Construction Noise Assessment and Management Plan and Acoustic Design Review

Proposed Residential Development
4 Fleet Street
Salamander Bay, NSW

Prepared for: Perception Planning
March 2025
MAC252376-01RP1

Muller Acoustic Consulting

Document Information

Construction Noise Assessment and Management Plan and Acoustic Design Review

Proposed Residential Development

4 Fleet Street

Salamander Bay, NSW

Prepared for: Perception Planning

260 Maitland Road

Mayfield NSW 2304

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
MAC252376-01RP1	27 March 2025	Robin Heaton		Oliver Muller	

CONTENTS

1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Perception Planning (PP) to prepare a Construction Noise Assessment and Management Plan (CNAMP) to quantify emissions from the proposed residential development to be located at 4 Fleet Street, Salamander Bay, NSW (the project).

Additionally, MAC have been commissioned to complete an Acoustic Design Review (ADR) of the intertenancy walls to inform the wall design and their adequacy against the appropriate performance with BCA standards at the project site.

The CNAMP and ADR are required as part of a Response for Further Information (RFI) for the Development Application (DA) issued by Port Stephens Council (PSC) for the project.

This CNAMP and ADR have been prepared in accordance with relevant legislative and regulatory requirements, and provides a framework for monitoring, communication, management, reporting and auditing. This assessment has been undertaken in accordance with the following documents:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- NSW Government – Transport for NSW (TfNSW) Construction Noise and Vibration Strategy V4.2 (CNVS) April 2020;
- Standards Australia AS 2436–2010 (R2016) (AS 2436) – Guide to Noise and Vibration Control on Construction, Demolition and Maintenance sites;
- 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;
- Australian Building Codes Board (ABCB), National Construction Code (NCC) Handbook – Sound Transmission and Insulation in Buildings, 2021;
- Australian Acoustical Consultants (AAC), Guideline for Apartment and Townhouse Acoustic Rating, 2010;
- CSR Gyprock, The Red Book Design Guide – Fire Acoustics and Thermaland; 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**..

1.1 Purpose and Objectives

The CNAMP has been prepared to assist with the management of noise emissions associated with project construction works. The CNAMP will assess potential construction noise impacts at off-site receivers and presents mitigation and management measures that may be implemented to effectively manage such emissions. The objectives of the CNAMP are as follows:

- minimise unreasonable noise impacts on receivers;
- comply with relevant construction noise management levels; and
- undertake active community consultation and maintain positive working relationships with neighbours.

The key components of the CNAMP include:

- identification of background noise levels and construction noise management criteria;
- evaluation of potential noise impacts on receivers;
- description of environmental management controls to mitigate potential noise impacts on receivers;
- procedures for monitoring and auditing of noise impacts against noise criteria; and
- procedures for the management of complaints and non-compliances.

In addition to the assessment and management of construction noise, the report will provide interparty wall design advice to assist with minimising internal airborne sound transmission between adjoining units.

The ADR has been prepared to review the interparty wall performance requirements to assist in providing adequate attenuation between the sole occupancy residences.

2 Project Description

2.1 Background

The project includes the additions and alterations to the existing tourist accommodation dwellings located at 4 Fleet Street, Salamander Bay, NSW. The project includes the refurbishment and refitting of 10 accommodation units along the southern portion of the project site and the demolition of existing cabins and construction of 29 townhouse dwellings. The project will be undertaken in five stages with the initial stage being the refurbishment of the existing units, followed by four stages of new builds. Site Plans are provided in **Appendix B,** which show the site layout and construction stages.

The project site is bound to the north and west by undeveloped bushland. The site is bound to the south by Fleet Street with the nearest existing residential receivers located to the east. Additional residential receivers are located to the south across Fleet Street. The project site as shown in **Figure 1**.

2.1.1 Receiver Review

A review of residential receivers in proximity to the project has been referenced from the historic assessment 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 Height (m)	Coordinates (GDA94/MGA56)	
			Easting	Northing
Offsite Residential Receivers				
R01	Residential	1.5m	412844	6379832
R02	Residential	1.5m	412884	6379846
R03	Residential	1.5m	412913	6379857
R04	Residential	1.5m	412939	6379865
R05	Residential	1.5m	412964	6379886
R06	Residential	1.5m	412980	6379892
R07	Residential	1.5m	413000	6379897
R08	Residential	1.5m	413022	6379900
R09	Residential	1.5m	413045	6379905
R10	Residential	1.5m	413082	6379918
R11	Residential	1.5m	413120	6379932
R12	Residential	1.5m	413125	6379924
R13	Residential	1.5/4.5m	413151	6379868
R14	Residential	1.5/4.5m	413129	6379829
R15	Residential	1.5/4.5m	413162	6379857
R16	Residential	1.5/4.5m	413170	6379845
R17	Residential	1.5/4.5m	413173	6379826
R18	Residential	1.5/4.5m	413181	6379814
R19	Residential	1.5/4.5m	413176	6379795
R20	Residential	1.5/4.5m	413176	6379784
R21	Residential	1.5/4.5m	413178	6379778
R22	Residential	1.5/4.5m	413177	6379767
R23	Residential	1.5/4.5m	413177	6379761
R24	Residential	1.5/4.5m	413182	6379754
R25	Residential	1.5/4.5m	413185	6379747
R26	Residential	1.5/4.5m	413184	6379742
R27	Residential	1.5/4.5m	413170	6379744
R28	Residential	1.5m	413193	6379709
R29	Residential	1.5m	413158	6379694
R30	Residential	1.5m	413140	6379689
R31	Residential	1.5m	413127	6379687
R32	Residential	1.5m	413115	6379683
R33	Residential	1.5m	413104	6379678
R34	Residential	1.5m	413090	6379674
R35	Residential	1.5m	413079	6379669
R36	Residential	1.5m	413064	6379664

Table 1 Receiver Locations				
Receiver	Description	Receiver Height (m)	Coordinates (GDA94/MGA56)	
			Easting	Northing
Offsite Residential Receivers				
R37	Residential	1.5m	413054	6379659
R38	Residential	1.5m	413039	6379655
R39	Residential	1.5m	413028	6379650
R40	Residential	1.5m	413019	6379646
R41	Residential	1.5m	413000	6379640
R42	Residential	1.5m	412989	6379634
R43	Residential	1.5m	412978	6379630
R44	Residential	1.5m	412970	6379628
R45	Residential	1.5m	412958	6379623
Onsite Project Related Receivers				
PR01	Residential	1.5m	413018	6379797
PR02	Residential	1.5m	413028	6379803
PR03	Residential	1.5m	413042	6379808
PR04	Residential	1.5m	413055	6379814
PR05	Residential	1.5m	413068	6379821
PR06	Residential	1.5m	413078	6379827
PR07	Residential	1.5m	413088	6379823
PR08	Residential	1.5m	413139	6379779
PR09	Residential	1.5m	413145	6379767
PR10	Residential	1.5m	413147	6379755
PR11	Residential	1.5m	413149	6379741
PR12	Residential	1.5m	413139	6379734
PR13	Residential	1.5m	413126	6379730
PR14	Residential	1.5m	413109	6379724
PR15	Residential	1.5m	413106	6379739
PR16	Residential	1.5m	413125	6379751
PR17	Residential	1.5m	413115	6379762

FIGURE 1

Locality PLan

MAC252376-01

4 Fleet Street,

Salamander Bay, NSW

KEY

- Receiver
- Unattended Noise Monitoring Location
- Attended Noise Monitoring Location
- Site Boundary

0 20 40 60 80 m

N

MAC
Muller Acoustic Consulting

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).

3.1.1 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 4.1**

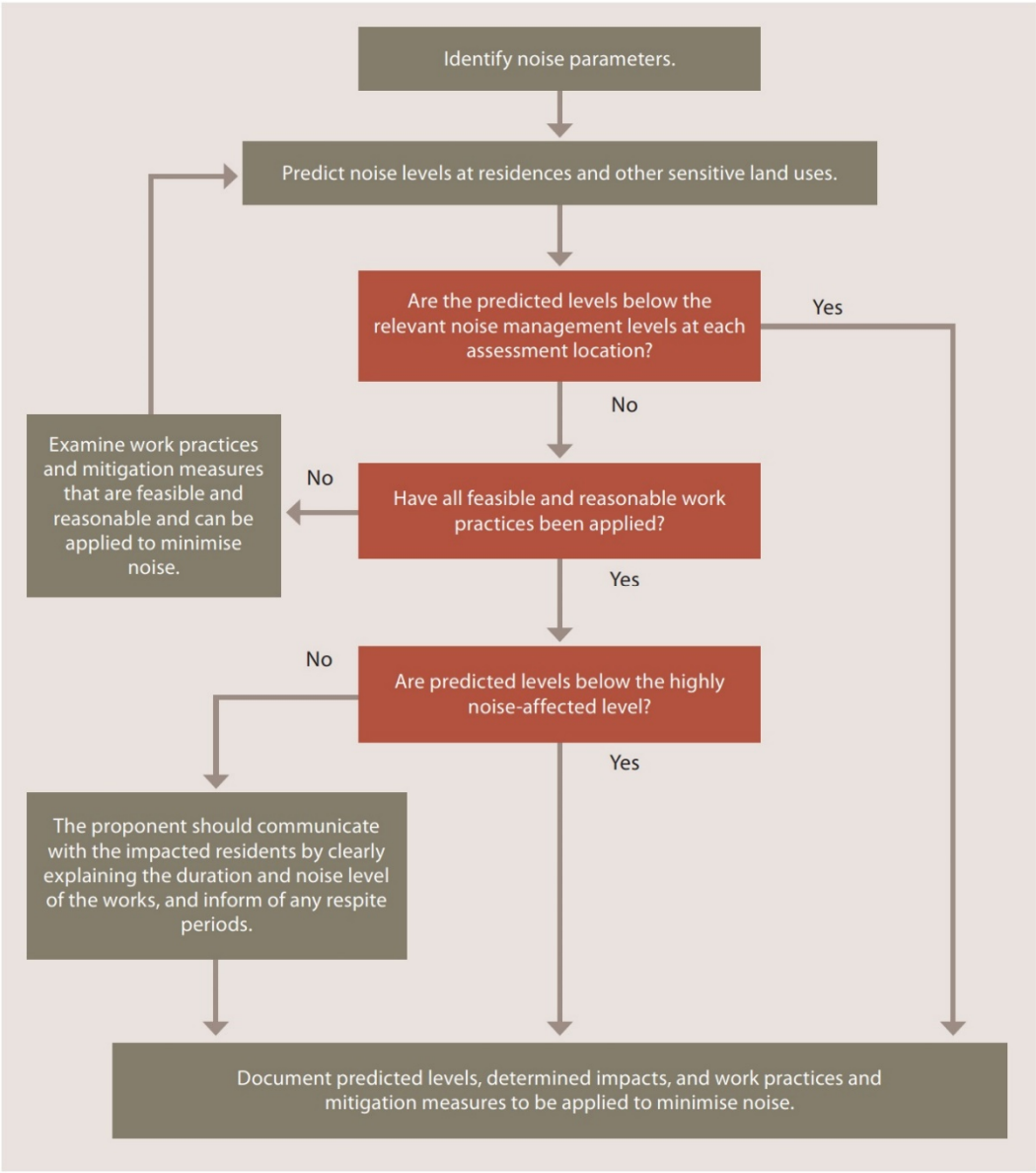
3.2 Interim Construction Noise Guideline

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 CNAMP 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 2 presents the ICNG recommended standard hours for construction works.

Table 2 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. As construction is to occur within standard construction hours, Out of Hours (OOH) construction is considered further in this management plan.

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 3** 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 3 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.

3.3 Wall Design Standards

MAC has completed a qualitative acoustic design review of the proposed intertenancy walls.

The deemed to comply design standards for acoustic separation requirements for a wall separating sole-occupancy units are provided Part F7 of the National Construction Code (NCC) Building Code of Australia (BCA). It is noted that the NCC design standards for acoustic separation are provided as a Weighted Sound Reduction Index (Rw), which is the single number value in decibels representing the sound insulation performance across the spectrum of audible frequencies of an individual building element. The overall Weighted Level Difference (Dw), which represents the “as-built” transmission loss of the composite of building elements (ie true performance) is dependent on factors including reverberation time and flanking pathways. To achieve the required sound insulation performance, reverberation times must be controlled, and flanking pathways minimised. Additionally, in accordance with BCA Part F7D6.6, where a wall required to have sound insulation has a roof above, the wall must continue to the underside of the roof, or to a ceiling that provides the same level of sound insulation required for the wall.

This page has been intentionally left blank

4 Existing Environment and Construction Noise Management Levels

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 are considered representative of surrounding residential receivers as per Fact Sheet B1.1 of the NPI.

The unattended noise surveys were 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 Tuesday 25 February 2025 to Thursday 6 March 2025. 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 local traffic and residential noise the dominant noise sources. 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 results of long-term unattended noise monitoring are provided in **Table 4**. The noise monitoring charts, and a summary of the background monitoring data are provided in **Appendix C.**

Table 4 Background Noise Monitoring Summary

Monitoring Location	Period[1]	Measured Background Noise Level (LA90) dB RBL	Measured dB LAeq
L1	Day	36	54
	Evening	36	51
	Night	31	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.

Note: Excludes periods of wind or rain affected data. Meteorological data obtained from the Bureau of Meteorology weather station Williamtown RAAF AWS (32.8°S 151.8E 8m 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 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 March 2025 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 5**.

Table 5 Operator-Attended Noise Survey Results

Date/Time (hrs)	Noise Descriptor (dB re 20µPa)			Meteorology	Description and SPL, dBA
	L_{Amax}	L_{Aeq}	L_{A90}		
10:52 06/03/2025	73	50	44	WD: N WS: 2.0m/s Rain: Nil	Traffic 43-73 Birds 44-65 Residential Equipment 35-38 Wind Blown Vegetation 42-60

4.3 Construction Noise Management Levels

The relevant Noise Management Levels (NMLs) for standard construction hours are presented in **Table 6**.

Table 6 Construction Noise Management Levels

Catchment (No) Receiver ID	Assessment Period[1]	Adopted RBL dB L_{A90}	NML dB $L_{Aeq(15min)}$
Residential	Standard Hours	36	46 (RBL+10dBA)

Note 1: Refer to Table 2 for Standard Recommended Hours for Construction.

5 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.

5.1 Construction Assessment Scenarios and Construction Stages

Construction activities are proposed to be progressive and will occur in five stages across the entire site. The proposed construction stages are shown in **Figure 3** Each stage will consist of four construction scenarios, with the exception of Stage 1 which will only include internal refit of the existing structures onsite. The four construction scenarios for each work stage are outlined below:

Scenario 1: Demolition of existing structures, earth moving and excavation of foundations;

Scenario 2: Concrete slabs;

Scenario 3: General building construction; and

Scenario 4: Internal fit out.

[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

The construction scenarios, noise emission data and assumptions used in this assessment are summarised in **Table 7.**

Table 7 Construction Equipment Sound Power Levels, Lw dBA (re 10^{-12} Watts)

Scenario Description	Items	Number of	Lw
Scenario 1 – Demolition Works			
Demolition of Required Sections and required preparation works[1]	Excavator – Tracked 10t	2	103
	Handheld Jackhammer	1	113
	Truck – Medium rigid (20 tonne)	2	106
	Hand tools	1	103
Total Scenario Sound Power			**115**
Scenario 2 – Pouring Concrete Driveway Slabs and General Building Construction			
Install reo formation work pour concrete slabs[1]	Generator (attenuated)	1	92
	Grinders	2	108
	Truck – Concrete	2	112
	Vibrator – Concrete	2	116
Total Scenario Sound Power			**118**
Scenario 3 – Installation of New Roof and Mechanical Plant			
Install roof roof insulation roof Construction Install mechanical plant[1]	Crane – Franna (20 tonne)	2	101
	Elevated work platform – Scissor lift	2	100
	Grinder	2	108
	Saw – Concrete	1	118
	Truck – Medium rigid 20 tonne)	2	106
	Truck – Concrete	1	109
	Hand tools	1	103
Total Scenario Sound Power			**119**
Scenario 4 – Internal Fit out			
Internal Fit out and install final equipment[1]	Crane – Franna (20 tonne)	1	98
	Elevated work platform – Scissor lift	2	100
	Grinder	2	108
	Truck – Medium rigid (20 tonne)	2	106
	Hand tools	1	103
Total Scenario Sound Power			**110**

Note 1: All scenarios have been modelled at 1.5m above ground level.

Sound Power Levels (SWLs) range from 110dBA to 119dBA which is representative of the combined noise level for specific construction activities. It should be noted that some items may be interchanged within each activity and would have no influence on the overall noise level of each activity or predicted noise levels.

CONSTRUCTION STAGING DIAGRAM

STAGE 1: RENOVATION TO CABINS, GARAGES G1-G3
STAGE 2: TH1-3, TH5-6 (5 DWELLINGS)
STAGE 3: ANGEL CLOSE, TH8, 10, 12, 14, 16, 18, 20, 22 (8 DWELLINGS)
STAGE 4: TH7, 9, 11, 13, 15, 17, 19, 21, 23, 24, 25 (11 DWELLINGS)
STAGE 5: TH26, 27, 28, 29, 30, 31, 32, 33 (8 DWELLINGS).

