RENZO TONIN & ASSOCIATES
inspired to achieve

Acoustics
Vibration
Structural Dynamics

WOOLWORTHS WYONG RDC

Noise Impact Assessment

27 April 2022

Fabcot Pty Ltd

TM296-01F03 Noise impact assessment (r6).docx

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

aaac Association of Australian Acoustical Consultants

Document details

Detail	Reference
Doc reference:	TM296-01F03 Noise impact assessment (r6).docx
Prepared for:	Fabcot Pty Ltd
Address:	1 Woolworths Way Bella Vista NSW 2153
Attention:	Andrew Hollander

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
22.02.2022	Draft issue for comment	0, 1	2	A. Morris	A. Morris	A. Leslie
18.03.2022	Address client comments	3	4	A. Morris	A. Morris	A. Leslie
27.04.2022	Address DPE comments	5	6	A. Morris	A. Morris	A. Leslie

File Path: R:\AssocSydProjects\TM251-TM300\TM296 ale Wyong RDC Woolworths\1 Docs\03 Noise impact assessment\TM296-01F03 Noise impact assessment (r6).docx

Executive summary

Renzo Tonin & Associates was engaged by Fabcot Pty Ltd on behalf of Woolworths Group Limited to prepare a noise and vibration impact assessment for State Significant Development (SSD) application 33701741. Fabcot is proposing alterations and additions to the existing Woolworths Wyong Regional Distribution Centre (RDC) at Lot 413 DP 1058215, commonly known as 11 Warren Road, Warnervale (the Proposal).

A combination of short term and long term noise measurements were undertaken to quantify the existing noise environment and the noise emissions from the existing Wyong RDC. Background and ambient noise levels are generally affected by the nearby M1 Motorway and natural sounds.

Construction noise and vibration impacts were assessed in accordance with the NSW Interim Construction Noise Guideline (ICNG). Noise management levels for residences were set based on the results of the noise logging. Detailed computer modelling predicted that construction noise levels will be less than the nominated noise management levels at all residential receivers. Vibration from construction is unlikely to result in cosmetic damage. One industrial receiver may potentially be impacted for noise and vibration (human disturbance) if excavation works occur close to the western site boundary near Woolworths Way. This can be managed through consultation with the potentially affected receiver, on-site measurements and a complaints management process.

Operational noise emissions were assessed in accordance with the NSW Noise Policy for Industry (NPfI). A computer noise model for site operations was developed and validated against noise measurements of the existing operations. Reference noise measurements of the Woolworths heavy vehicle fleet were used alongside site-specific measurements to prepare a validation noise model, which aligned closely with noise measurements around the existing Wyong RDC. This noise model was then adapted to the proposed design and future site usage data. The proposal is predicted to achieve the nominated industrial noise targets.

Road traffic generated by the proposal is expected to increase traffic to and from the site by approximately 2-7%. This is unlikely to result in a significant change in road traffic noise on public roads. As a result, the proposal is expected to meet the requirements of the NSW Road Noise Policy (RNP).

Contents

List of tables

List of figures

1 Introduction

Renzo Tonin & Associates (RT&A) was engaged by Fabcot Pty Ltd (Fabcot) on behalf of Woolworths Group Limited (Woolworths) to prepare a noise and vibration impact assessment (NVIA) to accompany the Environmental Impact Statement (EIS) for State Significant Development (SSD) application 33701741. Fabcot is proposing alterations and additions to the existing Woolworths Wyong Regional Distribution Centre (Wyong RDC) at Lot 413 DP 1058215, commonly known as 11 Warren Road, Warnervale (the Proposal).

This report assesses noise and vibration impacts during the construction and operational stages for the Proposal. It proposes mitigation and management measures to reduce impacts during the construction and operation phases of the Proposal. The report has been prepared to address the Planning Secretary's environmental assessment requirements (SEARs). It is noted the Department of Planning, Industry and Environment (DPIE) has issued industry-specific SEARs for the Proposal.

The noise and vibration assessment has been carried out in accordance with the policies, guidelines and standards presented in Section 3 (construction noise and vibration) and Section 4 (operational noise and vibration) of this report.

1.1 Secretary's environmental assessment requirements

Noise and vibration assessment requirements for the Proposal are detailed in the SSD-33701741 SEARs dated 21 December 2021. These requirements are addressed in this report, as outlined in Table 1.1.1.

Table 1.1.1: Secretary's environmental assessment requirements – Noise and vibration

Secretary's environmental assessment requirements	Where addressed
11. Noise and vibration	
Provide a noise and vibration assessment prepared in accordance with the relevant EPA guidelines. The assessment must detail construction and operational noise and vibration impacts on nearby sensitive receivers and structures and outline the proposed management and mitigation measures that would be implemented.	**Construction noise and vibration** Relevant guidelines: Section 3 Assessment: Section 5
	Operational noise and vibration Relevant guidelines: Section 4 Assessment: Section 6
	Proposed management and mitigation measures Construction: Section 5.5.3, Section 5.6.3 Operational: Section 6.1.7
Additional assessment requirements (as relevant)	
Existing approval – The EIS must provide a clear overview of the relationship between the proposed development and the existing development consent, including any relevant conditions. The EIS should also confirm whether the existing development consent would be surrendered as part of the subject DA.	Section 1.3

1.2 Proposal overview

1.2.1 Location and access

The Proposal is located at 11 Warren Road, Warnervale within the Central Coast local government area (LGA), as shown in Figure 2.1.

Existing vehicle access is provided via Warren Road. Vehicle access is also available via Woolworths Way, however, this entry/exit driveway is not currently utilised.

1.2.2 Proposal hours

The Proposal hours of operation are to be 24 hours, 7 days per week.

1.2.3 Proposal description

The Proposal comprises alterations and additions to the existing Wyong RDC, including:

- 7,032 m^2 extension of the existing temperature controlled warehouse (including new exhaust fans),
- 14,454 m^2 extension of the ambient warehouse including B-double drive-through,
- 5,400 m^2 extension of the Return Transfer Facility (RTF) warehouse including B-double drive-through,
- Expansion of the confectionary storage floorspace,
- 13 new banana ripening rooms,
- Refurbishment of the existing canteen, locker rooms and amenities,
- Expansion of the existing hardstand areas to accommodate a truck wash and maintenance facility and refuel station,
- Two new weighbridges,
- 98 pan-tech parking spaces, including 48 new spaces,
- 17 truck parking spaces, including 6 new spaces,
- Site services infrastructure including relocation of existing fire tank and pumphouse, and
- Provision for additional entry/exit movements via the existing driveway to Woolworths Way.

1.3 Existing development consent

The Wyong RDC is an existing site within the Central Coast local government area. Currently it is subject to consent conditions issued by the then Wyong Shire Council for Development Application number DA0187/2003B, last modified June 29, 2004. No specific noise conditions are set out in the Consent.

1.4 Acoustic terms & quality

This report is technical in nature and uses acoustic terminology throughout. A summary and explanation of the common acoustic terms that have been used in this report is presented in Section A.1. Some of the key acoustic concepts used in this report are outlined in Section A.2.

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 Existing noise environment

2.1 Noise catchment areas

The receivers immediately surrounding the Wyong RDC are industrial in nature and is zoned IN1 General Industrial. Two residential properties are located to the north on Sparks Road, with the remaining nearby residential receivers located in Jilliby to the west located within a land zoning of either R5 (large lot residential) or C2 (environmental conservation). The M1 Motorway is situated between Jilliby residences and the Wyong RDC.

The acoustic environment in residential areas is typically influenced by local environmental noise (i.e. fauna and rustling leaves) and traffic noise from the M1 Motorway and, to a lesser degree, Sparks Road. The Wyong RDC and other industries within the estate were not audible at nearby residential receivers during site visits.

To facilitate the assessment of noise impacts from the Proposal, noise sensitive receiver areas around the project have been divided into Noise Catchment Areas (NCAs). As the existing acoustic environment varies at the nearby residential receivers, the residential receivers have been grouped into Noise Catchment Areas (NCAs) based upon areas with similar acoustic environments. Industrial receivers surrounding the Wyong RDC are considered separately, as noise targets for this receiver type do not depend on the existing ambient noise environment.

The NCAs identified for the proposal are described in Table 2.1 and shown on Figure 2.2.

Table 2.1: Noise Catchment Areas

NCA	NCA location description	Approximate minimum distance to nearest residential receiver, m
NCA01	Residences in Halloran nearby to Sparks Road	580
NCA02	Residences in Jilliby adjacent to M1 Motorway	600
NCA03	Residences in Jilliby set back from M1 Motorway	780

2.2 Nearby noise sensitive receivers

Noise levels have been modelled to potentially impacted residential receivers within approximately 1 km of the Proposal. Assessment of industrial receivers has been limited to representative receivers adjacent to the Wyong RDC.

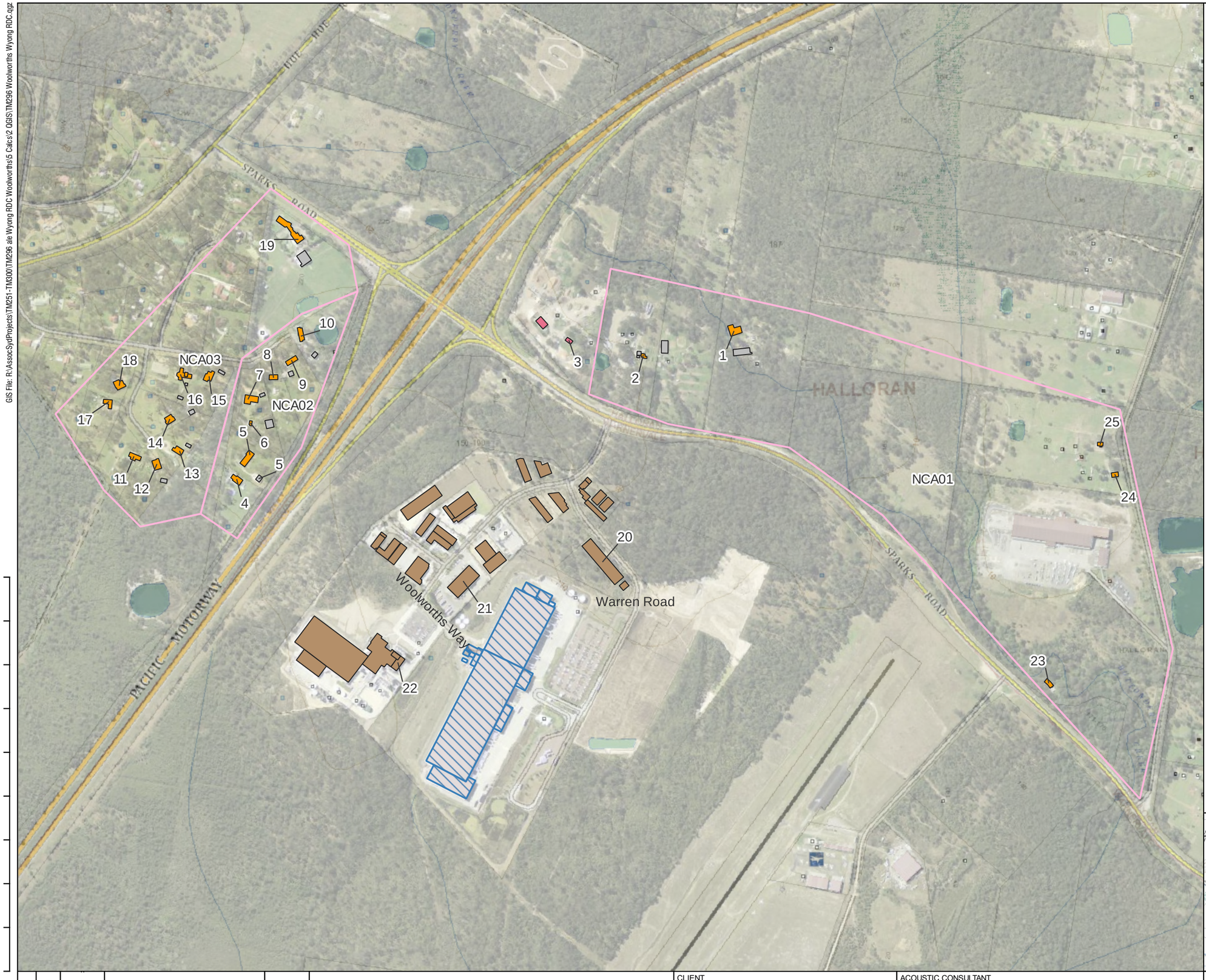
The receivers considered in the construction and operational noise assessments are listed in Table 2.2.

Table 2.2: Noise assessment receivers

NCA	ID	Address	Receiver type
NCA01	R1	187 Sparks Road, Halloran	Residential
NCA01	R2	211 Sparks Road, Halloran	Residential
-	R3	221 Sparks Road, Halloran	Commercial
NCA02	R4	13 Buttonderry Way, Jilliby	Residential
NCA02	R5	15 Buttonderry Way, Jilliby	Residential
NCA02	R6	17 Buttonderry Way, Jilliby	Residential
NCA02	R7	17 Buttonderry Way, Jilliby	Residential
NCA02	R8	19 Buttonderry Way, Jilliby	Residential
NCA02	R9	21 Buttonderry Way, Jilliby	Residential
NCA02	R10	23 Buttonderry Way, Jilliby	Residential
NCA03	R11	5 The Downs, Jilliby	Residential
NCA03	R12	7 The Downs, Jilliby	Residential
NCA03	R13	6 The Downs, Jilliby	Residential
NCA03	R14	4 The Downs, Jilliby	Residential
NCA03	R15	11 Buttonderry Way, Jilliby	Residential
NCA03	R16	9 Buttonderry Way, Jilliby	Residential
NCA03	R17	3 The Downs, Jilliby	Residential
NCA03	R18	1 The Downs, Jilliby	Residential
NCA03	R19	220 Sparks Road, Jilliby	Residential
-	R20	5 Warren Road, Warnervale	Industrial
-	R21	12 Burnet Road, Warnervale	Industrial
-	R22	18 Burnet Road, Warnervale	Industrial
NCA01	R23	171 Sparks Road, Halloran	Residential
NCA01	R24	80 Mountain Road, Halloran	Residential
NCA01	R25	80 Mountain Road, Halloran	Residential

Plot Date: 18/03/22 - 11:40 Layout: Figure 2.1 Receiver locations

GIS File: R:\AssocSydProjects\TM251-TM300\TM296 ale Wyong RDC Woolworths\5 Calcs\2 QGIS\TM296 Woolworths Wyong RDC.qgz



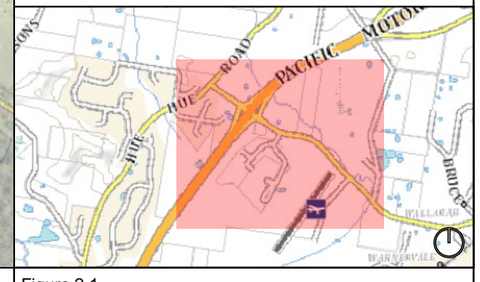
0 100 200 300 400 500 600 700 800 900 m

LEGEND

- Site buildings
- Noise Catchment Area

Receiver buildings

- Residential
- Commercial
- Industrial
- Non-residential



REV	BY	DATE	DESCRIPTION	APPROVED
..	..	..	..	..
..	..	..	..	..
..	..	..	..	..
..	..	..	..	..
..	..	..	..	..
r1	AMo	18/03/22	Update figure	ALe
r0	AMo	22/02/22	Prepare figure	ALe

0 140 280 420 560 m

1:8,500

FULL SIZE A3

A3 Original

Co-ordinate System: GDA94 / MGA zone 56

NOTE: Do not scale from this drawing.

CLIENT

Woolworths Group

ACOUSTIC CONSULTANT

RENZO TONIN & ASSOCIATES

inspired to achieve

Ph (02) 8218 0500 Fax (02) 8218 0501

Figure 2.1
Existing site layout and noise sensitive receivers

2.3 Existing ambient noise conditions

Criteria for the assessment of operational and construction noise are usually derived from the existing noise environment of an area, excluding noise from the subject development.

Fact Sheet B of the NSW EPA Noise Policy for Industry (NPfI) outlines two methods for determining the background noise level of an area, being 'B1 – Long-term background noise method' and 'B2 – Short-term background noise method'. This assessment has used a combination of long-term and short-term noise monitoring.

As the noise environment of an area almost always varies over time, background and ambient noise levels need to be determined for the operational times of the proposed development. For example, in a suburban or urban area the noise environment is typically at its minimum at 3:00am in the morning and at its maximum during the morning and afternoon traffic peak hours. The NPfI outlines the following standard time periods over which the background and ambient noise levels are to be determined:

- Day: 7:00am to 6:00pm Monday to Saturday and 8:00 to 6:00pm Sundays & Public Holidays
- Evening: 6:00pm to 10:00pm Monday to Sunday & Public Holidays
- Night: 10:00pm to 7:00am Monday to Saturday and 10:00pm to 8:00am Sundays & Public Holidays

2.3.1 Ambient noise surveys and monitoring locations

Noise measurements have been carried out at both the nearest and potentially most affected locations surrounding the Proposal. This has included residential receiver locations located further back from the M1 Motorway, as the most-affected receiver may be in a location where the M1 Motorway has a lower contribution to background noise levels.

The long-term and short-term measurement were undertaken, and the locations are outlined in Table 2.3 and shown in Figure 2.2. Monitoring results are presented in Table 2.4 (unattended) and Table 2.5 (attended).

Table 2.3: Unattended and attended noise monitoring locations

ID	Monitoring location	Monitoring purpose, and noise measurement description
Long-term noise monitoring		
L1	187 Sparks Road, Halloran	Representative of NCA01. Front yard of property approximately 70m along driveway from entry. Background noise in absence of Sparks Road traffic consists of distant road traffic (including M1 Motorway), day and night. Ambient and instantaneous noise generally controlled by Sparks Road traffic and birds from all directions.

ID	Monitoring location	Monitoring purpose, and noise measurement description
L2	13 Buttonderry Way, Jilliby	Representative of NCA02. Backyard of property approximately 14m south of the house. M1 Motorway traffic noise dominant and controlling ambient and background noise levels, day and night. Instantaneous events include trucks accelerating along M1 and infrequent light aircraft.
L3	4 The Downs, Jilliby	Representative of NCA03. Front yard of property, on southeast boundary approximately 20m from driveway entry. M1 Motorway traffic noise controlling background, day and night. Road traffic generally audible from northeast. Ambient noise is a combination of M1 road traffic and birds with occasional insects. Instantaneous events include birds to the north and east, and insects to the southeast.
Short-term noise monitoring		
M1	187 Sparks Road, Halloran	Verification of noise environment at unattended monitoring. At noise logger L1. Secondary location (M1a) at driveway entry due to access limitations at time of measurement.
M2	13 Buttonderry Way, Jilliby	Verification of noise environment at unattended monitoring. At noise logger L2. Secondary location (M2a) at driveway entry due to access limitations at time of measurement.
M3	4 The Downs, Jilliby	Verification of noise environment at unattended monitoring. At noise logger L3. Secondary location (M3a) at driveway entry due to access limitations at time of measurement.
M4	Woolworths Way, Warnervale	Validation location for noise model. Woolworths Way driveway to Wyong RDC. Location selected to obtain measurement of western plantdeck rooftop mechanical plant at Wyong RDC. No significant extraneous noise sources detected at time of measurement.
M5	Wyong RDC	Validation location for noise model. Wyong RDC car park facing temperature controlled (TC)/produce warehouse and docks. Location selected to obtain validation measurement of key stationary noise sources on site. Noise dominated by compressors on refrigerated trailers. Trucks moving on site sometimes audible.
M6	Wyong RDC	Short-term unattended monitoring during the morning of 25/11/2021. Validation location for noise model. Wyong RDC near entry to site from site access road. Location selected to obtain validation measurement of heavy vehicle movements. Trucks moving in and out of site dominant, with steady site noises (namely refrigerated trailers) audible in absence of passing trucks. Infrequent fauna audible at times.
M7	Inside Wyong RDC	Noise modelling input. Inside Wyong RDC building at returns/liquor section of Ambient warehouse. Location selected to obtain measurement of internal noise during typical usage of returns/liquor area. Forklifts loading trucks in finger docks (trucks switched off) and distant radio audible.

Plot Date: 18/03/22 - 11:41 Layout: Figure 2.2 Measurement locations

GIS File: R:\AssocSydProjects\TM251-TM300\TM296 ale Wyong RDC Woolworths\5 Calcs\2 QGIS\TM296 Woolworths Wyong RDC.qgz

LEGEND

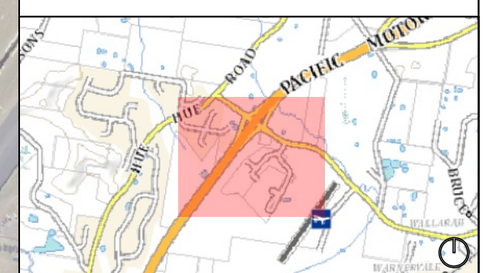
- Site boundar
- Noise Catchment Area

Receiver buildings

- Residential
- Commercial
- Industrial
- Non-residential

Measurement locations

- Long-term noise logger
- Attended measurement
- Indoor attended measurement



0 90 180 270 360 450 540 630 720 810 m

REV	BY	DATE	DESCRIPTION	APPROVED
..	..	..	..	..
..	..	..	..	..
..	..	..	..	..
..	..	..	..	..
..	..	..	..	..
r1	AMo	18/03/22	Update figure	ALe
r0	AMo	22/02/22	Prepare figure	ALe

A3 Original | Co-ordinate System: GDA94 / MGA zone 56

0 100 200 300 400 m

1:6,000

FULL SIZE A3

NOTE: Do not scale from this drawing.

CLIENT

Woolworths Group

ACOUSTIC CONSULTANT

RENZO TONIN & ASSOCIATES
inspired to achieve
Ph (02) 8218 0500 Fax (02) 8218 0501

Figure 2.2
Existing site layout and noise monitoring locations

2.3.2 Long-term noise surveys and monitoring results

Long-term noise monitoring was carried out at residential premises within the study area from 24 November to 16 December 2021. During the setup of the noise monitors it was confirmed that the locations were not potentially affected by any localised noise sources such as pool pumps or air conditioners.

The long-term noise monitoring methodology is detailed in APPENDIX B, and noise level vs time graphs of the data are included in APPENDIX C.

Table 2.4 presents the Rating Background Levels (RBL) and representative ambient L_{eq} noise levels for each assessment period, determined in accordance with the NPfI.

Table 2.4: Long-term measured existing background and ambient noise levels, dB(A)

Monitoring location	Rating Background Level (RBL), $L_{A90,\ 15\ minute}$ dB(A)			Ambient noise levels, $L_{Aeq,\ 15\ minute}$ dB(A)		
	Day[1]	Evening[2]	Night[3]	Day[1]	Evening[2]	Night[3]
L1	51	47	43	61	56	54
L2	52	51	44	68	67	56
L3	43	43[5]	39	58	58	50

Notes:

1. Day: 7:00am-6:00pm Monday to Saturday and 8:00-6:00pm Sundays & Public Holidays
2. Evening: 6:00pm-10:00pm Monday to Sunday & Public Holidays
3. Night: 10:00pm-7:00a, Monday to Saturday and 10:00pm-8:00am Sundays & Public Holidays
4. As required by the NPfI, the external ambient noise levels presented are free-field noise levels.
5. The Day RBL was adopted as it is lower than the measured Evening RBL.

2.3.3 Short-term noise surveys and monitoring results

Short-term attended noise measurements were undertaken alongside the long-term noise monitoring. This was undertaken to assist in identifying the contributing noise sources around each noise logging location. In addition, short-term attended and unattended measurements were also carried out on the Wyong RDC site to assist with noise model preparation and validation.

The equipment used for noise measurements was an NTi Audio Type XL2 precision sound level analyser which is a class 1 instrument having accuracy suitable for field and laboratory use. The instrument was calibrated prior to and after measurements using a Bruel & Kjaer Type 4231 calibrator. No significant drift in calibration was observed. All instrumentation complies with IEC 61672 (parts 1-3) '*Electroacoustics - Sound Level Meters*' and IEC 60942 '*Electroacoustics - Sound calibrators*' and carries current NATA certification (or if less than 2 years old, manufacturers certification).

A summary of the short-term measurement results is presented in Table 2.5. The Wyong RDC was inaudible during measurements at the long-term noise monitoring locations during all periods.

Table 2.5: Short-term noise monitoring results

Location	Date and time	Measured noise level, dB(A)			Comments
		L_{Amax}	$L_{Aeq,T}$	L_{A90}	
M1 187 Sparks Road, Halloran	16/12/2021 1:58pm-2:13pm	67	56	53	At logger. Ambient and instantaneous noise generally controlled by Sparks Road traffic and birds from all directions. Birds approx. 52 dB(A) at times and audible throughout measurement, up to 55 dB(A) from north on occasion. Background noise generally from distant road traffic from M1 Motorway and Sparks Rd. Wyong RDC inaudible.
M1a 187 Sparks Road, Halloran	25/11/2021 5:50am-6:05am	84	73	62	At driveway entry. Sparks Road dominant and controlling ambient noise levels. Distant Sparks Road traffic controlling background. Trucks entering and leaving Burnet Road generally indistinguishable from distant road traffic. Trucks on M1 barely audible in absence of all Sparks Rd traffic. Wyong RDC inaudible.
M2 13 Buttonderry Way, Jilliby	24/11/2021 3:15pm-3:30pm	70	57	54	At logger. M1 Motorway road traffic dominant, continuous and controlling background and ambient noise. Dogs barking occasionally, up to 60 dB(A) instantaneous. Other instantaneous events include trucks passing on M1 and occasional light aircraft. Wyong RDC inaudible.
M2a 13 Buttonderry Way, Jilliby	25/11/2021 5:20am-5:35am	63	54	52	At driveway entry. M1 Motorway road traffic dominant, continuous and controlling background and ambient noise. Birds up to 58-61 dB(A) from all directions. Insects occasionally audible from north, approx. 45-48 dB(A). Trucks at speed on M1 just distinguishable from east and south east. Wyong RDC inaudible.
M3 4 The Downs, Jilliby	24/11/2021 4:31pm-4:46pm	63	49	47	At logger. M1 Motorway traffic controls background noise level and contributes to ambient noise. Birds contribute to ambient and control instantaneous noise. Birds generally east (up to 57 dBA) and north [approx. 40-43 dB(A)]. Wyong RDC inaudible.
M3a 4 The Downs, Jilliby	25/11/2021 4:56am-5:11am	61	47	44	At driveway entry. M1 controlling background noise, audible mainly from south/southeast. Frogs audible from west, approx. 38-40 dB(A). Infrequent birds chirping [approx. 44-46 dB(A)]. Wyong RDC inaudible.
M4 Woolworths Way	25/11/2021 6:15am-6:19am	67	54	51	At Woolworths Way entrance to Wyong RDC. Rooftop plant dominant and steady. Distant traffic from M1 only barely audible. Minor contribution to ambient and instantaneous noise from birds.
M5 Wyong RDC	25/11/2021 4:40am-4:43am	72	70	69	Wyong RDC car park facing TC warehouse. Ambient and background controlled by refrigerated trailers. Birds briefly audible with minor contribution to ambient and instantaneous noise.
M6 Wyong RDC	10/12/2021 6:00am-6:15am	83	67	59	Near entry to site from service road. Ambient noise controlled by truck movements in and out of Wyong RDC. Background noise controlled by steady noise sources on site. Infrequent fauna audible at times. 59 dB(A) between 6:10am-6:12am when no trucks nearby and steady site noise audible.
M7 Inside Wyong RDC	25/11/2021 9:11am-9:18am	81	66	59	Approximately 4m from side door for pallet removal and 26m from finger dock number 11. Radio and forklift movements control ambient noise level inside. Birds outside briefly audible as an instantaneous event, approx. 66-68 dB(A).

3 Construction noise and vibration objectives

3.1 Construction noise objectives

3.1.1 Noise management levels (NMLs)

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.
- 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 described for the 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 duration of less than three weeks and focuses on minimising noise disturbance through the implementation of reasonable and feasible work practices, and community notification. Given the scale and duration of the construction works proposed, a quantitative assessment is carried out herein, consistent with the ICNG requirements.

Table 3.1 reproduced from the ICNG, sets out the airborne noise management levels and how they are to be applied for residential receivers.

Table 3.1: Noise management levels at residential receivers

Time of day	Management level $L_{Aeq\ (15\ min)}$ *	How to apply
Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq,\ 15\ min}$ 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.

Time of day	Management level $L_{Aeq\ (15\ min)}$ *	How to apply
	Highly noise affected 75 dB(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: 1. times identified by the community when they are less sensitive to noise (such as before/ after school for works near schools, or mid-morning or mid-afternoon for works near residences 2. 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 + 5 dB	• 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 *ICNG* section 7.2.2.

* Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 metres above ground level. If the property boundary is more than 30 metres from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 metres of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Table 3.2 sets out the ICNG noise management levels for other noise sensitive receiver locations.

Table 3.2: Noise management levels at other noise sensitive land uses

Land use	Time of day	Where objective applies	Management level $L_{Aeq\ (15\ min)}$
Classrooms at schools and other educational institutions	When in use	Indoor noise level Outdoor noise level[1]	45 dB(A) 55 dB(A)
Hospital wards and operating theatres	When in use	Indoor noise level Outdoor noise level[1]	45 dB(A) 55 dB(A)
Places of worship	When in use	Indoor noise level Outdoor noise level[1]	45 dB(A) 55 dB(A)
Active recreation areas	When in use	Outdoor noise level	65 dB(A)
Passive recreation areas	When in use	Outdoor noise level	60 dB(A)
Commercial premises	When in use	Outdoor noise level	70 dB(A)
Industrial premises	When in use	Outdoor noise level	75 dB(A)

Notes: 1. Outdoor noise level based on internal noise level in ICNG and assumes 10 dB loss through an open window

3.1.2 Works outside standard hours

The ICNG identifies five categories of works that may be undertaken outside standard construction hours (OOH):

- The **delivery of oversized plant or structures** that police or other authorities determine require special arrangements to transport along public roads

- **Emergency work** to avoid the loss of life or damage to property, or to prevent environmental harm
- **Maintenance and repair of public infrastructure** where disruption to essential services and/or considerations of worker safety do not allow work within standard hours
- **Public infrastructure works** that shorten the length of the project and are supported by the affected community
- Works where a proponent demonstrates and justifies a **need to operate outside the recommended standard hours**.

Some of these categories may apply to the Proposal at different stages of the works, noting this project is not related to public infrastructure. For the last category, proponents are required to provide clear justification for working outside standard hours for reasons other than convenience.

3.1.3 Summary of construction noise management levels

Table 3.3 presents the construction noise management levels established for the nearby assessment receivers, including the nearby residential receivers which is based upon the noise monitoring outlined in Section 2.3.2.

Table 3.3: Construction noise management levels

Reference noise monitor	Receiver type (and location)	Noise management level $L_{Aeq(15min)}$			
		Standard Hours	Outside Standard Hours		
		Day	Day (OOH)	Evening	Night
L1	Residential[1] - NCA01 (Sparks Road)	61	56	52	48
L2	Residential[1] - NCA02 (adjacent M1 Motorway)	62	57	56	49
L3	Residential[1] - NCA03 (set back from M1 Motorway)	53	48	48	44
-	Commercial[2,3]	70	70	70	70
-	Industrial[2,3]	75	75	75	75

Notes: Day (standard hours) – 7am to 6pm weekdays, 8am to 1pm Saturday

Day (out of hours, OOH) – 1pm to 6pm Saturday, 8am to 6pm Sunday/public holidays

Evening – 6pm to 10pm

Night – all other times

1. Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5m above ground level. If the property boundary is more than 30m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30m of the residence.
2. Noise management levels apply when receiver areas are in use only.
3. Noise management levels should be assessed at the most-affected occupied point of the premises.

3.2 Construction vibration objectives

Construction vibration is associated with three main types of impact:

- disturbance to building occupants
- potential damage to buildings, and
- potential damage to sensitive equipment in a building.

Generally, if disturbance to building occupants is controlled, there is limited potential for structural damage to buildings.

Vibration amplitude may be measured as displacement, velocity, or acceleration.

- Displacement (x) measurement is the distance or amplitude displaced from a resting position. The International System of Units (SI unit) for distance is the metre (m), although common industrial standards include mm.
- Velocity ($v=\Delta x/\Delta t$) is the rate of change of displacement with respect to change in time. The SI unit for velocity is metres per second (m/s), although common industrial standards include mm/s. The Peak Particle Velocity (PPV) is the greatest instantaneous particle velocity during a given time interval. If measurements are made in 3-axis (x, y, and z) then the resultant PPV is the vector sum (i.e. the square root of the summed squares of the maximum velocities) regardless of when in the time history those occur.
- Acceleration ($a=\Delta v/\Delta t$) is the rate of change of velocity with respect to change in time. The SI unit for acceleration is metres per second squared (m/s^2). Construction vibration goals are summarised below.

Construction vibration goals are summarised below.

3.2.1 Disturbance to buildings occupants

The acceptable vibration values to assess the potential for human annoyance from vibration are set out in the NSW '*Environmental Noise Management Assessing Vibration: A Technical Guideline*' (AVTG).

To assess the potential for vibration impact on human comfort, an initial screening test will be done based on peak velocity units, as this metric is also used for the cosmetic damage vibration assessment. The screening test is based on the continuous vibration velocity (i.e. vibration that continues uninterrupted for a defined period). If the predicted vibration exceeds the initial screening test, the total estimated Vibration Dose Value (i.e. eVDV) will be determined based on the level and duration of the vibration event causing exceedance.

The initial screening test values and VDVs recommended in BS 6472-1992 for which various levels of adverse comment from occupants may be expected, are presented in Table 3.4. The 'Low probability of adverse comment eVDV' represent the preferred and maximum value presented in the AVTG.

Table 3.4: Vibration management levels for disturbance to building occupants

Place and Time	Initial screening test Velocity, PEAK, mm/s (>8Hz)	Low probability of adverse comment eVDV $m/s^{1.75}$	Adverse comment possible eVDV $m/s^{1.75}$	Adverse comment probable eVDV $m/s^{1.75}$
Critical areas (day or night)[1]	0.28	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8
Residential buildings 16 hr day[2]	0.56	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8 hr night[2]	0.40	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8
Offices, schools, educational institutions and places of worship (day or night)	1.10	0.4 to 0.8	0.8 to 1.6	1.6 to 2.4
Workshops (day or night)	2.20	0.8 to 1.6	1.6 to 3.2	3.2 to 6.4

1. Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. There may be cases where sensitive equipment or delicate tasks require more stringent criteria than the human comfort criteria specify above
2. Daytime is 7:00am to 10:00pm and night-time is 10:00pm to 7:00am

3.2.2 Building damage

Potential structural damage of buildings as a result of vibration is typically managed by ensuring vibration induced into the structure does not exceed certain limits and standards, such as British Standard 7385 Part 2 and German Standard DIN4150-3. Currently there is no existing Australian Standard for assessment of structural building damage caused by vibration energy.

It is noted that vibration levels required to cause minor cosmetic damage are typically 10 times higher than levels that will cause disturbance to building occupants. Many building occupants assume that building damage is occurring when they feel vibration or observe rattling of loose objects, however the level of vibration at which people perceive vibration or at which loose objects may rattle is far lower than vibration levels that can cause damage to structures.

Within British Standard 7385 Part 1, different levels of structural damage are defined:

- *Cosmetic - The formation of hairline cracks on drywall surfaces, or the growth of existing cracks in plaster or drywall surfaces; in addition the formation of hairline cracks in mortar joints of brick/concrete block construction.*
- *Minor - The formation of large cracks or loosening of plaster or drywall surfaces, or cracks through bricks/concrete blocks.*
- *Major - Damage to structural elements of the building, cracks in supporting columns, loosening of joints, splaying of masonry cracks, etc.*

The vibration limits in Table 1 of British Standard 7385 Part 2 are for the protection against cosmetic damage, however guidance on limits for minor and major damage is provided in Section 7.4.2 of the Standard:

7.4.2 Guide values for transient vibration relating to cosmetic damage

Limits for transient vibration, above which cosmetic damage could occur are given numerically in Table 1 and graphically in Figure 1. In the lower frequency region where strains associated with a given vibration velocity magnitude are higher, the guide values for the building types corresponding to line 2 are reduced. Below a frequency of 4 Hz, where a high displacement is associated with a relatively low peak component particle velocity value a maximum displacement of 0.6 mm (zero to peak) should be used.

Minor damage is possible at vibration magnitudes which are greater than twice those given in Table 1, and major damage to a building structure may occur at values greater than four times the tabulated values.

Within DIN4150-3, damage is defined as "*any permanent consequence of an action that reduces the serviceability of a structure or one of its components*" (p.4). The Standard also outlines:

"For buildings as in lines 2 and 3 of Tables 1, 4 or B.1, the serviceability is considered to have been reduced if, for example

- *cracks form in plastered or rendered surfaces of walls;*
- *existing cracks in a structure are enlarged;*
- *partitions become detached from load-bearing walls or floor slabs.*

These effects are deemed 'minor damage. " (DIN4150.3:2016, p.6)

While the DIN Standard defines the above damage as 'minor', based on the definitions provided in BS7385, the DIN standard is considered to deal with cosmetic issues rather than major structural failures.

3.2.2.1 British Standard

British Standard 7385: Part 2 '*Evaluation and measurement of vibration in buildings*', can be used as a guide to assess the likelihood of building damage from ground vibration. BS7385 suggests levels at which 'cosmetic', 'minor' and 'major' categories of damage might occur.

The cosmetic damage levels set by BS 7385 are considered 'safe limits' up to which no damage due to vibration effects has been observed for certain particular building types. Damage comprises minor non-structural effects such as hairline cracks on drywall surfaces, hairline cracks in mortar joints and cement render, enlargement of existing cracks and separation of partitions or intermediate walls from load bearing walls. 'Minor' damage is considered possible at vibration magnitudes which are twice those given and 'major' damage to a building structure may occur at levels greater than four times those values.

