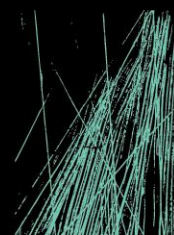


NOISE AND VIBRATION IMPACT ASSESSMENT

NEW HIGH SCHOOL FOR LEPPINGTON AND DENHAM COURT



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1 INTRODUCTION

The Department of Education (DoE) is the proponent and determining authority pursuant to Section 5.1 of the Environmental Planning and Assessment Act 1979 (the Act).

This Noise and Vibration Impact Assessment has been prepared to support a Review of Environmental Factors (REF) for the Department of Education (DoE) for the new high school for Leppington and Denham Court (the activity). The purpose of the REF is to assess the potential environmental impacts of the activity prescribed by *State Environmental Planning Policy (Transport and Infrastructure) 2021* (T&I SEPP) as “development permitted without consent” on land carried out by or on behalf of a public authority under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The activity is to be undertaken pursuant to Chapter 3, Part 3.4, Section 3.37A of the T&I SEPP.

The proposed activity is for the construction of a new high school located at 128-134 Rickard Road, Leppington, NSW, 2179 (the site).

The purpose of this report is to:

- Assess the potential transport noise and vibration impacts on the proposed activity.
- Assess the potential noise and vibration impacts that the proposed activity may have on nearby sensitive receivers.
- Identify noise and vibration sensitive receivers that will potentially be affected by the operation and construction of the proposed activity.
- Establish appropriate noise criteria based on noise surveys carried out by JHA, in accordance with the relevant standards, guidelines and legislation for the following noise emissions:
 - Mechanical plant from the activity to the surrounding receivers.
 - Public address and school bell systems.
 - Activities and events within Hall.
 - Noise from outdoor playgrounds located within the campus.
 - Car park noise emissions.
 - Other noise emissions.
 - Traffic noise generation.
- Determine whether the relevant criteria can be achieved based on the proposed operations. Where applicable, provide recommendations for any necessary acoustic control measures that will need to be incorporated into the activity or use to ensure compliance with the assessment criteria.
- Establish noise and vibration criteria for construction work based on noise survey conducted by JHA Consulting Engineers, in accordance with standards and guidelines.
- Provide recommendations for Construction Noise and Vibration Planning.

This report provides:

- A statement of compliance with the relevant statutory criteria for the proposed activity within the vicinity of the nearest potentially affected receivers.
- Recommendations for noise mitigation measures for the proposed activity in order to meet the relevant criteria when compliance is not achieved.

The following documentation has been used for the preparation of this report:

- Proposed site plan drawings prepared by DJRD Architects, dated 08/01/2025 – Issue P07
- Noise data collected on site through the use of noise loggers and a handheld spectrum analyser.

This document and related work have been prepared following JHA Consulting Engineers Quality and Environmental Management Systems, which are based on AS/NZS ISO 9001:2015 and ISO 14001:2015 respectively.

2 DESCRIPTION OF THE PROPOSAL

2.1 LOCATION / SITE DESCRIPTION

The site is known as 128-134 Rickard Road, Leppington, NSW, 2179 and is legally described as Lots A and B in Deposited Plan 411211. The site is located on the eastern side of Rickard Road and is approximately 4.1ha in area. The site is located immediately south of the existing Leppington Public School at 144 Rickard Road and is approximately 700m south of Leppington Train Station.

Figure 1 below provides an aerial image of the site.



Figure 1: Aerial image of site (source: NearMap).

The northern portion of the site is currently used for residential purposes. The southern portion of the site is used for agricultural purposes, with multiple greenhouses and an existing pond on the property.

2.2 PROPOSED WORK

The proposed activity is for a new high school in Leppington and Denham Court. The new high school will accommodate up to 1,000 students across 3 new buildings that will comprise 48 permanent teaching spaces (PTS), 3 support teaching spaces (STS), 19 specialist labs/workshops/kitchens and a hall. Buildings A, B and C will wrap the western and southern boundaries of the site, with the hall being located in south-east corner. The activity also includes the construction of a sports field in the centre of the site and 3 x multipurpose courts along the northern boundary. The proposed scope of works is illustrated in Figure 2 below.



Figure 2: New High School for Leppington and Denham Court (source: djrd architects).

2.3 EXISTING SURROUNDING RECEIVERS

A summary of the nearest noise sensitive receivers surrounding the site is shown in Table 1, including assumed approximate distances from the site boundary to the receiver boundaries in accordance with NPI, noting the type of noise receiver.

Receiver ID NCA	Sensitive Receiver	Receiver Status	Receiver Type	Approx. Distance, m
1	144 Rickard Road	Existing	Educational (Business Park – B7)	<5
2	129, 141, 153 Byron Road	Existing	Residential (Business Park – B7)	<5
3	118 Rickard Road 74 Ingleburn Road	Existing	Residential (Business Park – B7)	<5
4	151 Rickard Road	Existing	Residential (Commercial Core – B3)	15

Table 1: Nearest current sensitive receivers surrounding the site.

We note that if noise impacts associated with the proposed activity are controlled at the nearest noise-sensitive receivers (as identified above) then compliance with the recommended criteria at all noise-sensitive receivers will be achieved. Figure 3 shows the nearest noise receivers surrounding the site location.

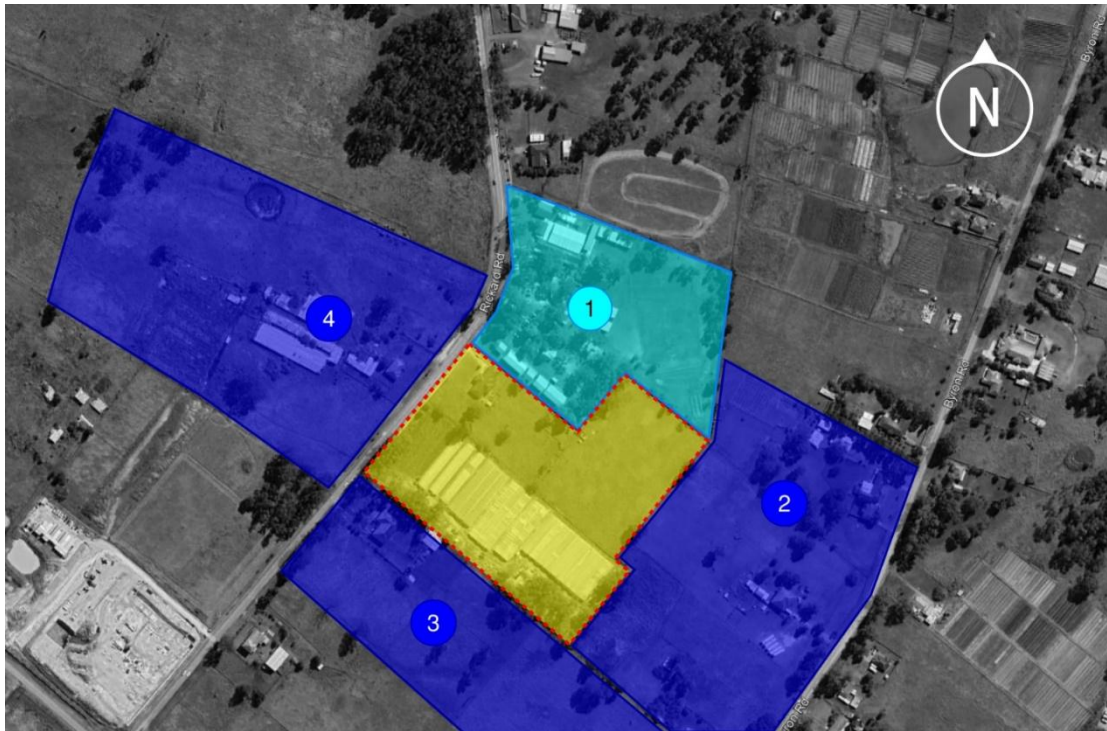


Figure 3: Nearest noise sensitive receivers surrounding the site location.

There is a current Planning Proposal (PP) for the Leppington Town Centre (PP-2023-284), which includes the site. The PP proposes alternative land uses for some of the lots identified above. If successful the re-zoning will transform the area immediately surrounding, specially NCAs 2, 3 and 4, to residential and mixed used. Based on this as a worst-case scenario, it has been assumed that NCA 2, 3 and 4 will be residential receivers.

3 SITE MEASUREMENTS

3.1 GENERAL

Attended and unattended noise surveys were conducted at the locations shown in Figure 4 to establish the ambient and background noise levels at the site. JHA Consulting Engineers carried out the noise surveys, in accordance with the method described in the AS/NZS 1055:2018 '*Acoustics – Description and measurement of environmental noise*'. Unattended measurements were previously conducted by JHA for Leppington Public School, this data has been used to assess traffic noise – referred as L2.



Figure 4: Noise survey locations and boundary of the site. (Long-term monitoring - L1, Long-term monitoring conducted for Leppington Primary school – L2, short-term monitoring S1 & S2).

From observations during the noise survey, it is noted that ambient noise levels are dominated by natural sounds; in particular insects in trees on and around the site, plus intermittent traffic along Rickard Road.

3.2 LONG-TERM NOISE MONITORING

Long-term noise monitoring was carried out from Wednesday, 6th December 2023 to Monday, 18th December 2023 with a Rion NL-52 noise logger (Serial Number 175549). The noise logger recorded L_{A1} , L_{A10} , L_{Aeq} and L_{A90} noise parameters at 15-minute intervals during the measurement period. The calibration of the noise logger was checked before and after use and no deviations were recorded.

The noise logger location is shown in Figure 4, location L1. The location was secured and is considered to be representative of the typical ambient and background noise levels. The noise logger microphone was mounted 1.5 metres above the ground and a windshield was used to protect the microphone. Weather conditions were monitored during the unattended noise monitoring period.

The detailed results of the long-term noise monitoring are presented graphically in Appendix A. As stated in the NSW EPA Noise Policy for Industry (NPI) 2017, any data likely to be affected by rain, wind or other extraneous noise has been excluded from the calculations (shadowed in the Appendix A graphs).

The Rating Background Levels (RBLs) have been established in general accordance with the methodology described in the NSW NPI – i.e., 10th percentile background noise level (L_{A90}) for each period of each day of the ambient noise level. The median of these levels is then presented as the RBL for each assessment period.

These RBLs are shown in Table 2 together with the ambient noise levels (L_{Aeq}) measured for each period.

Date	Assessment Background Levels, dB(A)			L_{Aeq} Ambient Noise Levels, dB(A)		
	Day 0700-1800	Evening 1800-2200	Night 2200-0700	Day 0700-1800	Evening 1800-2200	Night 2200-0700
Wednesday, 6 December 2023	---	40	34	---	50	42
Thursday, 7 December 2023	38	39	31	45	53	43
Friday, 8 December 2023	37	41	35	45	55	43
Saturday, 9 December 2023	36	---	---	44	---	---
Sunday, 10 December 2023	35	39	32	46	43	42
Monday, 11 December 2023	36	---	---	45	---	---
Tuesday, 12 December 2023	37	40	31	45	45	41
Wednesday, 13 December 2023	36	40	---	44	44	---
Thursday, 14 December 2023	---	42	---	---	48	---
Friday, 15 December 2023	---	41	32	---	44	42
Saturday, 16 December 2023	39	41	32	45	47	42
Sunday, 17 December 2023	---	39	29	---	43	43
Monday, 18 December 2023	---	---	---	---	---	---
Rating Background Levels	37	40	32	---	---	---
Ambient Noise Levels	---	---	---	45	49	42

Table 2: Results of long-term noise monitoring.

The noise environment surrounding the site is dominated by; natural noise (i.e., birds, insects, etc.), agricultural activities and intermittent road noise from Rickard Road. We note that the increased noise levels recorded at night-time period are likely due to increased wildlife activity at night, in particular from insects.

3.3 SHORT-TERM NOISE MONITORING

Short-term noise monitoring was carried out to obtain representative third-octave band noise levels of the site on Wednesday, 6th December 2023 during the day-time period. Short-term noise measurements were carried out with a NTi XL-3 hand-held Sound Level Meter (SLM) (Serial Number A3A-00494-D1). The calibration of the SLM was checked before and after each use, and no deviations were recorded.

The SLM microphone was mounted 1.5 metres above the ground, and a windshield was used to protect the microphone. Measurements were undertaken in the free field – i.e., more than 3 metres away from any building façade or vertical reflective surface. Weather conditions were calm and dry during the attended noise monitoring.

Location	Date and Time	Parameter	Sound Pressure Level, dB (re 20µPa)								
			Overall dB(A)	Octave Band Centre Frequency, Hz							
				63	125	250	500	1k	2k	4k	8k
S1	6/12/2023 10:26am – 10:41am	L _{90,15min}	41	49	41	35	36	38	32	23	21
		L _{eq,15min}	47	58	49	44	42	43	38	32	30
		L _{10,15min}	47	59	50	44	42	44	36	32	29
S2	6/12/2023 10:46am – 11:01am	L _{90,15min}	42	53	47	40	36	38	34	28	22
		L _{eq,15min}	65	72	64	61	60	62	57	52	47
		L _{10,15min}	69	70	66	63	62	66	61	53	45

Table 3: Results of short-term noise monitoring.

3.4 TRAFFIC NOISE MONITORING

JHA has previously undertaken measurements to assess traffic noise levels along Rickard Road for the neighbouring Leppington Primary School. Based on the long-term measurements conducted from Thursday 16th February 2023 to Monday 27th February 2023 traffic noise levels have been detailed in the table below.

Location	Measured Traffic Noise Levels, dB(A)			
	Day (7am-10pm)		Night (10pm-7am)	
L2	L _{Aeq,15hour} 59	Noisiest L _{Aeq,1hour} 62	L _{Aeq,9hour} 60	Noisiest L _{Aeq,1hour} 62

Table 4: Results of unattended long-term noise monitoring for traffic.

4 RELEVANT NOISE STANDARDS AND GUIDELINES

4.1 STANDARDS AND GUIDELINES

The following standards and guidelines are considered relevant to the project and have been referenced in developing the project noise level criteria.

Regulatory Framework:

- Environmental Planning and Assessment (EP&A) Act 1979.
- Protection of the Environment Operations (POEO) Act 1997.
- NSW Environment Protection Authority (EPA), Noise Guide for Local Government (NGLG) 2023.

Planning Framework:

- Camden Local Environment Plan 2010.
- Camden Growth Centre Precincts Development Control Plan 2016.
- State Environmental Planning Policy (Sydney Region Growth Centres) 2006.
- State Environmental Planning Policy (Precincts—Western Parkland City) 2021.

Noise Emissions:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI) 2017.
- State Environmental Planning Policy, (Transport and Infrastructure) 2021.
- AAAC Guideline for Child Care Centre Acoustic Assessment Version 3.0

Transport Noise:

- NSW DECCW, Road Noise Policy (RNP) 2011.
- Australian Standard AS2021:2015 '*Acoustics – Aircraft Noise Intrusion – Building Sitting and Construction*'.