1 MASTERPLAN
1:1000

EJE ARCHITECTURE

REV	DATE	COMMENTS
H	21/04/2024	ISSUE FOR DA
I	12/07/2024	REVISED ISSUE FOR CAVL
J	6/08/2024	ISSUE FOR INFORMATION
K	21/08/2024	ISSUE FOR INFORMATION
L	23/09/2024	ISSUE FOR DA
M	26/09/2024	ISSUE FOR DA
N	25/09/2024	ISSUE FOR DA
O	27/09/2024	ISSUE FOR DA
P	3/10/2024	ISSUE FOR DA

PROJECT: WANDA BEACH ESTATE

SITE: 4 FLEET STREET, SALAMANDER BAY NSW 2317 (WORIMI COUNTRY)

CLIENT: NEIL SLATER, STEPHEN LAMBOURNE

DRAWING: MASTERPLAN / STAGING PLAN

NOT FOR CONSTRUCTION

DRAWN: GVC | DATE: 3/10/2024 | SCALE @A1: 1:1000

PROJECT No: 14076 | PHASE: DA | DRAWING No: A01 | REV: P

EJE architecture

This page has been intentionally left blank

6 Noise Assessment Results

This assessment has quantified construction noise levels at the nearest receivers

6.1 Construction Noise Assessment

Table 8 summarises the predicted noise levels for construction Scenario 4, during Stage 1 works at the closest noise sensitive receivers. Where a predicted noise level is above the NML at an assessed receiver, it is highlighted in **Bold**.

Table 8 Stage 1 Construction Noise Predictions – All Receivers

Rec	Predicted Noise Level dB $L_{Aeq(15min)}$	NML
	Scenario 4	dB $L_{Aeq(15min)}$
	Offsite Residential Receivers	
R01	43	46
R02	43	46
R03	43	46
R04	41	46
R05	42	46
R06	41	46
R07	41	46
R08	40	46
R09	41	46
R10	40	46
R11	42	46
R12	40	46
R13	37	46
R14	**49**	46
R15	39	46
R16	**47**	46
R17	**53**	46
R18	**50**	46
R19	**52**	46
R20	**52**	46
R21	**53**	46
R22	**53**	46
R23	**53**	46
R24	**54**	46
R25	**51**	46
R26	44	46
R27	**53**	46

Table 8 Stage 1 Construction Noise Predictions – All Receivers		
Rec	Predicted Noise Level dB $LA_{eq(15min)}$	NML
	Scenario 4	dB $LA_{eq(15min)}$
R28	**52**	46
R29	**56**	46
R30	**58**	46
R31	**59**	46
R32	**62**	46
R33	**61**	46
R34	**63**	46
R35	**62**	46
R36	**62**	46
R37	**61**	46
R38	**61**	46
R39	**60**	46
R40	**56**	46
R41	**58**	46
R42	**57**	46
R43	**56**	46
R44	**57**	46
R45	**55**	46
Onsite Project Related Receivers		
PR01	46	46
PR02	**52**	46
PR03	**54**	46
PR04	**52**	46
PR05	**52**	46
PR06	**54**	46
PR07	**56**	46
PR08	**56**	46
PR09	46	46
PR10	**51**	46
PR11	**56**	46
PR12	**57**	46
PR13	**62**	46
PR14	**65**	46
PR15	**68**	46
PR16	**62**	46
PR17	**65**	46

Table 9 summarises the predicted noise level for all construction scenarios during Stage 2 works at the closest noise sensitive receivers. Where a predicted noise level is above the NML at an assessed receiver, it is highlighted in **Bold.**

Table 9 Stage 2 Construction Noise Predictions – All Receivers

Rec	Predicted Noise Level dB $LA_{eq(15min)}$				NML
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	dB $LA_{eq(15min)}$
Residential Receivers					
R01	44	44	44	44	46
R02	44	44	44	44	46
R03	45	45	45	45	46
R04	46	46	46	46	46
R05	**47**	**47**	**48**	**47**	46
R06	**48**	**48**	**48**	**48**	46
R07	41	41	41	41	46
R08	**49**	**49**	**49**	**49**	46
R09	**52**	**52**	**52**	**52**	46
R10	**49**	**49**	**49**	**49**	46
R11	**50**	**50**	**50**	**50**	46
R12	**52**	**52**	**52**	**52**	46
R13	**48**	**48**	**48**	**48**	46
R14	**79**	**79**	**79**	**79**	46
R15	**56**	**55**	**55**	**56**	46
R16	**62**	**62**	**61**	**62**	46
R17	**67**	**67**	**67**	**67**	46
R18	**67**	**67**	**67**	**67**	46
R19	**69**	**69**	**69**	**69**	46
R20	**68**	**68**	**68**	**68**	46
R21	**67**	**67**	**67**	**67**	46
R22	**65**	**65**	**65**	**65**	46
R23	**64**	**64**	**64**	**64**	46
R24	**63**	**63**	**62**	**63**	46
R25	**61**	**61**	**61**	**61**	46
R26	**60**	**60**	**60**	**60**	46
R27	**59**	**59**	**59**	**59**	46
R28	**51**	**51**	**51**	**51**	46
R29	**52**	**52**	**52**	**52**	46
R30	**49**	**49**	**49**	**49**	46
R31	**49**	**49**	**49**	**49**	46
R32	**50**	**50**	**50**	**50**	46
R33	**51**	**51**	**51**	**51**	46

Table 9 Stage 2 Construction Noise Predictions – All Receivers					
Rec	Predicted Noise Level dB $LA_{eq(15min)}$				NML
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	dB $LA_{eq(15min)}$
R34	**57**	**56**	**56**	**56**	46
R35	**55**	**55**	**55**	**55**	46
R36	**53**	**53**	**53**	**53**	46
R37	**52**	**52**	**52**	**52**	46
R38	**47**	**47**	**47**	**47**	46
R39	44	44	44	45	46
R40	35	35	35	35	46
R41	41	41	41	41	46
R42	40	40	40	40	46
R43	40	40	40	40	46
R44	40	40	40	40	46
R45	39	39	39	39	46
Onsite Project Related Receivers					
PR01	**58**	**58**	**58**	**58**	46
PR02	**60**	**60**	**60**	**60**	46
PR03	**62**	**62**	**62**	**62**	46
PR04	**63**	**63**	**63**	**63**	46
PR05	**63**	**63**	**63**	**63**	46
PR06	**63**	**63**	**63**	**63**	46
PR07	**67**	**67**	**68**	**67**	46
PR08	**73**	**73**	**73**	**74**	46
PR09	**68**	**68**	**68**	**68**	46
PR10	**66**	**66**	**66**	**66**	46
PR11	**63**	**63**	**63**	**63**	46
PR12	**61**	**61**	**61**	**61**	46
PR13	**59**	**59**	**59**	**59**	46
PR14	**54**	**54**	**54**	**54**	46
PR15	**62**	**62**	**62**	**62**	46
PR16	**52**	**52**	**52**	**52**	46
PR17	**69**	**69**	**69**	**69**	46

Table 10 summarises the predicted noise level for all construction scenarios during Stage 3 works at the closest noise sensitive receivers. Where a predicted noise level is above the NML at an assessed receiver, it is highlighted in **Bold**.

Table 10 Stage 3 Construction Noise Predictions – All Receivers

Rec	Predicted Noise Level dB $LA_{eq(15min)}$				NML
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	dB $LA_{eq(15min)}$
Residential Receivers					
R01	**53**	**53**	**52**	**52**	46
R02	**53**	**53**	**53**	**53**	46
R03	**55**	**55**	**55**	**55**	46
R04	**53**	**53**	**53**	**53**	46
R05	**53**	**53**	**53**	**53**	46
R06	**50**	**50**	**50**	**50**	46
R07	**51**	**51**	**51**	**51**	46
R08	**50**	**50**	**50**	**50**	46
R09	**49**	**49**	**49**	**49**	46
R10	**48**	**48**	**48**	**48**	46
R11	**51**	**51**	**51**	**51**	46
R12	**50**	**50**	**50**	**50**	46
R13	45	45	45	45	46
R14	**68**	**68**	**68**	**68**	46
R15	44	44	44	44	46
R16	45	45	45	45	46
R17	**56**	**56**	**56**	**56**	46
R18	**59**	**59**	**59**	**59**	46
R19	**59**	**59**	**59**	**59**	46
R20	**56**	**56**	**56**	**56**	46
R21	**55**	**55**	**55**	**55**	46
R22	**54**	**54**	**54**	**54**	46
R23	**55**	**55**	**55**	**55**	46
R24	**54**	**54**	**54**	**54**	46
R25	**54**	**54**	**54**	**54**	46
R26	**51**	**51**	**51**	**51**	46
R27	**53**	**53**	**53**	**53**	46
R28	**48**	**48**	**48**	**48**	46
R29	**48**	**48**	**48**	**48**	46
R30	**50**	**50**	**50**	**50**	46
R31	**51**	**51**	**51**	**51**	46
R32	**51**	**51**	**51**	**51**	46
R33	**51**	**51**	**51**	**51**	46

Table 10 Stage 3 Construction Noise Predictions – All Receivers					
Rec	Predicted Noise Level dB $LA_{eq(15min)}$				NML
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	dB $LA_{eq(15min)}$
R34	**50**	**50**	**50**	**50**	46
R35	**47**	**47**	**47**	**47**	46
R36	**46**	**46**	**46**	**46**	46
R37	45	45	45	45	46
R38	44	44	44	44	46
R39	43	43	43	43	46
R40	41	41	41	41	46
R41	45	45	45	45	46
R42	46	46	46	46	46
R43	**47**	**47**	**47**	**47**	46
R44	**47**	**47**	**47**	**47**	46
R45	**47**	**47**	**47**	**47**	46
Onsite Project Related Receivers					
PR01	**76**	**75**	**75**	**76**	46
PR02	**76**	**76**	**76**	**76**	46
PR03	**77**	**77**	**77**	**77**	46
PR04	**78**	**78**	**78**	**78**	46
PR05	**78**	**78**	**77**	**77**	46
PR06	**77**	**77**	**77**	**77**	46
PR07	**77**	**79**	**79**	**79**	46
PR08	**60**	**60**	**60**	**60**	46
PR09	**57**	**57**	**57**	**57**	46
PR10	**49**	**49**	**49**	**49**	46
PR11	**48**	**48**	**48**	**48**	46
PR12	**50**	**50**	**50**	**50**	46
PR13	**54**	**54**	**54**	**54**	46
PR14	**51**	**51**	**51**	**51**	46
PR15	**51**	**51**	**51**	**51**	46
PR16	**50**	**50**	**50**	**50**	46
PR17	**52**	**52**	**52**	**52**	46

Table 11 summarises the predicted noise level for all construction scenarios during Stage 4 works at the closest noise sensitive receivers. Where a predicted noise level is above the NML at an assessed receiver, it is highlighted in **Bold**.

Table 11 Stage 4 Construction Noise Predictions – All Receivers

Rec	Predicted Noise Level dB $LA_{eq(15min)}$				NML
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	dB $LA_{eq(15min)}$
Residential Receivers					
R01	**50**	**53**	**56**	**46**	46
R02	**51**	**53**	**57**	**47**	46
R03	**52**	**55**	**58**	**48**	46
R04	**50**	**53**	**56**	**46**	46
R05	**50**	**53**	**56**	**47**	46
R06	**49**	**51**	**55**	45	46
R07	**49**	**52**	**55**	46	46
R08	**47**	**49**	**53**	43	46
R09	**47**	**49**	**53**	43	46
R10	**47**	**49**	**53**	43	46
R11	**48**	**51**	**54**	45	46
R12	**47**	**50**	**53**	43	46
R13	**45**	**47**	**51**	41	46
R14	**68**	**71**	**74**	**64**	46
R15	44	**46**	**50**	40	46
R16	**50**	**53**	**56**	46	46
R17	**62**	**66**	**68**	**58**	46
R18	**61**	**65**	**67**	**57**	46
R19	**59**	**62**	**65**	**55**	46
R20	**57**	**59**	**63**	**53**	46
R21	**57**	**60**	**63**	**53**	46
R22	**57**	**60**	**63**	**53**	46
R23	**57**	**60**	**63**	**54**	46
R24	**57**	**59**	**63**	**53**	46
R25	**56**	**59**	**62**	**52**	46
R26	**52**	**55**	**58**	**48**	46
R27	**56**	**59**	**63**	**53**	46
R28	**52**	**55**	**58**	**48**	46
R29	**51**	**54**	**57**	**47**	46
R30	**53**	**55**	**59**	**49**	46
R31	**54**	**56**	**60**	**50**	46
R32	**54**	**57**	**60**	**50**	46
R33	**56**	**59**	**62**	**52**	46

Table 11 Stage 4 Construction Noise Predictions – All Receivers					
Rec	Predicted Noise Level dB $LA_{eq(15min)}$				NML
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	dB $LA_{eq(15min)}$
R34	**56**	**59**	**62**	**51**	46
R35	**50**	**53**	**56**	**46**	46
R36	**47**	**50**	**54**	44	46
R37	**47**	**49**	**53**	43	46
R38	46	**48**	**52**	42	46
R39	44	**46**	**50**	41	46
R40	39	42	45	36	46
R41	43	45	**49**	40	46
R42	43	45	**49**	39	46
R43	43	45	**49**	39	46
R44	43	46	**49**	40	46
R45	44	**46**	**50**	40	46
Onsite Project Related Receivers					
PR01	**62**	**65**	**68**	**58**	46
PR02	**64**	**67**	**70**	**60**	46
PR03	**65**	**68**	**72**	**61**	46
PR04	**63**	**66**	**69**	**59**	46
PR05	**62**	**65**	**68**	**58**	46
PR06	**64**	**67**	**70**	**60**	46
PR07	**66**	**69**	**72**	**62**	46
PR08	**68**	**71**	**74**	**64**	46
PR09	**64**	**68**	**71**	**60**	46
PR10	**57**	**60**	**63**	**53**	46
PR11	**56**	**58**	**62**	**52**	46
PR12	**60**	**63**	**66**	**56**	46
PR13	**62**	**65**	**68**	**58**	46
PR14	**60**	**63**	**66**	**56**	46
PR15	**65**	**69**	**71**	**61**	46
PR16	**67**	**70**	**73**	**62**	46
PR17	**73**	**76**	**79**	**69**	46

Table 12 summarises the predicted noise level for all construction scenarios during Stage 5 works at the closest noise sensitive receivers. Where a predicted noise level is above the NML at an assessed receiver, it is highlighted in **Bold**.

Table 12 Stage 5 Construction Noise Predictions – All Receivers

Rec	Predicted Noise Level dB $LA_{eq(15min)}$				NML
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	dB $LA_{eq(15min)}$
Residential Receivers					
R01	**56**	**59**	**62**	**52**	46
R02	**58**	**61**	**64**	**54**	46
R03	**61**	**64**	**67**	**56**	46
R04	**60**	**63**	**66**	**56**	46
R05	**61**	**64**	**67**	**57**	46
R06	**58**	**61**	**64**	**54**	46
R07	**56**	**59**	**62**	**52**	46
R08	**49**	**51**	**55**	45	46
R09	46	**48**	**52**	42	46
R10	**47**	**49**	**53**	43	46
R11	**48**	**51**	**54**	45	46
R12	**49**	**52**	**55**	46	46
R13	38	39	43	34	46
R14	**62**	**65**	**68**	**58**	46
R15	40	41	46	36	46
R16	42	43	**47**	38	46
R17	**53**	**56**	**59**	**49**	46
R18	**53**	**56**	**59**	**49**	46
R19	**51**	**54**	**58**	**48**	46
R20	**50**	**52**	**56**	**46**	46
R21	**51**	**54**	**58**	**48**	46
R22	**51**	**54**	**57**	**47**	46
R23	**51**	**54**	**57**	**47**	46
R24	**52**	**55**	**58**	**48**	46
R25	**51**	**54**	**58**	**48**	46
R26	42	**44**	**48**	38	46
R27	**51**	**53**	**57**	**47**	46
R28	**48**	**51**	**54**	44	46
R29	**48**	**50**	**54**	44	46
R30	**48**	**50**	**54**	44	46
R31	**49**	**52**	**55**	45	46
R32	**49**	**51**	**55**	45	46
R33	**47**	**49**	**53**	43	46

Table 12 Stage 5 Construction Noise Predictions – All Receivers					
Rec	Predicted Noise Level dB $LA_{eq(15min)}$				NML
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	dB $LA_{eq(15min)}$
R34	**48**	**50**	**54**	44	46
R35	**47**	**49**	**53**	43	46
R36	46	**47**	**51**	42	46
R37	46	**47**	**51**	42	46
R38	**52**	**54**	**57**	**48**	46
R39	**54**	**57**	**60**	**50**	46
R40	**55**	**58**	**61**	**51**	46
R41	**56**	**59**	**62**	**52**	46
R42	**55**	**58**	**61**	**51**	46
R43	**55**	**58**	**61**	**51**	46
R44	**54**	**57**	**60**	**50**	46
R45	**54**	**57**	**60**	**50**	46
Onsite Project Related Receivers					
PR01	**83**	**86**	**89**	**79**	46
PR02	**74**	**77**	**80**	**70**	46
PR03	**69**	**72**	**75**	**65**	46
PR04	**65**	**69**	**72**	**61**	46
PR05	**63**	**66**	**69**	**59**	46
PR06	**62**	**65**	**68**	**58**	46
PR07	**62**	**65**	**68**	**58**	46
PR08	**51**	**53**	**57**	**47**	46
PR09	45	**47**	**51**	41	46
PR10	45	**46**	**51**	41	46
PR11	**47**	**49**	**53**	43	46
PR12	**47**	**49**	**53**	43	46
PR13	**52**	**55**	**59**	**49**	46
PR14	**49**	**51**	**55**	45	46
PR15	**49**	**51**	**55**	45	46
PR16	**49**	**51**	**55**	45	46
PR17	**52**	**54**	**58**	**48**	46

Received noise levels are expected to generally exceed the NMLs during construction works. Accordingly, recommendations to reduce the impact of construction noise emissions on surrounding receivers are provided in **Section 9**.

