Noise Assessment

Proposed Childcare Centre
Lots 301-304 and lot 719, The Loxford Estate Loxford, NSW

Prepared for: Stevens Land Pty Limited
March 2025
MAC242074-01RP1V2

Muller Acoustic Consulting

Document Information

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Loxford, NSW

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Stevens Group (SG) to prepare a Noise Assessment (NA) to quantify emissions from the Proposed Childcare Centre (CCC) to be established at Lots 301-304 and lot 719, The Loxford Estate, Loxford, NSW. The NA has quantified potential emissions associated with the proposed CCC as well as the noise intrusion from surrounding noise sources to the CCC spaces.

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

- NSW Department of Environment and Climate Change (DECC), NSW Interim Construction Noise Guideline (ICNG), July 2009;
- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- NSW Environment Protection Authority (EPA's), Approved Methods for the measurement and analysis of environmental noise in NSW, 2022;
- Standards Australia AS 1055:2018 - Acoustics - Description and measurement of environmental noise - General Procedures;
- International Organisation for Standardisation (ISO) 9613-1:1993 (ISO9613:1) - Acoustics - Attenuation of Sound During Propagation Outdoors - Part 1: Calculation of the Absorption of Sound by the Atmosphere;
- International Organisation for Standardisation (ISO) 9613-2:1996 (ISO9613:2) - Acoustics - Attenuation of Sound during Propagation Outdoors - Part 2: General Method of Calculation; and
- Association of Australian Acoustical Consultants (AAAC), Guideline for Childcare Centre Acoustic Assessment (GCCCAA).

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

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2 Project Description

2.1 Background

The project is to be located at lots 301-304 and lot 719,The Loxford Estate, Loxford, NSW. The area surrounding the project is zoned predominantly for future residential land uses. The site is bound to the west and to the south by future roadways. The nearest future residential receivers are located immediately to the east and north of the site. All the receivers considered as part of this assessment are undeveloped future residential receivers and are yet to be constructed.

The ambient noise environment surrounding the project site is dominated by distant traffic noise from the surrounding area, and wildlife noise.

The project proposes the construction of a single storey childcare centre with associated outdoor play area and carpark.

Site plans are provided in **Appendix B**. The CCC is proposed to operate 6.30am to 6pm Monday to Friday. It is noted that staff may access the project prior to the 6.30am commencement of operations. Staff arrivals have been considered as part of this assessment.

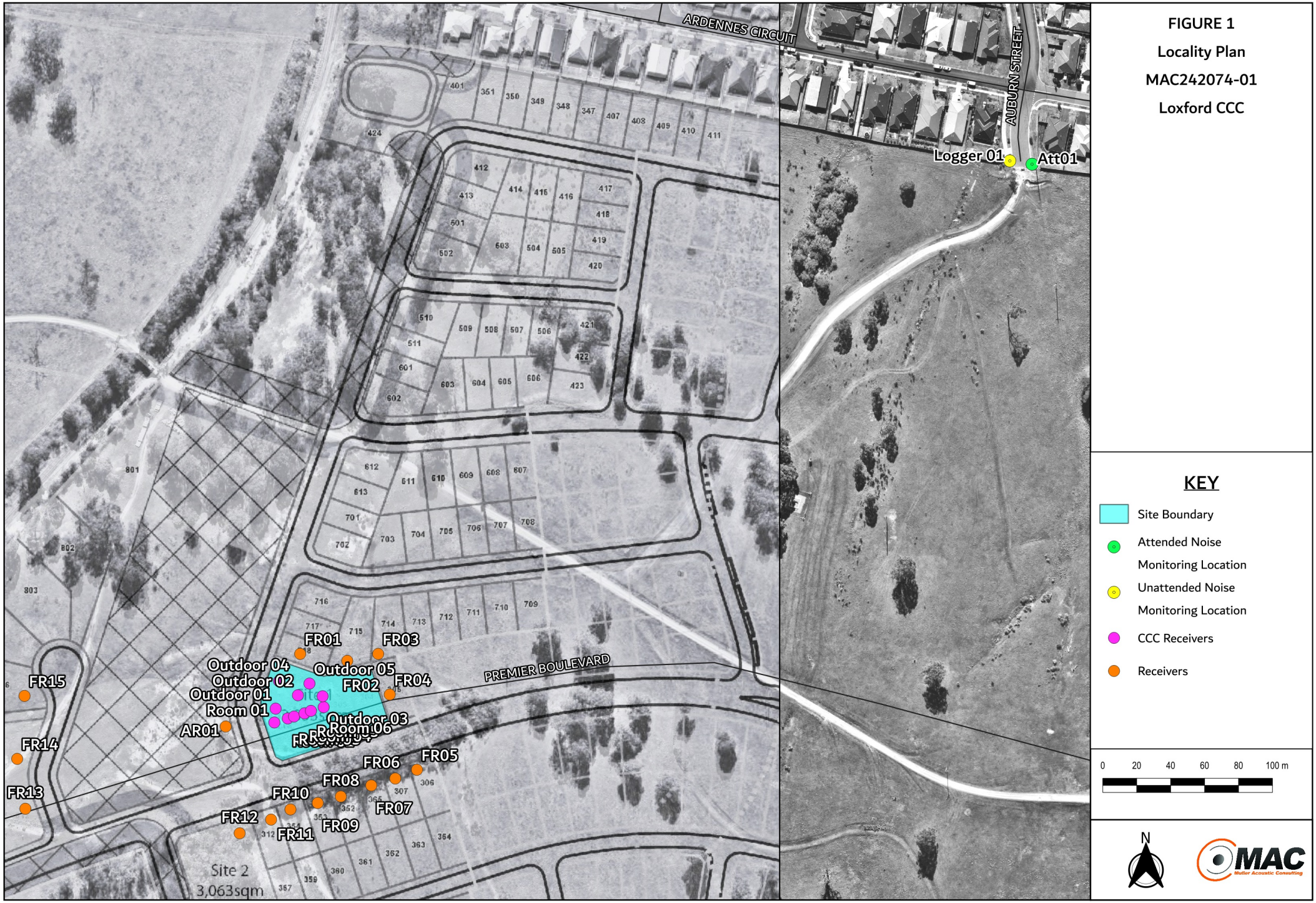
2.1.1 Receiver Review

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	Receiver Type	Receiver Height	MGA56 Coordinates	
			Easting	Northing
FR01	Future Residential	1.5m	361378	6372999
FR02	Future Residential	1.5m	361406	6372995
FR03	Future Residential	1.5m	361424	6372999
FR04	Future Residential	1.5m	361431	6372975
FR05	Future Residential	1.5m	361447	6372931
FR06	Future Residential	1.5m	361434	6372926
FR07	Future Residential	1.5m	361420	6372922
FR08	Future Residential	1.5m	361402	6372915
FR09	Future Residential	1.5m	361389	6372911
FR10	Future Residential	1.5m	361372	6372908
FR11	Future Residential	1.5m	361361	6372902
FR12	Future Residential	1.5m	361343	6372894
FR13	Future Residential	1.5m	361216	6372908
FR14	Future Residential	1.5m	361211	6372937
FR15	Future Residential	1.5m	361216	6372975
AR01	Active Recreational	1.5m	361334	6372956

The CCC receivers for both external play areas and internal occupied rooms are presented in **Table 2**.

Table 2 On-site Receiver Locations				
Receptors	Type	Height Above Ground Level	MGA56 Coordinates	
			Easting	Northing
Outdoor Play Area 01	External Play Area	1.5m	361364	6372967
Outdoor Play Area 02	External Play Area	1.5m	361377	6372975
Outdoor Play Area 03	External Play Area	1.5m	361391	6372974
Outdoor Play Area 04	External Play Area	1.5m	361366	6372983
Outdoor Play Area 05	External Play Area	1.5m	361384	6372982
Room 01	Internal Sleep Area	1.5m	361363	6372959
Room 02	Internal Sleep Area	1.5m	361371	6372961
Room 03	Internal Play Area	1.5m	361375	6372962
Room 04	Internal Play Area	1.5m	361381	6372964
Room 05	Internal Play Area	1.5m	361385	6372966
Room 06	Internal Play Area	1.5m	361392	6372968


ARDENNES CIRCUIT
AUBURN STREET
PREMIER BOULEVARD
Logger 01
Att01
FR01
FR02
FR03
FR04
FR05
FR06
FR07
FR08
FR09
FR10
FR11
FR12
FR13
FR14
FR15
AR01
Outdoor 01
Outdoor 02
Outdoor 03
Outdoor 04
Outdoor 05
Room 01
Room 06
Site 2
3,063sqm
FIGURE 1
Locality Plan
MAC242074-01
Loxford CCC
KEY
Site Boundary
Attended Noise Monitoring Location
Unattended Noise Monitoring Location
CCC Receivers
Receivers
0 20 40 60 80 100 m
N
MAC
Muller Acoustic Consulting

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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**.

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 3**.

Table 3 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 The AAAC Guideline

The Guideline for Childcare Centre Acoustic Assessment (GCCCAA) been prepared by the AAAC. The document provides criteria for the assessment of noise intrusion into and noise emissions from CCCs and also provides recommendations for treatment to minimise noise upon surrounding receptors. The guideline aligns with the NPI for establishing criteria for CCCs with respect to the following noise sources:

- mechanical plant (air conditioning condensers and mechanical ventilation);
- on-site traffic, deliveries and ingress and egress of vehicles;
- on-site drop off/collection areas of children; and
- noise emissions from children at play.

