of the day.

Table 9: Determining Project Trigger Level

Type of Receiver	Time of Day	Standardised $L_{Aeq,\ 15\ min}$ Noise Level (dB)		
		Intrusiveness Noise Level	Amenity Noise Level	Project Noise Trigger Levels
Subject Site boundary	Day	59	N/A	59
	Evening	58	N/A	58
	Night	59	N/A	59
Residence	Day	45	55 + 3 = 58	45
	Evening	49	45 + 3 = 48	48
	Night	43	40 + 3 = 43	43
Hotel	Day	-	60 + 3 = 63	63
	Evening	-	50 + 3 = 53	53
	Night	-	45 + 3 = 48	48

When applying the project specific noise levels to existing industrial uses, the NPfI acknowledges that noise mitigation measures may be limited or costly. When determining the impact from existing industry, the NPfI recommends the project noise trigger levels should not

be applied as mandatory noise limits. Instead they should be used to assess noise impact and drive the process of assessing all feasible and reasonable control measures. The NPfI also identifies that for sites with limited mitigation measures available, the achievable noise limits can be above the project noise trigger levels.

4.1.4 Sleep Disturbance

NSW EPA have identified a screening assessment for sleep disturbance based on the night-time noise levels at a residential location. Where noise levels at a residential location exceed the following levels during the Night time period, the potential for sleep disturbance should be investigated:

- $L_{Aeq,\ 15\ min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is greater; and/or
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB whichever is the greater,

Based on the assessment the following criteria is applied for L_{Amax} at night to prevent sleep disturbance at sensitive receptors only:

- $L_{Aeq,\ 15\ min}$ RBL of 38 plus 5 dB = 43 dB(A); and
- L_{AFmax} RBL of 38 plus 15 dB = 53 dB(A).

5 ASSESSMENT METHODOLOGY

5.1 Software

For the purposes of predicting impacts associated with noise emissions from the Subject Site on nearby sensitive receptors, noise modelling of the sources was completed using the proprietary software CadnaA (version 2021 MR2 build 185.5161) developed by DataKustik. CadnaA incorporates the influence of meteorology, terrain, ground type and air absorption in addition to source characteristics to predict noise impacts at receptor locations.

The model is utilised to assess the potential noise emissions from the Subject Site under a range of operating scenarios and meteorological conditions. The noise modelling also allows investigation of possible noise management solutions, in the event that non-compliance with the assessment criterion is predicted.

5.2 Meteorology

The NPfI presents guidelines for the consideration of meteorological effects on noise propagation, specifically, temperature inversions and/or gradient winds. NPfI provides two options for assessing meteorological effects as detailed in Table 10.

Table 10: Standard and Noise Enhancing Meteorological Conditions

Meteorological Conditions	Meteorological Parameters
Standard conditions	Day/Evening/Night: stability categories A-D with wind speed up to 0.5 m/s at 10 m AGL[b].
Noise enhancing conditions	Day/Evening: stability categories A-D with light winds (up to 3 m/s at 10 m AGL).
	Night: stability categories A-D with light winds (up to 3 m/s at 10 m AGL). And/or stability category F with light winds (up to 2 m/s at 10 m AGL).

a) Pasquill-Gifford Atmospheric Stability Class
b) AGL: Above ground level

5.3 Model Configuration

Table 11 summarises the model configuration used for the modelling.

Table 11: Model Configuration

Parameter	Approach
Standards	CONCAWE
Time Periods	Day (07:00 – 18:00 hours
	Evening (18:00 – 22:00 hours)
	Night (22:00 – 07:00 hours)
Digital Terrain	LIDAR data at 1 m intervals. Triangulation calculation applied.
Ground Absorption	Default absorption for hard surface. Aerial mapping used to include soft ground.
Meteorology	Day and Evening: Stability class D at 3 m/s
	Night: Stability class F at 2 m/s
	Worst case source to receptor

5.4 Validation of Noise Model

The majority of the Sound Pressure Levels (SPL) provided by the manufacturer were calculated at 10 m distance. In order to validate the noise model, the loudest noise source (inverter) was used. The manufacturer stated at 50% load, the SPL is 55 dB(A), which is equivalent to a sound power level (SWL) of 83 dB(A) based on hemispherical radiation.

Comparison of the supplied sound pressure level at 10 m with the modelled noise level at 10 m is shown in Table 12. The predicted noise level validates the noise model predictions.