6.2 Acoustic Design Review

Section f7P2 of the NCC states:

"a wall separating sole-occupancy units has a weighted standardised level difference with spectrum adaptation term (DnT,W+Ctr) not less than 45"

The Association of Australasian Acoustical Consultants (AAAC) Guideline for Apartment and Townhouse Acoustic Rating provides a star rated system for internal apartment sources such as occupant raised speech and amplified entertainment noise. This rating system is reproduced in **Table 13**.

Table 13 Star Ratings for Various Attributes of Acoustic Performance

	Sound Insulation expressed as $D_{nT,w} + C_{tr}$				
	35	40	45	50	55
Type of Noise Source	2 Star	3 Star	4 Star	5 Star	6 Star
Normal Speech	Audible	Just Audible	Not Audible	Not Audible	Not Audible
Raised Speech	Clearly Audible	Audible	Just Audible	Not Audible	Not Audible
Dinner Party / Laughter	Clearly Audible	Audible	Just Audible	Not Audible	Not Audible
Shouting	Clearly Audible	Clearly Audible	Audible	Just Audible	Not Audible
Small Television / Small Entertainment System	Clearly Audible	Clearly Audible	Audible	Just Audible	Not Audible
Large Television / Large Hi-fi Music System	Clearly Audible	Clearly Audible	Clearly Audible	Audible	Just Audible
DVD with Surround Sound	Clearly Audible	Clearly Audible	Clearly Audible	Audible	Audible
Digital Television with Surround Sound	Clearly Audible	Clearly Audible	Clearly Audible	Audible	Audible

Source: The Association of Australasian Acoustical Consultants (AAAC) Guideline for Apartment and Townhouse, 2017.

As a conservative approach, to satisfy the requirement s of Section f7P2 of the NCC and to adequately attenuate the noise from shouting or a small entertainment system to be just audible, a 5-star wall with a DnT,W+Ctr of 50 is recommended. Examples of wall systems which satisfy the design requirement were sourced from The Redbook Design Guide (CSR Gyprock 2023) and are reproduced in **Appendix D.**

Once the final wall design is selected, MAC can review the proposed construction elements and confirm the design will satisfy the requirements of a 5-star wall.

This page has been intentionally left blank

7 Noise Mitigation of Construction Activities

The primary objective of the CNAMP is to minimise noise impacts on surrounding receivers. The project construction manager may adopt the following hierarchical strategy to achieve this objective:

- demonstrate that construction activities meet Noise Management Levels within the allowable hours of construction as far as practicable;
- where noise levels are above relevant Noise Management Levels, implement reasonable and feasible best practice noise controls to minimise noise emissions and/or exposure duration at affected receivers; and
- where the use of best practice noise controls does not adequately address exceedance of Noise Management Levels, adopt alternative measures to minimise impacts on the community.

Standards Australia AS 2436-2010 “Guide to Noise Control on Construction, Maintenance and Demolition Sites” sets out numerous practical recommendations to assist in mitigating construction noise emissions. These recommendations include operational strategies, source noise control strategies, noise barrier control strategies, and community consultation.

7.1 Noise Management Recommendations

During construction and demolition activities, the following mitigation strategies (see **Table 13**) may be employed to manage noise.

Table 13 Construction Noise Mitigation Measures

Mitigation Level	Mitigation Measures
Standard Mitigation	▪ Toolbox and induction of personnel prior to shift to discuss noise control measures that may be implemented to reduce noise emissions to surrounding receivers; ▪ Training (of employees to conduct quieter work practices); ▪ Equipment which is used intermittently is to be shut down when not in use; ▪ Where possible, machinery will be located/orientated to direct noise away from the closest sensitive receivers; ▪ Undertake regular maintenance of machinery to minimise noise emissions. Maintenance will be confined to standard daytime construction hours and where possible, away from noise sensitive receivers; ▪ The quietest suitable machinery reasonably available will be selected for each work activity; ▪ Avoid queuing of vehicles adjacent to any receivers; ▪ Where practicable, ensure noisy plant/machinery are not working simultaneously in close proximity to receivers; ▪ Where possible, all plant are to utilise a broad band reverse alarm in lieu of the traditional hi-frequency type reverse alarm; and ▪ Minimising the need for reversing or movement alarms.
Level 1 Mitigation (Including Standard Mitigation Level)	▪ Scheduling of construction activities to minimise the number of work fronts and simultaneous activities occurring along the boundary to minimise noise levels; ▪ Wherever possible, subject to feasibility and reasonability, the quietest plant and equipment should be utilised in combination with management measures to minimise noise impacts; ▪ Where vehicle queuing is required, for example due to safety reasons, engines are to be switched off to reduce their overall noise impacts on receivers; ▪ Notification of OOH works; and ▪ Conduct noise monitoring to validate noise emissions are within NMLs.
Level 2 Mitigation (Including Mitigation Level 1)	▪ Use mobile noise screens (which can achieve noise reductions of up to 8dBA), optimise the positioning of plant and equipment to minimise line of site to receivers or substitute noisy equipment to reduce the noise level at nearby receivers for these activities; ▪ Conduct noise monitoring to validate noise emissions are within NMLs; ▪ Respite periods; and ▪ Potential temporary alternative accommodation.

Employing these strategies could potentially result in noise level reductions ranging:

- Standard Mitigation – up to 10dBA in instances where space requirements place limitations on the attenuation options available;
- Level 1 Mitigation – potentially up to 20dBA depending on mixture of measures and noise sources in operation, location and proximity to receivers; and
- Level 2 Mitigation – potentially over 20dBA where the use of enclosures, silencers, etc) can be combined with noise barriers and management techniques (eg avoidance of clustering).

Should compliance noise monitoring indicate exceedances of the noise criteria, a combination of comprehensive noise mitigation treatments (i.e. noise barriers, equipment enclosures, silencers, regular equipment maintenance, etc) and consultation with the local community will be considered on a case-by-case basis to manage exceedances. Further descriptions of management measures and mitigation options are provided for specific construction activities and work areas in the following sections.

7.2 Exceedance of Management Levels

Where monitoring indicates exceedances, Additional Mitigation Measures and controls may be considered to minimise impacts to nearby sensitive receptors.

The objectives of the noise monitoring program are as follows:

- assess construction noise levels against derived NMLs presented in **Section 5.1** of this report, with consideration given to non-site related ambient and background noise at the time of measurements;
- identify potential noise sources and their relative contribution to noise impacts from construction;
- specify appropriate intervals for noise monitoring to evaluate, assess and report the noise contribution due to construction;
- outline the methodologies to be adopted for monitoring construction noise, including justification for monitoring intervals or triggers, weather conditions, monitoring location selection and timing; and
- incorporate noise management and mitigation strategies outlined in this plan.

The noise measurement procedures employed throughout the monitoring programme shall be guided by the requirements of AS 1055:2018 “Acoustics - Description and Measurement of Environmental Noise” and the EPA’s Noise Policy for Industry (NPI), 2017. Noise monitoring will be undertaken by a suitably qualified acoustic specialist or suitably qualified and trained environment officer.

7.3 Complaints Handling

All reported complaints are to be addressed by the responsible contractor and monitored within a complaints register. Details of the complaints handling procedure are provided as follows:

- provide a readily accessible contact point;
- have a documented complaints process, including an escalation procedure so that if a complainant is not satisfied there is a clear path to follow;
- records of all community complaints will be maintained in up-to-date complaints register. The records will include:
  - date and time of the complaint;
  - the means by which the complaint was made (telephone, mail or email);
  - any personal details of the complainant that were provided, or if no details are provided, a note to that effect;
  - the nature of the complaint;
  - any actions taken by the site supervisor/construction contractor in relation to the complaint, including any follow up contact with the complainant and the timing for implementing action; and
  - if no action was taken by site supervisor/construction contractor in relation to the complaint, the reason why no action was taken.
- community complaints will be allocated to a responsible contractor’s representative immediately to facilitate the implementation of corrective actions. The details of the complaint will also be circulated to the applicable construction personnel for action, where required.

8 Discussion and Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Construction Noise Assessment and Management Plan to quantify emissions from the proposed residential development to be located at 4 Fleet Street, Salamander Bay, NSW.

The Construction Noise Assessment and Management Plan has quantified construction noise emissions on surrounding receivers. The results of the assessment demonstrate that construction noise levels may be above relevant Noise Management Levels during several activities at assessed receivers during standard construction hours. Notwithstanding, the Construction Noise Management Plan provides prescriptive reasonable and feasible recommendations that can be implemented to reduce any residual impacts to the community.

To adequately attenuate intertenancy the noise from shouting or a small entertainment system to be 'just audible', a 5-star wall with a DnT,w + CTR of 50 is recommended. Examples of 5 star rated walls source from the CSR Redbook are provided in **Appendix D**.

In summary, it is recommended that during construction, noise control and management measures provided in this report are adopted to minimise impacts on surrounding receivers.

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

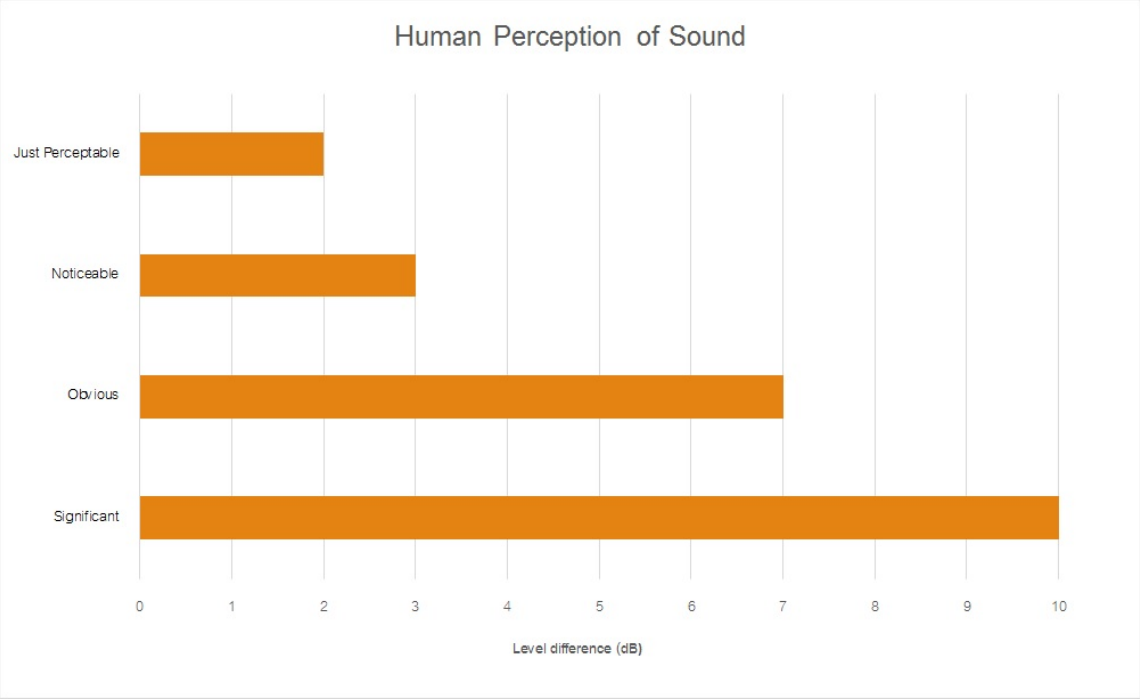
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for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

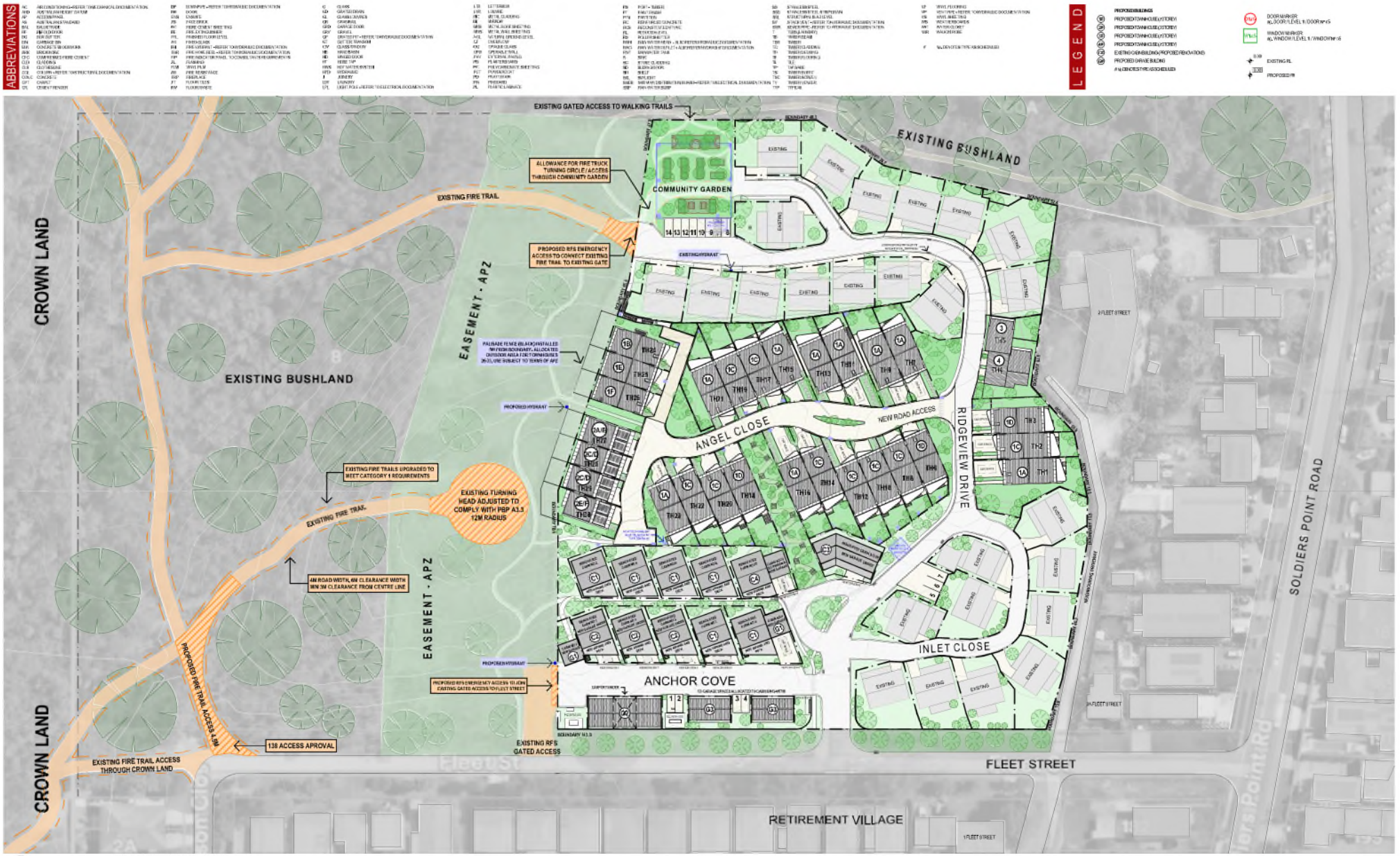
Source	Typical Sound Pressure Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom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

Figure A1 – Human Perception of Sound



This page has been intentionally left blank

Appendix B – Site Plans



1 **MASTERPLAN**
1:1000

EJE ARCHITECTURE

REV	DATE	COMMENTS
J	6/09/2024	ISSUE FOR INFORMATION
K	21/09/2024	ISSUE FOR INFORMATION
L	26/09/2024	ISSUE FOR DA
M	26/09/2024	ISSUE FOR DA
N	26/09/2024	ISSUE FOR DA
O	27/09/2024	ISSUE FOR DA
P	7/10/2024	ISSUE FOR DA
Q	25/10/2024	REVISION FOR DA
R	10/03/2025	DRAFT MASTERPLAN FOR INFORMATION

PROJECT: WANDA BEACH ESTATE

SITE: 4 FLEET STREET, SALAMANDER BAY NSW 2317 (WORIMI COUNTRY)

CLIENT: NEIL SLATER, STEPHEN LAMBOURNE

DRAWING: MASTERPLAN

NOT FOR CONSTRUCTION

DRAWN: GVC | DATE: 10/03/2025 | SCALE @A3: 1:1000

PROJECT No: 14076 | PHASE: DA | DRAWING: A001 | REV: R

EJE architecture

CONSTRUCTION STAGING DIAGRAM

STAGE 1: RENOVATION TO CABINS, GARAGES G1-G3
STAGE 2: TH1-3, TH5-6 (5 DWELLINGS)
STAGE 3: ANGEL CLOSE, TH8, 10, 12, 14, 16, 18, 20, 22 (8 DWELLINGS)
STAGE 4: TH7, 9, 11, 13, 15, 17, 19, 21, 23, 24, 25 (11 DWELLINGS)
STAGE 5: TH26, 27, 28, 29, 30, 31, 32, 33 (8 DWELLINGS).