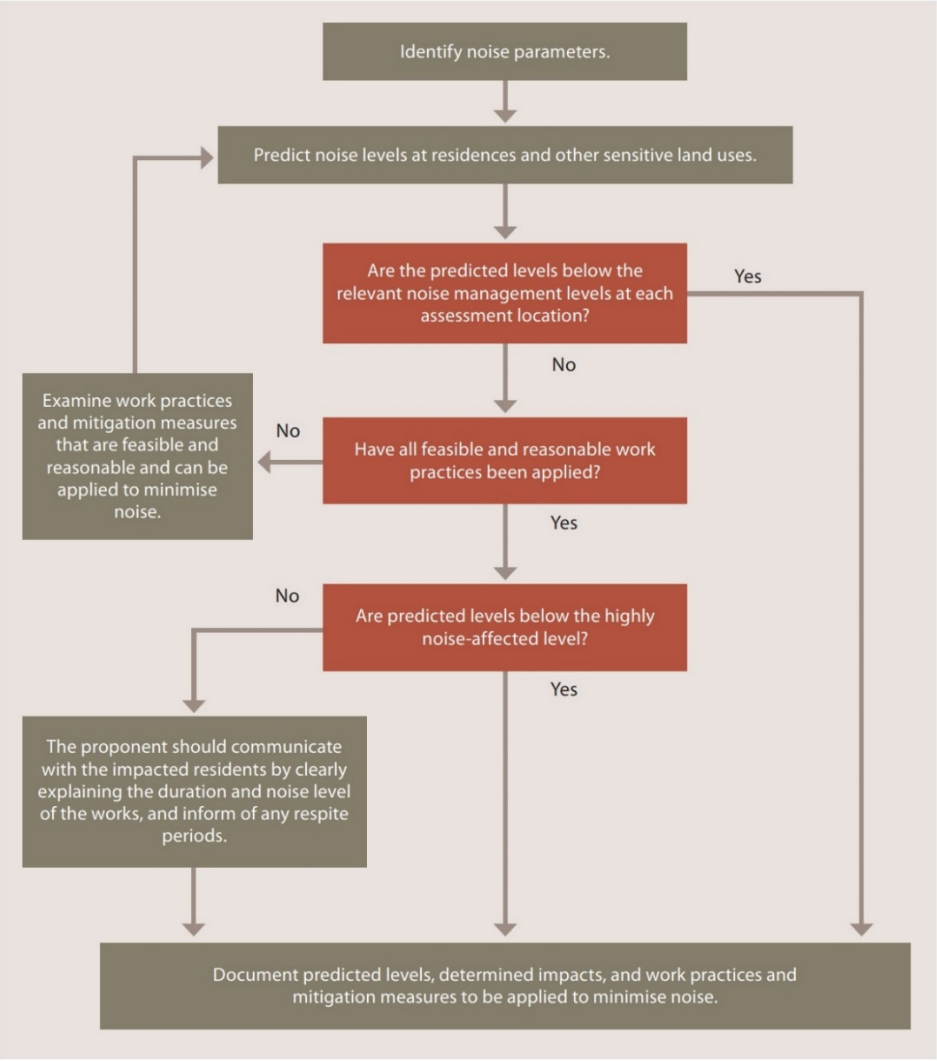
3.3 Interim Construction Noise Guideline

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.

3.3.1 Standard Hours for Construction

Table 4 presents the ICNG recommended standard hours for construction works.

Table 4 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.

3.3.2 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 5** 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 5 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.

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 future residential receivers surrounding the project as per Fact Sheet B1.1 of the NPI.

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

The measurements were carried out using one Svantek 977 noise analyser from Thursday 25 July 2024 to Monday 5 August 2024. All acoustic instrumentation used carries appropriate and current NATA (or manufacturer) calibration certificates with records of all calibrations maintained by MAC as per Approved Methods for the measurement and analysis of environmental noise in NSW (EPA, 2022) 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.

Observations on-site identified the surrounding locality was typical of a suburban environment, with distant road traffic noise and wildlife noise audible.

Data affected by adverse meteorological conditions have been excluded from the results in accordance with methodologies provided in Fact Sheet A4 of the NPI. Residential receivers situated in the surrounding area have been classified under the EPA's suburban amenity category. This criteria is used in conjunction with the intrusiveness criteria to determine the limiting criteria. The summary results of long-term unattended noise monitoring are provided in **Table 6**. The measured daily ABLs for the background monitoring are provided in **Table C23** in **Appendix C** along with the daily noise monitoring charts.

Table 6 Background Noise Monitoring Summary

Monitoring Location	Period[1]	Measured Background Noise Level (LA90) dB RBL	Measured dB LAeq
L1	Morning Shoulder	37	49
	Day	42	51
	Evening	39	49
	Night	27	45

Note 1: Morning Shoulder - the period from 6am to 7am; 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: Excludes periods of wind or rain affected data. Meteorological data obtained from the Bureau of Meteorology weather station Maitland Airport AWS 32.7°S 151.48°E 28m AMSL.

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 Standards Australia AS 1055:2018, "Acoustics – Description and Measurement of Environmental Noise".

All acoustic instrumentation used carries appropriate and current NATA (or manufacturer) calibration certificates with records of all calibrations maintained by MAC as per Approved Methods for the measurement and analysis of environmental noise in NSW (EPA, 2022) 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.

The attended noise monitoring was conducted using one Svantek 971 noise analyser at the site (see **Figure 1)** on Thursday 25 July 2024 to quantify ambient background noise levels.

The attended measurement was completed during calm and clear meteorological conditions and confirmed that ambient traffic and commercial noise dominated the surrounding environment. The results of the short-term noise measurement and observations are summarised in **Table 7**.

Table 7 Operator-Attended Noise Survey Results

Date/ Time (hrs)	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
25/07/2024 10:39	72	49	43	WD: N WS: 2.1m/s Rain: Nil	Dogs Barking 40-43 Traffic 42-53 Birds 43-55 Operator Noise 71-72

Note 1: Morning Shoulder - the period from 6am to 7am; 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.

5 Assessment Criteria

5.1 Operational Noise Criteria

5.1.1 Intrusiveness Noise Levels

The PINL 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 LA_{90}	Adopted RBL dB LA_{90}	PINL dB $LA_{eq(15min)}$
L1	Residential	Morning Shoulder	37	37	42
		Day	42	42	47
		Evening	39	39	44
		Night	27	30[2]	35

Note 1: Morning Shoulder - the period from 6am to 7am; 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 guidance, the minimum nighttime RBL is 30dBA.

5.1.2 Determination of NPI Residential Receiver Amenity Category

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 9**. The detailed assessment of receiver categories is provided in **Table 22** in **Appendix D.** This classification is used in conjunction with the intrusiveness criteria to determine the limiting criteria.

Table 9 Determination of NPI Residential Receiver Category

Receiver/Location/Catchment	Rural	Suburban	Urban
L1	1	8	3

Observations at locations in the surrounding locality support the assessment of the receivers as a suburban residential category.

5.1.3 Amenity Noise Levels and Project Amenity Noise Levels

The PANL for residential receivers affected by the project are presented in **Table 10.**

Table 10 Amenity Noise Levels and Project Amenity Noise Levels

Receiver Type	Noise Amenity Area	Assessment Period[1]	NPI Recommended ANL dB $LA_{eq(period)}$	ANL dB $LA_{eq(period)}$	PANL dB $LA_{eq(15min)}$[3]
Residential	Suburban	Morning Shoulder	N/A[2]	N/A[2]	N/A[2]
		Day	55	55	58
		Evening	45	45	48
		Night	40	40	43
Active Recreational	Any	When in Use	55	55	58

Note 1: Morning Shoulder - the period from 6am to 7am; 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 guidance, shoulder periods are assessed on intrusiveness levels only.

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 Project Noise Trigger Levels

The PNTL are the lower of either the PINL or the PANL. **Table 11** presents the derivation of the PNTLs in accordance with the methodologies outlined in the NPI.

Table 11 Project Noise Trigger Levels

Receiver Type	Noise Amenity Area	Assessment Period[1]	PINL dB $LA_{eq(15min)}$	PANL dB $LA_{eq(15min)}$	PNTL dB $LA_{eq(15min)}$
Residential	Suburban	Morning Shoulder	42	N/A[2]	42
		Day	47	58	47
		Evening	44	48	44
		Night	35	43	35
Active Recreational	All	When in Use	N/A	58	58

Note 1: Morning Shoulder - the period from 6am to 7am; 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.

5.1.5 Maximum Noise Trigger Levels

The maximum noise trigger levels shown in **Table 12** 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 12 Maximum Noise Trigger Levels (Morning Shoulder)

NPI 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	42	RBL +15dB	52
Highest	**42**	**Highest**	**52**

Note 1: Morning Shoulder - the period from 6am to 7am; 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.

5.2 Noise Intrusion Criteria to Childcare Centres

The GCCCAA provides recommendations for external noise impact upon children in Childcare Centres. The relevant criteria for noise intrusion to the CCC is reproduced below:

- the $L_{Aeq(1\text{-}hour)}$ intrusive noise level from road, rail or industry at any location within an outdoor play area should not exceed 55dBA; and
- the $L_{Aeq(1\text{-}hour)}$ intrusive noise level from road, rail or industry within the indoor play or sleeping areas should not exceed 40dBA.

5.3 Noise Emission Criteria from Childcare Centres

The GCCCAA recommends a base criterion of 45dB $L_{Aeq(15min)}$ for the assessment of outdoor play where the background noise level is less than 40dBA, however, where the background noise level is greater than 40dBA, the GCCCAA states:

> *The contributed Leq,15min noise level emitted from an outdoor play and internal activity areas shall not exceed the background noise level by more than 5 or 10 dB at the assessment location, depending on the usage of the outdoor play area. AAAC members regard that a total time limit of approximately 2 hours outdoor play per morning and afternoon period should allow an emergence above the background of 10 dB (ie background +10 dB if outdoor play is limited to 2 hours in the morning and 2 hours in the afternoon).*

Other noise emissions, from mechanical plant, drop off, pick up and any other activities are not to exceed the background noise level by more than 5dB. In regard to sleep disturbance, activities prior to 7am, such as the L_{Amax} noise level from staff vehicles arriving, parking etc should not exceed the background noise level by more than 15dB. **Table 13** summarises the noise emission criteria from the CCC.

Table 13 CCC Noise Emission Criteria

Location	Period	Activity	Criteria
Residential Receivers	Day (7am-6pm)	All Day Outdoor Play	47dB $L_{Aeq(15min)}$
	Morning Shoulder (6am-7am)	All Other Activities	42dB $L_{Aeq(15min)}$
	Day (7am-6pm)		47dB $L_{Aeq(15min)}$
	Morning Shoulder (6am-7am)	Staff Arrival	52dB L_{Amax}

5.4 Construction Noise Criteria

The relevant Noise Management Levels (NMLs) for standard construction hours are presented in **Table 14**.

Table 14 Construction Noise Management Levels

Catchment (No) Receiver ID	Assessment Period[1]	Adopted RBL dB L_{A90}	NML dB $L_{Aeq(15min)}$
Residential	Standard Hours	42	52 (RBL+10dBA)

Note 1: Refer to Table 4 for Standard Recommended Hours for Construction.

6 Modelling Methodology

A computer model was developed to quantify project noise emissions to neighbouring receivers using DGMR (iNoise, Version 2024.2) 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 15 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 15 Acoustically Significant Sources - Sound Power Levels dBA (re 10^{-12} Watts)

Item and number modelled per 15 minutes	Sound Power Level dB L_{Aeq}	Total Sound Power Level dB $L_{Aeq(15min)}$	Source Height[1]
CCC Operational Sources			
AC plant RZA160CV1 (x7)	75	85	3.5m
Toilet Extraction Fan (x4)	70	76	0.5m
Laundry Extraction Fan (x1)	73	73	0.5m
Kitchen Extraction Fan (x1)	73	73	0.5m
Car enters, park, start up, idle and drive off – External (x15)[2]	73	85	0.5m
Waste Collection (x1)	85	85	1.0m
CCC Outdoor Play Sources			
Child aged 0-2 years vocal effort (x24)	68	80[3]	0.5m
Child aged 2-3 years vocal effort (x40)	75	89[3]	0.5m
Child aged 3-6 years vocal effort (x46)	77	92[3]	0.5m
Maximum Noise Level Assessment (L_{Amax}), Morning Shoulder (5am – 7am)			
Door Slam	87		0.5m

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

Note 2: Includes a duration adjustment assuming vehicles operate for three (3) minutes continuously within a period of 15-minutes.

