RENZO TONIN & ASSOCIATES
inspired to achieve

Acoustics
Vibration
Structural Dynamics

15-17 LUPIN AVENUE AND 82 BELMORE STREET, FAIRFIELD EAST

Acoustic Assessment for DA

30 May 2023

BlueCHP Limited

TN235-01F02 Acoustic Assessment for DA (r4)

35 1982-2017 ACOUSTIC ENGINEERING EXCELLENCE

Sydney Melbourne Brisbane Gold Coast Kuwait Singapore
Renzo Tonin & Associates ABN 29 117 462 861
Level 1/418A Elizabeth St SURRY HILLS NSW 2010 | PO Box 877 STRAWBERRY HILLS NSW 2012
P (02) 8218 0500 F (02) 8218 0501 sydney@renzotonin.com.au www.renzotonin.com.au

Document details

Detail	Reference
Doc reference:	TN235-01F02 Acoustic Assessment for DA (r4)
Prepared for:	BlueCHP Limited
Address:	Sydney NSW
Attention:	Gareth Bird

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
17.03.2023	Prepare draft	0		T. Wong		T. Wong
27.04.2023	Finalise report and issue		1	T. Wong		T. Wong
15.05.2023	Update APPENDIX C (NCC 2022 reference).		2	T. Wong		T. Wong
26.05.2023	Update site address		3	T. Wong		T. Wong
30.05.2023	Update drawing reference (Table 1) and Figure 2		4	T. Wong		T. Wong

File Path: R:\AssocSydProjects\TN201-TN250\TN235 tw 15-17 Lupin Avenue, Fairfield East\1 Docs\TN235-01F02 Acoustic Assessment for DA (r4).docx

Contents

List of tables

List of figures

1 Introduction

This report presents an assessment of noise intrusion into and operational noise from the proposed residential development at 15-17 Lupin Avenue and 82 Belmore Street, Fairfield East.

This study examines the effects of external noise intrusion on the proposed development from nearby ambient noise such as road traffic noise and rail noise. A long-term noise survey has been conducted on site by Renzo Tonin & Associates from 10/03/2023 to 17/03/2023 to establish the existing levels of external noise affecting the development. The predicted noise levels at the building facades were used to determine the sound insulation rating requirements for the external building elements in accordance with the acoustic criteria nominated for this development.

This report also includes an assessment of potential noise emission impact from the site. Noise emissions associated with the development have been identified as usage of the roof outdoor communal space and traffic noise generation as results of the development. Applicable noise emission criteria have been established based on relevant Council and/EPA criteria and noise mitigation measures have been determined where necessary to ensure that the noise impact on nearby noise-sensitive neighbours is within acceptable limits.

The following architectural drawings from Loucas Architects were reviewed.

Table 1: Drawings Reviewed

Drawing No.	Issue	Date	Title
A-800	C	04/05/2023	Lower Basement Plan
A-900	C	04/05/2023	Basement Plan
A-1000	C	04/05/2023	Ground floor Plan
A-1100	C	04/05/2023	L1 Floor Plan
A-1200	C	04/05/2023	L2 Floor Plan
A-1300	C	04/05/2023	L3 Floor Plan
A-1400	C	04/05/2023	L4 Floor Plan
A-1500	C	04/05/2023	L5 Floor Plan
A-1600	C	04/05/2023	L6 Roof Top Plan

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001.

2 Site and Surrounds

The site is located at 15-17 Lupin Avenue and 82 Belmore Street, Fairfield East and is currently occupied by 2 single storey and one double storey houses. The site is bounded by Belmore Street to the north, Lupin Avenue to the west, single and double storey houses to the east and south. The SydneyTrain T3 (Bankstown) rail corridor is located at approximately 167m south of the subject site. This section of the T3 rail corridor nearest to the subject site has three operational tracks and services commuter and freight trains.

The proposed development is the demolition of existing structures on site and construction of 6-storey building with 2 levels of basement parking.

Figure 1. Site Surrounds and Noise Survey Locations

The nearest noise-sensitive receivers to subject development have been identified as follows and indicated in Figure 1 above;

Table 2: Noise Sensitive Receiver Locations

Receiver ID	Address	Description
R1	16 Seaman Avenue, Fairfield East	Single storey house located 12m from site eastern boundary
R2	13 Lupin Avenue, Fairfield East	Single storey house located 1m from site southern boundary
R3	24-30 Lupin Avenue, Fairfield East	Single and double storey houses located 25m west of site across Lupin Avenue
R4	71-77 Belmore Street, Fairfield East	Single houses located 27m west of site across Belmore Street

3 Ambient and Background Noise Surveys

3.1 Noise Surveys

The proposed development is potentially affected by road traffic noise from surrounding roads and rail noise from the Bankstown Line rail corridor at 167m south of site. A noise monitor logger was installed in the front yard of 17 Lupin Avenue for a background and ambient noise survey from 10/03/2023 to 17/03/2023. In addition, operator attended noise surveys were conducted on Lupin Avenue and Belmore Street on 10/03/2023.

The noise logger records noise levels on a continuous basis and stores data every fifteen minutes. The noise logger was calibrated before and after measurements and no significant deviation in calibration was noted. The noise monitoring equipment used here complies with Australian Standard 1259.2-1990 "Acoustics - Sound Level Meters" and is designated as Type 2 instruments suitable for field use.

The results of the background and ambient noise monitoring conducted on site are presented in APPENDIX D.

3.2 Measured Traffic Noise Levels

Traffic noise levels at the site were quantified using a combination of long-term noise logging and attended noise measurements.

The design traffic noise levels are taken from the representative L_{Aeq} for the week for both the day (7am to 10pm) and night (10pm-7am) periods. The design external traffic noise levels are presented Table 3 below.

Table 3: Day and Night Traffic Noise Levels

Monitoring Location	Survey Period	Measured Traffic Noise Levels over Day (15 hour) and Night (9 hour) Periods in dB(A)	
		$L_{Aeq, 15hour}$ [1]	$L_{Aeq, 9hour}$ [1]
M1 – Corner of Lupin Avenue and Belmore Street on front yard of 17 Lupin Avenue, Fairfield East	Day (7am to 10pm) 10/03/2023 to 17/03/2023	54	-
	Night (10pm to 7am) 10/03/2023 to 17/03/2023	-	51

Notes:

1. Noise levels presented are facade values.

Table 4 below presents the maximum morning and afternoon peak 1-hour traffic noise levels determined from the long-term noise survey.

Table 4: Measured Maximum AM and PM Peak Traffic Noise Levels

Location	Period	Maximum 1-Hour AM & PM Peak Traffic Noise Levels $L_{Aeq, T}$ [1,2]
M1 – Corner of Lupin Avenue and Belmore Street on front yard of 17 Lupin Avenue, Fairfield East	Morning 1-hour peak (between 7am to 10am)	55.4 dB(A)
	Afternoon 1-hour peak (3pm to 6pm)	58.7 dB(A)

Notes:

1. Noise levels presented are facade values.
2. Traffic noise level in measured L_{Aeq} over 1-hour period

Table 5 below presents results of the short-term noise surveys conducted around the subject site.

Table 5: Results of Short-term Traffic Noise Surveys

Monitoring Location	Survey Period / Comment	Measured Traffic Noise Levels
		$L_{Aeq, 15minute}$
S1 – on footpath at front of 17 Lupin Avenue facing Belmore Street	3:45pm to 4pm on Friday 10/03/2023	50
S2 – on footpath on western side of 17 Lupin Avenue facing Lupin Avenue	3:45pm to 4pm on Friday 10/03/2023	51

Notes:

1. Noise levels presented are free-field values.

The short-term traffic noise survey above indicates there is not sufficient difference in traffic noise levels between Belmore Street and Lupin Avenue.

3.3 Site Ambient and Background Noise Level

The results of the long-term noise monitoring have been summarised in accordance with Noise Policy for Industry requirements published by NSW Environmental Protection Authority (EPA) and are presented in the following tables.

Table 6: Measured Site Background Noise Levels (L_{A90})

Noise Monitoring		Representative L_{A90} Background Noise Levels in dB(A)		
Location	Survey Period	Day[1]	Evening[2]	Night[3]
M1 – Corner of Lupin Avenue and Belmore Street on front yard of 17 Lupin Avenue, Fairfield East	10/03/2023 to 17/03/2023	38	43	40

Noise Monitoring		Representative L_{A90} Background Noise Levels in dB(A)		
Location	**Survey Period**	**Day[1]**	**Evening[2]**	**Night[3]**

Notes:

Day, Evening & Night assessment periods are defined in accordance NSW EPA's Noise Policy for Industry as follows,

1. Day is defined as 7:00am to 6:00pm, Monday to Saturday; 8:00am to 6:00pm Sundays & Public Holidays
2. Evening is defined as 6:00pm to 10:00pm, Monday to Sunday & Public Holidays.
3. Night is defined as 10:00pm to 7:00am, Monday to Saturday; 10:00pm to 8:00am Sundays & Public Holidays

Table 7: Measured Site Ambient Noise Levels

Noise Monitoring		Representative L_{Aeq} Ambient Noise Levels in dB(A)		
Location	**Survey Period**	**Day[1]**	**Evening[2]**	**Night[3]**
M1 – Corner of Lupin Avenue and Belmore Street on front yard of 17 Lupin Avenue, Fairfield East	10/03/2023 to 17/03/2023	52	52	50

Notes:

Day, Evening & Night assessment periods are defined in accordance NSW EPA's Noise Policy for Industry as follows.

1. Day is defined as 7:00am to 6:00pm, Monday to Saturday; 8:00am to 6:00pm Sundays & Public Holidays. As results were affected by construction noise weekend day and Saturday morning, Sunday results have been presented for the Day time period
2. Evening is defined as 6:00pm to 10:00pm, Monday to Sunday & Public Holidays
3. Night is defined as 10:00pm to 7:00am, Monday to Saturday; 10:00pm to 8:00am Sundays & Public Holidays

The background (L_{A90}) and ambient (L_{Aeq}) noise levels in the tables above are representative of surrounding neighbours and are used in defining external noise emission from the development such as mechanical ventilation and air-conditioning systems in accordance with EPA Noise Policy for Industry (NPfI).

4 Acoustic Criteria

4.1 Road Traffic and Rail Noise Criteria

Table 8 below presents internal noise criteria recommended for this development which was based on the following documents.

- Fairfield City Council Development Control Plan 2013 (Amendment 16)
- State Environment Planning Policy (Transport & Infrastructure) 2021
- Department of Planning (DoP) publication "Development Near Rail Corridors & Busy Roads – Interim Guideline" 2008
- Australian Standard AS/NZS 2107:2016 "Acoustics – Recommended design sound pressure levels and reverberation times for building interior"

Section 2.5.10 of Council DCP require developments near busy roads and rail corridors to include measures to control noise intrusion. The DCP refers to the SEPP 2007 [superseded by SEPP (Transport & Infrastructure) 2021 and DoP's guideline for assessment of developments adjacent rail corridor or near busy roads.

As such, an acoustic assessment of road and rail noise in accordance with ISEPP and DoP Guideline is mandatory for this development. The relevant internal noise criteria for the development are summarised in Table 8 below.

Table 8: Recommended Maximum Internal Road Traffic and Rail Noise Levels

Type of Occupancy	Windows & Doors Condition	Maximum Design Noise Levels	
		Day, L_{Aeq} (15hour)	Night, L_{Aeq} (9hour)
Sleeping areas	Closed	-	35dB(A)
	Open[2]	-	45dB(A)
All other habitable rooms	Closed	40dB(A)	40dB(A)
	Open[2]	50dB(A)	50dB(A)
Bathrooms & en-suites [1]	Closed	45dB(A)	45dB(A)
	Open[2]	55dB(A)	55dB(A)
Communal indoor areas [1]	Closed	45dB(A)	45dB(A)
	Open[2]	55dB(A)	55dB(A)
Lift lobbies [1]	Closed	50dB(A)	50dB(A)

Notes:

1. Design sound pressure levels for these spaces not coved in the ISEPP were based on Australian Standard AS2107
2. Window and/or external door open to 5% of floor area as per National Construction Code requirement for natural ventilation

Relevant sections of the State Environment Planning Policy, Australia Standard AS2107, Council DCP, and Government Policies are presented in APPENDIX A of this report.

4.2 Mechanical Plant Noise Emission Limits

4.2.1 EPA Requirements

The NSW Environment Protection Authority (EPA) sets out noise criteria in its Noise Policy for Industry (NPfI) to control the noise emission from industrial sources.

The NPfI sets project noise trigger level to protect noise amenity for residential receivers. The project noise trigger level is set as the lower value of the following two assessment components:

- Controlling intrusive noise impacts in the short term for residences; and
- Maintaining noise level amenity for particular land uses for residences and other land uses.

