Noise Assessment

BioCarbon Processing Facility
11 Markwell Road
Bulahdelah, NSW

Prepared for: BioCarbon Pty Ltd
March 2025
MAC252346-01RP1

MAC
Muller Acoustic Consulting

Document Information

Noise Assessment

BioCarbon Processing Facility

11 Markwell Road

Bulahdelah, NSW

Prepared for: BioCarbon Pty Ltd

11 Markwell Road

Bulahdelah NSW 2423

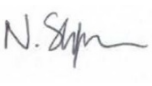
Prepared by: Muller Acoustic Consulting Pty Ltd

PO Box 678, Kotara NSW 2289

ABN: 36 602 225 132

P: +61 2 4920 1833

www.mulleracoustic.com

DOCUMENT ID	DATE	PREPARED	SIGNED	REVIEWED	SIGNED
MAC252346-01RP1	17 March 2025	Nicholas Shipman		Oliver Muller	

CONTENTS

1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by BioCarbon Pty Ltd to prepare a Noise Assessment (NA) to quantify emissions from the proposed BioCarbon Processing Facility to be located at 11 Markwell Road, Bulahdelah, NSW (the 'project').

The NA has quantified potential operational and sleep disturbance noise emissions from the proposed operation and recommends reasonable and feasible noise controls where required.

This assessment has been undertaken in accordance with the following documents:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI) 2017;
- NSW Department of Environment and Climate Change (DECCW) – NSW Interim Construction Noise Guideline (ICNG), July 2009;
- NSW Environment Protection Authority (EPA), Approved Methods for the measurement and analysis of environmental noise in NSW, 2022; and
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise - General Procedures.

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

This page has been intentionally left blank

2 Project Description

2.1 Background

The proposed BioCarbon Processing Facility (the project) is located at 11 Markwell Road, Bulahdelah, NSW. The project site is zoned RU5 – Village and is bounded by several residential and industrial receivers in all directions. The proposed project will be ancillary to an existing approved sawmill and will be located on the northern boundary of Lot 322 (DP1309245) as shown in **Figure 1**.

The project is located 700m west of the Pacific Highway, therefore highway traffic and ambient rural noise sources are main contributors to the acoustic environment for the project.

2.1.1 Receiver Review

A review of residential receivers in proximity to the project has been completed and are summarised in **Table 1. Figure 1** provides a locality plan showing the position of these receivers in relation to the project.

Table 1 Receiver Locations

Receiver	Description	Receiver Type	Coordinates (GDA20/MGA56)	
			Easting	Northing
R01	65 Markwell Road, Bulahdelah, NSW	Residential	425119	6415458
R02	105 Markwell Road, Bulahdelah, NSW	Residential	425403	6415927
R03	90 Markwell Road, Bulahdelah, NSW	Residential	425527	6415457
R04	8 Mahogany Street, Bulahdelah, NSW	Residential	425883	6415200
R05	1 Markwell Road, Bulahdelah, NSW	Residential	425559	6415190
R06	88 Alexandria Street, Bulahdelah, NSW	Residential	425543	6415145
R07	4 Markwell Road, Bulahdelah, NSW	Residential	425659	6415059
R08	2 Markwell Road, Bulahdelah, NSW	Residential	425685	6415026
R09	3 Lee Street, Bulahdelah, NSW	Residential	425792	6414928
R10	6A Lee Street, Bulahdelah, NSW	Residential	425759	6414881
R11	2-4 Stroud Street, Bulahdelah, NSW	Residential	425706	6414887
R12	1 Stroud Street, Bulahdelah, NSW	Residential	425654	6414896
R13	12A Lee Street, Bulahdelah, NSW	Residential	425597	6414905
R14	12B Lee Street, Bulahdelah, NSW	Residential	425577	6414908
R15	13 Lee Street, Bulahdelah, NSW	Residential	425490	6414996
R16	14 Lee Street, Bulahdelah, NSW	Residential	425515	6414917
R17	16 Lee Street, Bulahdelah, NSW	Residential	425496	6414918
R18	18 Lee Street, Bulahdelah, NSW	Residential	425475	6414923
R19	20 Lee Street, Bulahdelah, NSW	Residential	425456	6414925
R20	22 Lee Street, Bulahdelah, NSW	Residential	425440	6414929

Table 1 Receiver Locations

Receiver	Description	Receiver Type	Coordinates (GDA20/MGA56)	
			Easting	Northing
R21	24 Lee Street, Bulahdelah, NSW	Residential	425419	6414932
R22	1 Prince Street, Bulahdelah, NSW	Residential	425360	6414945
R23	4 Edgar Street, Bulahdelah, NSW	Residential	425293	6414925
R24	2 Edgar Street, Bulahdelah, NSW	Residential	425268	6414954
R25	1 Edgar Street, Bulahdelah, NSW	Residential	425216	6414964
R26	2 Myall Street, Bulahdelah, NSW	Residential	425136	6414973
R27	1 Myall Street, Bulahdelah, NSW	Residential	425057	6414980
R28	2 River Street, Bulahdelah, NSW	Residential	424995	6414997
I01	10 Markwell Road, Bulahdelah, NSW	Industrial	425643	6415164
I02	8 Markwell Road, Bulahdelah, NSW	Industrial	425630	6415130
I03	6 Markwell Road, Bulahdelah, NSW	Industrial	425639	6415098
I04	4 Red Gum Road, Bulahdelah, NSW	Industrial	425699	6415162
I05	6 Red Gum Road, Bulahdelah, NSW	Industrial	425739	6415164
I06	8 Red Gum Road, Bulahdelah, NSW	Industrial	425756	6415155
I07	1 Mahogany Street, Bulahdelah, NSW	Industrial	425738	6415091
I08	2 Markwell Road, Bulahdelah, NSW	Industrial	425723	6415040
I09	5 Lee Street, Bulahdelah, NSW	Industrial	425726	6414949

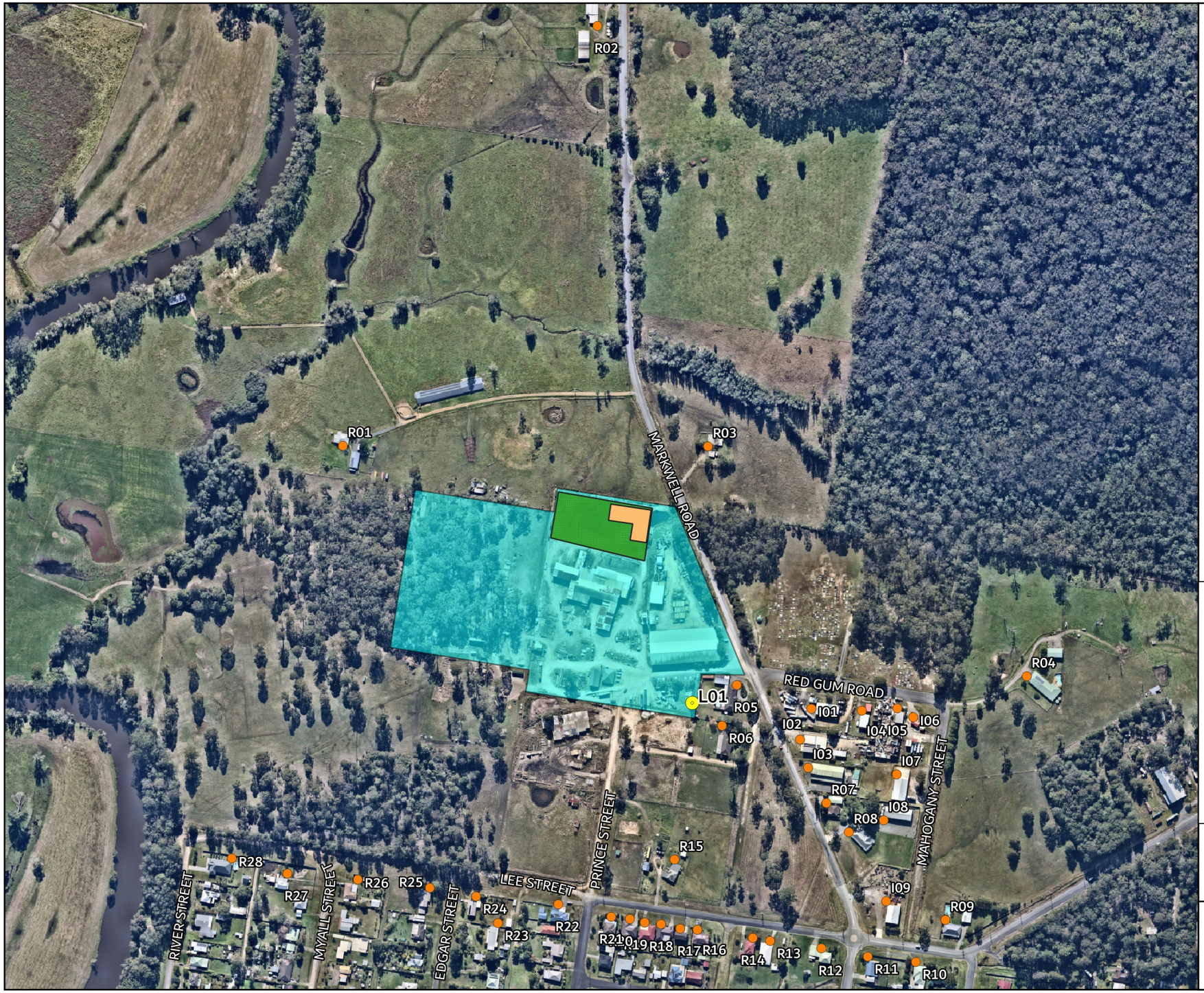


FIGURE 1

LOCALITY PLAN

MAC252346-01

BioCarbon Bulahdelah

11 Markwell Road, Bulahdelah

KEY

- Receiver Locations
- Proposed Shed
- Unattended Logger
- BioCarbon Boundary
- Lot Boundary

0 50 100 150 200 m

N

MAC
Muller Acoustic Consulting

This page has been intentionally left blank

3 Noise Policy and Guidelines

3.1 Noise Policy for Industry

The EPA released the Noise Policy for Industry (NPI) in October 2017 which provides a process for establishing noise criteria for consents and licenses enabling the EPA to regulate noise emissions from scheduled premises under the Protection of the Environment Operations Act 1997.

The objectives of the NPI are to:

- provide noise criteria that is used to assess the change in both short term and long-term noise levels;
- provide a clear and consistent framework for assessing environmental noise impacts from industrial premises and industrial development proposals;
- promote the use of best-practice noise mitigation measures that are feasible and reasonable where potential impacts have been identified; and
- support a process to guide the determination of achievable noise limits for planning approvals and/or licences, considering the matters that must be considered under the relevant legislation (such as the economic and social benefits and impacts of industrial development).

The policy sets out a process for industrial noise management involving the following key steps:

1. Determine the Project Noise Trigger Levels (PNTLs) (ie criteria) for a development. These are the levels (criteria), above which noise management measures are required to be considered. They are derived by considering two factors: shorter-term intrusiveness due to changes in the noise environment; and maintaining the noise amenity of an area.
2. Predict or measure the noise levels produced by the development with regard to the presence of annoying noise characteristics and meteorological effects such as temperature inversions and wind.
3. Compare the predicted or measured noise level with the PNTL, assessing impacts and the need for noise mitigation and management measures.

4. Consider residual noise impacts - that is, where noise levels exceed the PNTLs after the application of feasible and reasonable noise mitigation measures. This may involve balancing economic, social and environmental costs and benefits from the proposed development against the noise impacts, including consultation with the affected community where impacts are expected to be significant.

5. Set statutory compliance levels that reflect the best achievable and agreed noise limits for the development.

6. Monitor and report environmental noise levels from the development.

3.1.1 Project Noise Trigger Levels (PNTL)

The policy sets out the procedure to determine the PNTLs relevant to an industrial development. The PNTL is the lower (ie, the more stringent) of the **Project Intrusiveness Noise Level** (PINL) and **Project Amenity Noise Level** (PANL) determined in accordance with Section 2.3 and Section 2.4 of the NPI.

3.1.2 Rating Background Level (RBL)

The Rating Background Level (RBL) is a parameter determined from noise monitoring and is used for assessment purposes. As per the NPI, the RBL is an overall single figure background level representing each assessment period (day, evening and night) over the noise monitoring period. The measured RBLs relevant to the project are contained in **Section 4**.

For low noise environments, such as rural environments, minimum assumed RBLs apply within the NPI can be adopted in lieu of completing background noise measurements. This is considered the most conservative method for establishing noise criteria for a project. The minimum assumed RBLs are as follows:

- Minimum Day RBL = 35dBA;
- Minimum Evening RBL = 30dBA; and
- Minimum Night RBL = 30dBA.

3.1.3 Project Intrusiveness Noise Level (PINL)

The PINL ($LA_{eq(15min)}$) is the RBL + 5dB and seeks to limit the degree of change a new noise source introduces to an existing environment. Hence, when assessing intrusiveness, background noise levels need to be measured.

Background noise levels need to be determined before intrusive noise can be assessed. The NPI states that background noise levels to be measured are those that are present at the time of the noise assessment and without the subject development operating. For the assessment of modifications to existing premises, the noise from the existing premises should be excluded from background noise measurements. It is note that the exception is where the premises has been operating for a significant period of time and is considered a normal part of the acoustic environment; it may be included in the background noise assessment under the following circumstances:

- the development must have been operating for a period in excess of 10 years in the assessment period/s being considered and is considered a normal part of the acoustic environment; and,
- the development must be operating in accordance with noise limits and requirements imposed in a consent or licence and/or be applying best practice.