1 **MASTERPLAN**
1:1000

NOT FOR CONSTRUCTION

EJE ARCHITECTURE

REV	DATE	COMMENTS
H	25/06/2024	ISSUE FOR DA
I	16/07/2024	REVISED ISSUE FOR CIVIL
J	6/08/2024	ISSUE FOR INFORMATION
K	21/08/2024	ISSUE FOR INFORMATION
L	26/09/2024	ISSUE FOR DA
M	2/10/2024	ISSUE FOR DA
N	28/09/2024	ISSUE FOR DA
O	27/09/2024	ISSUE FOR DA
P	7/10/2024	ISSUE FOR DA

PROJECT: WANDA BEACH ESTATE

CLIENT: NEIL SLATER, STEPHEN LAMBOURNE

SITE: 4 FLEET STREET, SALAMANDER BAY NSW 2317 (WORIMI COUNTRY)

DRAWING: MASTERPLAN / STAGING PLAN

DRAWN: GVC | DATE: 3/10/2024 | SCALE @A0: 1:1000

PROJECT No: 14076 | PHASE: DA | DRAWING#: A01 | REV: P

EJE architecture

This page has been intentionally left blank

Appendix C – Noise Monitoring Charts

Table C14 Background Noise Monitoring Summary – Unattended Noise Monitoring (L1)

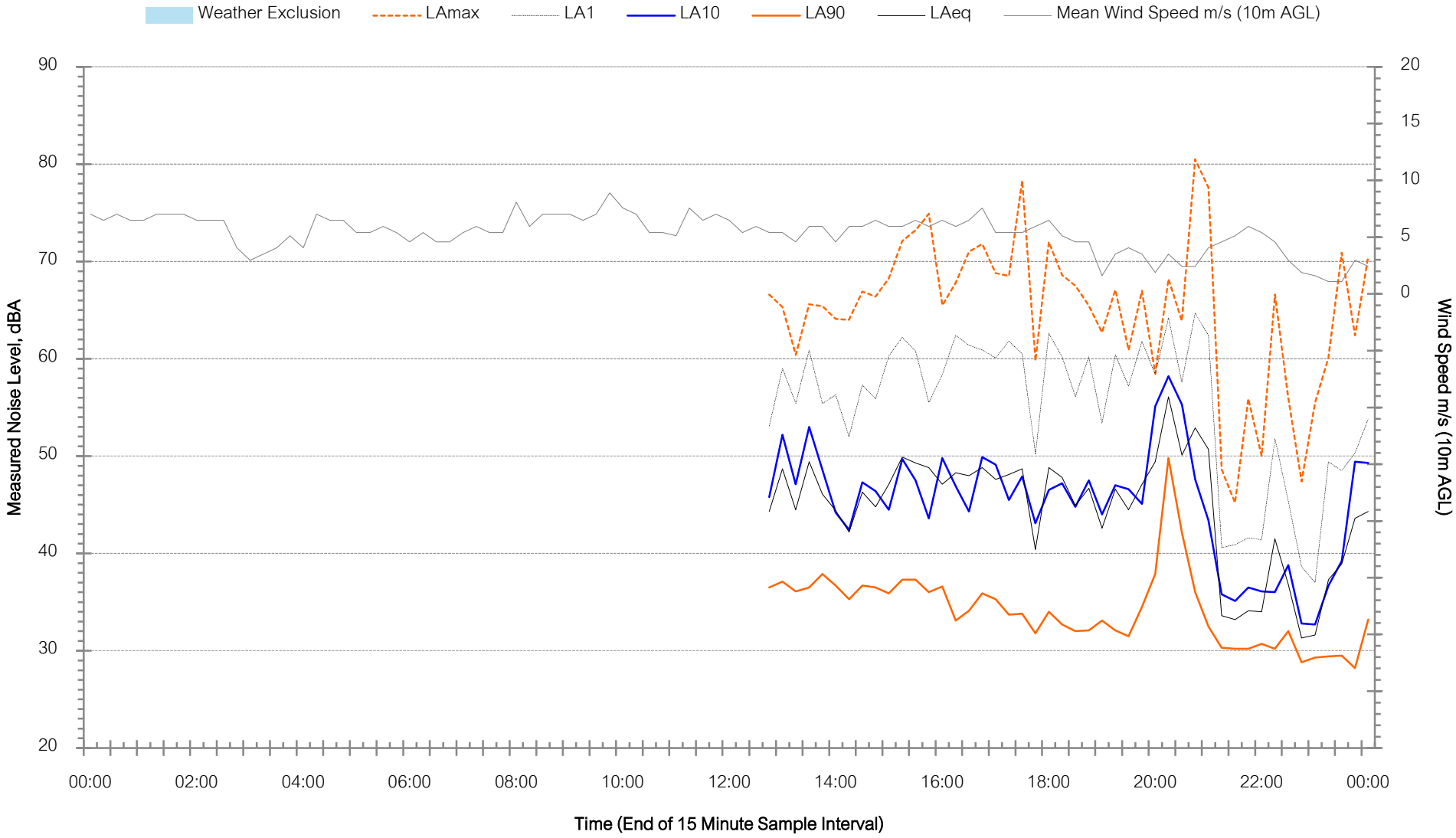
Date	Measured Background Noise Level (L_{A90}) dB ABL[1]			Measured dB $L_{Aeq(period)}$		
	Day	Evening	Night	Day	Evening	Night
Tuesday-25 February 2025	-[2]	30	26	-[2]	49	46
Wednesday 26 February 2025	31	38	31	48	49	40
Thursday 27 February 2025	33	41	36	54	50	45
Friday 28 February 2025	34	36	29	49	46	40
Saturday 1 March 2025	32	41	35	47	51	44
Sunday 2 March 2025	38	32	29	49	44	45
Monday 3 March 2025	38	32	27	51	49	53
Tuesday-4 March 2025	40	35	33	58	57	49
Wednesday 5 March 2025	40	37	33	59	53	49
Thursday 6 March 2025	-[2]	-[2]	-[2]	-[2]	-[2]	-[2]
RBL / Leq Overall	36	36	31	54	51	47

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.