4.2 REGULATORY FRAMEWORK

4.2.1 ENVIRONMENTAL PLANNING AND ASSESSMENT (EP&A) ACT 1979

The Environmental Planning and Assessment Act 1979 (EP&A Act) provides the regulatory framework for the protection of the environment in NSW. The EP&A Act is relevantly about planning matters and ensuring that “environmental impact” associated with the proposed development is properly considered and reasonable before granting development consent to develop.

The assessment of “environmental impact” relies upon the identification of acceptable noise criteria which may be defined in a Development Control Plan or derived from principles using guidelines like NSW EPA Noise Policy for Industry (NPI 2017) or Noise Guide for Local Government (NGLG 2023).

4.2.2 PROTECTION OF THE ENVIRONMENTAL OPERATIONS (POEO) ACT 1997

The Protection of the Environment Operations (POEO) Act 1997 has the objective of protecting, restoring and enhancing the quality of NSW environment. Abatement of noise pollution is underpinned by the definition of “offensive noise” as follows:

"...

(a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:

(i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or

(ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or

(b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances, prescribed by the regulations.

...

4.2.3 NOISE GUIDE FOR LOCAL GOVERNMENT

NGLG 2023 is a guideline that it is aimed at councils and planners to provide guidance in the management of local noise problems and in the interpretation of existing policy and legislation. Table 6 of NGLG 2023 contains the management for common neighbourhood noise issues and describes the responsibilities of EPA as the Appropriate Regulatory Authority (ARA).

NGLG 2023 provides a consideration checklist to determine an "offensive noise". The "offensive noise" test aids in making a systematic judgment about the offensive nature of noise emissions. The NGLG 2023 offensive noise test considers that noise may be offensive in three ways, according to:

- Audibility.
- Duration.
- Inherently offensive characteristics.

4.3 PLANNING FRAMEWORK

4.3.1 STATE ENVIRONMENTAL PLANNING POLICY

The SEPP (Precincts – Western Parkland City) 2021 is the environmental planning instrument that applies to the site and sets the land zoning of the site and surroundings. The proposed site of Leppington high school is zoned as Business Park (B7), as is the surrounding land to the north, east and south. Land to the west is zoned as Commercial Core (B3).

Figure 5 shows the land zoning as per information extracted from NSW planning Portal Spatial Viewer Land Zoning Map.



Figure 5: Land zoning of the site (red outline) and surroundings.

As noted in Section 2.3, there is a current Planning Proposal (PP) for the Leppington Town Centre (PP-2023-284), which includes the site. The PP proposes alternative land uses and urban design response to the redevelopment of the Leppington Town Centre which will transform the area immediately surrounding the site from a proposed business park (B7 - under the current controls) to one that acknowledges the existing school and proposes an educational precinct, residential lots, parklands and new roads surrounding the site. Based on this as a worst-case scenario, it has been assumed that lots immediately adjacent to the site will be residential receivers.

4.3.2 CAMDEN GROWTH CENTRE PRECINCTS DEVELOPMENT CONTROL PLAN

Relevant Planning Documents of Camden Council Legislation have been reviewed for any noise requirement or criteria. The DCP provides general planning strategies and noise level criteria that are in line with state standards.

4.4 OPERATIONAL NOISE

4.4.1 NSW EPA NOISE POLICY FOR INDUSTRY

The NSW EPA Noise Policy for Industry 2017 assesses noise from industrial noise sources - scheduled under the POEO. Mechanical noise from the activity shall be addressed following the recommendations in the NSW NPI.

The assessment is carried out based on the existing ambient and background noise levels addressing the following:

- Intrusiveness Criteria, to control intrusive noise into nearby sensitive receivers.
- Amenity Criteria, to maintain the noise level amenity for particular land uses.

These criteria are established for each assessment period (day, evening and night) and the more stringent of the two criteria sets the Project Noise Trigger Level (PNTL).

4.4.1.1 Intrusiveness Criteria

The NSW NPI defines the intrusiveness criteria as follows:

"The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the L_{Aeq} descriptor), measured over a 15-minute period, and does not exceed the background noise level by more than 5dB when beyond a minimum threshold."

The noise environment at the site is dominated by natural sounds and the surrounding area is sparsely populated greenfield land with residential properties to the north, east and south of the site. Based on the existing noise environment plus surrounding land use, the nearest potentially noise affected receivers have been categorised as rural residential.

Based on the intrusiveness criteria definition and the measured background noise levels on site conducted by JHA Consulting Engineers, Table 5 shows the intrusiveness criteria for the noise sensitive receivers.

Indicative Noise Amenity Area	Period	Rating Background Level dB(A)	Intrusiveness Criterion dB(A)
Rural Residential	Day	37	42
	Evening	37 ¹	42
	Night	32	37

Table 5: Determination of the intrusiveness criterion. Note 1: As per the guiding notes in the NPI, the evening RBL has been assumed to be no higher than the day-time RBL

4.4.1.2 Amenity Criteria

The NSW NPI states the following to define the amenity criteria:

"To limit continuing increases in noise levels from application of the intrusiveness level alone, the ambient noise level within an area from all industrial noise sources combined should remain below the recommended amenity noise levels specified in Table 2.2 where feasible and reasonable. The recommended amenity noise levels will protect against noise impacts such as speech interference, community annoyance and some sleep disturbance."

Based on the amenity criteria definition and the land zoning, Table 6 shows the amenity criteria for the noise sensitive receivers.

Indicative Noise Amenity Area	Period	Recommended Amenity Noise Level ($L_{Aeq,period}$) dB(A)	Amenity Criterion ($L_{Aeq,15min}$) dB(A)
Rural Residential	Day	50	48 (50-5+3)
	Evening	45	43 (45-5+3)
	Night	40	38 (40-5+3)

Table 6: Determination of amenity criterion for residential receivers.

4.4.1.3 Project Noise Trigger Levels

The PNTL's for residential and non-residential receivers are shown in Table 7 and Table 8 respectively and have been obtained in accordance with the requirements of the NSW NPI. These shall be assessed to the most affected point of the noise sensitive receiver boundary.

Indicative Noise Amenity Area	Period	Intrusiveness Criterion dB(A)	Amenity Criterion dB(A)
Rural Residential	Day	42	48
	Evening	42	43
	Night	37	38

Table 7: PNTLs for residential sensitive receivers (light grey).

Receiver Type	Period	Criteria, L_{Aeq}
Educational	Noisiest 1-hour when in use	35dB(A) (Internal)
		45dB(A) (External)

Table 8: PNTLs for non-residential receivers

4.4.2 SEPP TRANSPORT AND INFRASTRUCTURE

In the absence of operational noise level criteria for development without consent, the NSW State Environmental Planning Policy (SEPP) (Transport and Infrastructure) 2021 has been used and provides the noise criteria for the use of the school in Schedule 6, Chapter 3. The policy states:

"A new building or (if the development is an alteration or addition to an existing building for the purpose of changing its use) an existing building that is to be used for the purpose of a school or school-based childcare must be designed so as not to emit noise exceeding an L_{Aeq} of 5dB(A) above background noise when measured at any lot boundary."

It has been assumed for this assessment that the school will operate within typical school hours with occasional evening use. Based on the long-term unattended noise results of background noise levels, the school's operational noise level criterion for the daytime and evening time periods are shown in Table 9.

Indicative Noise Amenity Area	Period	Noise Level Criteria, L_{Aeq} dB(A)
Rural Residential	Day (7am-6pm)	42
	Evening (6pm-10pm)	45

Table 9: Noise level emissions criteria as per EECCF SEPP.

4.4.3 PLAYGROUND NOISE BASED ON AAAC GUIDELINES

There are no prescribed regulations or legislation that applies to noise for outdoor playgrounds. Therefore, there is no noise criteria that can be used. Furthermore, we understand that the common approach of "offensive noise" is not appropriate for a planning situation such as this proposal.

Our noise assessment approach is based on:

- NSW tribunal decisions when assessing noise from the use of child care centres.

- 'Guideline for Childcare Centre Acoustic Assessment' prepared by the Association of Australasian Acoustical Consultants (AAAC).

The AAAC guideline is addressed for assessment of childcare centres, and its noise level criterion for outdoor spaces have been considered as deemed adequate by NSW tribunal decisions. As children do not play outdoors continuously for long periods of time, and as the duration of time for children playing outside is reduced, the overall noise annoyance reduces. Therefore, it is reasonable to allow a higher level of noise impact for a shorter duration.

Whilst the AAAC guideline does not apply to schools, there are similarities in noise emissions from uses of outdoor playground areas for schools and childcare centres. Therefore, we recommend that the following noise criteria shall be applied to noise impacts arising from schools' outdoor playgrounds.

Table 10 shows the noise level criteria proposed by the AAAC guideline for assessing noise from outdoor spaces. These are the noise levels at which it is considered that complaints are unlikely.

Use of outdoor area	Noise Level Criteria	Criteria (day-time), $L_{Aeq,15min}$
Up to 4 hours (total) per day	$L_{Aeq,15min}$ noise level from outdoor area not to exceed the existing background noise level (RBL) plus 10dB $L_{Aeq,15min} \leq RBL + 10dB(A)$	47dB(A)
More than 4 hours (total) per day	$L_{Aeq,15min}$ noise level from outdoor area not to exceed the existing background noise level (RBL) plus 5dB $L_{Aeq,15min} \leq RBL + 5dB(A)$	42dB(A)

Table 10: Noise level criteria for the playground areas as per AAAC guideline.

For the purpose of this assessment, it has been assumed that outdoor playtime is more than 4 hours per day.

4.4.4 SUMMARY OF OPERATIONAL NOISE LEVELS

Based on the criteria from the relevant noise standards and guidelines detailed above, Table 11 summarises the operational noise level criteria.

Noise Emission	Standard / Guideline	Time Period	Noise Level Criteria (dBA)
External Mechanical Plant (Applicable to residential receivers)	NSW EPA NPI	Day Time (7am-6pm)	42
		Evening Time (6pm-10pm)	42
		Night Time (10pm-7am)	37
External Mechanical Plant (Applicable to educational receivers)		Noisiest 1-hour when in use	35dB(A) (Internal) 45dB(A) (External)
Operational Noise (Outdoor Play , School Bell and PA-system)	SEPP & AAAC guideline	Day Time (7am-6pm)	42

Table 11: Summary of the noise level criteria at the nearest noise sensitive receivers based on the noise emission.

4.5 TRANSPORT NOISE

4.5.1 TRAFFIC NOISE

The NSW Road Noise Policy (RNP) establishes criteria for traffic noise from:

- Existing roads,
- New road projects,
- Road development projects,
- New traffic generated by developments.

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 up to 2.0dB above the existing noise levels. An increase of up to 2.0dB represents a minor impact that is considered barely perceptible to the average person.

In cases where existing traffic noise levels are above the noise assessment criteria, the primary objective is to reduce these through feasible and reasonable measures to meet the assessment criteria.

4.5.2 AVIATION NOISE

As per information obtained from Western Sydney Airport Environmental Impact Statement, it can be confirmed that the proposed activity is located outside the Australian Noise Exposure Concept (ANEC). Therefore, as per AS 2021:2015 '*Acoustics – Aircraft Noise Intrusion – Building Sitting and Construction*', the building site is considered acceptable and there is no requirement to carry out an aircraft noise assessment to define additional noise control requirements for aircraft noise. Appendix B contains the Western Sydney Airport ANEC contours.

4.6 CONSTRUCTION NOISE AND VIBRATION

4.6.1 NOISE CRITERIA

The ICNG suggest construction noise management levels that may minimise the likelihood of annoyance being caused to noise sensitive residential receivers depending on the duration of works. The management levels for long-term duration works are as follows:

- Within recommended standard hours.

The Management Level ($L_{Aeq,15min}$) measured at the most exposed boundary of any affected residential receiver when the construction site is in operation must not exceed the background noise level (RBL) by more than 10dB(A). This noise level represents the point above which there may be some community reaction to noise.

However, in the case of a highly noise affected area, the Management Level ($L_{Aeq,15min}$) at the most exposed boundary of any affected residential receiver when the construction site is in operation should not exceed 75dB(A). This level represents the point above which there may be strong community reaction to noise.
- Outside recommended standard hours.

The Management Level ($L_{Aeq,15min}$) measured at the most exposed boundary of any affected residential receiver when the construction site is in operation must not exceed the background

noise level (RBL) by more than 5dB(A). It is noted that a strong justification is required for works outside the recommended standard hours.

ICNG suggests construction noise management levels for other sensitive land uses surrounding construction sites. Table 12 below summarises the airborne construction noise criteria for receivers surrounding the site.

<i>Sensitive Receiver</i>		<i>Airborne Construction Noise Criteria, L_{Aeq} dB(A)</i>	
		<i>Within Standard Hours</i>	<i>Outside Standard Hours</i>
<i>Residential Receivers</i>	Noise affected / External	RBL+10	RBL+5
	Highly noise affected / External	75	N/A
<i>Active Recreation</i>	External (when in use)	65	N/A
<i>Classrooms</i>	Internal (when in use)	45	N/A

Table 12: ICNG construction airborne noise criteria for noise sensitive receivers surrounding the site.

The ICNG recommends internal ground-borne noise maximum levels at residences affected by nearby construction activities. Ground-borne noise is noise generated by vibration transmitted through the ground into a structure and can be more noticeable than airborne noise for some sensitive receivers. The ground-borne noise levels presented below from the ICNG are for residential receivers during evening and night-time periods only, as the objective is to protect the amenity and sleep of people when they are at home.

- Evening: $L_{Aeq,15min}$ 40dB(A) - internal
- Night: $L_{Aeq,15min}$ 35dB(A) - internal

The internal noise levels are assessed at the centre of the most affected habitable room.

4.6.2 VIBRATION CRITERIA

4.6.2.1 Human Comfort

The Department of Environment and Climate Change (DECC) developed the document '*Assessing Vibration: A Technical Guideline*' in February 2006 to assist in preventing people from exposure to excessive vibration levels within buildings. It is based on the guidelines contained in BS 6472.1:2008 '*Guide to evaluation of human exposure to vibration in buildings – Vibration sources other than blasting*'.

The guideline does not address vibration induced damage to structures or structure-borne noise effects. Vibration and its associated effects are usually classified as continuous (with magnitudes varying or remaining constant with time), impulsive (such as shocks) or intermittent (with the magnitude of each event being either constant or varying with time). Vibration criteria for continuous and impulsive vibration are presented in Table 13 below, in terms of vibration velocity levels.