Where a project intrusiveness noise level has been derived in this way, the derived level applies for a period of 10 years to avoid continuous incremental increases in intrusiveness noise levels. This approach is consistent with the purpose of the intrusiveness noise level to limit significant change in the acoustic environment. The purpose of the project amenity noise level is to moderate against background noise creep.

3.1.4 Project Amenity Noise Level (PANL)

The PANL is relevant to a specific land use or locality. To limit continuing increases in intrusiveness levels, the ambient noise level within an area from all combined industrial sources should remain below the recommended amenity noise levels specified in Table 2.2 (of the NPI). The NPI defines two categories of amenity noise levels:

- **Amenity Noise Levels (ANL)** – are determined considering all current and future industrial noise within a receiver area; and
- **Project Amenity Noise Level (PANL)** – is the recommended level for a receiver area, specifically focusing the project being assessed.

Additionally, Section 2.4 of the NPI states: “to ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, a project amenity noise level applies for each new source of industrial noise as follows”:

PANL for new industrial developments = recommended **ANL** minus 5dBA.

The following exceptions apply when deriving the PANL:

- areas with high traffic noise levels;
- proposed developments in major industrial clusters;
- existing industrial noise and cumulative industrial noise effects; and
- greenfield sites.

Where relevant this assessment has considered influences of traffic with respect to amenity noise levels (ie areas where existing traffic noise levels are 10dB greater than the recommended amenity noise level).

Furthermore, Section 2.4 of the NPI states “*where the project amenity noise level applies and it can be met, no additional consideration of cumulative industrial noise is required*. “

The recommended amenity noise levels as per Table 2.2 of the NPI are reproduced in **Table 2**.

Table 2 Amenity Noise Levels

Receiver Type	Noise Amenity Area	Time of day	Recommended amenity noise level dB LAeq(period)
Residential	Rural	Day	50
		Evening	45
		Night	40
	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks.	See column 4	See column 4	5dB above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day
School Classroom	All	Noisiest 1-hour period when in use	35 (internal) 45 (external)
Hospital ward			
- internal	All	Noisiest 1-hour	35
- external	All	Noisiest 1-hour	50
Place of worship - internal	All	When in use	40
Passive Recreation	All	When in use	50
Active Recreation	All	When in use	55
Commercial premises	All	When in use	65
Industrial	All	When in use	70

Notes: The recommended amenity noise levels refer only to noise from industrial noise sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The levels represent outdoor levels except where otherwise stated.

Types of receivers are defined as rural residential; suburban residential; urban residential; industrial interface; commercial; industrial – see Table 2.3 and Section 2.7 of the NPI.

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

3.1.5 Maximum Noise Assessment Trigger Levels

The potential for sleep disturbance from maximum noise level events from a project during the night-time period needs to be considered. The NPI considers sleep disturbance to be both awakenings and disturbance to sleep stages.

Where night-time noise levels from a development/premises at a residential location exceed the following criteria, a detailed maximum noise level event assessment should be undertaken:

- $L_{Aeq(15min)}$ 40dB or the prevailing RBL plus 5dBA, whichever is the greater, and/or
- L_{Amax} 52dB or the prevailing RBL plus 15dBA, whichever is the greater.

A detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period.

Other factors that may be important in assessing the impacts on sleep disturbance include:

- how often the events would occur;
- the distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the development;
- whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods); and
- current understanding of effects of maximum noise level events at night.

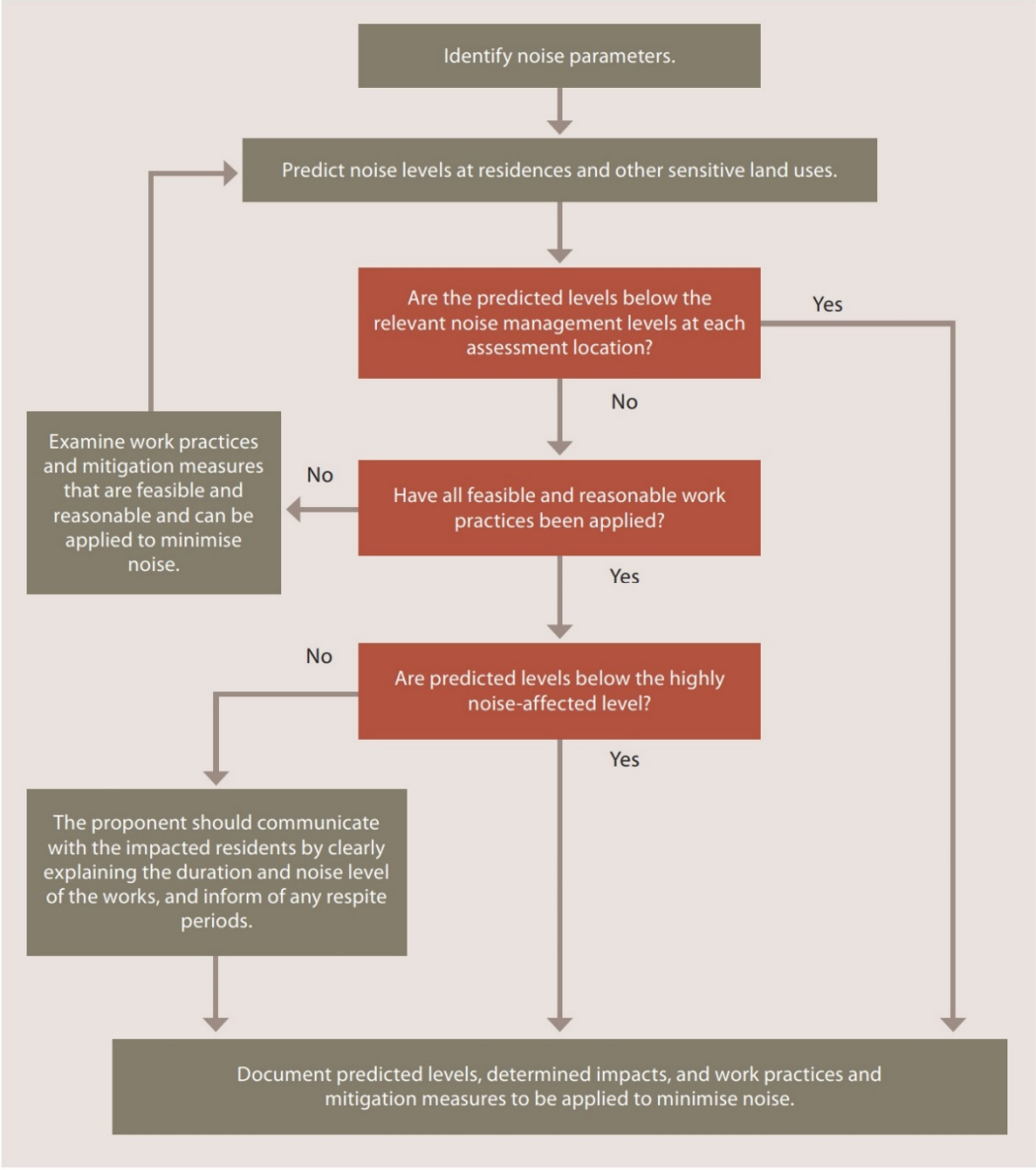
3.2 Interim Construction Noise Guideline

The ICNG sets out procedures to identify and address the impacts of construction noise on residences and other sensitive land uses. This section provides a summary of noise objectives that are applicable to the assessment. The ICNG provides two methodologies for the assessment of construction noise emissions:

- Quantitative, which is suited to major construction projects with typical durations of more than three weeks; and
- Qualitative, which is suited to short term infrastructure maintenance (< three weeks).

The qualitative assessment methodology is a more simplified approach that relies on noise management strategies. This NA has adopted a quantitative assessment approach which is summarised in **Figure 2.** The quantitative approach includes identification of potentially affected receivers, derivation of the construction noise management levels, quantification of potential noise impact at receivers via predictive modelling and, provides management and mitigation recommendations.

Figure 2 Quantitative Assessment Processes for Assessing and Managing Construction Noise



Source: Department of Environment and Climate Change, 2009.

3.2.1 Standard Hours for Construction

Table 3 presents the ICNG recommended standard hours for construction works.

Table 3 Recommended Standard Hours for Construction

Daytime	Construction Hours
Monday to Friday	7am to 6pm
Saturdays	8am to 1pm
Sundays or Public Holidays	No construction

These recommended hours do not apply in the event of direction from police, or other relevant authorities, for safety reasons or where required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm.

Construction activities are anticipated to be undertaken during standard construction hours.

3.2.2 Construction Noise Management Levels

Section 4 of the ICNG details the quantitative assessment method involving predicting noise levels and comparing them with the Noise Management Level (NML) and are important indicators of the potential level of construction noise impact. **Table 4** reproduces the ICNG Noise Management Level (NML) for residential receivers. The NML is determined by adding 10dB (standard hours) or 5dB for Out of Hours (OOH) to the Rating Background Level (RBL) for each specific assessment period.

Table 4 Noise Management Levels

Time of Day	Management Level LAeq(15min)[1]	How to Apply
Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays.	Noise affected RBL + 10dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured LAeq(15min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of work to be carried out, the expected noise levels and duration, as well as contact details.
	Highly Noise Affected 75dBA (HNA)	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account times identified by the community when they are less sensitive to noise such as before and after school for work near schools, or mid-morning or mid-afternoon for work near residences; and if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours.	Noise affected RBL + 5dB	A strong justification would typically be required for work outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5dBA above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see Section 7.2.2 of the ICNG.

Note 1: The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the construction noise management levels for noise assessment purposes and is the median of the ABL's.

This page has been intentionally left blank

4 Existing Environment

4.1 Unattended Noise Monitoring

To quantify the existing background noise environment of the area, unattended noise monitoring was conducted at one location representative of the ambient environment surrounding the project site. The selected monitoring location is shown in **Figure 1** and is considered representative of surrounding residential receivers as per Fact Sheet B1.1 of the NPI.

The unattended noise survey was conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics – Description and Measurement of Environmental Noise".

The measurements were carried out using one Svantek 977 noise analyser from Thursday 6 February 2025 to Monday 17 February 2025. The acoustic instrumentation used carries current NATA calibration and complies with AS/NZS IEC 61672.1-2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA. All equipment carries appropriate and current NATA (or manufacturer) calibration certificates with records of all calibrations maintained by MAC as per the EPA's Approved Methods for the measurement and analysis of environmental noise in NSW (EPA, 2022).

The results of long-term unattended noise monitoring are provided in **Table 5**. The noise monitoring charts for the background monitoring assessment are provided in **Appendix B**. Data affected by adverse meteorological conditions have been excluded from the results in accordance with methodologies provided in Fact Sheet A4 of the NPI.

Table 5 Background Noise Monitoring Summary – L01						
Date	Measured Background Noise Level (LA90) dB ABL[1]			Measured Ambient Noise Level dB LAeq(period)		
	Day	Evening	Night	Day	Evening	Night
Thursday 6 February 2025	N/A	38	40	N/A	48	52
Friday 7 February 2025	38	38	39	48	46	55
Saturday 8 February 2025	35	38	38	47	48	52
Sunday 9 February 2025	34	38	38	49	51	55
Monday 10 February 2025	38	36	39	57	46	57
Tuesday 11 February 2025	36	35	40	52	48	55
Wednesday 12 February 2025	38	38	40	50	48	55
Thursday 13 February 2025	42	40	40	56	48	55
Friday 14 February 2025	39	37	38	50	47	53
Saturday 15 February 2025	38	36	38	50	49	53
Sunday 16 February 2025	40	41	42	52	50	53
L01 – RBL / Leq Overall	**38**	**38**	**39**	**52**	**48**	**54**

Note 1: Assessment background level (ABL) – the single-figure background level representing each assessment period day, evening and night as per NPI Fact Sheet A.

Note 2: Excludes periods of wind or rain affected data. Meteorological data obtained from the Bureau of Meteorology weather station Williamtown RAAF, NSW. Site no. 61078.

Note 3: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

4.2 Attended Noise Monitoring

To supplement the unattended noise assessment and to quantify the changes in ambient noise in the community surrounding the operation, one 15 minute attended measurement was completed.

The attended noise survey was conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics – Description and Measurement of Environmental Noise".

The acoustic instrumentation used carries current NATA calibration and complies with AS/NZS IEC 61672.1-2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA. All equipment carries appropriate and current NATA (or manufacturer) calibration certificates with records of all calibrations maintained by MAC as per the EPA's Approved Methods for the measurement and analysis of environmental noise in NSW (EPA, 2022).

The attended noise monitoring was conducted using one Svantek 971 noise analyser at the site (see **Figure 1**) on Thursday 6 February 2025 to quantify ambient background noise levels.

The attended measurement was completed during calm and clear meteorological conditions and confirmed that ambient rural noise, traffic and industrial noise dominated the surrounding environment. The results of the short-term noise measurement and observations are summarised in **Table 6**.

Table 6 Operator-Attended Noise Survey Results

Date/Time (hrs)	Noise Descriptor (dB re 20µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
06/02/2025 12:27	65	45	39	WD: NE WS: 1.5m/s 30°C	Traffic 36-54 Wind in vegetation 36-42 Birds 36-65 Insects 36-46 Industrial noise <40

4.3 NPI Receiver Type

Classification of residential receivers in the surrounding area have been determined by review of the measured RBLs and a tally of the features for each category described in Table 2.3 of the NPI. The overall tally of features and resulting classifications are provided in **Table 7**. The detailed assessment of receiver categories is provided in **Appendix C.** This classification is used in conjunction with the intrusiveness criteria to determine the limiting criteria.