BS7385 is based on peak particle velocity and specifies damage criteria for frequencies within the range 4Hz to 250Hz, being the range usually encountered in buildings. At frequencies below 4Hz, a maximum displacement value is recommended. The values set in the Standard relate to transient vibrations and to low-rise buildings. Continuous vibration can give rise to dynamic magnifications due to resonances and

may need to be reduced by up to 50%. Table 3.5 sets out the BS7385 criteria for cosmetic, minor and major damage.

Regarding heritage buildings, British Standard 7385 Part 2 (1993) notes that "*a building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive*" (p.5).

Table 3.5: BS 7385 structural damage criteria

Group	Type of structure	Damage level	Peak component particle velocity, mm/s		
			4Hz to 15Hz	15Hz to 40Hz	40Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	Cosmetic	50		
		Minor*	100		
		Major*	200		
2	Un-reinforced or light framed structures Residential or light commercial type buildings	Cosmetic	15 to 20	20 to 50	50
		Minor*	30 to 40	40 to 100	100
		Major*	60 to 80	80 to 200	200

Notes: Peak Component Particle Velocity is the maximum Peak particle velocity in any one direction (x, y, z) as measured by a tri-axial vibration transducer.

* Minor and major damage criteria established based on British Standard 7385 Part 2 (1993) Section 7.4.2

3.2.2.2 German Standard

German Standard DIN 4150 - Part 3 (2016) '*Vibration in buildings - Effects on Structures*' (DIN 4150-3:2016), also provides recommended maximum levels of vibration that reduce the likelihood of building damage caused by vibration and are generally recognised to be conservative.

DIN 4150-3:2016 presents the recommended maximum limits over a range of frequencies (Hz), measured at the foundations, in the plane of the uppermost floor of a building or structure or vertically on floor slabs. The vibration limits at the foundations increase as the frequency content of the vibration increases. The criteria are presented in Table 3.6.

Table 3.6: DIN 4150-3:2016 structural damage criteria

Group	Type of structure	Vibration velocity, mm/s				
		At foundation in all directions at frequency of			Plane of floor uppermost storey in horizontal direction	Floor slabs, vertical direction
		1Hz to 10Hz	10Hz to 50Hz	50Hz to 100Hz	All frequencies	All frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40	20
2	Residential buildings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20	15	20

Group	Type of structure	Vibration velocity, mm/s				
		At foundation in all directions at frequency of			Plane of floor uppermost storey in horizontal direction	Floor slabs, vertical direction
		1Hz to 10Hz	10Hz to 50Hz	50Hz to 100Hz	All frequencies	All frequencies
3	Structures that because of their particular sensitivity to vibration, cannot be classified under Groups 1 and 2 and are of great intrinsic value (eg listed buildings)	3	3 to 8	8 to 10	8	20

3.2.3 Damage to vibration sensitive equipment

Some high technology manufacturing facilities, hospitals and laboratories utilise equipment that is highly sensitive and susceptible to vibration, for example scanning electron microscopes and micro-electronic manufacturing facilities. In addition, buildings housing sensitive computer or telecommunications equipment may require assessment against stricter criteria than those nominated for building damage.

There is no explicit guidance on acceptable vibration levels for such equipment, so recommended vibration levels should be obtained from instrument manufacturers. In the absence of equipment specific data provided by manufacturers, there are generic vibration criteria that can be used to assess the impact of vibration generating activities on buildings housing vibration sensitive equipment. For example, the Vibration Criteria (VC) curves are often referred to as they are generic and apply to all tools/ equipment types within each category. The VC curves are defined over the frequency range 8 to 100 Hz.

Table 3.7 below summarises a range of suitable and conservatively stringent vibration limits that are applicable to buildings housing vibration sensitive equipment which may potentially be affected by construction vibration.

Table 3.7: Acceptable vibration limits for vibration measured on building structure housing sensitive equipment

Equipment Requirements	Vibration Limit[1] mm/s,		Description of Use[3]
	RMS[4]	Peak [5]	
Computer Areas[2]	0.7	1.0	Barely perceptible vibration. Adequate for computer equipment accommodation environments.
Medical[2, 3]	0.1	0.14	Vibration not perceptible. Suitable in most instances for microscopes to 100X and for other equipment of low sensitivity.
VC-A[3]	0.05	0.07	Vibration not perceptible. Adequate in most instances for optical microscopes to 400X, microbalances, optical balances, proximity and projection aligners, etc

Notes: 1. As measured in one-third octave bands of frequency over the frequency range 8 to 100 Hz. Vibration measured on the building structure near vibrating equipment or in areas containing sensitive equipment.

2. Based on AS 2834 Computer Accommodation

3. Gordon CG Generic Vibration Criteria for Vibration Sensitive Equipment

4. Root Mean Square value representing the average value of a signal

5. In the absence of Peak limits, RMS limits are converted to Peak by conservatively assuming the vibration signal is sinusoidal and random with a nominal crest factor of 1.414

3.2.4 Damage to buried services

Section 5.3 of DIN 4150-3:2016 also sets out guideline values for vibration velocity to be used when evaluating the effects of vibration on buried pipework. These values, which apply at the wall of the pipe, are reproduced and presented in Table 3.8 below.

Table 3.8: DIN 4150-3:1999 Guideline values for vibration velocity to be used when evaluating the effects of short-term vibration on buried pipework

Line	Pipe Material	Guideline values for vibration velocity measured on the pipe, mm/s
1	Steel (including welded pipes)	100
2	Vitrified clay, concrete, reinforced concrete, prestressed concrete, metal (with or without flange)	80
3	Masonry, plastics	50

For long-term vibration the guideline levels presented in Table 3.8 should be halved.

Recommended vibration goals for electrical cables and telecommunication services such as fibre optic cables range from between 50 mm/s and 100 mm/s. It is noted however that although the cables may sustain these vibration levels, the services they are connected to, such as transformers and switch blocks, may not. It is recommended that should such equipment be encountered during the construction process an individual vibration assessment should be carried out. This may include a specific vibration impact statement addressing impact on the utility and consultation with the utility provider to confirm specific vibration requirements.

4 Operational noise objectives

4.1 Industrial noise

This assessment aims to quantify the potential operational noise emissions from the Proposal in accordance with the NSW 'Noise Policy for Industry' (NPfI), 2017. The assessment procedure has two components:

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

In accordance with the NPfI, noise impact should be assessed against the project noise trigger level which is the lower value of the project intrusiveness noise levels and project amenity noise levels.

4.1.1 Application of the NPfI to existing sites

Section 6 of the NPfI provides principles and guidance on the application of the policy to established industrial sites. It notes that a review of noise limits and requirement for noise reduction programs may be necessary if a proposal to upgrade or expand the site is submitted, or the subject of noise complaints.

Fabcot has advised that the site has not received any noise complaints since the commencement of operations in 2003. Residents contacted during noise logger deployment noted that the Wyong RDC is inaudible, and they do not notice its operation. This is consistent with site observations by RT&A engineers where the site was inaudible during noise logger deployment and early morning attended noise measurements at residences.

As such, no further consideration of existing noise impacts on receivers is required to establish project noise trigger levels in accordance with the NPfI.

4.1.2 Project intrusive noise levels

According to the NPfI, 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 $L_{Aeq,15min}$ descriptor) does not exceed the background noise level measured in the absence of the source by more than 5 dB(A). The project intrusiveness noise level, which is only applicable to residential receivers, is determined as follows:

$L_{Aeq,15minute}$ Intrusiveness noise level = Rating Background Level ('RBL') plus 5 dB(A)

For the purposes of assessing operational noise impacts, background noise levels have been established at nearby receiver locations that may be the potentially most affected. This has involved adopting background levels for both the closest residential receivers, but also for residential receivers located

further back in the residential areas. The intrusiveness noise levels for residential receivers are summarised in Table 4.1.

Table 4.1: Project intrusiveness noise levels

Receiver	Intrusiveness noise level, $L_{Aeq,15min}$		
	Day[1]	Evening[2]	Night[3]
NCA01 (Sparks Road)	56	52	48
NCA02 (adjacent M1 Motorway)	57	56	49
NCA03 (set back from M1 Motorway)	48	48[4]	44

Notes:
1. Day: 7:00am to 6:00pm Monday to Saturday and 8:00am to 6:00pm Sundays & Public Holidays
2. Evening: 6:00pm to 10:00pm Monday to Sunday & Public Holidays
3. Night: 10:00pm to 7:00am Monday to Saturday and 10:00pm to 8:00am Sundays & Public Holidays
4. As per Section 2.3 of the NPfI, the project intrusiveness noise level for the evening is set no greater than the project intrusiveness noise level for the daytime.

4.1.3 Project amenity noise levels

The project amenity noise levels for different time periods of day are determined in accordance with Section 2.4 of the NPfI. The NPfI recommends amenity noise levels ($L_{Aeq,period}$) for various receivers including residential, commercial, industrial receivers and sensitive receivers such as schools, hotels, hospitals, churches and parks. These "recommended amenity noise levels" represent the objective for total industrial noise experienced at a receiver location. However, when assessing a single industrial development and its impact on an area then "project amenity noise levels" apply.

The recommended project amenity noise levels applicable for the subject receiver areas are reproduced from the NPfI in Table 4.2 below.

Table 4.2: Project amenity noise levels

Type of receiver	Noise amenity area	Time of day	Recommended amenity noise level, $L_{Aeq,}$ dB(A)
Residential	Rural	Day	50
		Evening	45
		Night	40
	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks	See column 4	See column 4	5 dB(A) above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day
School classroom (internal)	All	Noisiest 1-hour period when in use	35[5]

Type of receiver	Noise amenity area	Time of day	Recommended amenity noise level, L_{Aeq}, dB(A)
Hospital ward	All		
- Internal		Noisiest 1-hour	35
- External		Noisiest 1-hour	50
Place of worship (internal)	All	When in use	40
Passive recreation (e.g. national park)	All	When in use	50
Active recreation (e.g. school playground, golf course)	All	When in use	55
Commercial premises	All	When in use	65
Industrial premises	All	When in use	70
Industrial interface (applicable only to residential noise amenity areas)	All	When in use	Add 5 dB(A) to recommended noise amenity area

Notes:
1. Daytime 7:00am to 6:00pm; Evening 6:00pm to 10:00pm; Night-time 10:00pm to 7:00am.
2. On Sundays and Public Holidays, Daytime 8:00am - 6:00pm; Evening 6:00pm - 10:00pm; Night-time 10:00pm - 8:00am.
3. The L_{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.
4. The recommended amenity noise levels refer only to noise from industrial sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The levels represent outdoor levels except where otherwise stated.
5. In the case where existing schools are affected by noise from existing industrial noise sources, the acceptable LAeq noise level may be increased to 40 dB LAeq(1hr)

To ensure that the total industrial noise level (existing plus new) remain within the recommended amenity noise levels for an area, the project amenity noise level that applies for each new industrial noise source is determined as follows:

$$\mathbf{L_{Aeq,period}\ Project\ amenity\ noise\ level = L_{Aeq,period}\ Recommended\ amenity\ noise\ level - 5\ dB(A)}$$

Furthermore, given that the intrusiveness noise level is based on a 15 minute assessment period and the project amenity noise level is based on day, evening and night assessment periods, the NPfI provides the following guidance on adjusting the $L_{Aeq,period}$ level to a representative $L_{Aeq,15minute}$ level in order to standardise the time periods.

$$\mathbf{L_{Aeq,15minute} = L_{Aeq,period} + 3dB(A)}$$

4.1.3.1 Residential amenity category

Table 2.3 "*Determining which of the residential receiver categories applies*" of the NPfI provides guidance on assigning residential receiver noise categories. It presents three methods for determining which of the residential receiver noise categories apply. The three methods presented are:

- typical planning zoning (column 2 of NPfI Table 2.3);
- typical existing background noise levels (column 3 of NPfI Table 2.3); and
- description of the acoustical environment (column 4 of NPfI Table 2.3).

Given that the NPfI is unclear about which of these three methods is preferred compared to the other methods, the NSW EPA (Noise) was consulted on 7 June 2021 for clarification. The advice given was that

the use of typical planning zoning (column 2 of NPfI Table 2.3) is the starting point in the process for determining which receiver noise category applies, and a further review of the noise environment can be undertaken looking at background noise levels (column 3 of NPfI Table 2.3) and the acoustical environment (column 4 of NPfI Table 2.3), to support and justify a different receiver noise category. Particular reference was made during the consultation, to the note in the description column of NPfI Table 2.3 under Rural residential, which supports the consideration of a higher noise amenity area where background noise levels are higher than those presented in column 3 of NPfI Table 2.3. The advice given in relation to this is that the principle of considering higher noise amenity based on high background noise levels applies to any category (the whole NPfI Table 2.3).

Furthermore, the NSW EPA cited Fact Sheet E: Worked case studies in the NPfI, which refers to the use of existing background noise levels to justify and support the selected receiver noise category. During the consultation, particular reference was made to Case Study E4 where a change of residential amenity category based on the acoustic environment prevailing at the receiver location is illustrated. In this case study, the receiver locations to the east have a zoning of R5 which would attract a rural residential amenity category, however they were classified as suburban residential based on higher traffic noise levels prevailing in the area. This case study is of particular relevance to this current assessment.

Assigning a noise category based on planning zoning alone provides for a conservative assessment without giving any consideration to the existing acoustic environment. Given that the subject receivers are located near to a busy road (M1 Motorway), the existing noise environment was also considered in this assessment. Therefore, all three methods are used in this assessment to determine which receiver noise category best suits the receivers potentially impacted by the proposed development.

Potentially impacted residential receivers are located within a land zoning of R5 (large lot residential) and C2 (environmental conservation). By following column 2 of Table 2.3 in the NPfI, residences zoned as R5 and C2 would be classified as 'rural residential' and 'suburban residential', respectively.

Consistent with Case Study E4 of the NPfI, consideration should also be given to the prevailing background noise levels at the receivers. In all NCAs, the background noise levels are influenced or controlled by traffic noise levels from the M1 Motorway, while NCA01 also receives noise from Sparks Road as determined in the noise surveys presented in Section 2.3.3. Table 4.3 summarises and compares the measured RBLs with the typical background noise levels listed in Table 2.3 of the NPfI.

Table 4.3: Residential project amenity category - existing background noise level review

Evaluation				Rural			Suburban			Urban		
Location	RBL			D	E	N	D	E	N	D	E	N
	D	E	N	<40	<35	<30	<45	<40	<35	>45	>40	>35
NCA01	51	47	43	N	N	N	N	N	N	Y	Y	Y
NCA02	52	51	44	N	N	N	N	N	N	Y	Y	Y
NCA03	43	43	39	N	N	N	Y	N	N	N	Y	Y

Notes: D = Day, E = Evening, N = Night

As shown in Table 4.3, the prevailing background noise levels generally support a classification of 'urban residential'. The day RBL in NCA03 is consistent with the 'suburban residential' category.

However, consideration should also be given to Column 4 of Table 2.3 of the NPfI, which gives descriptions of the acoustical environments for each category. Table 4.4 shows which aspects of the acoustical environment descriptions align with site observations at the noise logging locations.

Table 4.4: Comparison of site observations with NPfI Table 2.3 acoustical environment descriptions

Receiver category	Description given in Column 4 of Table 2.3 of the NPfI	Do the aspects of the acoustic environment match site observations?	Does the receiver category align with site observations?
Rural residential	Rural – an area with an acoustical environment that is dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels. Settlement patterns would be typically sparse. Note: Where background noise levels are higher than those presented in column 3 due to existing industry or intensive agricultural activities, the selection of a higher noise amenity area should be considered.	*Dominated by natural sounds* **No** (natural sounds contribute to ambient noise but do not control it) *Little or no road traffic noise* **No** (M1 Motorway and Sparks Road are key noise sources) *Low background noise levels* **No** (measured RBLs are higher than the typical background levels for 'rural residential' areas) *Settlement patterns are typically sparse* **Yes** (large lot residential)	**No** – apart from the settlement patterns, this description does not align with site observations at the noise logging locations. Consistent with the note, a higher amenity category should be considered due to prevailing background noise levels being higher than the 'rural residential' typical levels.
Suburban residential	Suburban – an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry. This area often has the following characteristic: evening ambient noise levels defined by the natural environment and human activity.	*Local traffic with intermittent traffic flows* **Partial** (M1 Motorway has few pauses in road traffic noise; Sparks Rd has some breaks in traffic) *Some limited commerce or industry* **Yes** (Burnet Rd industrial estate) *Evening ambient noise defined by natural environment and human activity* **Yes** (consistent with site observations and audio review)	**Yes** – there is some limited commerce in the area, evidenced by the Burnet Rd industrial estate where the Project is located. The description of the evening noise environment is most consistent with site observations.
Urban residential	Urban – an area with an acoustical environment that: • is dominated by 'urban hum' or industrial source noise, where urban hum means the aggregate sound of many unidentifiable, mostly traffic and/or industrial related sound sources • has through-traffic with characteristically heavy and continuous traffic flows during peak periods • is near commercial districts or industrial districts • has any combination of the above.	*Is dominated by urban hum* **No** (urban hum was not found to control background levels) *Has heavy traffic flow* **Yes** (M1 Motorway) *Is near commercial/industrial districts* **Yes** (Burnet Rd industrial estate) *Has a combination of the above* **Yes**	**Partial** – this area is not dominated by urban hum, which is a defining characteristic of urban areas. However, there is heavy traffic flow on the nearby M1 Motorway.

With consideration of the land zoning and background noise levels, as well as the acoustic environment descriptions for each receiver category, the 'suburban residential' classification has been adopted in all NCAs. A 'suburban residential' classification is most consistent with site observations, which noted the presence of both human activity and natural sounds. This determination of residential receiver category is consistent with Case Study E4 of the NPfI. A classification of 'rural residential' could not be supported due to the high existing background noise levels (consistent with the note in Table 2.3 of the NPfI). 'Urban residential' is considered inappropriate due to the absence of a dominant 'urban hum', despite the measured RBLs supporting the use of this category.

4.1.3.2 Project amenity noise levels

The project amenity noise levels ($L_{Aeq, 15min}$) applied for the Proposal are reproduced in Table 4.5 below.

Table 4.5: Project amenity noise levels

Type of receiver	Noise amenity area	Time of day[1]	Recommended noise level, dB(A)	
			$L_{Aeq, Period}$	$L_{Aeq, 15min}$
Residence	Suburban	Day	55 – 5 = 50	50 + 3 = **53**
		Evening	45 – 5 = 40	40 + 3 = **43**
		Night	40 – 5 = 35	35 + 3 = **38**
Commercial Premises	All	When in use	65 – 5 = 60	60 + 3 = **63**
Industrial premises	All	When in use	70 – 5 = 65	65 + 3 = **68**

Notes: 1. Daytime 7:00am to 6:00pm; Evening 6:00pm to 10:00pm; Night-time 10:00pm to 7:00am. On Sundays and Public Holidays, Daytime 8:00 am - 6:00pm; Evening 6:00pm - 10:00pm; Night-time 10:00 pm - 7:00am.

2. The L_{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

4.1.3.3 High traffic project amenity noise level

Section 2.4.1 of the NPfI allows for amending the project amenity noise level if road traffic noise is high enough to make noise from an industrial source effectively inaudible, even though the LAeq noise level from that industrial noise source may exceed the project amenity noise level, the NPfI sets out criteria to take this into account.

In such cases NPfI Section 2.4.1 details that the project amenity noise level may be derived from the $L_{Aeq, period(traffic)}$ minus 15 dB(A). It is noted that in a similar manner to the derivation of the project amenity noise level in Section 4.1.3, the minus 15 dB(A) includes a 5 dB(A) reduction to take into account potential cumulative other industrial noise contributions, to ensure that the total industrial noise level (existing plus new) remains within the recommended amenity noise levels for an area.

This high traffic project amenity noise level may be applied only if all the following apply:

- traffic noise is identified as the dominant noise source at the site

- the existing traffic noise level (determined using the procedure outlined in A2, Fact Sheet A, that is, measuring traffic instead of industrial noise) is 10 dB or more above the recommended amenity noise level for the area
- it is highly unlikely traffic noise levels will decrease in the future.

The applicability of these traffic noise provisions needs to be determined for each assessment period (that is, day, evening and night).

A review of the noise logging at L2, representing residences in NCA02 adjacent to the M1 Motorway, found that road traffic noise during all periods was dominant and 10 dB(A) or more above the recommended amenity noise level for suburban residences. In addition, road traffic noise from the M1 Motorway is highly unlikely to decrease in the future. For these reasons, the high traffic project amenity noise level is proposed for residences in NCA02 and is summarised in Table 4.6.

Table 4.6: High traffic project amenity noise levels

Type of receiver	Time of day	Measured road traffic noise level[1], dB(A) $L_{Aeq, Period}$	High traffic project amenity noise level, dB(A) $L_{Aeq, 15min}$[2]
Residence – NCA02 (adjacent to M1 Motorway)	Day	68	56
	Evening	67	55
	Night	56	44

Notes: 1. Noise levels measured as per NPfI Section 2.4.1, which noted that the traffic noise levels are to be determined using the procedure outlined in A2, Fact Sheet A, that is, measuring traffic instead of industrial noise.

2. High traffic project amenity noise level is existing traffic levels minus 15 dB(A) plus 3 dB(A) to convert from a period level to a 15-minute level.

4.1.4 Project noise trigger levels

The project noise trigger levels have been converted from $L_{Aeq, period}$ values to $L_{Aeq\ 15min}$ values in accordance with Section 4.1.3 and these are presented in Table 4.7.

Table 4.7: Project noise trigger levels for residential receivers

Receiver location	$L_{Aeq, 15min}$ Project noise trigger levels, dB(A)					
	Day		Evening		Night	
	Intrusive	Amenity	Intrusive	Amenity	Intrusive	Amenity
NCA01 (Sparks Road)	56	53	52	43	48	38
NCA02 (adjacent M1 Motorway)	57	56	56	55	49	44
NCA03 (set back from M1 Motorway)	48	53	48[1]	43	44	38

Notes: 1. As per Section 2.3 of the NPfI, the project intrusiveness noise level for the evening is set no greater than the project intrusiveness noise level for the daytime.

In accordance with the NPfI, the project noise trigger levels are the lesser of the project intrusive and project amenity noise levels, and are presented in Table 4.8.

Table 4.8: Project noise trigger levels

Receiver location	$L_{Aeq, 15min}$ Project noise trigger levels, dB(A)[1]		
	Day	Evening	Night
Residential receivers[2]			
NCA01 (Sparks Road)	53	43	38
NCA02 (adjacent M1 Motorway)	56	55	44
NCA03 (set back from M1 Motorway)	48	43	38
Other sensitive receivers[3]			
Commercial	63	63[4]	63[4]
Industrial	68	68[5]	68[5]

Notes:
1. Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 5.00 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 - 5.00 am. The morning shoulder period (5:00am to 7:00am) project trigger levels have been derived as per NPfI Fact Sheet A3.
2. For a residence, the project noise trigger level and maximum noise levels are to be assessed at the reasonably most-affected point on or within the residential property boundary, within 30m of the residence.
3. For commercial or industrial premises the noise level is to be assessed at the reasonably most-affected point on or within the property boundary.
4. Project noise trigger level is only applicable when the receiver type is in use.
5. Assumed industrial receivers near Wyong RDC operate during the Evening and Night.

4.1.5 Cumulative industrial noise

The management of cumulative operational noise is required by the NPfI. By addressing cumulative noise impacts consistent with the NPfI, this will also sufficiently address cumulative impacts in accordance with the DPIE guideline "*Cumulative Impact Assessment Guidelines for State Significant Projects*" (DPIE, 2021) as detailed in Section 3.5 of that document.

As stated in Section 2.1 of the NPfI *"The project intrusiveness noise level aims to protect against significant changes in noise levels, whilst the project amenity noise level seeks to protect against cumulative noise impacts from industry and maintain amenity for particular land uses."*.

The NPfI amenity noise criteria derived in Section 4.1.3 aims to control the total industrial noise level (existing plus new) with the aim for it to remain within the recommended amenity noise levels for the area. As such, the potential cumulative noise impacts as a result of the development has been considered in the assessment through the derivation of criteria in accordance with the NPfI, and assessment against these levels.

4.1.6 Sleep disturbance noise levels

The potential for sleep disturbance from maximum noise level events from the Proposal site during the night-time period needs to be considered. In accordance with NPfI, a detailed maximum noise level event assessment should be undertaken where the subject development night-time noise levels at a residential location exceed the following noise trigger levels:

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

The detailed assessment should consider all feasible and reasonable noise mitigation and management measures with a goal of achieving the sleep disturbance noise trigger levels. The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period. Some guidance on possible impact is contained in the review of research results in the NSW Road Noise Policy (RNP).

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

- how often high noise events will occur,
- the distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the subject development,
- whether there are times of day when there is a clear change in the noise environment (such as during early-morning shoulder periods), and
- current scientific literature available at the time of the assessment regarding the impact of maximum noise level events at night.

Maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response.

The detailed assessment should consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels.

The latest guidelines produced by the World Health Organisation relating to night-time impacts on sleep, were produced in 2009 and 2018. These reports mainly focus on sleep disturbance from transportation noise sources, such as aircraft, road and rail, with the 2018 guideline also providing recommendations for wind turbine and leisure noise sources. They do not provide specific recommendations for industrial activity noise due to lack of information and data. However, given that some of the proposed operations on the development site may have a similar nature and character of noise to road traffic noise, guidelines relating to road traffic noise can be referred to for guidance when assessing potential sleep disturbance from site operations and activities (see below Section 4.1.6.1 for WHO guideline discussion).

4.1.6.1 Current reference literature

In relation to maximum traffic noise level events affecting sleep, the NSW Road Noise Policy (NSW EPA, 2012) identifies several investigations into the impacts of intermittent and emerging noise sources on the disturbance of sleep.

Further studies by the enHealth Council (2004) and the guidelines published by the World Health Organisation (1999) were reviewed and analysed in terms of the guidance on noise exposure and sleep disturbance. The enHealth report states that:

> *'as a rule in planning for short-term or transient noise events, for good sleep over 8 hours the indoor sound pressure level measured as a maximum instantaneous value should not exceed approximately 45 dB(A) LAmax more than 10 or 15 times per night'.*

Following the publication of World Health Organisation's (WHO) community noise guidelines in 1999, the WHO released the *Night Noise Guidelines for Europe (WHO 2009)* in 2009 which uses $L_{night\ (outside)}$ as a primary measure of night-time noise. This is the yearly average of outside facade noise levels during the night-time period, and roughly equivalent to the external $L_{Aeq(9hour)}$ night-time descriptor. The report recommends a long-term Lnight (outside) noise guideline level of 40 dB(A), with an interim $L_{night\ (outside)}$ target level of 55 dB(A). The interim target is only intended as an intermediate step in localised situations as health impacts, particularly on vulnerable groups, are apparent at this noise level.

1. For $L_{Aeq(9hour)\ (external)}$ levels above 55 dB(A), adverse health effects occur frequently, and a sizeable proportion of the population is highly annoyed and sleep disturbed. Cardiovascular disease risk rises, and public health is also threatened;

2. For $L_{Aeq(9hour)\ (external)}$ levels between 40 dB(A) and 55 dB(A), adverse health effects are observed, with many people needing to adapt their lives to cope; vulnerable groups are more severely affected;

The WHO released the latest research into sleep in 2018 as the *Environmental Noise Guidelines for the European Region: A systematic Review on Environmental Noise and Effects on Sleep* (WHO 2018). The WHO 2018 guideline for night noise exposure, recommends reducing noise levels produced by road traffic during night-time to below 45 dB(A) $L_{night\ (outside)}$, as night-time road traffic noise above this level is associated with adverse effects on sleep. The $L_{night\ (outside)}$ is an A-weighted noise level at the most exposed facade outdoors over all night periods determined as a long-term average over a year, and is roughly equivalent to the external $L_{Aeq(9hour)}$ night-time descriptor.

The WHO 2018 guideline does not recommend criteria in terms of single-event noise indicators or maximum sound pressure levels (eg L_{Amax}), because the assessment of the relationship between different types of single-event noise indicators and long-term health outcomes at the population level remains tentative. The WHO guideline therefore makes no recommendations for single-event noise indicators. Thus, the WHO guideline is restricted to long-term health effects during night-time and therefore only includes recommendations about average noise indicators, e.g. Lnight (outside).

The NSW Road Noise Policy (RNP) concludes as follows:

From the research on sleep disturbance to date it can be concluded that:

- *maximum internal noise levels below 50–55 dB(A) are unlikely to awaken people from sleep*

- *one or two noise events per night, with maximum internal noise levels of 65–70 dB(A), are not likely to affect health and wellbeing significantly.*

It is therefore concluded that internal traffic noise levels of 45 dB(A) and up to 55 dB(A), may have the potential to impact sleep but are unlikely to cause awakenings. On the assumption that there is a 10 dB(A) outside-to-inside noise sound transmission loss through an open window (see NSW Road Noise Policy, p17), the above references indicate that external traffic noise levels of L_{Amax} 55 to 65 dB(A) are unlikely to cause awakening reactions from road traffic noise.

4.1.6.2 Sleep disturbance assessment noise levels

In accordance with the NPfI and current scientific literature, the sleep disturbance project assessment trigger levels, are presented in Table 4.9.

Table 4.9: Sleep disturbance assessment trigger levels

Receiver location	Sleep disturbance project assessment noise levels, dB(A)			
	EPA NPfI sleep disturbance assessment levels, L_{Amax}	Awakening reaction[2], L_{Amax}	EPA NPfI sleep disturbance assessment levels, $L_{Aeq,15min}$	WHO 2018 $L_{Aeq,15min}$[1]
NCA01 (Sparks Road)	43 + 15 = 58	65	43 + 5 = 48	48
NCA02 (adjacent M1 Motorway)	44 + 15 = 59	65	44 + 5 = 49	48
NCA03 (set back from M1 Motorway)	39 + 15 = 54	65	39 + 5 = 44	48

Notes: 1. As per Section 2.2 of the NPfI, the WHO 45 dB(A) Lnight (outside) has been converted to a LAeq,15minute level by adding 3 dB(A).

2. As per the NSW RNP.

4.2 Road traffic noise

The NSW Road Noise Policy applies to road traffic noise generated by new and redeveloped roads, and developments which generate additional road traffic on the local network.

Table 4.10 sets out the assessment criteria for residences to be applied depending on the type of project, road category and land use. These criteria are for assessment against facade corrected noise levels when measured in front of a building façade. Freeways, arterial roads and sub-arterial roads are grouped together and attract the same criteria.

Table 4.10: Road traffic noise assessment criteria for residential land use

Road category	Type of project/land use	Assessment criteria – dB(A)	
		Day 7:00am-10:00pm	Night 10:00pm-7:00am
Freeway/ arterial/ sub-arterial roads	1. Existing residences affected by noise from new freeway/arterial/sub-arterial road corridors	$L_{Aeq,(15\ hour)}$ 55 (external)	$L_{Aeq,(9\ hour)}$ 50 (external)
	2. Existing residences affected by noise from redevelopment of existing freeway / arterial / sub-arterial roads	$L_{Aeq,(15\ hour)}$ 60 (external)	$L_{Aeq,(9\ hour)}$ 55 (external)
	3. Existing residences affected by additional traffic on existing freeways / arterial / sub-arterial roads generated by land use developments	$L_{Aeq,(15\ hour)}$ 60 (external)	$L_{Aeq,(9\ hour)}$ 55 (external)
Local roads	4. Existing residences affected by noise from new local road corridors	$L_{Aeq,(1\ hour)}$ 55 (external)	$L_{Aeq,(1\ hour)}$ 50 (external)
	5. Existing residences affected by noise from redevelopment of existing local roads		
	6. Existing residences affected by additional traffic on existing local roads generated by land use developments		

Note: Land use developers must meet internal noise goals in the Infrastructure SEPP (Department of Planning NSW 2007) for sensitive developments near busy roads (see Appendix C10).

Further to the above, the RNP states the following for land use developments generating additional traffic:

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

The RNP states that in assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.

5 Construction noise and vibration assessment

5.1 Background

Construction activities associated with the proposed development will result in increased noise levels during construction hours. This assessment identifies potentially noisy activities, their impacts on surrounding receivers and outlines management strategies to control the impacts of noise and vibration during the construction stages of the project.

5.2 Construction hours

5.2.1 Standard construction hours

Works are expected to occur during the ICNG standard construction hours, which are detailed in Section 3.1.1 and reproduced as follows:

- 7:00am to 6:00pm Monday to Friday
- 8:00am to 1:00pm on Saturday
- No work performed on Sunday and Public Holidays.

5.2.2 Works outside standard construction hours

Additional works may be required outside standard construction hours to facilitate the delivery of the Proposal, noting that the construction works will be undertaken concurrently with the existing distribution facility operations. While the exact works required are not yet confirmed, it is anticipated that potential works outside standard hours, likely during the day (OOH) and evening periods, may be required for the following reasons:

- The establishment and connection of temporary electrical supply and/or infrastructure – these works may result in disruptions to essential services if conducted during standard hours.
- The establishment and commissioning of temporary mechanical building services and plant to support the continued facility operations – these works may be needed to ensure the integrity of the existing operating temperature controlled (TC) warehouse and prevent extensive perishing of temperature-sensitive stock (and subsequent disruption to supermarkets across NSW).
- Internal works where the safety of warehouse operations staff might be compromised (ie. internal structure removal / modification) – these works may need to be scheduled for less busy times to minimise adverse impacts to safety and operations of the existing operating distribution facility components.
- Oversized deliveries – identified as a potential out-of-hours activity in the ICNG.
- Works requiring a Road Opening Permit – these works may result in disruptions to essential services if conducted during standard hours.

These would be undertaken as required by the ICNG as detailed in Section 3.1.2.

5.3 Receiver locations

Noise sensitive receiver locations considered in the construction noise and vibration assessment are identified in Section 2.2.

5.4 Construction activities and assumptions

An assessment of the potential level of construction noise and vibration impact has been carried out to determine whether mitigation would be required, and to determine appropriate management controls. Specific construction equipment requirements are not yet known. The type and number of plant and equipment associated with the proposed works was assumed based upon experience with similar noise assessments.

Prior to the commencement of construction, the final construction details should be reviewed against the assumptions in this report to ensure that the mitigation and management measures that will be implemented remain consistent with these assumptions, and appropriate for the project. This includes reviewing the concurrent works stages, to determine actual potential noise emissions.

The Project's Construction Management Plan (CMP), prepared by Root Partnerships, states that the works are expected to commence in January 2023 and should be completed by early 2024. An indicative outline and high level description of the staging of works given in the CMP is as follows:

1. Construction and commissioning of new fire pump house and sprinkler tanks.
2. Demolition of existing fire tanks and pumps. Construction and commissioning of ripening rooms. Construction of new TC docks.
3. Construction of B-double drive through to the south and associated hardstand.
4. Demolition of western wall of existing facility and construction of Ambient extension, RTF and associated hardstand.
5. Construction of eastern hardstand, truck/van parking and all outbuildings.

The CMP notes that the staging is subject to change during design development and some works for each stage may be concurrent.

With consideration of the anticipated staging and potential for similar works to occur across each stage at the same time, representative construction noise modelling scenarios have been devised to cover the various construction works proposed across the Proposal and are listed in Table 5.1 along with the corresponding relevant construction stage/s.

Table 5.1: Representative construction scenarios

Activity	Description	Relevant construction stage described in the CMP
Site establishment	Prepare site offices, set levels, utilities relocations (if required)	All
Demolition	Hard demolition of buildings and existing concrete pavements where required	Stage 2 (demolition) Stage 4 (demolition)
Excavation/civil	Cutting and filing to new benched levels with minimal rock excavation,	Stage 2 (demolition, construction) Stage 3 (hardstand preparation) Stage 5
Building and hardstand construction	Construction of the fire pump house, sprinkler tanks, main building extensions, new outbuildings and hardstands	All
Building fit-out	Deliveries and fitout of new buildings/extensions, deliveries of operational plant and equipment	Stage 1 (commissioning) Stage 2 (commissioning)

5.4.1 Construction traffic

The worksite will generate additional traffic movements in the form of:

- Light vehicle movements generated by construction personnel travelling to and from work
- Heavy vehicle movements generated by:
  - Trucks removing demolition refuse from the site
  - Delivery vehicles bringing raw materials, plant, and equipment to the site

Construction traffic on the site is included as part of the construction noise assessment of the work activities identified in Table 5.1. When construction-related traffic moves on the public road network, a different noise assessment methodology is required as vehicle movements would be regarded as additional road traffic on public roads rather than as part of the construction site's activities.

The Proposal's traffic impact assessment, prepared by Colston Budd Rogers and Kafes Pty Ltd, details that construction vehicles will access the site via Warren Road and Woolworths Road. The estimated daily number of heavy vehicles accessing the site will be 220 vehicles per day two way, which includes approximately 180 cars and 40 construction vehicles.

Construction traffic from the site on public roads is predicted not to be a significant noise impact and is not further addressed in this report.

5.4.2 Construction noise sources

The schedule of items of plant and equipment likely to be used during the construction phases of the Proposal is presented in Table 5.2.

Table 5.2: Typical construction equipment & sound power levels, dB(A) re 1pW

Plant item	Estimated number of items	Individual source/activity sound power level ($L_{w)}$, $L_{Aeq(15min)}$
Site establishment		
5-tonne excavator with hydraulic hammer	2 x 5-tonne excavators in total	118
5-tonne excavator with saw		116
Powered hand tools	Various	107
Double bogey tippers	2	105
5-tonne excavator with claw/bucket	2 x 5-tonne excavators in total	103
Bobcat	2	102
Non-powered hand tools	Various	98
Demolition		
20-tonne excavator with hydraulic hammer	2 x 20-tonne excavators in total	121
20-tonne excavator with saw		119
5-tonne excavator with hydraulic hammer	2 x 5-tonne excavators in total	118
5-tonne excavator with saw		116
Powered hand tools	Various	107
Double bogey tippers	2	105
20-tonne excavator with claw/bucket	2 x 20-tonne excavators in total	103
5-tonne excavator with claw/bucket	2 x 5-tonne excavators in total	103
Bobcat	2	102
Non-powered hand tools	Various	98
Excavation/civil		
20-tonne excavator with hydraulic hammer	2 x 20-tonne excavators in total	121
20-tonne excavator with saw		119
Cat D1 Dozer	2	110
Grader	2	110
Vibratory roller	2	109
Powered hand tools	Various	107
Double bogey tippers	8	105
Water cart	1	105
20-tonne excavator with claw/bucket	2 x 20-tonne excavators in total	103
Non-powered hand tools	Various	98
Building construction		
Concrete trucks	2	108
Delivery trucks	2	108
Hand tools	Various	107
Mobile/Tower crane	2	110
Concrete pump	2	102
Bobcat	2	102

Plant item	Estimated number of items	Individual source/activity sound power level ($L_{w)}$, $L_{Aeq(15min)}$
Concrete vibrator	8	99
Non-powered hand tools	Various	98
Building fit-out		
Delivery trucks	2	108
Hand tools	Various	107
Bobcat	2	102
Scissor lift	2	99
Non-powered hand tools	Various	98

The sound power levels for the majority of construction plant and equipment presented in the above table are based on maximum noise levels given in Table A1 of Australian Standard 2436 - 2010 'Guide to Noise Control on Construction, Demolition and Maintenance Sites', the Interim Construction Noise Guideline (ICNG), information from past projects and/or information held in our library files.