Place	Time	r.m.s. velocity, mm/s [dB ref 10 ⁻⁶ mm/s]			
		Continuous Vibration		Impulsive Vibration	
		Preferred	Maximum	Preferred	Maximum
Residences	Day-time	0.20 [106 dB]	0.40 [112 dB]	6.00 [136 dB]	12.00 [142 dB]
	Night-time	0.14 [103 dB]	0.28 [109 dB]	2.00 [126 dB]	4.00 [132 dB]
Offices, schools, educational and worship	When in use	0.40 [112 dB]	0.80 [118 dB]	13.00 [142 dB]	26.00 [148 dB]

Table 13: Continuous and impulsive vibration criteria applicable to the site.

When assessing intermittent vibration comprising a number of events, the Vibration Dose Value (VDV) it is recommended to be used. Table 14 shows the acceptable VDV values for intermittent vibration.

Place	Time	Vibration Dose Values, m/s ^{1.75}	
		Preferred	Maximum
Residences	Day-time	0.20	0.40
	Night-time	0.13	0.26
Offices, schools, educational and worship	When in use	0.40	0.80

Table 14: Intermittent vibration criteria applicable to the site.

4.6.2.2 Structural Building Damage

Ground vibration from construction activities can damage surrounding buildings or structures. For occupied buildings, the vibration criteria given in previous section for Human Comfort shall generally form the limiting vibration criteria for the Project.

For unoccupied buildings, or during periods where the buildings are unoccupied, the vibration criteria for building damage suggested by German Standard DIN 4150.3:2016 'Vibration in Buildings – Effects on Structures' are to be adopted. Guideline values from DIN 4150.3:2016 are presented in Table 15.

Structural type	Vibration velocity, mm/s (Peak Particle Velocity - PPV)				
	Foundation			Plane of floor uppermost full storey in horizontal direction	Floor slabs, vertical direction
	1Hz to 10Hz	10Hz to 50Hz	50Hz to 100Hz	All frequencies	All frequencies
Type 1: Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40	20
Type 2: Residential buildings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20	15	20
Type 3: Structures that because their particular sensitivity to vibration, cannot be classified under Type 1 and 2 and are of great intrinsic value (e.g. heritage buildings)	3	3 to 8	8 to 10	8	20

Table 15: DIN 4150.3:2016 Guideline values of vibration velocity (PPV) for evaluating the effects of short-term vibration.

5 OPERATIONAL NOISE EMISSIONS ASSESSMENT

Noise emissions from the proposed activity have the potential to impact on existing surrounding noise sensitive receivers. For the purpose of this noise impact assessment, the noise sources associated with the activity are assumed as follows:

- Mechanical plant from the activity to the surrounding receivers,
- Public address and school bell systems,
- Activities and events within the Hall,
- Noise from outdoor playgrounds located within the school grounds,
- Noise emissions from car park,
- Other noise emissions,
- Traffic generation noise.

Each of these noise sources have been considered in the noise impact assessment. The noise impact assessments have also considered the following:

- Noise levels have been considered as continuous over the assessment time period to provide the worst-case scenario.
- Distance attenuation, building reflections and directivity.
- Lowest background noise levels measured.

5.1 EXTERNAL MECHANICAL PLANT

Noise from mechanical plant from the proposed activity should be controlled to ensure external noise emissions are not intrusive and do not impact the amenity of noise sensitive receivers. The noise emissions must meet the noise limits as set out in accordance with the NSW NPI.

Noise controls may need to be incorporated with the design of the mechanical plant to ensure that cumulative noise levels from plant to the nearest noise sensitive receivers meets the noise level criteria. Mechanical plant will operate continuously during school's operational hours (typically from 8:00am to 4:00pm) and no night-time operation (10pm to 7am) of the external mechanical plant should be allowed.

At this stage, final mechanical plant selections have not been made; therefore, it is not possible to undertake a detailed assessment of the mechanical plant noise emissions. However, preliminary external plant locations have been identified and a preliminary assessment has been carried out based on a review of the Mechanical Services Concept design report and drawings prepared by Steensen Varming. Refer to Figure 6 for preliminary external plant locations.

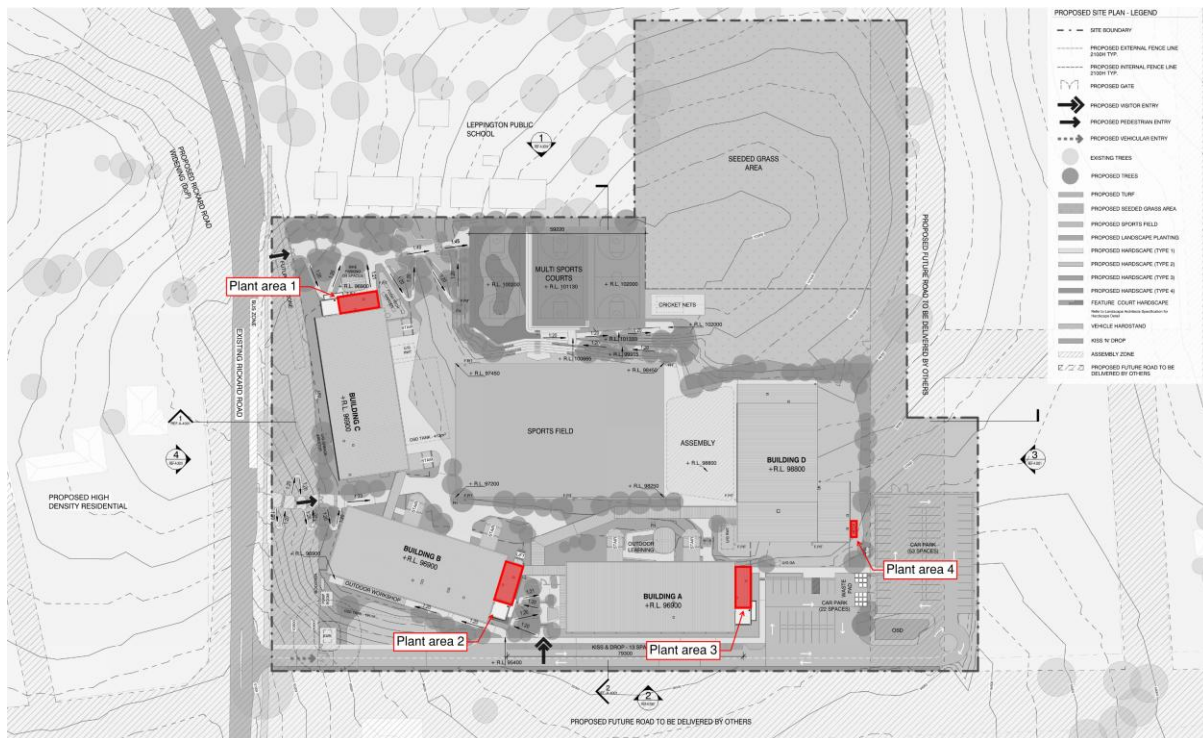


Figure 6: External mechanical plant locations.

Based on the proposed location of building services mechanical plant and the approximate distances to surrounding noise sensitive receivers, Table 16 shows maximum permissible cumulative noise limits for external plant in order to comply with the criteria set out in Section 4.4.3 of this report.

Plant area	Receiver type	Noise Level criteria, dB(A)	Maximum permissible noise level, dB(A) @ 1m
1	Residential / Education	42 / 45	73
2	Future residential	42	75
3	Future residential	42	74
4	Future residential	42	74

Table 16: Maximum permissible noise limits for external plant.

Noise controls will need to be incorporated with the design of the mechanical plant rooms to ensure that the cumulative noise levels from plant to the nearest noise sensitive receivers meets the NSW NPI noise level criteria.

Usual design noise controls that may need to be implemented will typically include, but are not limited to:

- Strategic location and selection of mechanical plant to ensure the cumulative noise levels at the receiver boundaries is met.
- Selection of appropriate quiet plant.
- Acoustic noise control measures to be put in place to minimise noise impacts such as:
 - In-duct attenuation.
 - Noise enclosures as required.
 - Sound absorptive panels.
 - Acoustic louvres as required.

- Noise barriers as required.

Acoustic assessment of mechanical plant shall continue during the detailed design phase of the project in order to confirm any noise control measures to achieve the relevant noise criteria at the nearest noise sensitive receivers.

5.2 PUBLIC ADDRESS AND SCHOOL BELL SYSTEMS

Noise from proposed activity public address and school bell systems should be controlled to ensure external noise emissions are not intrusive and do not impact on the amenity of noise sensitive receivers.

At this stage, public address and school bell systems selections have been not made; therefore, it is not possible to undertake a detailed assessment of the public address and school bell noise emissions.

The EPA notes numerous reports of community concern arising from inadequate design and installation as well as inappropriate use of school public address and bell systems. EPA considers that appropriate design, installation and use of those systems can both:

- Meet the proponent's objectives of proper administration of the school and ensuring safety of students, staff and visitors, and
- Avoid interfering unreasonably with the comfort and repose of occupants of nearby residences.

The Public Address and School Bell Systems shall be designed, installed and operated such that the systems do not interfere unreasonably with the comfort and repose of occupants of nearby residences. It is anticipated that the noise impact to the nearest sensitive receivers will be negligible if following measures are implemented:

- Low-powered horn-type speakers shall be located and orientated to provide a good coverage of the school areas whilst being directly away from residences and near sensitive receivers. System coverage shall be reviewed during the detailed design phase.
- Speakers shall be mounted with a downward angle and as close to the floor as possible.
- The noise level of the systems shall be adjusted on site so they will be clearly audible on the school site without being excessive. The systems shall initially be set so that the noise at nearby residences and sensitive receivers do not exceed noise level criteria.
- Once the appropriate noise level has been determined on site, the systems shall be limited to these noise levels so that staff cannot increase the noise levels.
- The systems shall be set so that it only occurs on school days.

5.3 ACTIVITIES AND EVENTS WITHIN HALL

Operational noise from activities and events associated with the proposed Hall should be controlled to ensure external noise emissions are not intrusive and do not impact the amenity of noise sensitive receivers. The Hall's noise level emissions must meet the noise limits as set out in accordance with the SEPP in Table 9. An acoustic assessment of the noise emissions from the use of the Hall has been conducted.

The following assumptions have been made for the assessment:

- The noise assessment has considered the proposed layout as shown in Figure 7.
- Distance attenuation.
- Events will occasionally occur during out of school hours (Evening time period from 6.00pm to 10.00pm).
- Two scenarios have been assessed:

- Scenario 1: Hall operating with open doors and open window.
- Scenario 2: Hall operating with closed doors and window.
- The glazing for doors (when applicable) and windows provides a minimum sound reduction index of R_{w32} which is achieved using a 6.38mm laminated fixed single glazing system.

The location of the Hall, relative to the site boundaries is shown (highlighted red) in Figure 7. Note the large bifold glazed doors are located to the west of the hall directed into the proposed school site.



Figure 7: Location of the new Hall building (highlighted red).

Activity within the proposed Hall is assumed to occur predominantly during the day-time, with occasional during the evening use for out-of-hours events. It is expected that the hall will be used for school assemblies, presentations, examinations and student concerts. The noise assessment within this section has considered amplified noise sources (such as music performances, etc.) during the daytime period as a worst-case scenario.

The predicted noise levels at the nearest future residential receiver, as a results of noise emissions from the Hall for each scenario, are shown in Table 17.

Calculation	Noise Level dB(A)	
	Scenario 1	Scenario 2
Reverberant $L_{Aeq,15min}$ within Hall	95	95
Composite Sound Insulation of Façade, dB	-10	-34
Correction Surface Area of Façade, dB	24	24
Correction for Distance, dB	-32	-32
Correction for reflections, directivity, building shielding, dB	-42	-42
Predicted Noise Level at Boundary of the Nearest Receiver, dB(A)	35	11
Noise Level Criteria, L_{Aeq} / Complies?	42 / Yes	42 / Yes

Table 17: Predicted noise levels from Communal Hall with doors and windows open (Scenario 1) and doors and windows closed (Scenario 2) to the nearest residential receiver.

Based on the assessment above, the predicted noise level at the boundary of nearest receiver will comply with the recommended daytime and evening criteria (SEPP - Transport and Infrastructure) with the windows open and windows closed.

5.4 OUTDOOR PLAY AREAS NOISE

Noise emission levels from the outdoor play areas have the potential to impact on the nearest noise sensitive receivers. The school has a combination of multisport courts, a sports field, assembly area and landscaped areas located within the centre of the site. Refer to Figure 7 for locations of the outdoor play areas.

The key noise source will be students using the outdoor play area during recess or lunch periods and before / after school. It has been assumed that the outdoor playgrounds are only likely to be at full capacity during recess or lunch times and the vocal effort of the students communicating will be generally considered as 'raised' speech.

The noise assessment for the new sports court is based on following assumptions:

- 1000 students using the playgrounds during recess and lunch times.
- For every two students using the sports court, only one will be speaking at any given time with a 'raised' vocal effort.
- Students talking at 'raised' speech level as worst-case scenario - 77dB(A) sound power level per student.
- The proposed play areas are situated in the centre of the site; therefore, the nearest noise-sensitive residential receivers have been identified as future residential receivers to the south and east.
- The future noise-sensitive residential receivers are partially shielded by the Hall.
- The students will be evenly distributed across the outdoor play areas.
- The outdoor play areas will be in used during School hours – i.e. day-time period – for more than 4 hours.

Calculation	Noise Level dB(A)
Cumulative sound power level $L_{Aeq,15min}$ of students	96
Correction for Distance, dB	-40
Correction for reflections, directivity, shielding, dB	-26
Predicted Noise Level at Boundary of the Nearest Receiver, dB(A)	30
Noise Level Criteria, L_{Aeq} / Complies?	42 / Yes

Table 18: Predicted noise levels from the outdoor play areas to the nearest residential receiver.

Based on the assessment above, the predicted noise level at the boundary of nearest receiver will comply with the recommended criteria (AAAC guideline and SEPP - Transport and Infrastructure).

5.5 CARPARK NOISE EMISSIONS

Based on the proposed site plan, the new activity will include two new carparks to the south of the site.

A carpark noise assessment has been conducted and noise emissions to the nearest noise-sensitive residential receiver boundary have been considered. Based on the proposed site plan, this will be future residential receivers approximately 40m to the east of the site. The main source of noise will be from cars travelling in, around and out of the car parks.

The following have been assumed for the carpark noise impact:

- The carpark will be used during school hours (Day time 7.00am - 6.00pm), and occasionally during evening time (6.00pm – 10.00pm).
- Assessment period of 15 minutes by assuming 2 cars entering or leaving each carpark (4 total), with each car taking approximately 30 - 60 seconds to park.
- Typical sound power level of a one car movement is 85dB(A).



Figure 8: Location of the proposed carparks.

Based on the assumptions above, the predicted noise levels at the residential receiver from carpark are shown in the Table 19.

Calculation	Noise Level dB(A)
Total Sound Pressure Level of 4 cars $L_{Aeq,15min}$ dB at 1 metre	71
Correction for distance attenuation, dB	-32
Predicted Noise Level at Boundary of the Nearest Receiver, dB(A)	39
Noise Level Criterion Day-time / Complies?	42 / Yes

Table 19: Noise assessment of car movements at carpark.