Table 7 Determination of NPI Residential Receiver Category

Location	Rural	Suburban	Urban
L01	1	6	10

Observations at locations in the surrounding locality support the assessment of the receiver categories where industrial noise, traffic and natural sounds were audible, supporting the residential receiver category determinations as urban.

5 Assessment Criteria

5.1 Operational Noise Trigger Levels (Criteria)

This section outlines the determination of PNTLs and Maximum Noise Assessment Trigger Levels in accordance with NPI methodology.

5.1.1 Intrusiveness Noise Levels

The PINL for the project are presented in **Table 8** and have been determined based on the RBL +5dBA and only apply to residential receivers.

Table 8 Project Intrusiveness Noise Levels

Location	Receiver Type	Period[1]	Measured RBL dB L_{A90}	Adopted RBL dB L_{A90}	PINL dB $L_{Aeq(15min)}$
L01	Urban	Day	38	38	43
		Evening	38	38	43
		Night	39	38[2]	43

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: As per NPI night RBL cannot be higher than evening.

5.1.2 Amenity Noise Levels and Project Amenity Noise Levels

The PANL for residential receivers and other receiver types (ie non-residential) potentially affected by the project are presented in **Table 9.** The residential receiver category for each NCA is determined from the applicable land zoning as per Table 2.3 of the NPI (ref to **Table 2**).

Table 9 Amenity Noise Levels and Project Amenity Noise Levels

Receiver Type	Noise Amenity Area	Assessment Period[1]	NPI Recommended ANL dB $L_{Aeq(period)}$	ANL dB $L_{Aeq(period)}$[2]	PANL dB $L_{Aeq(15min)}$[3]
Residential	Urban	Day	60	55	58
		Evening	50	45	48
		Night	45	40	43
Industrial	All	When in use	70	65	68

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: Project Amenity Noise Level equals the Amenity Noise Level -5dB as there is other industry in the area.

Note 3: Includes a +3dB adjustment to the amenity period level to convert to a 15-minute assessment period as per Section 2.2 of the NPI.

5.1.3 Project Noise Trigger Levels

The PNTL are the lower of either the PINL or the PANL. **Table 10** presents the derivation of the PNTLs in accordance with the methodologies outlined in the NPI.

Table 10 Project Noise Trigger Levels

Receiver Type	Noise Amenity Area	Assessment Period[1]	PINL dB $L_{Aeq(15min)}$	PANL dB $L_{Aeq(15min)}$[2]	PNTL dB $L_{Aeq(15min)}$[3]
Residential	Urban	Day	43	58	43
		Evening	43	48	43
		Night	43	43	43
Industrial	All	When in Use	N/A	68	68

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: Project Amenity Noise Level equals the Amenity Noise Level -5dB as there is other industry in the area.

Note 3: Includes a +3dB adjustment to the amenity period level to convert to a 15-minute assessment period as per Section 2.2 of the NPI.

5.1.4 Maximum Noise Trigger Levels

The maximum noise trigger levels shown in **Table 11** are based on night time RBLs and trigger levels as per Section 2.5 of the NPI. The trigger levels will be applied to transient noise events that have the potential to cause sleep disturbance.

Table 11 Maximum Noise Trigger Levels (Night)

Residential Receivers			
$L_{Aeq(15min)}$		L_{Amax}	
40dB $L_{Aeq(15min)}$ or RBL + 5dB		52dB L_{Amax} or RBL + 15dB	
Trigger	40	Trigger	52
RBL +5dB	43	RBL +15dB	53
Highest	**43**	**Highest**	**53**

Note: Monday to Saturday; Night 10pm to 7am. On Sundays and Public Holidays Night 10pm to 8am.

Note: NPI identifies that maximum of the two values is to be adopted which is shown in bold font.

5.2 Construction Noise Management Levels

The relevant Noise Management Levels (NMLs) for standard construction hours are presented in Table 12.

Table 12 Construction Noise Management Levels

Catchment (No) Receiver ID	Assessment Period[1]	Adopted RBL dB LA_{90}	NML dB $LA_{eq(15min)}$
Rural Residential	Standard Hours	38	48 (RBL+10dBA)
Industrial Premises	When in use	N/A	75 (external)

Note 1: Refer to Table 3 for Standard Recommended Hours for Construction.

Note 2: External level based on 10dB with windows open for adequate ventilation (ICNG).

This page has been intentionally left blank

6 Modelling Methodology

A computer model was developed to quantify project noise emissions to neighbouring receivers using DGMR (iNoise, Version 2024) noise modelling software. iNoise is an intuitive and quality assured software for industrial noise calculations in the environment. 3D noise modelling is considered industry best practice for assessing noise emissions from projects.

The model incorporated a three-dimensional digital terrain map giving all relevant topographic information used in the modelling process. Additionally, the model uses relevant noise source data, ground type, attenuation from barrier or buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers. Where relevant, modifying factors in accordance with Fact Sheet C of the NPI have been applied to calculations.

The model calculation method used to predict noise levels was in accordance with ISO 9613:1 and ISO 9613:2 including corrections for meteorological conditions using CONCAWE[1]. The ISO 9613 standards are the most used noise prediction method worldwide. Many countries refer to ISO 9613 in their noise legislation. However, the ISO 9613 standard does not contain guidelines for quality assured software implementation, which leads to differences between applications in calculated results. In 2015 this changed with the release of ISO/TR 17534-3. This quality standard gives clear recommendations for interpreting the ISO 9613 method. iNoise fully supports these recommendations. The models and results for the 19 test cases are included in the software.

[1] Report no. 4/18, "the propagation of noise from petroleum and petrochemical complexes to neighbouring communities", Prepared by C.J. Manning, M.Sc., M.I.O.A. Acoustic Technology Limited (Ref.AT 931), CONCAWE, Den Haag May 1981

6.1 Sound Power Levels

Table 13 presents the sound power level for each noise source modelled in this assessment. It is noted that sound power levels were sourced from manufacturer's specifications or from in-field measurements at similar project sites.

Table 13 Acoustically Significant Sources - Sound Power Levels dBA (re 10^{-12} Watts)

Item and number modelled per 15 minutes	Individual Sound Power Level	Modelled Sound Power Level dB LAeq(15min)	Source Height[1] (m)
Operation			
Dry Cooler Fan 1.2MW (x10)	83	93	2.5
Generator Aurelia A400 (x1)	93	93	3.0
Forklift (3t) (x1)	106	106	0.75
Maximum Noise Level Assessment (L_{Amax}), Night time periods (10pm to 7am)[2]			
Door Slam		92	1.5
Construction			
Cumulative Construction Activities		108	2.0

Note 1: Height above the relative ground or building below source.

Note 2: Impact is representative of a LAmax transient event.

6.2 Mitigation Included in Design and Noise Control Recommendations

The following mitigation and design measured were adopted for the assessment;

- the project is constructed as per the site design and plans, which includes attenuation provided by the project building orientation as shown in **Appendix D**;
- a sound power level of 83dBA was adopted to represent each dry cooling fan for the associated charring plant as provided by the data specification sheet;
- a sound power level of 93dBA was adopted for the generator as provided by the data specification sheet;
- it is proposed that all plant activities are operating 24 hours a day, seven (7) days a week; and
- a review of plant sound power levels indicates that key noise sources are broadband in nature, hence do not contain low frequency or tonal elements that would trigger application of NPI modifying factors. Notwithstanding, it is recommended that on commissioning attended noise measurements be conducted to validate compliance with noise criteria.

6.3 Meteorological Analysis

Noise emissions can be influenced by prevailing weather conditions. Light stable winds (<3m/s) and temperature inversions have the potential to increase noise at a receiver.

Fact Sheet D of the NPI provides two options when considering meteorological effects:

- adopt the noise enhancing conditions for all assessment periods without an assessment of how often the conditions occur – a conservative approach that considers a source to receiver winds for all receivers and F class temperature inversions with wind speeds up to 2m/s at night; or
- determine the significance of noise enhancing conditions. This requires assessing the significance of temperature inversions (F and G Class stability categories) for the night time period and the significance of light winds up to 3m/s for all assessment periods during stability categories other than E, F or G.

Standard meteorological conditions and noise-enhancing meteorological conditions as defined in Table D1of the NPI are reproduced in **Table 14**.

Table 14 Standard and Noise-Enhancing Meteorological Conditions

Meteorological Conditions	Meteorological Parameters
Standard Meteorological Conditions	Day/evening/night: stability categories A–D with wind speed up to 0.5m/s at 10m AGL.
Noise Enhancing Meteorological Conditions	Daytime/evening: stability categories A–D with light winds (up to 3 m/s at 10m AGL). Night-time: stability categories A–D with light winds (up to 3m/s at 10m AGL) and/or stability category F with winds up to 2m/s at 10 m AGL.

A detailed analysis of the significance of noise enhancing conditions has not been undertaken and hence, the NPI noise enhancing meteorological conditions have been applied to the noise modelling assessment are presented in **Table 15**.

Table 15 Modelled Meteorological Parameters

Assessment Condition[1]	Temperature	Wind Speed[2]/ Direction	Relative Humidity	Stability Class[2]
Day	20°C	0.5m/s all directions	50%	D
Evening	10°C	3m/s all directions	50%	D
Night	10°C	2m/s all directions	50%	F

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 2: Implemented using CONCAWE meteorological corrections.

7 Noise Assessment Results

This assessment has quantified operational noise levels at the nearest receivers.

7.1 Operational Noise Assessment

Noise predictions from all sources have been quantified at surrounding residential receivers to the project site and are presented in **Table 16**.

Table 16 Noise Predictions – All Receivers

Receiver	Period[1]	Predicted Noise Level dB LAeq(15min)	PNTL dB LAeq(15min)	Compliant
R01	Day/Evening/Night	<35/36/36	43/43/43	✓
R02	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R03	Day/Evening/Night	39/40/40	43/43/43	✓
R04	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R05	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R06	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R07	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R08	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R09	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R10	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R11	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R12	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R13	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R14	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R15	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R16	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R17	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R18	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R19	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R20	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R21	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R22	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R23	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R24	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R25	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R26	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R27	Day/Evening/Night	<35/<35/<35	43/43/43	✓
R28	Day/Evening/Night	<35/<35/<35	43/43/43	✓

Table 16 Noise Predictions – All Receivers				
Receiver	Period[1]	Predicted Noise Level dB LAeq(15min)	PNTL dB LAeq(15min)	Compliant
I01	Day	<35	68	✓
I02	Day	<35	68	✓
I03	Day	<35	68	✓
I04	Day	<35	68	✓
I05	Day	<35	68	✓
I06	Day	<35	68	✓
I07	Day	<35	68	✓
I08	Day	<35	68	✓
I09	Day	<35	68	✓

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

7.1.1 Maximum Noise Level Assessment

In assessing maximum noise events, typical L_{Amax} noise levels from transient events were assessed at the nearest residential receivers. For the maximum noise level assessment, a sound power level of 92dBA representative of a door slam was adopted for maximum noise level (L_{Amax}) events during the night period. Predicted noise levels from L_{Amax} events for assessed receivers are presented in **Table 17.** Results identify that the maximum noise trigger levels will be satisfied for all assessed receivers.

Table 17 Maximum Noise Level Assessment (Night)[1]

Receiver	Predicted Noise Level dB LAmax	Maximum Trigger Levels dB LAmax	Compliant
R01	<35	53	✓
R02	<35	53	✓
R03	<35	53	✓
R04	<35	53	✓
R05	<35	53	✓
R06	<35	53	✓
R07	<35	53	✓
R08	<35	53	✓
R09	<35	53	✓
R10	<35	53	✓
R11	<35	53	✓
R12	<35	53	✓
R13	<35	53	✓
R14	<35	53	✓
R15	<35	53	✓
R16	<35	53	✓
R17	<35	53	✓
R18	<35	53	✓
R19	<35	53	✓
R20	<35	53	✓
R21	<35	53	✓
R22	<35	53	✓
R23	<35	53	✓
R24	<35	53	✓
R25	<35	53	✓
R26	<35	53	✓
R27	<35	53	✓
R28	<35	53	✓

Note 1: Monday to Saturday; Night 10pm to 7am. On Sundays and Public Holidays Night 10pm to 8am.

7.2 Construction Noise Assessment

Table 18 presents the results of modelled construction noise emissions. Predictions identify that emissions from construction have the potential to be above the noise management levels at one location (R03). Accordingly, recommendations to reduce the impact of construction noise emissions on surrounding receivers are provided in Section 8.

Table 18 Construction Noise Levels – All Receivers

Receiver	Period[1]	Predicted Noise Level dB $L_{Aeq(15min)}$	Management Level dB $L_{Aeq(15min)}$
R01	Day	45	48
R02	Day	41	48
R03	Day	55	48
R04	Day	41	48
R05	Day	32	48
R06	Day	32	48
R07	Day	30	48
R08	Day	30	48
R09	Day	32	48
R10	Day	24	48
R11	Day	34	48
R12	Day	32	48
R13	Day	34	48
R14	Day	34	48
R15	Day	44	48
R16	Day	33	48
R17	Day	37	48
R18	Day	42	48
R19	Day	40	48
R20	Day	38	48
R21	Day	34	48
R22	Day	31	48
R23	Day	31	48
R24	Day	31	48
R25	Day	31	48
R26	Day	31	48
R27	Day	32	48
R28	Day	32	48
I01	Day	47	75

Table 18 Construction Noise Levels – All Receivers			
Receiver	Period[1]	Predicted Noise Level dB $L_{Aeq(15min)}$	Management Level dB $L_{Aeq(15min)}$
I02	Day	39	75
I03	Day	37	75
I04	Day	45	75
I05	Day	44	75
I06	Day	44	75
I07	Day	38	75
I08	Day	33	75
I09	Day	33	75

Note 1: See Table 3 for Recommended Standard Hours for Construction.