Note 3: Assumes 50% of children passively playing.

6.2 Noise Attenuation Assumptions, Controls and Recommendations

The noise model adopted the following assumptions, controls and recommendations:

- the project is constructed as per the site design and plans, which includes the barrier attenuation provided by the project buildings orientation;
- the mechanical plant includes one15.5kW AC unit per childroom and one for the admin space, totalling seven (7) AC units. The AC units are to be located on northern façade of the CCC building above the playground awning (see **Figure 3**);
- construction of an impervious barrier surrounding the northern end of playground (see **Figure 3**). The barrier should be constructed to an RL of 1.8m above the relative ground level of the top of the retaining walls and consist of materials with a surface density of at least 10kg/m^2, and not contain any gaps (ie lapped and capped timber or equivalent); and
- construction of an impervious barrier surrounding the northern and western boundaries of the car park area (see **Figure 3**). The barrier should be constructed to an RL of 1.8m above the top of the retaining walls and consist of material consistent with those outlined above.

FIGURE 3

Barrier and Plant Plan

MAC242074-01

Loxford CCC

KEY

1.8m Acoustic Barrier

Plant Locations

0 3 6 9 12 15 m

N

MAC Muller Acoustic Consulting

7 Noise Assessment Results

7.1 Operational Noise Assessment

Noise predictions from all operational sources (mech plant and onsite parent/educator vehicles) have been quantified at surrounding residential receivers to the project site and are presented in **Table 16**.

Table 16 Noise Predictions – All Receivers

Location	Predicted Noise Level dB $L_{Aeq(15min)}$		PNTL dB $L_{Aeq(15min)}$		Compliant
	Morning Shoulder	Day	Morning Shoulder	Day	
FR01	39	39	42	47	✓
FR02	41	44	42	47	✓
FR03	40	43	42	47	✓
FR04	40	44	42	47	✓
FR05	36	39	42	47	✓
FR06	36	40	42	47	✓
FR07	36	40	42	47	✓
FR08	35	38	42	47	✓
FR09	<35	36	42	47	✓
FR10	<35	<35	42	47	✓
FR11	<35	<35	42	47	✓
FR12	<35	<35	42	47	✓
FR13	<35	<35	42	47	✓
FR14	<35	<35	42	47	✓
FR15	<35	<35	42	47	✓
Location	Period	Predicted Noise Level dB $L_{Aeq(15min)}$	PNTL dB $L_{Aeq(15min)}$		Compliant
AR01	When in use	39	58		✓

Note 1: Morning Shoulder - the period from 6am to 7am; 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.

Satisfying the NPI PNTLs also satisfies the GCCCAA emission criteria from mechanical plant and onsite vehicles.

Waste collections are expected to be undertaken once per day during the day and morning shoulder periods. Waste collection usually takes several minutes, but to present a conservative assessment, it has been assumed that it would take up to 15 minutes to complete. Fact Sheet C of the NPI allows for exceedance of the PNTL or adjustment of the PNTL for short term single events that may occur in any 24-hour period. Table C3 of the NPI allows an adjustment to the PNTL of +7dB for the daytime period and +2dB during the morning shoulder period, when the event is expected to occur. Results of the noise modelling predictions are presented in **Table 17** for operations with waste collection during the morning shoulder and daytime periods.

Table 17 Noise Predictions – All Receivers with Waste Collection

Location	Predicted Noise Level dB $LA_{eq(15min)}$		PNTL dB $LA_{eq(15min)}$		Compliant
	Morning Shoulder	Day	Morning Shoulder	Day	
FR01	40	41	44	54	✓
FR02	44	45	44	54	✓
FR03	43	45	44	54	✓
FR04	43	45	44	54	✓
FR05	38	40	44	54	✓
FR06	38	41	44	54	✓
FR07	37	40	44	54	✓
FR08	35	38	44	54	✓
FR09	<35	36	44	54	✓
FR10	<35	<35	44	54	✓
FR11	<35	<35	44	54	✓
FR12	<35	<35	44	54	✓
FR13	<35	<35	44	54	✓
FR14	<35	<35	44	54	✓
FR15	<35	<35	44	54	✓

Location	Period	Predicted Noise Level dB $LA_{eq(15min)}$	PNTL dB $LA_{eq(15min)}$	Compliant
AR01	When in use	40	65	✓

Note 1: Morning Shoulder - the period from 6am to 7am; 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.

7.2 Childcare Centre Noise Assessment Results

7.2.1 Noise Intrusion Results - Outdoor Play Area

Table 18 presents the predicted noise intrusion from the ambient noise levels impacting on the CCC external play spaces. The predicted results show compliance with the criteria in the GCCCAA.

Table 18 External Play Area Noise Results

Receiver	Ambient Noise Level dB $LA_{eq(1hr)}$	Criteria dB $LA_{eq(1hr)}$	Compliant
Outdoor Play Area 01	52	55	✓
Outdoor Play Area 02	52	55	✓
Outdoor Play Area 03	52	55	✓
Outdoor Play Area 04	52	55	✓
Outdoor Play Area 05	52	55	✓

7.2.2 Noise Intrusion Results – Internal Play Spaces

Table 19 presents the predicted internal CCC noise levels (assuming that rooms have an external façade) from ambient noise levels. The predicted results show compliance with the criteria in the GCCCAA assuming a 20dB loss for the installed windows when closed.

Table 19 Internal Cumulative Noise Results

Receiver	Ambient noise level dB $LA_{eq(1hr)}$		Internal Criteria dB $LA_{eq(1hr)}$	Compliant
	External	Internal[1]		
Room 01	52	32	40	✓
Room 02	52	32	40	✓
Room 03	52	32	40	✓
Room 04	52	32	40	✓
Room 05	52	32	40	✓
Room 06	52	32	40	✓

Note 1: Includes 20dB attenuation for closed window.

7.2.3 Noise Emission Results – Outdoor play

Table 20 presents the noise emission results for children at play ($LA_{eq(15min)}$) in the outdoor play area of the CCC The predicted results show compliance with the criteria in the GCCCAA.

Table 20 Noise Emissions Results – CCC Outdoor Play

Receiver	Predicted Noise Level dB LAeq(15min)	Emission Criteria dB LAeq(15min)	Compliant
FR01	46	47	✓
FR02	44	47	✓
FR03	41	47	✓
FR04	43	47	✓
FR05	<35	47	✓
FR06	<35	47	✓
FR07	<35	47	✓
FR08	<35	47	✓
FR09	<35	47	✓
FR10	<35	47	✓
FR11	<35	47	✓
FR12	<35	47	✓
FR13	<35	47	✓
FR14	<35	47	✓
FR15	<35	47	✓

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.

7.2.4 Noise Emission Results – Transient Events

Table 21 presents the noise emission results for transient events such as car door slam events in the car park during the morning shoulder period (L_{Amax}).

Table 21 Noise Emissions Results –Transient Events[1]

Receiver	Predicted Noise Level[2] dB LAmax				GCCCAA Trigger Level dB LAmax	NPI Trigger Level dB LAmax
	Door Slam Northeastern Car Space	Door Slam Northwestern Car Space	Door Slam Southern Car Space	Door Slam Playground		
FR01	48	42	44	41	52	52
FR02	47	51	42	<35	52	52
FR03	36	41	37	<35	52	52
FR04	38	41	38	<35	52	52
FR05	38	41	38	<35	52	52
FR06	36	39	<35	<35	52	52
FR07	32	38	<35	<35	52	52
FR08	<35	37	<35	<35	52	52
FR09	<35	36	<35	<35	52	52
FR10	<35	34	<35	<35	52	52
FR11	<35	18	<35	<35	52	52
FR12	<35	<35	<35	<35	52	52
FR13	<35	<35	<35	<35	52	52
FR14	<35	<35	<35	<35	52	52
FR15	<35	<35	<35	<35	52	52

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.

The predicted maximum noise level results show compliance with the criteria in the GCCCAA and NPI for all receivers for all receivers for all events assessed.

7.3 Construction Noise Assessment

Table 22 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 several assessed receivers. Accordingly, recommendations to reduce the impact of construction noise emissions on surrounding receivers are provided in Section 8.

Table 22 Construction Noise Levels – All Receivers

Receiver	Period[1]	Predicted Noise Level dB $L_{Aeq(15min)}$	Management Level dB $L_{Aeq(15min)}$
FR01	Day	66	52
FR02	Day	66	52
FR03	Day	63	52
FR04	Day	64	52
FR05	Day	60	52
FR06	Day	61	52
FR07	Day	62	52
FR08	Day	62	52
FR09	Day	62	52
FR10	Day	61	52
FR11	Day	59	52
FR12	Day	57	52
FR13	Day	50	52
FR14	Day	50	52
FR15	Day	50	52
AR01	Day	66	52

Note 1: See Table 4 for Recommended Standard Hours for Construction.

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.

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9 Discussion and Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Assessment (NA) to quantify emissions from the Proposed Childcare Centre to be established at Lots 301-304 and lot 719, The Loxford Estate, Loxford, NSW. The Noise Assessment has quantified potential emissions associated with the proposed CCC as well as the noise intrusion from surrounding noise sources to the CCC.

The results of the Noise Assessment demonstrate that noise emissions from the operation would satisfy the relevant trigger levels at all assessed receivers 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 the barrier attenuation provided by the project buildings orientation;
- the mechanical plant includes one15.5kW AC unit per childroom and one for the admin space, totalling seven (7) AC units. The AC units are to be located on northern façade of the CCC building above the playground awning (see **Figure 3**);
- construction of an impervious barrier surrounding the northern end of playground (see **Figure 3**). The barrier should be constructed to an RL of 1.8m above the relative ground level of the top of the retaining walls and consist of materials with a surface density of at least 10kg/m^2, and not contain any gaps (ie lapped and capped timber or equivalent); and
- construction of an impervious barrier surrounding the northern and western boundaries of the car park area (see **Figure 3**). The barrier should be constructed to an RL of 1.8m above the top of the retaining walls and consist of material consistent with those outlined above.

The predicted maximum noise level results show compliance with the criteria in the GCCCAA and NPI for all receivers for all events assessed.

Modelled noise emissions from construction activities identify that predicted noise emissions may be above the applicable construction management levels at several assessed receivers. Accordingly, recommendations to reduce the impact of construction noise emissions on surrounding receivers are provided in **Section 8**.