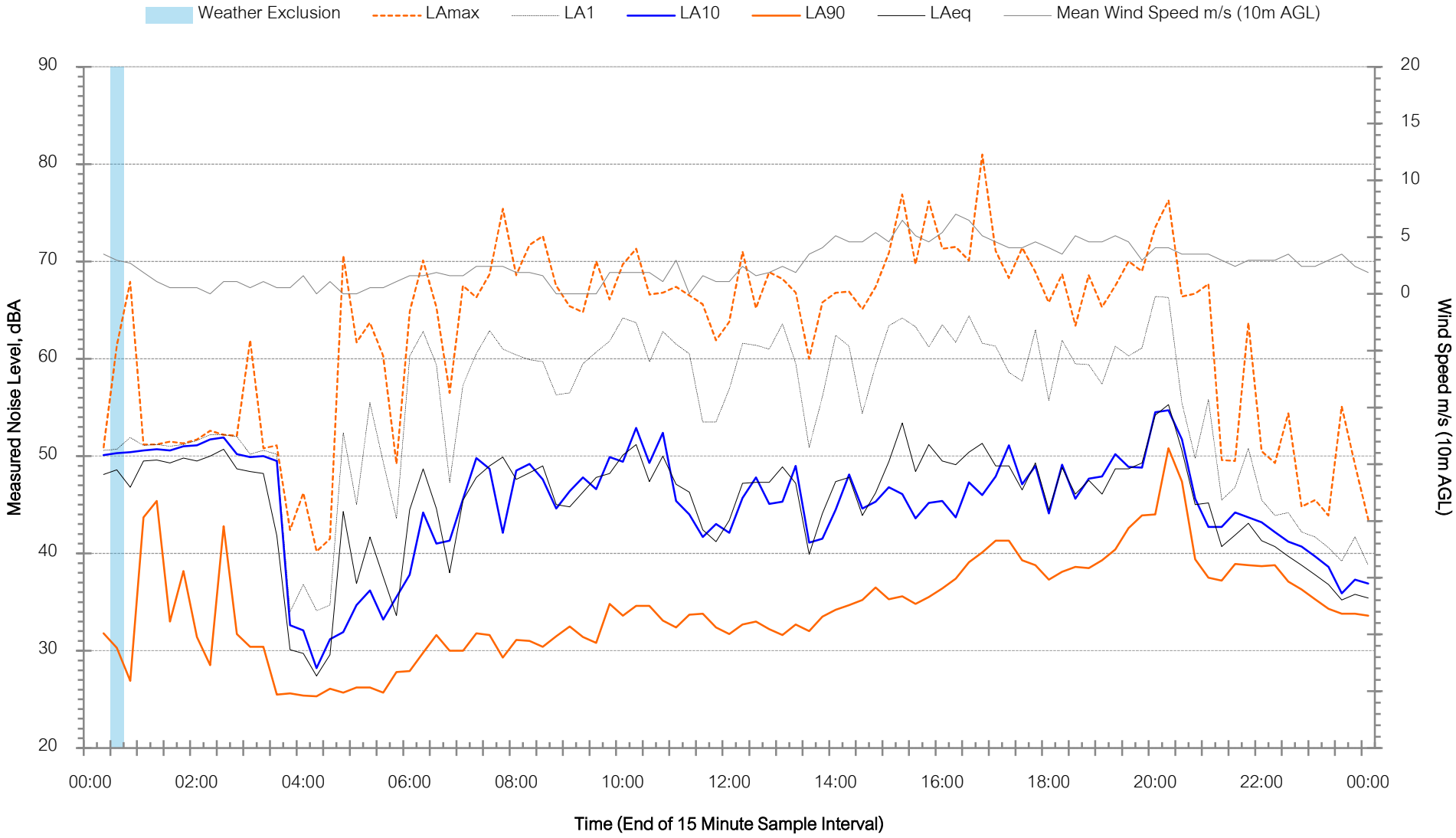
Background Noise Levels

Fleet Street, Salamander Bay, NSW - Tuesday 25 February 2025



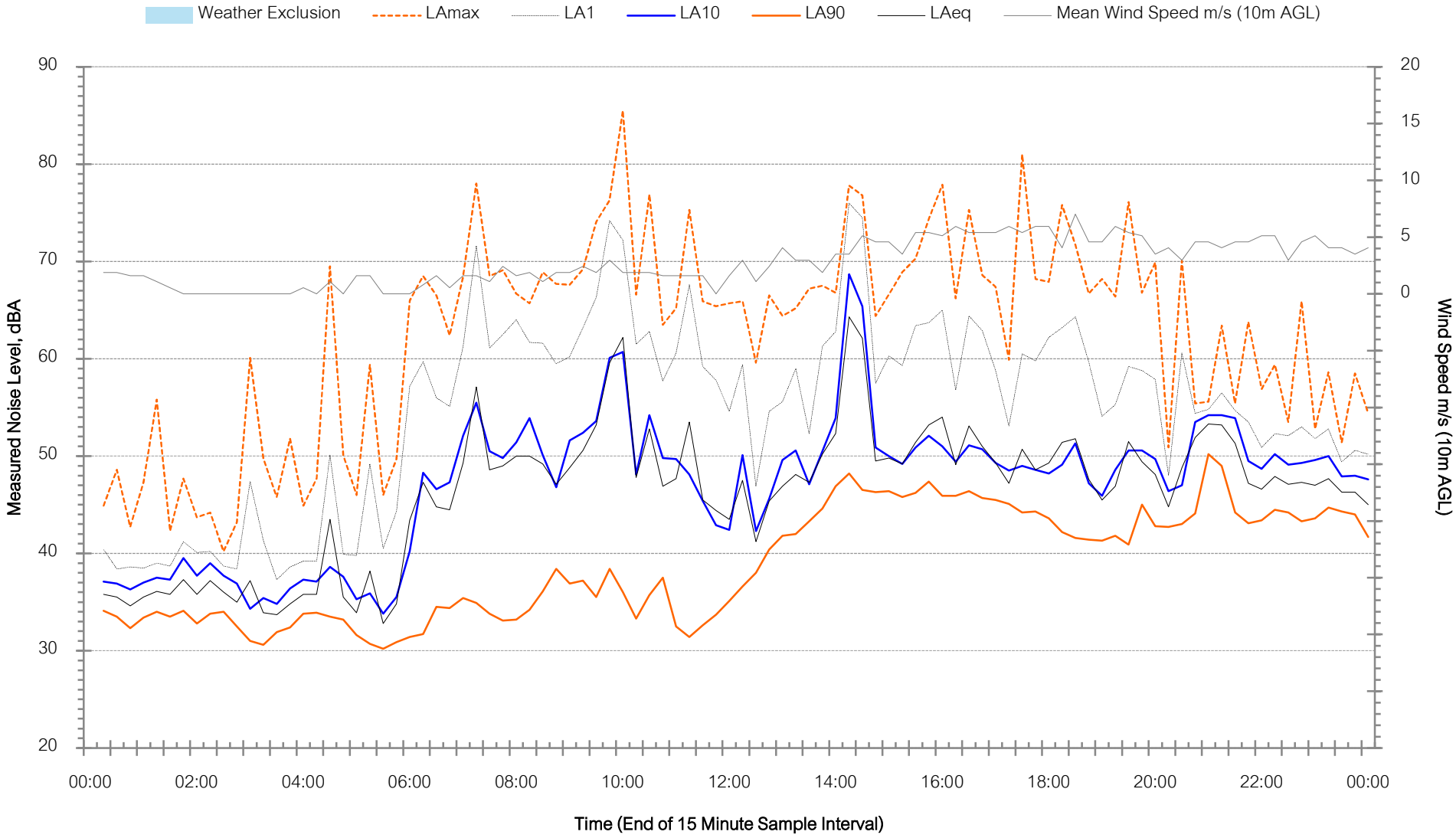
Background Noise Levels

Fleet Street, Salamander Bay, NSW - Wednesday 26 February 2025



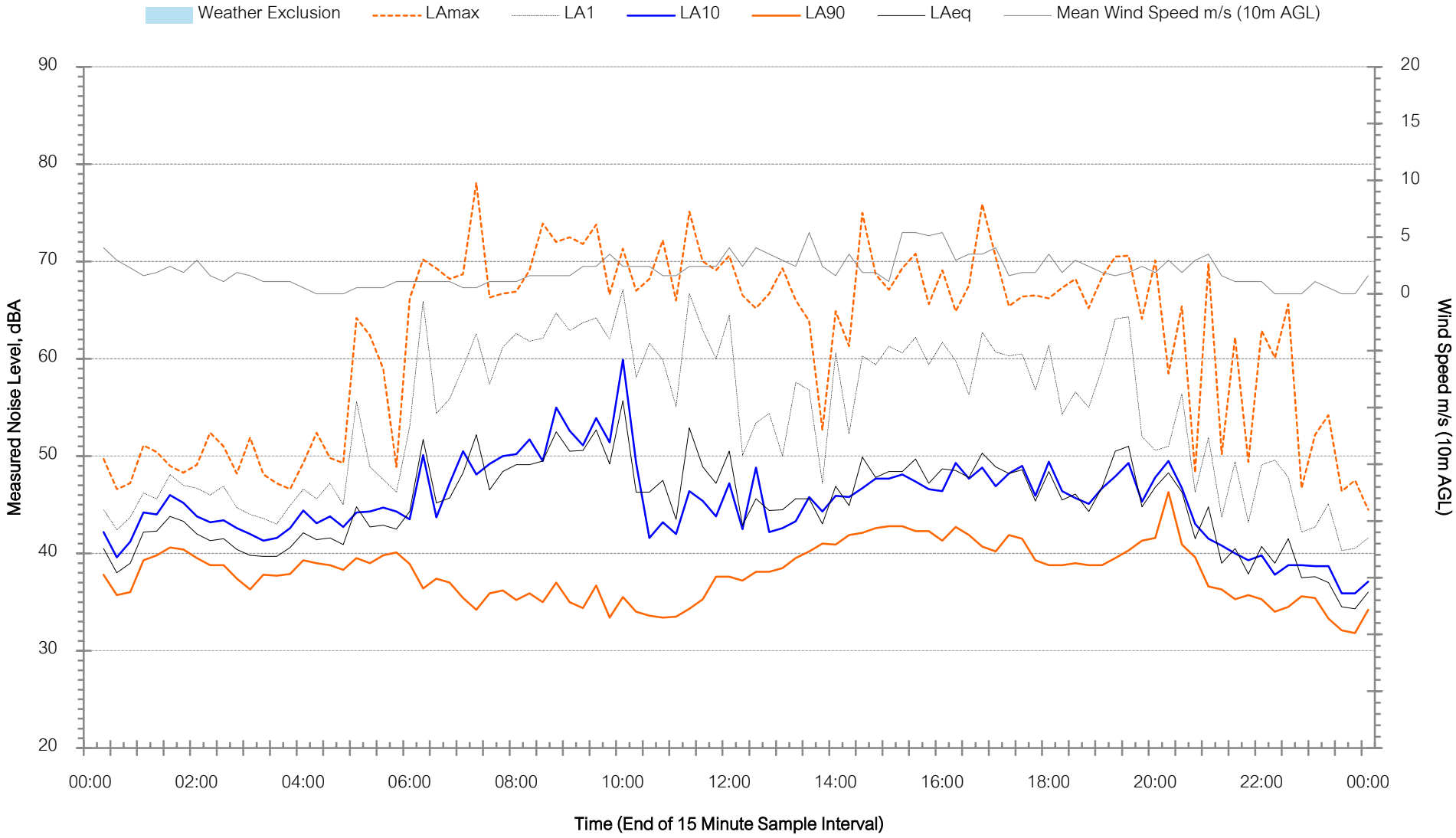
Background Noise Levels

Fleet Street, Salamander Bay, NSW - Thursday 27 February 2025



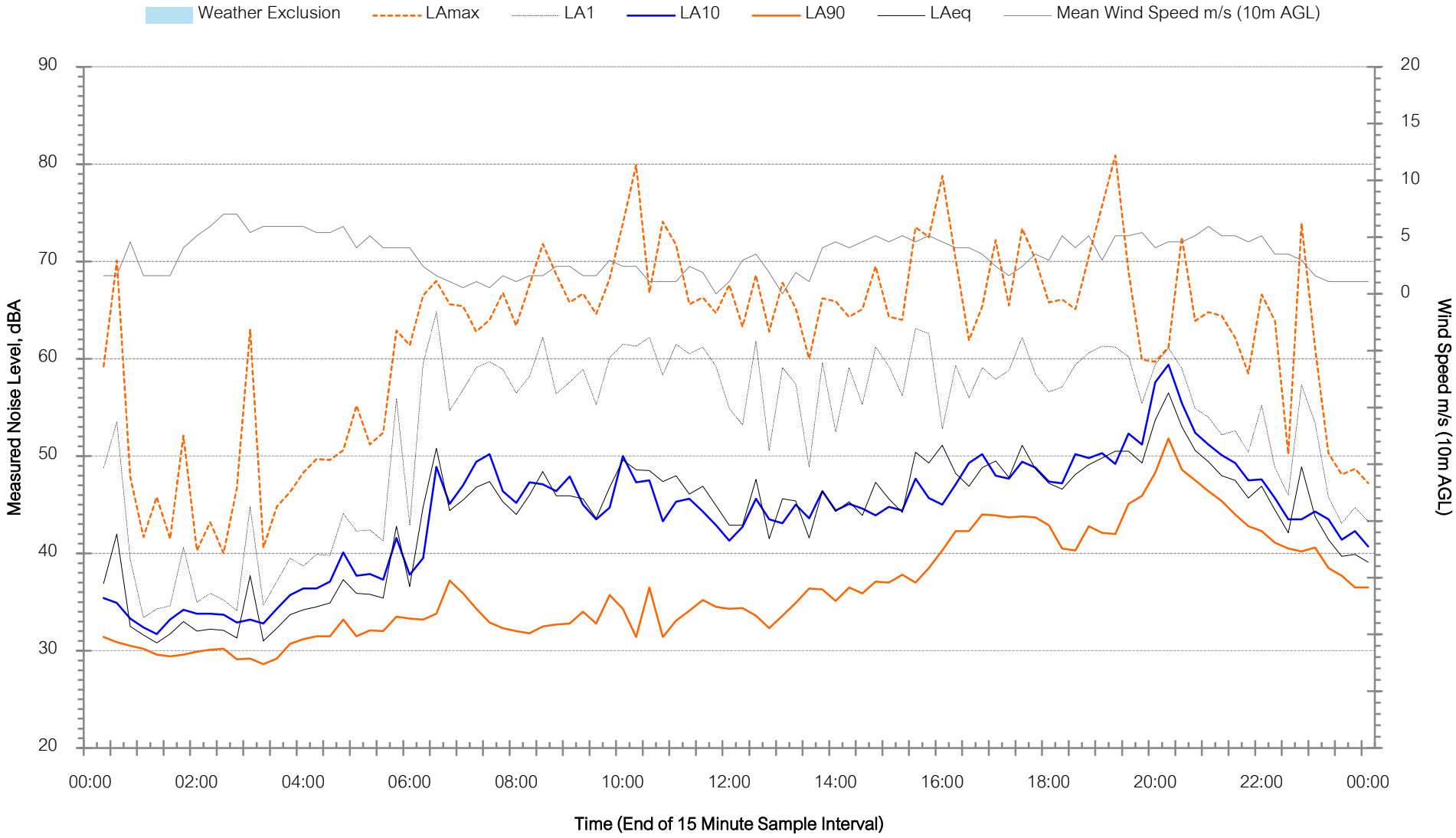
Background Noise Levels

Fleet Street, Salamander Bay, NSW - Friday 28 February 2025



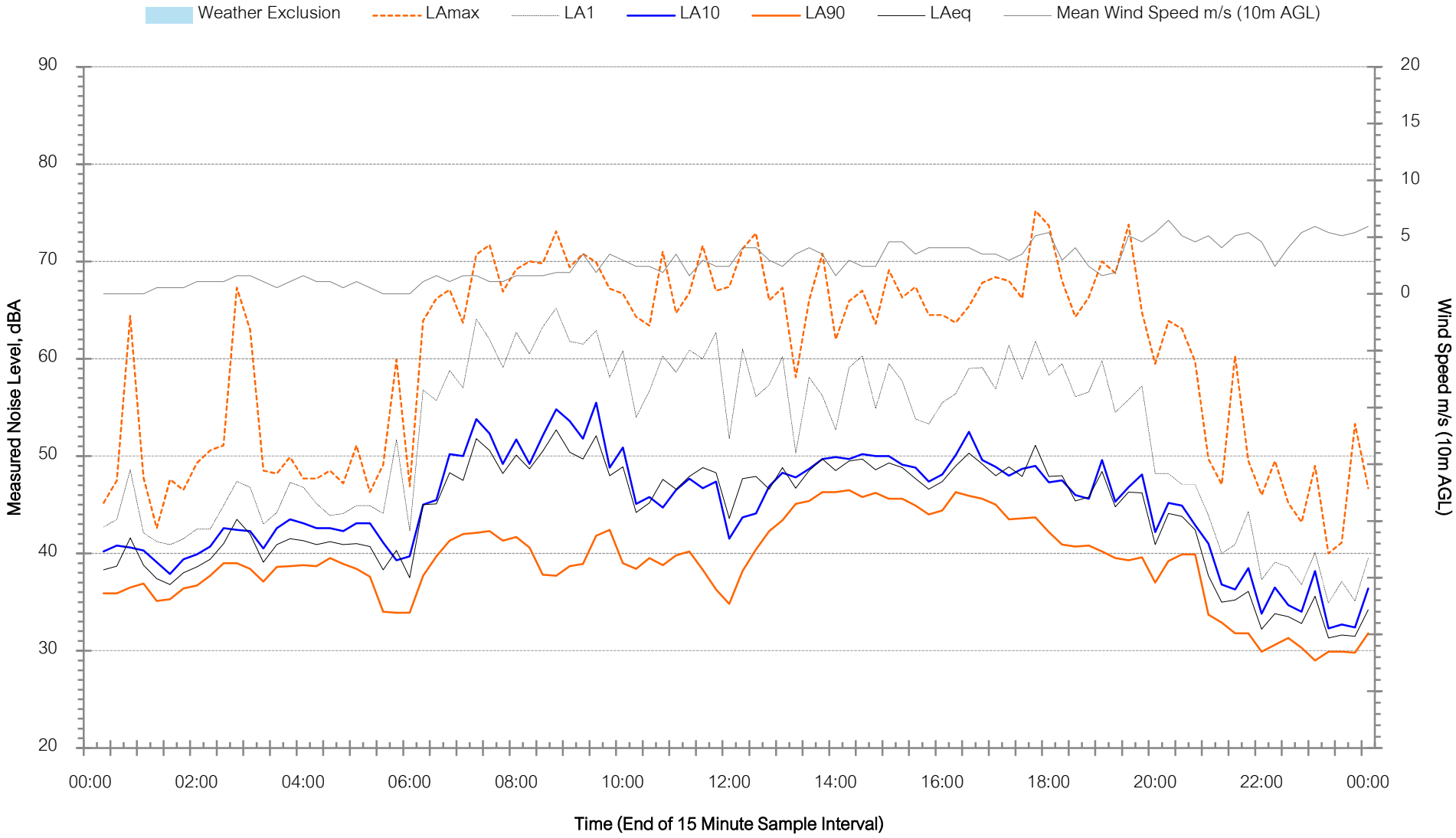
Background Noise Levels

Fleet Street, Salamander Bay, NSW - Saturday 1 March 2025



Background Noise Levels

Fleet Street, Salamander Bay, NSW - Sunday 2 March 2025

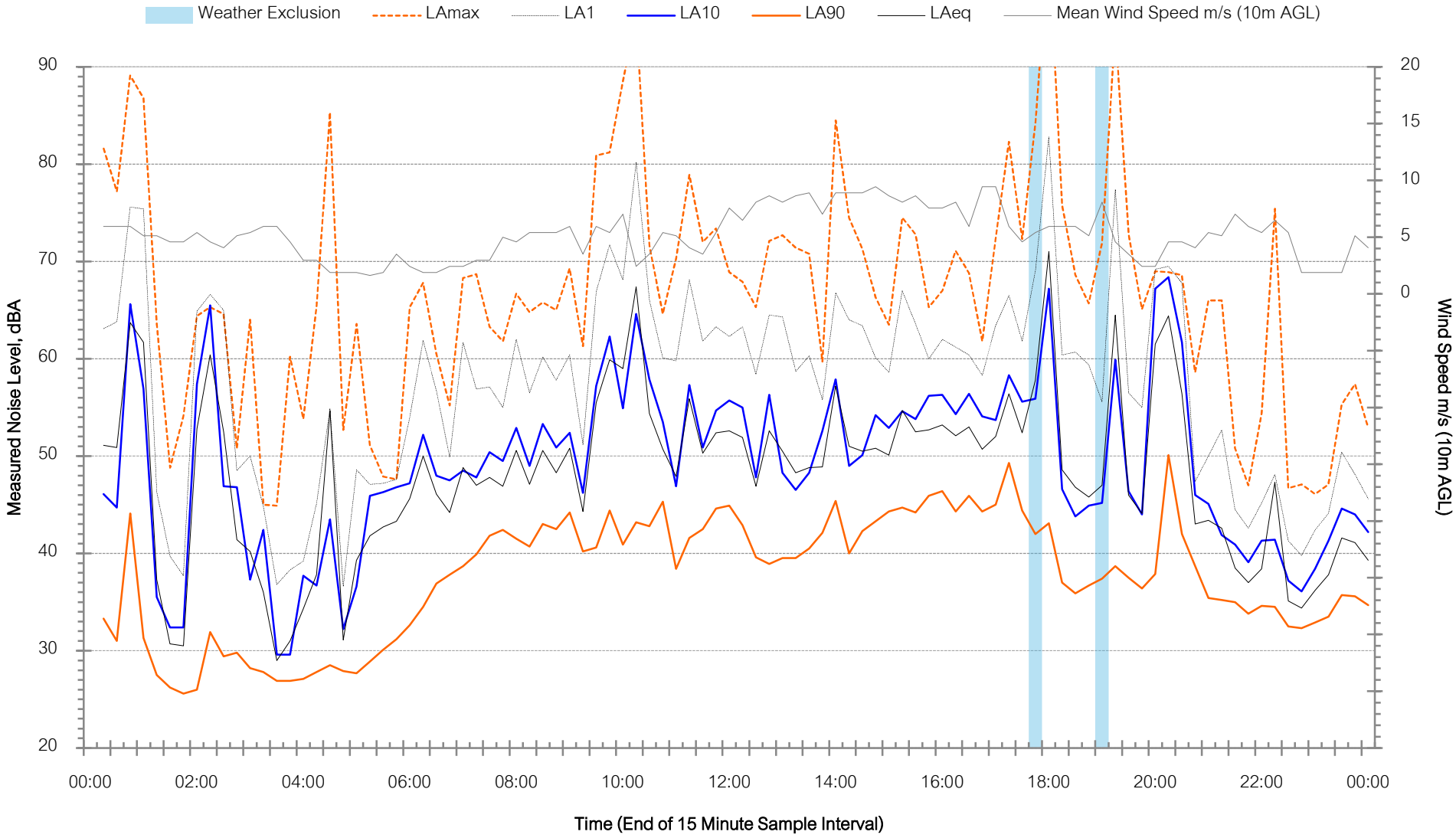


Background Noise Levels

Fleet Street, Salamander Bay, NSW - Monday 3 March 2025

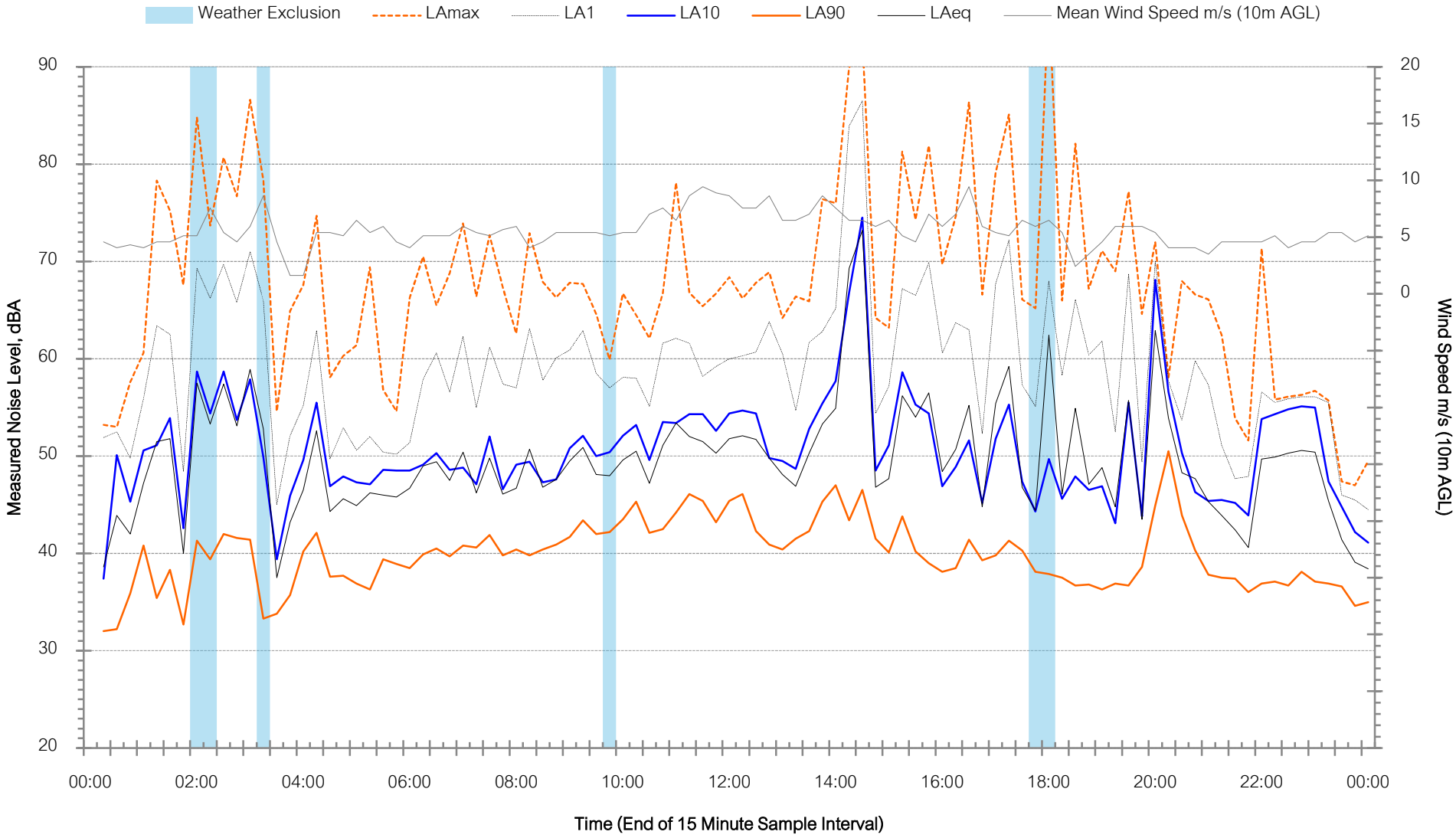
Background Noise Levels

Fleet Street, Salamander Bay, NSW - Tuesday 4 March 2025



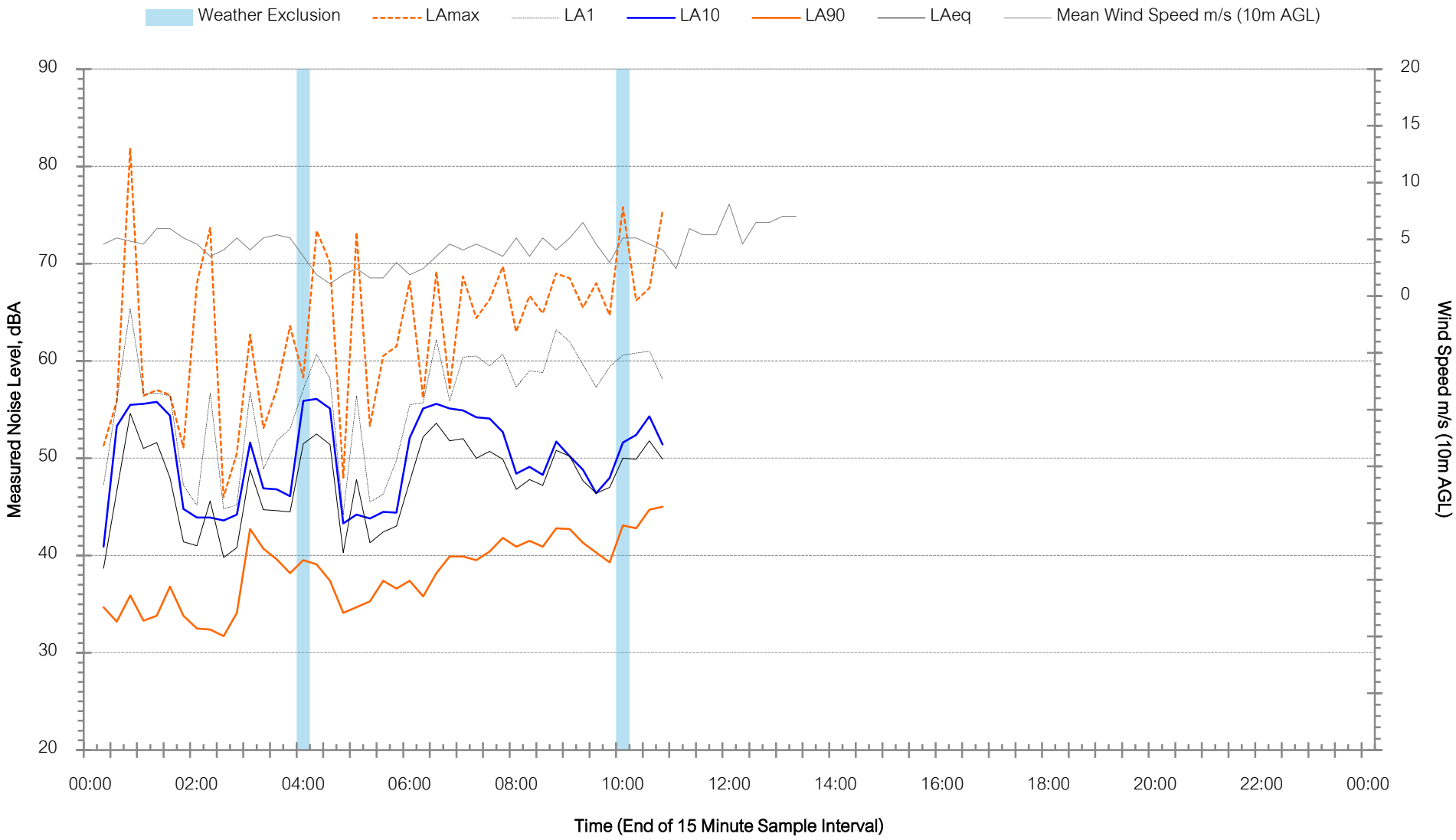
Background Noise Levels

Fleet Street, Salamander Bay, NSW - Wednesday 5 March 2025



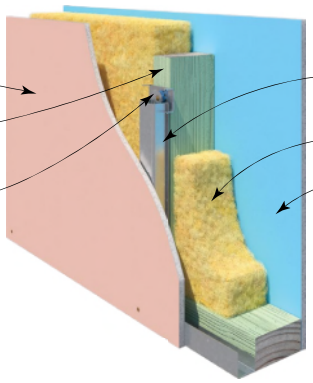
Background Noise Levels

Fleet Street, Salamander Bay, NSW - Thursday 6 March 2025

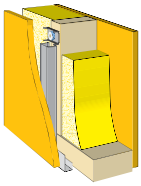
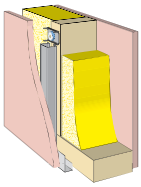
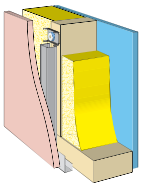
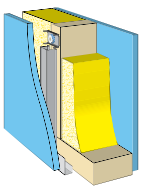
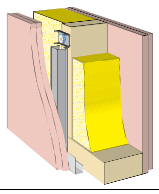


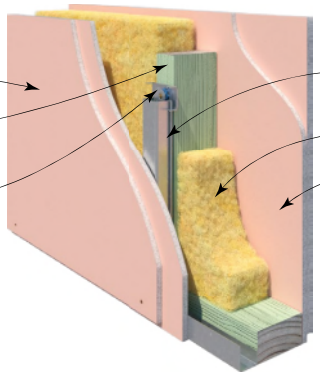
Appendix D – CSR Redbook

Recommended Wall Design Options

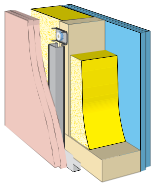
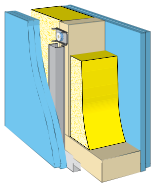
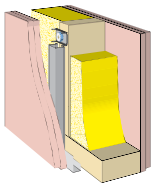
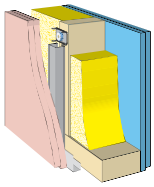
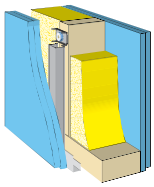


NOTE: Polyester insulation may NOT be used where the system has non-combustible construction requirements.
Acoustic performance valid for 35mm wide studs at 600mm centres.

SYSTEM SPECIFICATION Refer to Book 2 Residential Installation Guide			ACOUSTIC REPORT: PKA Predictor V16 Not Deemed Discontinuous Construction				
FRL Report	SYSTEM N°	WALL LININGS	STUD DEPTH mm	70	90	120	140
			CAVITY INFILL (Refer to TABLE B6)	R_w / R_w+C_{tr}			
– / – / –	CSR 2135 	BOTH SIDES • 1 x 13mm Gyprock Soundchek Plasterboard.	(a) Nil	42/35	44/38	45/39	46/40
			(c) 70 Soundscreen 2.0	52/42	54/45	54/45	55/46
			(e) 75 Gold Batts R2.0	50/41	52/44	53/45	53/45
			(f) 50 MAB Polyester 11kg	46/38	48/41	48/41	49/42
			Minimum Wall Thickness mm	124	144	174	194
– /60/60 60/60/60 FC 12969	CSR 2150 	BOTH SIDES • 1 x 16mm Gyprock Fyrchek Plasterboard.	(a) Nil	41/34	43/37	44/38	44/38
			(c) 70 Soundscreen 2.0	51/41	53/44	53/44	53/44
			(e) 75 Gold Batts R2.0	49/40	51/43	52/44	51/43
			(f) 50 MAB Polyester 11kg	45/37	47/40	47/40	47/40
			Minimum Wall Thickness mm	130	150	180	200
– /60/60 60/60/60 FC 12969	CSR 2151 	SIDE ONE • 1 x 16mm Gyprock Fyrchek Plasterboard. SIDE TWO • 1 x 16mm Gyprock Fyrchek MR Plasterboard.	(a) Nil	42/35	44/38	45/39	45/39
			(c) 70 Soundscreen 2.0	52/42	54/45	54/45	54/45
			(e) 75 Gold Batts R2.0	50/41	52/44	53/45	52/44
			(f) 50 MAB Polyester 11kg	46/38	48/41	48/41	48/41
			Minimum Wall Thickness mm	130	150	180	200
– /60/60 60/60/60 FC 12969	CSR 2152 	BOTH SIDES • 1 x 16mm Gyprock Fyrchek MR Plasterboard.	(a) Nil	43/36	45/39	46/40	46/40
			(c) 70 Soundscreen 2.0	53/43	55/46	55/46	55/46
			(e) 75 Gold Batts R2.0	51/42	53/45	54/46	53/45
			(f) 50 MAB Polyester 11kg	47/39	49/42	49/42	49/42
			Minimum Wall Thickness mm	130	150	180	200
– /120/120 90/90/90 FC 12969	CSR 2160 	BOTH SIDES • 2 x 13mm Gyprock Fyrchek Plasterboard.	(a) Nil	48/42	49/43	50/44	51/45
			(c) 70 Soundscreen 2.0	58/49	59/**50**	59/**50**	60/**51**
			(e) 75 Gold Batts R2.0	56/48	57/49	58/**50**	58/**50**
			(f) 50 MAB Polyester 11kg	52/45	53/46	53/46	54/47
			Minimum Wall Thickness mm	150	170	200	220



NOTE: Polyester insulation may NOT be used where the system has non-combustible construction requirements.
Acoustic performance valid for 35mm wide studs at 600mm centres.

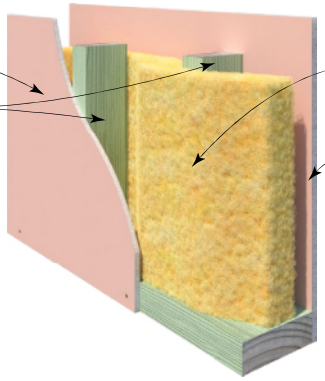
SYSTEM SPECIFICATION Refer to Book 2 Residential Installation Guide			ACOUSTIC REPORT: PKA Predictor V16 Not Deemed Discontinuous Construction				
FRL Report	**SYSTEM Nº**	**WALL LININGS**	**STUD DEPTH mm**	**70**	**90**	**120**	**140**
			CAVITY INFILL (Refer to TABLE B6)	**R_w / R_w+C_{tr}**			
– /120/120 **90/90/90** FC 12969	**CSR 2161** 	SIDE ONE • 2 x 13mm Gyprock Fyrchek Plasterboard. SIDE TWO • 2 x 13mm Gyprock Fyrchek MR Plasterboard.	(a) Nil	49/43	49/43	50/44	51/45