This page has been intentionally left blank

8 Construction Recommendations

The results of the Noise Assessment demonstrate that levels during standard construction hours are above the ICNG Noise Management Levels at several of the nearest receivers surrounding the project. Accordingly, it is recommended that noise management and mitigation measures be adopted during noise intensive construction activities to limit impacts on surrounding receivers. Recommendations for consideration during construction activities for this project may include:

- implement boundary fences/retaining walls as early as possible to maximise their attenuation benefits to surrounding receivers;
- toolbox and induction of personnel prior to shift to discuss noise control measures that may be implemented to reduce noise emissions to the community;
- where possible use mobile screens or construction hording to act as barriers between construction works and receivers;
- all plant should be shut down when not in use. Plant to be parked/started at farthest point from relevant assessment locations;
- operating plant in a conservative manner (no over-revving);
- selection of the quietest suitable machinery available for each activity;
- avoidance of noisy plant/machinery working simultaneously where practicable;
- minimisation of metallic impact noise;
- all plant are to utilise a broadband reverse alarm in lieu of the traditional hi frequency type reverse alarm; and
- undertake letter box drops to notify receivers of potential works.

This page has been intentionally left blank

9 Discussion and Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Assessment (NA) to quantify emissions from the proposed BioCarbon Processing Facility located at 11 Markwell Road, Bulahdelah, NSW.

The assessment has quantified potential noise emissions pertaining to operation and construction of a fixed woodchip charring plant and storage shed.

The results of the NA demonstrate that noise emissions from the operation would satisfy the relevant PNTLs at all assessed receivers for all assessment periods once noise controls for the project are implemented (see Section 6.2):

- the project is constructed as per the site design and plans, which includes attenuation provided by the project building orientation as shown in Appendix D;
- a sound power level of 83dBA was adopted to represent each dry cooling fan for the associated charring plant as provided by the data specification sheet;
- a sound power level of 93dBA was adopted for the generator as provided by the data specification sheet;
- it is proposed that all plant activities are operating 24 hours a day, seven (7) days a week; and
- a review of plant sound power levels indicates that key noise sources are broadband in nature, hence do not contain low frequency or tonal elements that would trigger application of NPI modifying factors. Notwithstanding, it is recommended that on commissioning attended noise measurements be conducted to validate compliance with noise criteria.

Furthermore, sleep disturbance is not anticipated, as emissions from maximum noise events (ie impact noise) are predicted to satisfy the NPIs maximum noise trigger levels.

Modelled noise emissions from construction activities identify that predicted noise emissions are above the applicable construction management levels at one residential receiver (R03). Therefore, noise management measures are provided in this report to reduce potential impacts on surrounding receivers.

Accordingly, the Noise Assessment supports the Development Application for the project incorporating the recommendations and controls outlined in this report.

This page has been intentionally left blank

Appendix A – Glossary of Terms

A number of technical terms have been used in this report and are explained in **Table A1**.

Table A1 Glossary of Acoustical Terms

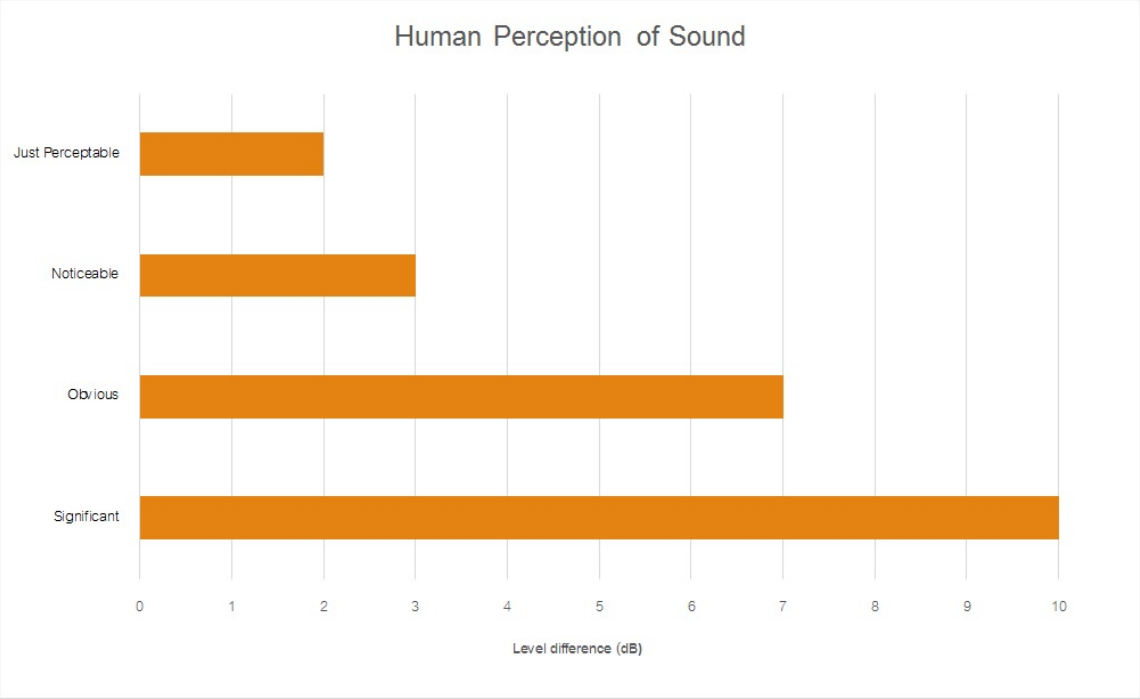
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L90 statistical noise levels.
Ambient Noise	The total noise associated with a given environment. Typically, a composite of sounds from all sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to sound.
Background Noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is usually represented by the LA90 descriptor
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z), dB(L)	Decibels Z-weighted or decibels Linear (unweighted).
Extraneous Noise	Sound resulting from activities that are not typical of the area.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A sound level which is exceeded 10% of the time.
LA90	Commonly referred to as the background noise, this is the level exceeded 90% of the time.
LAeq	Represents the average noise energy or equivalent sound pressure level over a given period.
LAmax	The maximum sound pressure level received at the microphone during a measuring interval.
Masking	The phenomenon of one sound interfering with the perception of another sound. For example, the interference of traffic noise with use of a public telephone on a busy street.
RBL	The Rating Background Level (RBL) as defined in the NPI, is an overall single figure representing the background level for each assessment period over the whole monitoring period. The RBL, as defined is the median of ABL values over the whole monitoring period.
Sound power level (Lw or SWL)	This is a measure of the total power radiated by a source in the form of sound and is given by 10.log10 (W/Wo). Where W is the sound power in watts to the reference level of 10^{-12} watts.
Sound pressure level (Lp or SPL)	the level of sound pressure; as measured at a distance by a standard sound level meter. This differs from Lw in that it is the sound level at a receiver position as opposed to the sound 'intensity' of the source.

Table A2 provides a list of common noise sources and their typical sound level.

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA

Source	Typical Sound Pressure Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound

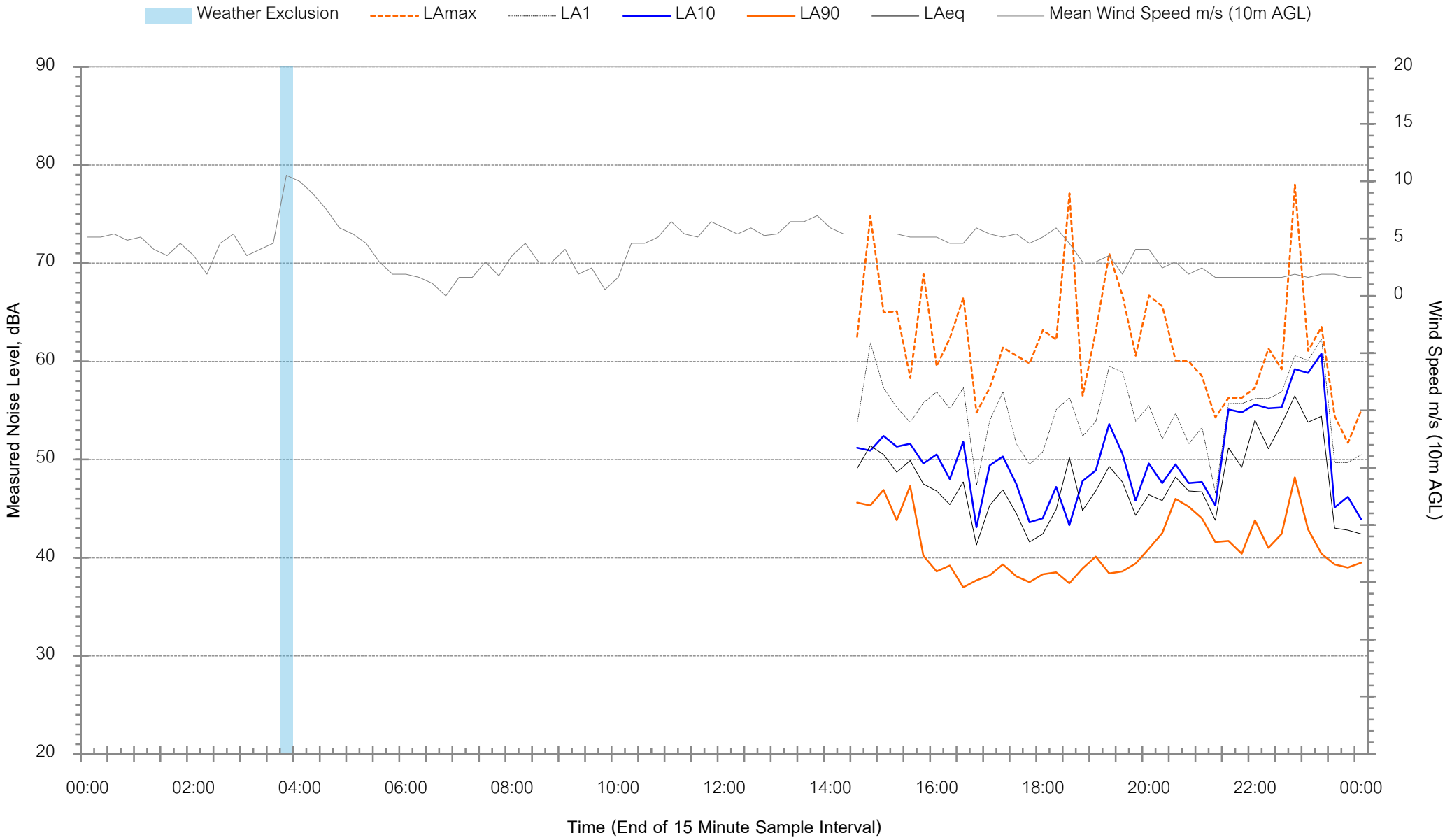


This page has been intentionally left blank

Appendix B – Noise Monitoring Charts

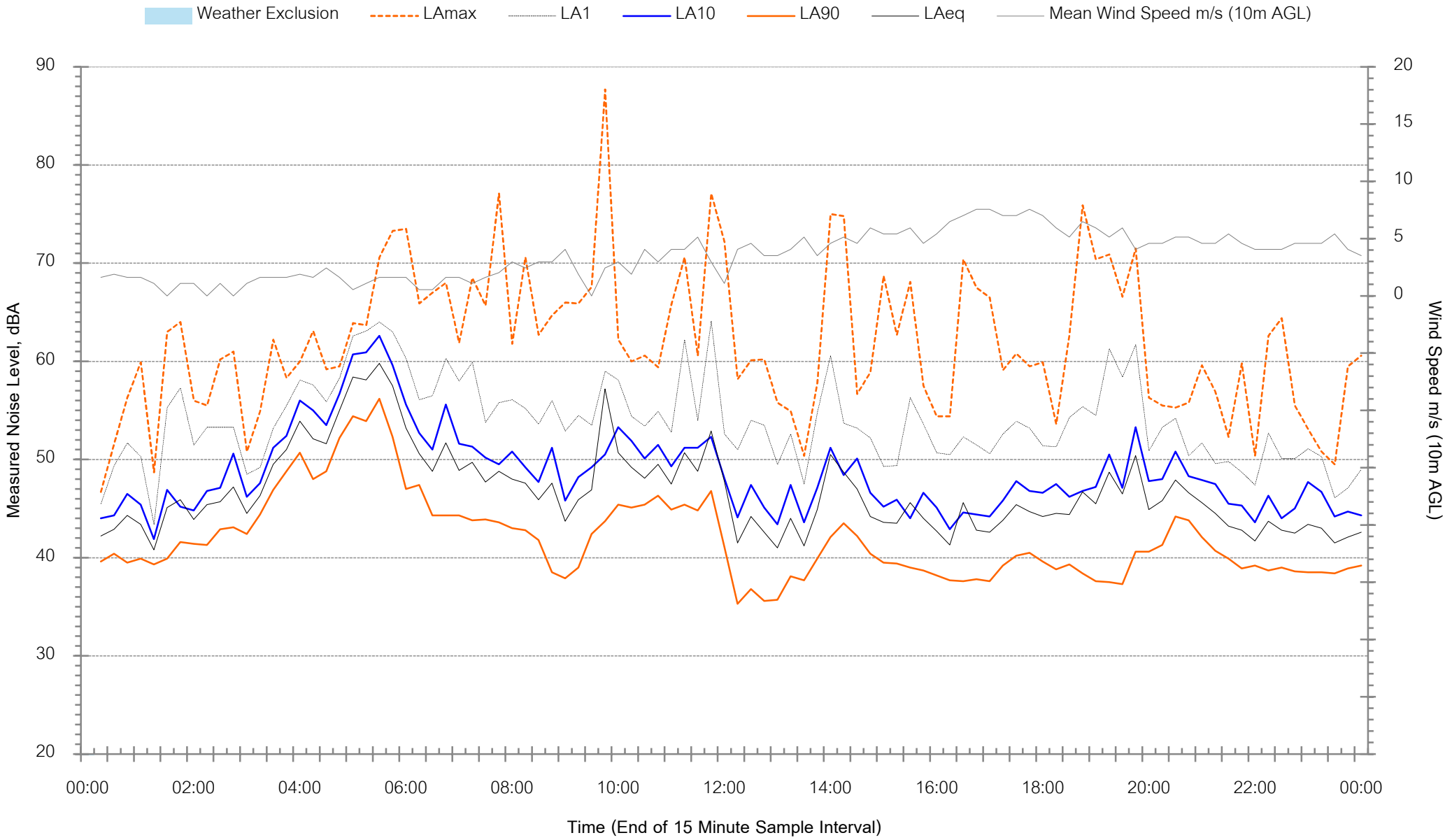
Background Noise Levels

1 Markwell Road, Bulahdelah NSW - Thursday 6 February 2025



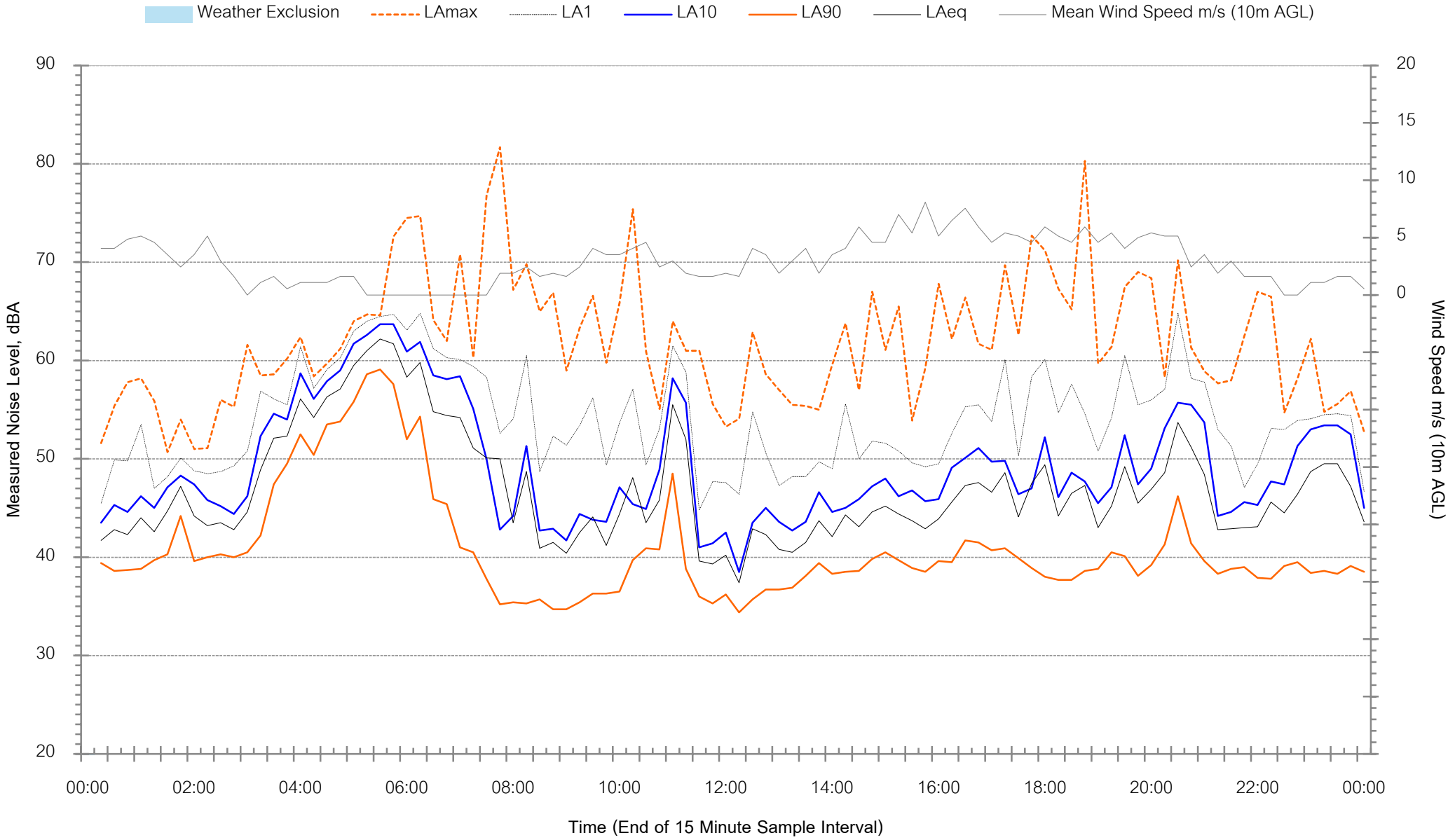
Background Noise Levels

1 Markwell Road, Bulahdelah NSW - Friday 7 February 2025



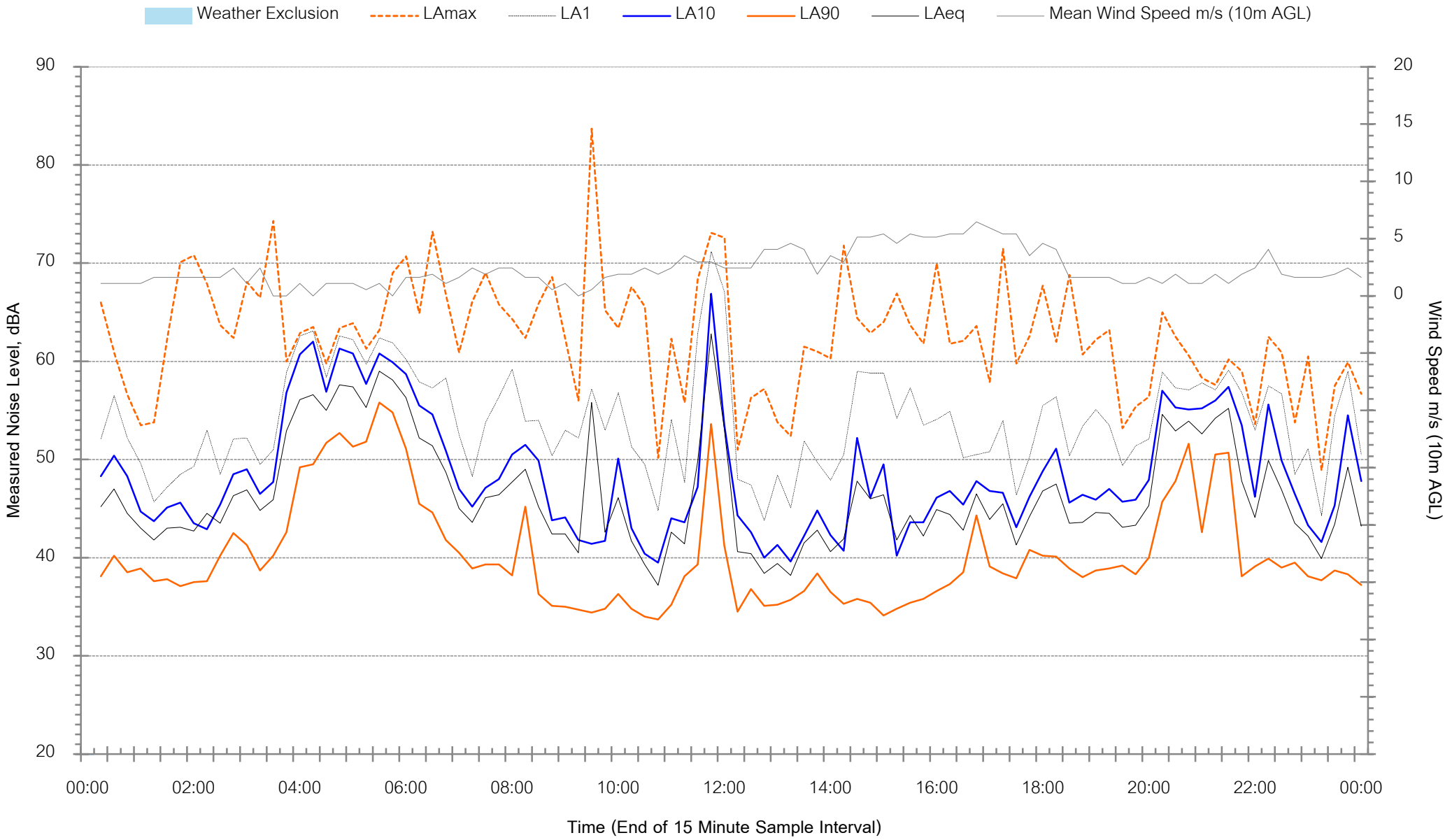
Background Noise Levels

1 Markwell Road, Bulahdelah NSW - Saturday 8 February 2025



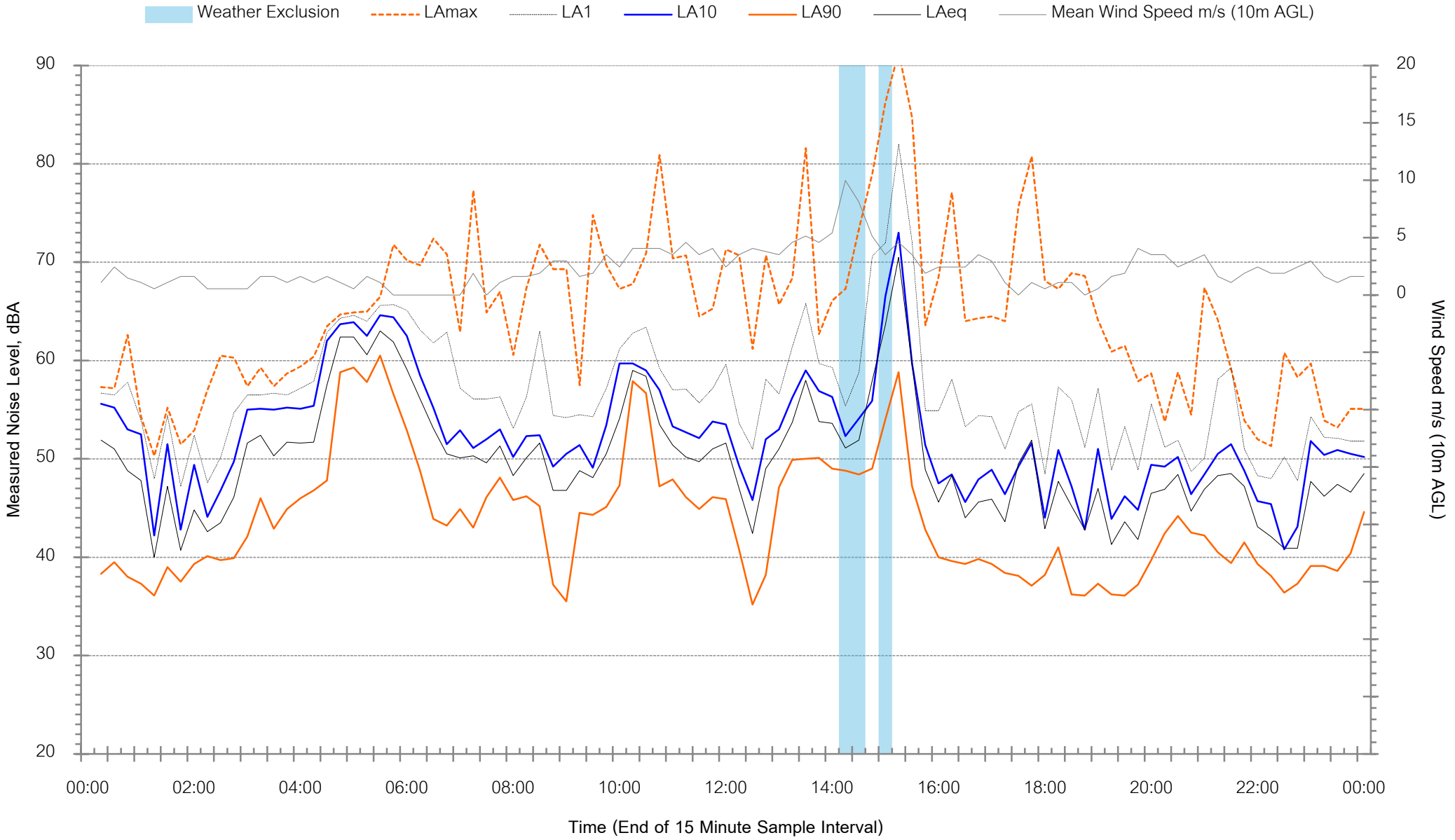
Background Noise Levels

1 Markwell Road, Bulahdelah NSW - Sunday 9 February 2025



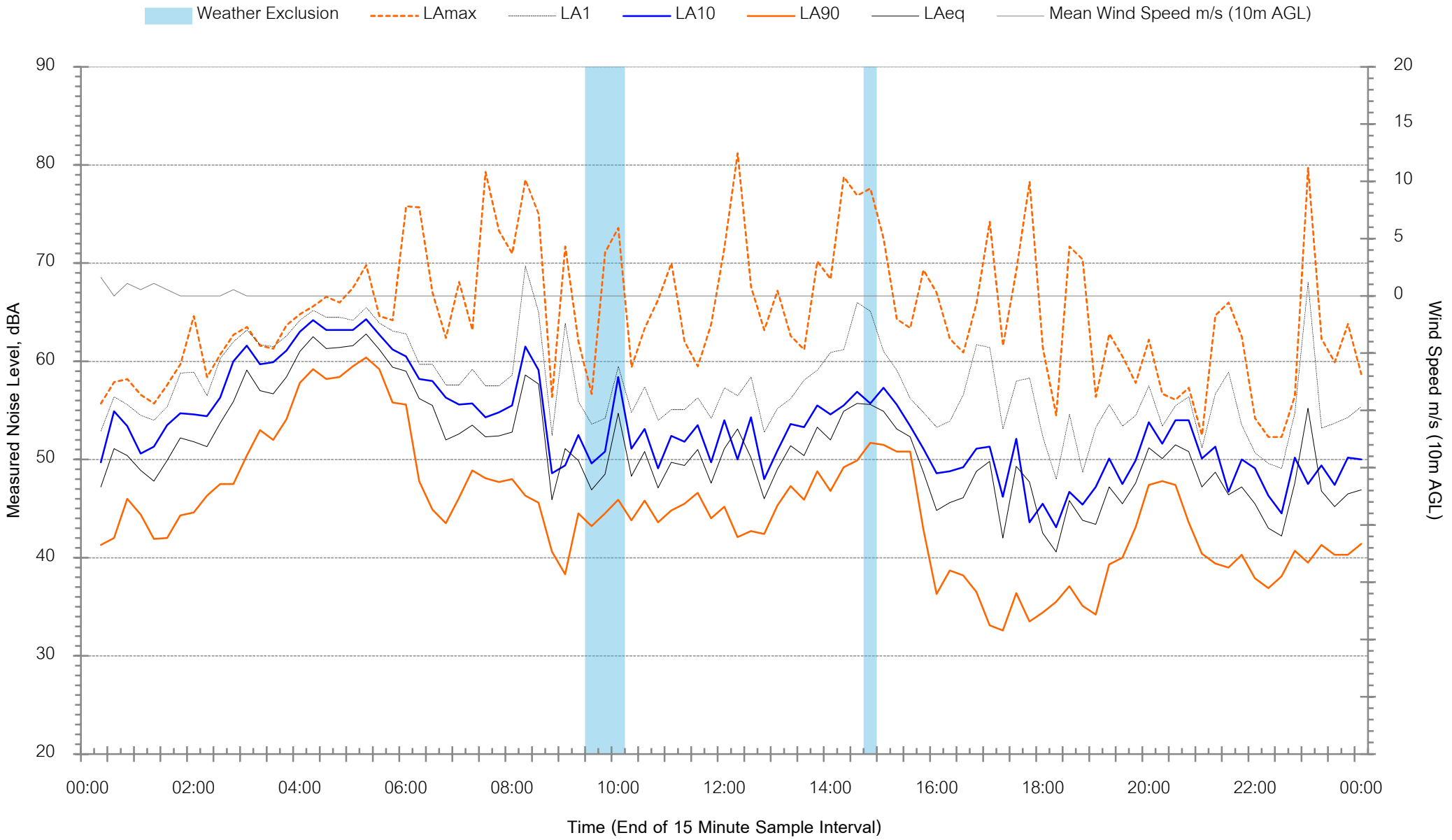
Background Noise Levels

1 Markwell Road, Bulahdelah NSW - Monday 10 February 2025



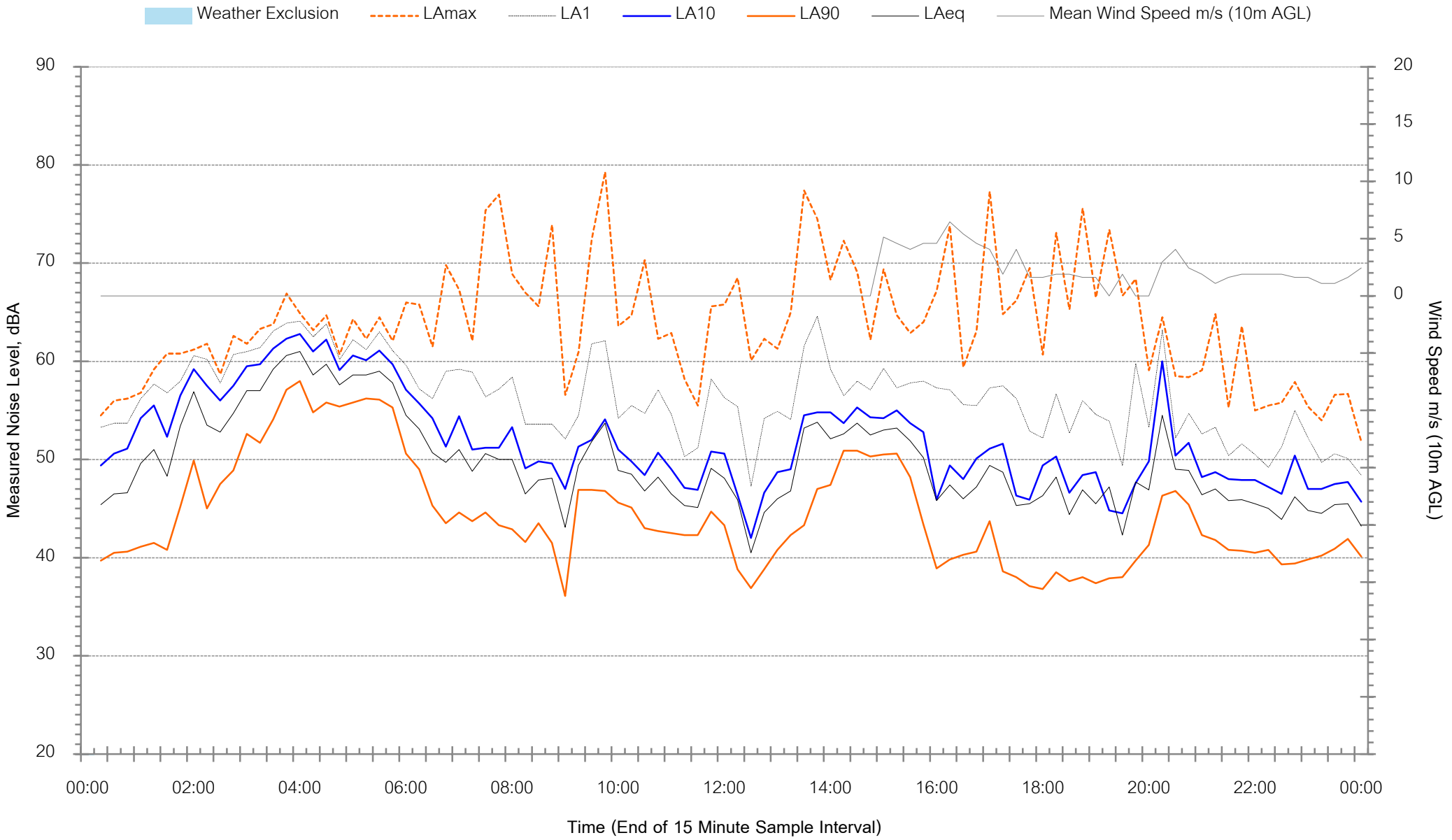
Background Noise Levels

1 Markwell Road, Bulahdelah NSW - Tuesday 11 February 2025



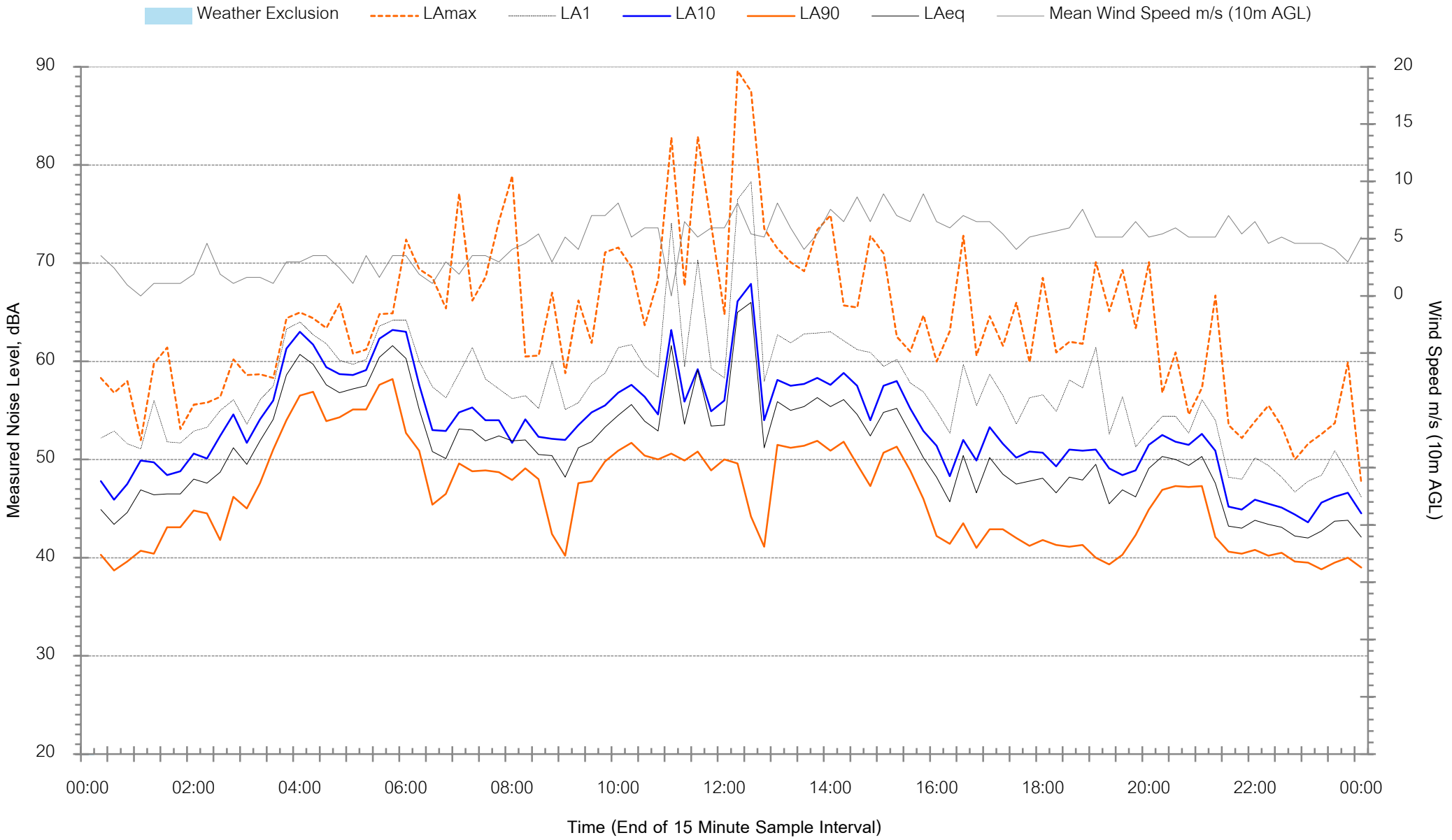
Background Noise Levels

1 Markwell Road, Bulahdelah NSW - Wednesday 12 February 2025



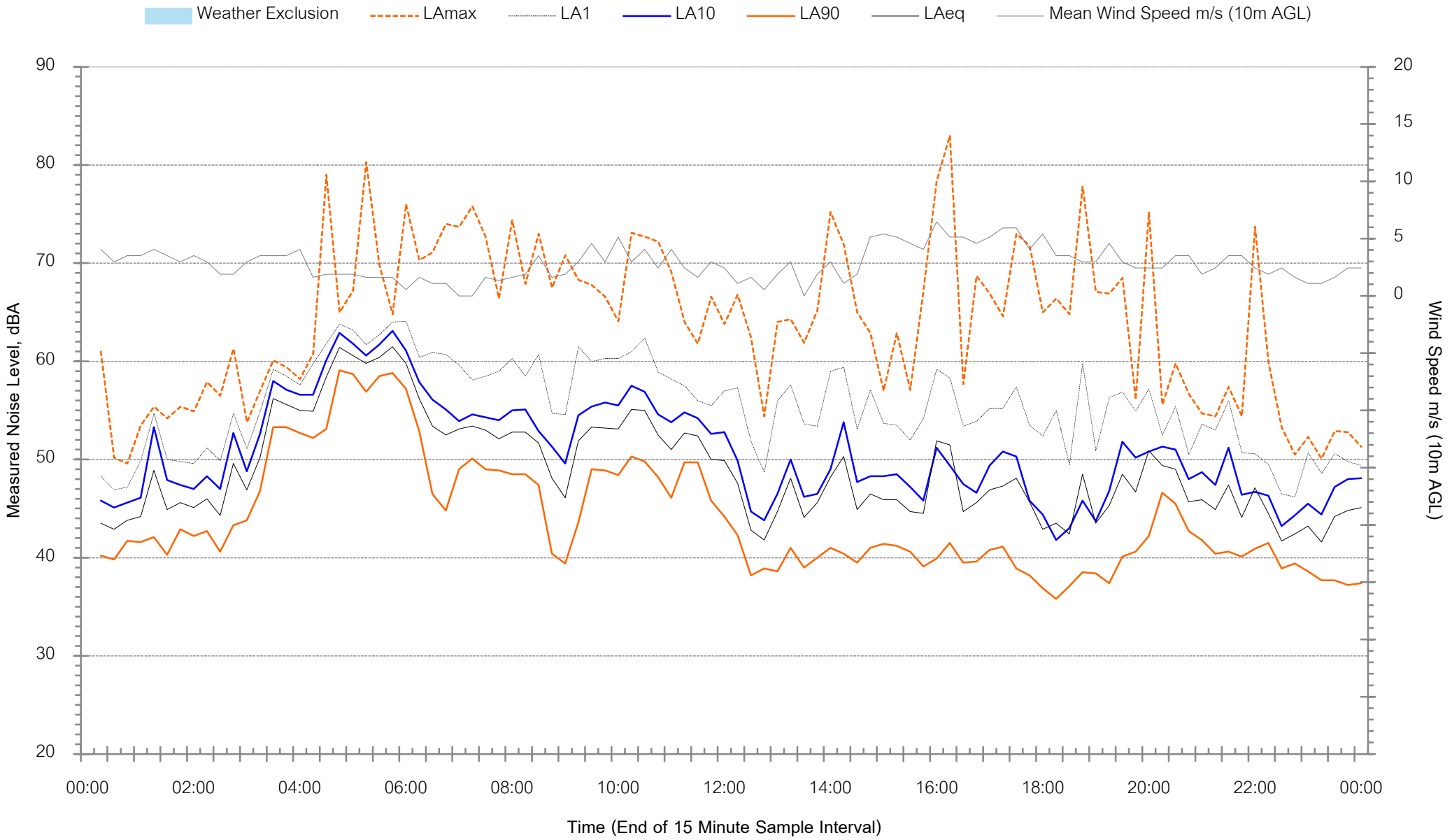
Background Noise Levels

1 Markwell Road, Bulahdelah NSW - Thursday 13 February 2025



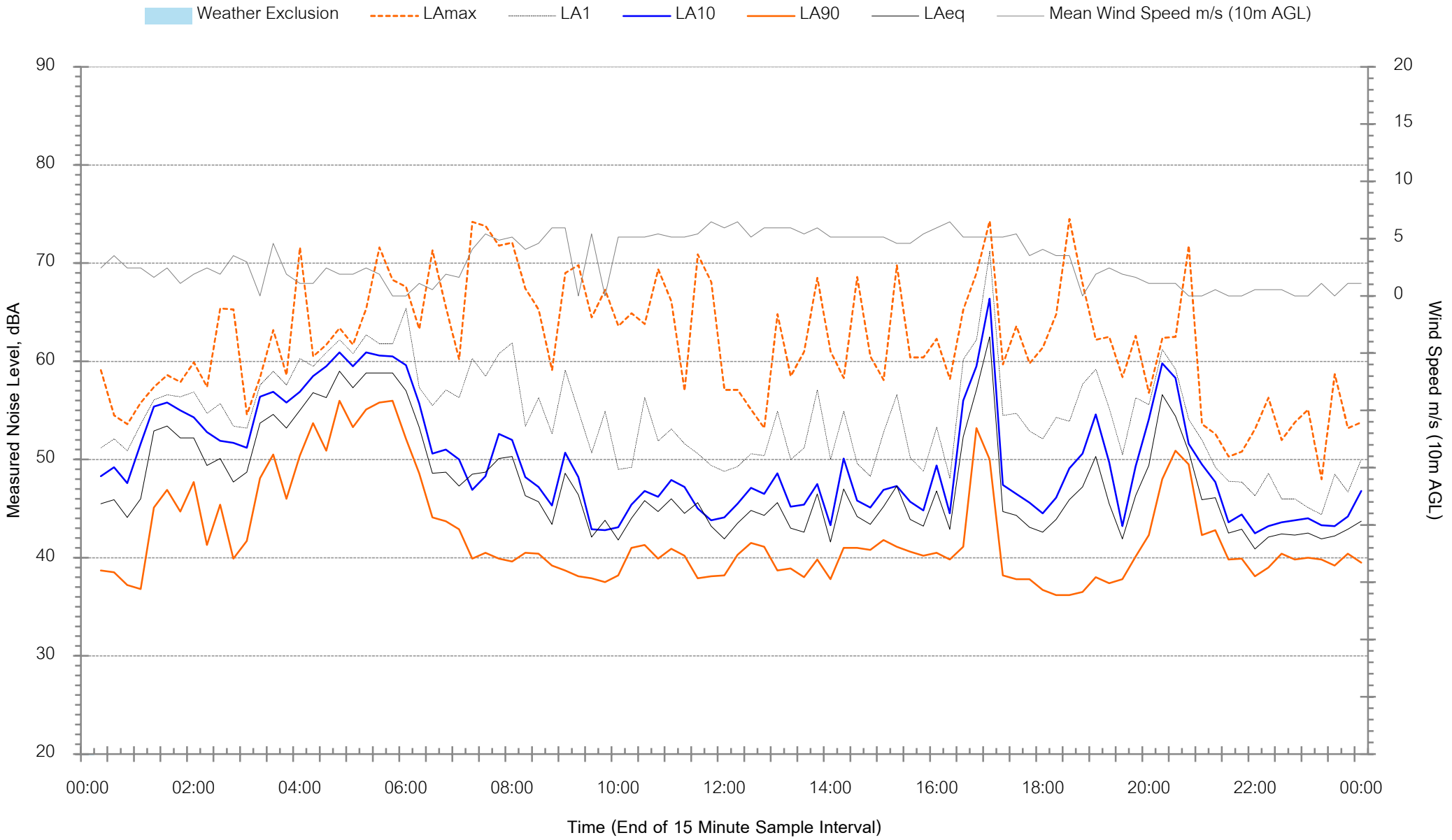
Background Noise Levels

1 Markwell Road, Bulahdelah NSW - Friday 14 February 2025