Table 12: Model Validation

Equipment	Sound Pressure Level (dB(A)) at 10 m		Difference (dB(A))
	Measured	Modelled	
Inverter at 1130 A and 50% fan	55.0	55.0	0

5.5 Noise Sources

Table 13 provides a summary of the noise sources adopted for this assessment and the operational details of each source. Where annoying noise characteristics have been identified the adjustment has been included in the L_{Aeq} column. The sound power levels have been taken from the following sources:

- manufacturers information for:
  - CATL batteries as per the email from the equipment supplier dated 15 February 2022;
  - Inverter as detailed in "Ingecon Sun Power B Series Noise Emissions test report" dated 11 December 2019. This test report identifies varying sound pressure levels for different electrical loadings.
  - Based on the maximum continuous electrical loading of the facility (which is limited by grid connection requirements) the appropriate representative case in the noise emissions test report was determined to be 1130 A and 50% fan loading per inverter. The sound pressure level for this case was used in the modelling.
- Transformer (inverter and auxiliary) SWL calculated from Australian Standard AS60076.10: 2009 '*Power transformers Determination of sound levels'*
- all other SWL taken from AE's database of typical levels taken by AE personnel or from verified sources including Australian Standards and published datasets.

It should be noted that the L_{Amax} level associated with the cooling fans is taken into consideration in the energetic average (L_{Aeq}) noise level to reflect slight changes in the fan power. Therefore a separate maximum noise assessment will not be undertaken.

The following plans have been used to determine source heights and layout, as shown in Appendix A:

- Western Sydney Smart Battery: Sections Plan – dated 1/02/2022; and
- Western Sydney Smart Battery: General Layout Concrete Platform – dated 1/02/2022.

Table 13: Sound Power Levels

Noise Source	Qty	Height (m)	Usage Period (%)			Sound Power Level (dB(A))		Noise Characteristics (as per Appendix C of the NPfI)
			Day	Evening	Night	L_{Aeq}	L_{Amax}	
CATL Enerone battery module rack	144	1 m above platform	100	100	100	80	-	N/A
Inverter (50% load)	20	1 m above platform	100	100	100	88	-	Tonal (+5 dB)
Inverter transformer (per 4 inverter unit)	4	1 m above platform	100	100	100	77	-	N/A
Inverter transformer (per 2 inverter unit)	2	1 m above platform	100	100	100	73	-	N/A
Auxiliary transformers	2	1 m above platform	100	100	100	62	-	N/A
Air conditioning units	4	1 m above platform or ground	100	100	100	60	-	N/A