Noise intrusiveness ensures that industrial noise does not exceed the background noise level by an excessive margin, preventing significant changes in the noise characteristic pertinent to the development site and surrounds. This is commonly referred to as the 'background plus 5' criterion. That is, the noise level from new industrial development, assessed in periods of 15 minutes, should not exceed the existing background noise level (measured in the absence of that development) by more than 5dB(A).

Noise amenity ensures that industrial noise levels do not increase without limit, for if a number of industrial noise sources are permitted to increase the background noise level by 5dB(A), in turn there would be a point where the ultimate noise level is unacceptable. A limit on the ultimate acceptable noise level is therefore included in the NPfI as a way of ensuring that cumulative noise impact from industrial growth is curtailed. This limit is referred to as the project amenity noise level. The appropriate limit in any circumstance relates to the land use category, for example, there are different limits for rural, suburban and urban areas.

The table below presents the recommended amenity noise level relevant to the receivers surrounding the proposed development site. The project amenity noise level is defined as the recommended amenity noise level minus 5dB(A).

Table 9: NPfI Amenity Noise Levels - Recommended L_{Aeq} Amenity Noise Levels from Industrial Noise Sources [EPA NPfI Table 2.1]

Receiver	Noise amenity area	Time of day	L_{Aeq}, dB(A)
			Recommended amenity noise level
Residential	Rural	Day	50
		Evening	45
		Night	40
	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60

Receiver	Noise amenity area	Time of day	L_{Aeq}, dB(A)
			Recommended amenity noise level
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks	See column 4	See Column 4	5dB(A) above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day
Area specifically reserved for passive recreation (e.g. national park)	All	When in use	50
Commercial premises	All	When in use	65

Notes:

- Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am
- On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am.
- The LAeq index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

In accordance with Section 2.4 of the NPfI, the following **exceptions** to the above method to derive the project amenity noise level apply:

1. In areas with high traffic noise levels (see Section 2.4.1 of the NPfI).
2. In proposed developments in major industrial clusters (see Section 2.4.2 of the NPfI).
3. Where the resultant project amenity noise level is 10dB, or more, lower than the existing industrial noise level. In this case the project amenity noise levels can be set at 10dB below existing industrial noise levels if it can be demonstrated that existing industrial noise levels are unlikely to reduce over time.
4. Where cumulative industrial noise is not a necessary consideration because no other industries are present in the area, or likely to be introduced into the area in the future. In such cases the relevant amenity noise level is assigned as the project amenity noise level for the development.

The following table below presents the site-specific noise production criteria from industrial noise sources, namely mechanical plant noise to neighbouring residential properties (R1 to R4) identified in Section 2.

Table 10: Project noise trigger levels for noise emission from mechanical plant to residential neighbours (EPA NPfI)

Time of Day	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
	Rating Background Level (RBL) L_{A90}	Intrusiveness Trigger Level, $L_{Aeq, 15minute}$ (RBL+5)	Recommended Amenity Noise Level (RANL), $L_{Aeq, period}$	Project Amenity Noise Level (PANL), $L_{Aeq, period}$	Measured $L_{Aeq, period}$ existing noise levels	Traffic noise exceed RANL by more than 10dB?	Existing noise level likely to decrease in future?	Exceptions to PANL $L_{Aeq, period}$?	Project Noise Trigger Level, $L_{Aeq, 15minute}$
Day (7am to 6pm)	38	43	55	50	52	No	No	None	**43**
Evening (6pm to 10pm)	43	43	45	40	52	No	No	None	**43**
Night (10pm to 7am)	40	45	40	35	50	No	No	None	**38**

Explanatory notes:

Column 1 – RBL measured in accordance with the NPfI and outlined in the results of the long-term noise monitoring has been summarised in accordance with NPfI requirements and are presented in Table 6 above. Where the evening time criterion is greater than the daytime criterion, the evening time goal is amended to be the same as the daytime criteria.

Column 4 – Project Amenity Noise Level determined based on 'Residential - Suburban' area in Table 2.2 (Amenity noise levels) of the EPA's NPfI minus 5dB

Column 5 – Measured in accordance with the NPfI

Column 8 - Determined in accordance with Section 2.4 of the NPfI.

Column 9 – Project Noise Trigger Level is the lower value of project intrusiveness noise level and project amenity noise level. In accordance with Section 2.2 of the NPfI, $L_{Aeq, 15minute}$ is calculated as $L_{Aeq, period}$ + 3dB(A)

Notes: Intrusiveness noise level for Evening must be set at no greater than the intrusiveness level for daytime in accordance with NPfI Section 2.3.

Where necessary, noise amelioration treatment to mechanical plant such as carpark exhaust fans and air conditioning systems will be incorporated in the design to ensure that noise levels comply with the recommended NPfI noise emission criteria noted above.

5 Noise Intrusion Assessment

5.1 External Noise Sources

This section addresses external noise impacts on the proposed development being.

- Road traffic noise from surrounding roads
- Airborne rail noise from the SydneyTrain rail corridor located 167m south of site which serves commuter and freight trains.

The target interior noise levels from ingress of the above external sources have been defined in Section Table 8 in accordance with the applicable noise guidelines.

5.2 Glazing Recommendations

Table 11 below presents recommended glazing treatment for the building facades to achieve compliance with the maximum noise levels nominated in Table 8 above.

Table 11: Recommended Glazing Treatment

Levels	Façade	Occupancy Type	Recommended Minimum Sound Insulation Rating of Glazing Assembly	Typical Compliance Glazing Thickness & Type	Laboratory Test Reference
Ground floor to Level 5	All	Lift lobbies	Rw23	3mm standard float glass or equivalent	ESTIMATE
		Bedrooms	Rw27	6mm standard float glass or equivalent	ESTIMATE
		Open plan Living/Dining/Kitchen areas	Rw27	6mm standard float glass or equivalent	ESTIMATE
		Bathrooms, ensuites and laundry rooms	Rw24	4mm standard float glass or equivalent	ESTIMATE
Roof	All	Communal indoor space	Rw24	4mm standard float glass or equivalent	ESTIMATE

By way of explanation, the Sound Insulation Rating Rw is a measure of the noise reduction property of the partition, a higher rating implying a higher sound reduction performance.

Note that the Rw rating of systems measured as built on site (R'w Field Test) may be up to 5 points lower than the laboratory result.

Levels	Façade	Occupancy Type	Recommended Minimum Sound Insulation Rating of Glazing Assembly	Typical Compliance Glazing Thickness & Type	Laboratory Test Reference
LEGEND where no appropriate test certificate exists: 1. ESTIMATE: The client is advised not to commence detailing or otherwise commit to partition construction systems which have not been tested in an approved laboratory or for which an opinion only is available. Testing of partition construction systems is a component of the quality control of the design process and should be viewed as a priority because there is no guarantee the forecast results will be achieved thereby necessitating the use of an alternative which may affect the cost and timing of the project. No responsibility is taken for use of or reliance upon untested partition construction systems, estimates or opinions. The advice provided here is in respect of acoustics only. 2. ESTIMATE – APPROVED FOR CONSTRUCTION: Use of the form of construction is approved prior to laboratory certification. To complete the quality control of the design process and confirm the acoustical performance of the construction, we recommend testing in a laboratory to confirm the Rw rating as soon as practicable. In the case of impact rating for floor systems, no particular impact rating is guaranteed to comply with either the Building Code of Australia or Strata Scheme Management Act and hence carpet runners may still be required. 3. ESTIMATE – TEST NOT REQUIRED: Use of the form of construction is approved without laboratory certification. The STC/Rw of the form of construction exceeds the project requirements. 4. The advice provided here is in respect of acoustics only. Supplementary professional advice may need to be sought in respect of fire ratings, structural design, buildability, fitness for purpose and the like.					
NOTES FOR GLAZING CONSTRUCTIONS: 5. The information in this table is provided for the purpose of Council approvals process and cost planning and shall not be used for construction unless otherwise approved in writing by the acoustic consultant. 6. The design in this table is preliminary and a comprehensive assessment shall be conducted prior to Construction Certification. 7. Before committing to any form of construction or committing to any builder, advice should be sought from an acoustic consultant to ensure that adequate provisions are made for any variations which may occur as a result of changes to the form of construction where only an "estimate" is available for the sound insulation properties of recommended materials. 8. The glazing supplier shall ensure that installation techniques will not diminish the Rw performance of the glazing when installed on site. 9. All openable glass windows and doors shall incorporate full perimeter acoustic seals equivalent to Q-Lon, which enable the Rw rating performance of the glazing to not be reduced. 10. The above glazing thicknesses should be considered the minimum thicknesses to achieve acoustical ratings. Greater glazing thicknesses may be required for structural loading, wind loading etc.					
GENERAL 11. The sealing of all gaps in partitions is critical in a sound rated construction. Use only sealer approved by the acoustic consultant. 12. Check design of all junction details with acoustic consultant prior to construction. 13. Check the necessity for HOLD POINTS with the acoustic consultant to ensure that all building details have been correctly interpreted and constructed. 14. The information provided in this table is subject to modification and review without notice. 15. The advice provided here is in respect of acoustics only. Supplementary professional advice may need to be sought in respect of fire ratings, structural design, buildability, fitness for purpose and the like.					

5.3 Building Ventilation

The internal noise criteria outlined in Table 8 for "windows closed" scenario will be achieved provided the recommended glazing in Table 11 are implemented and windows/external doors are closed. Table 12 below shows the assessment of external noise intrusion to the "windows open" noise criteria of Table 8.

Table 12: Noise Assessment to Windows Open Criteria

Period	Occupancy	Façade	Predicted Noise Level L_{Aeq}, in dB(A)		Windows Open Internal Noise Criteria L_{Aeq}, in dB(A)	Compliance (Yes/No)
			At Most-affected facade[1]	Inside Occupancy with Windows Open[2]		
Night (10pm to 7am)	Bedrooms	All facades	51	41	45 or less	Yes

Period	Occupancy	Façade	Predicted Noise Level $L_{Aeq,}$ in dB(A)		Windows Open Internal Noise Criteria $L_{Aeq,}$ in dB(A)	Compliance (Yes/No)
			At Most-affected facade[1]	Inside Occupancy with Windows Open[2]		
Day time (7am to 10pm)	Open plan Living/dining/kitchen areas	All facades	54	42	50 or less	Yes
	Bathrooms, en-suites and laundry rooms	All facades	54	44	55 or less	Yes
	Communal indoor space	All facades	54	44	55 or less	Yes

Notes:

1. Predicted façade noise levels are 1m from window or sliding door of the most affected façade. Achieving compliance on most-affected façade automatically compliance on other facades.
2. Opening area of window or sliding door is no greater than 5% of floor area as per NCC requirement

Our calculations have shown the internal noise levels will comply with the "windows open" scenario outlined in Table 8 for all spaces of the development. Therefore, natural ventilation can be implemented into the design building without impacting on compliance with internal noise levels.

5.4 Facade & Roof Sound Insulation

In principle advice is provided below for the acoustic requirements of the roofs, external walls and doors.

5.4.1 External Walls

All external walls shall have sound isolation ratings, Rw, of at least 15dB higher acoustic performance than that of the acoustic glazing specified in Table 11 above.

This will typically be achieved for external wall systems consisting of the following or equivalent.

s1. Fibre cement board, weather board, plank cladding or similar external skin, sarking/moisture barrier, minimum 70mm studwork, minimum R1.5 insulation batts wall cavity, 13mm standard plasterboard internally, or

s2. Brick veneer with 110mm thick brickwork, minimum 70mm studwork, 13mm standard plasterboard internally, or

s3. 110mm cavity brickwork

5.4.2 Roof and Ceiling

Roof/ceiling construction shall have a sound isolation rating, Rw, at least 10dB higher than that of the acoustic glazing on its facade walls.

This will typically be achieved for roof/ceiling systems consisting of the following or equivalent.

s1. Pitched concrete tile or metal roof with sarking, 13mm standard plasterboard ceiling fixed to ceiling joists, minimum R2 insulation batts in roof cavity, or

s2. Any concrete roof with plasterboard ceiling below.

5.4.3 Glazing Assembly Requirements

The following acoustic measures should also be incorporated into the building design:

s1. All operable glass windows and doors shall incorporate full perimeter acoustic seals equivalent to Q-Lon, which enable the Rw rating performance of the glazing to not be reduced.

s2. The glazing thicknesses outlined in Table 11 should be considered the minimum thicknesses to achieve acoustical ratings. Greater glazing thicknesses may be required for structural loading, wind loading etc.

s3. The glazing supplier shall ensure that installation techniques will not diminish the Rw performance of the glazing when installed on site. Sliding door meeting stiles should form an airtight seal when closed and locked.

s4. The perimeter of all window and door frames are to be sealed airtight in the external facade using the following methods:

- For gaps less than 10mm - Fill all gaps around the window perimeter with an acoustic mastic sealer (minimum specific gravity 1.6sg) equivalent to Promat Promaseal. The depth of sealer shall be at least equal to the width of the gap.
- If the gap is greater than 10mm, fill the cavity with polyester insulation and a backing rod. Seal the gap airtight an acoustic mastic sealer (min specific gravity 1.6sg) equivalent to Promat Promaseal. The depth of sealer shall be at least equal to the width of the gap. The gaps between frames shall also be sealed using aluminium angle brackets (approximately 25 x 25 x 3mm).