Based on the predicted noise level at the residential receiver boundary, the noise emissions from the new car parks will comply with the daytime noise level criteria. The predicted noise level will also comply with noise level criteria during evening time as the noise level criteria during the day time period is more stringent than evening time.

5.6 TRAFFIC NOISE GENERATION

Noise impact of the traffic flows generated by the proposed activity are required to meet the NSW Road Noise Policy (RNP).

As noted in Section 4.5 when considering land use redevelopment and the impact on sensitive land uses (residential / schools / hospitals / recreational) the RNP states that an increase up to 2.0dB in relation to existing noise levels is anticipated to be insignificant. Based on the proposed works and our review of the Transport Impact Assessment prepared by Stantec, dated 23 January 2025, the traffic on the existing nearby roads are expected to decrease at completion with the activity. This is due to council planning to construct additional roads. These roads are expected to include the expected traffic from the activity in their acoustic assessments for the new road proposals.

Table 20 shows the predicted road traffic-generated noise levels increase based on the predicted future traffic volumes with and without the development as per Traffic and Transport Impact Assessment by Stantec.

Time Period	Intersection	Future 2027 intersection Peak Hour Volume		Increase in Traffic	Increase in Traffic Noise dB,	Increase less than 2.1 dB
		Without development	With development			
am	Rickard Rd / Byron Rd	1,179	1,710	45%	1.6	Yes
	Rickard Rd / Ingleburn Rd	2,180	2,767	27%	1.0	Yes
	Ingleburn Rd / Byron Rd	2,016	2,111	5%	0.2	Yes
pm	Rickard Rd / Byron Rd	988	1,527	55%	1.9	Yes
	Rickard Rd / Ingleburn Rd	2,278	2,859	26%	1.0	Yes
	Ingleburn Rd / Byron Rd	2,147	2,084	-3%	-0.1	Yes

Table 20: Predicted traffic noise level increase for the roads around the site (with and without the development in 2027), as per Tables 4-6 & 4-7 Traffic and transport Impact Assessment Report by Stantec (rev G dated 23 January 2025).

Therefore, the activity is not expected to result in any noticeable increase traffic noise levels on the existing roads and is expected to meet the NSW Road Noise Policy recommendations.

5.7 OTHER NOISE EMISSIONS

Noise emissions from deliveries and waste collection have the potential to impact on the nearest noise sensitive receivers.

It is anticipated that the noise impact from deliveries and waste collection to the nearest noise sensitive receivers will be negligible if following recommendations are implemented:

- Deliveries, waste collection and servicing are to be carried out during daytime hours (7am – 6pm).
- Deliveries, waste collection and servicing are to be carried out within the confines of the school.

5.8 CUMULATIVE IMPACT ASSESSMENT

Cumulative impact refers to the combined effect of multiple projects or activities on the environment over time. It is critical to evaluate how the proposed project, in conjunction with other past, present, and reasonably foreseeable future actions, might affect the environment during both construction and operation.

Located in the South West Growth Area (SWGA), the site and surrounding areas are poised for substantial growth and densification. Leppington is undergoing significant change and transition following recent rezoning by the NSW Government. Further transformation is anticipated with the future rezoning of the Leppington Town Centre. This town centre is the focus of an active Planning Proposal which, if approved, is expected to greatly impact the character and context of the surrounding area.

The cumulative impacts of the new high school with the adjacent primary school have been considered with the application of the NSW NPI.

The NSW NPI specifies amenity noise level objects for the total noise levels at a receiver locations within different noise amenity areas. To ensure that cumulative noise levels remain within the recommended amenity objectives, the project amenity noise level is set at 5dB(A) lower than the amenity noise level.

Each neighbouring activity is expected to apply the same strategy from the NPI in order to maintain the acoustic amenity of the area.

6 NOISE INTRUSION ASSESSMENT

6.1 TRAFFIC NOISE

Traffic noise from Rickard Road has the potential to impact upon the facades of the proposed activity. Based on measurements of road noise carried out by JHA, the noise level at the façade of Building C is predicted to be 67dB(A).

It is understood that Rickard Road is subject to future road widening; however, the details of this are yet to be confirmed and it is understood that the road widening is proposed after the opening of the school in 2027. Based on the traffic volume increase of 55% as per the Traffic Impact Assessment (refer to Section 5.6), the assessment assumes future traffic noise levels on the façade of 69 dB(A) (i.e., a 1.9 dB increase).

Based on the measurements and assumptions stated above, JHA has carried out a review of noise impacts and recommends the minimum glazing thickness for spaces impacted by traffic noise from Rickard Road.

The following assumptions have been considered for the traffic noise impacts:

- Traffic noise levels for the assessment are as per measured levels on site by JHA Consulting Engineers plus assumptions stated above.
- Internal noise levels are predicted based on noise levels incident at the façade of each space.
- External glazing is the weakest elements of the façade, and solid sections of the façade typically provide a sound reduction index of R_w50 .
- Calculations have been based on achieving the internal noise level target of 40dB(A) as per NSW DOP Development Near Busy Roads and Rail Corridors 2008 for educational institutions.

Based on the predicted noise levels outside the western façades of the school buildings due to traffic on Rickard Road; to achieve the internal noise level criteria, it is recommended to install glazing with a sound reduction index of $R_w + C_{tr} 33$ for educational spaces facing Rickard Road within Building C. An example glazing is 10.38mm laminated fixed single glazing systems that can achieve this sound reduction index.

Figure 9 shows the facades which are recommended to achieve a minimum sound reduction index of $R_w + C_{tr} 33$.



Figure 9: External glazing recommended to achieve a minimum sound reduction index of $R_w + C_{tr}33$ (red highlight).

For all other facades glazing it is recommended to provide a minimum sound reduction index of R_w32 . A 6.38mm laminated fixed single glazing system achieves this sound reduction index.

The acoustic performance of the glazing and building façade shall be reviewed during the design phases of the project, once glazing and façade areas will be finalised and more detail regarding the road widening will be known.

6.2 AVIATION NOISE

Based on the most up-to-date information from Western Sydney Airport, the activity site does not lie within the Australian Noise Exposure Concept (ANEC) curves. As per AS2021:2015, nothing needs to be done for aircraft noise as noise from other sources will dominate the site.

7 CONSTRUCTION NOISE AND VIBRATION PLANNING

Currently a detailed construction program is not yet full defined. This section of the Construction Noise and Vibration Planning provides general recommendations only and provides applicable criteria together with feasible and reasonable noise and vibration control practices to be observed during the construction of the proposed activity.

This preliminary advice in relation to construction noise and vibration management shall form the basis for the Contractor's Construction Noise and Vibration Management Plan (CNVMP) which shall identify any noise criteria exceedance once construction methods and stages are known.

Any noise from construction activities to be carried out on site must not result in '*offensive noise*' to any noise sensitive receiver. To this end, the Contractor employed to undertake the construction works is responsible for ensuring that any site noise and, in particular, any complaints shall be monitored, investigated, managed and controlled.

7.1 RELEVANT STANDARDS FOR CONSTRUCTION NOISE AND VIBRATION CRITERIA

Section 4.6 of this report contains the relevant legislation, codes, and standards in addition to construction noise and vibration criteria for this project.

7.2 WORKING HOURS

The following construction hours are proposed as follows:

- Monday to Friday: 7am to 6pm.
- Saturday: 8am to 1pm.
- Sundays and Public Holidays: No excavation or construction works.

It is noted that the proposed construction hours are within the recommended EPA hours. Noise control measures are to be implemented during these hours following consultation and engagement with the community.

It is recommended that high noise level works – i.e. piling, excavation, etc – shall be scheduled to not occur during shoulder periods of the recommended standard hours – i.e 7am to 8am and 5pm to 6pm. A detailed Construction Noise & Vibration Management Plan (CNVMP) shall further assess the noise impact of construction works and shall include a protocol to minimise any potential noise impacts to identified sensitive receivers and ensure that appropriate noise control measures are defined and implemented to comply with all relevant noise guidelines.

7.3 MITIGATION MEASURES

In order to meet the noise and vibration requirements of the site, the Contractor will be required to engage a qualified acoustic consultant to assist in the compilation of a CNVMP and undertake noise and vibration monitoring for the duration of the project.

7.3.1 GENERAL CONTROL ELEMENTS

As a general rule, minimising noise and vibration should be applied as universal work practice at any time of day, but especially for any construction works to be undertaken at critical times outside normal daytime/weekday periods.

It is noted that the reduction of noise and vibration at the source and the control of the transmission path between the construction site and the receiver(s) are the preferred options for noise minimisation. Providing treatments at the affected receivers should only be considered as a last resort. Construction noise and vibration shall be managed by implementing the strategies listed below:

- *Plant and equipment.* In terms of both cost and results, controlling noise and vibration at the sources is one of the most effective methods of minimising the impacts from any work site activities. Work practices that will reduce noise and vibration at the source include:
 - Employing quieter techniques for all high noise activities such as rock breaking, concrete sawing, and using power and pneumatic tools.
 - Use quieter plant and equipment based on the optimal power and size to most efficiently perform the required tasks.
 - Selecting plant and equipment with low vibration generation characteristics.
 - Operate plant in a quietest and most effective manner.
 - Where appropriate, limit the operating noise of equipment.
 - Regularly inspecting and maintain plant and equipment to minimise noise and vibration level increases, to ensure that all noise and vibration reduction devices are operating effectively.
- *On site noise management.* Practices that will reduce noise from the site include:
 - Maximising the distance between noise activities and noise sensitive receivers. Strategically locate equipment and plant.
 - Undertaking noisy fabrication work off-site where possible.
 - Avoid the use of reversing beeping alarms or provide for alternative systems, such as broadband reversing alarms
 - Maintaining any pre-existing barriers or walls on a demolition or excavation site as long as possible to provide optimum sound propagation control.
 - Constructing barriers that are part of the project design early in the project to afford mitigation against site noise.
 - Using temporary site building and material stockpiles as noise barriers. These can often be created using site earthworks and may be included as a part of final landscape design.
 - Installing purpose-built noise barriers, acoustic sheds and enclosures.
- *Work scheduling.* Scheduling work during periods when people are least affected is an important way of reducing adverse impacts. The following scheduling aspects may reduce impacts:
 - Provide respite periods, including restricting very noisy activities to daytime, restricting the number of nights that after-hours work is conducted near residences, or by determining any specific requirements, particularly those needed for noise sensitive receivers.
 - Scheduling activities to minimise impacts by undertaking all possible work during hours that will least adversely affect sensitive receivers and by avoiding conflicts with other scheduled events.
 - Scheduling work to coincide with non-sensitive periods, to reduce impact on examinations.
 - Scheduling noisy activities to coincide with high levels of neighbourhood noise so that noise from the activities is partially masked and not as intrusive.

- Planning deliveries and access to the site to occur quietly and efficiently and organising parking only within designated areas located away from sensitive receivers.
- Optimising the number of deliveries to the site by amalgamating loads where possible and scheduling arrivals within designated hours.
- Designating, designing and maintaining access routes to the site to minimise impacts.
- Including contract conditions that include penalties for non-compliance with reasonable instructions by the principal to minimise noise or arrange suitable scheduling.
- *Consultation, notification and complaints handling.*
 - Provide information to neighbours before and during construction.
 - Maintain good communication between the community and Project staff.
 - Have a documented complaints process and keep register of any complaints.
 - Give complaints a fair hearing and provide for a quick response.
 - Implement all feasible and reasonable measures to address the source of complaint. Implementation of all reasonable and feasible mitigation measures for all works will ensure that any adverse noise impacts to surrounding receivers are minimised when noise goals cannot be met due to safety or space constraints.

7.3.2 ADDITIONAL NOISE AND VIBRATION CONTROL MEASURES

If, during construction, an item of equipment exceeds either the noise criteria at any location or the equipment noise level limits, the following noise control measures, together with construction best practices, shall be considered to minimise the noise impacts on the neighbourhood.

- Schedule noisy activities to occur outside of the most sensitive times of the day for each nominated receiver.
- Consider implementing equipment-specific screening or other noise control measures recommended in Appendix C of AS 2436:2010.
- Limit the number of trucks on site at the commencement of site activities to the minimum required by the loading facilities on site.
- When loading trucks, adopt best practice noise management strategies to avoid materials being dropped from height into dump trucks.
- Avoid unnecessary idling of trucks and equipment.
- Ensure that any miscellaneous equipment (extraction fans, hand tools, etc) not specifically identified in this plan incorporates silencing/shielding equipment as required to meet the noise criteria.

Implementation of all reasonable and feasible mitigation measures for all internal and underground works will ensure that any adverse noise impacts to surrounding residential, commercial and recreational receivers are minimised when noise goals cannot be met due to safety or space constraints.

8 CONCLUSIONS

A Noise & Vibration Impact Assessment for Review of Environmental Factors has been carried out for the proposed new high school at 128-134 Rickard Road, Leppington NSW. This report forms part of the documentation package to be submitted to the Department of Planning as part of the REF.

This report establishes relevant noise level criteria, details the acoustic assessment and provides comments, recommendations and mitigation measures for the proposed activity.

8.1 SUMMARY

The noise assessment has adopted methodology from relevant guidelines, standards and legislation to assess noise impact. The noise impacts have been predicted at the nearest noise sensitive receiver boundaries.

A summary of the assessments and their outcomes is listed below:

Mechanical Services: At this stage, mechanical plant selections have not been made. Therefore, a detailed noise assessment has not been able to be carried out. A preliminary review has been carried out based on the location, distance to noise sensitive receivers and the most restrictive criteria. Noise emissions from external mechanical plant around the site shall be restricted to the noise levels as per Section 5.1. Acoustic assessment of all building services plant shall continue during the detailed design phase of the project in order to confirm any noise control measures.

Public address and school bell systems: At this stage, public address and school bell systems selections have been not made; therefore, it is not possible to undertake a detailed assessment of the public address and school bell noise emissions. The Public Address and School Bell Systems shall be designed, installed and operated such that the systems do not interfere unreasonably with the comfort and repose of occupants of nearby residences. Acoustic assessment of public address and school bell systems shall continue during the detailed design phase of the project in order to confirm any noise control measures required to achieve the relevant noise criteria at the nearest noise sensitive receivers.

Activities and events within the Hall: Noise emission from Hall to the nearest residential receiver has been carried out and show that the noise emissions from the Hall will be comply with SEPP daytime and evening criteria with windows and doors closed and open.

Outdoor play areas: External noise emissions associated with the outdoor playgrounds have been assessed. Based on the proposed number of students the school can accommodate plus the location of the outdoor play areas on site, the predicted noise level at the boundary of nearest noise sensitive receiver will comply with the SEPP and AAAC guideline's criteria.