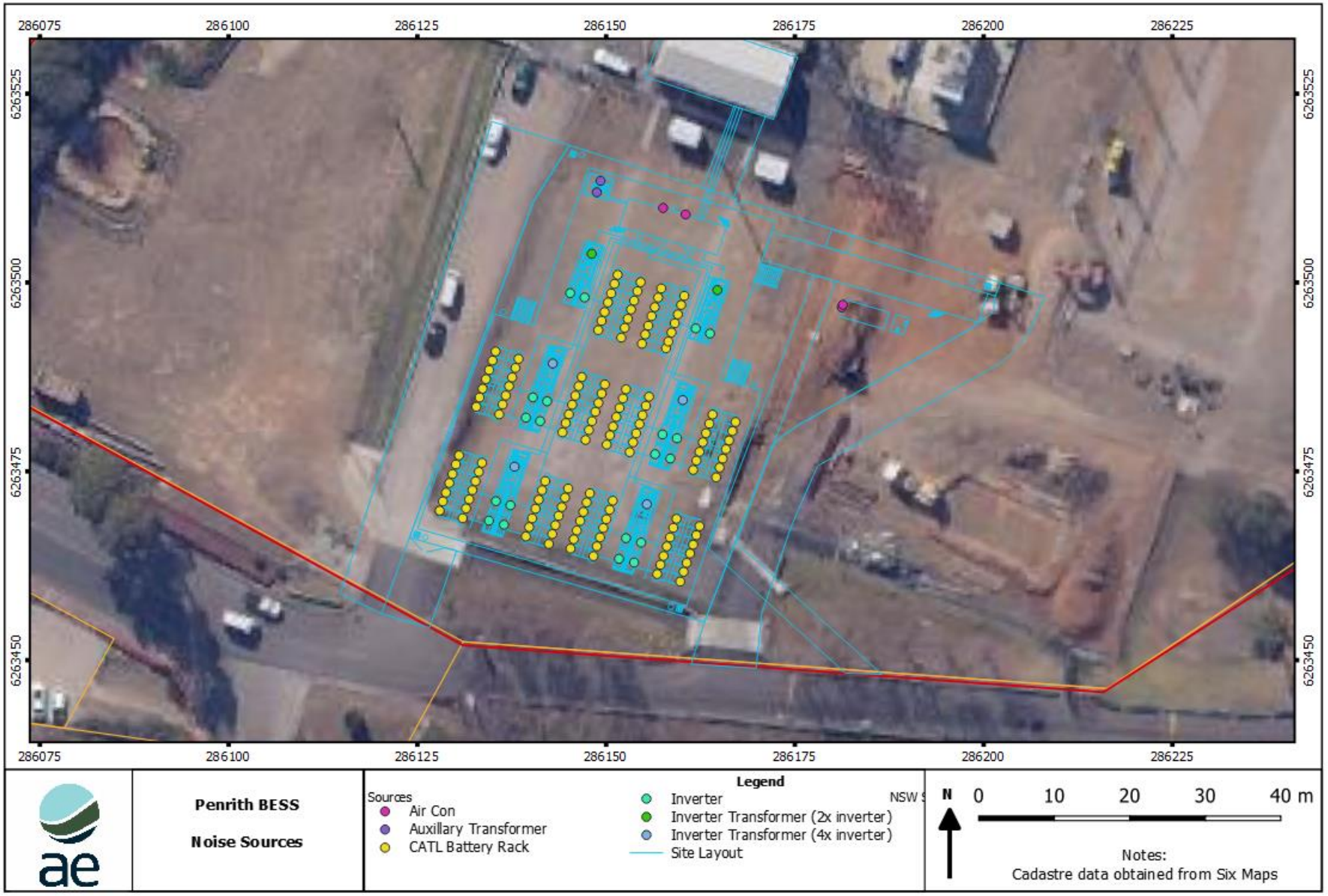


Figure 5: Locations of Noise Sources as Modelled

6 PREDICTED NOISE LEVELS

Table 14 below presents predicted receptor noise levels during the operational phase of the BESS based on the sound power levels listed in Table 13 and the source locations identified in Figure 5.

A review of the predicted noise levels confirms that compliance with the assessment criteria established in accordance with the NPfI can be achieved for all receptors during the daytime, evening, and night-time periods under noise-enhancing meteorological conditions.

The noise contours are presented in Appendix B.

Table 14: Predicted Receptor Noise Levels

Receptor	Predicted Noise Levels ($L_{Aeq, 15min}$)	Criteria (D / E / N)	Comply (Y/N)
R01 - 39 Lord Sheffield Cct Ground	33	45 / 48 / 43	Y
R01 - 39 Lord Sheffield Cct 1st	37	45 / 48 / 43	Y
R01 - 39 Lord Sheffield Cct 2nd	39	45 / 48 / 43	Y
R01 - 39 Lord Sheffield Cct 3rd	40	45 / 48 / 43	Y
R01 - 39 Lord Sheffield Cct 4th	41	45 / 48 / 43	Y
R01 - 39 Lord Sheffield Cct 5th	41	45 / 48 / 43	Y
R01 - 39 Lord Sheffield Cct 6th	41	45 / 48 / 43	Y
R01 - 39 Lord Sheffield Cct 7th	41	45 / 48 / 43	Y
R01 - 39 Lord Sheffield Cct 8th	42	45 / 48 / 43	Y
R02 - Combewood Avenue Ground	34	45 / 48 / 43	Y
R02 - Combewood Avenue 1st	35	45 / 48 / 43	Y
R02 - Combewood Avenue 2nd	38	45 / 48 / 43	Y
R02 - Combewood Avenue 3rd	40	45 / 48 / 43	Y
R02 - Combewood Avenue 4th	40	45 / 48 / 43	Y
R02 - Combewood Avenue 5th	41	45 / 48 / 43	Y
R02 - Combewood Avenue 6th	41	45 / 48 / 43	Y
R02 - Combewood Avenue 7th	41	45 / 48 / 43	Y
R02 - Combewood Avenue 8th	41	45 / 48 / 43	Y
R03 - 1194 Combewood Ave - Ground	33	45 / 48 / 43	Y
R03 - 1194 Combewood Ave - 1st	35	45 / 48 / 43	Y
R04 - Combewood Ave - Ground	33	45 / 48 / 43	Y
R04 - Combewood Ave - 1st	35	45 / 48 / 43	Y
R05 - 87 Thornton Dr - Ground	32	45 / 48 / 43	Y
R05 - 87 Thornton Dr - First	34	45 / 48 / 43	Y
R06 - 706 High St - Ground	22	45 / 48 / 43	Y
R07 - 688 High Street	22	45 / 48 / 43	Y
R08 - 686 High Street	22	45 / 48 / 43	Y