6 Traffic Noise Generation

6.1 Road Traffic Noise Criteria

Noise impact from the potential increase in traffic on Lupin Avenue and Belmore Street due to the operation of the development is assessed against the NSW Road Noise Policy (RNP) 2011 published by Department of Environment, Climate Change & Water. The RNP sets out criteria to be applied to particular types of road and land uses. These noise criteria are to be applied when assessing noise impact and determining mitigation measures for developments that are potentially affected by road traffic noise associated with the development, with the aim of preserving the amenity appropriate to the land use.

The RNP divides land use developments into different categories and lists the respective noise criteria for each case. Vehicle entry and exit to the proposed basement parking of the development will be via the driveway on Lupin Avenue.

Lupin Avenue and Belmore Street are categorised as a 'local' road. The applicable criteria for the day and night periods are summarised in Table 13 below.

Table 13: Applicable Road Traffic Noise Criteria, dB(A)

Road Category	Type of Project/ Land Use	Assessment Criteria in dB(A)	
		Day (7am-10pm)	Night (10pm-7am)
Local Roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	LAeq (1hour) 55 (external)	LAeq (1hour) 50 (external)

In addition to the above criterion, Section 3.4.1 of the RNP states the following:

> *"For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2dB above that of the corresponding 'no build option'."*

Based on the above statement, the **proposed development should not give rise to an increase in traffic noise level of 2dB(A) above existing traffic noise levels** at existing residences.

6.2 Predicted Road Traffic Noise

Traffic movements in and out of the basement driveway will be the main source of traffic generated by the site. TTPP traffic engineers has undertaken traffic counts on Belmore Street and Lupin Avenue from 16/03/2023 to 22/03/2023. For Belmore Street, based on the hourly traffic counts provided, the maximum average vehicle trips during the morning and afternoon peak hour are 27 and 37 respectively. For Lupin Avenue, the maximum average trips during morning and afternoon peak hour are 14 and 16 respectively.

Assuming 20 vehicles departs or arrives at the basement of the development during the morning and after peak hour, traffic noise prediction model CoRTN was used to calculate noise generated by the development. Table 14 below presents the existing and predicted peak hour traffic noise levels with the development.

Table 14: Traffic Noise Levels due to Development, dB(A)

Period	Existing Traffic Noise Levels during AM & PM Peak hour[1]	Traffic Noise from Development	Cumulative Traffic Noise Level[2] (Existing + Development)	Increase in Traffic Noise Level due to Development
Morning Peak Hour	55.4	52.3	57.1	1.7dB
Afternoon Peak Hour	58.7	52.3	59.6	0.9dB

Notes:

1. Results of long-term noise monitoring presented in Table 4
2. Calculated using CoRTN traffic noise model assuming 20 vehicles trips during the 1-hour morning and afternoon peak ie. 51% of the 39 apartments departs/arrives by vehicle.

The results above have demonstrated the additional traffic from the subject development is not predicted to increase existing traffic noise levels by more than 2dB therefore complies with RNP requirements.

Further, an increase in 2dB or less in noise level is not perceptible to the human ear and is deemed negligible.

7 Noise Emission Assessment

7.1 Noise Control Measures for Mechanical Plant & Equipment

Mechanical plant such as exhaust systems, air-conditioning, mechanical ventilation and refrigeration associated with the development has the potential to impact on nearby residential and commercial properties. As details of mechanical plant are not available at this stage of the development the following in principle noise control measures are provided.

- Acoustic assessment of mechanical plant and equipment will be required to be undertaken during the detail design phase of the development to ensure that they shall not either singularly or in total emit noise levels which exceed the EPA noise limits in established in Table 10 during day and night operations.
- Mechanical plant noise emission can be controllable by appropriate mechanical system design and implementation of common engineering methods that may include any of the following;
  - procurement of 'quiet' plant and plant with night 'silent' mode
  - strategic positioning of roof and balcony plant equipment away from sensitive neighbouring premises, maximising the intervening shielding between the plant and sensitive neighbouring premises
  - installation of commercially available silencers or acoustic attenuators for air discharge and air intakes of plant
  - acoustically lined and lagged ductwork
  - provide acoustic screens and/or acoustic louvres between plant and sensitive neighbouring premises
  - provide partially enclosed or fully enclosed acoustic enclosure over plant
  - Mechanical plant shall have their noise specifications and proposed locations checked prior to installation
  - Fans shall be mounted on vibration isolators and balanced in accordance with Australian Standard 2625 "Rotating and Reciprocating Machinery - Mechanical Vibration"

7.2 Roof Communal Open Space

A communal open space has been proposed on the roof of the development which only accessible by residences and their guests and will normally be used for family outdoor activities such as BBQ. Noise associated with normal family activities in the outdoor area may potentially impact on future residential neighbours to the east.

The nearest noise-sensitive neighbour to the roof outdoor area is the future residential building, Receiver R1, on the eastern site boundary as indicated in Figure 2 below. The future neighbouring building is expected to have equivalent height to subject development and is set back 3.5m from the common boundary.

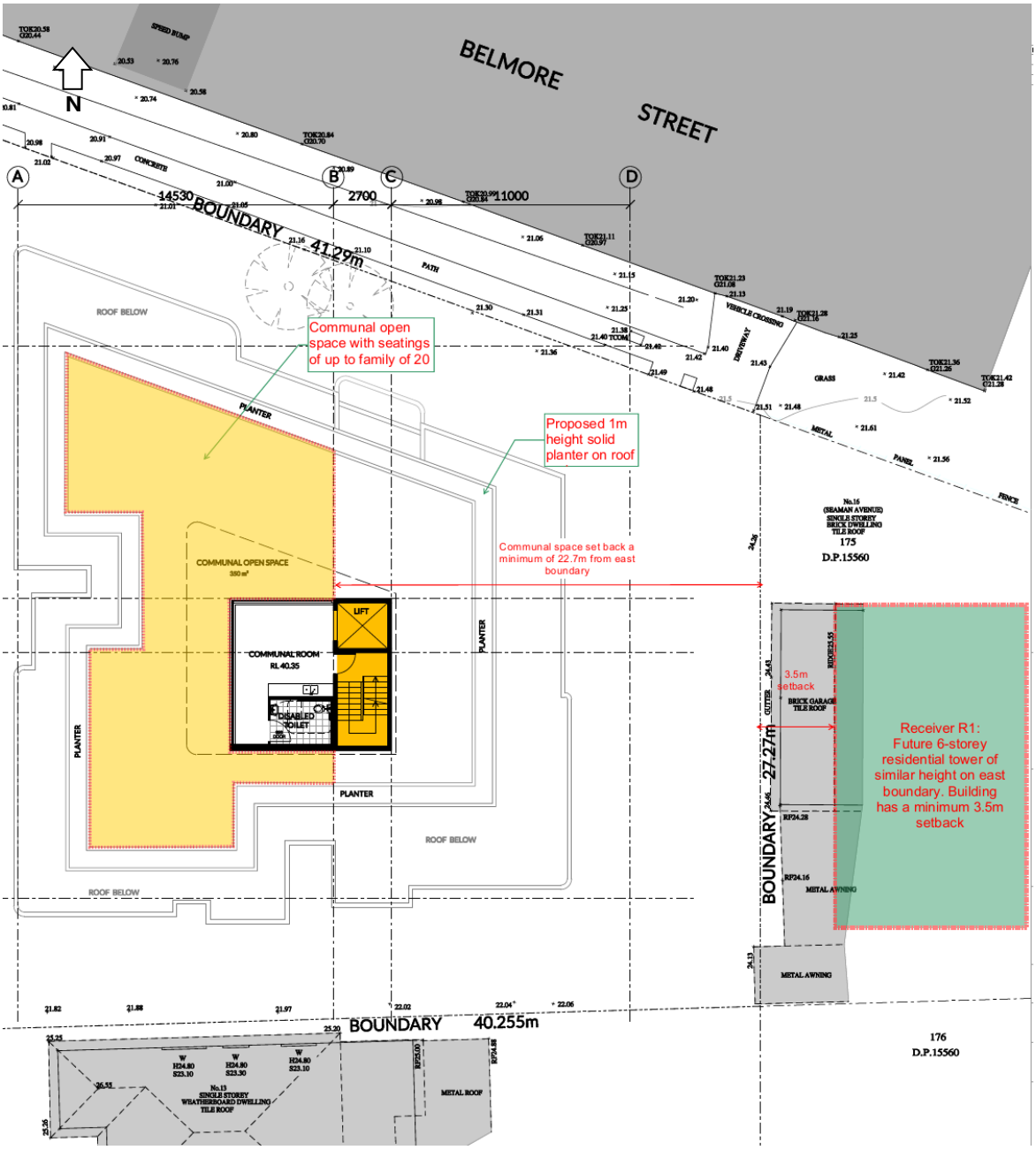


Figure 2: Proposed Roof Communal Open Space

The layout of the communal outdoor space has not been finalise at this stage, however our understanding is that outdoor seating of up to 20 has been proposed to allow large family gatherings. We recommended the outdoor area to be set back from the east boundary a minimum 22.7m as indicated in Figure 2 above.

Section below presents an assessment of normal voice conversations from the roof communal outdoor area to nearest future residential neighbours show in Figure 2 above.

7.2.1 Relevant Noise Criteria

Section 3.4.2.3 of Manly Development Control Plan 2013 (Amendment 11) references NSW *Noise Guide for Local Government (*NGLG) for assessment of noise generated in outdoor living areas. According to the NGLG, the intrusiveness of a noise source may generally be considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (represented by the L_{Aeq} descriptor) does not exceed the background noise level measured in the absence of the source by more than 5dB(A). The intrusiveness criterion is summarised as follows:

$$L_{Aeq,15minute} \leq \text{Background noise level} + 5\text{dB(A)}$$

The allowable $L_{Aeq\ 15minute}$ noise emission from an existing or newly introduce noise source is therefore dependant on the background noise level in the in an area without the subject noise source(s) in operation.

Therefore, based on the above intrusiveness criterion and the background noise levels shown in Table 6, the applicable noise limits at nearest neighbours are as follows. Since the intrusiveness criterion for Evening/Night cannot be greater than Day as per EPA NPfI, for this site the Evening/Night is set to the day criterion which provide a conservative assessment.

Table 15: Intrusiveness Noise Criteria

Assessment Location	Receiver Noise Emission Limits $L_{Aeq,\ 15minutes}$		
	Day[1]	Evening[2]	Night[3]
Southern residential neighbours with window/balcony on Level 3 facing development	43	43	43

Notes:

Day, Evening & Night assessment periods are defined in accordance NSW EPA's Noise Policy for Industry as follows.

1. Day is defined as 7:00am to 6:00pm, Monday to Saturday; 8:00am to 6:00pm Sundays & Public Holidays.
1. Evening is defined as 6:00pm to 10:00pm, Monday to Sunday & Public Holidays
2. Night is defined as 10:00pm to 7:00am, Monday to Saturday; 10:00pm to 8:00am Sundays & Public Holidays

7.2.2 Noise Sources

The source of noise from usage of the roof communal space will predominately be voices from occupants and guests engaging in conversations. Patron normal voice levels are shown in Table 16 below.

Table 16: Communal Area Noise Sources

Noise source description	Noise Descriptor	Overall Sound Power dB(A)	Sound Power Level in Octave Band Frequency (Hz) - dB					
			250	500	1k	2k	4k	8k
Male normal voice	$L_{eq, T}$	69	66	68	62	57	54	49
Female normal voice	$L_{eq, T}$	66	62	65	60	55	54	50

Source: Renzo Tonin & Associates past project files & database

7.2.3 Predicted Noise Level at Receiver

Allowance of up to a total of 20 seats on the communal outdoor space has been proposed. Assuming all designated seats occupied and based on the normal voice sound data outlined in Table 16, Table 17 below presents the predicted noise level at façade of the southern neighbours. The predicted noise levels are compared to the night noise criterion outlined in Table 15 above.

Table 17: Balcony Usage Noise Assessment

Assessment Location	Number of Patron Talking with Normal Voice Level	Predicted Noise Level at Nearest Receiver L_{Aeq}	Day/Evening/ Night Noise Limits at Receiver L_{Aeq}	Comply with Receiver Noise Criteria
Receiver R1 – Future east neighbours with window/balcony on Level 5 facing the development	20 residences/visitors on roof open communal area with 10 patrons (5 males & 5 females) talking simultaneously at normal voice levels (while others are listening)	No greater than 42 dB(A)	No greater than 43 dB(A)	Yes

Our results above demonstrate that noise generated from usage of the rooftop outdoor area to comply with NSW *Noise Guide for Local Government (*NGLG). Therefore, no acoustic impact to the surrounding environment is expected from usage of the proposed communal outdoor space.