5.5 Construction noise assessment

5.5.1 Predicted noise levels

Noise levels at any receiver location resulting from construction works would depend on the location of the receiver with respect to the area of construction, shielding from intervening topography and structures, and the type and duration of construction being undertaken. Furthermore, noise levels at receivers would vary significantly over the total construction program due to the transient nature and large range of plant and equipment that could be used.

Noise emissions were determined by modelling the noise sources, receiver locations, and operating activities, based on the information presented in Section 5.4. A 5 dB(A) penalty has been factored into the noise modelling levels where applicable to allow for particularly annoying activities, such as saw cutting and jack hammering in accordance with the ICNG.

Table 5.3 presents noise levels likely to be experienced at the nearby affected receivers based on the construction activities and plant and equipment associated with the proposed site. The predicted noise level represents the loudest plant item potentially operating during that stage at the location closest to the receiver. Noise levels were calculated taking into consideration attenuation due to distance between the construction works and the receiver locations and any intervening structures. The noise predictions are conservative and do not incorporate acoustic shielding provided by hoarding that may be erected.

Table 5.3: Predicted construction noise levels – Standard hours

ID	Address	Receiver type	NML, dB(A)	Predicted noise level, dB(A) $L_{eq,15min}$					dB above NML				
				Site establishment	Demolition	Excavation/ civil	Building construction	Building fit-out	Site establishment	Demolition	Excavation/ civil	Building construction	Building fit-out
R1	187 Sparks Road, Halloran	Residential	61	32	35	35	24	22	-	-	-	-	-
R2	211 Sparks Road, Halloran	Residential	61	39	42	42	31	29	-	-	-	-	-
R3	221 Sparks Road, Halloran	Commercial	70	39	42	42	31	29	-	-	-	-	-
R4	13 Buttonderry Way, Jilliby	Residential	62	48	51	51	40	38	-	-	-	-	-
R5	15 Buttonderry Way, Jilliby	Residential	62	48	51	51	40	38	-	-	-	-	-
R6	17 Buttonderry Way, Jilliby	Residential	62	47	50	50	39	37	-	-	-	-	-
R7	17 Buttonderry Way, Jilliby	Residential	62	46	49	49	38	36	-	-	-	-	-
R8	19 Buttonderry Way, Jilliby	Residential	62	45	48	48	37	35	-	-	-	-	-
R9	21 Buttonderry Way, Jilliby	Residential	62	46	49	49	38	36	-	-	-	-	-
R10	23 Buttonderry Way, Jilliby	Residential	62	39	42	42	31	29	-	-	-	-	-
R11	5 The Downs, Jilliby	Residential	53	36	39	39	28	26	-	-	-	-	-
R12	7 The Downs, Jilliby	Residential	53	38	41	41	30	28	-	-	-	-	-
R13	6 The Downs, Jilliby	Residential	53	40	43	43	32	30	-	-	-	-	-
R14	4 The Downs, Jilliby	Residential	53	37	40	40	29	27	-	-	-	-	-
R15	11 Buttonderry Way, Jilliby	Residential	53	40	43	43	32	30	-	-	-	-	-
R16	9 Buttonderry Way, Jilliby	Residential	53	38	41	41	30	28	-	-	-	-	-
R17	3 The Downs, Jilliby	Residential	53	35	38	38	27	25	-	-	-	-	-
R18	1 The Downs, Jilliby	Residential	53	35	38	38	27	25	-	-	-	-	-
R19	220 Sparks Road, Jilliby	Residential	53	37	40	40	29	27	-	-	-	-	-
R20	5 Warren Road, Warnervale	Industrial	75	64	67	67	56	54	-	-	-	-	-
R21	12 Burnet Road, Warnervale	Industrial	75	77	80	80	69	67	2	5	5	-	-
R22	18 Burnet Road, Warnervale	Industrial	75	71	74	74	63	61	-	-	-	-	-
R23	171 Sparks Road, Halloran	Residential	61	36	39	39	28	26	-	-	-	-	-
R24	80 Mountain Road, Halloran	Residential	61	33	36	36	25	23	-	-	-	-	-
R25	80 Mountain Road, Halloran	Residential	61	36	39	39	28	26	-	-	-	-	-

The predicted noise levels presented in Table 5.3 indicate that the noise levels at residences during all construction stages are predicted to achieve the standard hours construction NMLs. Construction noise at one industrial receiver (12 Burnet Road) may be above the NML during site establishment, demolition and excavation/civil works. This prediction assumes noise-intensive works occur close to the shared boundary with 12 Burnet Road around the new RTF site and hardstand extension. Consultation with this neighbouring receiver is recommended to understand potential noise-sensitive usage of the site and address noise when construction works are in close proximity.

As good general practice, it is recommended that a feasible and reasonable approach towards noise mitigation measures be applied to reduce noise levels as much as possible to mitigate the impact from construction noise. Further details on construction noise mitigation and management measures are provided in Section 5.5.3.

5.5.2 Works outside standard hours

As stated in Section 5.2, potential works outside standard hours, likely during the day (OOH) and evening periods, may be required but the exact activities are not yet confirmed.

To provide a high-level screening assessment of noise impacts from possible out of hours works, the representative construction scenarios and corresponding predicted noise levels have been compared to the relevant Evening NML in Table 5.4. The noise predictions for activities during standard hours have been conservatively used, even though works outside standard hours are likely to be of a reduced scope.

It is noted that the representative construction scenarios are predicted to be below the most stringent Evening NML at all nearby residential receivers for all representative construction scenarios. As a result, if a strong justification is present for works to continue into the evening (or Saturday afternoon daytime OOH) period), it may be reasonable to do so.

As per Section 5.4, prior to the commencement of construction once the construction staging and methodology have been further developed, any proposed OOH works are to be further reviewed in detail and with consideration of the NMLs presented in this assessment. Strong justification shall be provided as to why the proposed works cannot be undertaken during standard construction hours. Consistent with the ICNG, all feasible and reasonable measures shall be undertaken to achieve the nominated NMLs.

Table 5.4: Predicted construction noise levels – Outside standard hours

ID	Address	Receiver type	NML, dB(A)		Predicted noise level, dB(A) $L_{eq,15min}$					dB above NML				
			D(OOH)	Eve	Site establishment	Demolition	Excavation/ civil	Building construction	Building fit-out	Site establishment	Demolition	Excavation/ civil	Building construction	Building fit-out
R1	187 Sparks Road, Halloran	Residential	56	52	32	35	35	24	22	-	-	-	-	-
R2	211 Sparks Road, Halloran	Residential	56	52	39	42	42	31	29	-	-	-	-	-
R3	221 Sparks Road, Halloran	Commercial	70	70	39	42	42	31	29	-	-	-	-	-
R4	13 Buttonderry Way, Jilliby	Residential	57	56	48	51	51	40	38	-	-	-	-	-
R5	15 Buttonderry Way, Jilliby	Residential	57	56	48	51	51	40	38	-	-	-	-	-
R6	17 Buttonderry Way, Jilliby	Residential	57	56	47	50	50	39	37	-	-	-	-	-
R7	17 Buttonderry Way, Jilliby	Residential	57	56	46	49	49	38	36	-	-	-	-	-
R8	19 Buttonderry Way, Jilliby	Residential	57	56	45	48	48	37	35	-	-	-	-	-
R9	21 Buttonderry Way, Jilliby	Residential	57	56	46	49	49	38	36	-	-	-	-	-
R10	23 Buttonderry Way, Jilliby	Residential	57	56	39	42	42	31	29	-	-	-	-	-
R11	5 The Downs, Jilliby	Residential	48	48	36	39	39	28	26	-	-	-	-	-
R12	7 The Downs, Jilliby	Residential	48	48	38	41	41	30	28	-	-	-	-	-
R13	6 The Downs, Jilliby	Residential	48	48	40	43	43	32	30	-	-	-	-	-
R14	4 The Downs, Jilliby	Residential	48	48	37	40	40	29	27	-	-	-	-	-
R15	11 Buttonderry Way, Jilliby	Residential	48	48	40	43	43	32	30	-	-	-	-	-
R16	9 Buttonderry Way, Jilliby	Residential	48	48	38	41	41	30	28	-	-	-	-	-
R17	3 The Downs, Jilliby	Residential	48	48	35	38	38	27	25	-	-	-	-	-
R18	1 The Downs, Jilliby	Residential	48	48	35	38	38	27	25	-	-	-	-	-
R19	220 Sparks Road, Jilliby	Residential	48	48	37	40	40	29	27	-	-	-	-	-
R20	5 Warren Road, Warnervale	Industrial	75	75	64	67	67	56	54	-	-	-	-	-
R21	12 Burnet Road, Warnervale	Industrial	75	75	77	80	80	69	67	2	5	5	-	-
R22	18 Burnet Road, Warnervale	Industrial	75	75	71	74	74	63	61	-	-	-	-	-
R23	171 Sparks Road, Halloran	Residential	56	52	36	39	39	28	26	-	-	-	-	-
R24	80 Mountain Road, Halloran	Residential	56	52	33	36	36	25	23	-	-	-	-	-
R25	80 Mountain Road, Halloran	Residential	56	52	36	39	39	28	26	-	-	-	-	-

Notes:

D(OOH) = Day outside standard hours

Eve = Evening

5.5.3 Construction noise mitigation and management measures

5.5.3.1 General engineering noise controls

Implementation of noise control measures, such as those suggested in Australian Standard 2436-2010 'Guide to Noise Control on Construction, Demolition and Maintenance Sites', are expected to reduce predicted construction noise levels.

Reference to Australian Standard 2436-2010, Appendix C, Table C1 suggests possible remedies and alternatives to reduce noise emission levels from typical construction equipment. Table C2 in Appendix C presents typical examples of noise reductions achievable after treatment of various noise sources. Table C3 in Appendix C presents the relative effectiveness of various forms of noise control treatment.

Table 5.5 below presents noise control methods, practical examples and expected noise reductions according to AS2436 and according to Renzo Tonin & Associates' opinion based on experience with past projects.

Table 5.5: Relative effectiveness of various forms of noise control

Noise control method	Practical examples	Typical noise reduction possible in practice, dB(A)		Maximum noise reduction possible in practice, dB(A)	
		AS 2436	Renzo Tonin & Assoc.	AS 2436	Renzo Tonin & Assoc.
Distance	Doubling of distance between source and receiver	6	6	6	6
Screening	Acoustic barriers such as temporary or permanent noise barriers where barrier breaks line-of-sight between the source and receiver	5 to 10	5 to 10	15	15
Acoustic enclosures	Engine casing lagged with acoustic insulation and plywood	15 to 25	10 to 20	50	30
Engine Silencing	Residential class mufflers	5 to 10	5 to 10	20	20
Substitution by alternative process	Use electric motors in preference to diesel or petrol	-	15 to 25	-	40

The Renzo Tonin & Associates' listed noise reductions are conservatively low and should be referred to in preference to those of AS2436.

Table 5.6 identifies possible noise control measures, which are applicable on a number of construction plant likely to be used on site.

Table 5.6: Possible noise control measures for likely construction plant

Plant Description	Screening	Acoustic enclosures	Silencing	Alternative process
Excavator with hydraulic hammer	✔	✖	✖	✖
Concrete truck	✔	✖	✔	✖

Plant Description	Screening	Acoustic enclosures	Silencing	Alternative process
Delivery trucks	✔	✖	✔	✖
Electric / mobile crane	✔	✔	✖	✖
Hand tools	✔	✖	✔	✖
Excavator / Bobcat	✔	✖	✔	✖

5.5.3.2 Noise management measures

The following recommendations provide feasible and reasonable noise control solutions to reduce noise impacts to sensitive receivers. **These should be considered and implemented where feasible and reasonable where there is potential for the noise management levels presented in Section 3.1 to be exceeded by the construction works either individually or cumulatively**.

General noise management measures

The following general noise management measures are recommended for all receiver locations:

- Use less noisy plant and equipment, where feasible and reasonable.
- Plant and equipment must be properly maintained.
- Provide special attention to the use and maintenance of 'noise control' or 'silencing' kits fitted to machines to ensure they perform as intended.
- Strategically position plant on site to reduce the emission of noise to the surrounding neighbourhood and to site personnel.
- Avoid any unnecessary noise when carrying out manual operations and when operating plant.
- Any equipment not in use for extended periods during construction work must be switched off.
- Simultaneous operation of noisy plant within discernible range of a sensitive receiver is to be limited/avoided where possible.
- The offset distance between noisy plant and adjacent sensitive receivers is to be maximised where practicable.
- Plant used intermittently to be throttled down or shut down when not in use where practicable.
- Noise-emitting plant to be directed away from sensitive receivers where possible.
- Staging of construction works to erect solid external walls first and utilising them to provide noise shielding to the noise sensitive receivers. However, the structural integrity of the external walls should be investigated prior to implementing this measure and should be prioritised over the noise benefits.

- In addition to the noise mitigation measures outlined above, a management procedure should be put in place to deal with noise complaints that may arise from construction activities. Each complaint will need to be investigated and appropriate noise amelioration measures put in place to mitigate future occurrences, where the noise exceeds allowable limits.
- Good relations with people living and working in the vicinity of a construction site should be established at the beginning of a project and be maintained throughout the project, as this is of paramount importance. Keeping people informed of progress and taking complaints seriously and dealing with them expeditiously is critical. The person selected to liaise with the community must be adequately trained and experienced in such matters.

Additional measures to be considered

Other potential mitigation measures include:

- Use of broadband "quacker" type of reverse/movement alarms instead of the tonal 'beeping" type.
- All employees, contractors and subcontractors are to receive site induction and toolbox talks and ongoing training so that the above noise management measures are implemented accordingly. Content within toolboxes will include, location of nearest sensitive receivers; relevant project specific and standard noise and vibration mitigation measures; permissible hours of work, truck route and truck loading restrictions and construction employee parking areas.

5.5.3.3 Noise monitoring

Given that the predicted noise levels presented in Section 5.5.1 do not show exceedances of the standard hours construction NML at residences, verification noise monitoring is not considered necessary during the Proposal construction stages during standard construction hours works.

Where works outside standard hours are required, verification noise monitoring should be undertaken to verify that noise levels from the works are consistent with the predicted noise levels.

Should complaints be received then monitoring may be necessary as part of the investigation into the complaint.

5.6 Construction vibration assessment

5.6.1 Minimum working distances

The pattern of vibration radiation differs from the pattern of airborne noise radiation and is highly site specific. Final vibration levels are dependent on many factors including the actual plant used, its operation and the intervening geology between the activity and the receiver. Potential vibration

generated to receivers is dependent on separation distances, the intervening soil and rock strata, dominant frequencies of vibration, and the receiver construction and structure.

The recommended minimum working distances for vibration intensive plant are presented in Table 5.7. These distances are conservatively based on excavation of hard rock. Site specific minimum working distances for vibration intensive plant items must be measured on site where plant and equipment are likely to operate close to or within the minimum working distances for cosmetic damage presented in Table 5.7. Unlike noise, vibration cannot be readily predicted. There are many variables from site to site, such as soil type and conditions, sub surface rock, building types and foundations, and actual plant on site. The data relied upon in this assessment (tabulated below) is taken from a database of vibration levels measured at various sites or obtained from other sources (such as BS5228-2:2009). They are not specific to this proposal as final vibration levels are dependent on many factors including the actual plant used, its operation and the intervening geology between the activity and the receiver.

As such, potential vibration impacts are to be further reviewed during the construction design, planning stages to determine if the final selected plant and equipment could be located within the minimum working distances and/or result in vibration levels about the applicable vibration limits presented in Section 3.2. Where this is identified, feasible and reasonable mitigation and management would be implemented to achieve the applicable vibration limits. The recommended minimum working distances for key vibration intensive plant are presented in Table 5.7. Site specific buffer distances for vibration significant plant items must be measured on site where plant and equipment are likely to operate close to or within the minimum working distances for cosmetic damage.

Table 5.7: Recommended minimum working distances for vibration intensive equipment

Plant item	Minimum working distance[3], metres					
	Cosmetic damage			Human disturbance		
	Commercial and industrial buildings[1]	Dwellings and similar structures[1]	Sensitive structures (e.g. heritage)[1,4]	Residences Day[2]	Offices[5]	Workshops[5]
Truck traffic (over irregular surfaces)	5	5	10	20	15	10
Dozer	5	10	10	20	20	15
Grader	5	5	10	20	15	10
Excavator <=20 Tonne (travelling/ digging)	5	5	10	20	15	10
5 Tonne Excavator w/Hydraulic Breaker	5	5	10	20	15	10
20 Tonne Excavator w/Hydraulic Breaker	5	10	10	30	20	15
Vibratory roller	5	15	20	60	35	20

Notes: 1. Criteria referenced from DIN 4150 Structural Damage - Safe Limits for Short-term Building Vibration.
2. Daytime is 7:00am to 10:00pm.
3. Minimum working distances are in 5m increments only to account for the intrinsic uncertainty of this screening method.
4. A site inspection should determine whether a heritage structure is structurally unsound.
5. Appliable when in use

5.6.2 Potential vibration impacts

Based on the conservative MWDs in Table 5.7, potential vibration impacts were estimated and are summarised in Table 5.8.

Cosmetic damage is considered unlikely due to the substantial distances between the Proposal and receivers. The only receiver that may experience human disturbance is the industrial receiver at 12 Burnet Road, Warnervale, if a vibratory roller or a 20 tonne excavator with hammer is used at the new hardstand near the new RTF. However, this assumes the building at 12 Burnet Road is appropriately classified as a workshop and occupied by humans during the vibration intensive works.

Table 5.8: Potential vibration for residential and non-residential properties

NCA	Approx. distance to nearest building from works (m)	Group classification in accordance with Table 3.6	Assessment on potential vibration impacts		
			Cosmetic damage risk	Human disturbance	Vibration monitoring
NCA01	580	Group 2 (residential)	Low risk of structural damage from construction works	Low risk of adverse comment as a result of construction works	Vibration monitoring not required
NCA02	600	Group 2 (residential)	Low risk of structural damage from construction works	Low risk of adverse comment as a result of construction works	Vibration monitoring not required
NCA03	780	Group 2 (residential)	Low risk of structural damage from construction works	Low risk of adverse comment as a result of construction works	Vibration monitoring not required
Industrial	15	Group 1 (commercial /industrial)	Low risk of structural damage from construction works	Low to medium risk of adverse comment as a result of construction works	Vibration monitoring may be required

5.6.3 Construction vibration mitigation measures

The following vibration management measures are provided to minimise vibration impact from construction activities to the nearest affected receivers and to meet the relevant human comfort and building damage vibration limits:

1. A Noise and Vibration Complaints management procedure should be implemented to deal with vibration complaints. Owners and occupants of nearby potentially affected properties are to be informed by direct mail/email or a direct telephone line and contact person where any noise and/or vibration complaints related to the construction activities are to be reported should be provided.

2. Each complaint should be investigated and where vibration levels are established as exceeding the set limits, appropriate amelioration measures should be put in place to mitigate future occurrences.

3. Where vibration is found to be excessive, management measures should be implemented to ensure vibration compliance is achieved. Management measures may include modification of construction methods such as using smaller equipment, establishment of safe buffer zones as mentioned above, and if necessary, time restrictions for the most excessive vibration activities. Time restrictions are to be negotiated with affected receivers.

4. Where construction activity occurs near sensitive receivers, vibration testing of actual equipment on site would be carried out prior to their commencement of site operation to determine acceptable minimum working distances to the nearby sensitive receiver/structures location/s.

5. If vibration intensive work is proposed to occur within the recommended minimum working distance, then the following would be carried out:

    a. Evaluate whether alternative construction methods, plant or equipment can be utilised for the works and re-assess potential impacts (if required).

    b. Undertake attended vibration measurements at the commencement of vibration-generating activities to establish site-specific minimum working distances and re-assess potential impacts (if required). This may include further detailed analysis based on the frequency content of the vibration levels.

    c. If there is any risk of exceeding the cosmetic damage objectives after all of the above options have been considered, a permanent vibration monitoring system should be installed, to warn plant operators (via flashing light, audible alarm, SMS, etc) when vibration levels are approaching the structural/cosmetic damage limits. It is recommended that for the operator alerts, that multiple alert levels are set. Typically, this would be an alert trigger level at 75% of the vibration criteria (ie. amber alert), and an alert trigger level at 100% of the vibration criteria (ie. red alert).

    d. A management procedure would be developed prior to the works taking place to determine the response to each trigger level. It is recommended that this includes a pause and management measures for an alert trigger level at 75% of the vibration criteria, and stop work at an alert trigger level at 100% of the vibration criteria. Where stop work is triggered, it is recommended that the following are undertaken:

        Stop works actions

        i. Investigate cause of exceedance

        ii. Visual inspection of the vibration sensitive building/structure/item including photos

        iii. If no cosmetic damage is found, works and vibration monitoring can be resumed

        iv. If cosmetic damage has been identified, repair damage or undertake any specific required action and a different construction method with lower source vibration levels is to be used.

e. If works are proposed within the cosmetic damage minimum working distance, prior to starting work a building/structure condition survey would be carried out on items within the minimum working distances and vibration limits determined to manage cosmetic damage.

6. Dilapidation surveys must be conducted at all receivers within close proximity of the construction site and potentially impacted.

7. Notification by letterbox drop would be carried out for all buildings in the vicinity of the construction site. These measures are to address potential community concerns that perceived vibration may cause damage to property. Notification is to be provided to all occupants prior to any works that may cause vibration.

5.7 Complaints management

Noise and vibration levels generated by construction activities associated with the construction of the development must aim to comply with the noise and vibration goals set by the relevant regulations and guidelines. The contractor is responsible for ensuring that all reasonable and feasible mitigation and management measures are implemented such as the provision of a Noise and Vibration Complaints Program, to minimise the generation of excessive noise and/or vibration levels from the site to nearby sensitive areas.

Owners and occupants of nearby affected properties are to be informed by direct mail/email or a direct telephone line and contact person to either make a noise and/or vibration complaint or request information.

Nearby development should be notified of the proposed works.

The notification should outline:

- Detail of a site point of contact.
- The anticipated duration of the project.
- Identify the duration of the construction works and stages.

Identify which stages will have greatest potential impact on each sensitive receiver. This will provide much clearer information for each party about how the site work will impact them specifically (the duration over which the greatest noise impact will occur).

All noise and/or vibration complaints associated with the construction works shall be investigated in accordance with the Noise / Vibration Complaint Management Procedure developed for the Proposal.

6 Operational noise assessment

6.1 Industrial noise

To undertake an operational noise assessment for the Proposal, the NPfI requires a comprehensive assessment of the potential operational noise emissions from the Proposal. The basis of these noise emissions is what would be the "reasonable worst case 15-minute period" noise emissions for each of the Day (7:00am to 6:00pm), Evening (6:00pm to 10:00pm) and Night (10:00pm to 7:00am) periods.

The noise sources and modelling associated with the operation of the Proposal have been based upon a detailed understanding of the existing and proposed operations of the premises through site visits and client analysis, measurements of existing Woolworths vehicle fleet and existing Wyong RDC noise sources.

The following assessment sections provide:

1. Descriptions of the noise modelling established for the project, along with the validation of the base model of the existing premises operational noise emissions to determine the model suitability.
2. Descriptions of the Proposal operations, assessment assumptions and assessment inputs
3. Summary of the assessed reasonable worst-case assessment scenarios
4. Predicted outcomes from the modelling and assessment.

6.1.1 Noise modelling parameters and setup

To calculate noise emissions from the Proposal, a 3D noise modelling was developed in CadnaA (Version 2021 MR 1). The noise prediction model considers:

- Location of noise sources and sensitive receiver locations.
- Heights of sources and receivers referenced to digital ground contours (1 metre contour intervals) or relative to the Proposal building structure.
- Each noise-sensitive building in the project has been assessed separately.
- Noise source levels of individual plant and equipment.
- Internal noise levels within the facility, and the breakout of these noise levels through the key building elements.
- Separation distances between sources and receivers.
- Ground type and reflections between sources and receivers.
- Attenuation from barriers, buildings and structures (natural terrain and purpose built).

- Atmospheric losses and meteorological conditions.

The CONCAWE noise propagation algorithm (CONCAWE report number 4/81, 1981) was implemented for assessing potential noise impacts for the Proposal. This algorithm is suitable as many of the nearest noise sensitive receivers to the Proposal site are located between 500 and 800 metres from the Proposal site, and the CONCAWE algorithm is to allow for the prediction of sound pressure levels during various meteorological conditions required by the NPfI.

Table 6.1 summarises the noise modelling parameters adopted for the Proposal operational noise assessment.

Table 6.1: Noise modelling parameters

Modelling parameter	Notes			
Algorithm	CONCAWE			
Meteorological conditions	Validation[1]	Category D 0 m/s wind toward receiver		
	Design[2]	Day Category D 3m/s wind toward receiver	Evening Category D 3m/s wind toward receiver	Night Category F 2m/s wind toward receiver
Buildings	Identified from site visits and Nearmap aerial imagery			
Terrain	1m DEM from NSW Government – Spatial Services			
Ground absorption coefficient	Hardstands on Wyong RDC site: 0 Grass covered, vegetation and suburban areas: 0.7			
Receiver locations	Identified in Table 2.2. Ground floor receivers have been placed at an elevation of 1.5m and first floor receivers at an elevation of 4.5m.			

Notes

1. Aligns with prevailing conditions during site visits
2. Noise-enhancing meteorological conditions according to Fact Sheet D of the NPfI

6.1.2 Noise source data

Noise measurements and observations of typical operational activities was undertaken previously at three similar distribution facilities to provide some of the noise source levels used in this assessment. The three distribution facilities where noise measurements were conducted are:

1. Big-W Distribution Centre, Hoxton Park
2. Woolworths Distribution Centre, Minchinbury
3. Woolworths Customer Fulfilment Centre, Brookvale

Both attended and unattended noise monitoring was undertaken as part of the measurements at these facilities. The activity noise source measurements conducted at these facilities applicable to this assessment were as follows:

1. **Big-W Distribution Centre, Hoxton Park** - measurements undertaken 3 March 2021 and 1 April 2021

    a) Prime mover and 16 metre rigid trailer

        1. Trailer only - Stationary cooling mode on internal diesel power
        2. Prime mover and 16 metre trailer accelerating from dock
        3. Prime mover and 16 metre trailer pass-by at on-site speed (20km/h)
        4. Prime mover engine start and idle

2. **Woolworths Distribution Centre, Minchinbury** - measurements undertaken 5 March 2021

    a) Yard tug

        1. Yard tug idling
        2. Yard tug with 16 metre trailer pass-by at on-site speed (20km/h)
        3. Truck pass-by at on-site speed (20km/h) pass-by at on-site speed (20km/h)
        4. Yard tug acceleration and reversing from dock, with and without trailer

3. **Woolworths Customer Fulfilment Centre, Brookvale -** measurements undertaken 16 March 2021, on ramps with similar gradients to those in the Proposal.

    a) Prime mover and 16 metre trailer

        1. Moving up ramp
        2. Moving down ramp
        3. Reversing in dock operation
        4. Truck/trailer airbrake events

These measurements were used to derive a range of noise source levels for this Proposal and are presented in Section 6.1.4.

Measurements of the noise source levels from the key noise generating plant/equipment were undertaken at three similar facilities with a sufficient duration to capture the total activity noise level (ie. arrival and departure manoeuvre, idle etc), and all relevant statistical measurement parameters (L_{Amax}, $L_{A1,T}$, $L_{A10,T}$, $L_{A90,T,}$ L_{Amin}) were recorded in accordance with AS1055:2018. For the trucks moving onsite, maximum pass-by noise levels were used to derive conservatively high sound power levels for the assessment. A summary of the measured noise levels for the key activities are presented in Table 6.2 and Table 6.3.

Table 6.2: Attended noise measurement results – Key distribution centre noise activities - Steady sound activities

Noise source / noise generating operation	Measured noise level, dB(A)			Comments on measured noise levels
	L_{Amax}	$L_{Aeq,t}$	$L_{A90,t}$	
16 metre trailer - Stationary cooling (diesel power)[2]	76	74	73	10m measurement. Note 1
Tug – Idling[3]	72	71	71	6m measurement. Note 1
Prime mover - Idling – no trailer[4]	68	67	66	8m measurement. Note 1

Notes:
1. Loudest location presented, derived source level based upon multiple measurement locations.
2. Big-W Distribution Centre, Hoxton Park, 3 March 2021
3. Woolworths Distribution Centre, Minchinbury, 5 March 2021
4. Woolworths Distribution Centre, Minchinbury, 1 April 2021

Table 6.3: Attended noise measurement results – Key distribution centre noise activities – Non-steady sound activities

Noise source / noise generating operation	Measured noise level, dB(A)					Comments on measured noise levels
	L_{Amax}	$L_{A1,t}$	$L_{A10,t}$	$L_{Aeq,t}$	$L_{A90,t}$	
Prime mover – Accelerating from stationary[1]	82	82	80	75	63	Moving source, closest measurement distance 7.5m.
Prime mover with trailer - Reversing beeper (operating during reversing with trailer)[3]	76	74	74	73	72	Source distance varied from 11m to 23m.
Yard tug – Accelerating from stationary with trailer attached[2]	81	81	81	76	74	Source distance varied from 6m at closest point to 13m.
Yard tug reversing onto trailer with reversing beeper[2]	85	85	85	80	77	Tonal reversing beeper. Source distance varied from 6m to 12m.
Airbrake event[3]	85	83	83	79	69	Measurement distance 23m.

Notes:
1. Big-W Distribution Centre, Hoxton Park, 3 March 2021
2. Woolworths Distribution Centre, Minchinbury, 5 March 2021
3. Woolworths Customer Fulfilment Centre, Brookvale, 16 March 2021

6.1.2.1 Derived sound power levels

Sound power level for noise sources on the site were derived from previous measurements and measurements of site-specific rooftop mechanical plant (refer Table 2.5). Noise source data is summarised in the following tables:

- Table 6.4 summarises the noise source data adopted for trucks and truck movements,

- Table 6.5 contains sound power levels for loading dock and stationary noise sources, and
- Table 6.6 lists the internal sound pressure levels used for noise breakout through openings.

Table 6.4: Summary of sound power levels, dB(A)

Equipment / Plant	Noise source / noise generating operation	Individual source/activity sound power level (SWL, re. 1pW), $L_{Aeq,t}$, dB(A)	Modelled source height above local ground level (m)
Prime mover with 16 metre refrigeration unit trailer/s[4]	Moving onsite (15km/h) – Trailer compressor + Engine	107	2
	Pass-by (moving up or down ramp ~ 10km/h) – Trailer compressor + Engine	107	2
	Accelerating from stationary (ie. dock) (up to 10km/h) – Engine	109	1.5
B-double with refrigeration unit trailer/s	Moving onsite (15km/h)[1] – Trailer compressors[5] + Engine	108	2
	Pass-by (moving up or down ramp ~ 10km/h) [1] – Trailer compressor[5] + Engine	108	2
	Accelerating from stationary (ie. dock) (up to 10km/h) – Engine	110	1.5
Used for either truck type	Airbrake (when stopping at dock) (L_{Amax})	120	0.5
	Airbrake (when stopping at dock) ($L_{Aeq, 15min}$)	90	0.5
	Truck reversing into dock with reversing beeper (operating during reversing at 2km/h)[2]	105	1.5
Yard tug	Moving onsite (15km/h) with trailer attached	103[6]	2
	Accelerating from stationary (ie. dock) with trailer attached (~ 10km/h)[3]	110	2
	Airbrake (when stop at dock) (L_{Amax})	120[3]	0.5
	Airbrake (when stop at dock) ($L_{Aeq, 15min}$)	90	0.5
	Reversing beeper (operating during reversing with trailer at 2km/h)[3]	108	1.5

Notes:
1. Not measured, assumed same as Prime mover with 16 metre trailer with additional trailer for movements.
2. Measurements were with a tonal reversing alarm. Broadband alarms are recommended to be incorporated across all heavy vehicles using the facility.
3. Assumed a trailer is attached for all modelling.
4. Due to the level of detail for the types of trucks, 11 metre rigid with refrigeration have been conservatively modelled as the Prime mover with 16 metre refrigeration unit trailer.
5. Assumes both trailers are the same level.

Table 6.5: Loading dock and existing stationary source sound power levels

Noise source / noise generating operation	Individual source/activity sound power level (SWL, re. 1pW), $L_{Aeq,t}$, dB(A)	Modelled source height above local ground level (m)
Loading dock activities		
16 metre trailer - Stationary cooling (diesel power)	101[1]	3.8
Tug – Idling	98[2]	1.5
Prime mover - Idling – no trailer	96	1.5
Existing		
Existing rooftop mechanical plant on western plantdeck of Wyong RDC building[3]	108	10.6

Notes:
1. Calculated based on typical Woolworths' fleet truck noise measurements on 3 March 2021
2. Calculated based on typical Woolworths' fleet truck noise measurements on 5 March 2021
3. Calculated from measurement at location M4, refer Table 2.5

Table 6.6: Internal noise levels / noise breakout

Noise source / noise generating operation[2]	Internal sound pressure level, dB(A) $L_{Aeq,T}$	Description of modelled source
Existing returns/liquor section of ambient warehouse breakout	66	Modelled at the openings at each end of the B-Double drive through (13mx4m)

Notes:
1. From measurement at location M7, refer Table 2.5.
2. Site observations noted that noise breakout through the façade, other than the identified openings, was substantially below the external noise level contributions.

6.1.3 Noise model validation

Noise measurements described in Section 2.3.3 were used to assist in the preparation and validation of the CadnaA noise model of the existing site. As the Wyong RDC is an existing, operational facility, validating a noise model ensures that assessment of the Proposal aligns with actual noise sources on the site, consistent with the guidance in Section 6 of the NPfI.

To account for the weather conditions during the measurement, the stability category was set to Category D and wind speed amended to 0 m/s. Humidity was set at 90% and the temperature to 25°C.

Sound power levels used for the validation model are the same as those in Table 6.4 to Table 6.6. Quantities, locations and on-time durations of noise sources were set in line with site observations and review of concurrent video. A summary of the activities on the site during the validation period are presented in Table 6.7.

Table 6.7: Noise model validation scenario - Representative noise intensive 15-minute measurement period (10/12/2021 6:00am-6:15am)

Site location	Sources modelled
Gatehouse	• Incoming truck idling at gatehouse • Outgoing truck idling at gatehouse • Truck airbrake at gatehouse exit • Truck airbrake at gatehouse entry • Truck airbrake at terminal • Truck idling at terminal • Trucks accelerate from terminal and toward parking
TC/fresh produce warehouse	• Refrigerated trailer • Truck accelerate out of TC dock • Truck from pedestrian crossing to staging area • Truck moving from TC to pedestrian crossing • Truck moving to TC dock • Truck reversing into TC dock
Ambient warehouse and truck staging area	• Truck idling at staging area • Truck airbrake at staging area • Truck leave Ambient dock to staging area • Truck moving to Ambient dock • Truck reversing into Ambient dock • Trucks from staging area to gatehouse
Site access via Warren Road	• Trucks entering site (up to weighbridge) • Trucks entering site from weighbridge • Trucks entering site from weighbridge (via parking area) • Trucks leave site from gatehouse • Trucks accelerate from terminal and leave site
Rear of building	• Rooftop plant
Yard tugs	• Tug moving from Ambient to TC • Tug pull out trailer near Ambient docks • Tug pulling trailer out from near TC docks • Tug reverse to trailer near Ambient docks • Tug reverse trailer into Ambient dock • Tug reversing to trailer near TC docks • Tug reversing trailer into TC produce dock

The outcomes from the model validation scenarios are presented in Table 6.8. The noise model was validated against the noise measurements to within 1 dB(A) at the two validation locations (M5 and M6). Based on this validation, the noise model and sound power levels are considered suitable for modelling and assessing noise emissions from the Proposal.

Table 6.8: Comparison between measured and modelled noise levels

Location	Date and time	Notes	Modelled sources	Measured noise level, dB(A) $L_{eq,T}$	Predicted noise level, dB(A) $L_{eq,T}$	Difference, dB
M6	10/12/2021 6:00am-6:15am	***Representative noise intensive 15-minute measurement period*** Trucks entering and departing site; trucks idling at gatehouse; steady sources on site audible in absence of nearby trucks	All sources in Table 6.7	67	67	< 1
M6	10/12/2021 6:10-6:12am	***Low activity period during 15-minute measurement, only steady site noises contributing.*** No trucks near logger; steady sources on the site (primarily refrigerated trailers, also idling truck at staging area) audible and controlling background noise level	23 refrigerated trailers at TC/fresh produce docks, truck idling at staging area	59	58	< 1
M5	25/11/2021 4:40am-4:43am	***Steady TC noises contributing.*** Car park facing TC docks. 2 or 3 docks not in use, all others with a refrigerated trailer (compressor running).	20 refrigerated trailers at TC/fresh produce docks	70	70	< 1

6.1.4 Description of operational assumptions

6.1.4.1 Overview of noise generating activities

Wyong RDC has two primary areas of operation: the temperature controlled (TC) warehouse used for chilled products and fresh produce (TC/produce), and the ambient warehouse for products that do not need to maintain a set temperature (Ambient). Additionally, there is a Returns facility at the southern end of the Ambient warehouse and handles pallet returns and liquor freight. These are all shown in Figure 6.1.