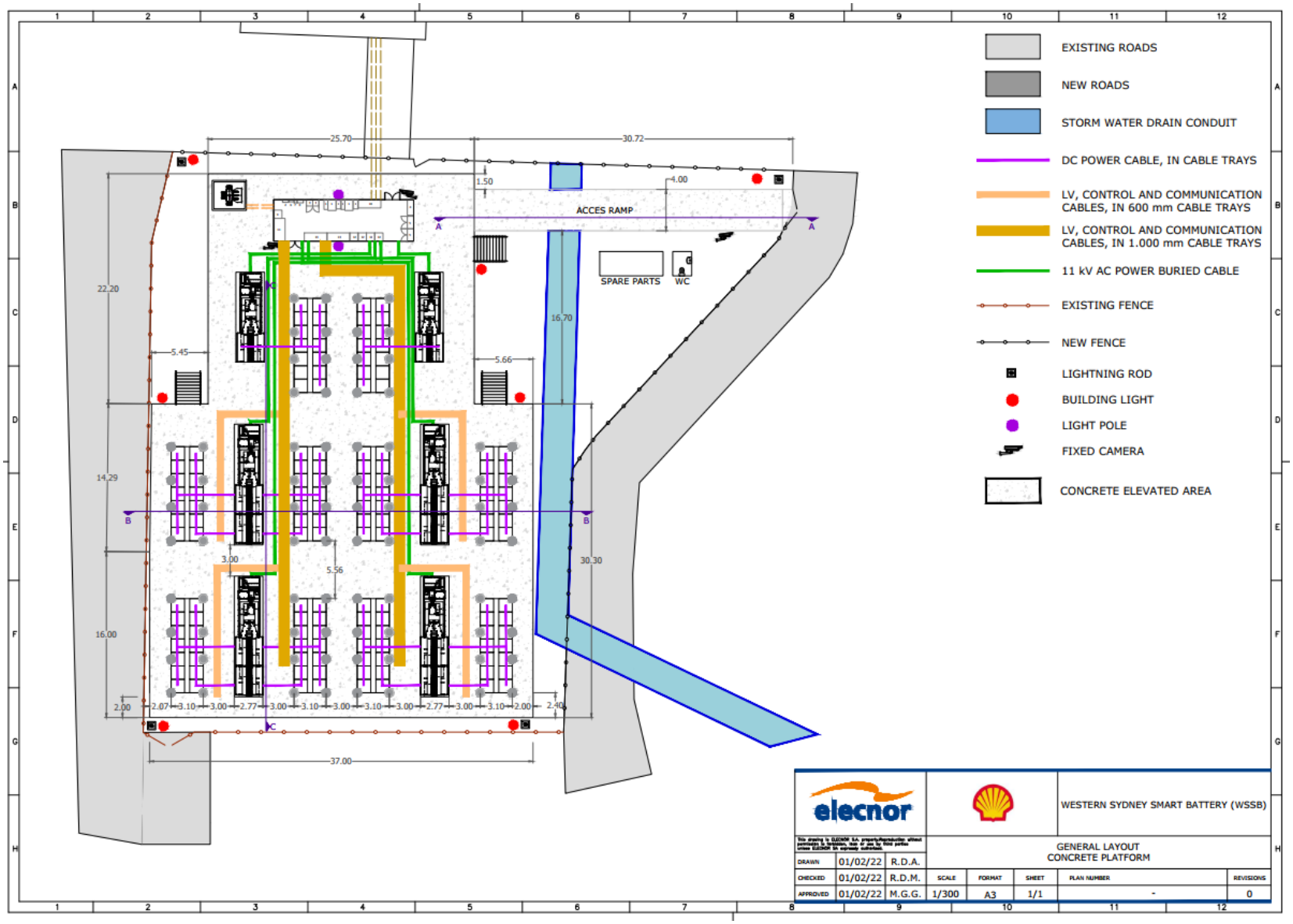
Receptor	Predicted Noise Levels ($L_{Aeq, 15min}$)	Criteria (D / E / N)	Comply (Y/N)
R09 - 682 High Street	23	45 / 48 / 43	Y
R10 - Chatterbox Speech Therapy	23	50 / 50 / 50	Y
R11 - 672 High Street	25	45 / 48 / 43	Y
R12 - The Select Inn Penrith	23	63 / 53 / 48	Y
R13 - Tennis	27	55 / 55 / 55	Y
R14 - Tennis	30	55 / 55 / 55	Y
R15 - Tennis	28	55 / 55 / 55	Y
R16 - Tennis	26	55 / 55 / 55	Y
R17 - Museum of Fire	44	55 / 55 / 55	Y
R18 - HVTC - Apprenticeship Centre	40	50 / 50 / 50	Y
R18 - HVTC - Apprenticeship Centre	45	50 / 50 / 50	Y
R19 - Productivity Bootcamp	39	50 / 50 / 50	Y
R20 - Bega Cheese	58	70 / 70 / 70	Y
R21 - Torino Motorcross	46	70 / 70 / 70	Y
R22 - Starbucks	47	65 / 65 / 65	Y
R23 - Oporto	39	65 / 65 / 65	Y
R24 - Zambrero	44	65 / 65 / 65	Y
R25 - McDonald’s	42	65 / 65 / 65	Y
R26 - Boral Concrete	42	70 / 70 / 70	Y
R27 - World Gym	40	65 / 65 / 65	Y
R28 - Zak Pak Timber Products	42	65 / 65 / 65	Y