			(c) 70 Soundscreen 2.0	59/**50**	59/**50**	49/**50**	60/**51**
			(e) 75 Gold Batts R2.0	57/49	57/49	58/**50**	58/**50**
			(f) 50 MAB Polyester 11kg	53/46	53/46	53/46	54/47
			Minimum Wall Thickness mm	150	170	200	220
– /120/120 **90/90/90** FC 12969	**CSR 2162** 	BOTH SIDES • 2 x 13mm Gyprock Fyrchek MR Plasterboard.	(a) Nil	49/43	49/43	50/44	51/45
			(c) 70 Soundscreen 2.0	59/**50**	59/**50**	59/**50**	60/**51**
			(e) 75 Gold Batts R2.0	57/49	57/49	58/**50**	58/**50**
			(f) 50 MAB Polyester 11kg	53/46	53/46	53/46	54/47
			Minimum Wall Thickness mm	150	170	200	220
– /120/120 **120/120/120** FC 12969	**CSR 2170** 	BOTH SIDES • 2 x 16mm Gyprock Fyrchek Plasterboard.	(a) Nil	48/42	49/43	50/44	50/44
			(c) 70 Soundscreen 2.0	58/49	59/**50**	59/**50**	59/**50**
			(e) 75 Gold Batts R2.0	56/48	57/49	58/**50**	57/49
			(f) 50 MAB Polyester 11kg	52/45	53/46	53/46	53/46
			Minimum Wall Thickness mm	162	182	212	232
– /120/120 **120/120/120** FC 12969	**CSR 2171** 	SIDE ONE • 2 x 16mm Gyprock Fyrchek Plasterboard. SIDE TWO • 2 x 16mm Gyprock Fyrchek MR Plasterboard.	(a) Nil	49/43	50/44	51/45	51/45
			(c) 70 Soundscreen 2.0	59/**50**	60/**51**	60/**51**	60/**51**
			(e) 75 Gold Batts R2.0	57/49	58/**50**	59/**51**	58/**50**
			(f) 50 MAB Polyester 11kg	53/46	54/47	54/47	54/47
			Minimum Wall Thickness mm	162	182	212	232
– /120/120 **120/120/120** FC 12969	**CSR 2172** 	BOTH SIDES • 2 x 16mm Gyprock Fyrchek MR Plasterboard.	(a) Nil	50/44	51/45	52/46	53/47
			(c) 70 Soundscreen 2.0	60/**51**	61/**52**	61/**52**	62/**53**
			(e) 75 Gold Batts R2.0	58/**50**	59/**51**	60/**52**	60/**52**
			(f) 50 MAB Polyester 11kg	54/47	55/48	55/48	56/49
			Minimum Wall Thickness mm	162	182	212	232

Lining material as per system table.

Staggered timber studs at 600mm maximum centres each side.

Minimum 20mm clearance between stud and opposing lining.

No Noggings or any connection between studs.



Cavity insulation as per system table. (Insulation may be cut and fitted between studs).

Lining material as per system table.

NOTE: Polyester insulation may NOT be used where the system has non-combustible construction requirements.
Acoustic performance valid for 35mm wide studs at 600mm centres.

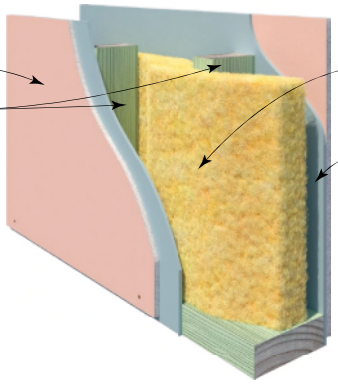
SYSTEM SPECIFICATION Refer to Book 2 Residential Installation Guide			ACOUSTIC REPORT: PKA Predictor V16 Not Deemed Discontinuous Construction			
FRL Report	SYSTEM Nº	WALL LININGS	PLATE WIDTH mm	90	120	140
			CAVITY INFILL (Refer to TABLE B6)	R_w / R_w+C_{tr}		
– /60/60 30/30/30 FC 12969	CSR 2240	BOTH SIDES • 1 x 13mm Gyprock Fyrchek Plasterboard.	(a) Nil	38/31	41/34	41/35
			(c) 70 Soundscreen 2.0	49/39	52/42	51/42
			(e) 75 Gold Batts R2.0	47/38	50/41	51/43
			(f) 50 MAB Polyester 11kg	43/36	46/39	45/39
			Wall Thickness mm	116	146	166
– /60/60 30/30/30 FC 12969	CSR 2241	SIDE ONE • 1 x 13mm Gyprock Fyrchek MR Plasterboard. SIDE TWO • 1 x 13mm Gyprock Fyrchek Plasterboard.	(a) Nil	38/31	41/34	41/35
			(c) 70 Soundscreen 2.0	49/39	52/42	51/42
			(e) 75 Gold Batts R2.0	47/38	50/41	51/43
			(f) 50 MAB Polyester 11kg	43/36	46/39	45/39
			Wall Thickness mm	116	146	166
– /60/60 30/30/30 FC 12969	CSR 2242	BOTH SIDES • 1 x 13mm Gyprock Fyrchek MR Plasterboard.	(a) Nil	38/31	41/34	41/35
			(c) 70 Soundscreen 2.0	49/39	52/42	51/42
			(e) 75 Gold Batts R2.0	47/38	50/41	51/43
			(f) 50 MAB Polyester 11kg	43/36	46/39	45/39
			Wall Thickness mm	116	146	166
– /60/60 60/60/60 FC 12969	CSR 2245	BOTH SIDES • 1 x 6mm CeminSeal Wallboard (against studs). • 1 x 13mm Gyprock Fyrchek Plasterboard.	(a) Nil	47/41	47/41	48/42
			(c) 70 Soundscreen 2.0	58/49	57/48	58/49
			(d) Polymax 2.0	56/**50**	56/**50**	57/**51**
			(e) 75 Gold Batts R2.0	56/48	56/48	56/48
			Wall Thickness mm	128	158	178
– /60/60 60/60/60 FC 12969	CSR 2255	BOTH SIDES • 1 x 16mm Gyprock Fyrchek Plasterboard.	(a) Nil	39/32	40/34	41/35
			(c) 70 Soundscreen 2.0	50/40	51/42	51/42
			(e) 75 Gold Batts R2.0	48/39	49/41	50/42
			(f) 50 MAB Polyester 11kg	44/37	45/39	45/39
			Wall Thickness mm	122	152	172
– /60/60 60/60/60 FC 12969	CSR 2256	SIDE ONE • 1 x 16mm Gyprock Fyrchek MR Plasterboard. SIDE TWO • 1 x 16mm Gyprock Fyrchek Plasterboard.	(a) Nil	40/33	41/35	43/37
			(c) 70 Soundscreen 2.0	51/41	52/43	53/44
			(e) 75 Gold Batts R2.0	49/40	50/42	51/43
			(f) 50 MAB Polyester 11kg	45/38	46/40	47/41
			Wall Thickness mm	122	152	172

Lining material as per system table.