8 Internal Sound Insulation between Tenancies

Internal walls and floors shall comply with the National Construction Code of Australia 2019 (formally Building Code of Australia). All services and doors shall comply with the requirements of NCC 2019.

APPENDIX C presents a summary of sound insulation provisions outlined in Part F5 of NCC 2019.

9 Construction Noise

The nature of the construction processes proposed for the development does not present difficulties in ensuring that the associated noise limits at surrounding properties are achieved. The major construction activities proposed on this site are excavation works, concrete pours and general building works.

Construction and building work will be adequately managed so as to minimise disruption to the local community and the environment.

Noise generated by construction activities will comply with the Department of Environment Climate Change & Water's Interim Construction Noise Guide (ICNG). APPENDIX B presents a summary ICNG's standard construction times and conditions.

10 Conclusion

Renzo Tonin & Associates have completed an assessment of potential noise impacts to and from the proposed residential development at 15-17 Lupin Avenue and 82 Belmore Street, Fairfield East.

The study of external noise intrusion into the subject development has found that appropriate noise control measures can be incorporated into the building design to achieve compliance with the acoustic requirements of Fairfield City Council DCP 2013, State Environmental Planning Policy (Transport & Infrastructure) 2021 and Australian Standard AS/NZS 2107.

Our assessment has found traffic noise generation from the development to comply with the relevant traffic noise criteria, and that no acoustic impact to the surrounding environment is expected from usage of the proposed roof communal outdoor space provided the recommended setback of outdoor area is implemented into the building design.

Recommendations have been provided in Section 5 of this report to comply with the nominated internal noise criteria.

APPENDIX A Assessment and Design Methodology

A.1 Fairfield City Council Development Control Plan 2013 (Amendment 16)

Fairfield City Council is the regulatory authority for the proposed development. Part 2.5.10 of Council's DCP 2013 (Amendment 16) recommends residential developments near railway lines or busy roads to conduct a noise and vibration assessment in accordance with the Department of Planning's "Development near Rail Corridors and Busy Road Interim Guideline (2007)".

Relevant sections of Council's DCP are re-iterated below.

"2.5.10 Acoustic Reports – Rail, Road and Aircraft

Development near a rail corridor or major road - Major roads and rail operations generate noise and vibration, and people living and working near major transport corridors can be adversely affected. In addition, major roads can impact on air quality due to the volume of traffic they carry.

If the development is within or near a rail corridor or in the proximity of a major road, details shall be submitted to address the noise, vibration and air quality impacts of the railway or major road on the development. (Refer to State Environmental Planning Policy (Infrastructure) 2007 and the Department of Planning's 'Development near Rail Corridors - Interim Guidelines').

As a guide, if your development is located on any of the following roads within Fairfield City, the requirements of State Environmental Planning Policy (Infrastructure) 2007 may apply:

- *Cabramatta Road (between Liverpool Road/Hume Highway and Meadows Road)*
- *Cowpasture Road*
- *Cumberland Highway (Orange Grove Road, Joseph Street, Cambridge Street, New Cambridge Street, Palmerston Road and Smithfield Road)*
- *Elizabeth Drive*
- *Hume Highway (Liverpool Road)*
- *The Horsley Drive*
- *Wallgrove Road*
- *Woodville Road*
- *Liverpool to Parramatta Transitway*
- *M7 Westlink Motorway*
- *Hassall Street (between The Horsley Drive and Gipps Road)*
- *Gipps Road"*

A.2 State Environmental Planning Policy (Transport & Infrastructure) 2021

The NSW State Environmental Planning Policy (Infrastructure) 2007 (known as 'ISEPP') came into force in NSW on 1 January 2008 to facilitate the effective delivery of infrastructure across the State. This has since been superseded by the State Environment Planning Policy (Transport & Infrastructure) 2021, effective 1 March 2022. The aim of the policy includes identifying the environmental assessment category into which different types of infrastructure and services development fall and identifying matters to be considered in the assessment of development adjacent to particular types of infrastructure.

The main variation of the SEPP (T&I) 2021 from the ISEPP 2007 is the inclusion of a mandatory assessment on road with an AADT of greater than 20,000 vehicles per day. Previously an assessment was recommended for roads having an AADT of more than 20,000 but less than 40,0000 and mandatory for roads having an AADT or more than 40,0000.

2.100 Impact of rail noise or vibration on non-rail development

(1) This section applies to development for any of the following purposes that is on land in or adjacent to a rail corridor and that the consent authority considers is likely to be adversely affected by rail noise or vibration—

(a) residential accommodation,

(b) a place of public worship,

(c) a hospital,

(d) an educational establishment or centre-based child care facility.

(2) Before determining a development application for development to which this section applies, the consent authority must take into consideration any guidelines that are issued by the Planning Secretary for the purposes of this section and published in the Gazette.

(3) If the development is for the purposes of residential accommodation, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded—

(a) in any bedroom in the residential accommodation—35 dB(A) at any time between 10.00 pm and 7.00 am,

(b) anywhere else in the residential accommodation (other than a garage, kitchen, bathroom or hallway)—40 dB(A) at any time.

2. *2.120 Impact of road noise or vibration on non-road development*

(1) This section applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transitway or any other road with an annual average daily traffic volume of more than 20,000 vehicles (based on the traffic volume data published on the website of TfNSW) and that the consent authority considers is likely to be adversely affected by road noise or vibration—

(a) residential accommodation,

(b) a place of public worship,

(c) a hospital,

(d) an educational establishment or centre-based child care facility.

(2) Before determining a development application for development to which this section applies, the consent authority must take into consideration any guidelines that are issued by the Planning Secretary for the purposes of this section and published in the Gazette.

(3) If the development is for the purposes of residential accommodation, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded—

(a) in any bedroom in the residential accommodation—35 dB(A) at any time between 10 pm and 7 am,

(b) anywhere else in the residential accommodation (other than a garage, kitchen, bathroom or hallway)—40 dB(A) at any time.

(3A) Subsection (3) does not apply to a building to which State Environmental Planning Policy (Housing) 2021, Chapter 3, Part 7 applies.

(4) In this section, freeway, tollway and transitway have the same meanings as they have in the Roads Act 1993.

A.2.1 Department of Planning publication 'Development near rail corridors and busy roads – Interim guideline'

To support the ISEPP 2007, the NSW Department of Planning released the *Development near Rail Corridors and Busy Roads – Interim Guideline* (December 2008). The Guideline has not been updated to reflect the changes made within SEPP (Transport & Infrastructure), but is still a useful resource and is assumed to remain applicable until a new Guideline is published (except where expressly contradicted by the SEPP (T&I) itself). The Guideline assists in the planning, design and assessment of developments in, or adjacent to, major transport corridors in terms of noise, vibration and air quality. While the SEPP (T&I) applies only to roads with an AADT greater than 20,000 vehicles, the guideline is also recommended for other road traffic noise affected sites.

A.2.2 Clarification of SEPP (T&I) noise limits

The Guideline clarifies the time period of measurement and assessment. Section 3.4 '*What Noise and Vibration Concepts are Relevant*' and Table 3.1 of Section 3.6.1 confirms that noise assessment is based over the following time periods:

- Daytime 7:00am - 10:00pm $L_{Aeq(15hr)}$
- Night-time 10:00pm - 7:00am $L_{Aeq(9hr)}$

The noise criteria nominated in the SEPP (T&I) apply to internal noise levels with windows and doors closed. However as the preliminary noise assessment is based on measurements/predictions at external locations, equivalent external noise criteria has been established. The equivalent external noise criterion is used to determine which areas of the development may require acoustic treatment in order to meet the internal noise requirements of the SEPP (T&I). The equivalent external goals have been determined on the following basis:

- The Department of Planning publication 'Development near rail corridors and busy roads – Interim guideline' states: "*If internal noise levels with windows or doors open exceed the criteria by more than 10dBA, the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia*." The internal criteria with windows open is therefore 10dB(A) above the criteria explicitly outlined in the SEPP (T&I).
- The generally accepted noise reduction through an open window from a free-field external position is 10dB(A). Windows/doors are assumed to be open no more than 5% of room floor area, in accordance with the National Construction Code, Building Code of Australia (BCA) ventilation requirements.

Table 18 presents the SEPP (T&I) internal noise criteria along with the equivalent external noise criteria for residential premises.

Table 18: SEPP (T&I) noise criteria for new residential development

Room	Location	$L_{Aeq, 15hr}$ Day 7am – 10pm	$L_{Aeq\ 9hr}$ Night 10pm – 7am
Living rooms*	Internal, windows closed	40	40
	Internal, windows open	50	50
	External free-field (allowing windows to remain open)^	60	60
Bedrooms*	Internal, windows closed	-	35
	Internal, windows open	-	45
	External free-field (allowing windows to remain open)^	-	55

Notes: * Requisite for 20,000AADT Roads only under SEPP (T&I) 2021.

^Department of Planning's Guideline states that where internal noise criteria are exceeded by more than 10dB(A) with windows open mechanical ventilation is required. External goals have been calculated on the basis of nominal 10dB(A) reduction through an open window to a free-field position. Windows open to 5% of floor area in accordance with the NCC/BCA requirements.

A.3 Australian/New Zealand Standard AS/NZS 2107:2016

As traffic noise levels are not constant, an L_{eq} noise level descriptor is used when assessing this type of noise source. The L_{eq} is the mean energy level of the noise being measured, and has been found to accurately describe the level of annoyance caused by traffic noise.

This standard provides recommended noise levels for steady state such as noise from building services and quasi-steady state sounds, such as traffic and industrial noise. The noise levels recommended in AS/NZS 2107:2016 take into account the function of the area and apply to the sound level measured within the space unoccupied although ready for occupancy.

This standard recommends the following noise levels for residential buildings.

Table 19: Design sound levels and reverberation times for different areas of occupancy in buildings

Item	Type of occupancy/activity	Design sound level (LAeq,t) range	Design reverberation time (T) range, s
7	**RESIDENTIAL BUILDINGS (see Note 5 and Clause 5.2)**		
	Houses and apartments in inner city areas or entertainment districts or near major roads -		
	Apartment common areas (e.g. foyer, lift lobby)	45 to 50	-
	Living areas	35 to 45	-
	Sleeping areas (night time)	35 to 40	-
	Work areas	35 to 45	-
	Houses and apartments in suburban areas or near minor roads -		
	Apartment common areas (e.g. foyer, lift lobby)	45 to 50	-
	Living areas	30 to 40	-
	Sleeping areas (night time)	30 to 35	-
	Work areas	35 to 40	-
	Houses in rural areas with negligible transportation -		
	Sleeping areas (night time)	25 to 30	-
	Hotels and motels -		
	Bars and lounges	< 50	0.6 to 1.0
	Conference areas -		
	Without sound reinforcement -		
	Up to 50 persons	35 to 40	Curve 1*
	From 50 to 250 persons	30 to 35	Curve 1*
	With sound reinforcement	35 to 45	Curve 1*
	Dining rooms	40 to 45	See Note 1
	Enclosed carparks	< 65	-
	Foyers and recreation areas	45 to 50	See Note 1
	Kitchen, laundry and maintenance areas	< 55	-
	Sleeping areas (night time) -		

Item	Type of occupancy/activity	Design sound level (LAeq,t) range	Design reverberation time (T) range, s
	Hotels and motels in inner city areas or entertainment districts or near major roads	35 to 40	-
	Hotels and motels in suburbs or near minor roads	30 to 35	-
	Washrooms and toilets	45 to 55	-
	Hostels, residential halls and barracks -		
	Cafeterias	45 to 50	< 1.0
	Common rooms	40 to 45	< 1.0
	Games rooms	45 to 50	< 1.0
	Kitchens and service areas	45 to 55	-
	Sleeping areas (night time) -		
	Hostels, residential halls and barracks in inner city areas or entertainment districts or near major roads	35 to 40	-
	Hostels, residential halls and barracks in suburbs or near minor roads	30 to 35	-
	Mining camps -		
	Sleeping areas	35 to 40	-
	Other facilities	See Item 3 or Item 5 in this Table	
	Retirement homes/villages	See Houses and apartments; and Clause 5.2	
* See Appendix A for all references to 'Curve' in this Table.			