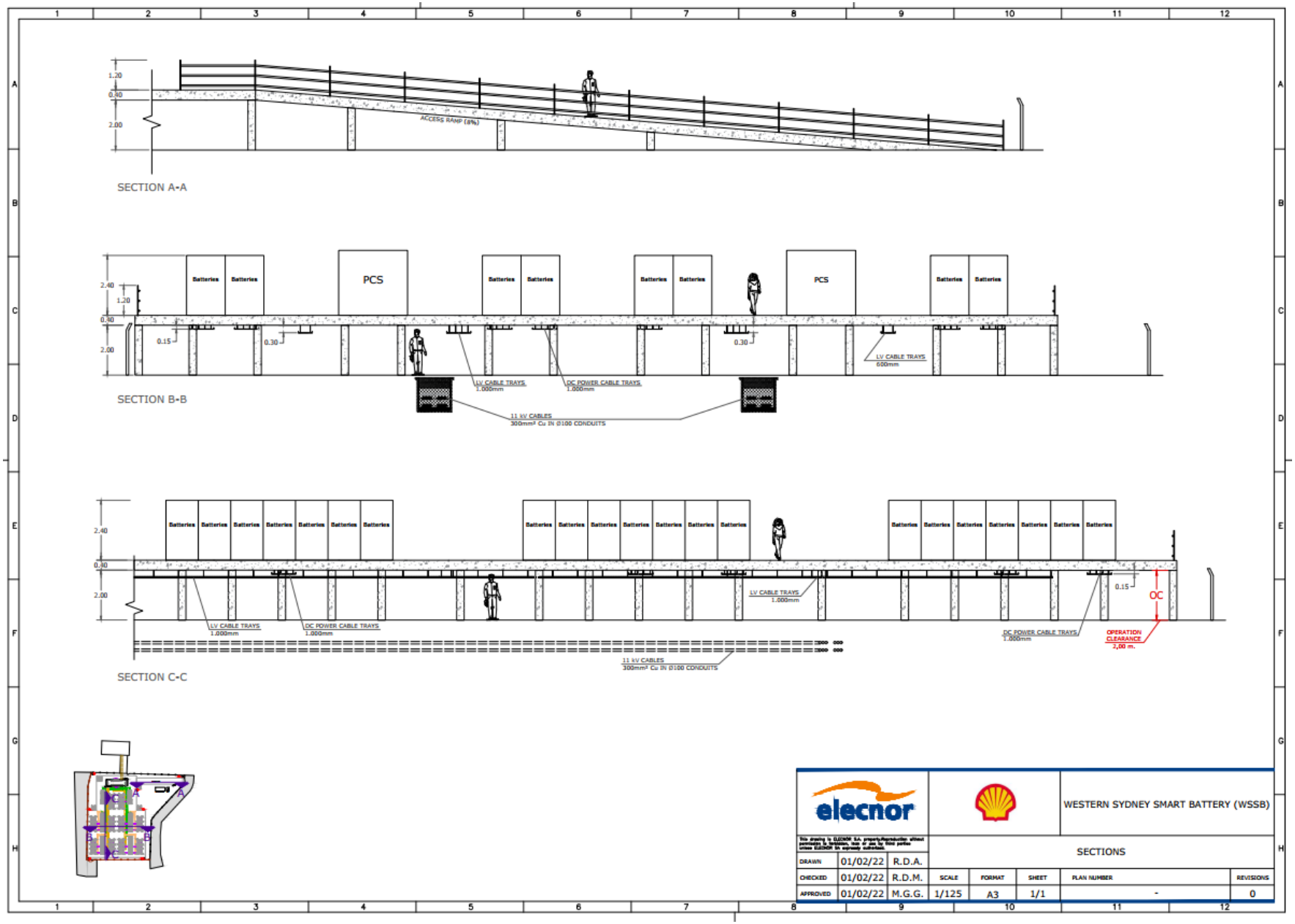
7 CONCLUSION

Assured Environmental (AE) was appointed by Firm Power Pty Ltd (Firm Power) to undertake a ambient noise monitoring and noise impact assessment. A noise model was developed to predict the noise from the BESS at surrounding