All docks at the TC/produce warehouse are rear-loading docks. There are unused finger docks which are being removed as part of the Proposal. The Ambient warehouse has mostly rear-loading docks, but the Returns facility has finger docks that are used for side-loading (primarily for liquor freight).

Heavy vehicles travelling to and from the site can be classified into two main categories: deliveries to the Wyong RDC from suppliers or other facilities in the Woolworths network (Primary freight), and Woolworths fleet vehicles that are loaded and dispatched to customer stores (Secondary fleet). Additionally, trucks that operate through the Returns facility are third-party heavy vehicles, such as Chep and Loskam, that attend site to collect pallets, produce crates and other reusable packaging items.

Table 6.9 provides an overview of each aspect of the site. Figure 6.1 and Figure 6.2 show markups of the Proposal site plan showing the general areas described in this section, as well as approximate truck movement paths.

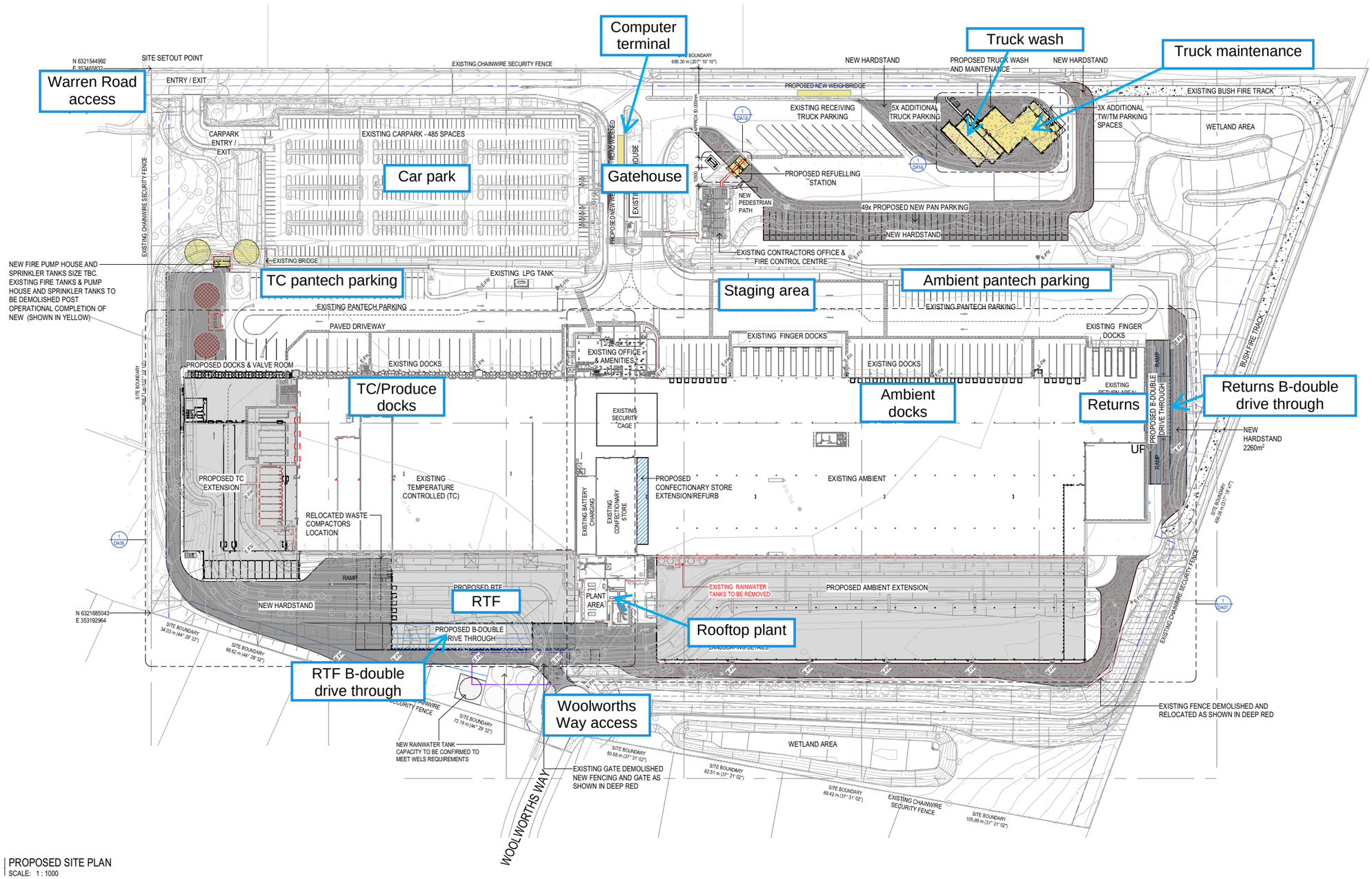
Table 6.9: Description of site noise-generating elements of the Proposal

Operational element	Description of operation	Typical quantities and timing of operation
Trucks to and from the site		
Primary freight	Trucks enter site via Warren Road. Most proceed straight through gatehouse, but some idle at gatehouse or in the truck parking area. Trucks proceed from gatehouse to their allocated dock, where they reverse into the dock. Once unloading is complete, truck proceeds to gatehouse, is processed by security, and then leaves site via Warren Rd. Truck types can vary from medium rigids to B-Doubles, with the majority being semi-trailers.	Refer Table 6.10 for typical expected quantities
Secondary freight	Prime mover moves from staging area or car park to allocated dock, where it is then coupled to a trailer. Truck then proceeds to staging area and idles while driver checks load and attends office. Truck proceeds to gatehouse where it is processed by security, then moves to a computer terminal before crossing weighbridge and leaving site via Warren Rd. Truck types can vary from medium rigids to B-Doubles, with the majority being semi-trailers.	
Temperature controlled and fresh produce warehouse (TC/Produce)		
Refrigerated trailers in docks	Refrigerated trailers without prime mover are located on each dock for unloading primary freight and loading secondary freight. The trailer refrigeration compressors is running on all trailers to maintain temperature during loading/unloading.	All docks occupied during peak times (4-6am) Approx. 70-80% occupied outside peak times, based on site observations.
Warehouse internal activities	Roof-mounted cooling units operating continuously. Pallet loaders and electric forklifts operating with semi-regular horn events. Occasional bangs and clatters from stacking pallets.	Varies. Approximately 4-6 pallet loaders at fresh produce docks and 4-6 at chilled docks observed during site visit. Additional units operating along aisles. Operations are generally more intense during peak times due to time-critical nature of fresh produce delivery.
Ambient warehouse (Ambient)		
Trailers in docks	Trailers without prime mover are located on each dock for unloading primary freight and loading secondary freight. Trailers do have compressors fitted but are rarely operating when in an Ambient dock. Mixed loads (part chilled, part ambient) are occasionally prepared but are not common.	Approx 50-100% of docks occupied at a time

Operational element	Description of operation	Typical quantities and timing of operation
Returns/liquor	Trailers are located alongside the finger docks inside the warehouse. No compressor are fitted to these trailers. Electric forklifts load and unload liquor freight via side loading.	Approx 2-4 trailers and approx. 4-5 electric forklifts operating inside. One forklift for moving pallets
Warehouse internal activities	Pallet loaders and electric forklifts operating with semi-regular horn events. Occasional bangs and clatters from stacking pallets. Low level radio playing music throughout the warehouse.	Varies. Approximately 4-6 pallet loaders at docks observed during site visit. Additional units operating along aisles. Operations are generally consistent throughout the day as outgoing deliveries are usually not as urgent as stock at TC/produce. .
Yard tugs		
General operations	Tugs move between TC/produce and Ambient warehouses as-needed. Transfer trailer from pan-tech parking to dock and vice versa.	Typically 2 yard tugs during busy times. One yard tug in use during quieter parts of the day.
B-doubles drive through		
Current operations	Primary fleet: Each trailer is removed one at a time and then transferred to a dock by a yard tug or the prime mover itself.	Approx 1-2 B-doubles during busy times
Proposed operations	B-double drive throughs so trailers do not always need to be uncoupled for loading/unloading	Approx 19 per day through drive-through, remainder will be broken and transferred to docks
Returns and Transfer Facility (RTF)		
Third party collections	The proposed RTF will service semi-trailers and B-doubles sent by third parties collecting pallets, produce containers etc	Varies. Site observations noted two semi-trailers between approx. 5-6am for pallet collection.
Woolworths Way	Currently, Woolworths Way is not used for trucks entering or leaving site. Woolworths Way will be used in Proposal for Returns trucks and some semi-trailers as required.	Assumed Returns trucks will prioritise Woolworths Way during busy times.
Mechanical plant and equipment and building services		
Mechanical plant and equipment and building services	The key mechanical plant and equipment are located in the dedicated plant area on the western side of the building. Additionally there are roof mounted exhaust fans located along the western end of the Ambient warehouse roof, and in the centre of the roof of the Ambient and TC/produce warehouses. Rotating ventilators are located on the roof to ventilate penthouse spaces. Building services component that typically operate and should be considered in the noise assessment are: • Warehouse exhaust system • Office and building condensing plant areas	Key noise generating mechanical plant and equipment noise sources could operate 24/7.
Other RDC operations		
Trailer maintenance activities	Inside trailer maintenance building, with doors open. Capacity for 4 trailers inside.	Typically operating between 7:00am to 5:00pm weekdays

Operational element	Description of operation	Typical quantities and timing of operation
Truck wash bay	Truck washing (pressure washer) inside the proposed truck wash building. Capacity for two semi-trailers inside.	Typically operating between 7:00am to 5:00pm Sunday, Monday and Wednesday
Office activities	General office operations (warehouse office areas and main office)	It would be expected that office hours and associated noise generating activities would typically occur between 7:00AM to depart 6:00PM Monday to Friday.
Carparking	General carparking activities (487 parking spaces provided)	Between approximately 100 and 300 staff per shift could arrive or depart from a shift. Three shifts [Day (5:00am-1:00pm), Afternoon (1:00pm-9:00pm) and Night (9:00pm-5:00am)] Shifts run on a staggered start basis, with staff arriving/ departing typically an hour either side of the shift change.

Attended measurements and site observations determined that noise breakout through the building fabric from activities within the warehouses, in addition to mechanical plant with the exception of the western plantdeck area, was negligible to the overall noise emissions which was controlled by external activities. The Proposal considers B-double drive throughs with open ends, where truck loading and unloading will occur similar to current operations at the existing Returns facility. As such, the only noise breakout source considered further in the modelling is that of the B-double drive through openings.



PROPOSED SITE PLAN
SCALE: 1 : 1000

NO:	DATE:	REVISION:	BY:	CHK:
P4	16.02.2022	TRUCKWASH/MAINTENANCE UPDATE	RF	JC
P5	18.02.2022	ISSUED FOR INTERNAL APPROVAL	RF	JC
P6	21.02.2022	SITE PLAN UPDATES	RF	JC
P7	22.02.2022	GEO REFERENCED SITE PLANS	RF	JC
P8	02.03.2022	ISSUED FOR INFORMATION	RF	JC

Watson Young Architects Pty Ltd 8 Grattan Street Prahran Victoria 3181 Australia
ACN: 111368700 T 03 9516 8555 info@watsonyoung.com.au www.watsonyoung.com.au

PROJECT:
PROPOSED EXTENSION TO WYONG RDC
11 WARREN ROAD, WARNERVALE

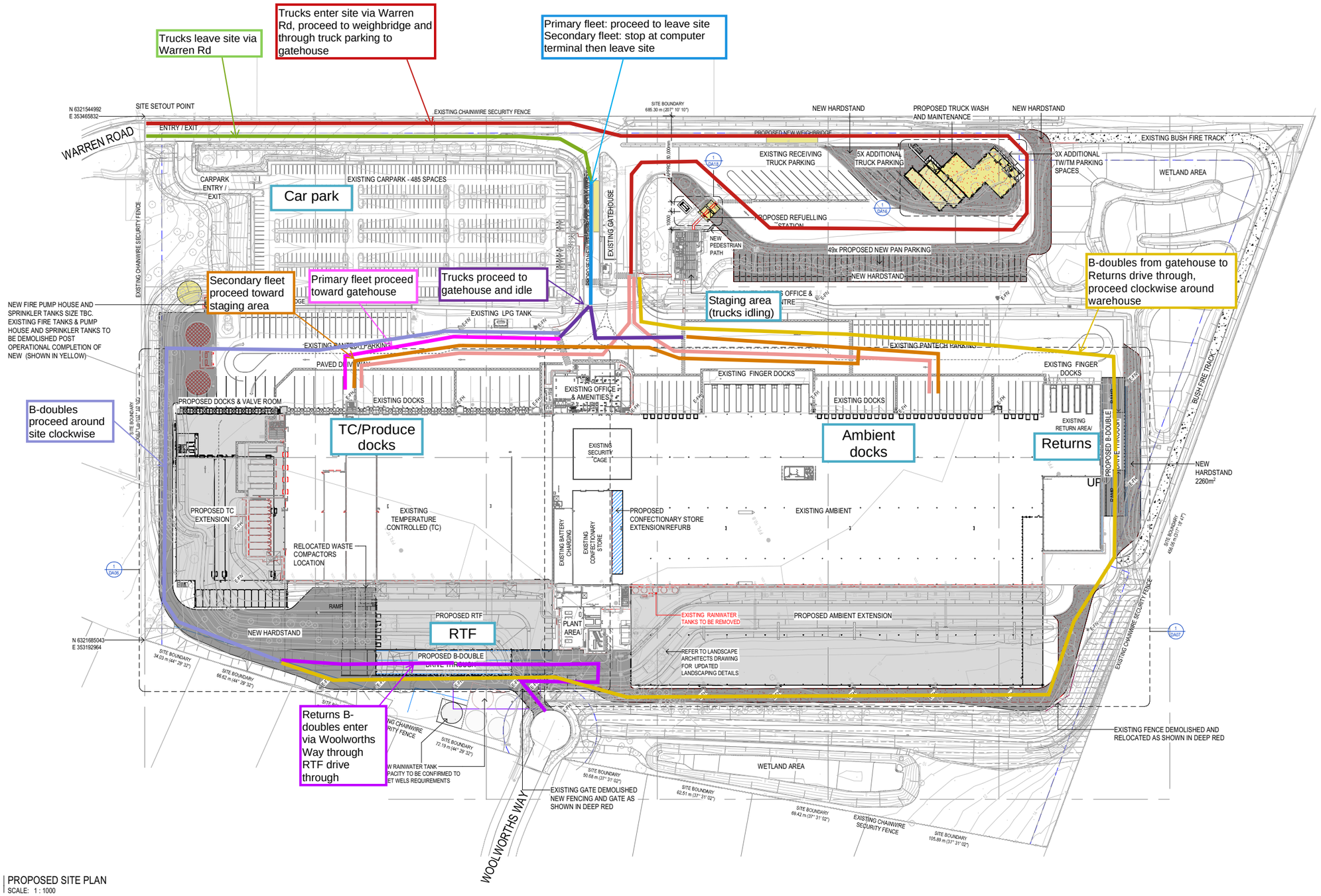
TITLE:
PROPOSED SITE PLAN

CLIENT:
WOOLWORTHS LTD

DATE: January, 2022
DRAWN BY: RF
SCALE: As indicated
SCALE:

JOB NO: 20231
DRAWING NO: DA05
REVISION: P8

watson young



PROPOSED SITE PLAN
SCALE: 1 : 1000

NO:	DATE:	REVISION:	BY:	CHK:
P4	16.02.2022	TRUCKWASH/MAINTENANCE UPDATE	RF	JC
P5	18.02.2022	ISSUED FOR INTERNAL APPROVAL	RF	JC
P6	21.02.2022	SITE PLAN UPDATES	RF	JC
P7	22.02.2022	GEO REFERENCED SITE PLANS	RF	JC
P8	02.03.2022	ISSUED FOR INFORMATION	RF	JC

Watson Young Architects Pty Ltd 8 Grattan Street Prahran Victoria 3181 Australia
ACN: 111368700 T 03 9516 8555 info@watsonyoung.com.au www.watsonyoung.com.au

PROJECT:
PROPOSED EXTENSION TO WYONG RDC
11 WARREN ROAD, WARNERVALE

TITLE:
PROPOSED SITE PLAN

TN / PN

CLIENT:
WOOLWORTHS LTD

DATE: January, 2022
DRAWN BY: RF
SCALE: As indicated
SCALE:

JOB NO: 20231
DRAWING NO: DA05
REVISION: P8

watson young

6.1.4.2 Heavy vehicle traffic volumes and composition

The truck movements through the facility can be split into three categories:

- Primary freight – trucks delivering goods to the Wyong RDC;
- Secondary freight – trucks delivering goods to stores; and
- Returns and Waste Management – trucks from third parties colleting items such as pallets and produce crates, and waste collection services.

Table 6.10 presents a summary of the forecasted vehicles for the Proposal provided by the project team.

Table 6.10: Predicted hourly heavy vehicles and composition, 2033

Time	Primary fleet			Secondary fleet			Total Heavy Vehicles
	B-doubles	Semi-trailers / Rigid	Total	B-doubles	Semi-trailers / Rigid	Total	
12:00 AM	0	0	0	0	0	0	0
1:00 AM	3	12	15	0	0	0	15
2:00 AM	3	12	15	0	0	0	15
3:00 AM	5	18	23	0	9	9	32
4:00 AM	5	18	23	0	4	4	27
5:00 AM	7	23	30	1	17	18	48
6:00 AM	3	17	20	1	8	9	29
7:00 AM	2	16	18	1	12	13	31
8:00 AM	2	17	19	1	20	21	40
9:00 AM	0	4	4	1	16	17	21
10:00 AM	0	4	4	1	9	10	14
11:00 AM	2	4	6	1	25	26	32
12:00 PM	0	0	0	1	5	6	6
1:00 PM	0	0	0	1	13	14	14
2:00 PM	5	10	15	1	8	9	24
3:00 PM	3	7	10	1	22	23	33
4:00 PM	0	2	2	0	7	7	9
5:00 PM	2	7	9	1	13	14	23
6:00 PM	3	8	11	0	8	8	19
7:00 PM	3	11	14	1	6	7	21
8:00 PM	7	18	25	1	18	19	44
9:00 PM	5	14	19	0	0	0	19
10:00 PM	4	13	17	0	0	0	17
11:00 PM	0	6	6	0	0	0	6
Daily Total	**64**	**241**	**305**	**14**	**220**	**234**	**539**

Notes: 1. One vehicle moves to and from the facility i.e. 2 movements on the public road.

Table 6.10 shows that for the day period, the highest hourly heavy vehicle movements occur 8:00am-9:00am; for the evening period 8:00pm-9:00pm; and for the night period 5:00am-6:00am.

Based on site observations during a busy morning peak period on the site (Thursday 10 December 2021, between approximately 3:00am and 6:30am), the following split between each warehouse was adopted:

- 50% of primary freight and 60% of secondary freight attributed to the TC/produce warehouse
- 50% of primary freight and 40% of secondary freight attributed to the Ambient warehouse

Site observations also found that two flatbed semi-trailers entered and departed the site. These trucks collected pallets from the Wyong RDC via the existing Returns area of the Ambient warehouse. For this assessment, a B-double is assumed to enter via Woolworths Way to the RTF B-double drive through, and then leave the site via Warren Road. A total of 4 B-doubles per day for returns are assumed.

Approximately 19 (30%) primary freight B-doubles per day are expected to use the proposed B-double drive through at the RTF on the southern end of the site. For the assessment, it is assumed 30% of primary freight B-doubles each hour will use the B-double drive through, then proceed clockwise around the building and depart via Warren Road.

Airbrake events were observed to take place at locations where trucks come to a stop, including at docks, at the staging area, and at the gatehouse and terminal. For this assessment, airbrake events have been modelled in these areas as they are not expected to commonly occur elsewhere.

6.1.4.3 Loading dock activities

There are approximately 31 rear-loading docks and 12 finger docks at the existing Ambient warehouse. At the TC/produce warehouse, there are 23 existing loading docks, with 10 additional docks for the TC/produce warehouse proposed. Existing finger docks at the TC/produce warehouse will be removed as part of the expansion.

From site observations, trailers at the TC/produce docks had cooling units running continuously during loading/unloading. This was not observed for trailers at the Ambient warehouse. In addition, all docks were filled during the busy morning period and each departing trailer was, generally, quickly replaced. For this assessment, all docks are assumed to be filled and all TC/produce docks are assumed to have cooling units running.

6.1.4.4 Staff vehicle movements and car parking

Parking on-site is in the existing car park at the north-east of the site, accessible via the main site entry which in turn is accessible via Warren Road. The Proposal forecasts approximately 100-300 staff per shift in 2033. 90% of the shift staff will arrive using their own car and the remaining 10% will arrive in shared vehicles (car-pooling and public transport). There are three shifts [Day (5:00am-1:00pm), Afternoon (1:00pm-9:00pm) and Night (9:00pm-5:00am)] which run on a staggered start basis, with staff arriving/departing typically an hour either side of the shift change.

For this assessment, staff vehicles entering/departing are conservatively assumed to occur within one hour. A shift change does not occur around 8:00am-9:00am. Table 6.11 summarises the number of light vehicles considered in each assessment period.

Table 6.11: Car parking activity considered for assessment

Representative assessment period time of day	Assessment period	Number of light vehicles entering site	Number of light vehicles departing site
8.00-9.00am	Daytime	0	0
8.00-9.00pm	Evening	104[1]	297[2]
5.00-6.00am	Night	297[2]	220[3]

Notes

1. Staff head count for the Night (9:00pm-5:00am) shift
2. Number of staff vehicles for the Day (5:00am-1:00pm) shift)
3. Number of staff vehicles for the Afternoon (1:00pm-9:00pm) shift

Noise generated by car park activities includes vehicle doors closing, vehicle engines starting, vehicles accelerating and vehicles moving. The sound power levels generated by carpark activities on site are presented in Table 6.12 sourced from the Renzo Tonin & Associates database.

Table 6.12: Carpark activity sound power levels

Activity	Metric	Individual noise source sound power level, $L_{Aeq,t}$ dB(A) re. 1pW	Modelled source height above local ground level (m)
Vehicle moving (10km/h)	Passby L_W	79	0.5
Door slam	L_W+10log(t)	86	0.5
Engine start	L_W+10log(t)	92	0.5

6.1.4.5 Other distribution centre activity typical noise sources

The following other noise generating activities are proposed to take place as part of typical distribution centre operations:

1. Trailer maintenance activities (located within proposed truck maintenance building, 7:00am to 5:00pm weekdays)

2. Truck washing activities (located within proposed truck wash building, 7:00am to 5:00pm Sunday, Monday and Wednesday)

Table 6.13: Other noise sources

Noise source	Location	Item sound power level, dB(A)	Number of items	Internal sound pressure level, dB(A) $L_{eq,15min}$[1]
Trailer maintenance activities (rattle gun)	Inside trailer maintenance building, doors open	96	4 3 mins operation	80
Truck washing (pressure washer)	Inside truck wash, doors open	101	1 per truck wash bay	89

Notes:

1. Assumed all internal surfaces have sound absorption coefficients similar to steel and concrete

6.1.4.6 Key building services and mechanical plant

Additional building services and mechanical plant and their location on site are yet to be finalised at this early development approval stage of the project. The key known building services and mechanical plant items to be considered for the noise assessment are the existing cooling towers and rooftop air handling units above the workshop part of the Wyong RDC building. This area is on the western side of the Wyong RDC near the Woolworths Way entrance.

Table 6.14 details the mechanical plant assumed as part of the modelling for this assessment, with noise source levels included in Table 6.5.

Table 6.14: Assumed mechanical plant noise sources, dB(A)

Noise source	Number of units	Individual source/activity sound power level (L_w re. 1pW), $L_{Aeq,t}$	Location
Western plantdeck mechanical equipment (rooftop cooling towers and air handling units)[1]	-	Refer to Table 6.5	Level 2 roof, located on western end of building above workshop.

Note:
1. Rooftop plant considered as one source in noise model with sound power level derived from measurement at location M4
2. Plant and equipment not listed above has not been assessed as it did not appreciably contribute to existing site outdoor noise emissions observed during site visits.

6.1.4.7 Emergency plant and equipment

The following noise generating plant are proposed to be included in the Proposal:

1. Fire pump, located within a dedicated fire pump house on the northern end of the site.

Due to the infrequent and non-typical operating nature of this emergency plant and equipment items, they do not operate as part of normal reasonable worst-case operations as they are for emergency and stand-by usage only. For this reason and in the absence of any directly relevant NSW guideline or specific guidance for emergency and stand-by equipment, they do not form part of the reasonable worst case 15-minute scenario modelling.

However, feasible and reasonable mitigation and management should be implemented in accordance with the NPfI in order to minimise the potential noise impacts on nearby sensitive receivers. The project trigger levels presented in Section 4.1.4 are not directly suitable or applicable to the stand-by and emergency plant but can serve as a guide for reviewing selections and feasible and reasonable mitigation and management at detailed design.

As such, the following recommendations should be incorporated:

1. For selection and installation of the emergency fire pump, it is to be located within an acoustically rated building, and a residential grade exhaust flue silencer is to be installed to minimise noise impacts at the nearest residential receivers during testing and maintenance procedures.

2. All emergency plant and equipment are to be tested and maintained during the daytime weekday period (7:00am to 6:00pm).

3. All noise mitigation and management measures should generally be selected to not substantially increase the cumulative site noise emissions during testing [ie. not increase total site noise emissions by more than 5 dB(A)].

4. The design of noise levels from emergency plant and equipment should consider the internal noise level requirements during emergencies detailed in Section 4.6 of AS/NZS 1668:2015.

6.1.5 Summary of noise assessment scenarios

To assess noise impacts from the Proposal, 'reasonable' worst-case scenarios (15-minute period) assessment scenarios have been developed for assessing noise emissions from the facility for each assessment period (ie. day, evening, night and morning shoulder). These scenarios have been developed based upon the aforementioned operational assumptions, operational inputs from the project team including potential traffic movements projected for the Proposal.

Considering the operational information and assumptions presented, noise sources for the 'reasonable' worst-case scenarios (15-minute period), covering the key noise generating activities detailed and noise intensive periods across the Proposal site are summarised in Table 6.15 for key times in each assessment period.

Table 6.15: Representative 'reasonable' worst-case 15-minute noise generating assessment scenarios

Activity	Daytime	Evening	Night
Representative period	***8:00am-9:00am***	***8:00am-9:00pm***	***5:00am-6:00am***
Heavy vehicles entering/departing the site			
Primary freight[1]	2 B-doubles per hour 17 semi-trailers per hour All trucks entering site from Warren Rd via parking area All trucks stop at gatehouse for up to 2 minutes, then depart site via Warren Rd	7 B-doubles per hour 18 semi-trailers per hour All trucks entering site from Warren Rd via parking area All trucks stop at gatehouse for up to 2 minutes, then depart site via Warren Rd	7 B-doubles per hour 23 semi-trailers per hour All trucks entering site from Warren Rd via parking area All trucks stop at gatehouse for up to 2 minutes, then depart site via Warren Rd
Secondary freight[1]	1 B-double per hour 20 semi-trailers per hour Prime movers from truck parking within site to dock All trucks stop at gatehouse for up to 2 minutes, stop at terminal for up to 2 minutes, then depart site via Warren Rd	1 B-double per hour 18 semi-trailers per hour Prime movers from truck parking within site to dock All trucks stop at gatehouse for up to 2 minutes, stop at terminal for up to 2 minutes, then depart site via Warren Rd	1 B-double per hour 17 semi-trailers per hour Prime movers from truck parking within site to dock All trucks stop at gatehouse for up to 2 minutes, stop at terminal for up to 2 minutes, then depart site via Warren Rd
Returns[1]	1 B-double per hour enters via Warren Rd 1 B-double per hour departs via Warren Rd	2 B-doubles per hour enter via Warren Rd 2 B-doubles per hour depart via Warren Rd	2 B-doubles per hour enter via Warren Rd 2 B-doubles per hour depart via Warren Rd

Activity	Daytime	Evening	Night
Representative period	***8:00am-9:00am***	***8:00am-9:00pm***	***5:00am-6:00am***
RTF[1]	1 B-double per hour enters via Woolworths Way, 1 B-double per hour departs via Warren Rd	1 B-double per hour enter via Woolworths Way, 1 B-double per hour departs via Warren Rd	1 B-double per hour enter via Woolworths Way, 1 B-double per hour departs via Warren Rd
Internal heavy vehicle movements			
Primary freight [1]	Trucks move to and reverse into dock, then proceed to gatehouse Ambient: 9 per hour TC/produce: 10 per hour	Trucks move to and reverse into dock, then proceed to gatehouse Ambient: 12 per hour TC/produce: 12 per hour	Trucks move to and reverse into dock, then proceed to gatehouse Ambient: 15 per hour TC/produce: 15 per hour
Secondary freight[1]	Trucks move to and reverse into dock, then move to staging area Ambient: 8 per hour TC/produce: 11 per hour	Trucks move to and reverse into dock, then move to staging area Ambient: 7 per hour TC/produce: 11 per hour	Trucks move to and reverse into dock, then move to staging area Ambient: 7 per hour TC/produce: 11 per hour
Returns[1]	1 B-double move past Ambient docks to RTF drive-through, proceed clockwise around building past TC/produce docks	2 B-doubles move past Ambient docks to RTF drive-through, proceed clockwise around building past TC/produce docks	2 B-doubles move past Ambient docks to RTF drive-through, proceed clockwise around building past TC/produce docks
RTF[1]	1 B-double moves to RTF drive-through, proceed clockwise around building past TC/produce docks	1 B-double moves to RTF drive-through, proceed clockwise around building past TC/produce docks	1 B-double moves to RTF drive-through, proceed clockwise around building past TC/produce docks
Yard tugs	2 tugs operating Tugs move between Ambient and TC/produce warehouses Tugs move 8 trailers per hour between docks and pan-tech parking (2 per 15 min)	2 tugs operating Tugs move between Ambient and TC/produce warehouses Tugs move 8 trailers per hour between docks and pan-tech parking (2 per 15 min)	2 tugs operating Tugs move between Ambient and TC/produce warehouses Tugs move 8 trailers per hour between docks and pan-tech parking (2 per 15 min)
Staging area	All secondary freight move from staging area to gatehouse before departing site 11 prime movers per hour to TC/produce docks	All secondary freight move from staging area to gatehouse before departing site 11 prime movers per hour to TC/produce docks	All secondary freight move from staging area to gatehouse before departing site 13 prime movers per hour to TC/produce docks
Stationary/fixed			
Rooftop mechanical plant	Operating continuously	Operating continuously	Operating continuously
Refrigerated trailers	All 33 TC/produce docks occupied with refrigerated trailer compressor running. 2 refrigerated trailers with prime mover at staging area running.	All 33 TC/produce docks occupied with refrigerated trailer compressor running. 2 refrigerated trailers with prime mover at staging area running.	All 33 TC/produce docks occupied with refrigerated trailer compressor running. 2 refrigerated trailers with prime mover at staging area running.
B-double drive through (Returns)	Noise breakout through open drive-through ends Internal sound pressure level similar to existing Returns area	Noise breakout through open drive-through ends Internal sound pressure level similar to existing Returns area	Noise breakout through open drive-through ends Internal sound pressure level similar to existing Returns area

Activity	Daytime	Evening	Night
Representative period	***8:00am-9:00am***	***8:00am-9:00pm***	***5:00am-6:00am***
B-double drive through (RTF)	Noise breakout through open drive-through ends Internal sound pressure level similar to existing Returns area	Noise breakout through open drive-through ends Internal sound pressure level similar to existing Returns area	Noise breakout through open drive-through ends Internal sound pressure level similar to existing Returns area
Parking areas			
Truck maintenance	Maintenance operations taking place	No activity	No activity
Truck wash	Truck washing operations	No activity	No activity
Carpark	No activity	104 cars entering 297 cars departing	297 cars entering 220 cars departing

Notes:

1. Number of vehicles are per hour. Worst-case 15 minute period is assumed 25% of quoted vehicle numbers, and operations
2. Numbers of movements captures the overall number within the facility, and this may not reflect one individual truck (ie. one are arrive to dock, and then one leaves dock, while the first truck is still being loaded/unloaded).

Across the various operational areas presented in Table 6.16 are the potential noise sources that could result in instantaneous noise events that could typically occur as part of operations that have been assumed in the sleep disturbance assessment at night. The locations of these key areas can be seen in Figure 6.1 for reference.

Table 6.16: Instantaneous noise events assessment scenarios (night period)

Location / activity	Instantaneous noise sources (L_{Amax} event)
Internal heavy vehicle movements	
Rigids/Semi-trailers/B-Doubles	Truck acceleration
Carpark and service vehicles	Car / service vehicle engine start Car / service vehicle door slam
Loading dock and delivery activities	
Loading dock area	1. Truck airbrake 2. Truck accelerate 3. Reversing activities

6.1.6 Predicted operational noise levels

Table 6.17 presents the predicted noise levels from the operational scenarios described in Section 6.1.4.6.

The predicted noise levels from the Proposal meet the project noise trigger levels at all sensitive receivers.

Noise contour maps at 1.5 metres above the local ground level for each of the scenarios assessed are presented in APPENDIX D. The maps show the predicted noise levels at the noise assessment receivers and the surrounding area, as well as the project noise trigger levels.

Table 6.17: Predicted noise levels – Operational noise emissions

ID	Address	Receiver type	Predicted noise level, $L_{eq\ 15min}$, dB(A)			Project noise trigger level, $L_{eq\ 15min}$ dB(A)			Complies?		
			Day[1]	Evening[2]	Night[3]	Day	Evening	Night	Day	Evening	Night
R1	187 Sparks Road, Halloran	Residential	33	34	34	53	43	38	Yes	Yes	Yes
R2	211 Sparks Road, Halloran	Residential	35	35	35	53	43	38	Yes	Yes	Yes
R3	221 Sparks Road, Halloran	Commercial	35	35	35	63	63	63	Yes	Yes	Yes
R4	13 Buttonderry Way, Jilliby	Residential	37	37	37	56	55	44	Yes	Yes	Yes
R5	15 Buttonderry Way, Jilliby	Residential	37	37	37	56	55	44	Yes	Yes	Yes
R6	17 Buttonderry Way, Jilliby	Residential	35	36	36	56	55	44	Yes	Yes	Yes
R7	17 Buttonderry Way, Jilliby	Residential	34	35	35	56	55	44	Yes	Yes	Yes
R8	19 Buttonderry Way, Jilliby	Residential	35	35	35	56	55	44	Yes	Yes	Yes
R9	21 Buttonderry Way, Jilliby	Residential	34	34	34	56	55	44	Yes	Yes	Yes
R10	23 Buttonderry Way, Jilliby	Residential	34	34	34	56	55	44	Yes	Yes	Yes
R11	5 The Downs, Jilliby	Residential	29	29	29	48	43	38	Yes	Yes	Yes
R12	7 The Downs, Jilliby	Residential	30	30	30	48	43	38	Yes	Yes	Yes
R13	6 The Downs, Jilliby	Residential	33	33	33	48	43	38	Yes	Yes	Yes
R14	4 The Downs, Jilliby	Residential	28	28	28	48	43	38	Yes	Yes	Yes
R15	11 Buttonderry Way, Jilliby	Residential	31	31	31	48	43	38	Yes	Yes	Yes
R16	9 Buttonderry Way, Jilliby	Residential	31	31	31	48	43	38	Yes	Yes	Yes
R17	3 The Downs, Jilliby	Residential	29	29	29	48	43	38	Yes	Yes	Yes
R18	1 The Downs, Jilliby	Residential	28	28	28	48	43	38	Yes	Yes	Yes
R19	220 Sparks Road, Jilliby	Residential	30	30	30	48	43	38	Yes	Yes	Yes
R20	5 Warren Road, Warnervale	Industrial	64	64	64	68	68	68	Yes	Yes	Yes
R21	12 Burnet Road, Warnervale	Industrial	53	54	54	68	68	68	Yes	Yes	Yes
R22	18 Burnet Road, Warnervale	Industrial	53	53	53	68	68	68	Yes	Yes	Yes
R23	171 Sparks Road, Halloran	Residential	37	37	37	53	43	38	Yes	Yes	Yes
R24	80 Mountain Road, Halloran	Residential	33	33	33	53	43	38	Yes	Yes	Yes
R25	80 Mountain Road, Halloran	Residential	34	34	34	53	43	38	Yes	Yes	Yes

6.1.7 Annoying noise characteristics adjustments

Where the character of the industrial noise is assessed as particularly annoying at a receiver location (ie. if the resulting noise level at a receiver location is tonal, low frequency or is intermittent at night), then an adjustment would be added to penalise the predicted noise for its potential increase in annoyance. The Fact Sheet C of the NPfI provides definitive procedures for determining whether a modifying factor should be applied which is assessed as part of the Proposal. The corrections are to be added to the predicted noise levels at the receiver before comparison with the project noise trigger levels.

The noise sources used for modelling were based upon measurements of the noise sources at similar warehouse and distribution facilities, and these measurements sufficiently captured the duration of the total activity noise level (ie. incoming manoeuvre, idle, departure manoeuvre etc), and all recorded the relevant statistical measurement parameters (L_{Amax}, $L_{A1,T}$, $L_{A10,T}$, $L_{A90,T}$, L_{Amin}) in accordance with AS1055:2018.

It is also noted that as detailed in Section 2.3.3, the existing facility operations at the nearby residential receivers is currently inaudible based upon the night-time attended noise measurements, and as such there are no annoying characteristics from noise emissions at these receivers.

6.1.7.1 Tonality

One noise source (tonal reversing alarms on some primary fleet heavy vehicles and yard tugs) was identified as tonal at source and as such was further assessed to see if it is potentially tonal at the nearby receivers. The noise contribution from this source was compared to the noise from typical operations at the nearby residential receivers and it was also compared to the background noise level at nearby receivers, and it was determined that this noise source is unlikely to exceed the tonality test of the NPfI, and so the predicted noise levels from the operations do not require an annoyance penalty to be applied.

6.1.7.2 Low frequency

The proposed operations do not support or expect to have any sources that could result in low-frequency noise levels at nearby receivers considering the types of sources and the separation distance, therefore noise emissions do not require a low-frequency noise penalty as identified in the NPfI.