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

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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

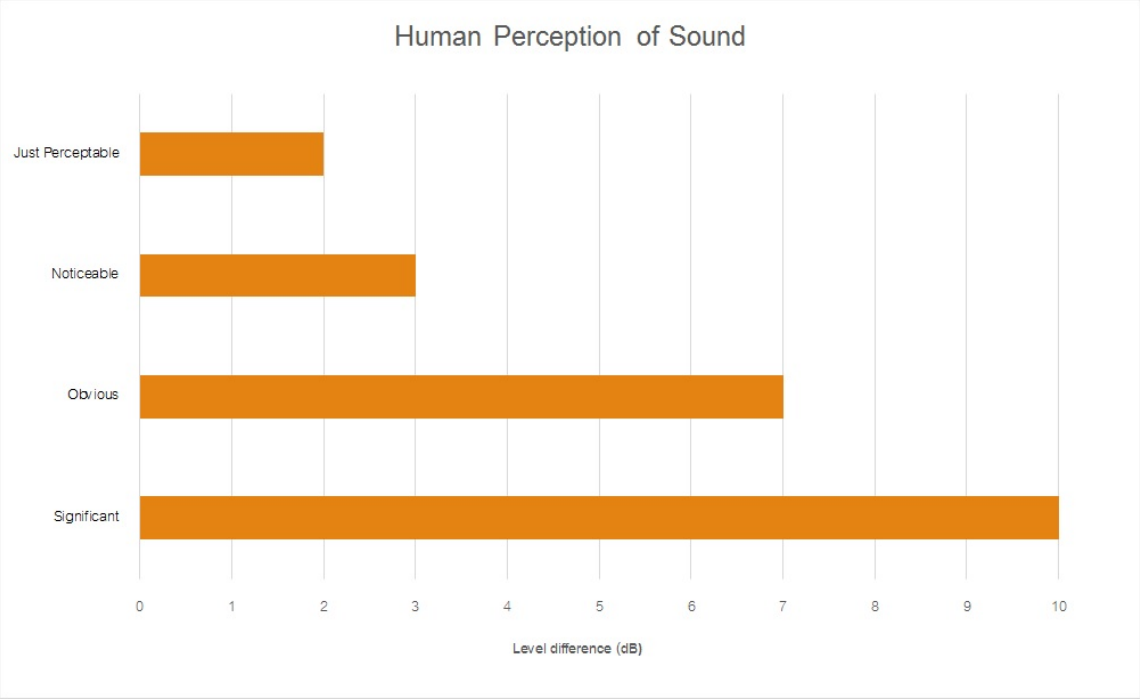
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for 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



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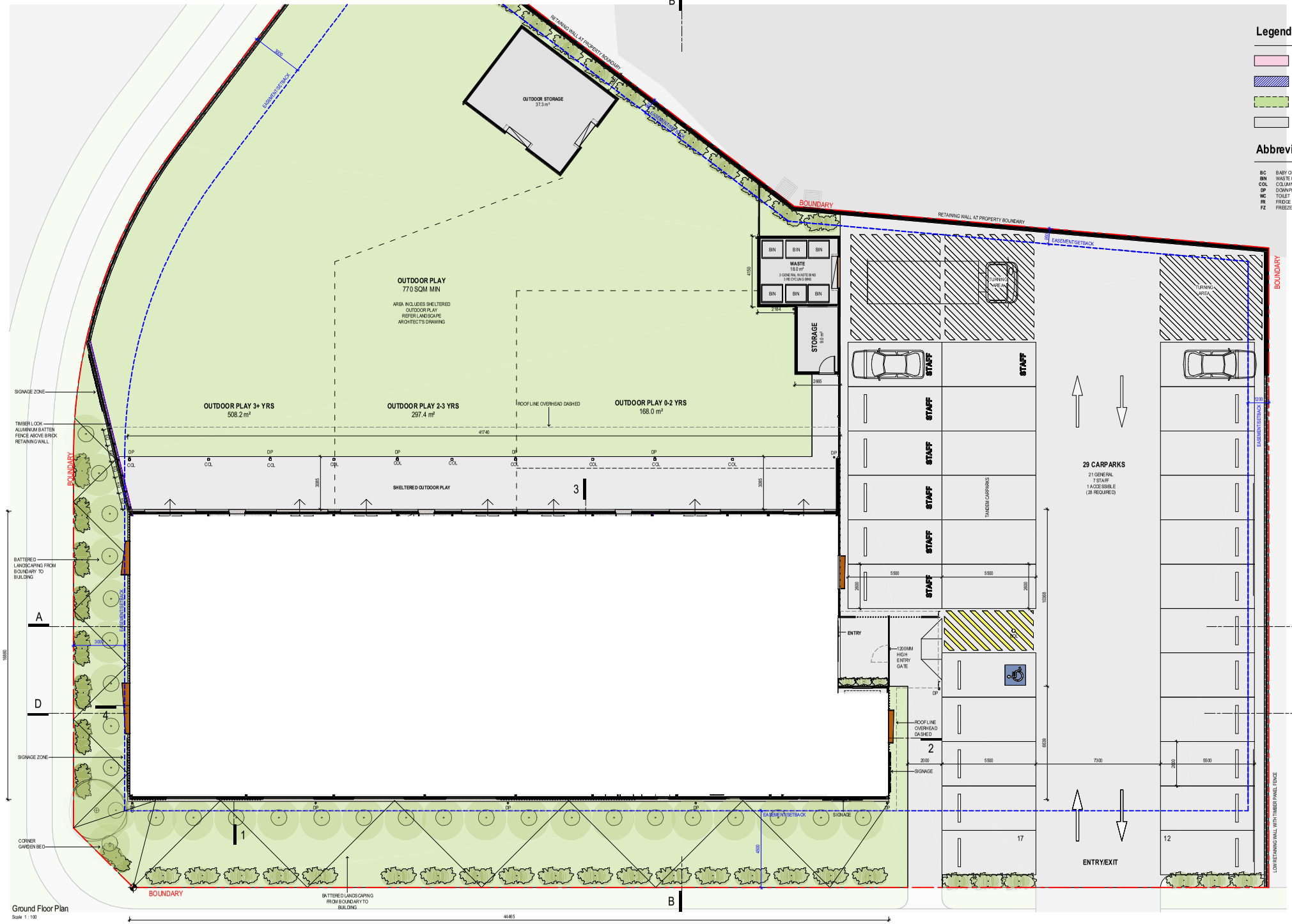
Appendix B – Site Plans



Legend - General Arrangement

- INTERNAL UNENCUMBERED AREA
- INTERNAL STORAGE
- EXTERNAL UNENCUMBERED AREA
- EXTERNAL STORAGE

Abbreviations - GA

BC	BABY CHANGE
BIN	WASTE BIN (1100L)
COL	COLUMN (TBC)
DP	DOWNPIPE (TBC)
WC	TOILET
FR	FRIDGE
FZ	FREEZER

Ground Floor Plan
Scale 1 : 100

PRELIMINARY

Clarke Hopkins Clarke
www.chc.com.au | studio@chc.com.au | 03 9419 4340 | NSW Nominated Architect: Jordan Curran (10259)

LOXFORD CHILDCARE - 230291
CESSNOCK RD, GILLIESTON HEIGHTS NSW, CONSOLIDATION OF LOT 719 D.P. & LOTS 301, 302, 303, 304 D.P.

Scale As indicated @ A1
0 10m

Ground Floor Plan | DA200 k

03.02.2025

Appendix C – Noise Monitoring Charts and ABLs Summary

Table C23 Background Noise Monitoring Summary – Location L1

Date	Measured Background Noise Level (LA_{90}) dB ABL[1]			Measured dB $LA_{eq(period)}$		
	Day	Evening	Night	Day	Evening	Night
Thursday 25 July 2024	--[2]	44	--[2]	--[2]	51	--[2]
Friday 26 July 2024	41	43	34	52	51	45
Saturday 27 July 2024	45	39	28	52	48	45
Sunday 28 July 2024	41	35	32	50	44	43
Monday 29 July 2024	42	36	25	50	48	46
Tuesday 30 July 2024	44	36	26	50	47	45
Wednesday 31 July 2024	43	38	27	50	47	43
Thursday 1 August 2024	43	41	28	52	48	45
Friday 2 August 2024	42	42	28	52	50	44
Saturday 3 August 2024	42	45	27	51	51	45
Sunday 4 August 2024	42	38	27	51	48	47
Monday 5 August 2024	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
Location1 – RBL / Leq Overall	44	43	40	57.3	57	52

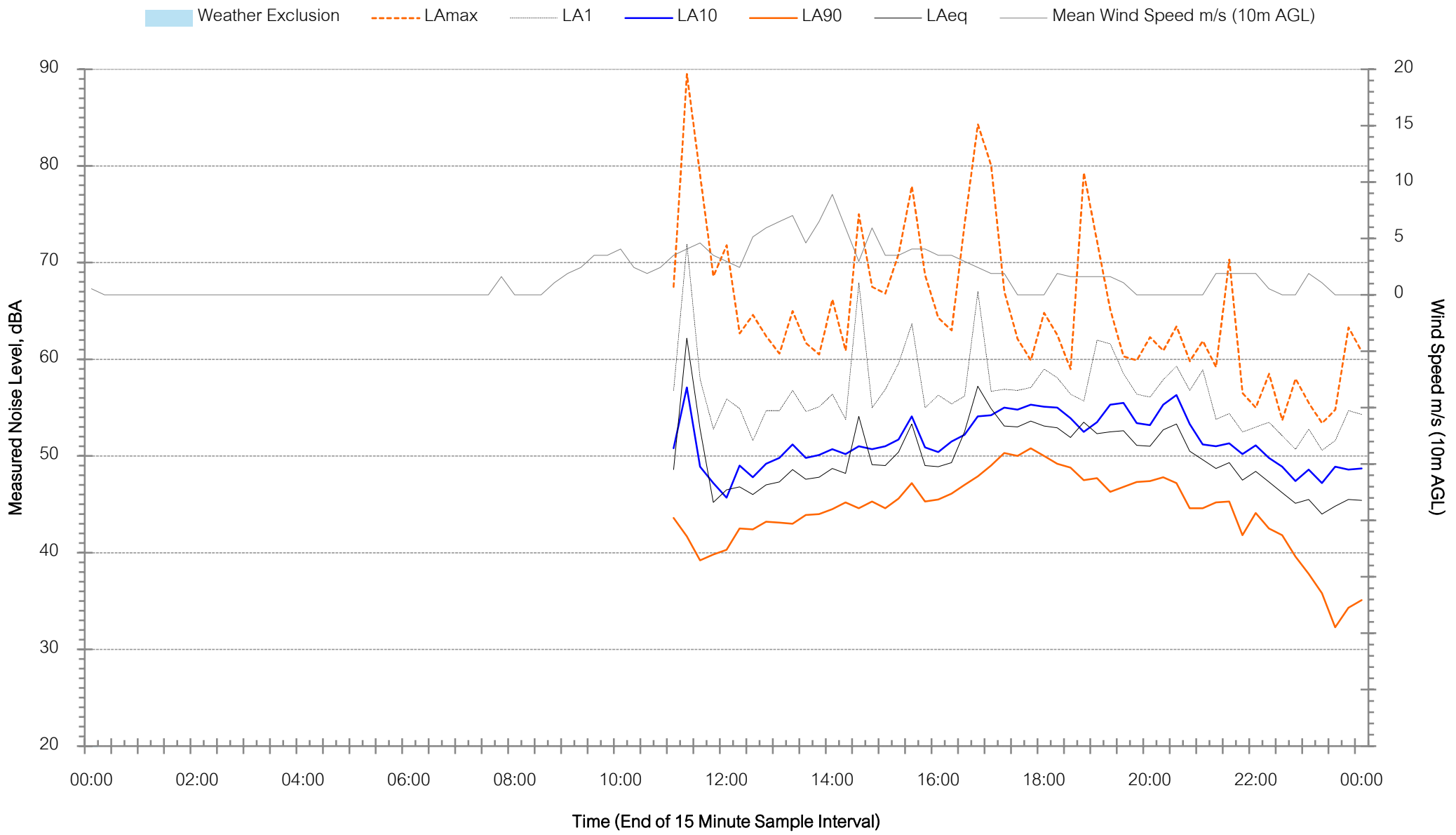
Note 1: Assessment background level (ABL) – the single-figure background level representing each assessment period day, evening and night as per NPI Fact Sheet A.