land uses in in accordance with the NSW Noise Policy for Industry (EPA, 2017).

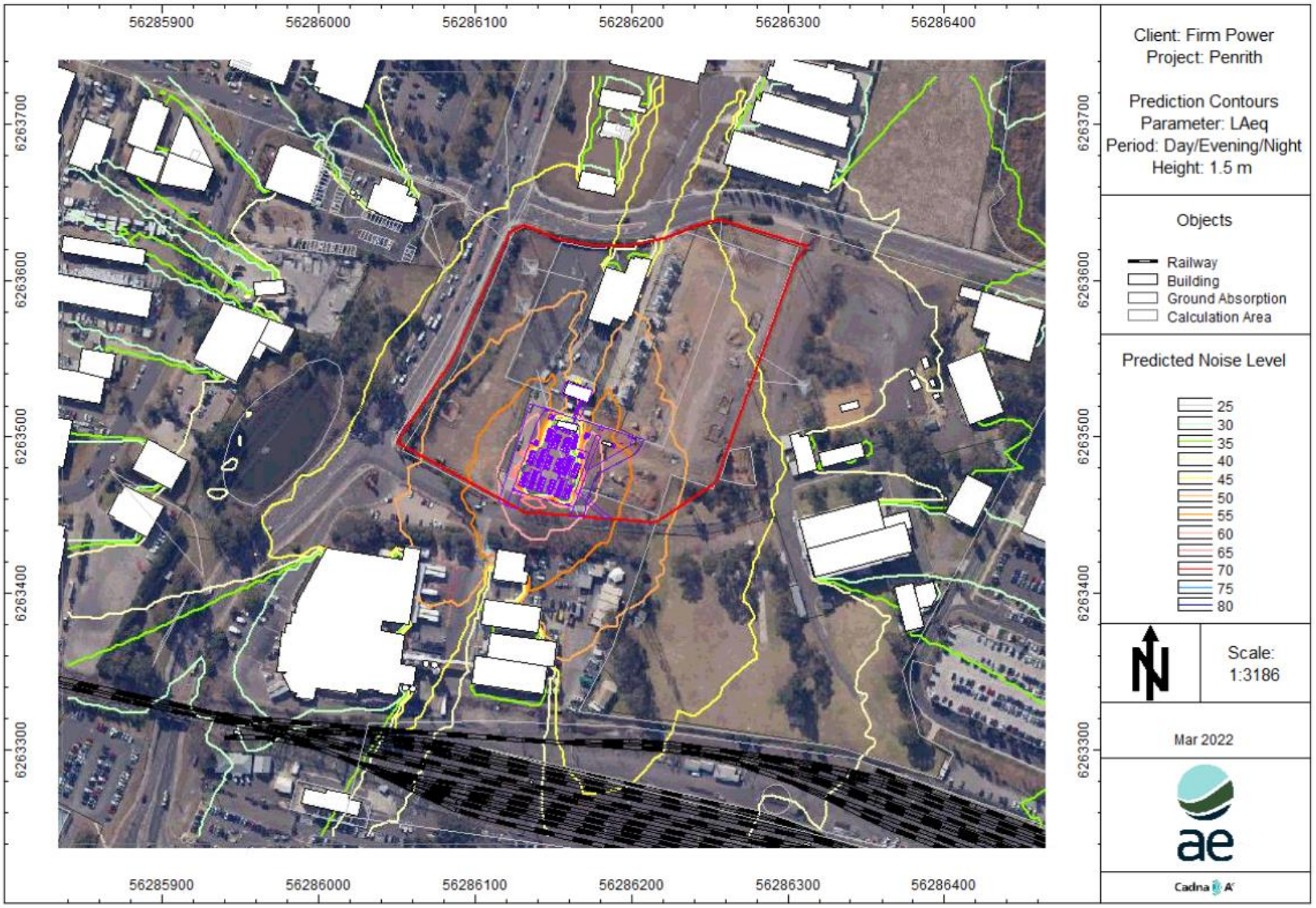
The results of the predictive noise modelling have determined compliance with the derived noise criteria is expected to be achieved at all off-site receptors.