Staggered timber studs at 600mm maximum centres each side.

Minimum 20mm clearance between stud and opposing lining.

No Noggings or any connection between studs.

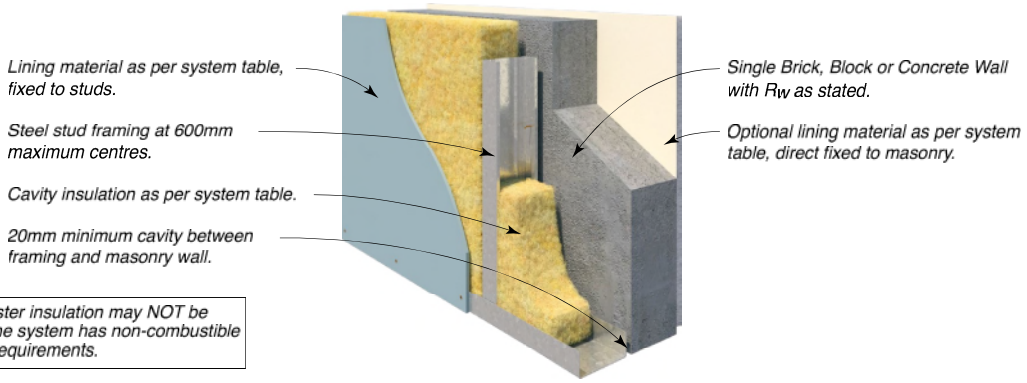


Cavity insulation as per system table. (Insulation may be cut and fitted between studs).

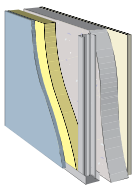
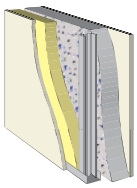
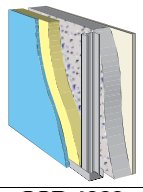
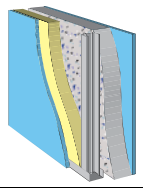
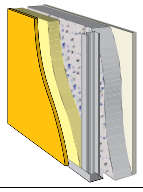
Lining material as per system table.

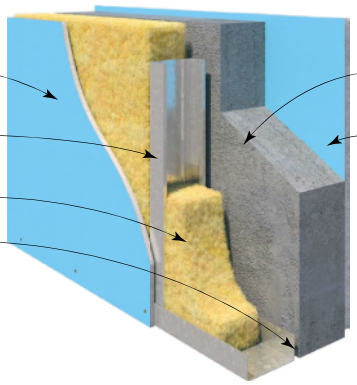
NOTE: Polyester insulation may NOT be used where the system has non-combustible construction requirements.
Acoustic performance valid for 35mm wide studs at 600mm centres.
**ACR = Axial Capacity Reduction.*

SYSTEM SPECIFICATION Refer to Book 2 Residential Installation Guide			ACOUSTIC REPORT: PKA Predictor V16 Not Deemed Discontinuous Construction			
FRL Report	**SYSTEM Nº**	**WALL LININGS**	**PLATE WIDTH mm**	**90**	**120**	**140**
			CAVITY INFILL (Refer to TABLE B6)	**R_w / R_w+C_{tr}**		
– /60/60 **60/60/60** FC 12969	**CSR 2257**	BOTH SIDES • 1 x 16mm Gyprock Fyrchek MR Plasterboard.	(a) Nil	40/33	41/35	43/37
			(c) 70 Soundscreen 2.0	51/41	52/43	53/44
			(e) 75 Gold Batts R2.0	49/40	51/42	52/44
			(f) 50 MAB Polyester 11kg	45/38	46/40	47/41
			Wall Thickness mm	122	152	172
– /60/60 **60/60/60** FC 12969	**CSR 2265**	BOTH SIDES • 1 x 16mm Gyprock Fyrchek Plasterboard (against studs). • 1 x 6mm CeminSeal Wallboard.	(a) Nil	46/40	47/41	48/42
			(c) 70 Soundscreen 2.0	57/48	58/49	58/49
			(e) 75 Gold Batts R2.0	55/47	56/48	57/49
			(f) 50 MAB Polyester 11kg	51/45	52/46	52/46
			Wall Thickness mm	134	164	184
– /90/90 **90/90/90*** *ACR Group 3 FC 12969	**CSR 2266**	BOTH SIDES • 1 x 6mm CeminSeal Wallboard (against studs). • 1 x 16mm Gyprock Fyrchek Plasterboard.	(a) Nil	46/40	47/41	48/42
			(c) 70 Soundscreen 2.0	57/48	58/49	58/49
			(e) 75 Gold Batts R2.0	55/47	56/48	57/49
			(f) 50 MAB Polyester 11kg	51/45	52/46	52/46
			Wall Thickness mm	134	164	184
– /120/120 **90/90/90** FC 12969	**CSR 2275**	BOTH SIDES • 2 x 13mm Gyprock Fyrchek Plasterboard.	(a) Nil	46/40	47/41	48/42
			(c) 70 Soundscreen 2.0	57/48	58/49	58/49
			(d) Polymax 2.0	55/49	56/**50**	57/**51**
			(e) 75 Gold Batts R2.0	55/47	56/48	57/49
			Wall Thickness mm	142	172	192
– /120/120 **90/90/90** FC 12969	**CSR 2276**	SIDE ONE • 2 x 13mm Gyprock Fyrchek Plasterboard. SIDE TWO • 2 x 13mm Gyprock Fyrchek MR Plasterboard.	(a) Nil	46/40	47/41	48/42
			(c) 70 Soundscreen 2.0	57/48	58/49	58/49
			(e) 75 Gold Batts R2.0	55/47	56/48	57/49
			(f) 50 MAB Polyester 11kg	51/45	52/46	52/46
			Wall Thickness mm	142	172	192

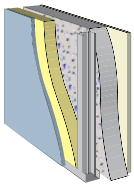
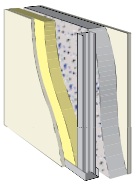
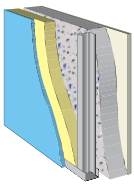
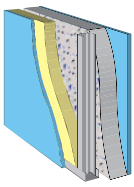
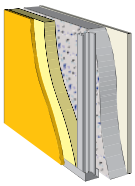


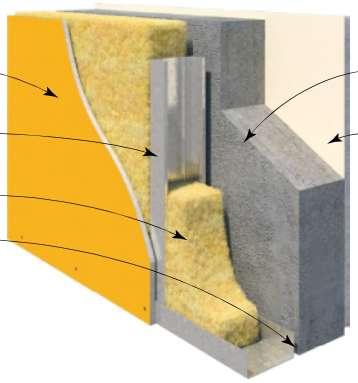
NOTE: Polyester insulation may NOT be used where the system has non-combustible construction requirements.

SYSTEM SPECIFICATION Refer to Book 3 Commercial & Multi-Residential Installation Guide			ACOUSTIC REPORT: PKA-A118 Discontinuous Construction		
WALL REQUIREMENTS	**SYSTEM Nº**	**WALL LININGS**	**STUD DEPTH mm**	**64**	**92**
			STUD BMT mm	**0.50**	**0.55**
			CAVITY INFILL (Refer to TABLE B6)	**R_W / R_W+C_{tr}**	
Tested Brick, Block or Concrete Wall with $R_W \geq 45$ **Wall from TABLE E1 Group B** Refer to Wall Manufacturer for FRL Details	**CSR 4005** 	STUD SIDE • 1 x 6mm CeminSeal Wallboard. MASONRY SIDE • 1 x 13mm Gyprock Standard Plasterboard.	(a) 75 Acoustigard 11kg	55/45	56/46
			(b) 90 Gold Batts 2.0	56/46	57/47
			(d) Nil	46/35	47/36
			(e) 75 MAB Polyester 11kg	54/44	55/45
			Additional Wall Thickness mm	103	131
	CSR 4010 	STUD SIDE • 1 x 13mm Gyprock Standard Plasterboard. MASONRY SIDE • 1 x 13mm Gyprock Standard Plasterboard.	(a) 75 Acoustigard 11kg	55/47	57/49
			(b) 90 Gold Batts 2.0	56/48	58/**50**
			(d) Nil	46/37	48/39
			(e) 75 MAB Polyester 11kg	54/46	56/48
			Additional Wall Thickness mm	110	138
	CSR 4015 	STUD SIDE • 1 x 13mm Gyprock Aquachek Plasterboard. MASONRY SIDE • 1 x 13mm Gyprock Standard Plasterboard.	(a) 75 Acoustigard 11kg	56/48	58/**50**
			(b) 90 Gold Batts 2.0	57/49	59/**51**
			(d) Nil	47/38	49/40
			(e) 75 MAB Polyester 11kg	55/47	57/49
			Additional Wall Thickness mm	110	138
	CSR 4020 	STUD SIDE • 1 x 13mm Gyprock Aquachek Plasterboard. MASONRY SIDE • 1 x 13mm Gyprock Aquachek Plasterboard.	(a) 75 Acoustigard 11kg	56/48	58/**50**
			(b) 90 Gold Batts 2.0	57/49	59/**51**
			(d) Nil	49/40	50/41
			(e) 75 MAB Polyester 11kg	55/47	57/49
			Additional Wall Thickness mm	110	138
	CSR 4025 	STUD SIDE • 1 x 13mm Gyprock Soundchek Plasterboard. MASONRY SIDE • 1 x 13mm Gyprock Standard Plasterboard.	(a) 75 Acoustigard 11kg	58/**50**	59/**51**
			(b) 90 Gold Batts 2.0	59/**51**	60/**52**
			(d) Nil	48/37	49/38
			(e) 75 MAB Polyester 11kg	57/49	58/**50**
			Additional Wall Thickness mm	110	138

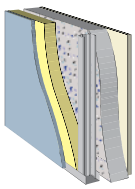
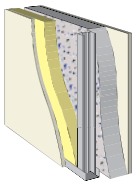
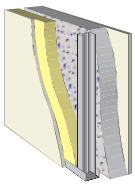
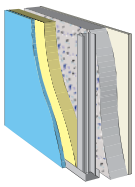
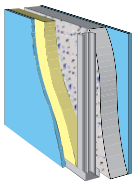
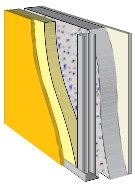


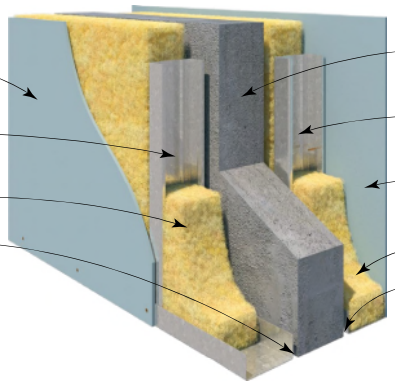
NOTE: Polyester insulation may NOT be used where the system has non-combustible construction requirements.

SYSTEM SPECIFICATION Refer to Book 3 Commercial & Multi-Residential Installation Guide			ACOUSTIC REPORT: PKA-A118 Discontinuous Construction		
WALL REQUIREMENTS	SYSTEM Nº	WALL LININGS	STUD DEPTH mm	64	92
			STUD BMT mm	0.50	0.55
			CAVITY INFILL (Refer to TABLE B6)	R_W / R_W+C_{tr}	
Tested Brick, Block or Concrete Wall with $R_W \geq 47$ Wall from TABLE E1 Group C Refer to Wall Manufacturer for FRL Details	CSR 4030 	STUD SIDE • 1 x 6mm CeminSeal Wallboard. MASONRY SIDE • 1 x 13mm Gyprock Standard Plasterboard.	(a) 75 Acoustigard 11kg	57/47	58/48
			(b) 90 Gold Batts 2.0	58/48	59/49
			(d) Nil	48/37	49/38
			(e) 75 MAB Polyester 11kg	56/46	57/47
			Additional Wall Thickness mm	103	131
	CSR 4035 	STUD SIDE • 1 x 13mm Gyprock Standard Plasterboard. MASONRY SIDE • 1 x 13mm Gyprock Standard Plasterboard.	(a) 75 Acoustigard 11kg	57/49	59/**51**
			(b) 90 Gold Batts 2.0	58/**50**	60/**52**
			(d) Nil	48/39	50/41
			(e) 75 MAB Polyester 11kg	56/48	58/**50**
			Additional Wall Thickness mm	110	138
	CSR 4040 	STUD SIDE • 1 x 13mm Gyprock Aquachek Plasterboard. MASONRY SIDE • 1 x 13mm Gyprock Standard Plasterboard.	(a) 75 Acoustigard 11kg	58/**50**	60/**52**
			(b) 90 Gold Batts 2.0	59/**51**	61/**53**
			(d) Nil	49/40	51/42
			(e) 75 MAB Polyester 11kg	57/49	59/**51**
			Additional Wall Thickness mm	110	138
	CSR 4045 	STUD SIDE • 1 x 13mm Gyprock Aquachek Plasterboard. MASONRY SIDE • 1 x 13mm Gyprock Aquachek Plasterboard.	(a) 75 Acoustigard 11kg	58/**50**	60/**52**
			(b) 90 Gold Batts 2.0	59/**51**	61/**53**
			(d) Nil	49/40	51/42
			(e) 75 MAB Polyester 11kg	57/49	59/**51**
			Additional Wall Thickness mm	110	138
	CSR 4050 	STUD SIDE • 1 x 13mm Gyprock Soundchek Plasterboard. MASONRY SIDE • 1 x 13mm Gyprock Standard Plasterboard.	(a) 75 Acoustigard 11kg	60/**52**	61/**53**
			(b) 90 Gold Batts 2.0	61/**53**	62/**54**
			(d) Nil	51/42	52/43
			(e) 75 MAB Polyester 11kg	59/**51**	60/**52**
			Additional Wall Thickness mm	110	138

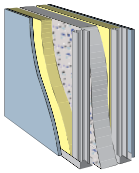
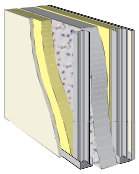
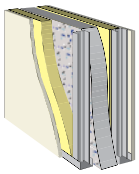
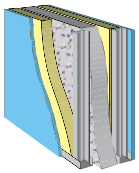
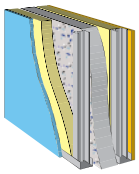
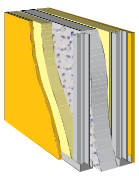


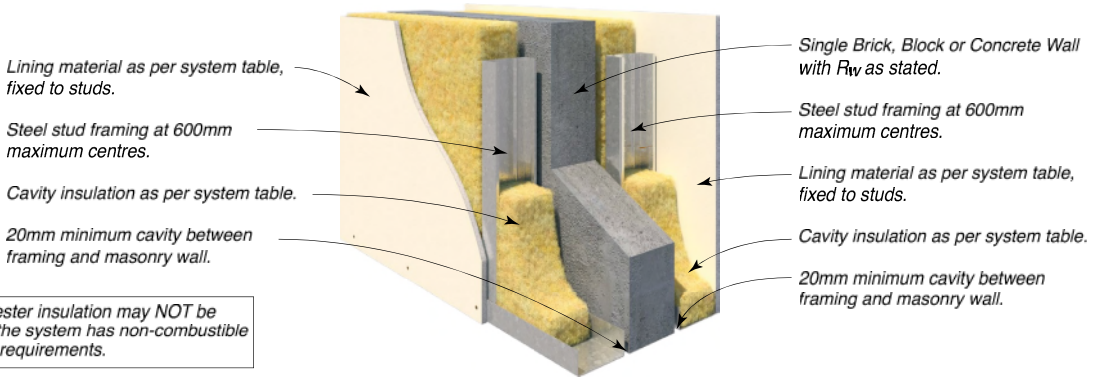
NOTE: Polyester insulation may NOT be used where the system has non-combustible construction requirements.