Carpark Noise: Noise impacts of car movements in the carparks have been assessed. Based on the assessment, predicted noise level at the nearest residential receiver boundary, the noise emissions from the new carparks will comply with the daytime and evening noise level criteria.

Traffic Noise Generation: Traffic noise impact due to the likely generated vehicle movements with the development compared to the predicted traffic volumes without the development are not expected to increase by more than 2dB at the nearby noise sensitive receivers. The proposed activity is therefore anticipated to be insignificant as per the trigger levels outlined in the NSW Road noise Policy.

Other Noise Sources: Noise emissions from delivers and waste collection have the potential to impact on the nearest noise sensitive receivers. It is anticipated that the noise impact from deliveries and waste collection to

the nearest noise sensitive receivers will be negligible provided that it is to be carried out within the confines of the school and during daytime hours. (7am – 6pm).

Noise Intrusion: Traffic noise from Rickard Road has the potential to impact upon the facades of the proposed activity. A minimum sound insulation performance has been obtained to meet the internal noise level criteria as per NSW DOP Development Near Busy Roads and Rail Corridors noise criteria. Acoustic design of the façade, other external building elements and ventilation openings of the school will need to be considered throughout the design stages in order to meet the noise level criteria.

Construction Noise and Vibration Planning: Currently a detailed construction program is not yet fully defined. This report has provided general Construction Noise and Vibration Planning recommendations only, applicable criteria plus feasible and reasonable noise and vibration control practices to be observed during the construction of the proposed activity. The preliminary advice in relation to construction noise and vibration management shall form the basis for the Contractor's Construction Noise and Vibration Management Plan (CNVMP) which shall identify any noise criteria exceedance once construction methods and stages are known.

The information presented in this report shall be reviewed if any modifications to the features of the activity specified in this report occur, including and not restricted to selection of mechanical plant, modifications to the building and introduction of any additional noise sources.

8.2 MITIGATION MEASURES

<i>Mitigation Number/Name</i>	<i>Aspect / Section</i>	<i>Mitigation Measures</i>	<i>Reason for Mitigation Measure</i>
Building Services Noise	Design / Section 5.1	At this stage, mechanical plant selections have not been made. Therefore, a detailed noise assessment has not been able to be carried out. A preliminary review has been carried out based on the location, distance to noise sensitive receivers and the most restrictive criteria. Noise emissions from external mechanical plant around the site shall be restricted to the noise levels as per Section 5.1. Acoustic assessment of all building services plant shall continue during the detailed design phase of the project in order to confirm any noise control measures.	To comply with the established noise level criteria
Public address and school bell systems Noise	Design & operation / Section 5.2	At this stage, public address and school bell systems selections have been not made; therefore, it is not possible to undertake a detailed assessment of the public address and school bell noise emissions. The Public Address and School Bell Systems shall be designed, installed and operated such that the systems do not interfere unreasonably with the comfort and repose of occupants of nearby residences. Acoustic assessment of public address and school bell systems shall continue during the detailed design phase of the project in order to confirm any noise control measures required to achieve the relevant noise criteria at the nearest noise sensitive receivers.	To comply with the established noise level criteria

<i>Mitigation Number/Name</i>	<i>Aspect / Section</i>	<i>Mitigation Measures</i>	<i>Reason for Mitigation Measure</i>
Activities and events within the Hall	Design & operation / Section 5.3	Noise emission from Hall to the nearest residential receiver has been carried out and show that the noise emissions from the Hall will be comply with SEPP daytime and evening criteria with windows and doors closed and open. Therefore, high noise generating activities within the hall shall be carried out with windows and doors shut.	To comply with the established noise level criteria
Other Noise Sources	Operation / Section 5.7	Recommendations for time restrictions on deliveries and waste collection has been provided in order to reduce acoustic impact to surrounding sensitive receivers. These can be found in Section 5.7	To comply with the established noise level criteria
Traffic Noise Intrusion	Design / Section 6	Recommendations have been provided for the minimum sound insulation performance of the external glazing likely required to meet the internal noise levels for the spaces.	To comply with the internal noise level criteria
Construction Noise and Vibration Planning	Prior to commencement of any construction work / Section 7	Currently a detailed construction program is not yet fully defined. This report has provided general Construction Noise and Vibration Planning recommendations only, applicable criteria plus feasible and reasonable noise and vibration control practices to be observed during the construction of the proposed activity. The preliminary advice in relation to construction noise and vibration management shall form the basis for the Contractor's Construction Noise and Vibration Management Plan (CNVMP) which shall identify any noise criteria exceedance once construction methods and stages are known.	To comply with the established noise level criteria

Table 21: Proposed mitigation measures for the proposed development

8.3 EVALUATION OF ENVIRONMENTAL IMPACTS

Based on the information presented in this report, impacts are able to be adequately mitigated through recommended measures and it is not considered to be a significant impact. Therefore, compliance with relevant guidelines is expected.

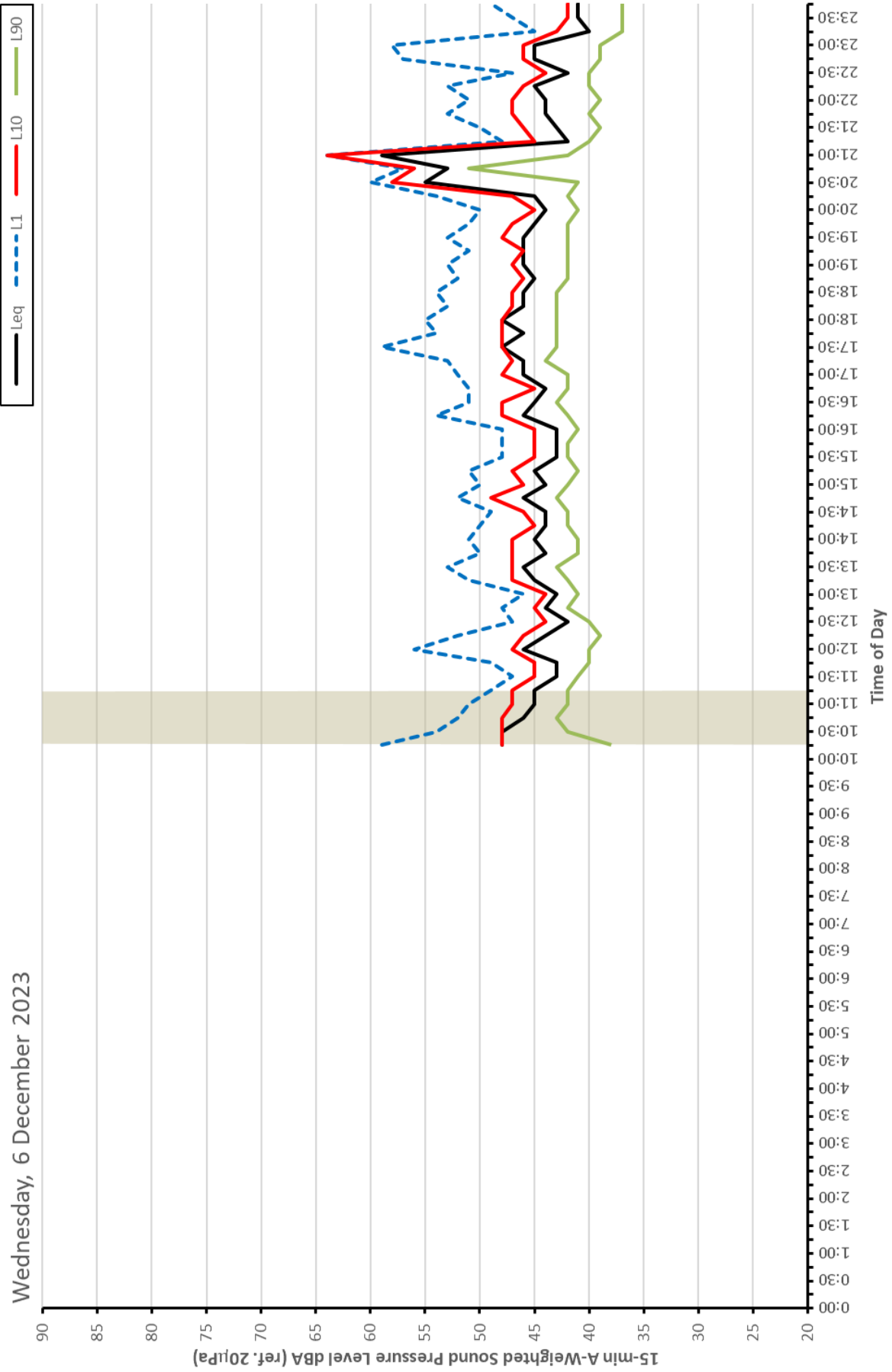
APPENDIX A: LONG-TERM NOISE MONITORING

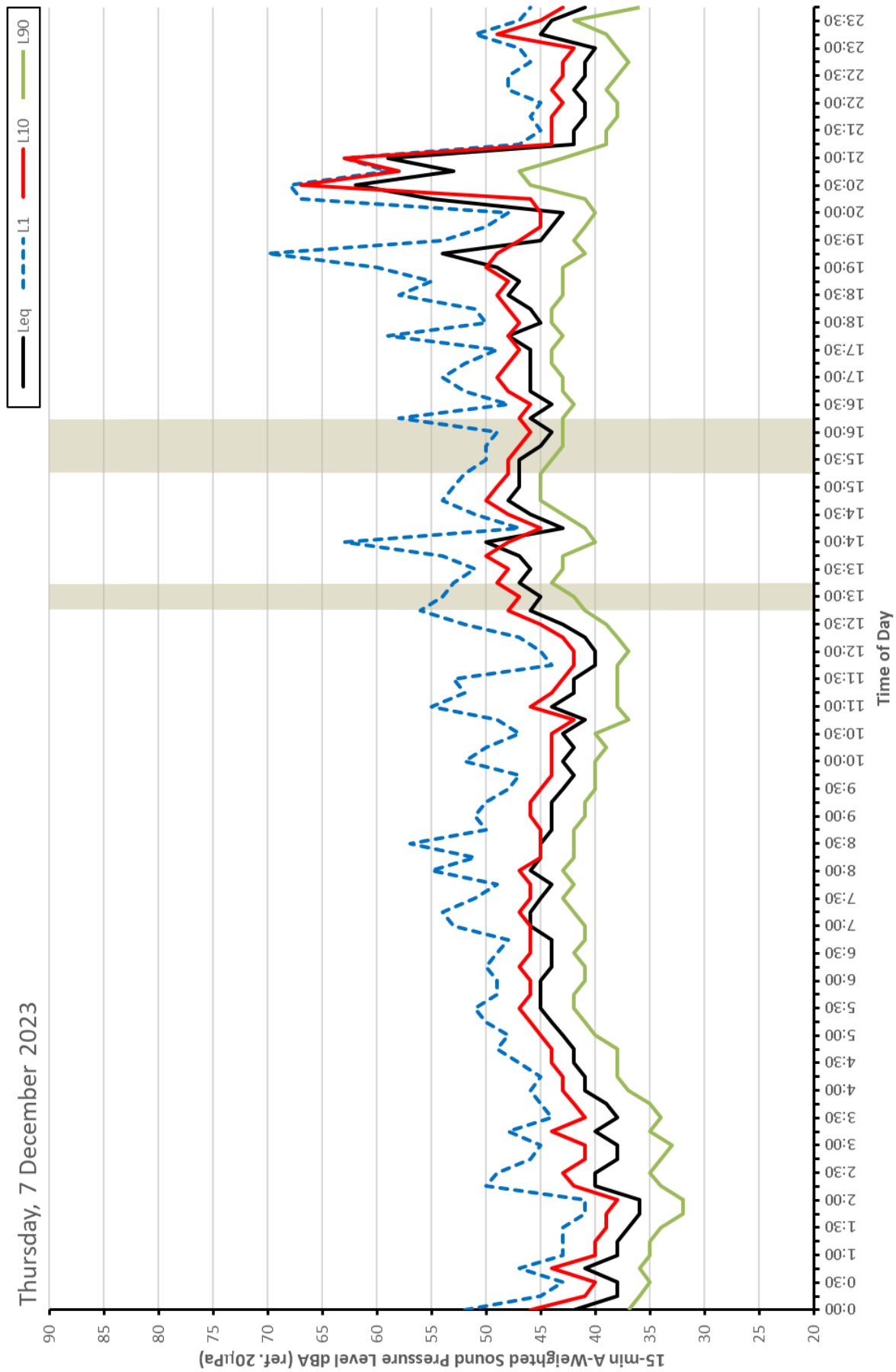
L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

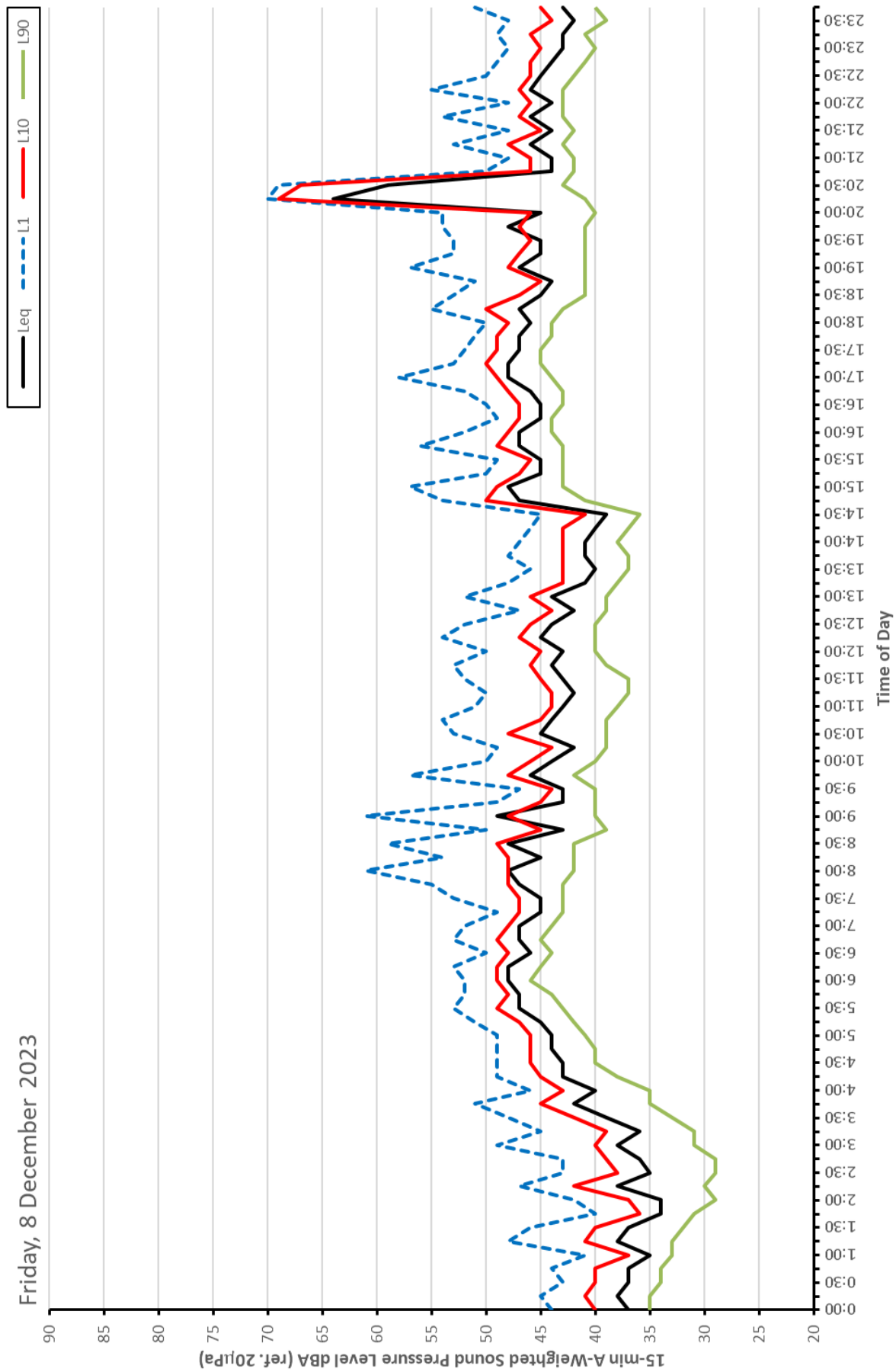
L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