6.1.7.3 Intermittent noise

The NPfI details that the test for intermittent noise that applies during the night period to be *"The source noise heard at the receiver varies by more than 5 dB(A) and the intermittent nature of the noise is clearly audible."* and *"…where the level suddenly drops/increases several times during the assessment period…"*. During the environmental assessment stage it is not possible to listen and subjectively assess the noise at the receiver as required by the guideline. However, only where all of the following tests are met shall a penalty be applicable to the predicted noise level at the relevant receiver:

- the noise level fluctuates / cycles by more than 5 dB(A);
- this difference relates to a 'sudden' drop/increase in the activity noise level;
- this activity may occur multiple times during a 15-minute assessment period; and
- the predicted noise level from the subject source at a receiver is clearly audible over the ambient noise environment.

The only noise source which potentially exhibits intermittent characteristics, such as cycling on and off, would be the reversing alarms fitted to the heavy vehicles that operate throughout the facility.

A screening test was undertaken to determine the likely instantaneous noise level from each of these sources to determine if an intermittent penalty was required in accordance with the NPfI.

The screening test determined that considering the distance to the nearest residential receivers, and the noise environment at the receivers when the project is operational, the instantaneous noise events from this intermittent source is unlikely to change noise levels at nearby receivers by more than 5 dB(A) and fail the NPfI intermittent test, given the separation distance at nearby receivers along with the background noise level. As such, the screening test determined that the noise emissions during the night-time period are unlikely to require an intermittent penalty as identified in the NPfI.

6.1.8 Sleep disturbance assessment

This section assesses the potential for sleep disturbance impacts, specifically looking at the maximum noise levels (L_{AFmax}). Refer to Section 6.1.6 for the $L_{Aeq15\ minute}$ predicted noise levels. The EPA NPfI $L_{Aeq15\ minute}$ sleep disturbance assessment levels are presented in Table 4.9, with the lowest assessment trigger levels across all NCAs being 44 dB(A) $L_{Aeq15\ minute}$ during the night period. Across all NCAs the highest predicted night period noise level is 37 dB(A) $L_{Aeq15\ minute}$ which is at a residential receiver in NCA02. As such, these levels achieve the EPA NPfI $L_{Aeq15\ minute}$ sleep disturbance assessment level.

Potentially loud instantaneous noise events that could occur across the Proposal operations with the potential to disturb sleep are detailed in Table 6.16. Activities such as truck manoeuvring and when trucks stop and release airbrakes exhibit non-steady noise characteristics with loud instantaneous noise events. Table 6.16 details the various locations and activities where they may typically occur and accordingly were modelled. As such, these maximum noise levels have been assessed for the potential to disturb sleep, in accordance with the NPfI.

In regard to the WHO 2018 sleep disturbance project assessment noise level of 48 dB(A) $L_{Aeq15\ minute}$ [equivalent to 45 dB(A) $L_{night\ (outside)}$ see Section 4.1.6.2], the highest predicted night period noise level is 37 dB(A) $L_{Aeq15\ minute}$ at a residential receiver in NCA02 under noise enhancing meteorological conditions, and as such clearly achieves the WHO 2018 recommended level.

Predicted noise levels for the Proposal operations at nearby representative receivers during the night period are presented in Table 6.18. Noise contour maps at 1.5 metres above the local ground level for each of the existing scenarios assessed are presented in APPENDIX D.

Table 6.18: Sleep disturbance assessment - Predicted noise levels

ID	Address	Receiver type	Predicted noise level, L_{max}, dB(A)	Sleep disturbance project assessment noise levels, L_{max}, dB(A)		Complies?
R1	187 Sparks Road, Halloran	Residential	32	58	65	Yes
R2	211 Sparks Road, Halloran	Residential	33	58	65	Yes
R4	13 Buttonderry Way, Jilliby	Residential	51	59	65	Yes
R5	15 Buttonderry Way, Jilliby	Residential	51	59	65	Yes
R6	17 Buttonderry Way, Jilliby	Residential	44	59	65	Yes
R7	17 Buttonderry Way, Jilliby	Residential	43	59	65	Yes
R8	19 Buttonderry Way, Jilliby	Residential	41	59	65	Yes
R9	21 Buttonderry Way, Jilliby	Residential	41	59	65	Yes
R10	23 Buttonderry Way, Jilliby	Residential	40	59	65	Yes
R11	5 The Downs, Jilliby	Residential	35	54	65	Yes
R12	7 The Downs, Jilliby	Residential	36	54	65	Yes
R13	6 The Downs, Jilliby	Residential	41	54	65	Yes
R14	4 The Downs, Jilliby	Residential	34	54	65	Yes
R15	11 Buttonderry Way, Jilliby	Residential	37	54	65	Yes
R16	9 Buttonderry Way, Jilliby	Residential	40	54	65	Yes
R17	3 The Downs, Jilliby	Residential	34	54	65	Yes
R18	1 The Downs, Jilliby	Residential	34	54	65	Yes
R19	220 Sparks Road, Jilliby	Residential	35	54	65	Yes
R23	171 Sparks Road, Halloran	Residential	39	58	65	Yes
R24	80 Mountain Road, Halloran	Residential	31	58	65	Yes
R25	80 Mountain Road, Halloran	Residential	35	58	65	Yes

The maximum noise level events associated with on-site truck activities have been reviewed to determine their potential to cause sleep disturbance at nearby residential receivers.

Considering the substantial shielding given by nearby structures and buildings, in addition to the large distance to the nearest residences (> 500m metres), the contributions from individual instantaneous noise source levels are substantially mitigated.

As shown in Table 6.18, the predicted noise levels from these noise sources are below the sleep disturbance screening levels at the nearby residences because the site mitigation measures also effectively reduce noise emissions from these events. As such, the L_{Amax} noise levels associated with these events are predicted to generally be below the sleep disturbance assessment trigger levels.

6.2 Noise management and mitigation recommendations

The Proposal is sited away from residential receivers and incorporates design elements which assist with noise control. For example, most noise-generating items (namely refrigerated trailers in docks) and activities (namely truck movements) occur on the eastern side of the Wyong RDC building. The building itself offers substantial shielding to residences west of the Proposal. In addition, local topography offers shielding to the north which also assists in controlling noise emissions to receivers on Sparks Road.

Noise sources on the western side of the building are less shielded to residences in Jilliby, but there is still some benefit afforded by intervening industrial buildings and topography. To reduce noise emissions from the Woolworths Way entrance, trucks can be directed to the Warren Road entrance where possible.

During detailed design, if operable louvres are required for smoke exhaust and/or ventilation, care should be taken to ensure the louvres do not compromise the facade noise reduction performance. It is noted that during site visits, no significant noise breakout through smoke exhaust louvres on the western Ambient warehouse facade was detected. In addition, Wyong RDC staff advised that the louvres are kept closed and fans are used inside the warehouse to assist with cooling on hot days.

At this early stage of the project, additional mechanical services have not yet been specified and selected. If additional plant and equipment is needed, items shall be designed to ensure the site continues to meet the nominated industrial noise targets cumulatively and remain consistent with the outcomes of this assessment. If required, mitigation measures can take the form of careful plant/equipment placement, silencers, and screens.

It is recommended that noise compliance measurements are conducted once operations commence, to determine that noise emissions are consistent with those documented in this assessment, and to determine that the mitigation measures are effective. The method for measuring the performance and/or noise compliance of the Proposal should be undertaken in accordance with Section 7 'Monitoring performance' of the NPfI.

6.3 Road traffic noise

The key roads which could be affected by road traffic generated by the Proposal are the M1 Motorway and Sparks Road. Warren Road, Woolworths Way and Burnet Road are local roads servicing the industrial estate and there are no residential receivers along these roads.

The NSW Road Noise Policy 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'.

The traffic impact assessment for the proposal, prepared by Colston Budd Rogers and Kafes Pty Ltd, indicates that additional traffic generated by the Proposal will be mostly heavy vehicles. Forecasts for

primary and secondary freight (heavy vehicles) servicing the Wyong RDC indicate a minor increase from the present day.

A summary of the change in heavy vehicle numbers from 2022 to 2033 is given in Table 6.19.

Table 6.19: Percentage increase in road traffic due to the Proposal – 2022 to 2033

Time period	Number of heavy vehicle movements to/from site[1]		Percent change	Change in road traffic noise level, dB(A)[1]
	2022	2033		
Day 7:00am-10:00pm	694[3]	708[3]	2%	0.1
Night 10:00pm-7:00am	354	378	7%	0.3

Notes:

1. Assumes each heavy vehicle generates two movements on the public roads
2. Assumes an equal percentage change in light vehicle traffic
3. A total of 4 B-doubles per day for returns are assumed.

Light vehicle traffic is also expected to increase marginally. Based on forecasts for car parking, the increase in cars driving to the Wyong RDC (from 2022 to 2033) is approximately 9 during the day shift and 7 during the afternoon shift. This is an increase of approximately 3% over 10 years.

Even if all road traffic on the M1 Motorway and Sparks Road were generated by the Proposal currently and in the future, an increase in road traffic of 2-7% from the present day would result in an insignificant change to road traffic noise levels.

Therefore, the Proposal is unlikely to result in adverse road traffic noise impacts and the Proposal will meet the requirements of the NSW Road Noise Policy.

7 Conclusion

A noise and vibration assessment of the Wyong RDC expansion was undertaken as part of State Significant Development (SSD) application 33701741. Fabcot, on behalf of Woolworths Group, proposes to extend the existing Wyong RDC building to provide additional warehouse space, as well as new hardstands and on-site facilities for heavy vehicles.

Short term and long term noise measurements were undertaken to quantify the existing noise environment and the noise emissions from the existing Wyong RDC. At residences, background and ambient noise levels are generally affected by the nearby M1 Motorway and natural sounds. The existing Wyong RDC was inaudible at the nearest representative residential receivers where noise monitoring was conducted.

Construction noise and vibration impacts were assessed in accordance with the NSW Interim Construction Noise Guideline. Noise management levels for residences were set based on the results of the noise logging and in accordance with the procedure set out in the ICNG. Detailed computer modelling confirmed that construction noise levels will be less than the nominated noise management levels at residential receivers during standard hours. Works outside standard hours may be needed noting that the construction works will be undertaken concurrently with the existing distribution facility operations and would require sufficient justification to be undertaken, but are generally expected to meet the nominated NMLs where required. Vibration from construction is unlikely to result in cosmetic damage to nearby buildings. One industrial receiver at 12 Burnet Road (assumed to be a workshop for this assessment) may potentially be impacted by noise and vibration (human disturbance), if vibratory rolling is to be undertaken nearby to the building. This can be managed through on-site vibration measurements and a complaints management process.

Operational noise emissions were assessed in accordance with the NSW Noise Policy for Industry. A validated, detailed computer noise model was prepared to determine potential noise impacts from operation of the proposal. Reference noise measurements of the existing Woolworths heavy vehicle fleet were used alongside site-specific measurements to validate the suitability of the noise model. The validation model produced predictions within 1 dB(A) of noise measurements around the existing Wyong RDC and was determined as suitable for modelling and assessing noise emissions from the Proposal. This noise model was then adapted to consider the Proposal's changes to site buildings and future vehicle movements and operations. The noise model incorporated noise-enhancing meteorological conditions as required by the NPfI. The Proposal is predicted to meet the nominated industrial noise targets at all receivers considered in this assessment.

Road traffic generated by the Proposal is expected to increase traffic to and from the site by approximately 2-7%. Light vehicles, namely staff car movements, are expected to grow by about 3%. This small growth is unlikely to result in a significant change in road traffic noise on public roads. As a result, the Proposal is expected to meet the requirements of the NSW Road Noise Policy.

APPENDIX A Glossary of terminology

A.1 Glossary of terminology - Noise

The following is a brief description of the technical terms used to describe noise and to assist in understanding the technical issues presented.

Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment Point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of common sounds in our daytime environment:

threshold of hearing	0 dB	The faintest sound we can hear
	10 dB	Human breathing
almost silent	20 dB	
	30 dB	Quiet bedroom or in a quiet national park location
generally quiet	40 dB	Library
	50 dB	Typical office space or ambience in the city at night
moderately loud	60 dB	CBD mall at lunch time
	70 dB	The sound of a car passing on the street
loud	80 dB	Loud music played at home
	90 dB	The sound of a truck passing on the street
very loud	100 dB	Indoor rock band concert
	110 dB	Operating a chainsaw or jackhammer
extremely loud	120 dB	Jet plane take-off at 100m away
threshold of pain	130 dB	
	140 dB	Military jet take-off at 25m away

dB(A)	A-weighted decibels. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.

Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L_{Max}	The maximum sound pressure level measured over a given period.
L_{Min}	The minimum sound pressure level measured over a given period.
L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

A.2 Acoustic concepts

A.2.1 Sound and noise

The terms 'sound' and 'noise' are almost interchangeable, except that in common usage 'noise' is often used to refer to unwanted sound. Sound is a vibration that travels as an audible wave of pressure through the air from a source to a receiver location such as the human ear. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) is a unit of measurement used to express the ratio of a quantity to another on a logarithmic scale to make the wide range of sound pressure more manageable.

Sound power is the rate at which a source emits acoustic energy and is unaffected by the environment. It is a property of the source that is emitting acoustic energy.

In contrast, **sound pressure** is the effect, and it is affected by factors associated with the built and natural environment such as distance, direction, obstacles etc. The sound pressure is the acoustic energy or 'noise level' at a distance away from the noise source. The relationship between sound power and sound pressure can be explained by considering the analogy of an electric heater, which radiates heat into a room and temperature is the effect. Like sound pressure, temperature also reduces with distance from the source following the inverse square law.

In this technical working paper, **sound power level** is identified by the symbols **SWL** or $\mathbf{L_w}$, while **sound pressure level** is represented by **SPL** or $\mathbf{L_p}$, and both have the same scientific unit in dB.

A.2.2 Individual's perception of sound

The loudness of sound depends on its sound pressure level. The A-weighted decibel [dB(A)] is generally used for the purposes of environmental noise impact assessment as it has been adjusted to account for the varying sensitivity of the human ear to different frequencies of sound. People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dB(A) is a good measure of the loudness of environmental noise to the human ear as it considers this frequency dependant sensitivity.

Different noise sources having the same dB(A) level generally sound equally loud. However, the frequency of a sound is what gives it a distinctive pitch or tone – for example, the rumble of distant thunder is an example of a low frequency sound and a whistle is an example of a high frequency sound. Most sounds we hear in our daily lives have sound pressure levels in the range of 30 to 90 dB(A). The following table provide some points of reference, measured in dB(A), of familiar sounds and those from construction activities.

Table A.1 Perception of sound - familiar sounds and construction noise

Common sounds	Construction noise	Sound pressure level
Leaf blower at operator's ear	Concrete saw or jack hammer 7 metres away	90 dB(A)
Airplane cabin during cruise (Airbus 321)	Excavator (with bucket) 7 metres away	80 dB(A)
General traffic noise kerbside next to Military Road	Towable compressor 7 metres away	75 dB(A)
Normal conversation at 1 metre		60 dB(A)
Outdoor air conditioning unit 1 metre away	Towable compressor 50 metres away	55 dB(A)
General office		50 dB(A)
Inside private office	Ground-borne noise from road header tunnel excavation between depths of 20 metres to 50 metres	40 dB(A)
Inside bedroom		30 dB(A)

In terms of sound perception, a change of 1 dB(A) or 2 dB(A) in the sound pressure level is difficult for most people to detect, whilst a 3 dB(A) to 5 dB(A) change corresponds to a small but noticeable change in loudness. An increase in sound level of 10 dB(A) is perceived as a doubling of loudness. However, individuals may perceive the same sound differently since many factors can influence an individual's response, including:

- The specific characteristics of the noise (eg. frequency, intensity, duration of the noise event)
- Time of day noise events occur
- Individual sensitivities and lifestyle
- Reaction to an unfamiliar sound
- Understanding of whether the noise is avoidable and the notions of fairness.

A.2.3 Environmental noise assessment indicators

Environmental noise is an accumulation of noise pollution that occurs outside and is most commonly attributed to various modes of transport as well as industrial and construction activities. Environmental noise has been shown to have an adverse effect on the quality of life, especially following long-term exposure. The focus of the present technical assessment is on annoyance and sleep disturbance as they constitute most of the burden related to the impact of environmental noise on health outcomes. Noise annoyance is defined by the World Health Organization as a feeling of displeasure, nuisance, disturbance or irritation caused by a specific sound. Sleep disturbance relates to difficulty with sleep initiation, consolidation as well as awakening and reduced quality of sleep.

In New South Wales, contemporary environmental noise assessment criteria for addressing noise annoyance and sleep disturbance are specified by the Environment Protection Authority (EPA). Potential

road traffic noise impact is assessed in accordance with the NSW Road Noise Policy. For motorway and ventilation facilities that are permanently fixed, and associated noise emissions are long-term in nature, noise criteria have been adopted in accordance with the Noise Policy for Industry. For enabling construction activities which are temporary in nature and highly variable, EPA's Interim Construction Noise Guideline provides the underlying assessment principles for the determination of potential construction noise impact. Each policy/guideline is discussed in detail in the body of this report:

- Section 4.2 details the NSW Road Noise Policy
- Section 4.1 details the Noise Policy for Industry
- Section 3.1 details the EPA's Interim Construction Noise Guideline.

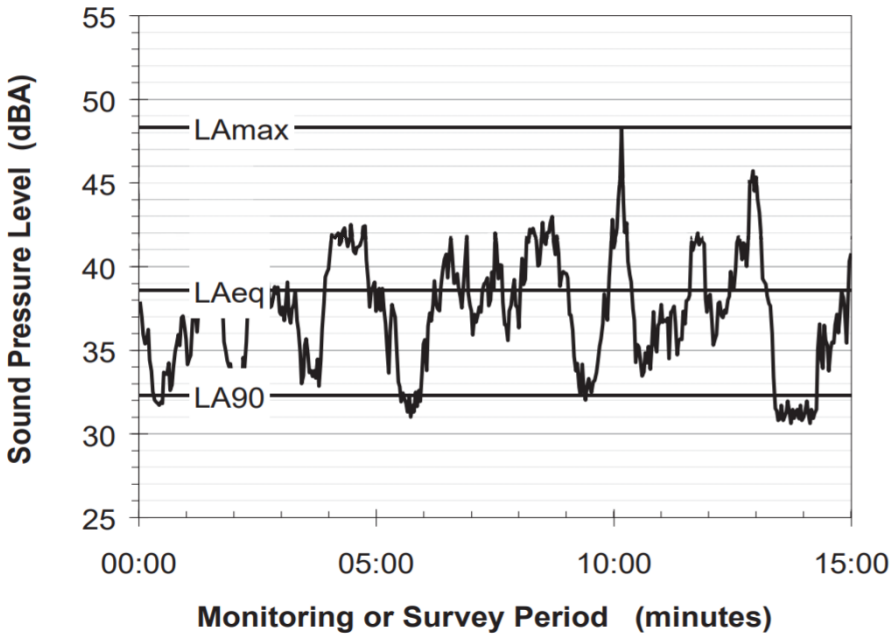
L_{Aeq} - To protect against long-term repeated noise exposure, the indicator for assessing the cumulative noise exposure level over a specific time interval is the equivalent sound pressure level, denoted as L_{Aeq}. The L_{Aeq} indicator accounts for the total energy content from all sources of sound under consideration. The fact that the L_{Aeq} is a cumulative measure means that louder activities have greater influence over the L_{Aeq} level than do quieter ones, and activities that last longer in time have greater L_{Aeq} than do shorter ones. An increase in the number of events also increases the L_{Aeq}. Further, people react to the duration of noise events, judging longer events to be more annoying than shorter ones, assuming equal maximum noise levels.

L_{Amax} - It is important to note that L_{Aeq} levels are numerically lower than maximum noise levels (denoted as L_{Amax}). None of the noise is ignored, just as all the rain that falls in the rain gauge in one hour counts toward the total. In the case of noisy but short-lived maximum noise events, which can sometime result in immediate short-term awakening reaction, potential impact is assessed using the L_{Amax} indicator in which its emergence above the background noise environment is evaluated.

L_{A90} - The L_{A90} is the level of noise that is present almost constantly, or for 90 per cent of the time and is commonly referred to as the background noise. Typical examples of what types of noise may contribute to the background noise levels are continuously flowing traffic or air conditioner noise.

These three noise indicators of L_{Amax}, L_{Aeq} and L_{A90} are presented in Figures A-1 for a sample noise monitoring survey period showing the sound pressure level of a varying noise environment such as environmental noise.

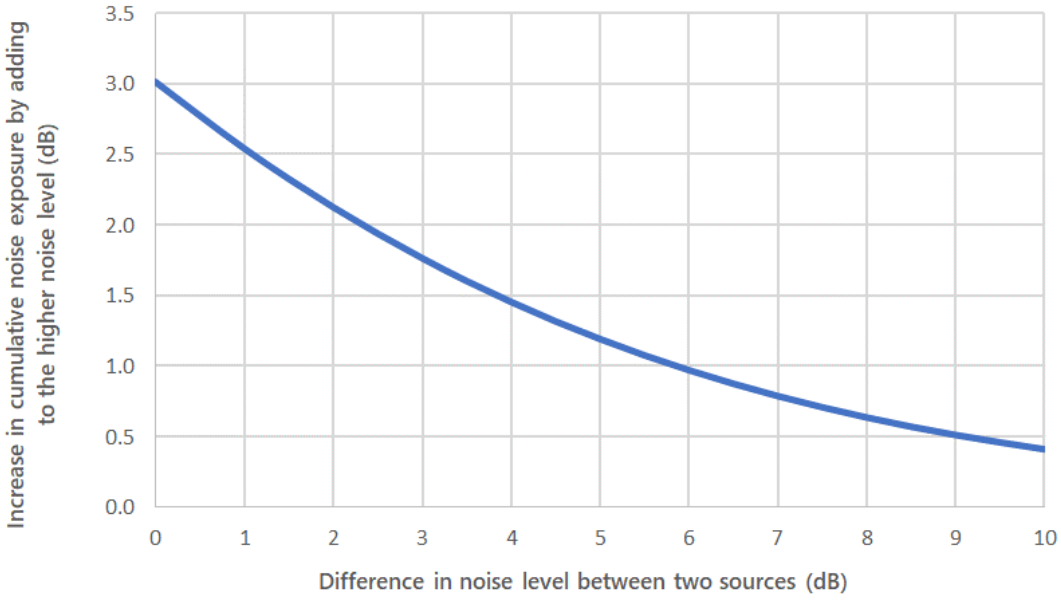
Figure A-1: Environmental noise assessment indicators



A.2.4 Cumulative sound exposure

As illustrated in Figure A-2, for two activities that result in the same amount of acoustical energy or noise level at a receiver location, the cumulative sound exposure level would be 3 dB higher than the level of just one single activity. This is because the decibel (dB) scale is logarithmic. Conversely, if the activity closer to your home results in noise exposure level that is 10 dB higher than the activity occurring further away, the quieter works would contribute very little to the cumulative noise exposure level.

Figure A-2: Difference in noise level between two sources



APPENDIX B Long-term noise monitoring methodology

B.1 Noise monitoring equipment

A long-term unattended noise monitor consists of a sound level meter housed inside a weather resistant enclosure. Noise levels are monitored continuously with statistical data stored in memory for every 15-minute period.

Long term noise monitoring was conducted using the following instrumentation:

Description	Type	Octave band data	Logger location(s)
RTA07 (NTi Audio XL2)	Class 1	1/1 & 1/3	All

Notes: All meters comply with AS IEC 61672.1 2004 "Electroacoustics - Sound Level Meters" and designated either Class 1 or Class 2 as per table, and are suitable for field use.

The equipment was calibrated prior and subsequent to the measurement period using a Bruel & Kjaer Type 4231 calibrator. No significant drift in calibration was observed.

B.2 Meteorology during monitoring

Measurements affected by extraneous noise, wind (greater than 5m/s) or rain were excluded from the recorded data in accordance with the NSW NPfI. Determination of extraneous meteorological conditions was based on data provided by the Bureau of Meteorology (BOM), for a location considered representative of the noise monitoring location(s). The data was adjusted to account for the height difference between the BOM weather station, where wind speed and direction is recorded at a height of 10m above ground level, and the microphone location, which is typically 1.5m above ground level (and less than 3m). The correction factor applied to the data is based on Table C.1 of ISO 4354:2009 '*Wind actions on structures*'.

B.3 Noise vs time graphs

Noise almost always varies with time. Noise environments can be described using various descriptors to show how a noise ranges about a level. In this report, noise values measured or referred to include the L_{10}, L_{90}, and L_{eq} levels. The statistical descriptors L_{10} and L_{90} measure the noise level exceeded for 10% and 90% of the sample measurement time. The L_{eq} level is the equivalent continuous noise level or the level averaged on an equal energy basis. Measurement sample periods are usually ten to fifteen minutes. The Noise -vs- Time graphs representing measured noise levels, as presented in this report, illustrate these concepts for the broadband dB(A) results.

APPENDIX C Existing acoustic environment

RENZO TONIN & ASSOCIATES
inspired to achieve

Acoustics
Vibration
Structural Dynamics

sydney@renzotonin.com.au
www.renzotonin.com.au

Monitoring ID: L1
Address: 187 Sparks Road, Halloran
Description: On driveway of 187 Sparks Road, 70m north of gate

Background & Ambient Noise Monitoring Results

	L_{A90} Background Noise Levels				L_{Aeq} Ambient Noise Levels			
	Day[1]	Evening[2]	Night[3]	Shoulder[4,6]	Day[1]	Evening[2]	Night[3]	Shoulder[4]
Representative Week[5]	51	47	43	46	61	56	54	58

Notes:

1. Day: 7.00am to 6.00pm Monday to Saturday and 8.00am to 6.00pm Sundays & Public Holidays
2. Evening: 6.00pm to 10.00pm Monday to Sunday & Public Holidays
3. Night: 10.00pm to 5.00am Monday to Sunday & Public Holidays
4. Shoulder period: 5:00am to 7:00am
5. Rating Background Level (RBL) for L_{A90} and logarithmic average for L_{Aeq}
6. Shoulder period RBL levels determined as per NPfI Fact Sheet A3

Road Monitoring Results (at one metre from façade[4])

	L_{Aeq} Noise Levels[4]	
	Day[1]	Night[2]
Representative Week[3]	60	56

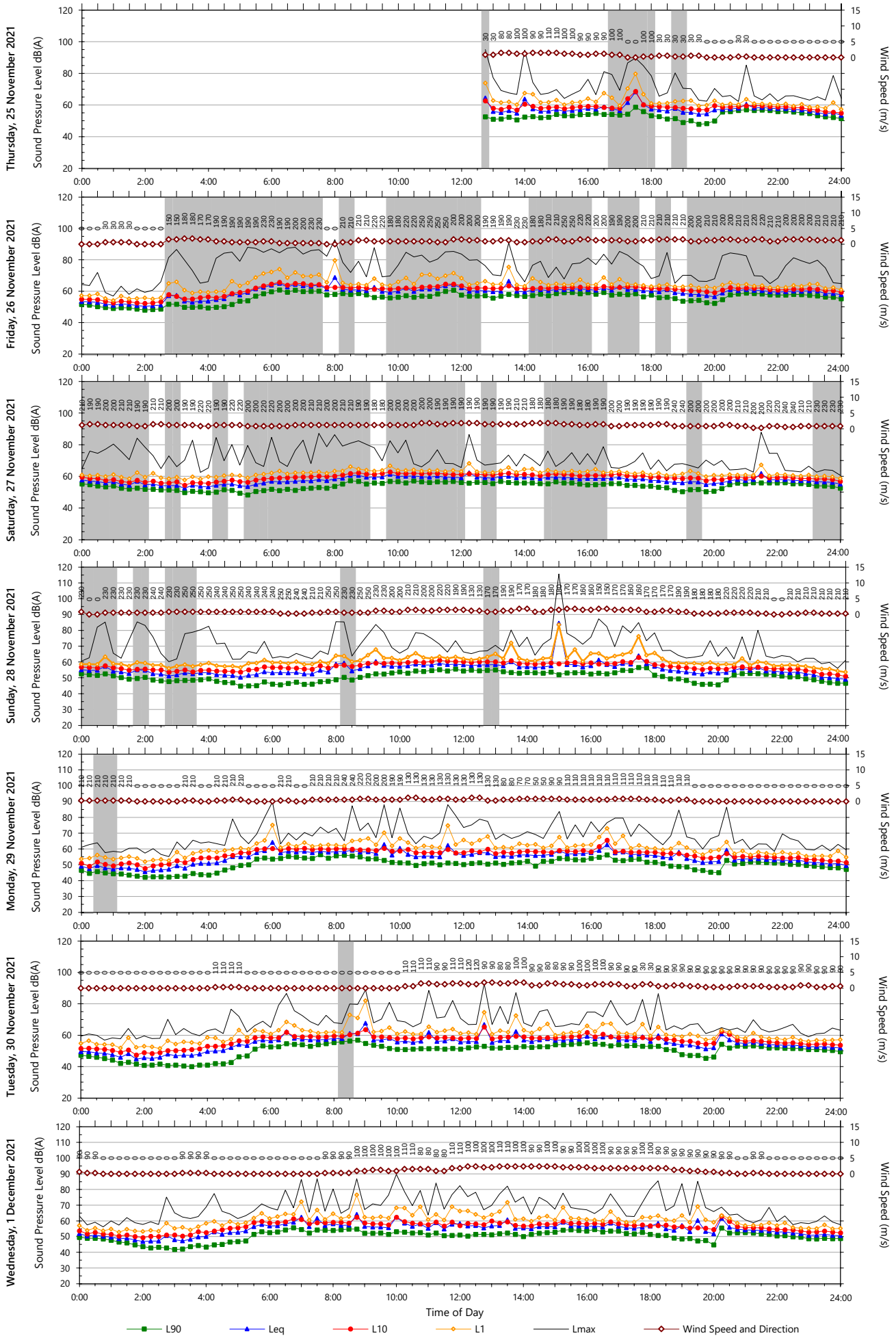
Notes:

1. Day is 7:00am to 10:00pm 2. Night is 10:00pm to 7:00am 3. Median of daily L_{Aeq}
4. Values are calculated at the facade. 2.5dB is added to results if logger is placed in the free field

Logger location photograph	Logger location map
	

Unattended Monitoring Results

Location: On driveway of 187 Sparks Road, 70m north of gate

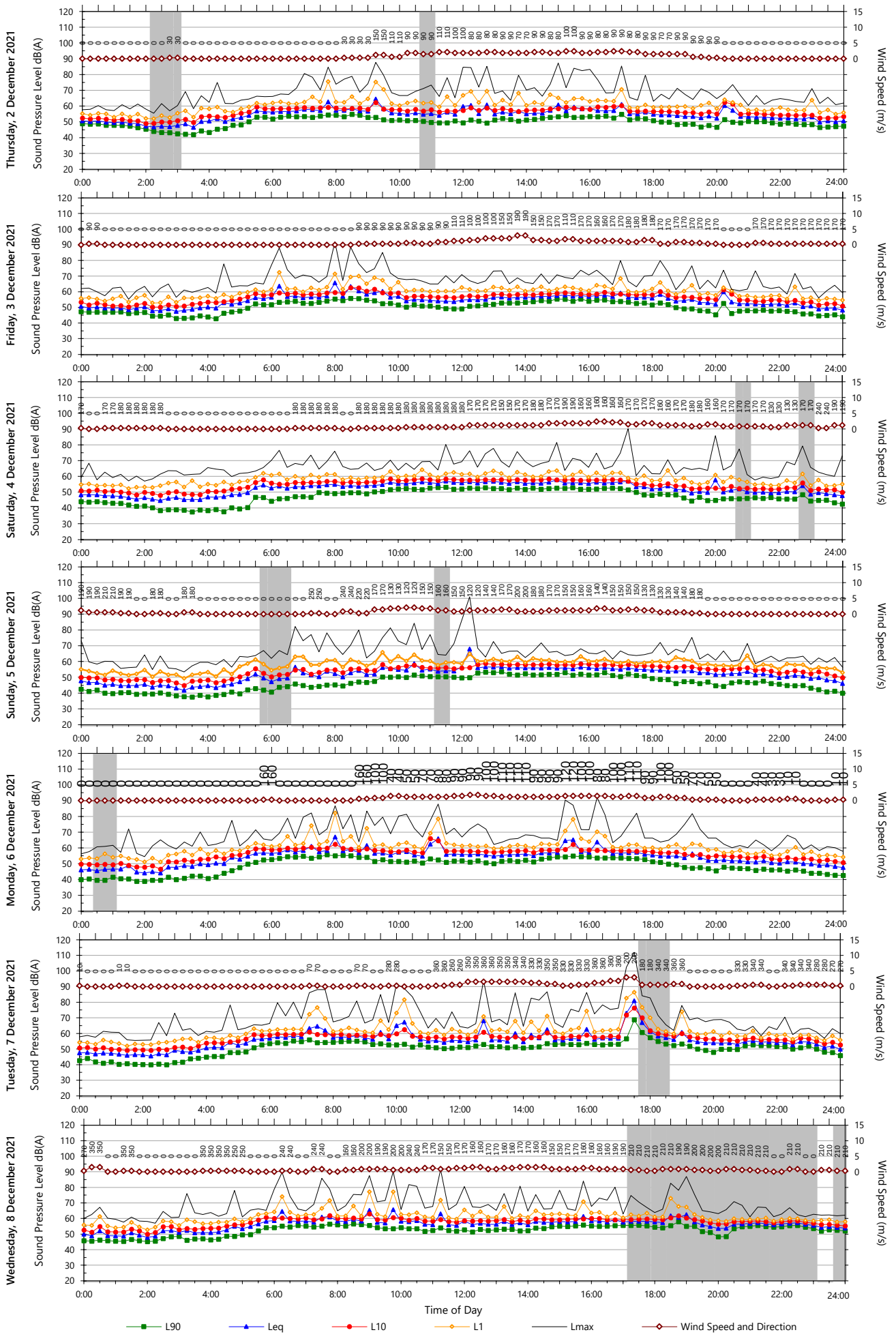


Data File: 2021-11-25_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r38)

Unattended Monitoring Results

Location: On driveway of 187 Sparks Road, 70m north of gate

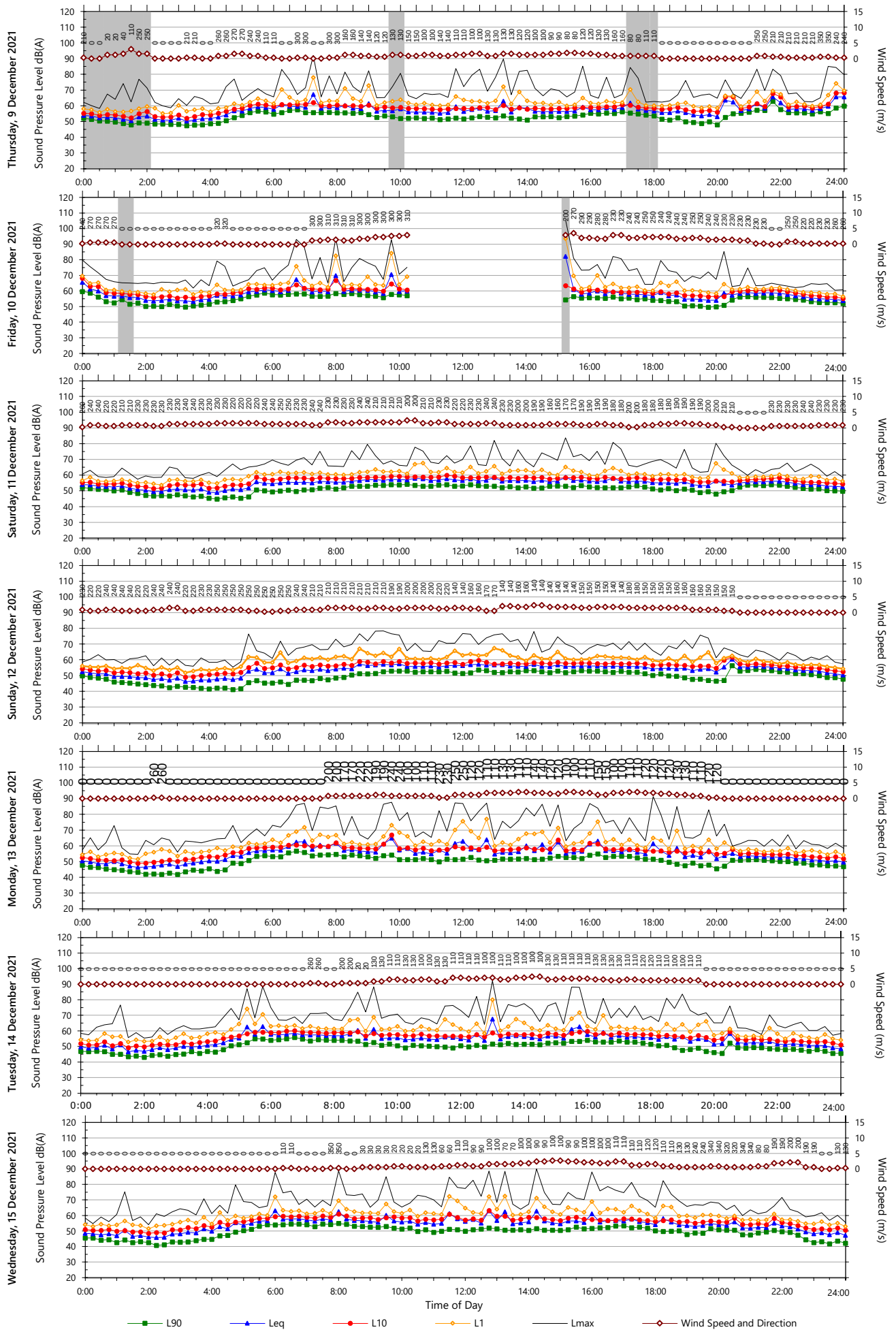


Data File: 2021-11-25_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r38)