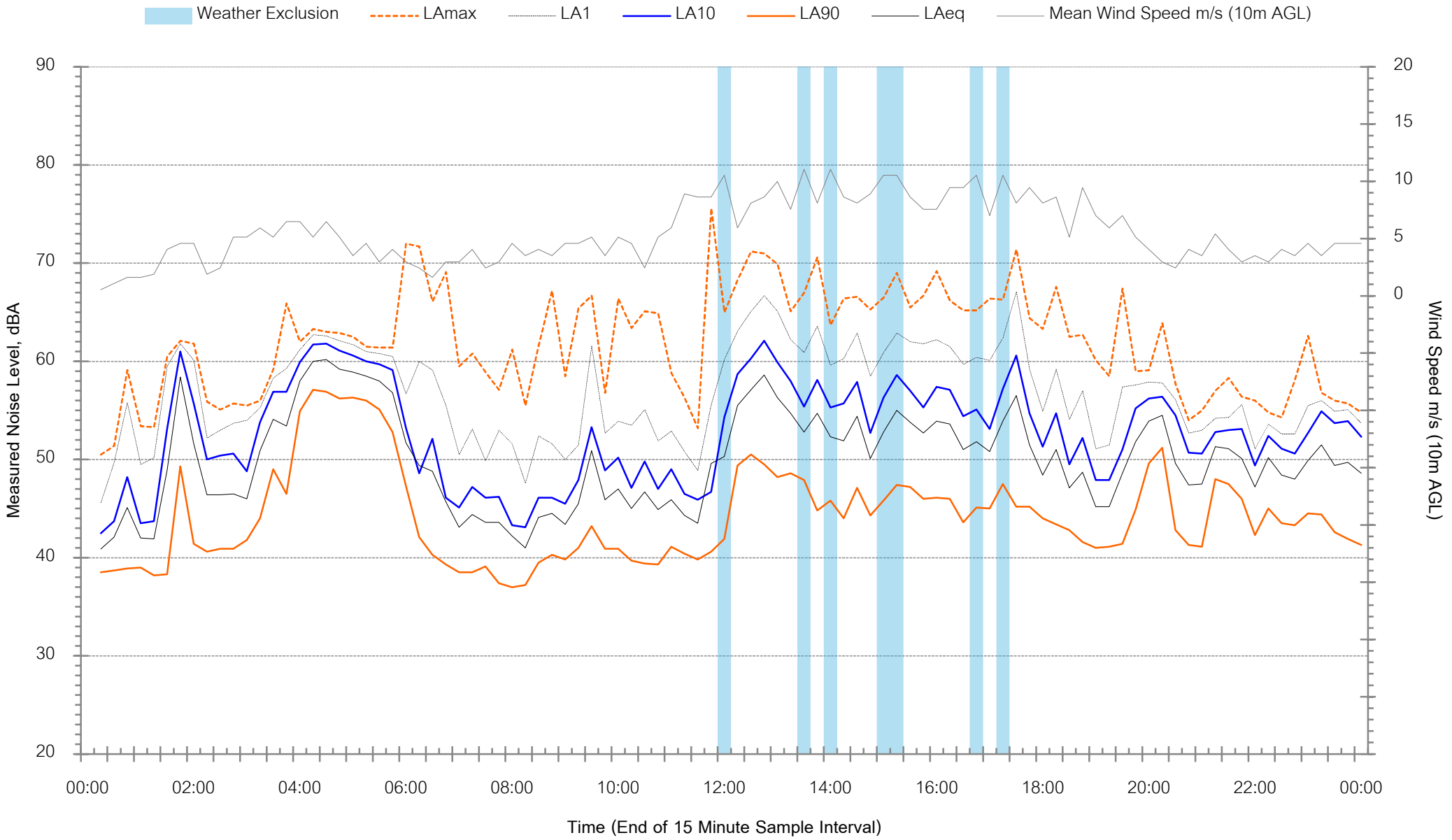
Background Noise Levels

1 Markwell Road, Bulahdelah NSW - Saturday 15 February 2025



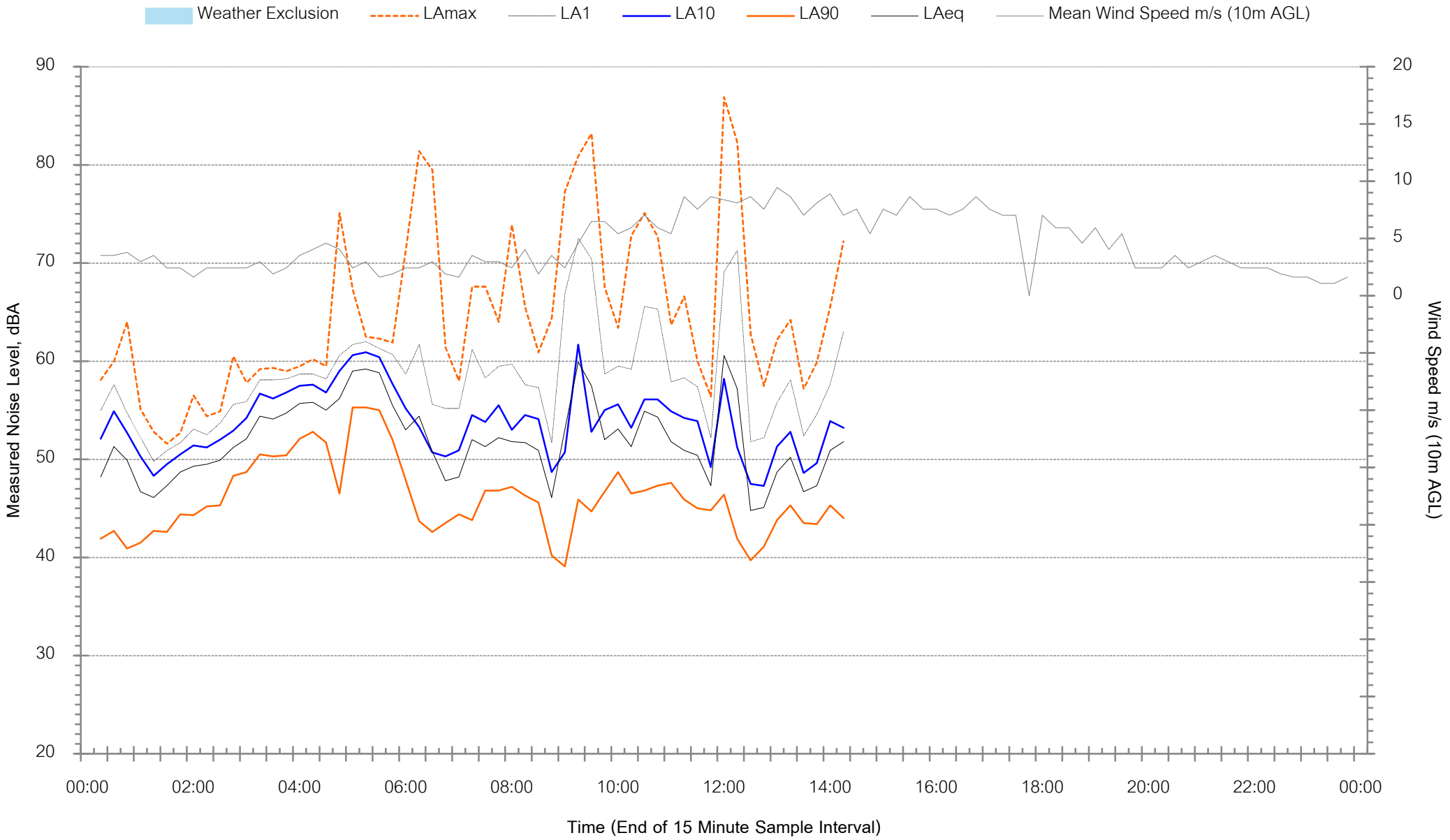
Background Noise Levels

1 Markwell Road, Bulahdelah NSW - Sunday 16 February 2025



Background Noise Levels

1 Markwell Road, Bulahdelah NSW - Monday 17 February 2025



This page has been intentionally left blank

Appendix C – Determination of NPI

Receiver Category

Table C1 - Determination of NPI Residential Receiver Category

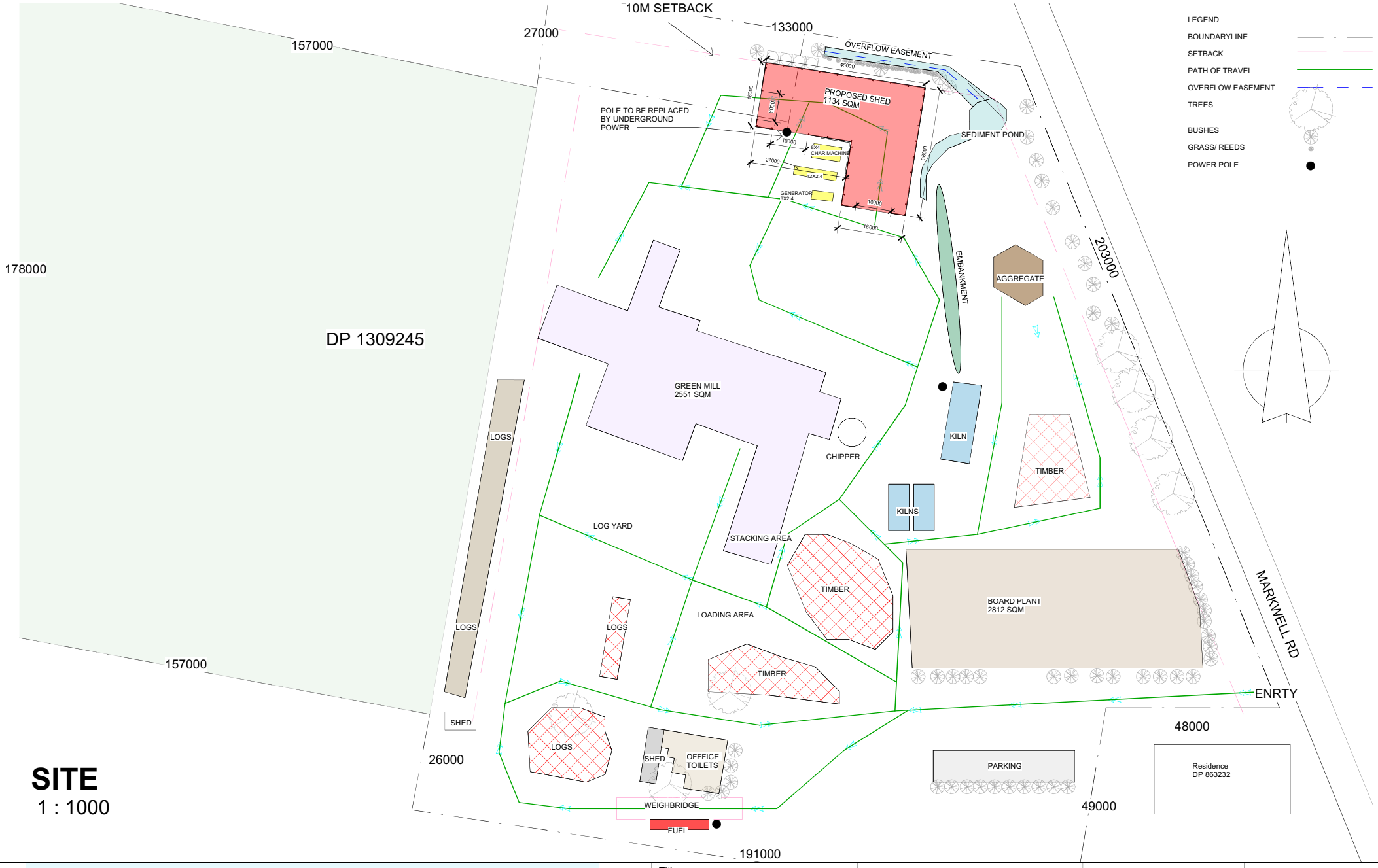
Location/ Catchment	Period	Measured RBL dB LA90(period)	Land Use Zone: RU1, RU2, RU4, R5, E4 (Rural)	Land Use Zone: RU5, RU6, R2, R3, R4, E2, E3 (Suburban)	Land Use Zone: R1, R4, B1, B2, B4 (Urban)	Land Use Zone: Others (Commercial, Industrial)	Typical Existing Background Noise Levels Table 2.3 NPI: RURAL Daytime <40 Eve <35 Night <30	Typical Existing Background Noise Levels Table 2.3 NPI: SUBURBAN Daytime <45 Eve <40 Night <35	Typical Existing Background Noise Levels Table 2.3 NPI: URBAN Daytime >45 Eve >40 Night >35	Rural Residential - an area with an acoustical environment that: is dominated by natural sounds.	Rural Residential: having little or no road traffic noise	Rural Residential: generally characterised by low background noise levels.	