Note 2: Measurement removed due to adverse weather as per NPI Fact Sheet A.

Note: 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

Background Noise Levels

The Loxford Estate, Gillieston Heights, NSW - Thursday 25 July 2024

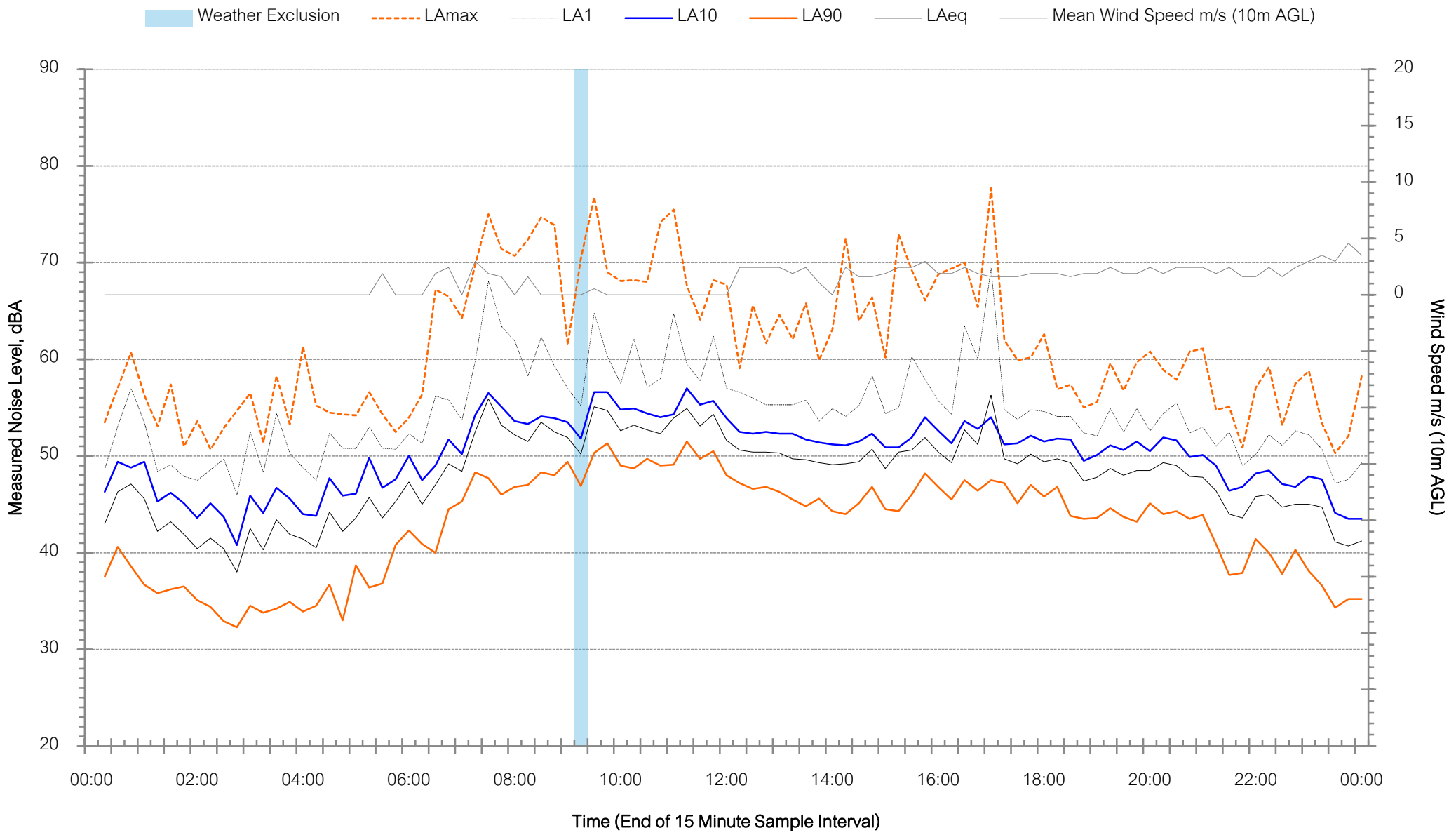


Background Noise Levels

The Loxford Estate, Gillieston Heights, NSW - Friday 26 July 2024

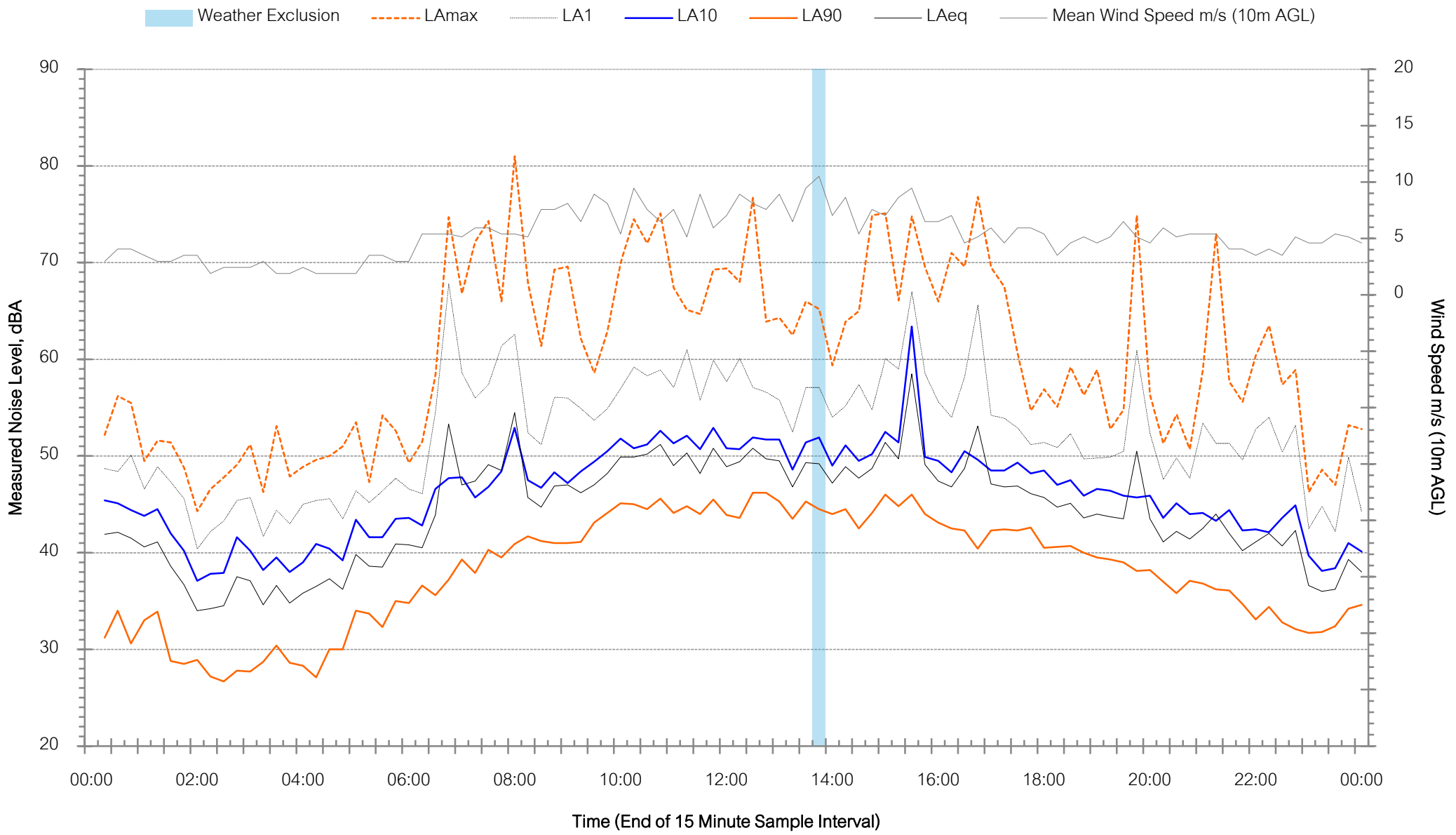
Background Noise Levels

The Loxford Estate, Gillieston Heights, NSW - Saturday 27 July 2024



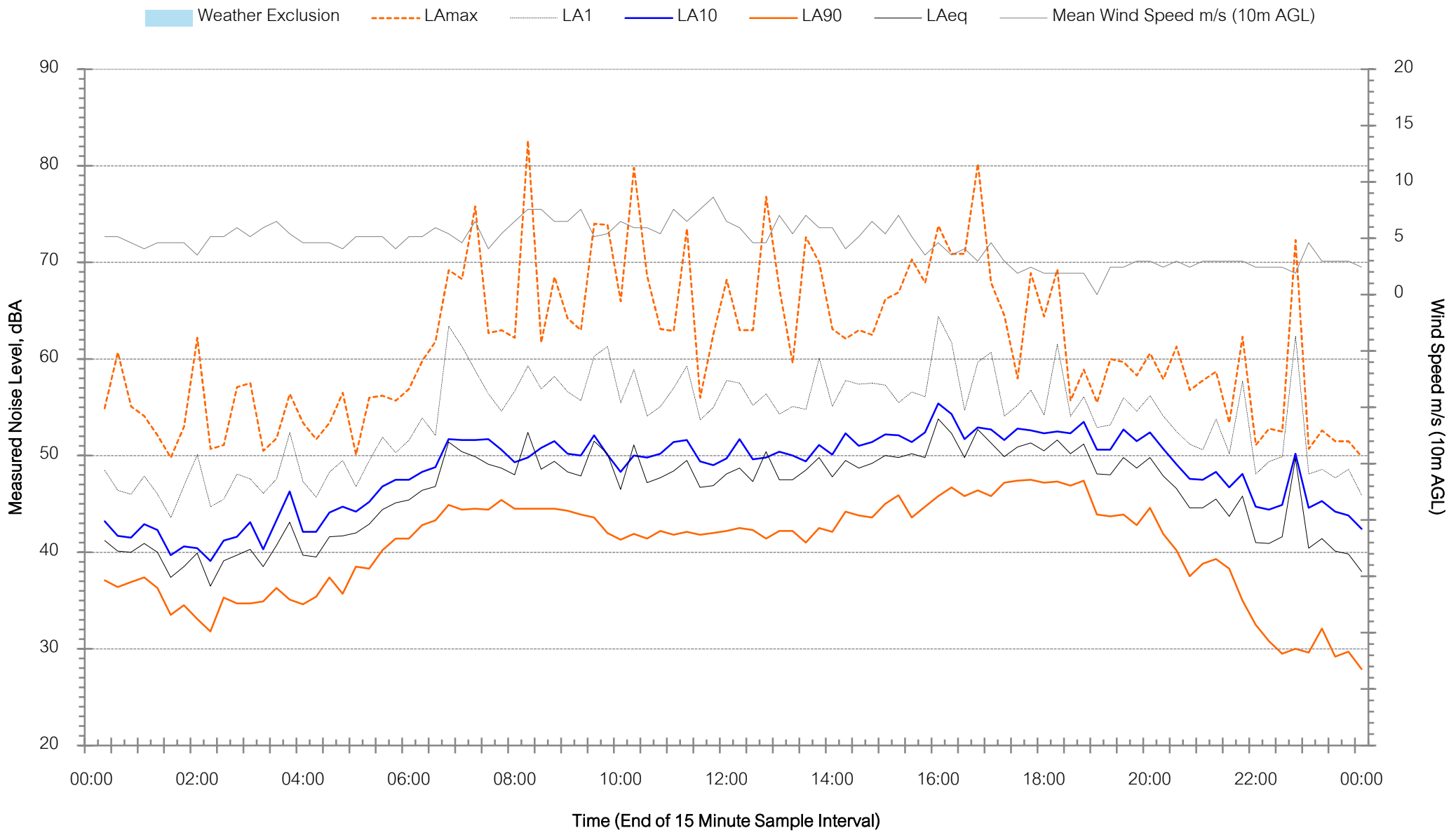
Background Noise Levels

The Loxford Estate, Gillieston Heights, NSW - Sunday 28 July 2024



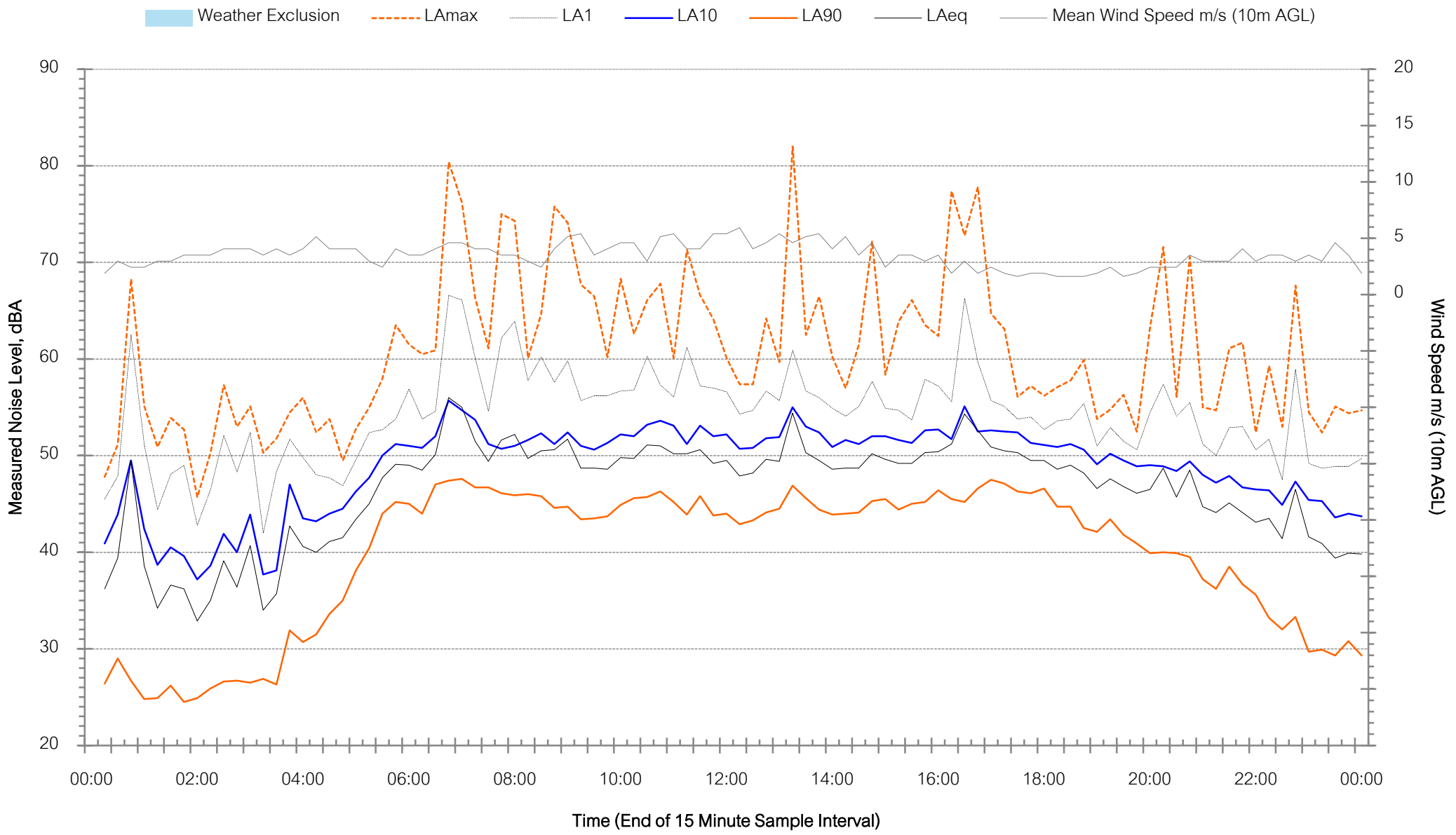
Background Noise Levels

The Loxford Estate, Gillieston Heights, NSW - Monday 29 July 2024



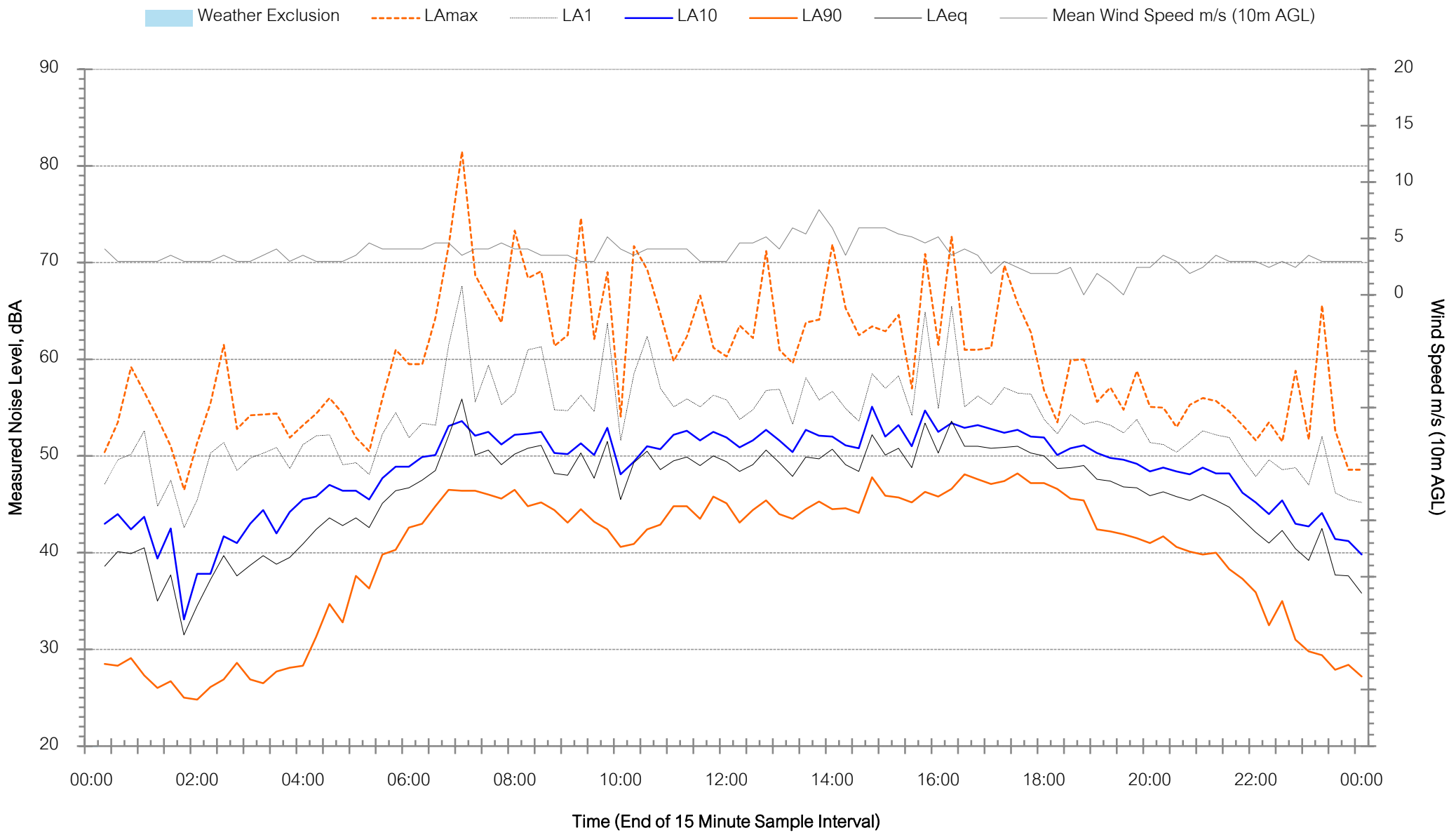
Background Noise Levels