NOTES:

1. Reverberation time should be minimized for noise control.
2. Certain teaching spaces, including those intended for students with learning difficulties and students with English as a second language, should have reverberation times at the lower end of the range.
3. Specialist advice should be sought for these spaces.
4. A very wide range of noise levels can occur in the occupied state in spaces housing manufacturing processes, and the levels are primarily subject to control as part of a noise management program (see AS/NZS 1269.2). The possibilities for segregating very noisy processes from quieter ones by partitioning vary between particular industries and plants. For reasons such as these, it is difficult to make generalized recommendations for desirable, or even maximum, design levels for the unoccupied state, but one guiding principle may still be observed-when the activity in one area of a manufacturing plant is halted, it is desirable that the local level should if possible drop to 70 dB(A) or lower to permit speech communication without undue effort.
5. In situations where traffic noise levels may vary widely over a 24 h period, measurement to assess compliance with this Standard should be taken at the relevant time and for an appropriate measurement period according to the area of occupancy or activity in the building. Where traffic noise fluctuates rapidly with the passage of individual vehicles, the community reaction may not correlate well with the equivalent continuous noise level as measured.
6. The overall sound pressure level in dB(A) should conform to the recommended design sound level given in Table 1. In these spaces, a balanced sound pressure level across the full frequency range is essential. These spaces should therefore be evaluated in octave bands across the full frequency spectrum. The recommended maximum sound pressure levels for the individual octave bands corresponding to the overall dB(A) value are given in Appendix C.
7. In spaces in which high quality sound recordings are to be made, the levels set for low frequency octave bands should not be exceeded (see Appendix C). Subsequent replay of the recordings might cause an amplification of the low-frequency sound resulting in an overemphasis of its low-frequency components. Specialist advice should always be sought when these spaces are being designed. In some circumstances, for purposes of very high quality recording, lower levels than those in Table 1 may be necessary.
8. Health requirements for hygiene and infection control may preclude achieving these recommended reverberation times.

APPENDIX B Construction Noise

The NSW *Interim Construction Noise Guideline* (ICNG, 2009) provides guidelines for assessing noise generated during the construction phase of developments.

The key components of the guideline that are incorporated into this assessment include:

Use of L_{Aeq} as the descriptor for measuring and assessing construction noise.

NSW noise policies, including the INP, RNP and RING have moved to the primary use of L_{Aeq} over any other descriptor. As an energy average, L_{Aeq} provides ease of use when measuring or calculating noise levels since a full statistical analysis is not required as when using, for example, the L_{A10} descriptor.

Application of reasonable and feasible noise mitigation measures

As stated in the ICNG, a noise mitigation measure is feasible if it is capable of being put into practice, and is practical to build given the project constraints.

Selecting reasonable mitigation measures from those that are feasible involves making a judgement to determine whether the overall noise benefit outweighs the overall social, economic and environmental effects.

The ICNG provides two methods for assessment of construction noise, being either a quantitative or a qualitative assessment. A quantitative assessment is recommended for major construction projects of significant duration, and involves the measurement and prediction of noise levels, and assessment against set criteria. A qualitative assessment is recommended for small projects with a duration of less than three weeks and focuses on minimising noise disturbance through the implementation of reasonable and feasible work practices, and community notification.

Table 20 below (reproduced from Table 2 of the ICNG) sets out the noise management levels and how they are to be applied for residential receivers. The guideline intends to provide respite for residents exposed to excessive construction noise outside the recommended standard hours whilst allowing construction during the recommended standard hours without undue constraints.

The rating background level (RBL) is used when determining the management level. The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours).

Table 20: Noise management levels at residential receivers

Time of day	Management level $L_{Aeq\ (15\ min)}$	How to apply
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL + 10dB(A)	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured LAeq (15 min) 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 works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75dB(A)	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 works near schools, or mid-morning or mid-afternoon for works near residences 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)	A strong justification would typically be required for works 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 5dB(A) 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.

Sensitive Land Use

Table 21 below (reproduced from Table 3 of the ICNG) sets out the noise management levels for various sensitive land use developments.

Table 21: Noise management levels at other noise sensitive land uses

Land use	Where objective applies	Management level $L_{Aeq\ (15\ min)}$
Classrooms at schools and other educational institutions	Internal noise level	45 dB(A)
Hospital wards and operating theatres	Internal noise level	45 dB(A)
Places of worship	Internal noise level	45 dB(A)
Active recreation areas	External noise level	65 dB(A)
Passive recreation areas	External noise level	60 dB(A)
Community centres	Depends on the intended use of the centre.	Refer to the 'maximum' internal levels in AS2107 for specific uses.
Commercial premises	External noise level	70 dB(A)
Industrial premises	External noise level	75 dB(A)

Notes: Noise management levels apply when receiver areas are in use only.

APPENDIX C Internal Sound Insulation

C.1 National Construction Code of Australia 2022

The National Construction Code of Australia (NCC) outlines minimum requirements for inter-tenancy (party) walls and ceiling/ floors to maintain privacy. This includes the incorporation of penetration of a service through a floor or through more than one sole-occupancy unit.

NCC nominates required Weighted Sound Reduction Indexes (R_w) and spectrum adaptation factor (C_{tr}) for partition constructions, of different space/ activity types in adjoining units. The R_w and $R_w + C_{tr}$ are single number descriptors for quantifying the attenuating performance of partitions for typical intrusive noises produced inside residences. The higher the rating, the greater the isolation provided by the partition.

Spectrum adaptation factors are commonly used to compensate for the fact that certain kinds of sounds are more readily transmitted through insulating materials than others insulate.

The adaptation factor C_{tr} has now been introduced for most building elements which require an airborne sound insulation rating. The only exception is a wall which separates a dwelling from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification. Therefore, both the C_{tr} factor and the R_w of the building element will need to be considered in most cases.

The C_{tr} factor takes into account lower frequency level sounds, and has been chosen in large part, in recognition of the problem of the high bass frequency outputs of modern home theatre systems and music reproduction equipment.

The Deemed-to-Satisfy Provisions also have impact sound insulation requirements for floors. The terms to describe the impact sound insulation of the floor is the weighted normalised impact sound pressure level ($L_{n,w}$). The lower the $L_{n,w}$ of the floor, the better the performance of the floor in terms of impact sound insulation.

The following section represents a summary of acoustic provisions outlined in the Part F7 of the NCC.

C.2 Sound Insultion Provision of NCC of Australia

The acoustic provisions for inter-tenancy partitions, service risers and entry doors in Class 2 and 3 buildings are outlined in the National Construction Code of Australia and the following is an extract from the NCC:

"F7D3 Determination of airborne sound insulation ratings

A form of construction required to have an airborne sound insulation rating must –

(a) have the required value for weighted sound reduction index (Rw) or weighted sound reduction index with spectrum adaptation term (Rw + Ctr) determined in accordance with AS/NZS ISO 717.1 using results from laboratory measurements; or

(b) comply with Specification 28.

F7D4 Determination of impact sound insulation ratings

(1) A floor in a building required to have an impact sound insulation rating must –

(a) have the required value for weighted normalised impact sound pressure level (Ln,w) determined in accordance with AS ISO 717.2 using results from laboratory measurements; or

(b) comply with Specification 28

(2) A wall in a building required to have an impact sound insulation rating must –

(a) for a Class 2 or 3 building be of discontinuous construction and

(b) (Class 9c)

(3) For the purposes of this Part, discontinuous construction means a wall having a minimum 20 mm cavity between 2 separate leaves, and

(a) for masonry, where wall ties are required to connect leaves, the ties are of the resilient type; and

(b) for other than masonry, there is no mechanical linkage between leaves except at the periphery.

F7D5 Sound insulation rating of floors

(1) A floor in a Class 2 or 3 building must have an Rw + Ctr (airborne) not less than 50 and an Ln,w (impact) not more than 62 if it separates –

(a) sole-occupancy units; or

(b) a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification.

(2) (Class 9c)

F7D6 Sound insulation rating of walls

(1) A wall in a Class 2 or 3 building must –

(a) have an Rw + Ctr (airborne) not less than 50, if it separates sole-occupancy units; and

(b) have an Rw (airborne) not less than 50, if it separates a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification; and

(c) comply with F7D4(2) if it separates:

(i) a bathroom, sanitary compartment, laundry or kitchen in one sole-occupancy unit from a habitable room (other than a kitchen) in an adjoining unit; or

(ii) a sole-occupancy unit from a plant room or lift shaft.

(2) A door may be incorporated in a wall in a Class 2 or 3 building that separates a sole-occupancy unit from a stairway, public corridor, public lobby or the like, provided the door assembly has an Rw not less than 30.

(3) (Class 9c)

(4) (Class 9c)

(5) Where a wall required to have sound insulation has a floor above, the wall must continue to –

(a) the underside of the floor above; or

(b) a ceiling that provides the sound insulation required for the wall.

(6) Where a wall required to have sound insulation has a roof above, the wall must continue to –

(a) the underside of the roof above; or

(b) a ceiling that provides the sound insulation required for the wall.

F7D7 Sound insulation rating of internal services

(1) If a duct or soil, waste or water supply pipe, including a duct or pipe that is located in a wall or floor cavity, serves or passes through more than one sole-occupancy unit, the duct or pipe must be separated from the rooms of any sole-occupancy unit by construction with an Rw+Ctr (airborne) not less than –

(a) 40 if the adjacent room is a habitable room (other than a kitchen); or

(b) 25 if the adjacent room is a kitchen or non-habitable room.

(2) If a stormwater pipe passes through a sole-occupancy unit, it must be separated in accordance with (1)(a) and (b).

F7D8 Sound isolation of pumps

A flexible coupling must be used at the point of connection between the service pipes in a building and any circulating or other pump."

APPENDIX D Location and Results of Noise Surveys

D.1 Ambient and Background Noise Survey

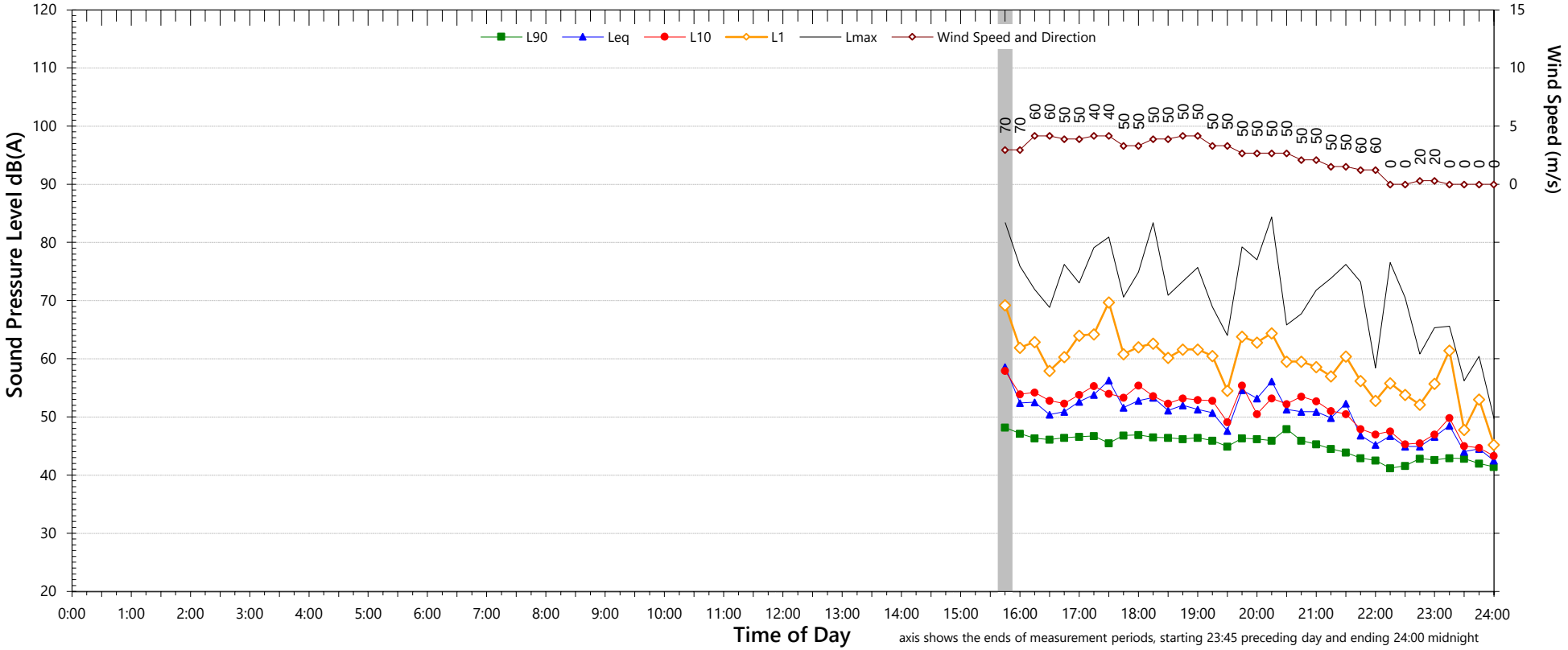
Unattended noise monitoring location M1: Corner of Lupin Avenue and Belmore Street on front yard of 17 Lupin Avenue, Fairfield East.