APPENDIX A: DEVELOPMENT PLANS





APPENDIX B: NOISE CONTOURS



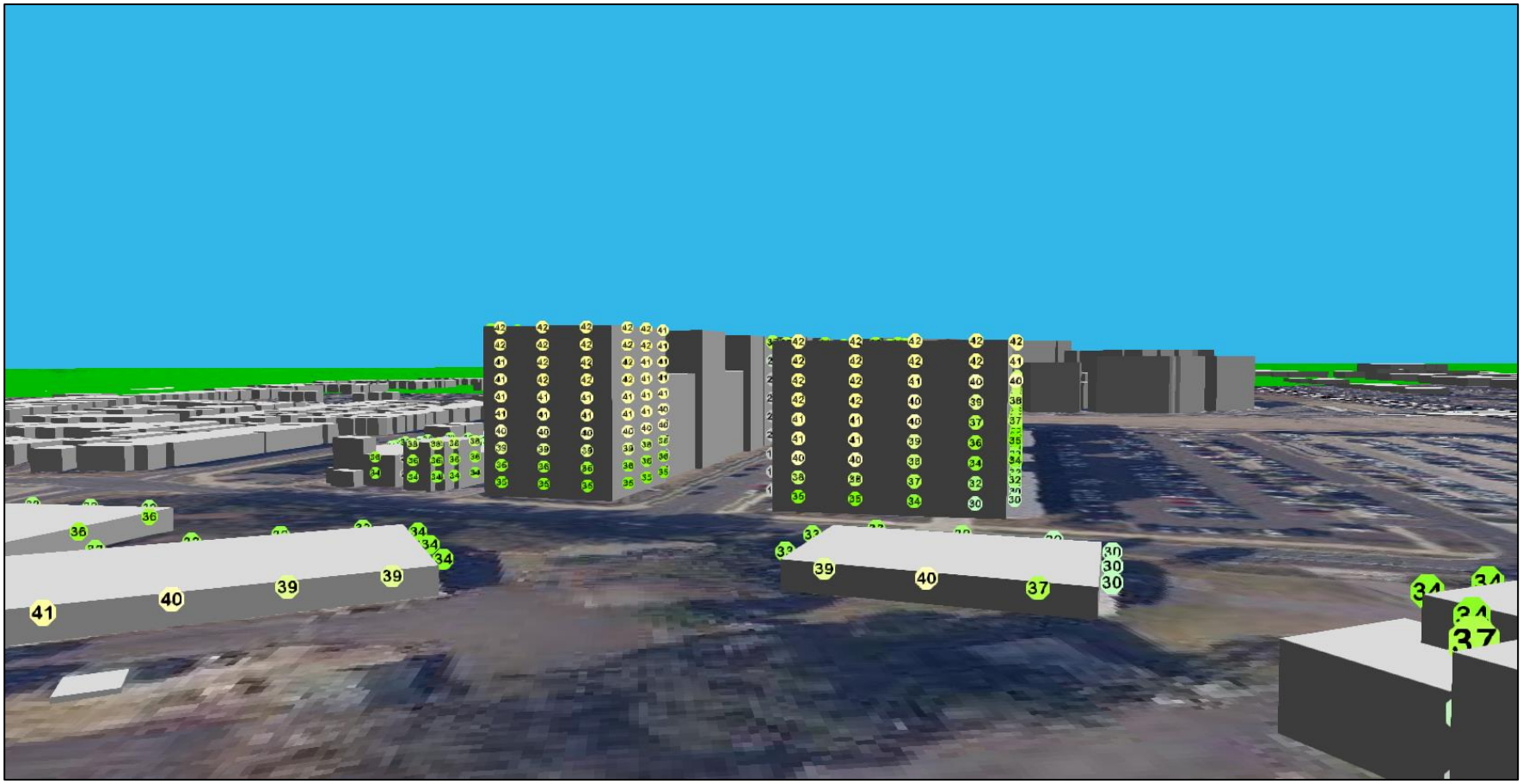


Figure 6: Predicted Day, Evening and Night Noise Levels at R01 and R02 (Lord Sheffield Cct and Combewood Avenue Apartments)