Rural Residential: Settlement patterns would be typically sparse	Suburban Residential - an area that has: local traffic with characteristically intermittent traffic flows	Suburban Residential: or with some limited commerce or industry.	Suburban Residential: evening ambient noise levels defined by the natural environment and human activity.	Urban Residential- an area with an acoustical environment that: is dominated by 'urban hum' or industrial source noise	Urban Residential: has through-traffic with characteristically heavy and continuous traffic flows during peak . .	Urban Residential: is near commercial districts or industrial districts	Urban Residential: has any combination of the above
Location 1	Day	38		✓			✓							✓	✓		✓		✓	✓
	Evening	38		✓				✓						✓	✓		✓		✓	✓
	Night	39		✓					✓						✓		✓		✓	✓

where urban hum means the aggregate sound of many unidentifiable, mostly traffic and/or industrial related sound sources

Assessment

Location	Rural	Suburban	Urban	Rural - RBL	Suburban - RBL	Urban - RBL	Rural - Description				Suburban - Description			Urban - Description			
Location 1	1	6	10	1	1	1	0	0	0	0	2	3	0	3	0	3	3

Appendix D – Site Plans

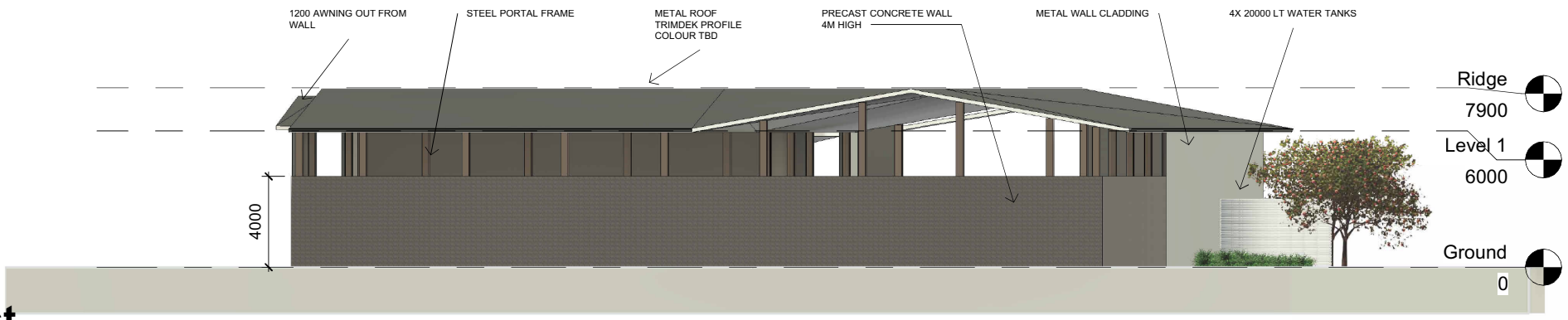


SITE
1 : 1000