Survey Period: 10/03/2023 to 17/03/2023

Unattended Noise Monitoring Results

Frontyard 17 Lupin Ave, Fairfield East

Friday, 10 March 2023



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	-	43	40
L_{Aeq}	-	52	48

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	66	to	81
L_{AFMax} - L_{Aeq} (Range)	19	to	36

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	-	51
$L_{Aeq\ 1hr}$ upper 10 percentile	-	52
$L_{Aeq\ 1hr}$ lower 10 percentile	-	46

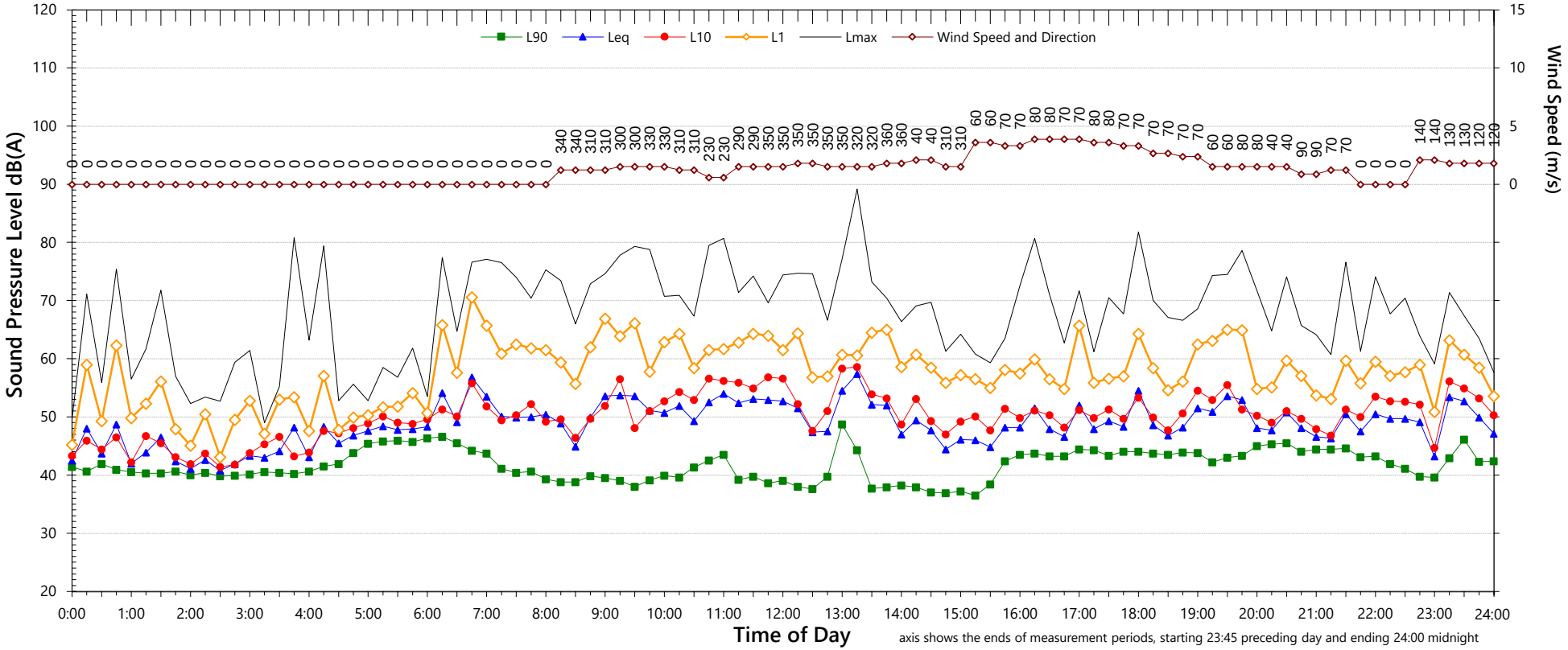
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)

Unattended Noise Monitoring Results

Frontyard 17 Lupin Ave, Fairfield East

Saturday, 11 March 2023



axis shows the ends of measurement periods, starting 23:45 preceding day and ending 24:00 midnight

NSW Noise Policy for Industry (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{A90} ABL	38	43	38
L_{Aeq}	51	50	49

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	53	51
$L_{Aeq\ 1hr}$ upper 10 percentile	55	54
$L_{Aeq\ 1hr}$ lower 10 percentile	50	45

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	67	to	81
L_{AFMax} - L_{Aeq} (Range)	16	to	27

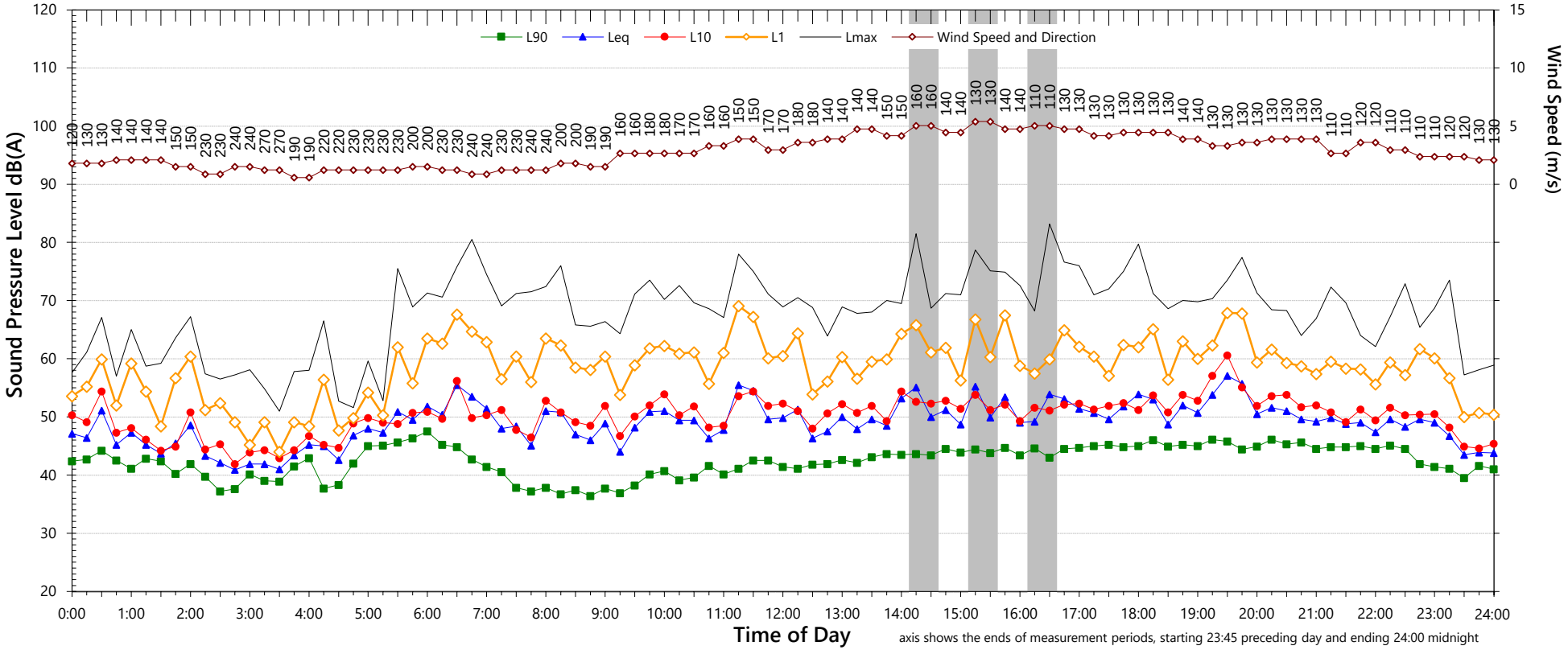
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)

Unattended Noise Monitoring Results

Frontyard 17 Lupin Ave, Fairfield East

Sunday, 12 March 2023



axis shows the ends of measurement periods, starting 23:45 preceding day and ending 24:00 midnight

NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	37	45	40
L_{Aeq}	51	52	49

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	73	to	82
L_{AFMax} - L_{Aeq} (Range)	17	to	29

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	53	51
$L_{Aeq\ 1hr}$ upper 10 percentile	55	55
$L_{Aeq\ 1hr}$ lower 10 percentile	51	47

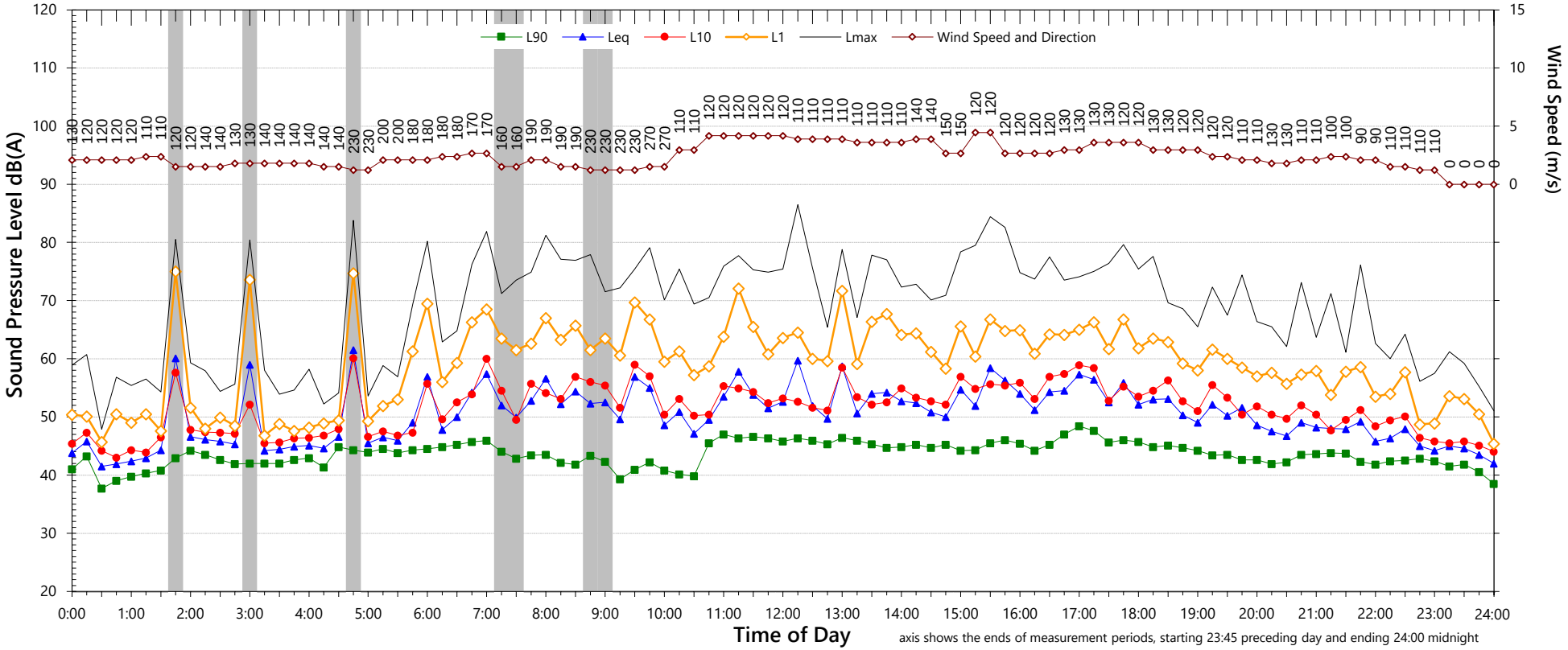
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)

Unattended Noise Monitoring Results

Frontyard 17 Lupin Ave, Fairfield East

Monday, 13 March 2023



NSW Noise Policy for Industry (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{A90} ABL	41	42	38
L_{Aeq}	54	50	46

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	65	to	71
L_{AFMax} - L_{Aeq} (Range)	17	to	23

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	56	48
$L_{Aeq\ 1hr}$ upper 10 percentile	58	49
$L_{Aeq\ 1hr}$ lower 10 percentile	52	45