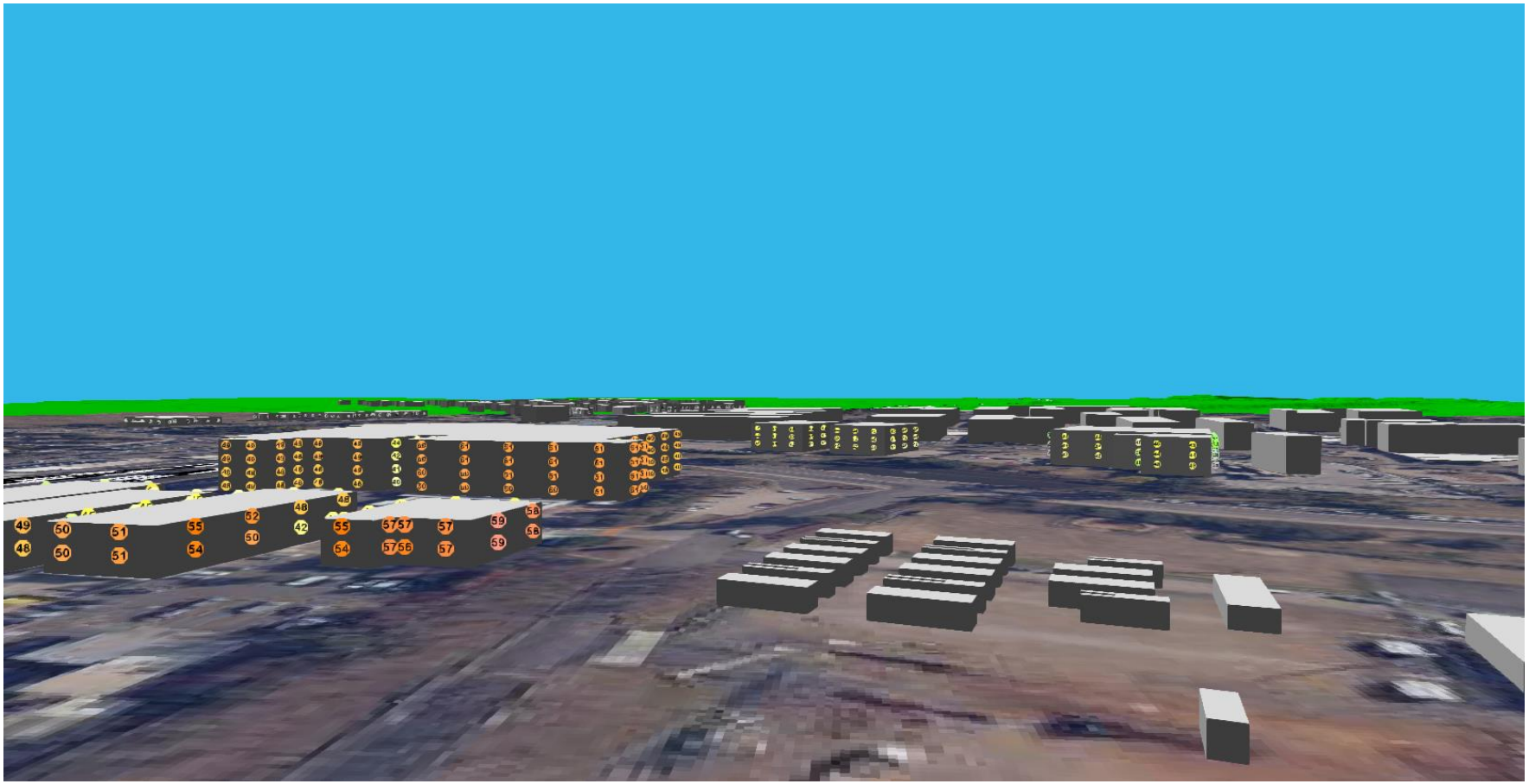


Figure 7: Predicted Day, Evening and Night Noise Levels (dB(A)) at R20 and R27 (Bega Cheese and World Gym)