The Loxford Estate, Gillieston Heights, NSW - Tuesday 30 July 2024



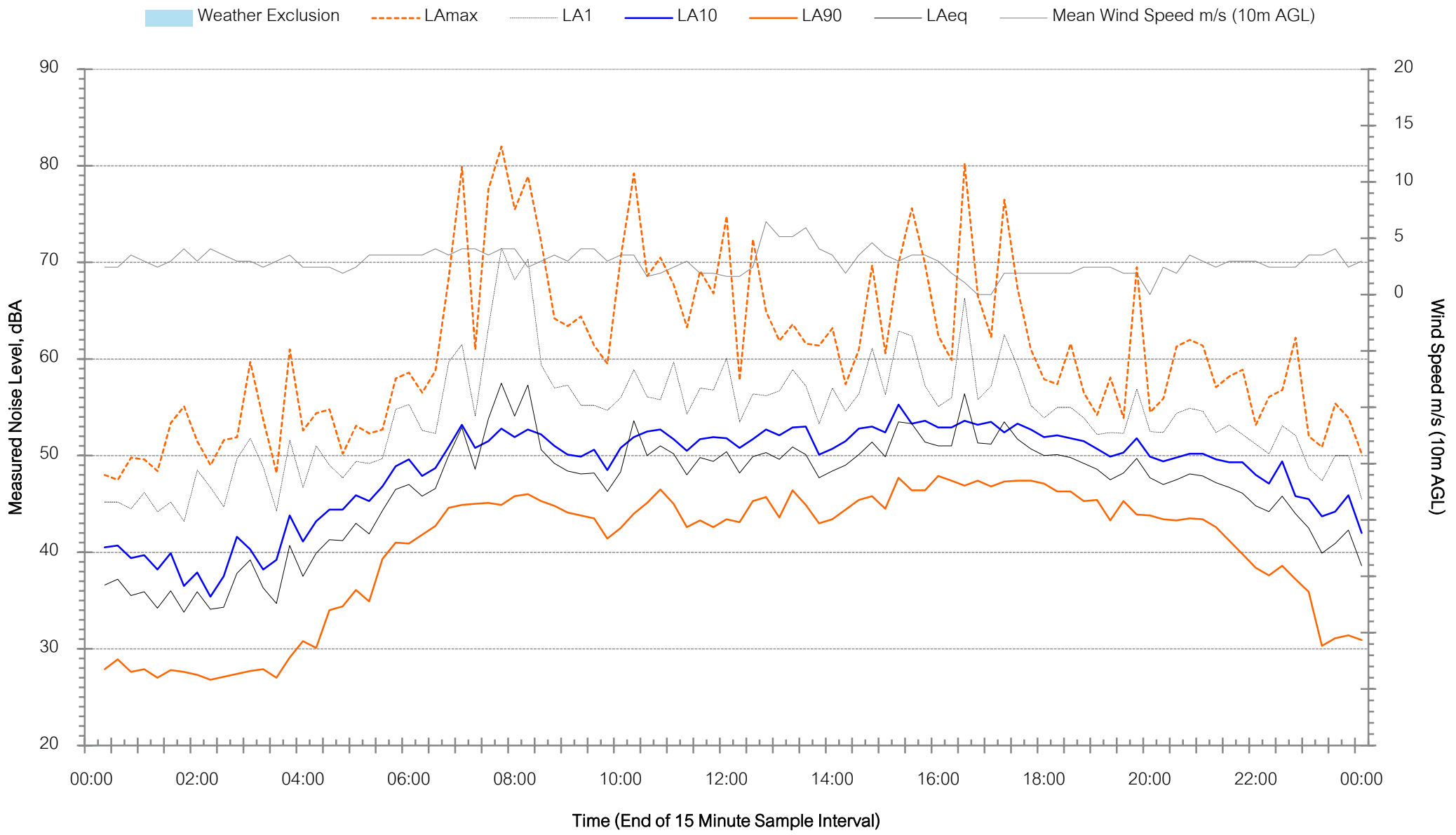
Background Noise Levels

The Loxford Estate, Gillieston Heights, NSW - Wednesday 31 July 2024



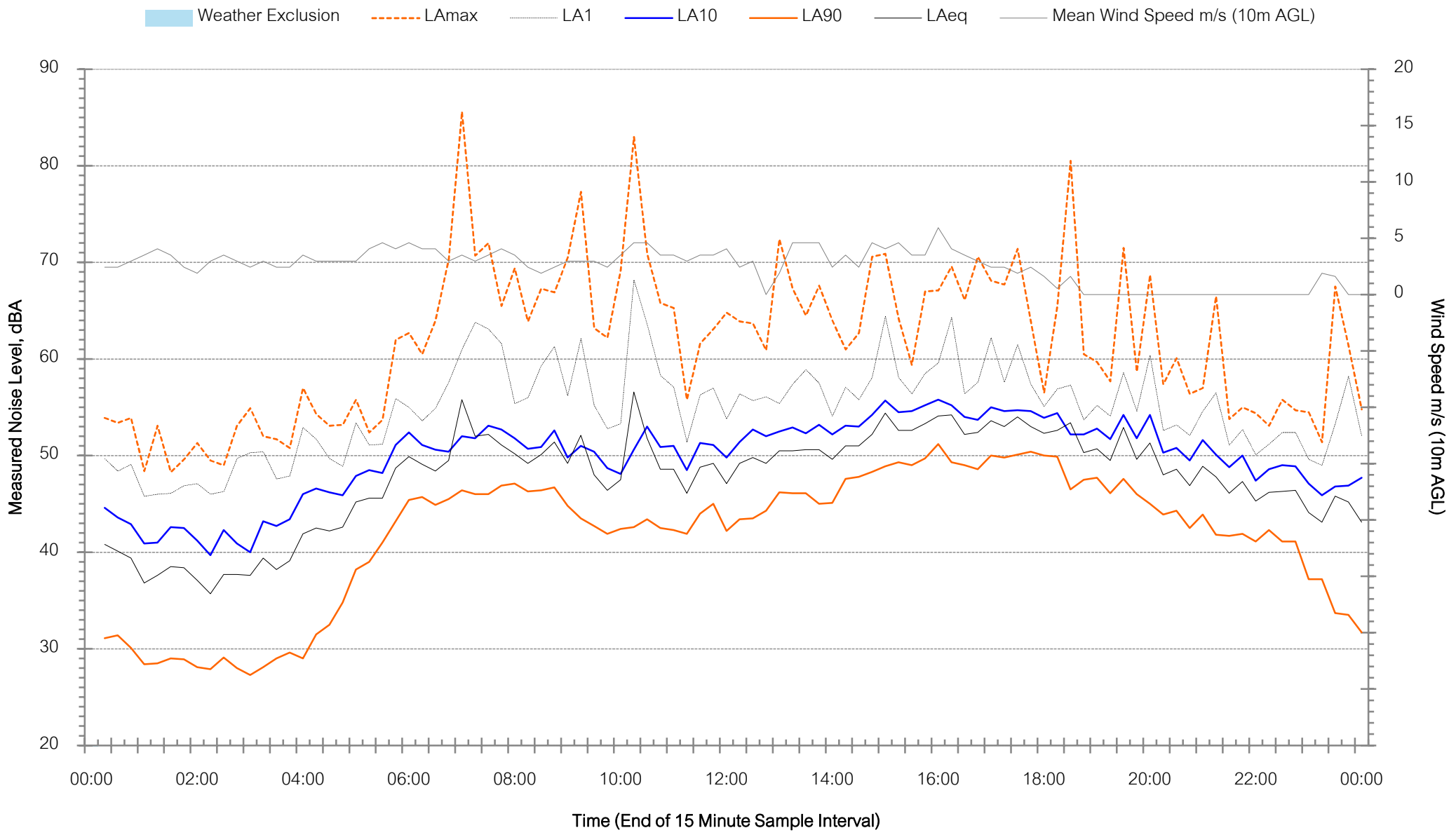
Background Noise Levels

The Loxford Estate, Gillieston Heights, NSW - Thursday 1 August 2024



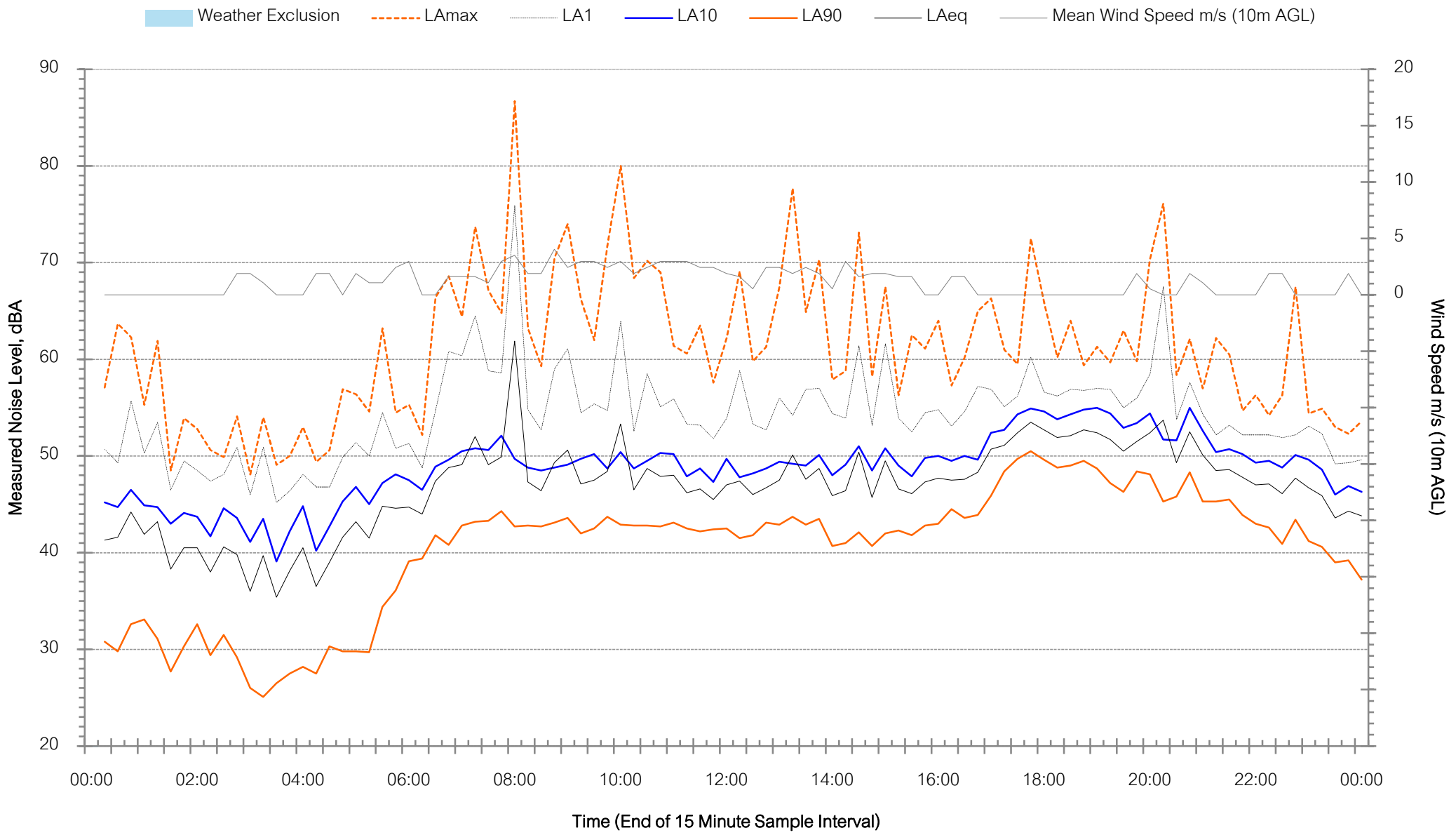
Background Noise Levels

The Loxford Estate, Gillieston Heights, NSW - Friday 2 August 2024



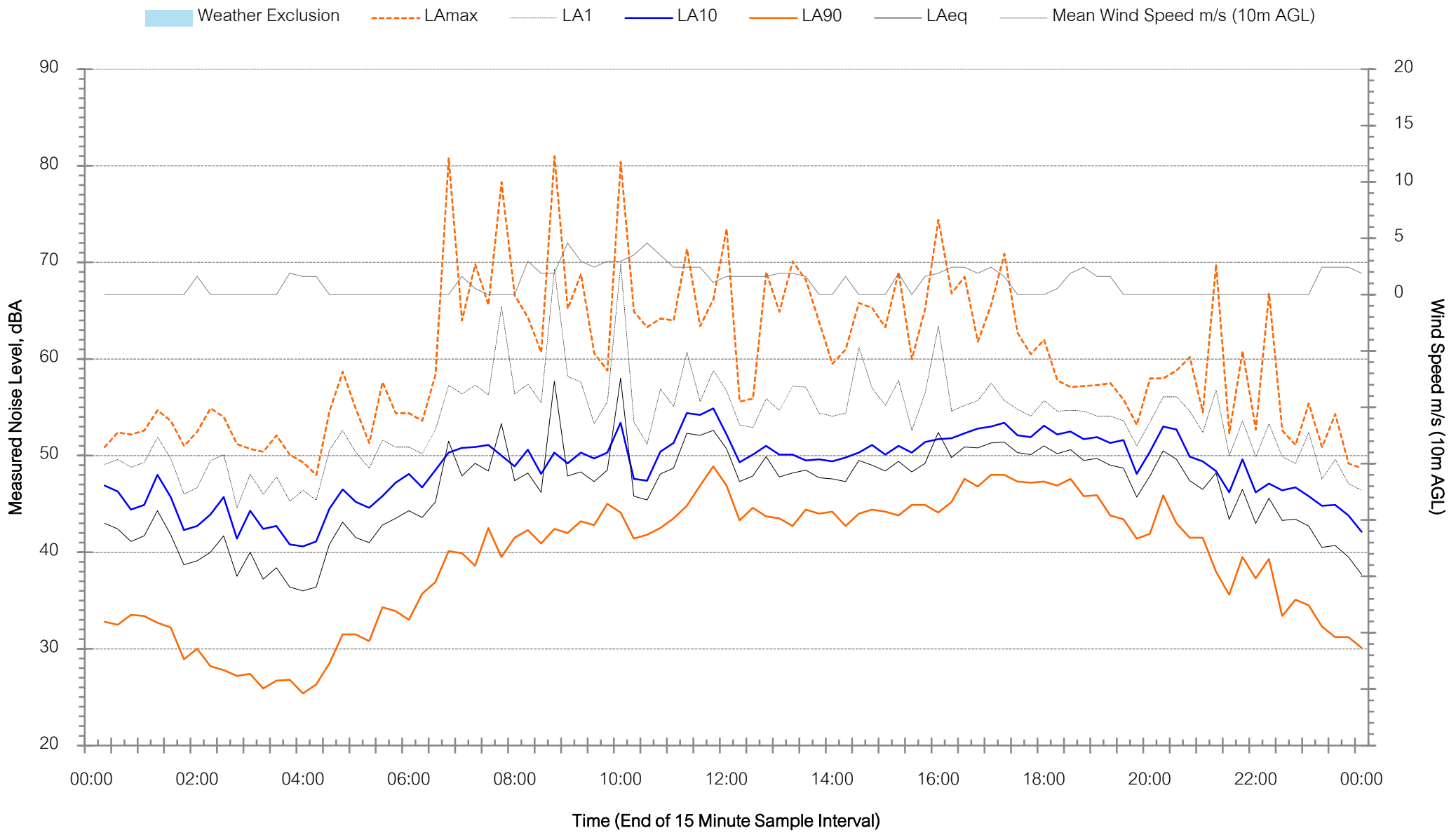
Background Noise Levels

The Loxford Estate, Gillieston Heights, NSW - Saturday 3 August 2024



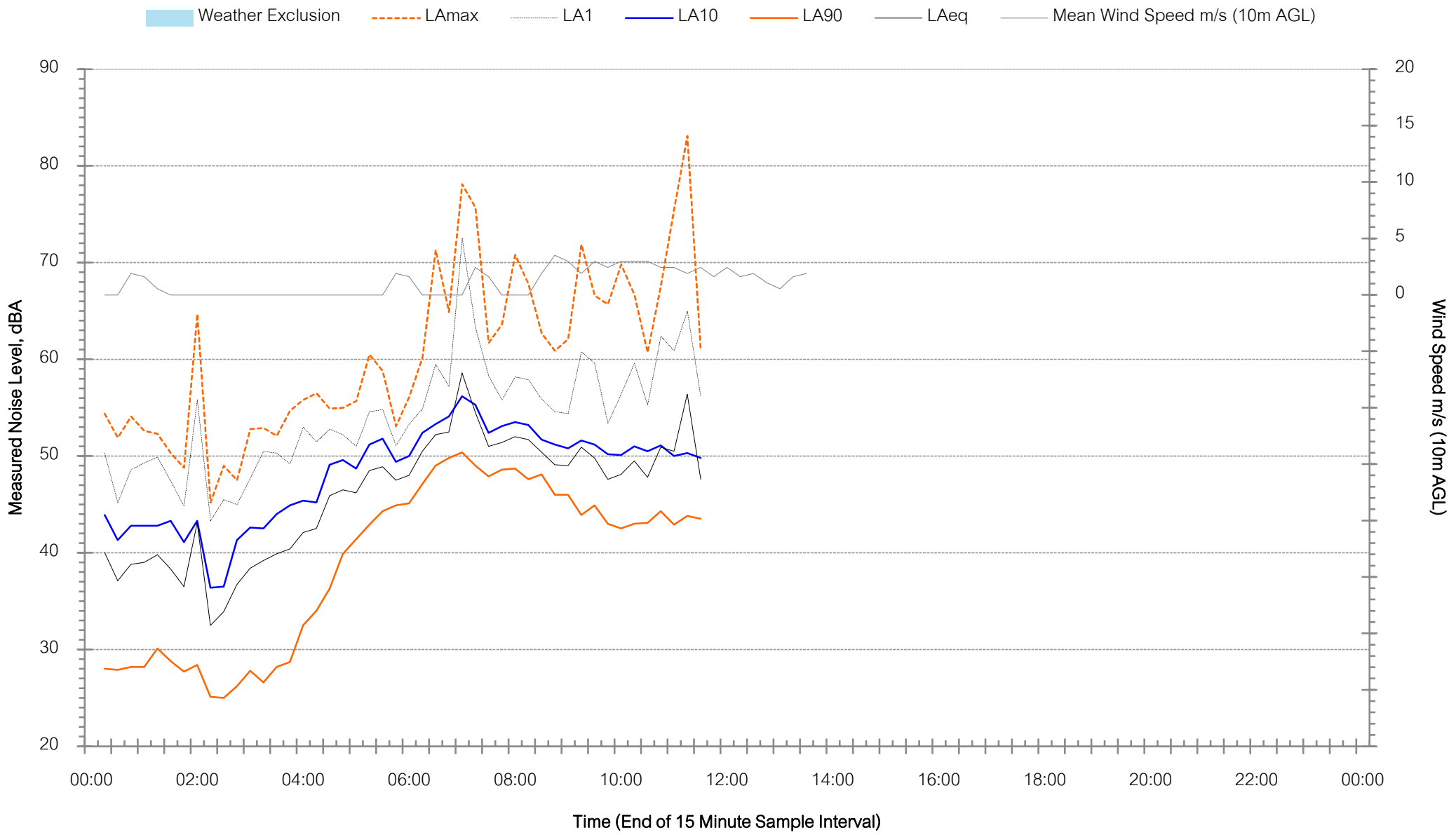
Background Noise Levels

The Loxford Estate, Gillieston Heights, NSW - Sunday 4 August 2024



Background Noise Levels

The Loxford Estate, Gillieston Heights, NSW - Monday 5 August 2024



Appendix D – Determination of NPI