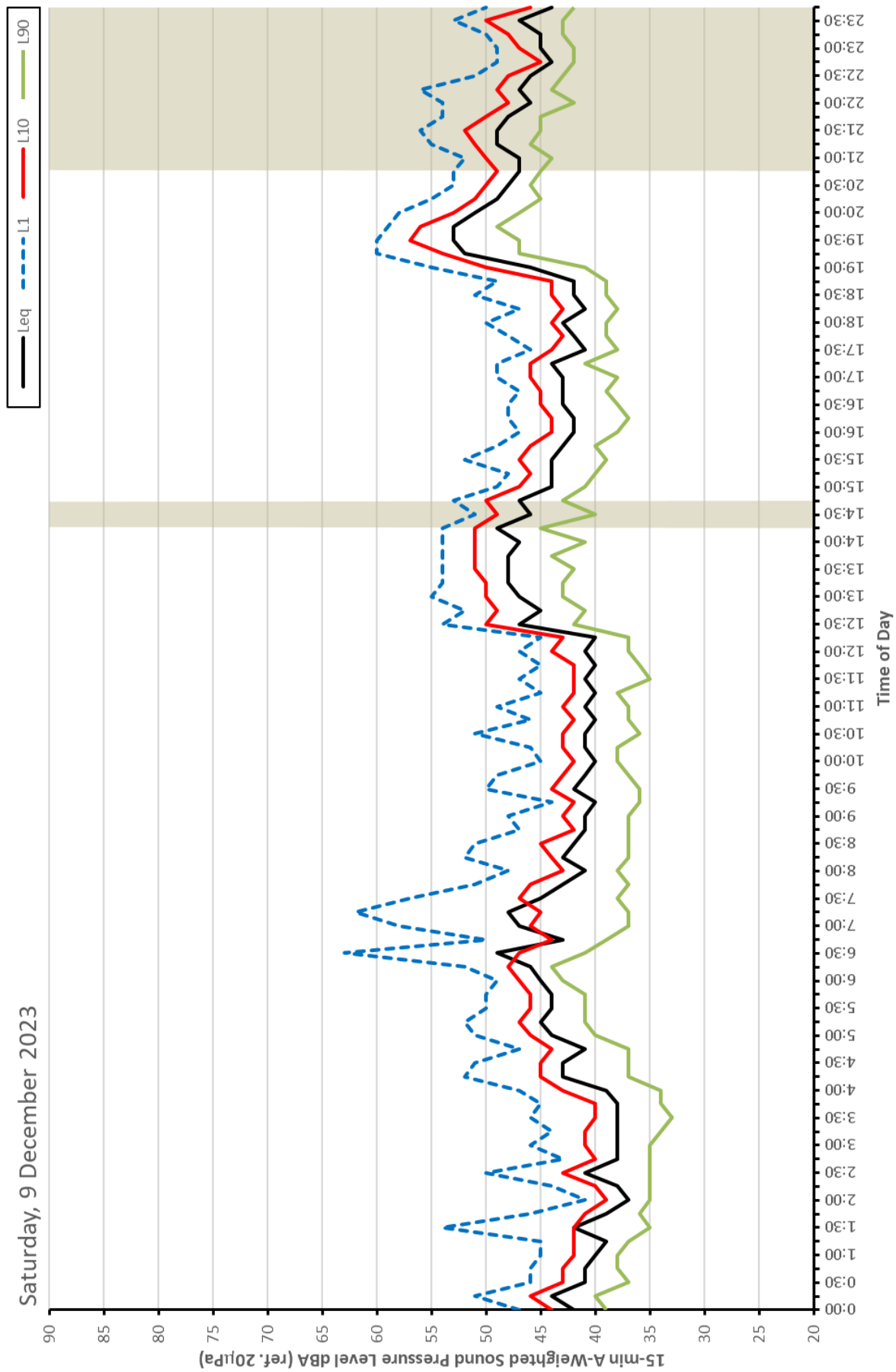
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

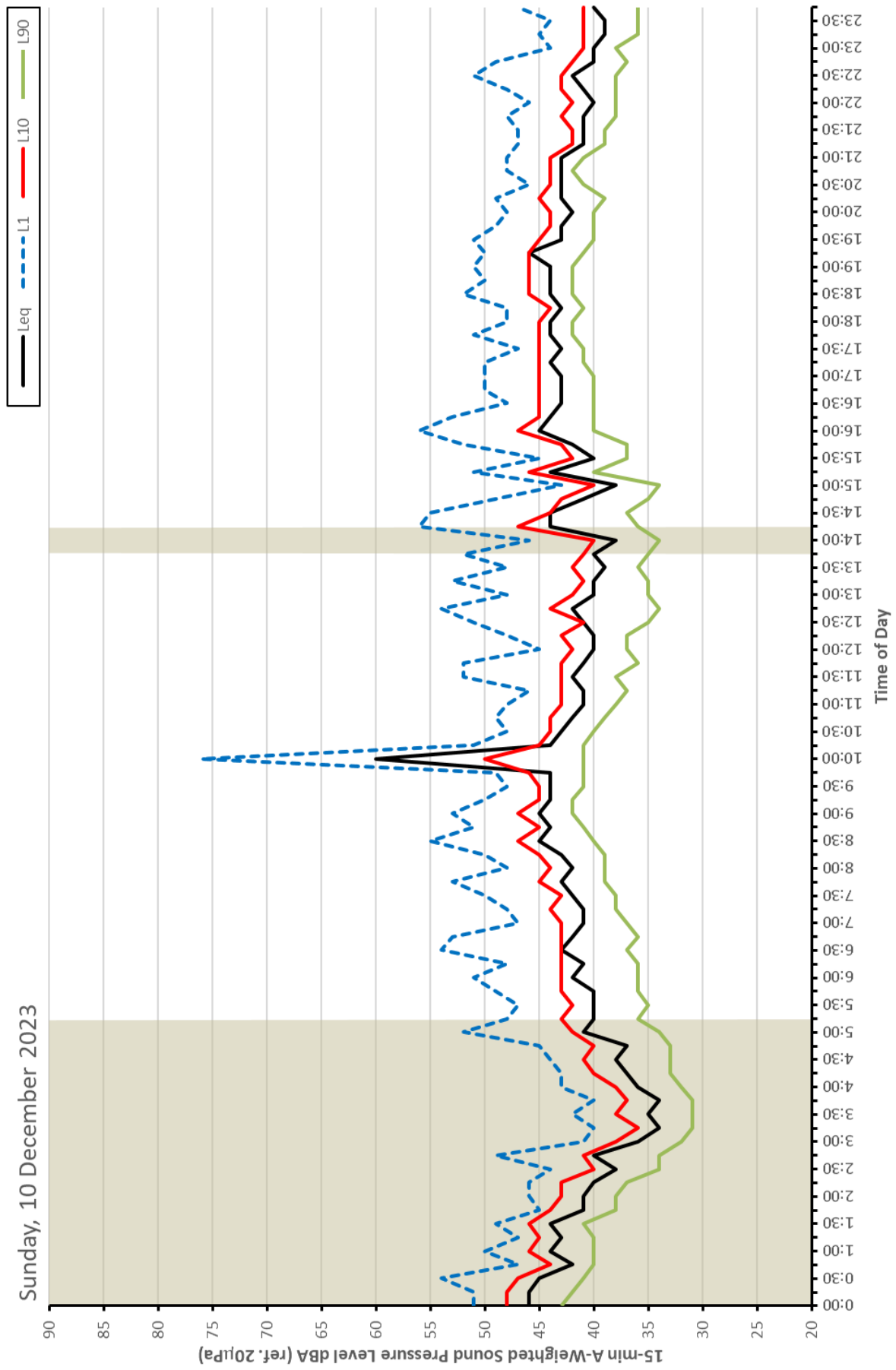
L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