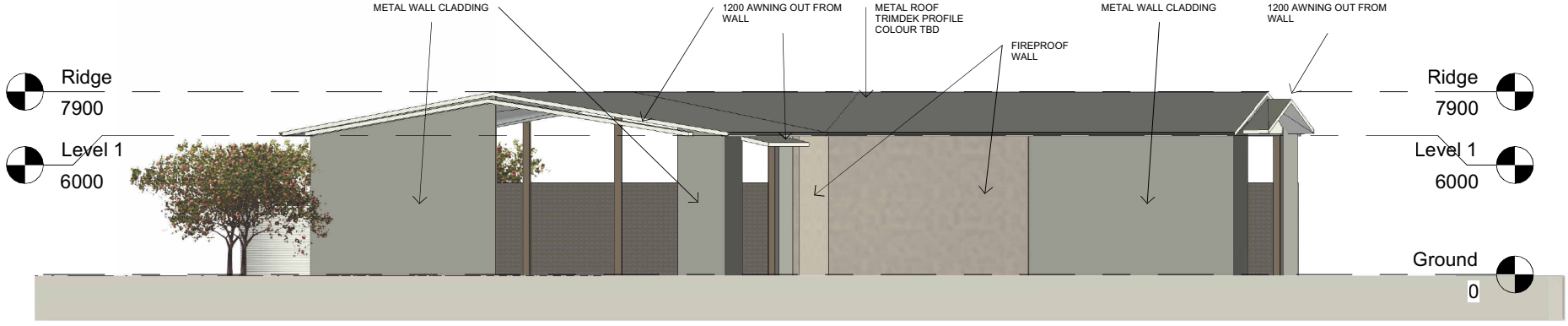
Beachside Drafting and Trade Services
1 The Lakes Way
Elizabeth Beach NSW 2428
0458635237
ABN 21231717780

Title : SITE PLAN	Client : BIOCARBON	CAD : Author	
		Chk'd : Checker	App'd : Approver
Site : 11 MARKWELL ROAD BULADELAH 2423	Project : BioCarbon Shed	Date : 25/11/2024 2:01:45 PM	Scale : 1 : 1000
		Drg. No. D-1	Rev:

A3



East
1 : 200



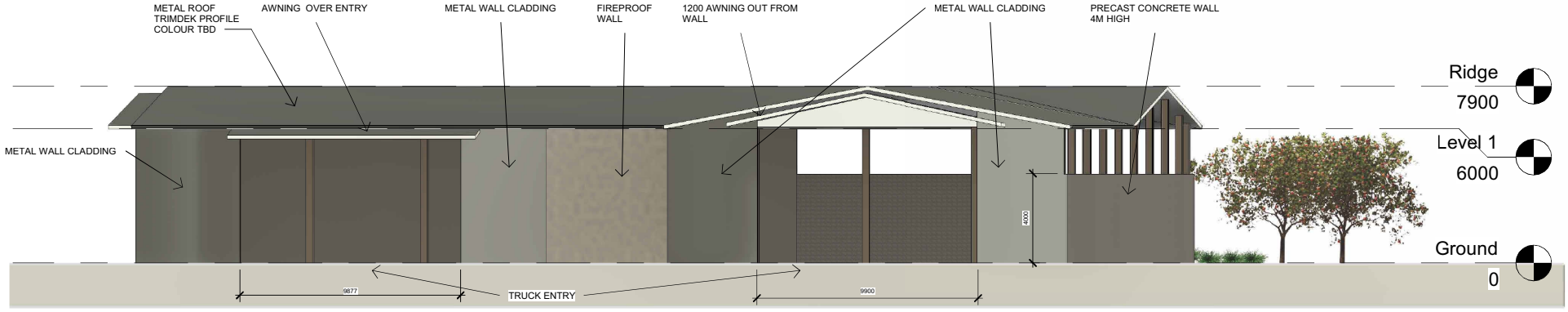
West
1 : 200

Beachside Drafting and Trade Services
1 The Lakes Way
Elizabeth Beach NSW 2428
0458635237
ABN 21231717780

Title : ELEVATIONS	Client : BIOCARBON	CAD : Author	
		Chk'd : Checker	App'd : Approver
Site : 11 MARKWELL ROAD BULADELAH 2423	Project : BioCarbon Shed	Date : 25/11/2024 2:01:47 PM	Scale : 1 : 200
		Drg. No. D-2	Rev:

A3

North
1 : 200



South
1 : 200

Beachside Drafting and Trade Services
1 The Lakes Way
Elizabeth Beach NSW 2428
0458635237
ABN 21231717780

Title : ELEVATIONS 2	Client : BIOCARBON	CAD : Author	
		Chk'd : Checker	App'd : Approver
Site : 11 MARKWELL ROAD BULADELAH 2423	Project : BioCarbon Shed	Date : 25/11/2024 2:01:49 PM	Scale : 1 : 200
		Drg. No. D-3	Rev:

A3

Muller Acoustic Consulting Pty Ltd
PO Box 678, Kotara NSW 2289
ABN: 36 602 225 132
Ph: +61 2 4920 1833
www.mulleracoustic.com

MAC
Muller Acoustic Consulting