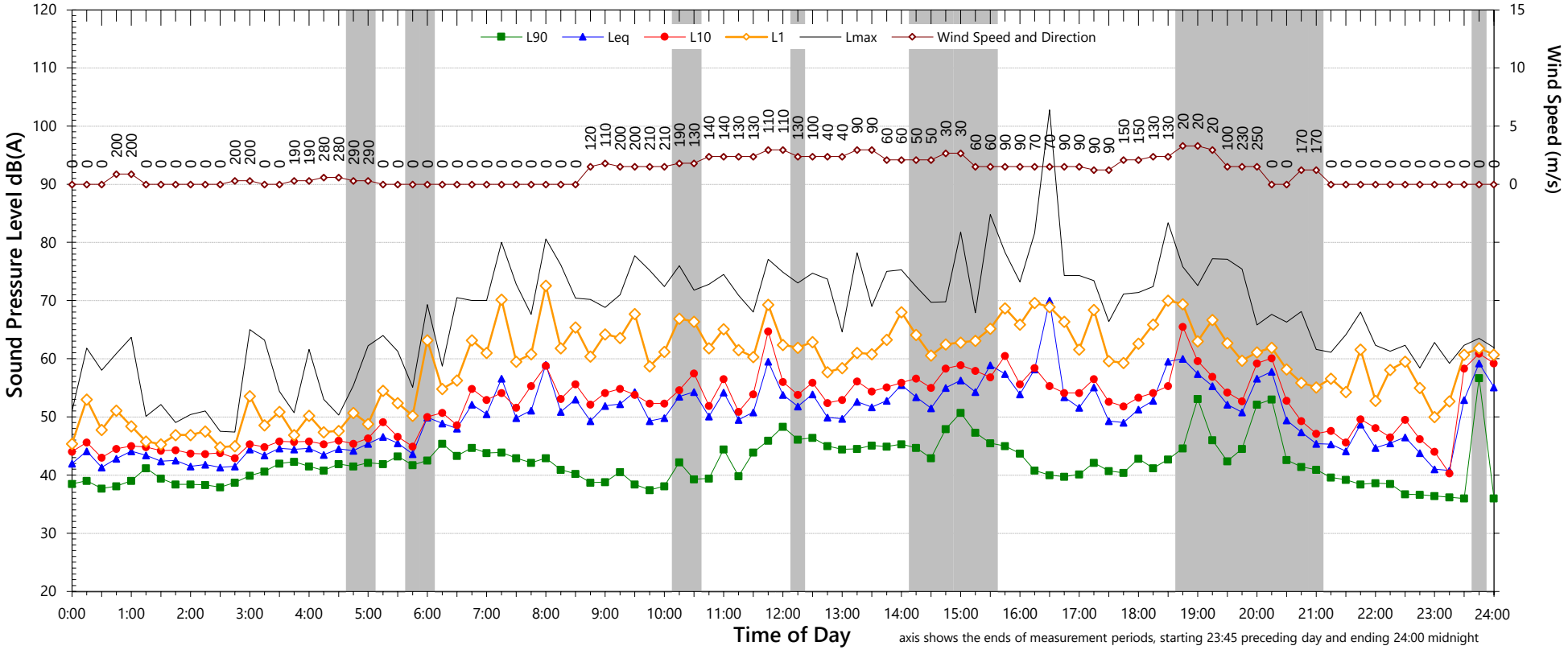
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)

Unattended Noise Monitoring Results

Frontyard 17 Lupin Ave, Fairfield East

Tuesday, 14 March 2023



axis shows the ends of measurement periods, starting 23:45 preceding day and ending 24:00 midnight

NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	-	-	36
L_{Aeq}	-	-	48

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	73	to	82
L_{AFMax} - L_{Aeq} (Range)	16	to	30

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	59	51
$L_{Aeq\ 1hr}$ upper 10 percentile	60	55
$L_{Aeq\ 1hr}$ lower 10 percentile	54	42

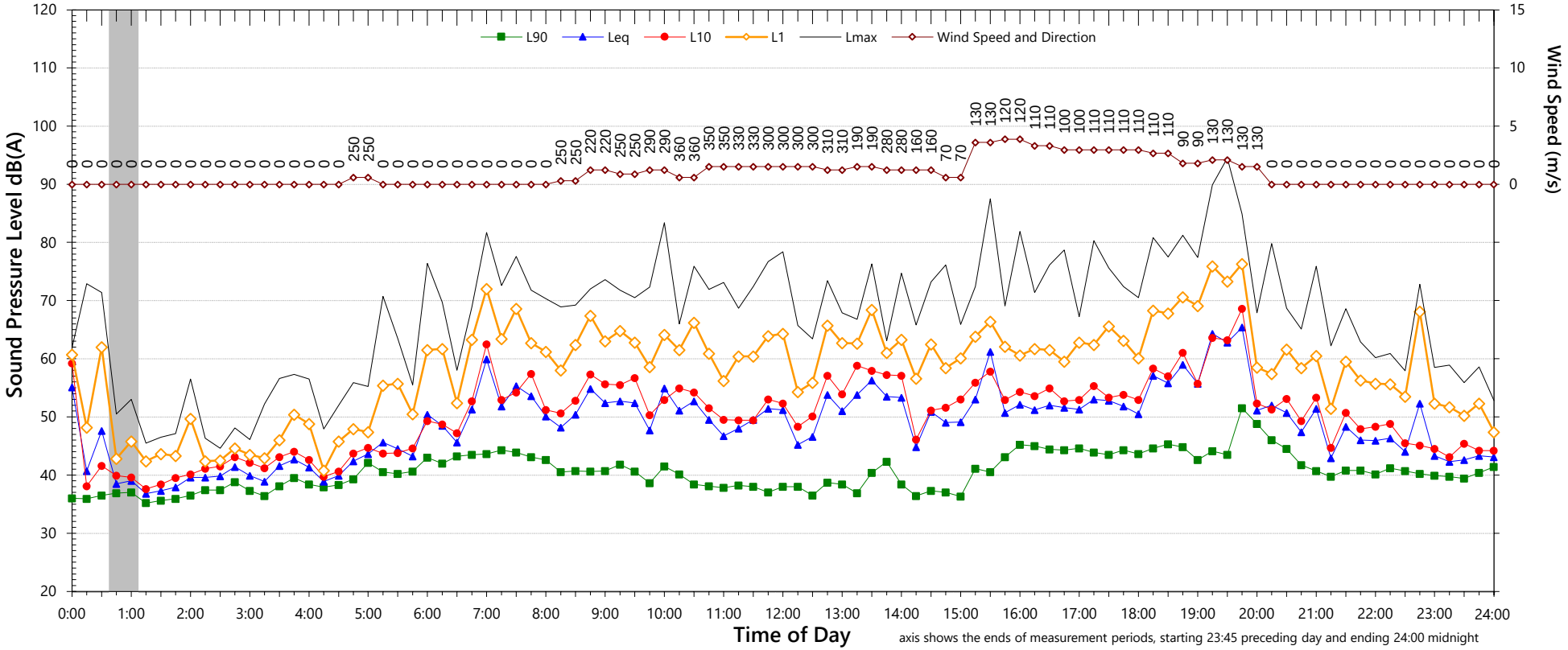
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)

Unattended Noise Monitoring Results

Frontyard 17 Lupin Ave, Fairfield East

Wednesday, 15 March 2023



NSW Noise Policy for Industry (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{A90} ABL	37	40	38
L_{Aeq}	53	58	47

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	66	to	77
L_{AFMax} - L_{Aeq} (Range)	16	to	25

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	57	50
$L_{Aeq\ 1hr}$ upper 10 percentile	59	53
$L_{Aeq\ 1hr}$ lower 10 percentile	52	44

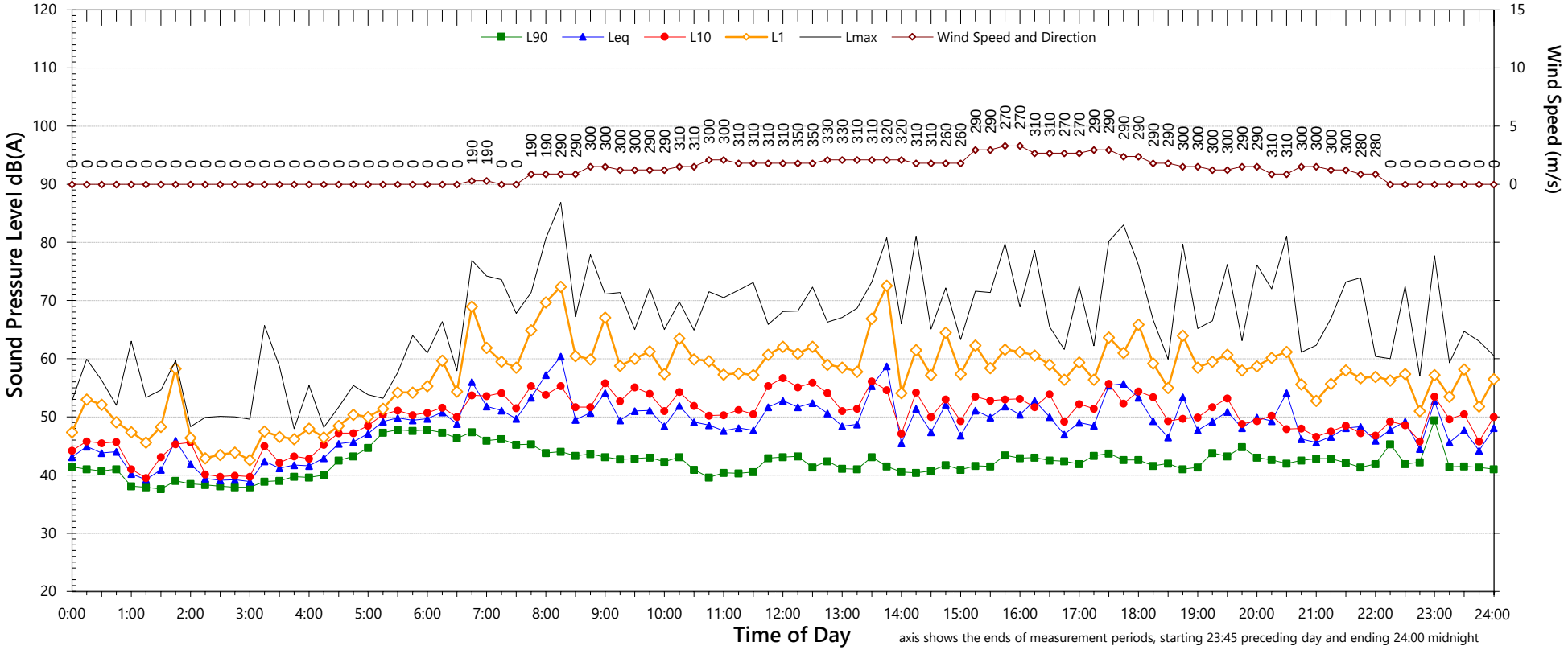
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)

Unattended Noise Monitoring Results

Frontyard 17 Lupin Ave, Fairfield East

Thursday, 16 March 2023



axis shows the ends of measurement periods, starting 23:45 preceding day and ending 24:00 midnight

NSW Noise Policy for Industry (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{A90} ABL	41	41	41
L_{Aeq}	52	49	48

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	66	to	78
L_{AFMax} - L_{Aeq} (Range)	18	to	28

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	54	51
$L_{Aeq\ 1hr}$ upper 10 percentile	57	53
$L_{Aeq\ 1hr}$ lower 10 percentile	52	47

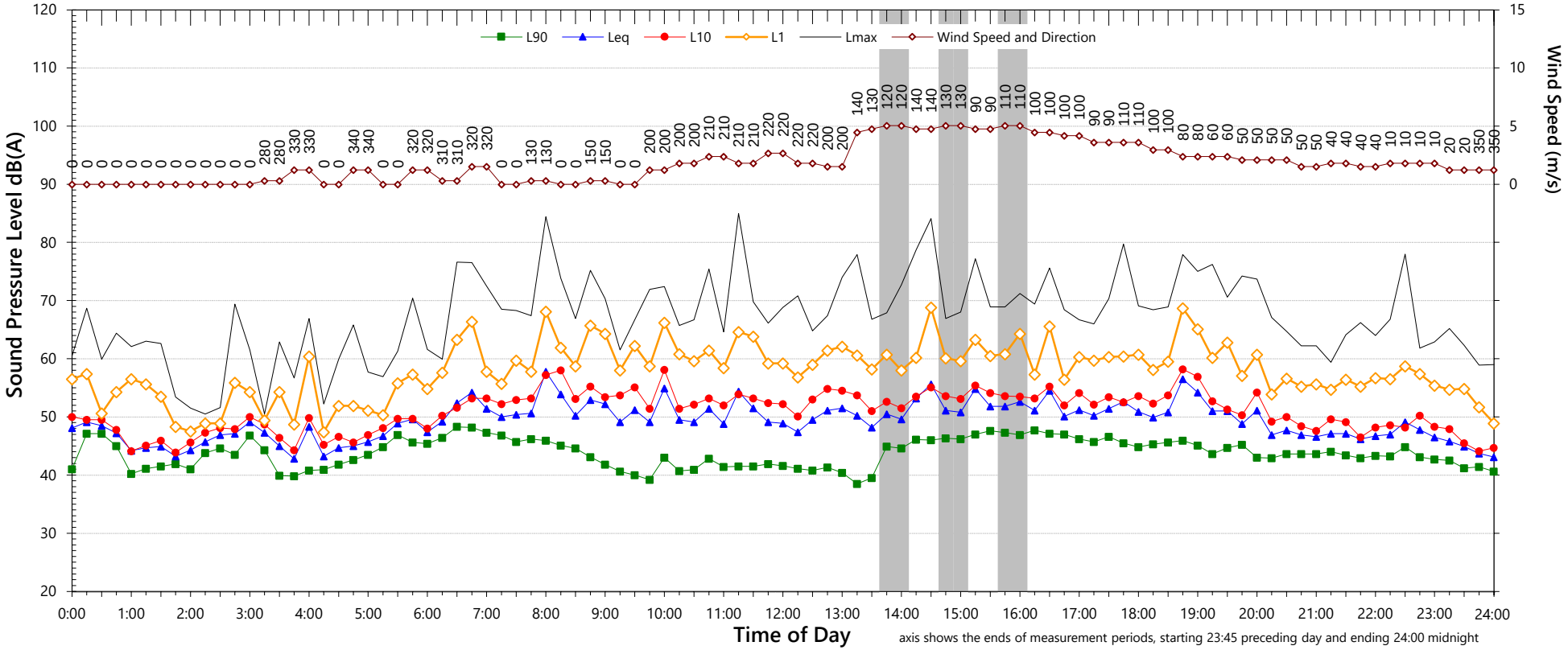
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)