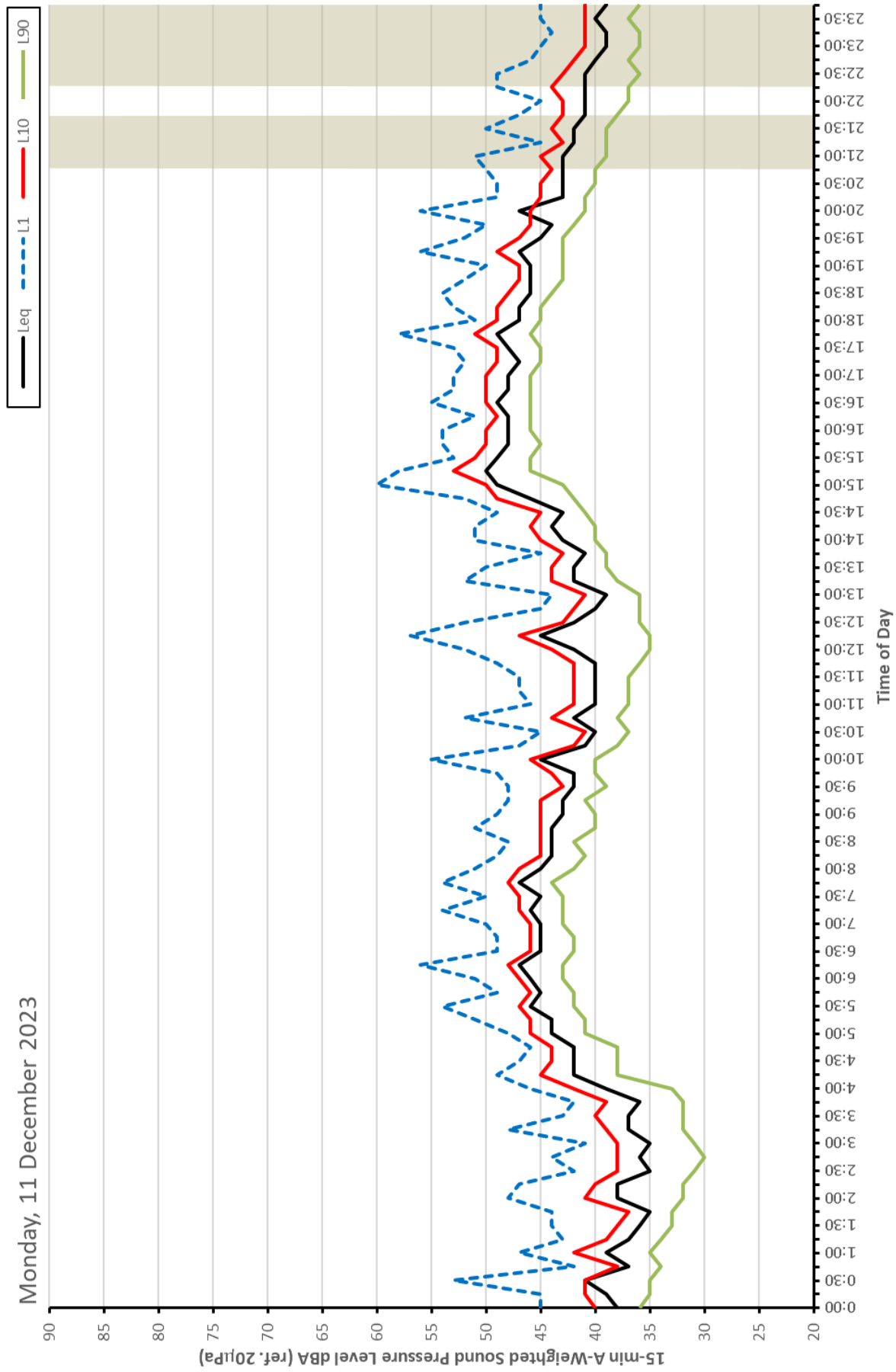


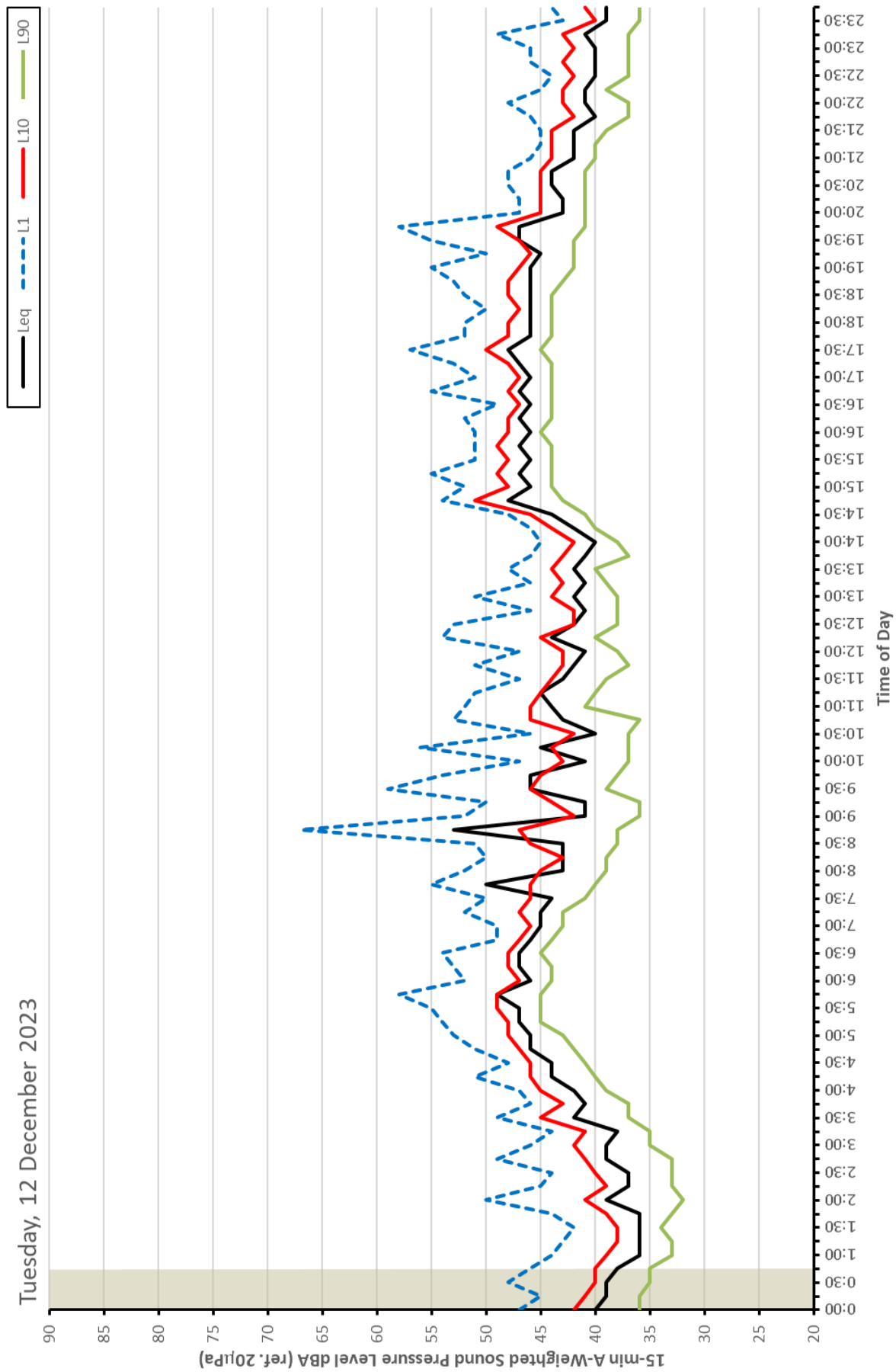


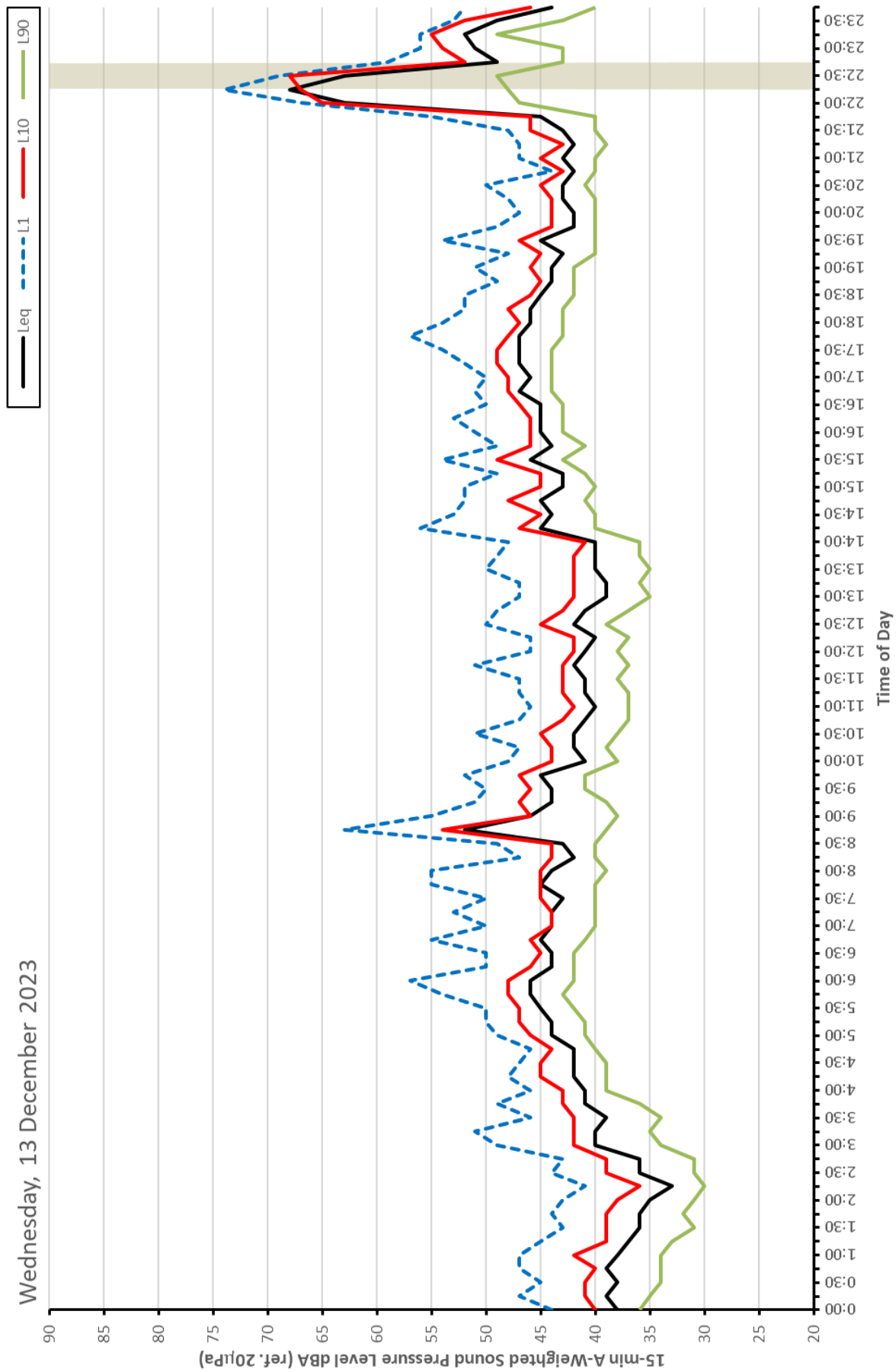


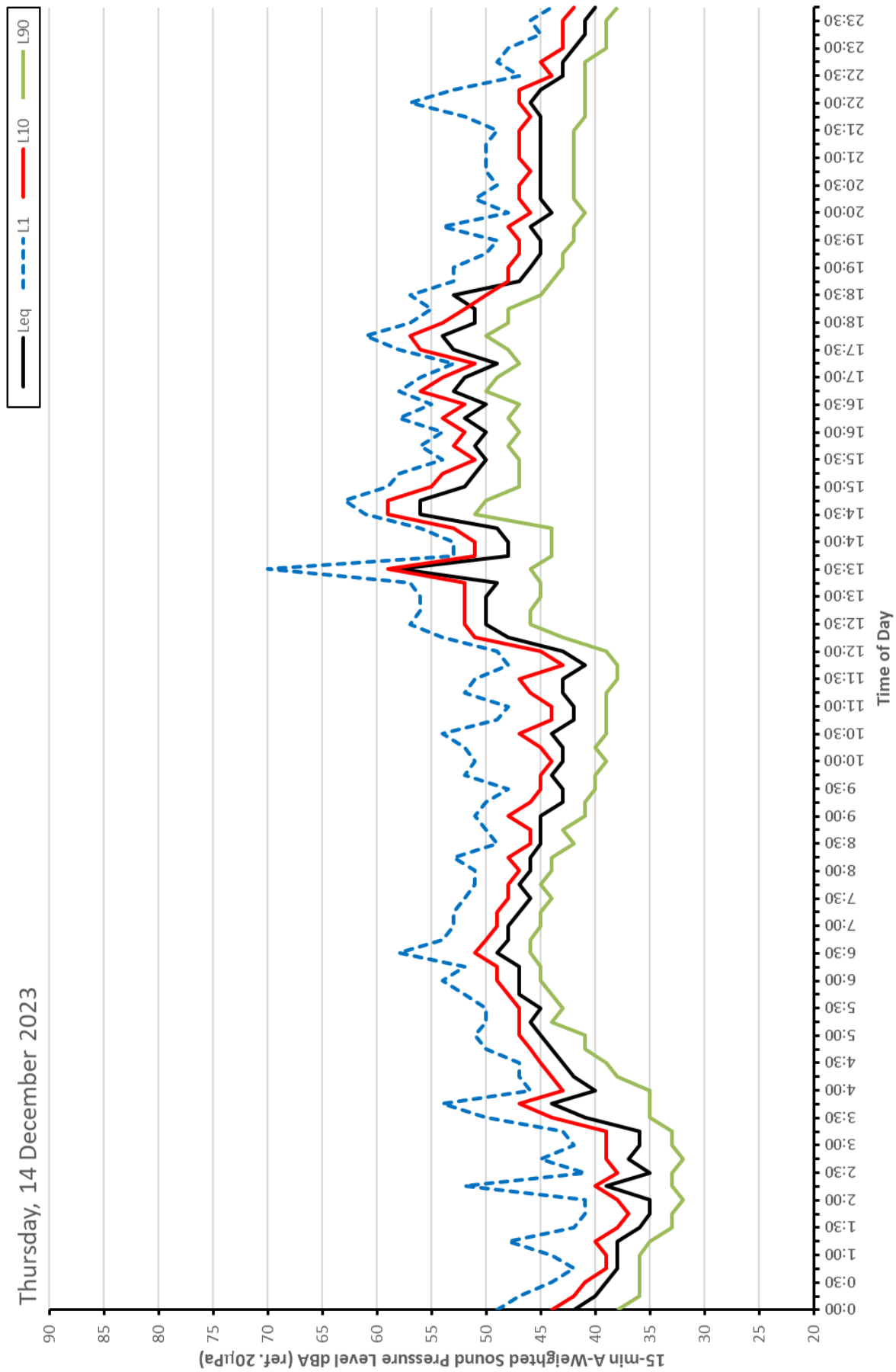


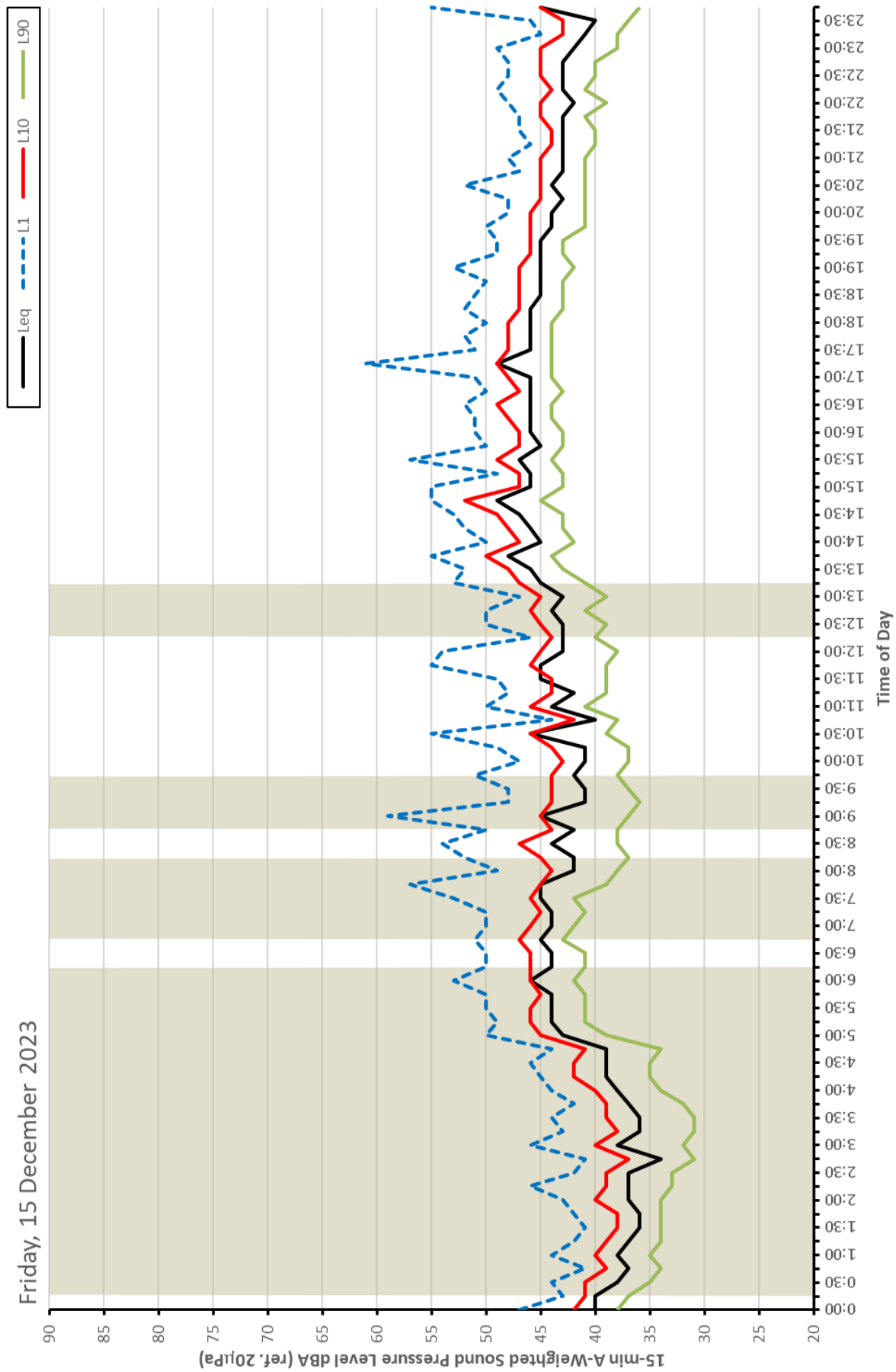


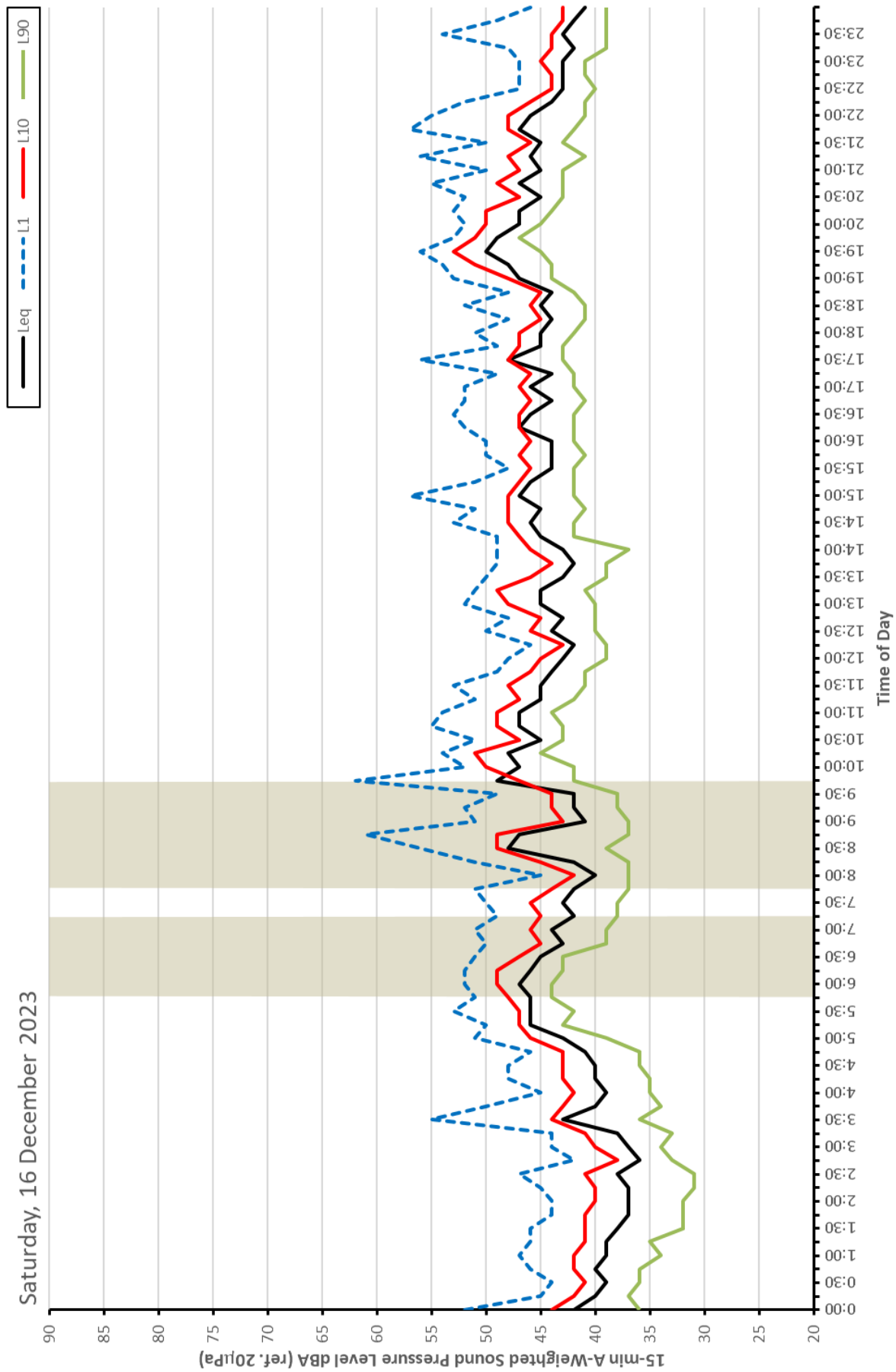


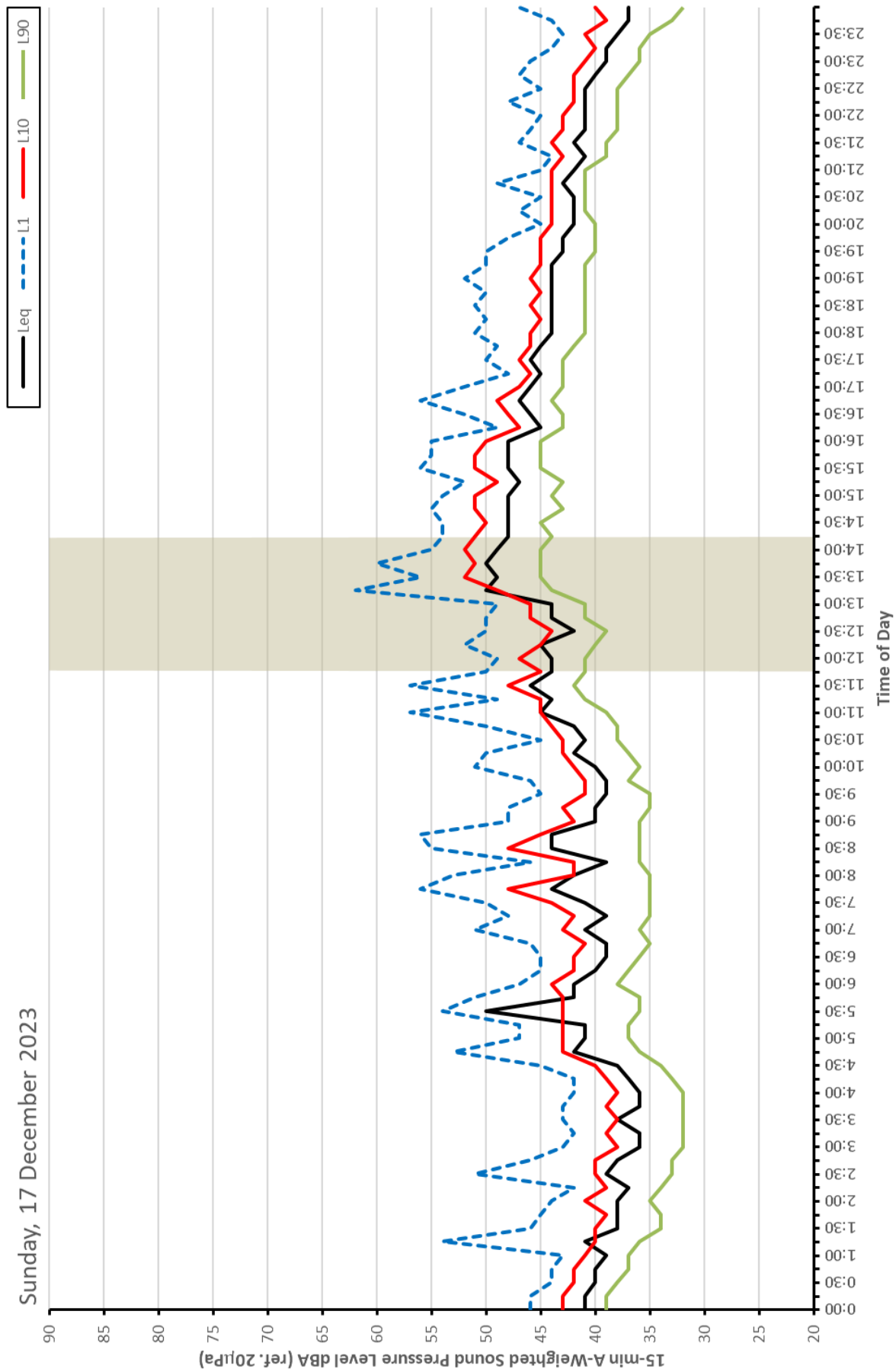