Unattended Monitoring Results

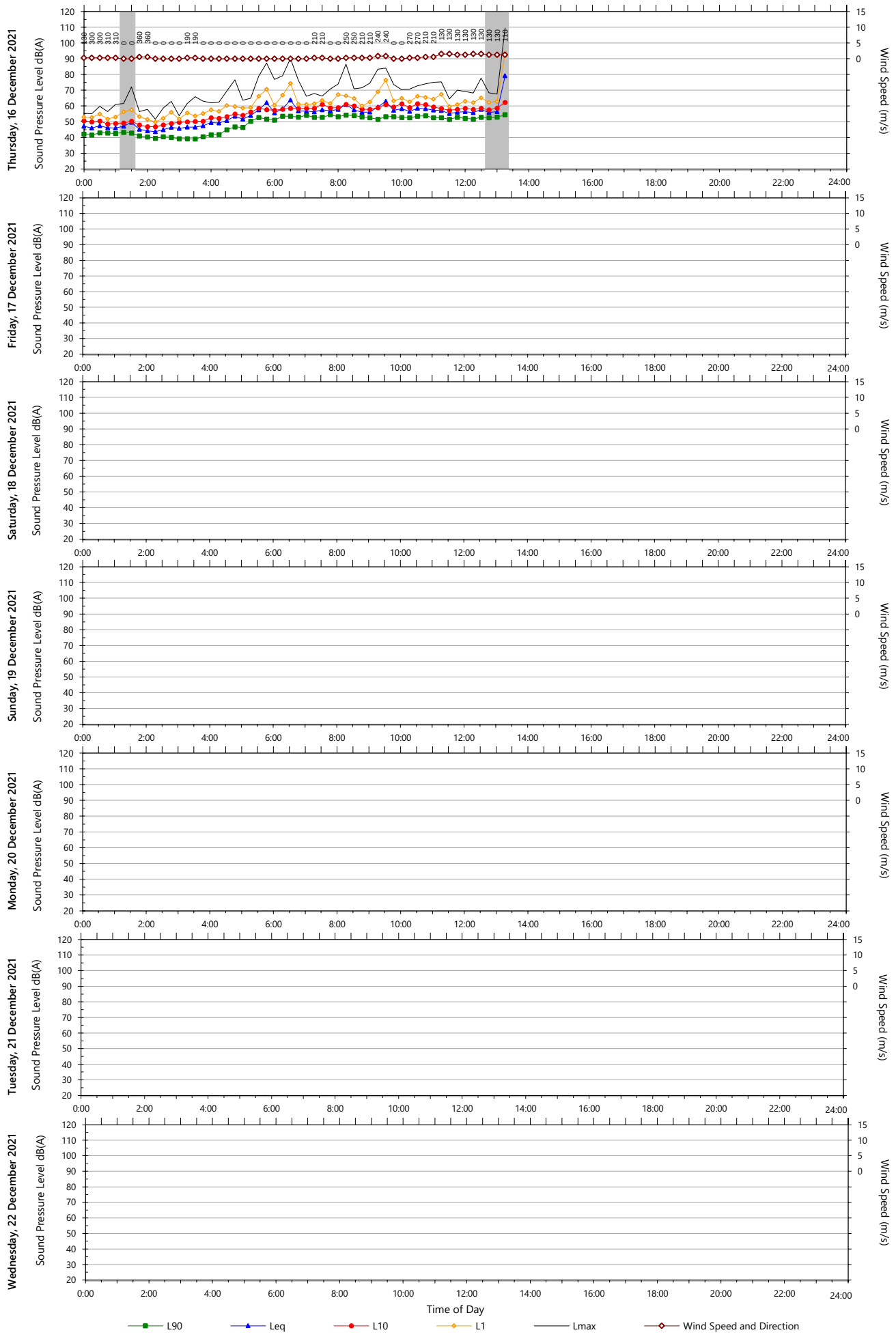
Location: On driveway of 187 Sparks Road, 70m north of gate



Data File: 2021-11-25_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r38)

Unattended Monitoring Results **Location: On driveway of 187 Sparks Road, 70m north of gate**



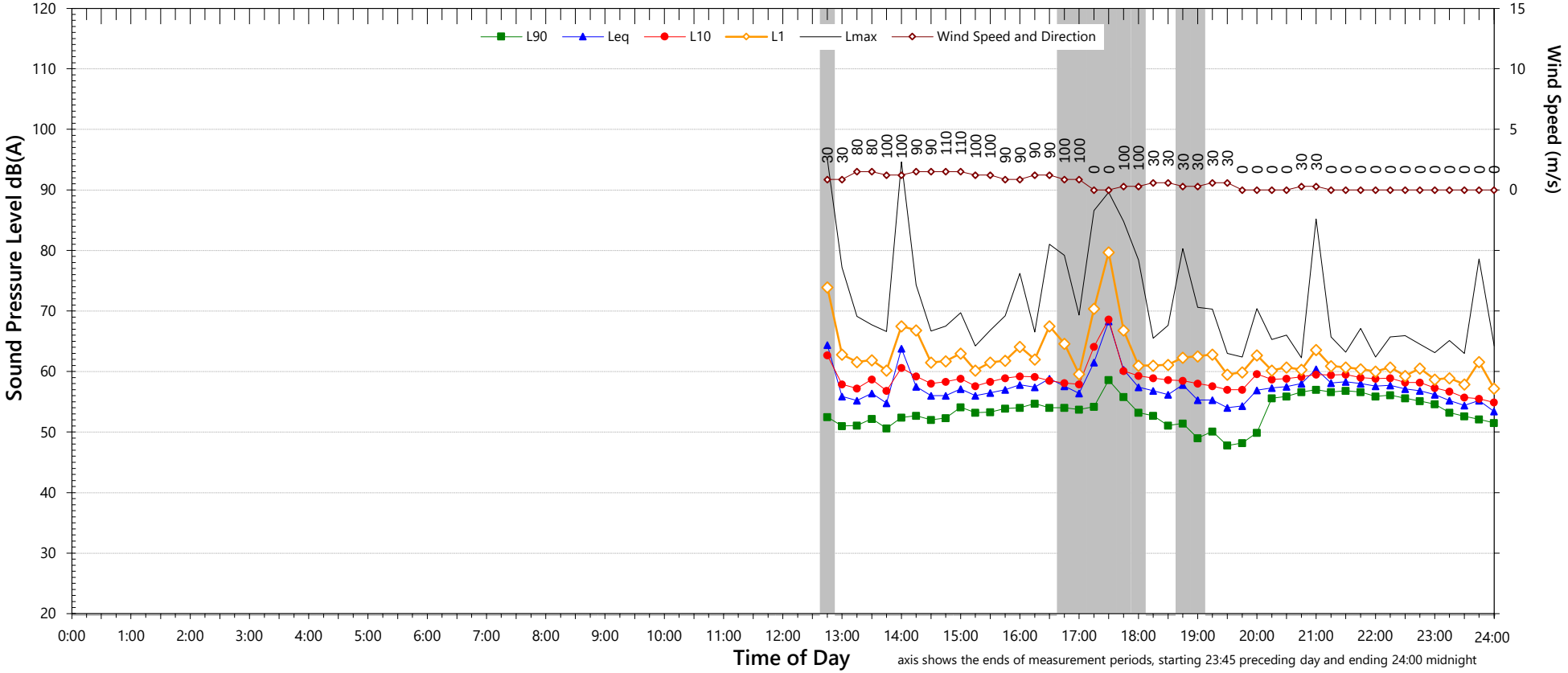
Data File: 2021-11-25_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r38)

Unattended Noise Monitoring Results

On driveway of 187 Sparks Road, 70m north of gate

Thursday, 25 November 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	-	49	-
L_{Aeq}	-	57	-

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	72	to	79
L_{AFMax} - L_{Aeq} (Range)	20	to	24

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	-	-

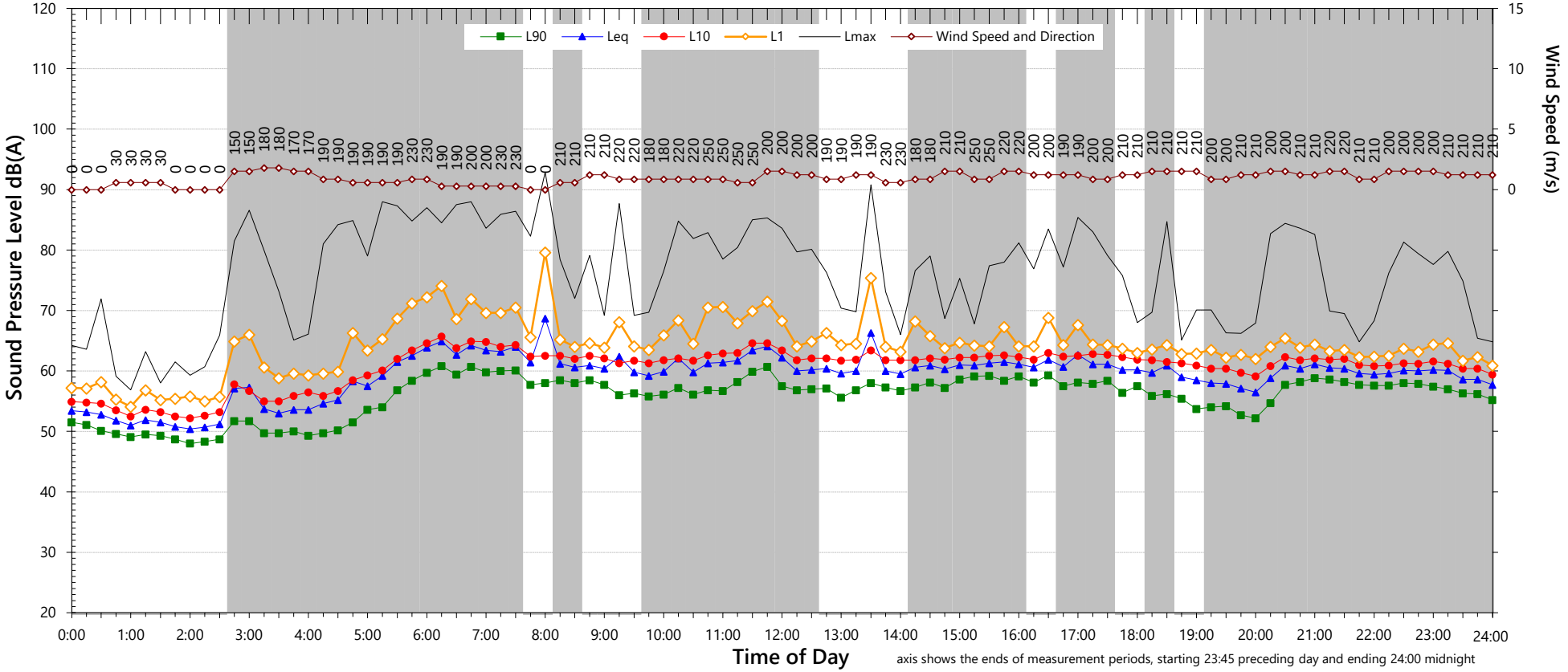
Notes:

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)

Unattended Noise Monitoring Results

On driveway of 187 Sparks Road, 70m north of gate

Friday, 26 November 2021



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)	73	to	83
L_{AFMax} - L_{Aeq} (Range)	18	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 $L_{Aeq\ 9\ hr}$	-	-
$L_{Aeq\ 1hr}$ upper 10 percentile	-	-
$L_{Aeq\ 1hr}$ lower 10 percentile	-	-

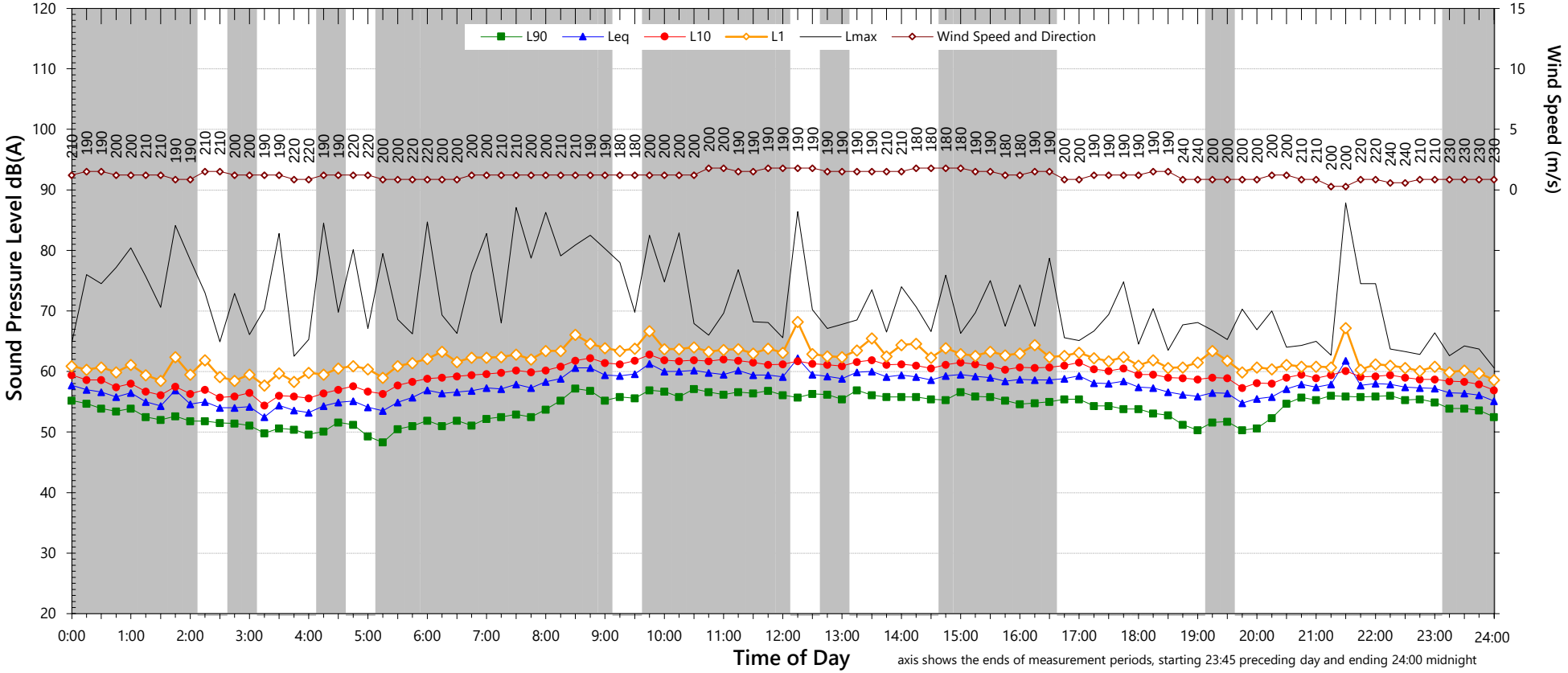
Notes:

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)

Unattended Noise Monitoring Results

On driveway of 187 Sparks Road, 70m north of gate

Saturday, 27 November 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	-	50	-
L_{Aeq}	-	57	-

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	72	to	83
L_{AFMax} - L_{Aeq} (Range)	20	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 $L_{Aeq\ 9\ hr}$	-	56
$L_{Aeq\ 1hr}$ upper 10 percentile	-	57
$L_{Aeq\ 1hr}$ lower 10 percentile	-	55

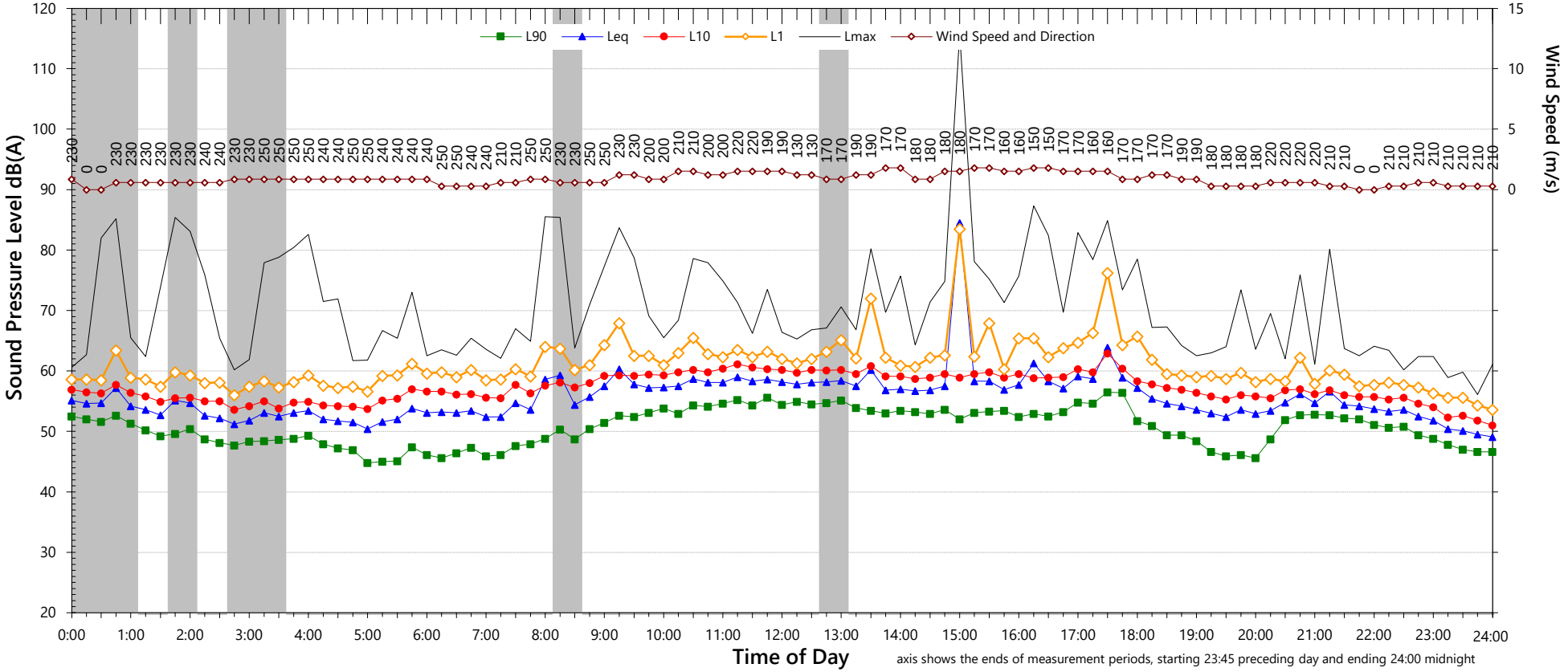
Notes:

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

On driveway of 187 Sparks Road, 70m north of gate

Sunday, 28 November 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	52	46	42
L_{Aeq}	69	54	55

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	66	to	90
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 $L_{Aeq\ 9\ hr}$	70	57
$L_{Aeq\ 1hr}$ upper 10 percentile	62	61
$L_{Aeq\ 1hr}$ lower 10 percentile	57	50

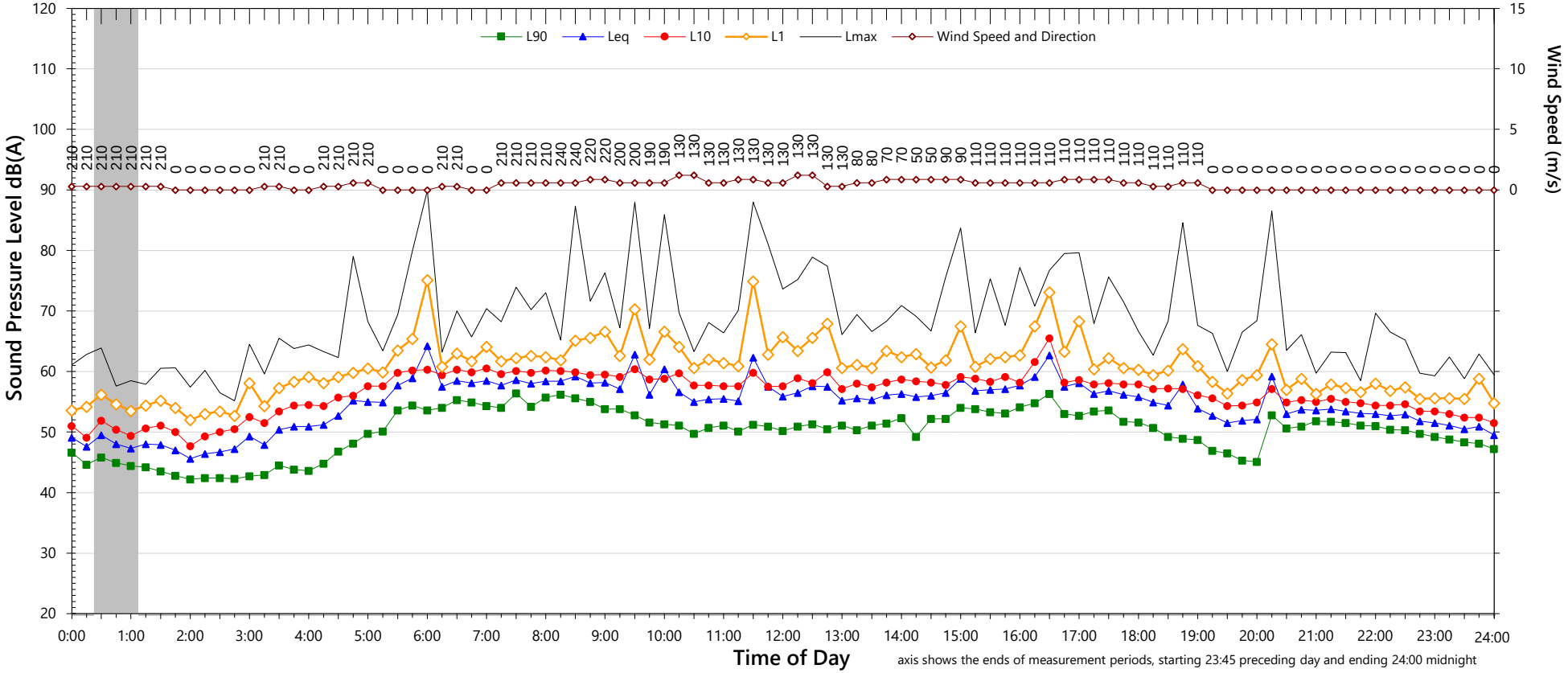
Notes:

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

On driveway of 187 Sparks Road, 70m north of gate

Monday, 29 November 2021



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	50	46	41
L_{Aeq}	58	54	53

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	70	to	87
L_{AFMax} - L_{Aeq} (Range)	16	to	27

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	60	56
$L_{Aeq\ 1hr}$ upper 10 percentile	62	59
$L_{Aeq\ 1hr}$ lower 10 percentile	57	49

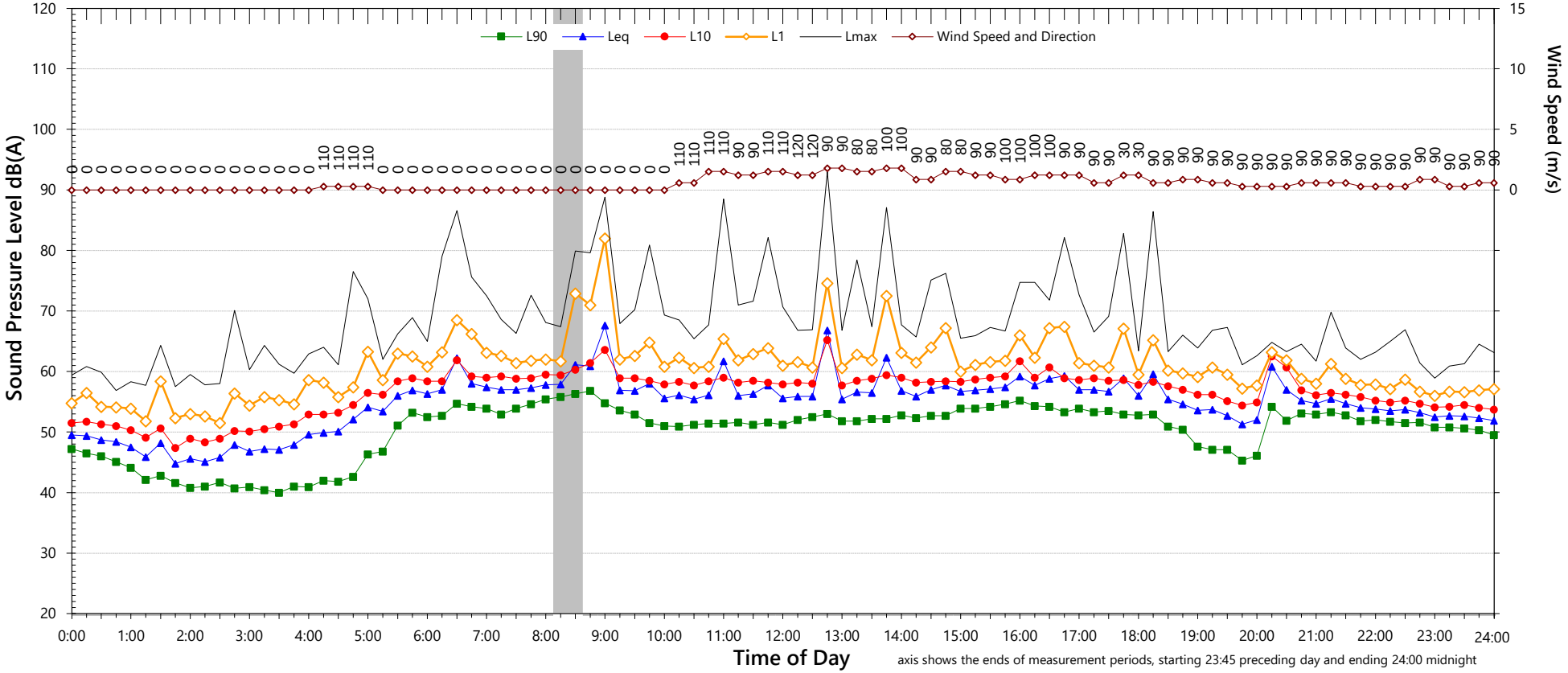
Notes:

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

On driveway of 187 Sparks Road, 70m north of gate

Tuesday, 30 November 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	51	47	43
L_{Aeq}	59	56	54

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	61	56
$L_{Aeq\ 1hr}$ upper 10 percentile	63	59
$L_{Aeq\ 1hr}$ lower 10 percentile	58	51

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	69	to	87
L_{AFMax} - L_{Aeq} (Range)	20	to	27

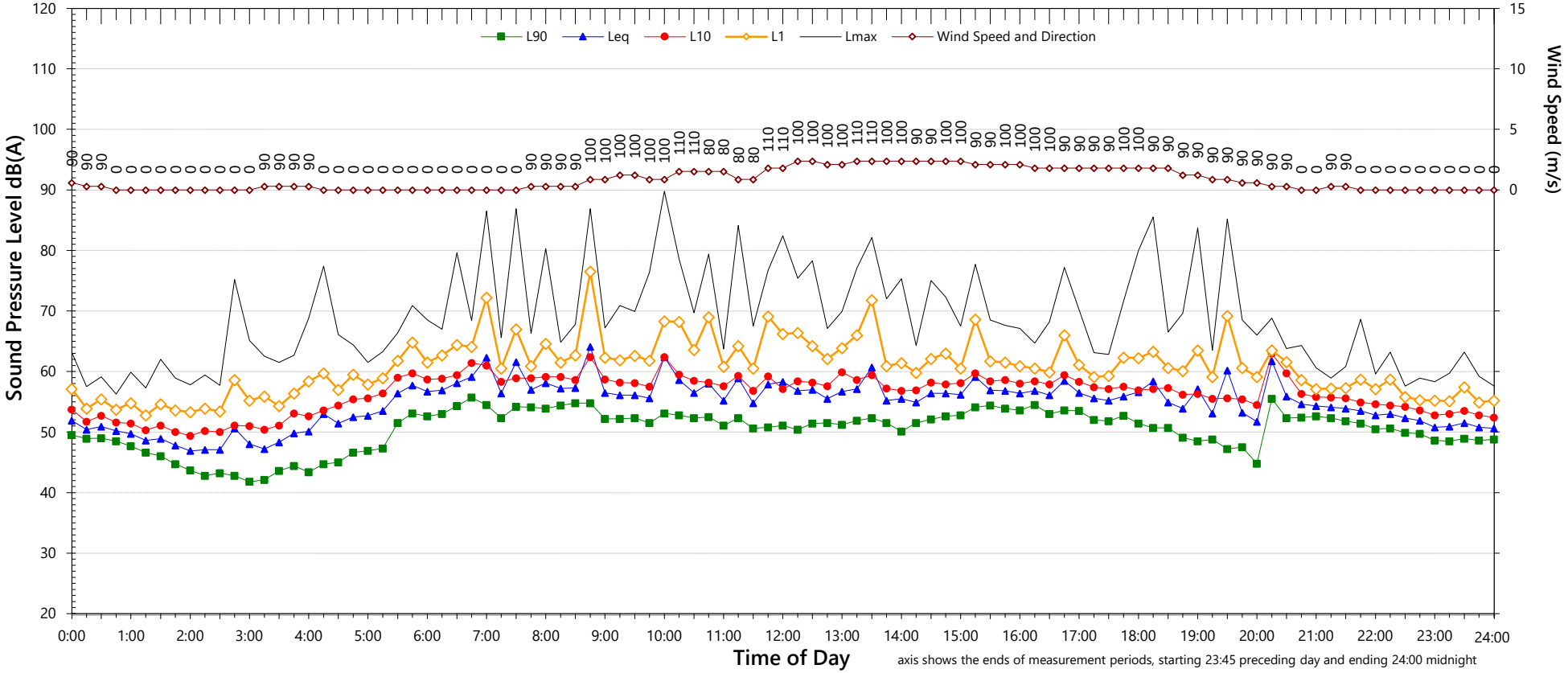
Notes:

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

On driveway of 187 Sparks Road, 70m north of gate

Wednesday, 1 December 2021



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	51	47	44
L_{Aeq}	58	56	53

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	60	55
$L_{Aeq\ 1hr}$ upper 10 percentile	61	59
$L_{Aeq\ 1hr}$ lower 10 percentile	58	52

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	69	to	81
L_{AFMax} - L_{Aeq} (Range)	20	to	24

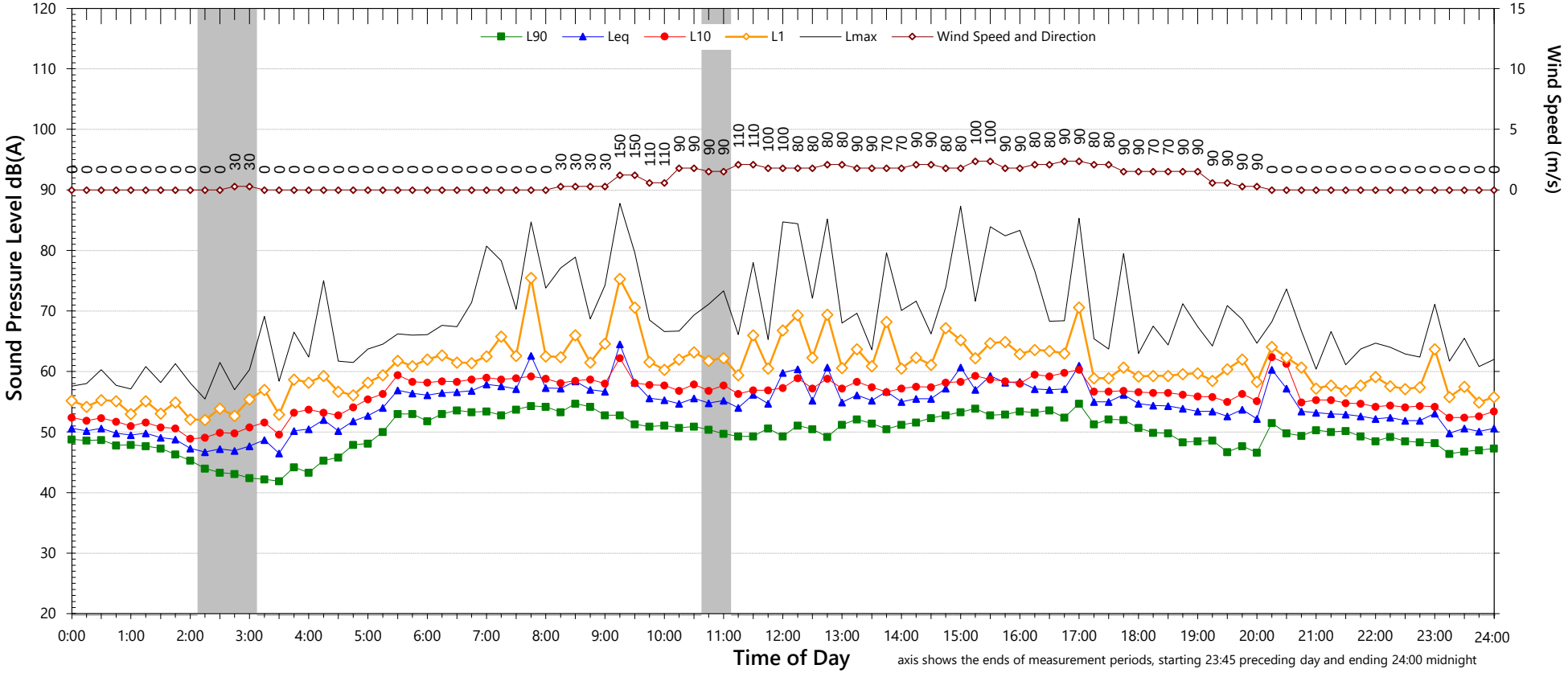
Notes:

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

On driveway of 187 Sparks Road, 70m north of gate

Thursday, 2 December 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	51	47	44
L_{Aeq}	58	55	54

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	66	to	88
L_{AFMax} - L_{Aeq} (Range)	15	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 $L_{Aeq\ 9\ hr}$	60	56
$L_{Aeq\ 1hr}$ upper 10 percentile	62	59
$L_{Aeq\ 1hr}$ lower 10 percentile	56	51

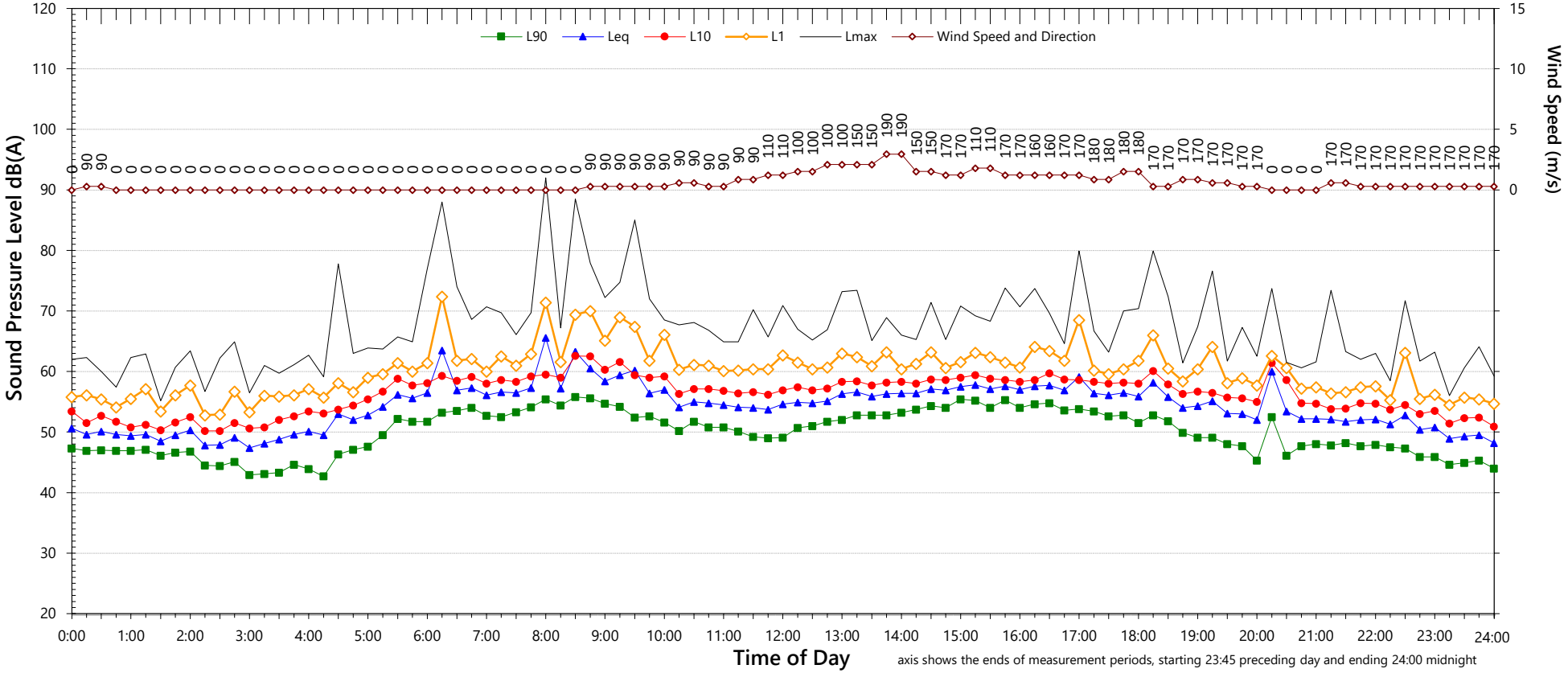
Notes:

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

On driveway of 187 Sparks Road, 70m north of gate

Friday, 3 December 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	50	47	38
L_{Aeq}	58	55	50

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	66	to	77
L_{AFMax} - L_{Aeq} (Range)	15	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 $L_{Aeq\ 9\ hr}$	60	52
$L_{Aeq\ 1hr}$ upper 10 percentile	62	55
$L_{Aeq\ 1hr}$ lower 10 percentile	56	48