Unattended Noise Monitoring Results

Frontyard 17 Lupin Ave, Fairfield East

Friday, 17 March 2023



axis shows the ends of measurement periods, starting 23:45 preceding day and ending 24:00 midnight

NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	40	43	40
L_{Aeq}	52	50	47

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	65	to	78
L_{AFMax} - L_{Aeq} (Range)	15	to	30

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	54	50
$L_{Aeq\ 1hr}$ upper 10 percentile	56	52
$L_{Aeq\ 1hr}$ lower 10 percentile	50	45

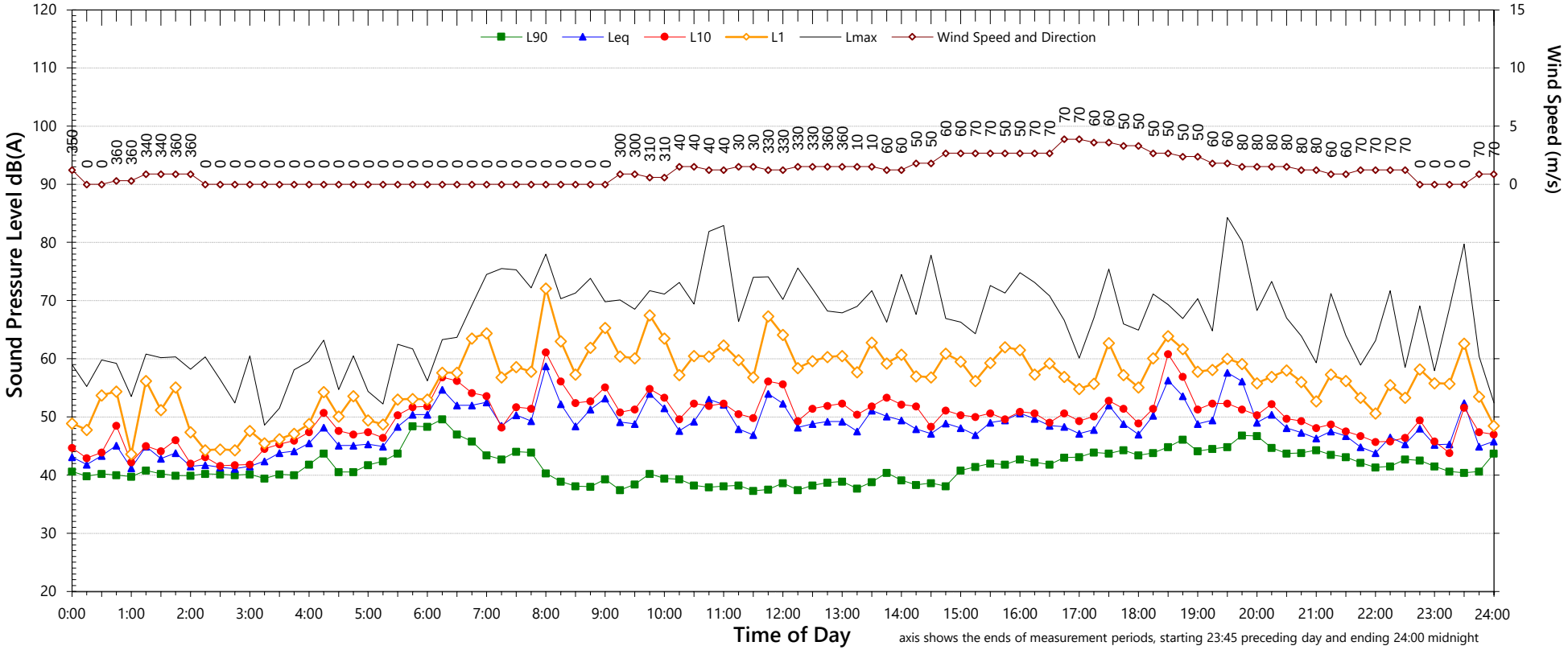
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)

Unattended Noise Monitoring Results

Frontyard 17 Lupin Ave, Fairfield East

Saturday, 18 March 2023



axis shows the ends of measurement periods, starting 23:45 preceding day and ending 24:00 midnight

NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	38	43	40
L_{Aeq}	51	52	49

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	66	to	80
L_{AFMax} - L_{Aeq} (Range)	16	to	31

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	53	51
$L_{Aeq\ 1hr}$ upper 10 percentile	56	53
$L_{Aeq\ 1hr}$ lower 10 percentile	51	48

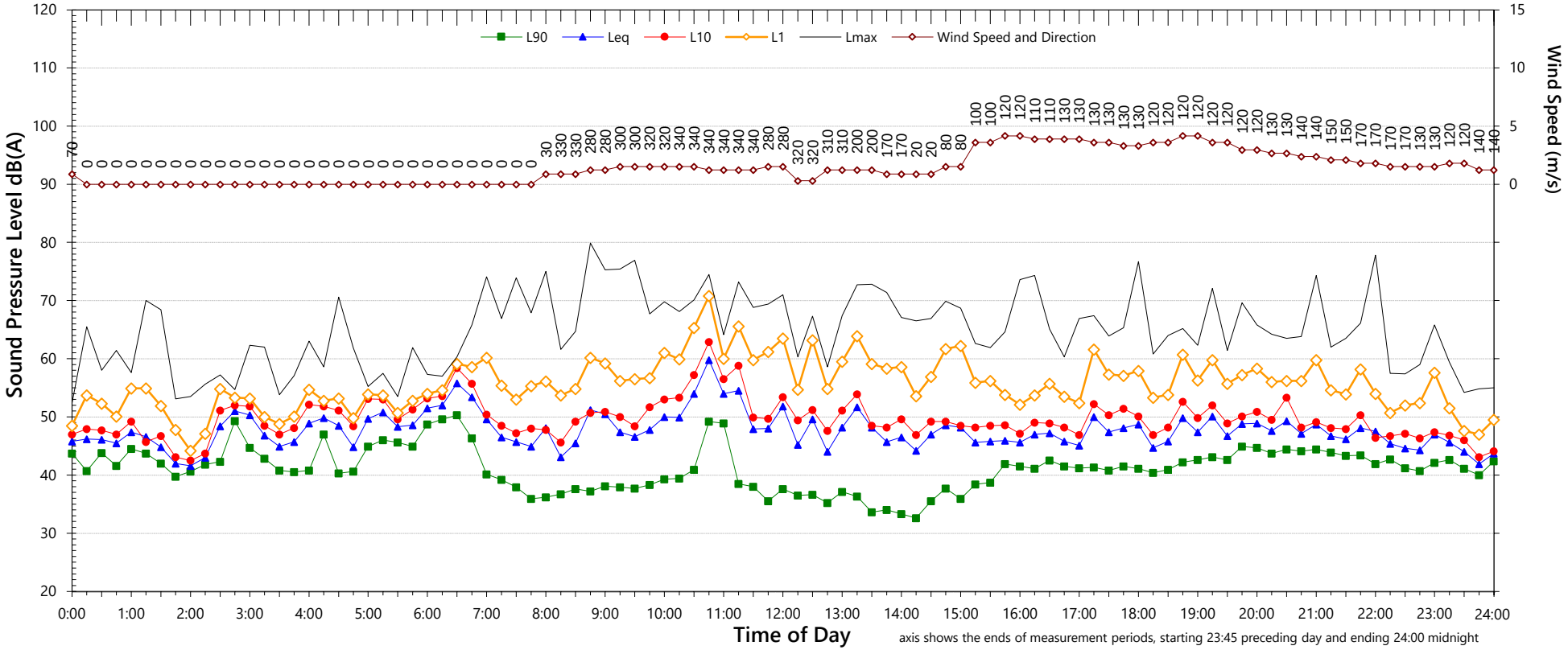
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)

Unattended Noise Monitoring Results

Frontyard 17 Lupin Ave, Fairfield East

Sunday, 19 March 2023



axis shows the ends of measurement periods, starting 23:45 preceding day and ending 24:00 midnight

NSW Noise Policy for Industry (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{A90} ABL	35	41	41
L_{Aeq}	50	48	55

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	52	58
$L_{Aeq\ 1hr}$ upper 10 percentile	53	60
$L_{Aeq\ 1hr}$ lower 10 percentile	49	46

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	66	to	81
L_{AFMax} - L_{Aeq} (Range)	15	to	25

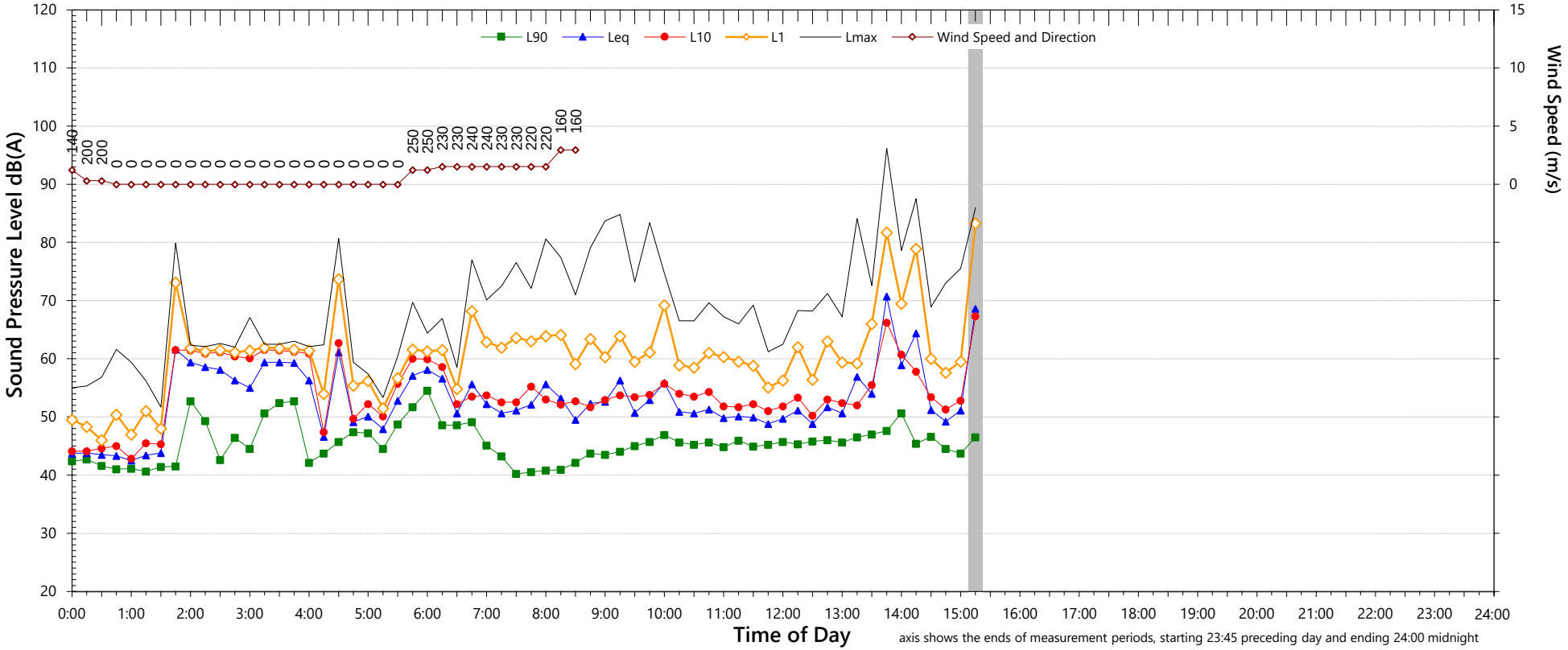
Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)

Unattended Noise Monitoring Results

Frontyard 17 Lupin Ave, Fairfield East

Monday, 20 March 2023



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	-	-	-
L_{Aeq}	-	-	-

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	-	to	-
L_{AFMax} - L_{Aeq} (Range)	-	to	-

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	-	-
$L_{Aeq\ 1hr}$ upper 10 percentile	-	-
$L_{Aeq\ 1hr}$ lower 10 percentile	-	-

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.
6. Graphed data measured in free-field; tabulated results facade corrected
7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)