SYSTEM SPECIFICATION Refer to Book 3 Commercial & Multi-Residential Installation Guide			ACOUSTIC REPORT: PKA-A118 Discontinuous Construction		
WALL REQUIREMENTS	SYSTEM Nº	WALL LININGS	STUD DEPTH mm	64	92
			STUD BMT mm	0.50	0.55
			CAVITY INFILL (Refer to TABLE B6)	R_w / R_w+C_{tr}	
Tested Brick, Block or Concrete Wall with $R_w \geq 50$ Wall from TABLE E1 Group D Refer to Wall Manufacturer for FRL Details	CSR 4055 	STUD SIDE • 1 x 6mm CeminSeal Wallboard. MASONRY SIDE • 1 x 13mm Gyprock Standard Plasterboard.	(a) Nil	51/41	52/42
			(b) 75 Acoustigard 11kg	60/**51**	61/**52**
			(c) 90 Gold Batts 2.0	61/**52**	62/**53**
			(e) 75 MAB Polyester 11kg	59/**50**	60/**51**
			Additional Wall Thickness mm	103	131
	CSR 4060 	STUD SIDE • 1 x 10mm Gyprock Plus Plasterboard. MASONRY SIDE • 1 x 13mm Gyprock Standard Plasterboard.	(a) Nil	49/39	51/41
			(b) 75 Acoustigard 11kg	58/49	60/**51**
			(c) 90 Gold Batts 2.0	59/**50**	61/**52**
			(e) 75 MAB Polyester 11kg	57/48	59/**50**
			Additional Wall Thickness mm	107	135
	CSR 4065 	STUD SIDE • 1 x 13mm Gyprock Standard Plasterboard. MASONRY SIDE • 1 x 13mm Gyprock Standard Plasterboard.	(a) Nil	51/42	53/44
			(b) 75 Acoustigard 11kg	60/**52**	62/**54**
			(c) 90 Gold Batts 2.0	61/**53**	63/**55**
			(e) 75 MAB Polyester 11kg	59/**51**	61/**53**
			Additional Wall Thickness mm	110	138
	CSR 4070 	STUD SIDE • 1 x 13mm Gyprock Aquachek Plasterboard. MASONRY SIDE • 1 x 13mm Gyprock Standard Plasterboard.	(a) Nil	52/43	54/45
			(b) 75 Acoustigard 11kg	61/**53**	63/**55**
			(c) 90 Gold Batts 2.0	62/**54**	64/**56**
			(e) 75 MAB Polyester 11kg	60/**52**	62/**54**
			Additional Wall Thickness mm	110	138
	CSR 4075 	STUD SIDE • 1 x 13mm Gyprock Aquachek Plasterboard. MASONRY SIDE • 1 x 13mm Gyprock Aquachek Plasterboard.	(a) Nil	52/43	54/45
			(b) 75 Acoustigard 11kg	61/**53**	63/**55**
			(c) 90 Gold Batts 2.0	62/**54**	64/**56**
			(e) 75 MAB Polyester 11kg	60/**52**	62/**54**
			Additional Wall Thickness mm	110	138
	CSR 4080 	STUD SIDE • 1 x 13mm Gyprock Soundchek Plasterboard. MASONRY SIDE • 1 x 13mm Gyprock Standard Plasterboard.	(a) Nil	54/45	55/46
			(b) 75 Acoustigard 11kg	63/**55**	64/**56**
			(c) 90 Gold Batts 2.0	64/**56**	65/**57**
			(e) 75 MAB Polyester 11kg	62/**54**	63/**55**
			Additional Wall Thickness mm	110	138

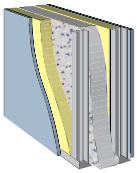
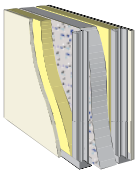
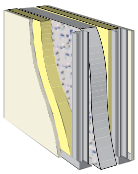
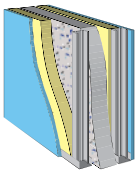
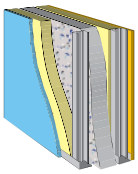
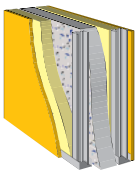


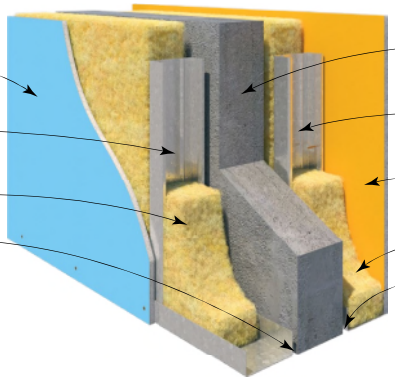
NOTE: Polyester insulation may NOT be used where the system has non-combustible construction requirements.

SYSTEM SPECIFICATION Refer to Book 3 Commercial & Multi-Residential Installation Guide			ACOUSTIC REPORT: PKA-A118 Discontinuous Construction		
WALL REQUIREMENTS	SYSTEM Nº	WALL LININGS	STUD DEPTH mm	64	92
			STUD BMT mm	0.50	0.55
			CAVITY INFILL (Both Sides) (Refer to TABLE B6)	R_W / R_W+C_{tr}	
Tested Brick, Block or Concrete Wall with $R_W \geq 42$ Wall from TABLE E1 Group A Refer to Wall Manufacturer for FRL Details	CSR 4105 	BOTH SIDES • 1 x 6mm CeminSeal Wallboard.	(a) 75 Acoustigard 11kg	60/46	61/47
			(b) 90 Gold Batts 2.0	61/47	62/48
			(d) 75 MAB Polyester 11kg	58/44	59/45
			Additional Wall Thickness mm	180	236
	CSR 4110 	BOTH SIDES • 1 x 10mm Gyprock Plus Plasterboard.	(a) 75 Acoustigard 11kg	59/46	60/47
			(b) 90 Gold Batts 2.0	60/47	61/48
			(d) 75 MAB Polyester 11kg	57/44	58/45
			Additional Wall Thickness mm	188	244
	CSR 4115 	BOTH SIDES • 1 x 13mm Gyprock Standard Plasterboard.	(a) 75 Acoustigard 11kg	60/48	61/49
			(b) 90 Gold Batts 2.0	61/49	62**/50**
			(d) 75 MAB Polyester 11kg	58/46	59/47
			Additional Wall Thickness mm	194	250
	CSR 4120 	BOTH SIDES • 1 x 13mm Gyprock Aquachek Plasterboard.	(a) 75 Acoustigard 11kg	61/49	62**/50**
			(b) 90 Gold Batts 2.0	62**/50**	63**/51**
			(d) 75 MAB Polyester 11kg	59/47	60/48
			Additional Wall Thickness mm	194	250
	CSR 4125 	SIDE ONE • 1 x 13mm Gyprock Aquachek Plasterboard. SIDE TWO • 1 x 13mm Gyprock Soundchek Plasterboard.	(a) 75 Acoustigard 11kg	62**/50**	63**/57**
			(b) 90 Gold Batts 2.0	63**/51**	64**/52**
			(d) 75 MAB Polyester 11kg	60/43	61/49
			Additional Wall Thickness mm	194	250
	CSR 4130 	BOTH SIDES • 1 x 13mm Gyprock Soundchek Plasterboard.	(a) 75 Acoustigard 11kg	63**/51**	64**/52**
			(b) 90 Gold Batts 2.0	64**/52**	65**/53**
			(d) 75 MAB Polyester 11kg	61/49	62**/50**
			Additional Wall Thickness mm	194	250

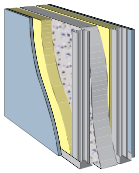
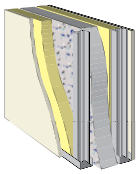
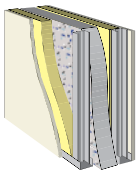
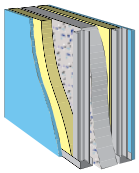
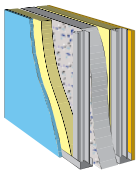
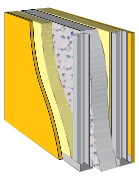


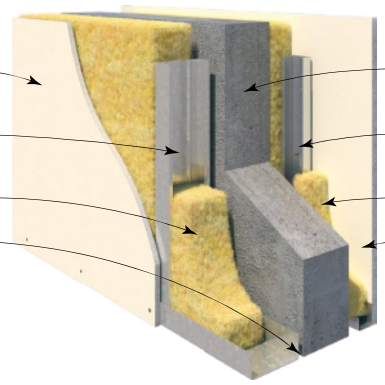
NOTE: Polyester insulation may NOT be used where the system has non-combustible construction requirements.

SYSTEM SPECIFICATION Refer to Book 3 Commercial & Multi-Residential Installation Guide			ACOUSTIC REPORT: PKA-A118 Discontinuous Construction		
WALL REQUIREMENTS	SYSTEM Nº	WALL LININGS	STUD DEPTH mm	64	92
			STUD BMT mm	0.50	0.55
			CAVITY INFILL (Both Sides) (Refer to TABLE B6)	R_w / R_w+C_{tr}	
Tested Brick, Block or Concrete Wall with $R_w \geq 45$ Wall from TABLE E1 Group B Refer to Wall Manufacturer for FRL Details	CSR 4135 	BOTH SIDES • 1 x 6mm CeminSeal Wallboard.	(a) 75 Acoustigard 11kg	62/48	63/49
			(b) 90 Gold Batts 2.0	63/49	64/**50**
			(d) 75 MAB Polyester 11kg	60/46	61/47
			Additional Wall Thickness mm	180	236
	CSR 4140 	BOTH SIDES • 1 x 10mm Gyprock Plus Plasterboard.	(a) 75 Acoustigard 11kg	62/49	63/**50**
			(b) 90 Gold Batts 2.0	63/**50**	64/**51**
			(d) 75 MAB Polyester 11kg	60/47	61/48
			Additional Wall Thickness mm	188	244
	CSR 4145 	BOTH SIDES • 1 x 13mm Gyprock Standard Plasterboard.	(a) 75 Acoustigard 11kg	63/**51**	64/**52**
			(b) 90 Gold Batts 2.0	64/**52**	65/**53**
			(d) 75 MAB Polyester 11kg	61/49	62/**50**
			Additional Wall Thickness mm	194	250
	CSR 4150 	BOTH SIDES • 1 x 13mm Gyprock Aquachek Plasterboard.	(a) 75 Acoustigard 11kg	63/**51**	64/**52**
			(b) 90 Gold Batts 2.0	64/**52**	65/**53**
			(d) 75 MAB Polyester 11kg	61/49	62/**50**
			Additional Wall Thickness mm	194	250
	CSR 4155 	SIDE ONE • 1 x 13mm Gyprock Aquachek Plasterboard. SIDE TWO • 1 x 13mm Gyprock Soundchek Plasterboard.	(a) 75 Acoustigard 11kg	64/**52**	65/**53**
			(b) 90 Gold Batts 2.0	65/**53**	66/**54**
			(d) 75 MAB Polyester 11kg	62/**50**	63/**51**
			Additional Wall Thickness mm	194	250
	CSR 4160 	BOTH SIDES • 1 x 13mm Gyprock Soundchek Plasterboard.	(a) 75 Acoustigard 11kg	65/**53**	66/**54**
			(b) 90 Gold Batts 2.0	66/**54**	67/**55**
			(d) 75 MAB Polyester 11kg	63/**51**	64/**52**
			Additional Wall Thickness mm	194	250

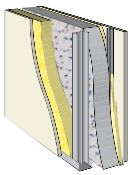
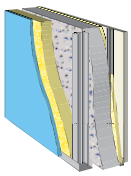
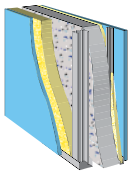
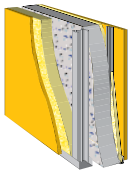


NOTE: Polyester insulation may NOT be used where the system has non-combustible construction requirements.

SYSTEM SPECIFICATION Refer to Book 3 Commercial & Multi-Residential Installation Guide			ACOUSTIC REPORT: PKA-A118 Discontinuous Construction		
WALL REQUIREMENTS	SYSTEM Nº	WALL LININGS	STUD DEPTH mm	64	92
			STUD BMT mm	0.50	0.55
			CAVITY INFILL (Both Sides) (Refer to TABLE B6)	R_W / R_W+C_{tr}	
Tested Brick, Block or Concrete Wall with $R_W \geq 47$ Wall from TABLE E1 Group C Refer to Wall Manufacturer for FRL Details	CSR 4165 	BOTH SIDES • 1 x 6mm CeminSeal Wallboard.	(a) 75 Acoustigard 11kg	65/**51**	66/**52**
			(b) 90 Gold Batts 2.0	66/**52**	67/**53**
			(d) 75 MAB Polyester 11kg	63/49	64/**50**
			Additional Wall Thickness mm	180	236
	CSR 4170 	BOTH SIDES • 1 x 10mm Gyprock Plus Plasterboard.	(a) 75 Acoustigard 11kg	64/**51**	65/**52**
			(b) 90 Gold Batts 2.0	65/**52**	66/**53**
			(d) 75 MAB Polyester 11kg	62/49	63/**50**
			Additional Wall Thickness mm	188	244
	CSR 4175 	BOTH SIDES • 1 x 13mm Gyprock Standard Plasterboard.	(a) 75 Acoustigard 11kg	65/**53**	66/**54**
			(b) 90 Gold Batts 2.0	66/**54**	67/**55**
			(d) 75 MAB Polyester 11kg	63/**51**	64/**52**
			Additional Wall Thickness mm	194	250
	CSR 4180 	BOTH SIDES • 1 x 13mm Gyprock Aquachek Plasterboard.	(a) 75 Acoustigard 11kg	65/**53**	66/**54**
			(b) 90 Gold Batts 2.0	66/**54**	67/**55**
			(d) 75 MAB Polyester 11kg	63/**51**	64/**52**
			Additional Wall Thickness mm	194	250
	CSR 4185 	SIDE ONE • 1 x 13mm Gyprock Aquachek Plasterboard. SIDE TWO • 1 x 13mm Gyprock Soundchek Plasterboard.	(a) 75 Acoustigard 11kg	66/**54**	67/**55**
			(b) 90 Gold Batts 2.0	67/**55**	68/**56**
			(d) 75 MAB Polyester 11kg	64/**52**	65/**53**
			Additional Wall Thickness mm	194	250
	CSR 4190 	BOTH SIDES • 1 x 13mm Gyprock Soundchek Plasterboard.	(a) 75 Acoustigard 11kg	67/**55**	68/**56**
			(b) 90 Gold Batts 2.0	68/**56**	69/**57**
			(d) 75 MAB Polyester 11kg	65/**53**	66/**54**
			Additional Wall Thickness mm	194	250



NOTE: Polyester insulation may NOT be used where the system has non-combustible construction requirements.

SYSTEM SPECIFICATION Refer to Book 3 Commercial & Multi-Residential Installation Guide			ACOUSTIC REPORT: PKA-A118 Discontinuous Construction			
			STUD DEPTH mm		**64**	**92**
			STUD BMT mm		**0.50**	**0.55**
WALL REQUIREMENTS	**SYSTEM Nº**	**WALL LININGS**	**STUD CAVITY INFILL** (Refer to TABLE B6)	**FURRING CAVITY INFILL** (Refer to TABLE B6)	**R_W / R_W+C_{tr}**	
Tested Brick, Block or Concrete Wall with $R_W \geq 42$ **Wall from TABLE E1 Group A** Refer to Wall Manufacturer for FRL Details	**CSR 4205** 	BOTH SIDES • 1 x 13mm Gyprock Standard Plasterboard.	(d) 50 Acoustigard 14kg	50 Acoustigard 14kg	57/45	59/47
			(e) 75 Acoustigard 11kg	50 Acoustigard 14kg	59/47	61/49
			(f) 75 MAB Polyester 14kg	25 MAB Polyester 20kg	56/44	58/46
			Additional Wall Thickness mm		150	178
	CSR 4210 	SIDE ONE • 1 x 13mm Gyprock Aquachek Plasterboard. SIDE TWO • 1 x 13mm Gyprock Standard Plasterboard.	(d) 50 Acoustigard 14kg	50 Acoustigard 14kg	58/46	59/47
			(e) 75 Acoustigard 11kg	50 Acoustigard 14kg	60/48	61/49
			(f) 75 MAB Polyester 14kg	25 MAB Polyester 20kg	57/45	58/46
			Additional Wall Thickness mm		150	178
	CSR 4215 	BOTH SIDES • 1 x 13mm Gyprock Aquachek Plasterboard.	(d) 50 Acoustigard 14kg	50 Acoustigard 14kg	58/46	59/47
			(e) 75 Acoustigard 11kg	50 Acoustigard 14kg	60/48	61/49
			(f) 75 MAB Polyester 14kg	25 MAB Polyester 20kg	57/45	58/46
			Additional Wall Thickness mm		150	178
	CSR 4220 	BOTH SIDES • 1 x 13mm Gyprock Soundchek Plasterboard.	(d) 50 Acoustigard 14kg	50 Acoustigard 14kg	59/47	60/49
			(e) 75 Acoustigard 11kg	50 Acoustigard 14kg	61/49	62/**51**
			(f) 75 MAB Polyester 14kg	25 MAB Polyester 20kg	58/46	59/48
			Additional Wall Thickness mm		150	178

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