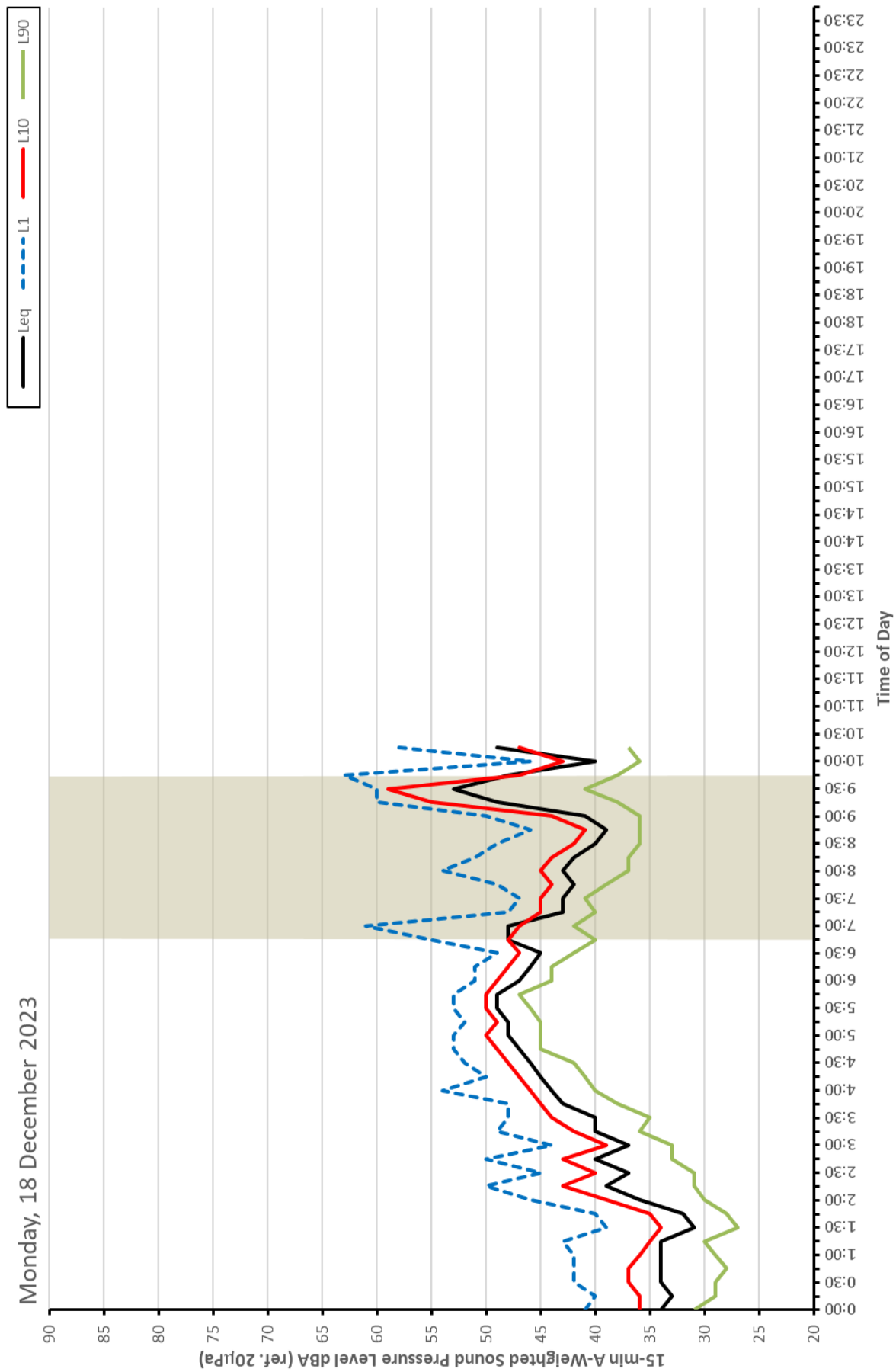




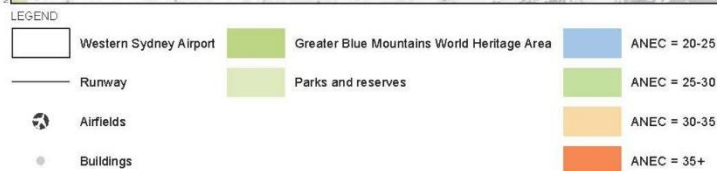
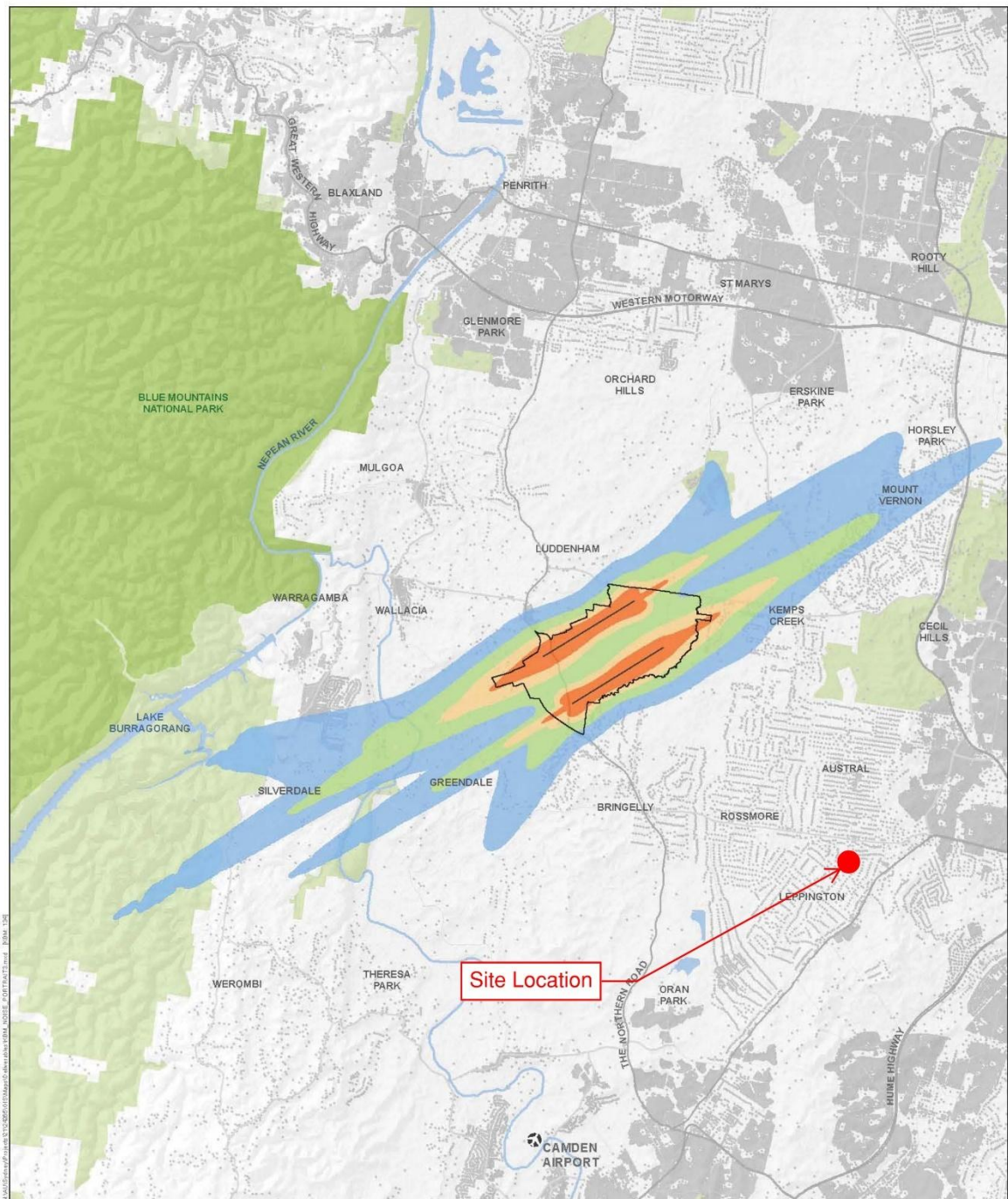








APPENDIX B: WESTERN SYDNEY AIRPORT ANEC CURVES



Data Source: Please refer to "Digital Data Sources" on the second page of the EIS

ES 19 - ANEC contours for Prefer 05 and Prefer 23 operating strategy (2063)