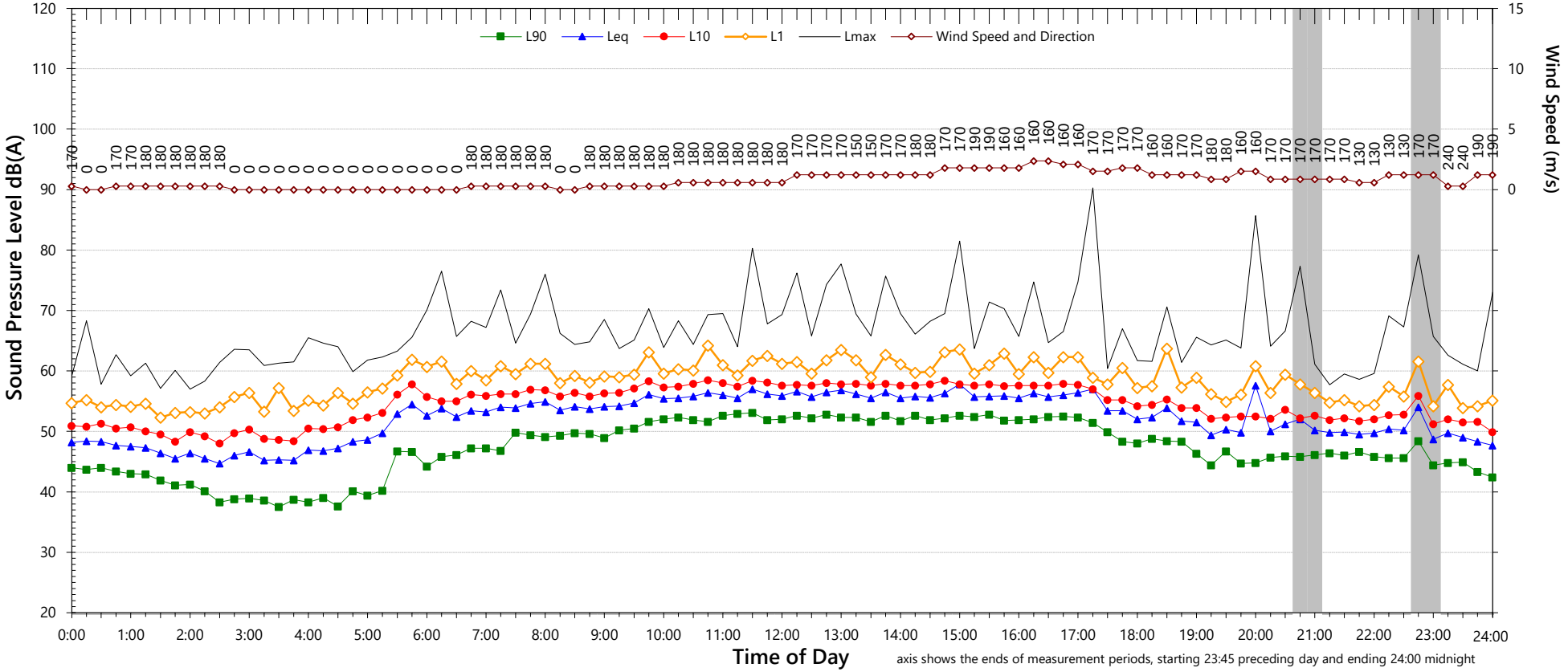
Notes:

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

On driveway of 187 Sparks Road, 70m north of gate

Saturday, 4 December 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	49	45	-
L_{Aeq}	56	52	-

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	69	to	82
L_{AFMax} - L_{Aeq} (Range)	16	to	27

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	51
$L_{Aeq\ 1hr}$ upper 10 percentile	59	54
$L_{Aeq\ 1hr}$ lower 10 percentile	54	47

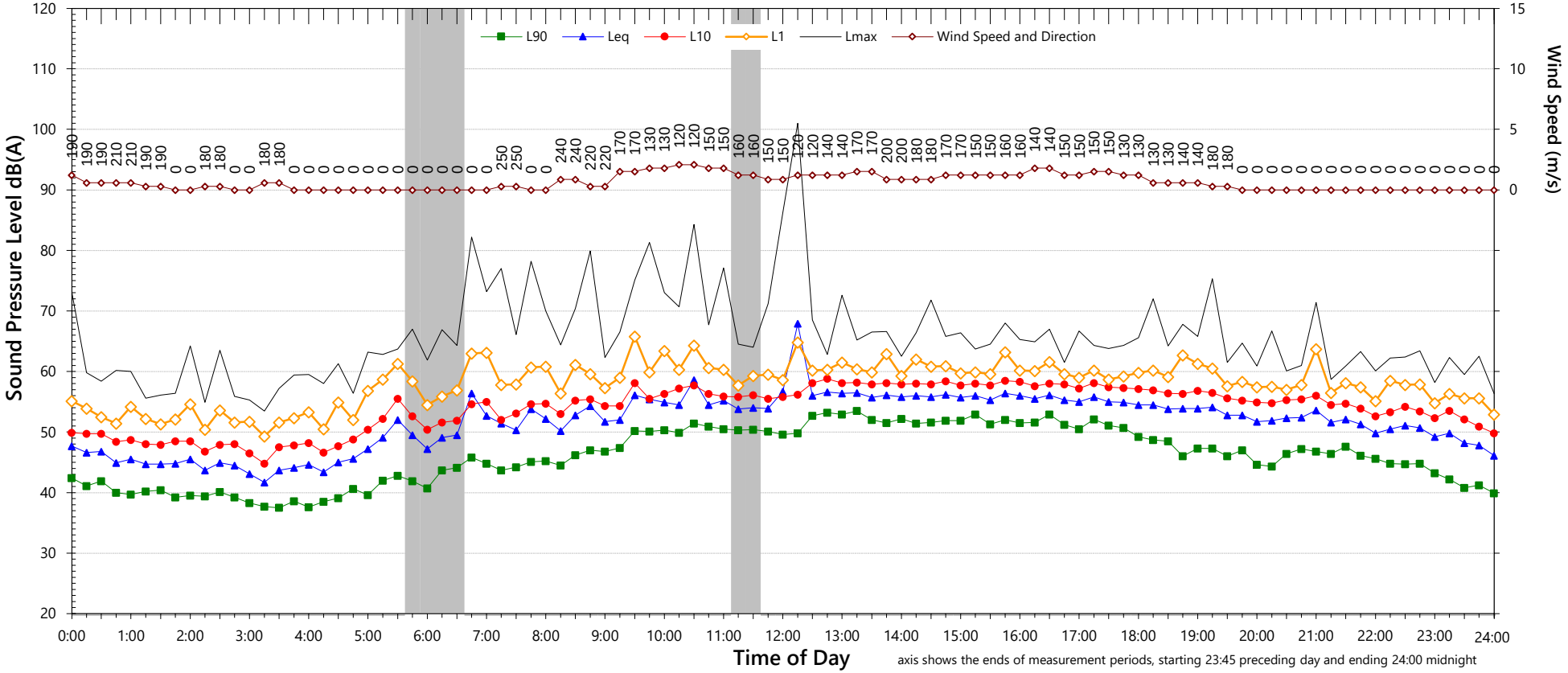
Notes:

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

On driveway of 187 Sparks Road, 70m north of gate

Sunday, 5 December 2021



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	47	45	40
L_{Aeq}	57	53	53

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	65	to	80
L_{AFMax} - L_{Aeq} (Range)	15	to	26

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	58	55
$L_{Aeq\ 1hr}$ upper 10 percentile	59	59
$L_{Aeq\ 1hr}$ lower 10 percentile	55	49

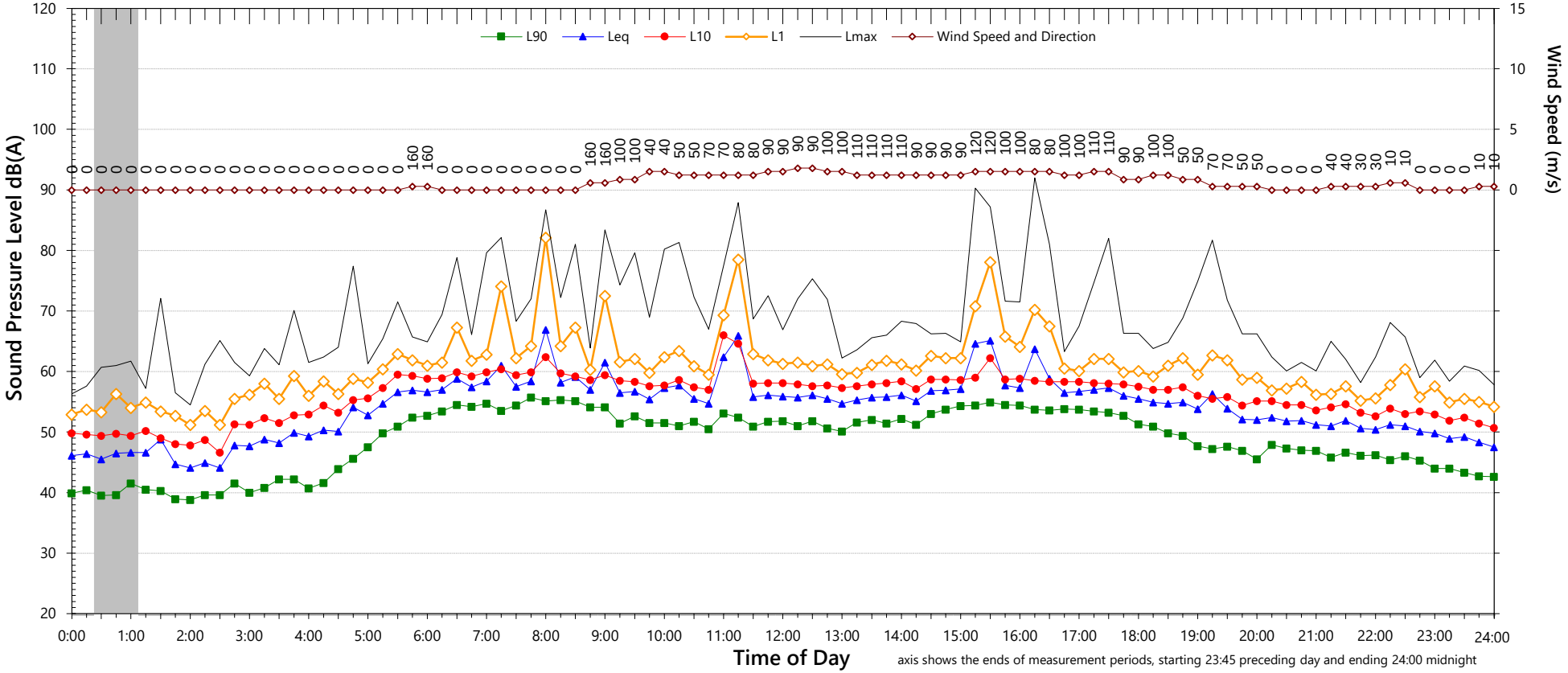
Notes:

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

On driveway of 187 Sparks Road, 70m north of gate

Monday, 6 December 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	51	46	40
L_{Aeq}	59	53	53

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	68	to	80
L_{AFMax} - L_{Aeq} (Range)	18	to	26

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	61	55
$L_{Aeq\ 1hr}$ upper 10 percentile	64	59
$L_{Aeq\ 1hr}$ lower 10 percentile	55	50

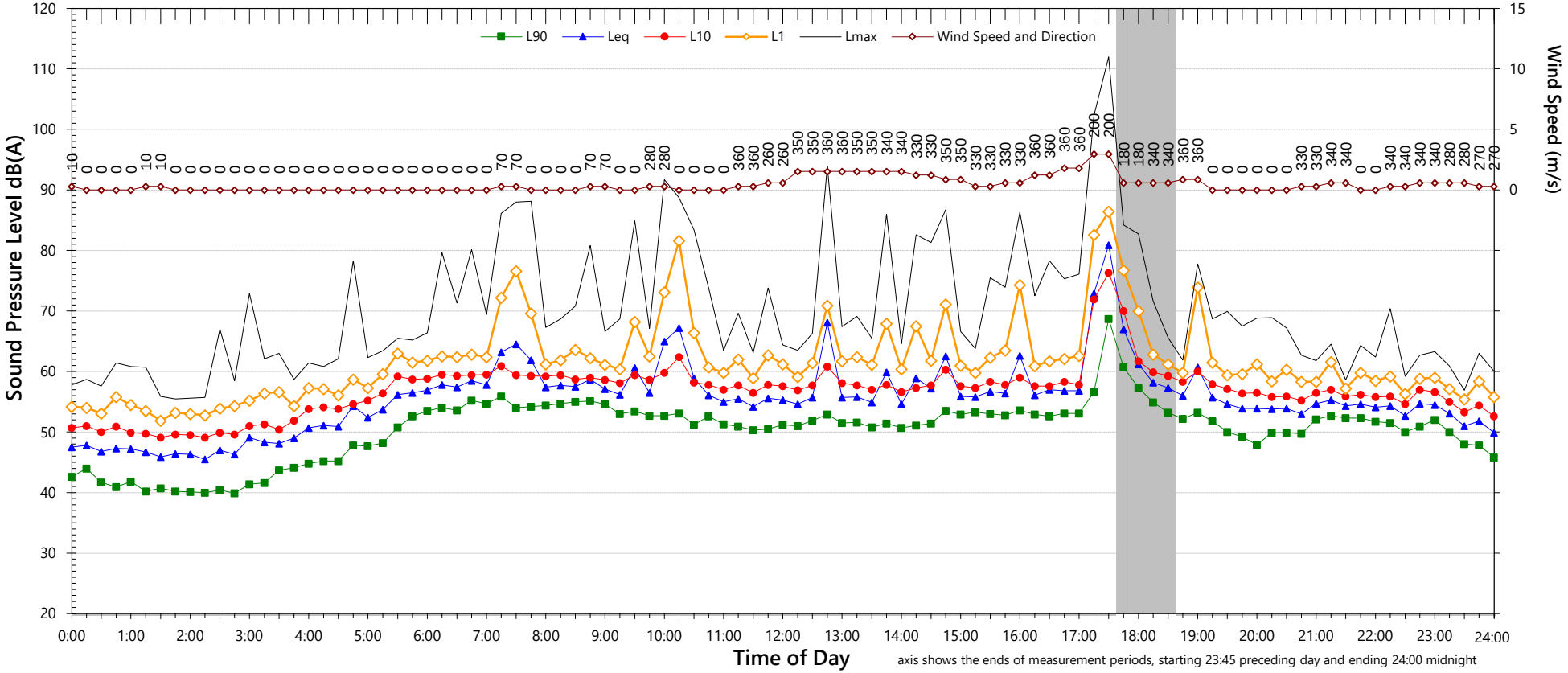
Notes:

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

On driveway of 187 Sparks Road, 70m north of gate

Tuesday, 7 December 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	51	49	45
L_{Aeq}	66	55	55

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	68	57
$L_{Aeq\ 1hr}$ upper 10 percentile	65	61
$L_{Aeq\ 1hr}$ lower 10 percentile	57	52

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	67	to	90
L_{AFMax} - L_{Aeq} (Range)	16	to	29

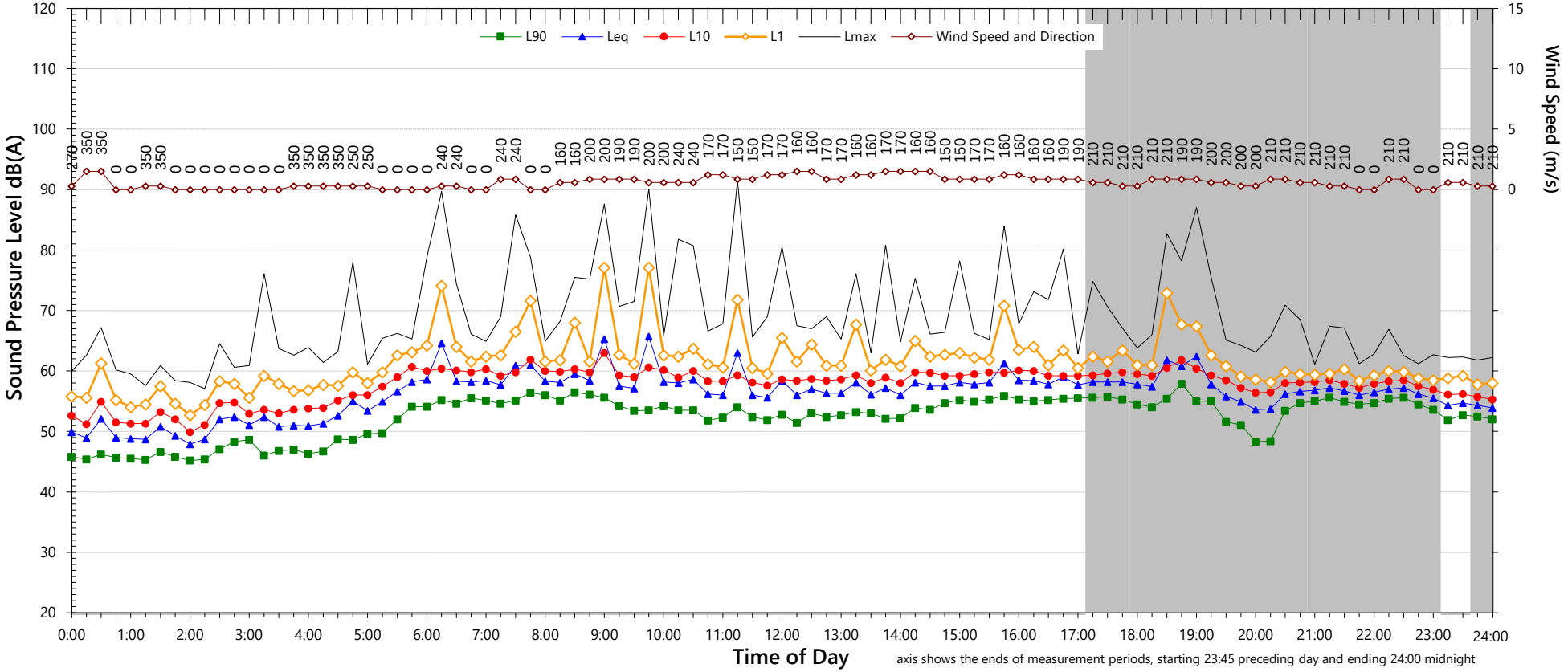
Notes:

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

On driveway of 187 Sparks Road, 70m north of gate

Wednesday, 8 December 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	52	-	-
L_{Aeq}	59	-	-

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	77	to	83
L_{AFMax} - L_{Aeq} (Range)	22	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 $L_{Aeq\ 9\ hr}$	-	-
$L_{Aeq\ 1hr}$ upper 10 percentile	-	-
$L_{Aeq\ 1hr}$ lower 10 percentile	-	-

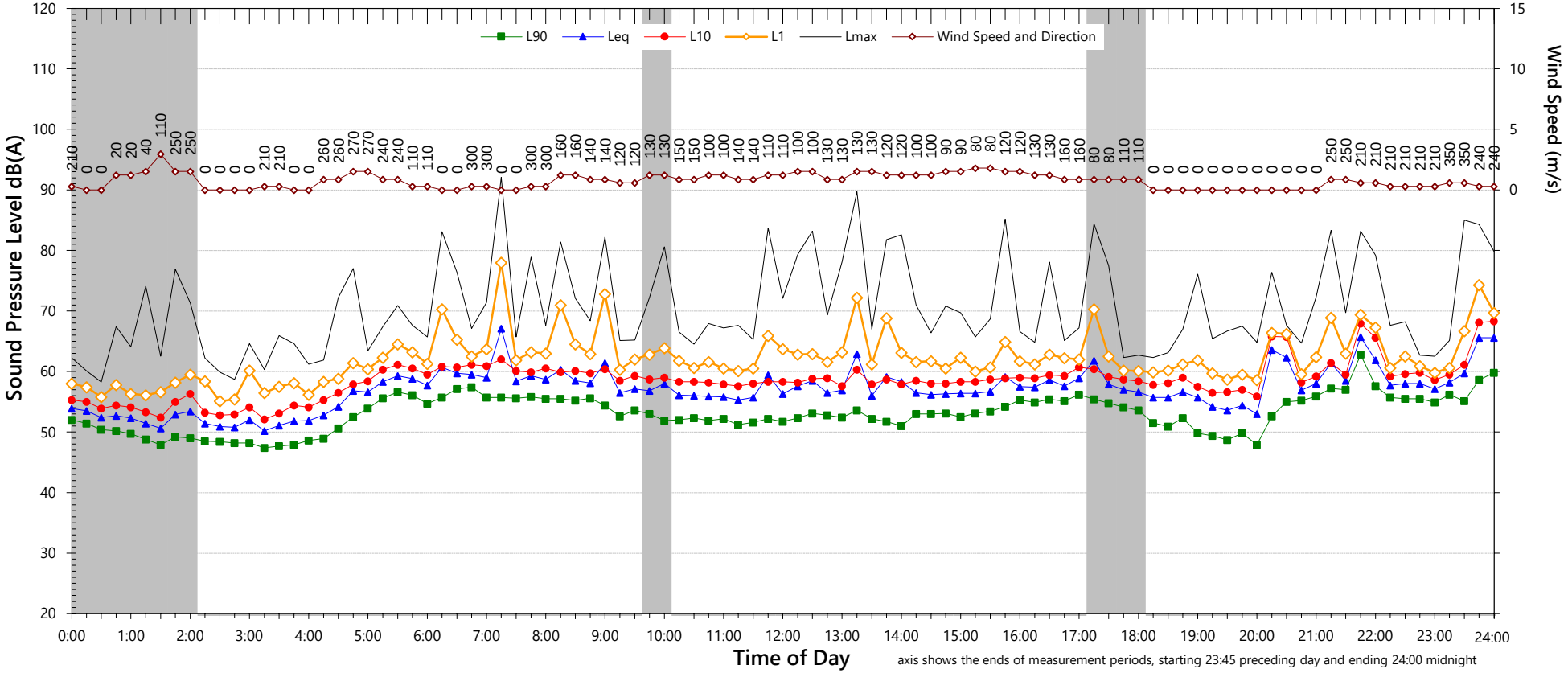
Notes:

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)

Unattended Noise Monitoring Results

On driveway of 187 Sparks Road, 70m north of gate

Thursday, 9 December 2021



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	52	49	50
L_{Aeq}	59	60	60

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	62	62
$L_{Aeq\ 1hr}$ upper 10 percentile	65	66
$L_{Aeq\ 1hr}$ lower 10 percentile	58	57

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	76	to	93
L_{AFMax} - L_{Aeq} (Range)	16	to	29

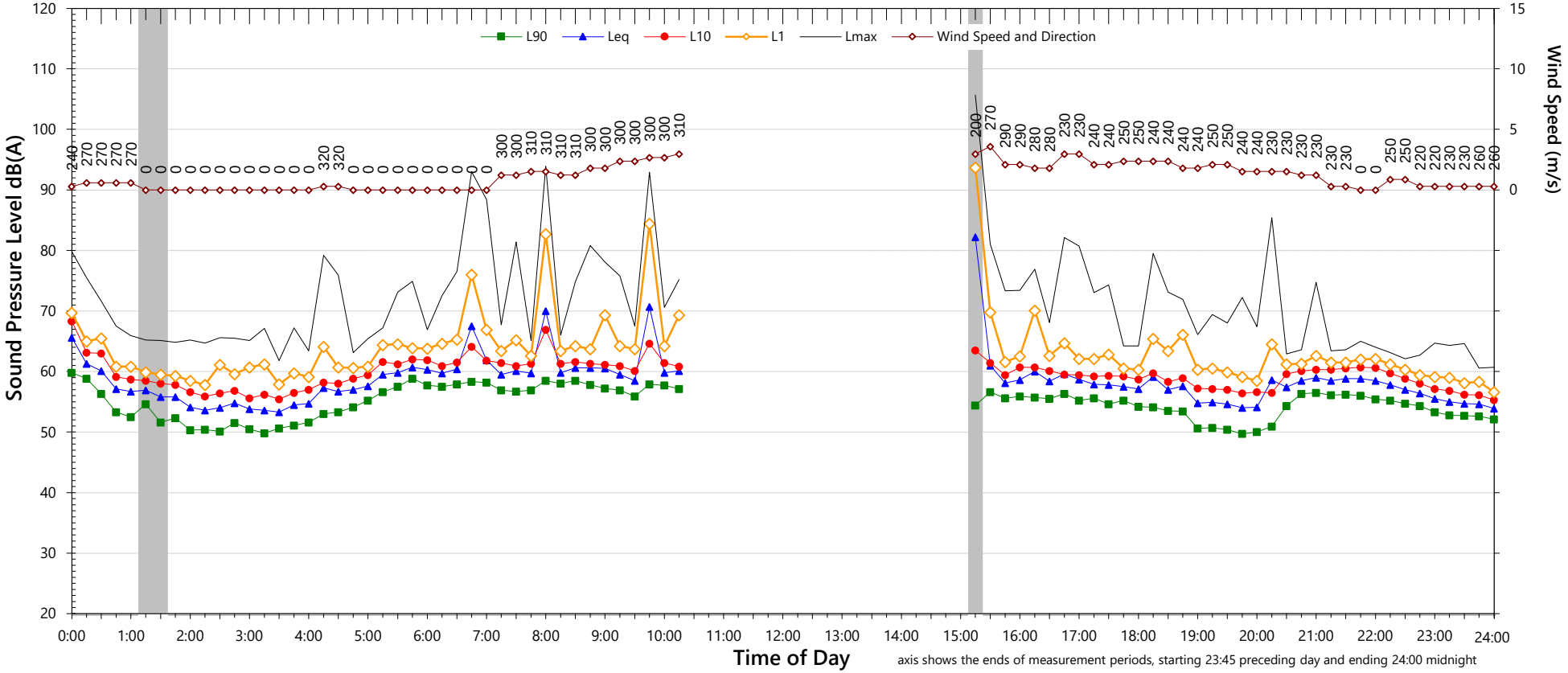
Notes:

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

On driveway of 187 Sparks Road, 70m north of gate

Friday, 10 December 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	-	50	46
L_{Aeq}	-	58	54

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	67	to	71
L_{AFMax} - L_{Aeq} (Range)	15	to	17

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	63	56
$L_{Aeq\ 1hr}$ upper 10 percentile	68	58
$L_{Aeq\ 1hr}$ lower 10 percentile	60	53

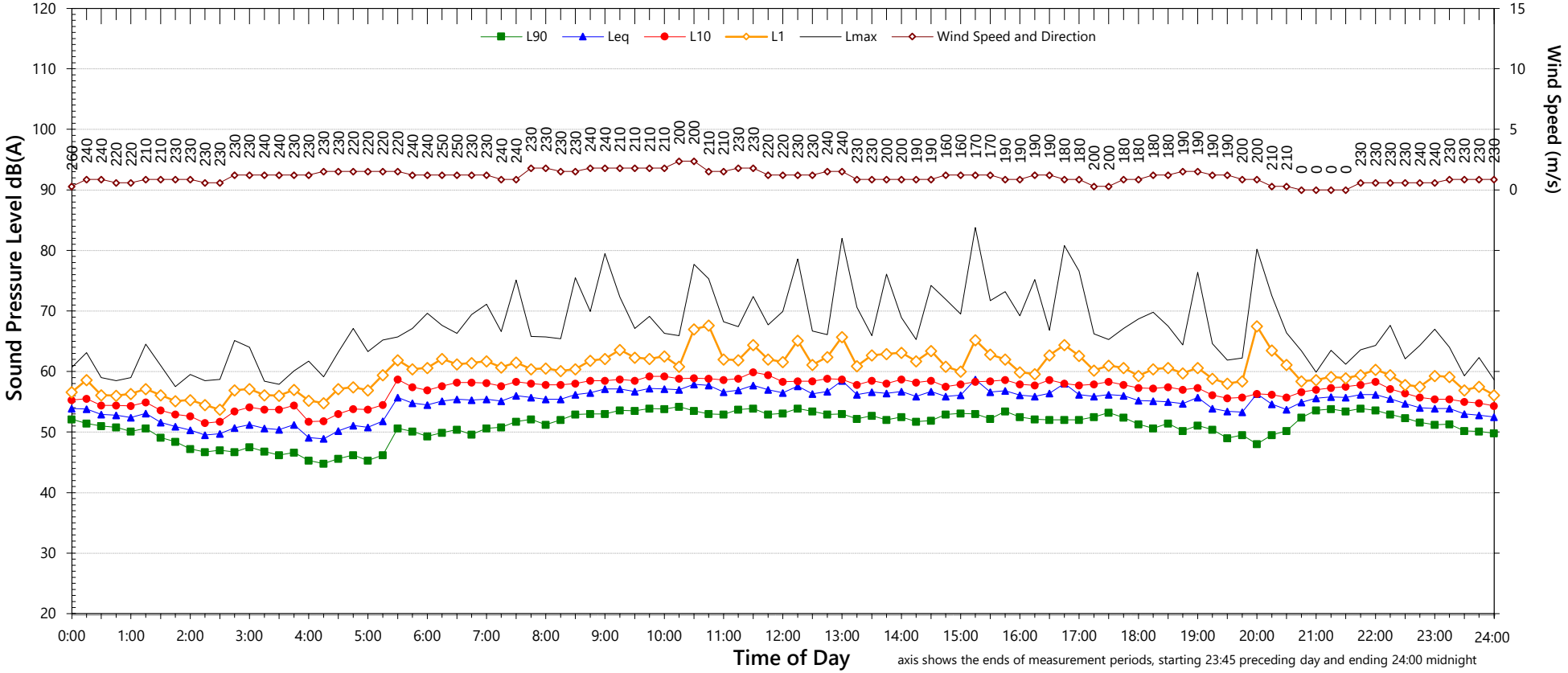
Notes:

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

On driveway of 187 Sparks Road, 70m north of gate

Saturday, 11 December 2021



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	52	49	42
L_{Aeq}	57	55	52

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	54
$L_{Aeq\ 1hr}$ upper 10 percentile	60	56
$L_{Aeq\ 1hr}$ lower 10 percentile	57	50

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	72	to	76
L_{AFMax} - L_{Aeq} (Range)	19	to	24

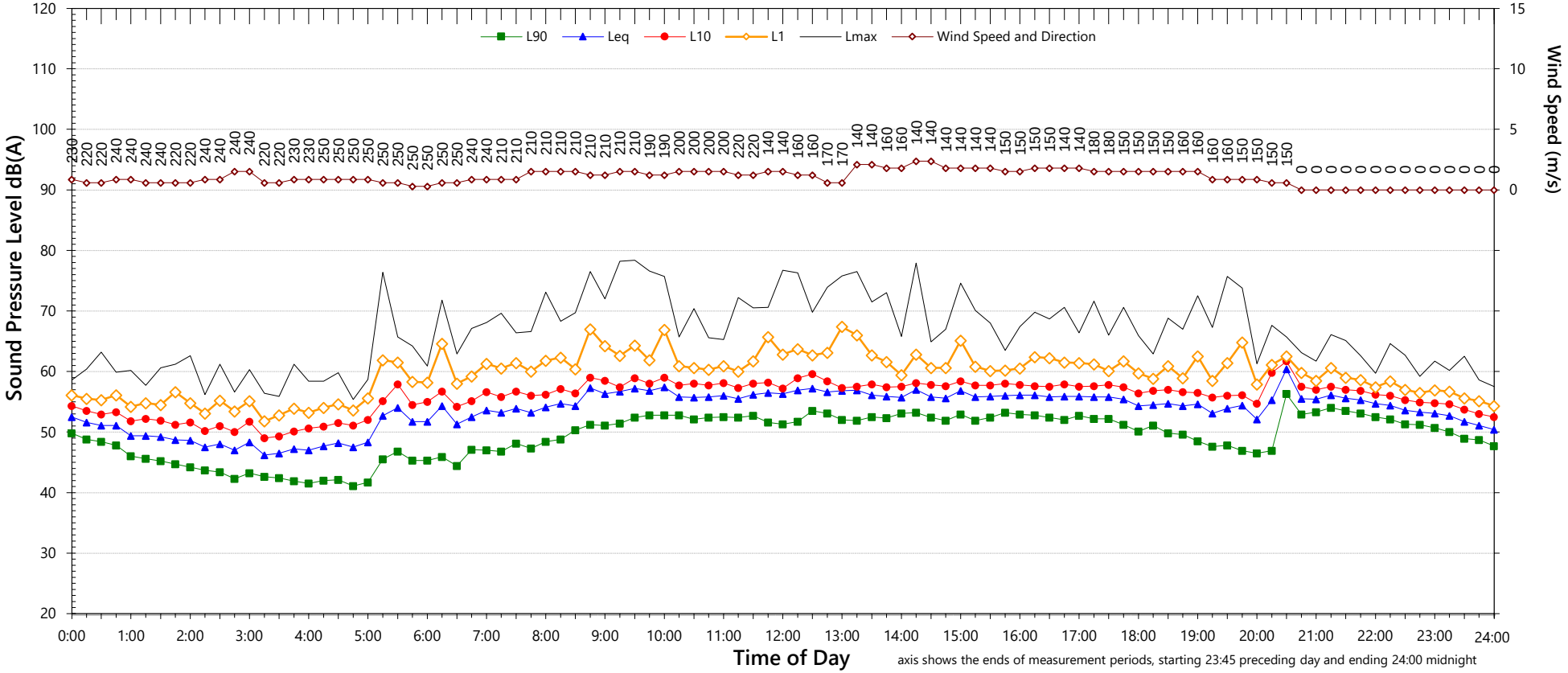
Notes:

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

On driveway of 187 Sparks Road, 70m north of gate

Sunday, 12 December 2021



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	51	47	42
L_{Aeq}	56	55	55

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	58	57
$L_{Aeq\ 1hr}$ upper 10 percentile	59	60
$L_{Aeq\ 1hr}$ lower 10 percentile	56	50

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	73	to	87
L_{AFMax} - L_{Aeq} (Range)	16	to	26

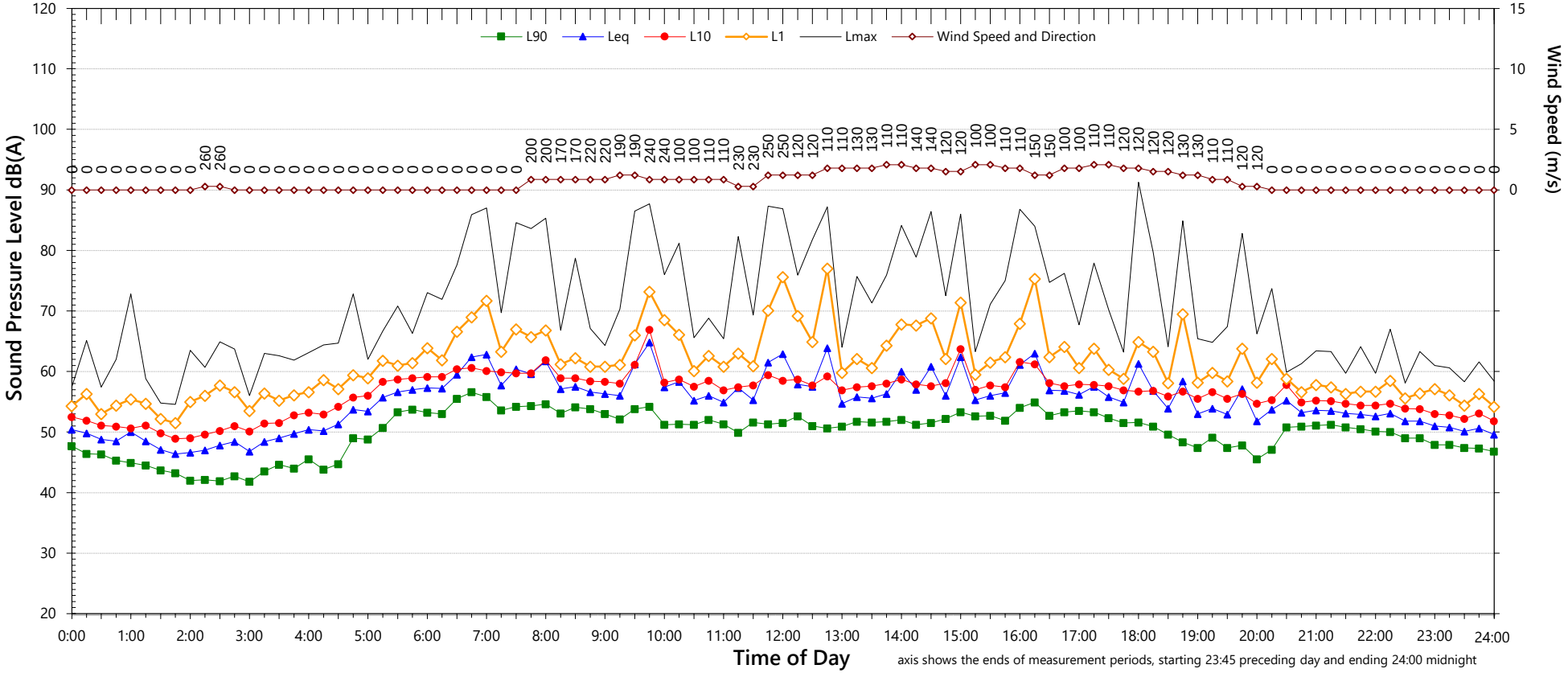
Notes:

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

On driveway of 187 Sparks Road, 70m north of gate

Monday, 13 December 2021



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	51	47	44
L_{Aeq}	59	55	55

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	61	57
$L_{Aeq\ 1hr}$ upper 10 percentile	63	61
$L_{Aeq\ 1hr}$ lower 10 percentile	57	51

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	67	to	89
L_{AFMax} - L_{Aeq} (Range)	15	to	28