Receiver Category

Table D24 - Determination of NPI Residential Receiver Category																																
			Land Use Zone				Typical Existing Background Noise Levels Table 2.3 NPI			Rural Residential - an area with an acoustical environment that:					Suburban Residential - an area that has:				Urban Residential- an area with an acoustical environment that:														
			RU1, RU2, RU4, R5, E4	RU5, RU6, R2, R3, R4, E2, E3	R1, R4, B1, B2, B4	Others	RURAL Daytime <40 Eve <35 Night <30	SUBURBAN Daytime <45 Eve <40 Night <35	URBAN Daytime >45 Eve >40 Night >35	is dominated by natural sounds.	having little or no road traffic noise	generally characterised by low background noise levels.	Settlement patterns would be typically sparse		local traffic with characteristically intermittent traffic flows	or with some limited commerce or industry.	evening ambient noise levels defined by the natural environment and human activity.		is dominated by 'urban hum' or industrial source noise	has through-traffic with characteristically heavy and continuous traffic flows during peak	is near commercial districts or industrial districts	has any combination of the above										
Location/ Catchment	Period	Measured RBL dB LA90(period)	Rural	Suburban	Urban	Commercial, Industrial																										
Location 1	Day	42			✓			✓								✓		✓														
	Evening	39			✓			✓								✓		✓														
	Night	30			✓		✓									✓		✓														

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 - RBL	Suburban - RBL	Urban - RBL	Rural - Description				Suburban - Description				Urban - Description					
Location 1	1	**8**	3	0	0	3	1	2	0	0	0	0	0	3	0	3		0	0	0	0		

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