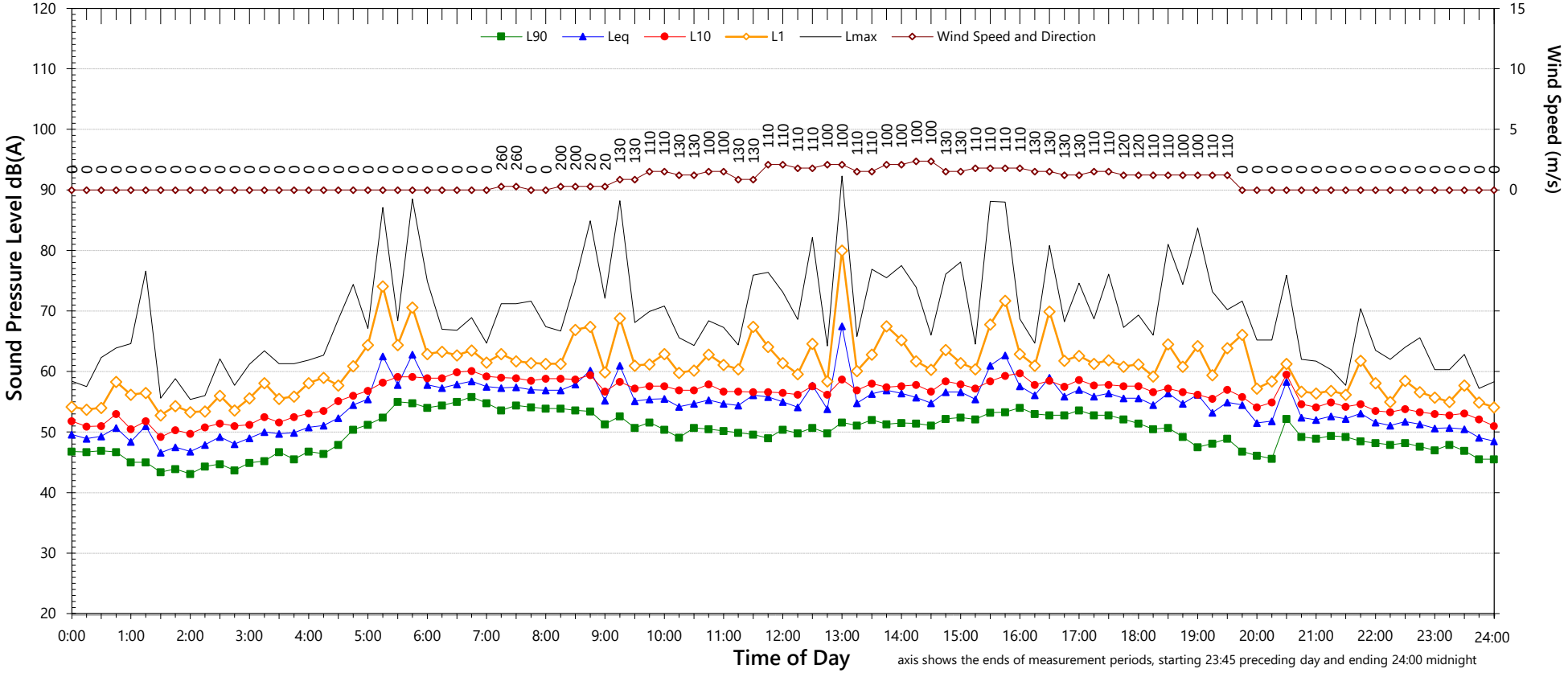
Notes:

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

On driveway of 187 Sparks Road, 70m north of gate

Tuesday, 14 December 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	50	46	43
L_{Aeq}	58	54	54

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	71	to	88
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 $L_{Aeq\ 9\ hr}$	60	56
$L_{Aeq\ 1hr}$ upper 10 percentile	62	60
$L_{Aeq\ 1hr}$ lower 10 percentile	57	50

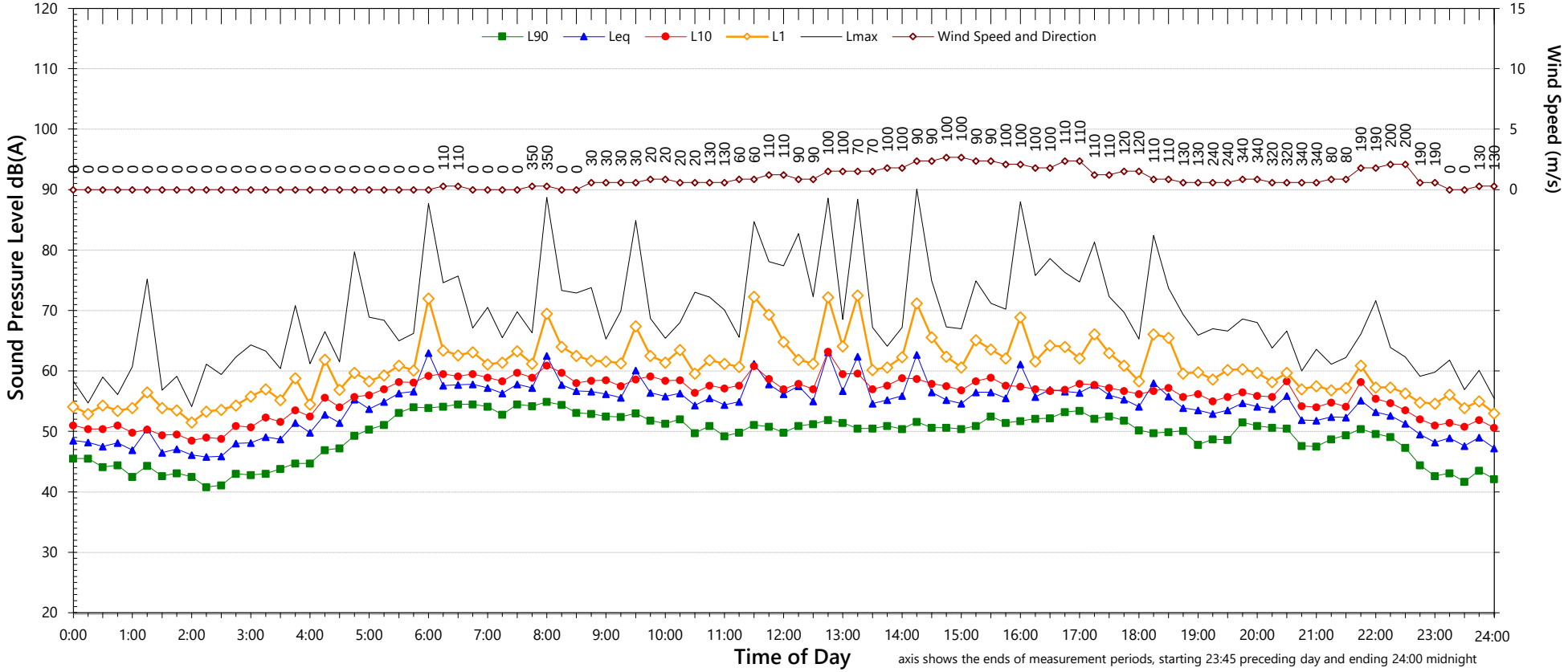
Notes:

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

On driveway of 187 Sparks Road, 70m north of gate

Wednesday, 15 December 2021



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	50	48	40
L_{Aeq}	58	54	54

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	66	to	90
L_{AFMax} - L_{Aeq} (Range)	18	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 $L_{Aeq\ 9\ hr}$	60	57
$L_{Aeq\ 1hr}$ upper 10 percentile	61	61
$L_{Aeq\ 1hr}$ lower 10 percentile	56	48

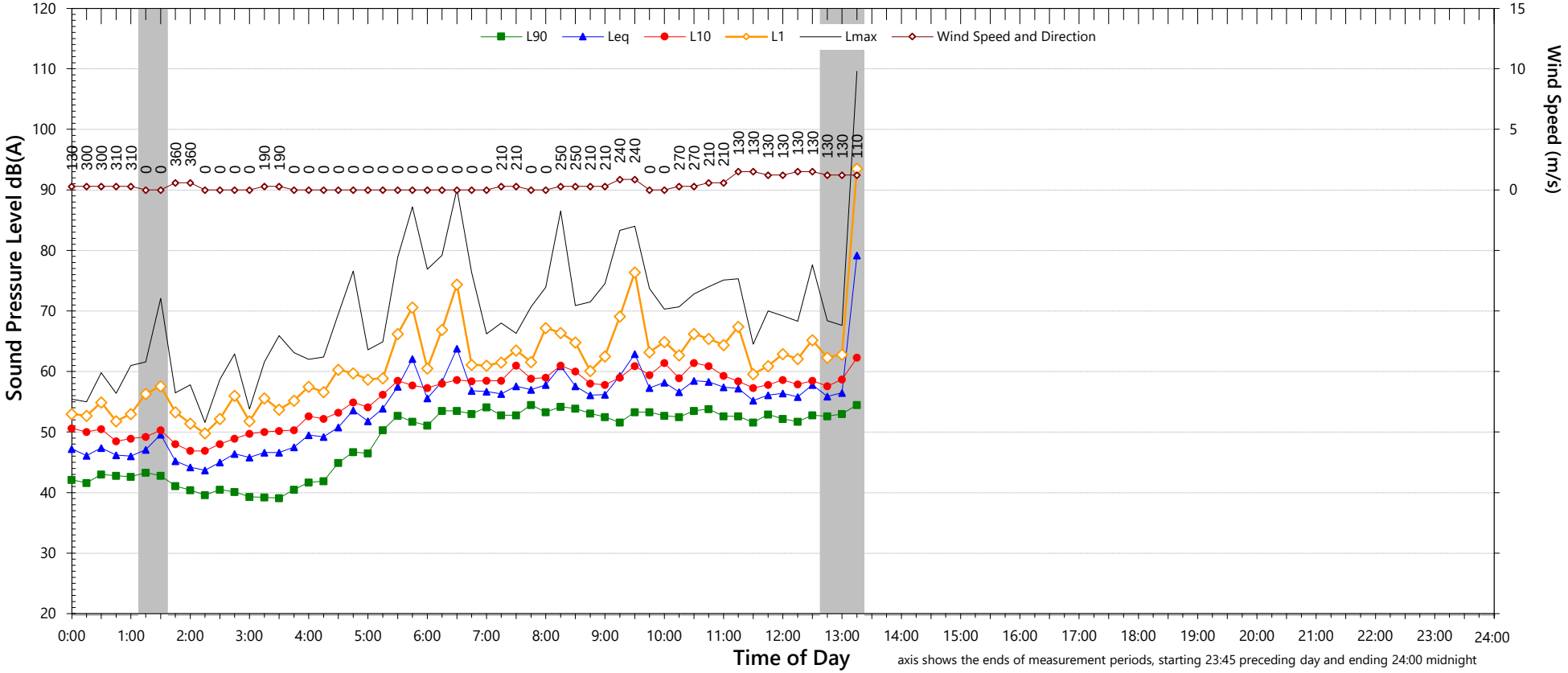
Notes:

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

On driveway of 187 Sparks Road, 70m north of gate

Thursday, 16 December 2021



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)

RENZO TONIN & ASSOCIATES
inspired to achieve

Acoustics
Vibration
Structural Dynamics

sydney@renzotonin.com.au
www.renzotonin.com.au

Monitoring ID: L2
Address: 13 Buttonderry Way, Jilliby
Description: Backyard of 13 Buttonderry Way, 14m south of house

Background & Ambient Noise Monitoring Results

	L_{A90} Background Noise Levels				L_{Aeq} Ambient Noise Levels			
	Day[1]	Evening[2]	Night[3]	Shoulder[4,6]	Day[1]	Evening[2]	Night[3]	Shoulder[4]
Representative Week[5]	52	51	44	49	68	67	56	60

Notes:

1. Day: 7.00am to 6.00pm Monday to Saturday and 8.00am to 6.00pm Sundays & Public Holidays
2. Evening: 6.00pm to 10.00pm Monday to Sunday & Public Holidays
3. Night: 10.00pm to 5.00am Monday to Sunday & Public Holidays
4. Shoulder period: 5:00am to 7:00am
5. Rating Background Level (RBL) for L_{A90} and logarithmic average for L_{Aeq}
6. Shoulder period RBL levels determined as per NPfI Fact Sheet A3

Road Monitoring Results (at one metre from façade[4])

	L_{Aeq} Noise Levels[4]	
	Day[1]	Night[2]
Representative Week[3]	69	58

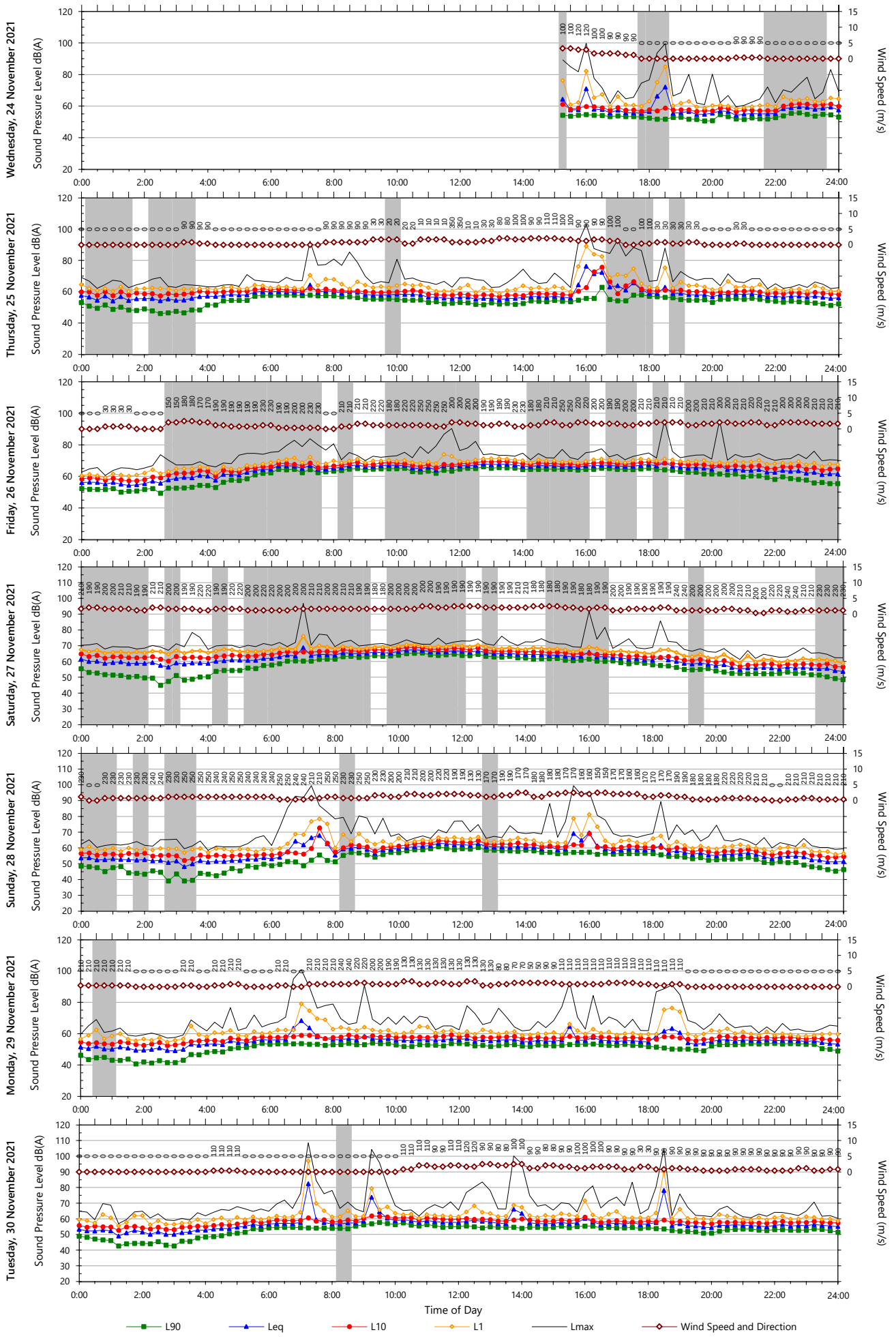
Notes:

1. Day is 7:00am to 10:00pm 2. Night is 10:00pm to 7:00am 3. Median of daily L_{Aeq}
4. Values are calculated at the facade. 2.5dB is added to results if logger is placed in the free field

Logger location photograph	Logger location map
	

Unattended Monitoring Results

Location: Backyard of 13 Buttonderry Way, 14m south of house

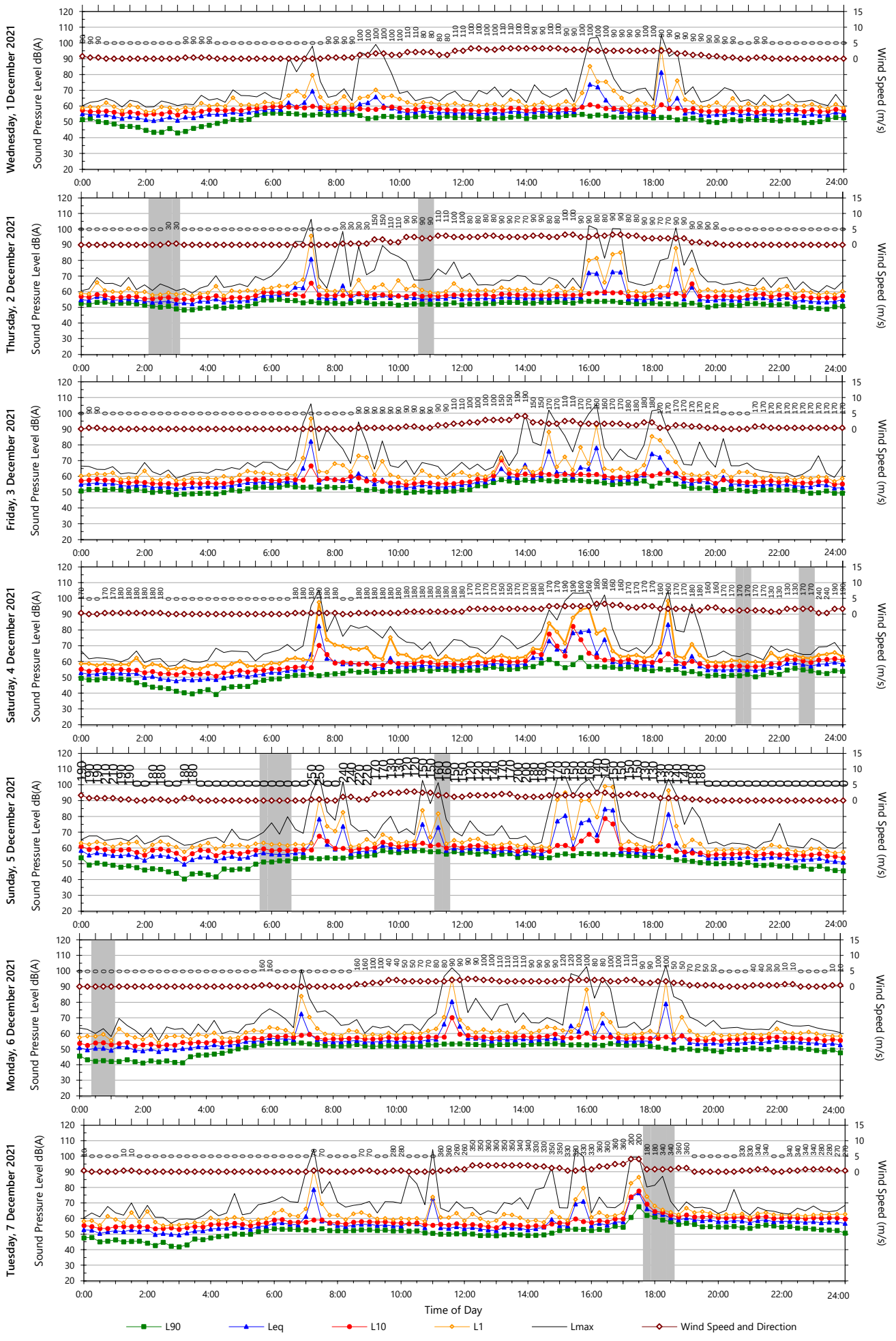


Data File: 2021-11-24_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r38)

Unattended Monitoring Results

Location: Backyard of 13 Buttonderry Way, 14m south of house

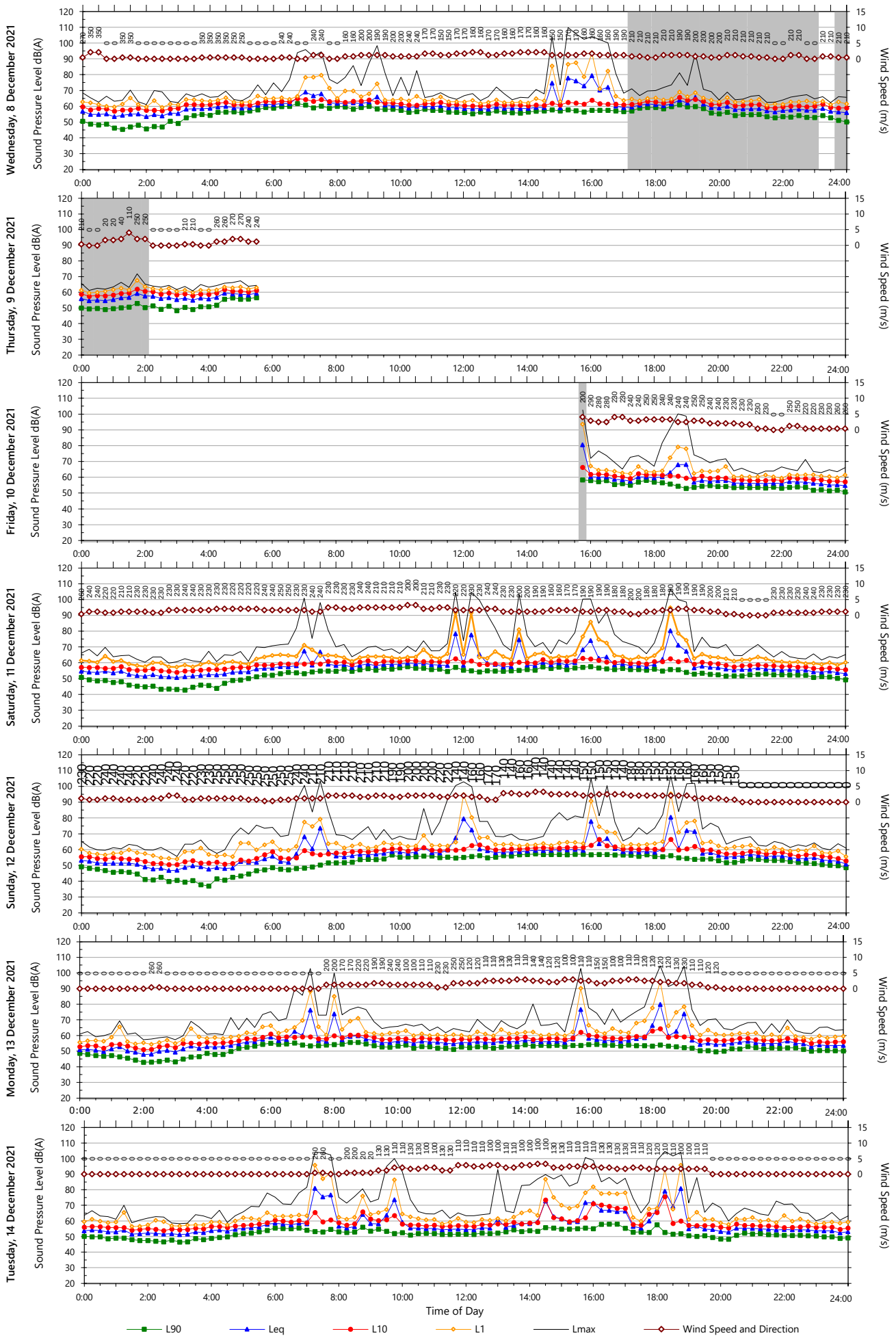


Data File: 2021-11-24_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r38)

Unattended Monitoring Results

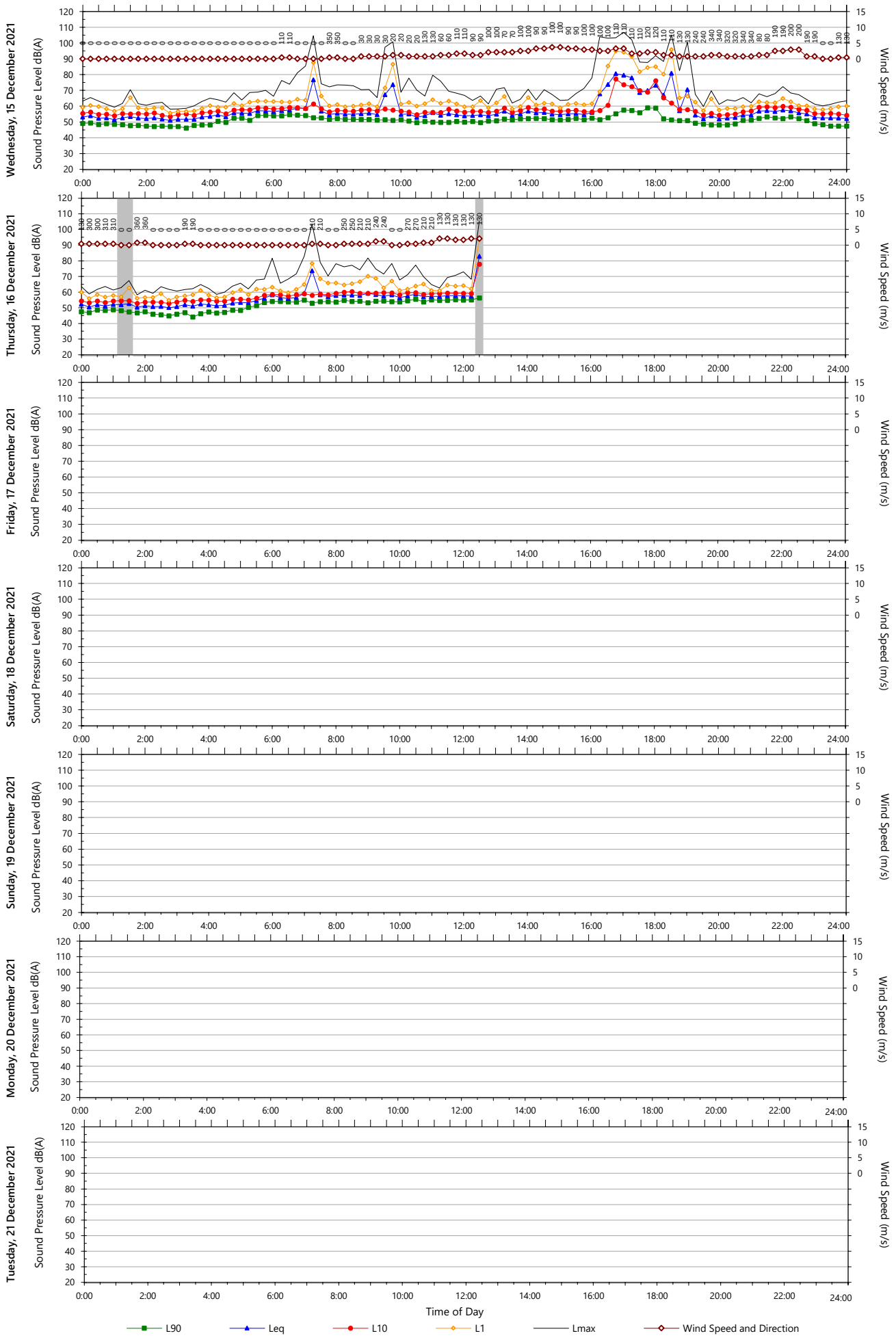
Location: Backyard of 13 Buttonderry Way, 14m south of house



Data File: 2021-11-24_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r38)

Unattended Monitoring Results **Location: Backyard of 13 Buttonderry Way, 14m south of house**



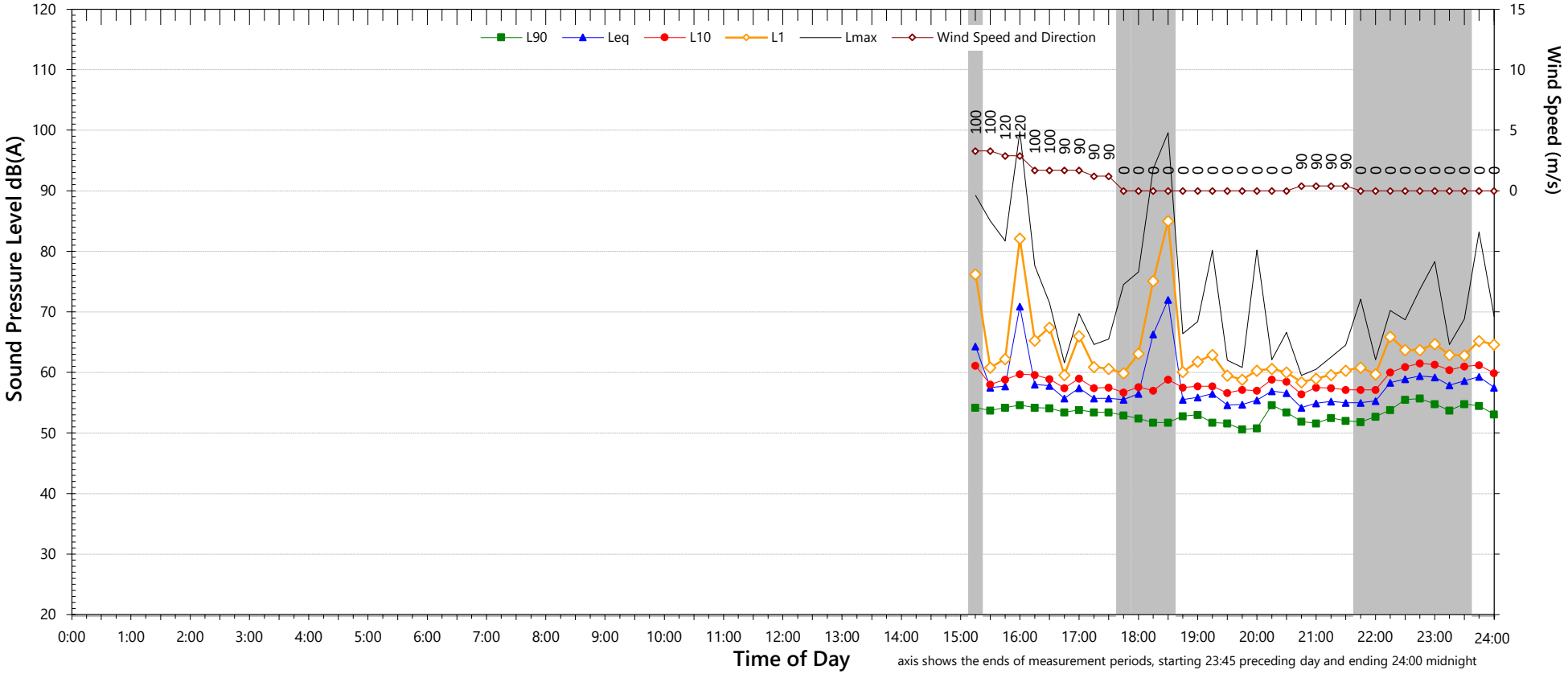
Data File: 2021-11-24_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r38)

Unattended Noise Monitoring Results

Backyard of 13 Buttonderry Way, 14m south of house

Wednesday, 24 November 2021



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	-	-	-
L_{Aeq}	-	-	-

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	83	to	83
L_{AFMax} - L_{Aeq} (Range)	25	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 $L_{Aeq\ 9\ hr}$	-	-
$L_{Aeq\ 1hr}$ upper 10 percentile	-	-
$L_{Aeq\ 1hr}$ lower 10 percentile	-	-

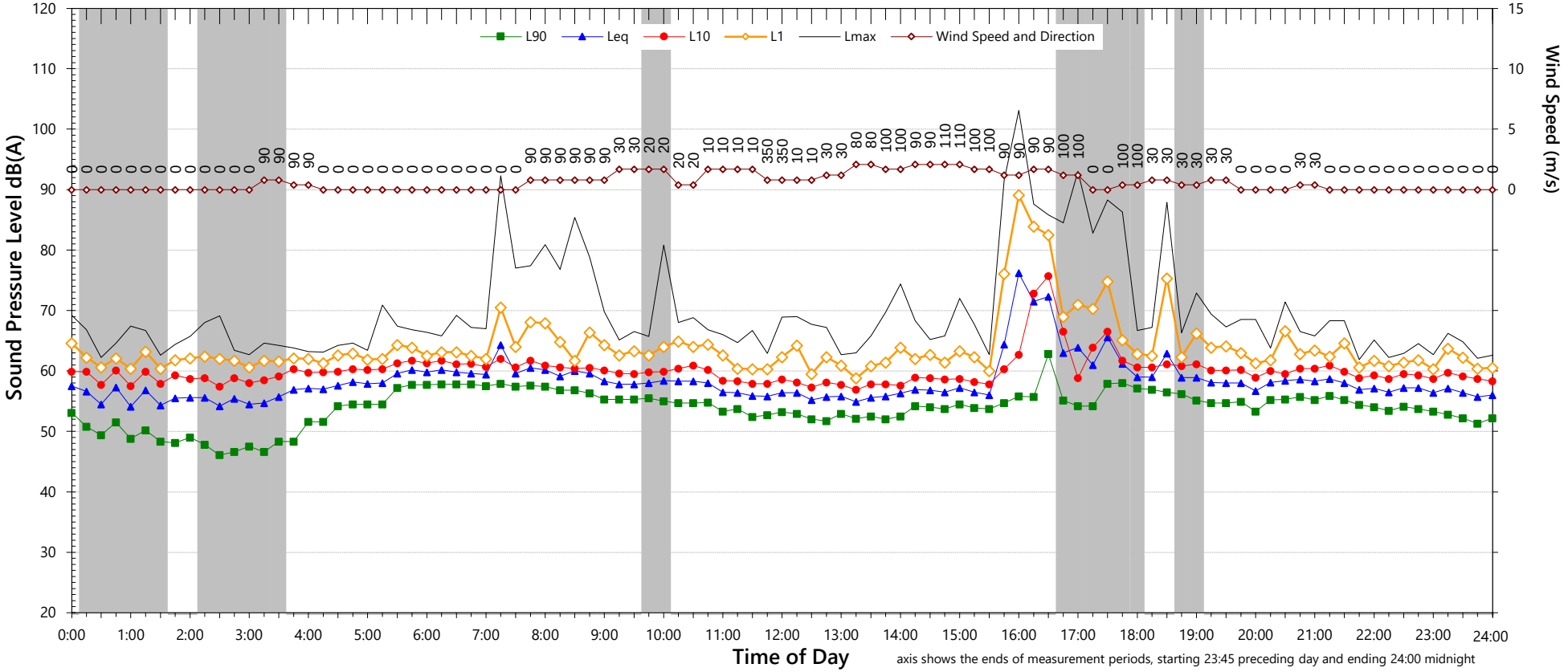
Notes:

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)

Unattended Noise Monitoring Results

Backyard of 13 Buttonderry Way, 14m south of house

Thursday, 25 November 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	52	54	-
L_{Aeq}	64	59	-

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	74	to	74
L_{AFMax} - L_{Aeq} (Range)	17	to	17

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	66	-
$L_{Aeq\ 1hr}$ upper 10 percentile	70	-
$L_{Aeq\ 1hr}$ lower 10 percentile	58	-

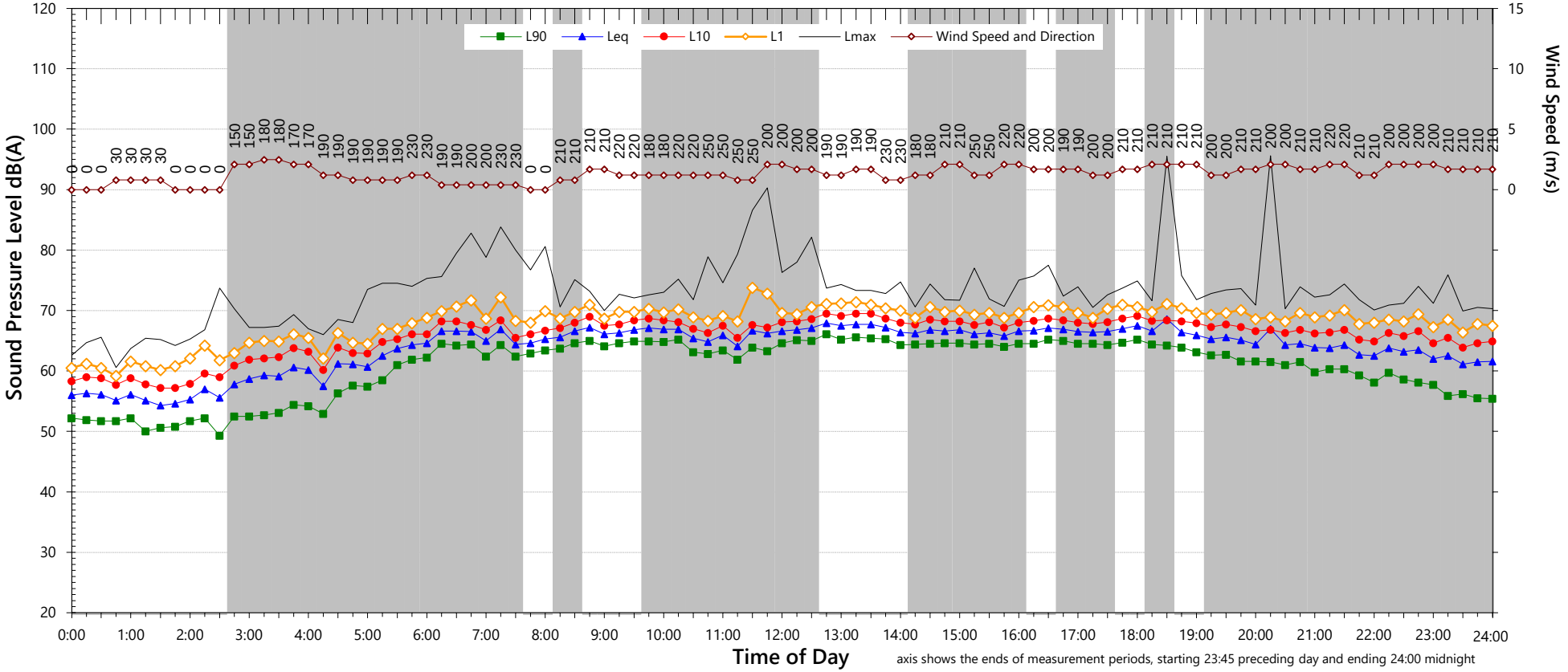
Notes:

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

Backyard of 13 Buttonderry Way, 14m south of house

Friday, 26 November 2021



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)	78	to	78
L_{AFMax} - L_{Aeq} (Range)	20	to	20

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	-	-

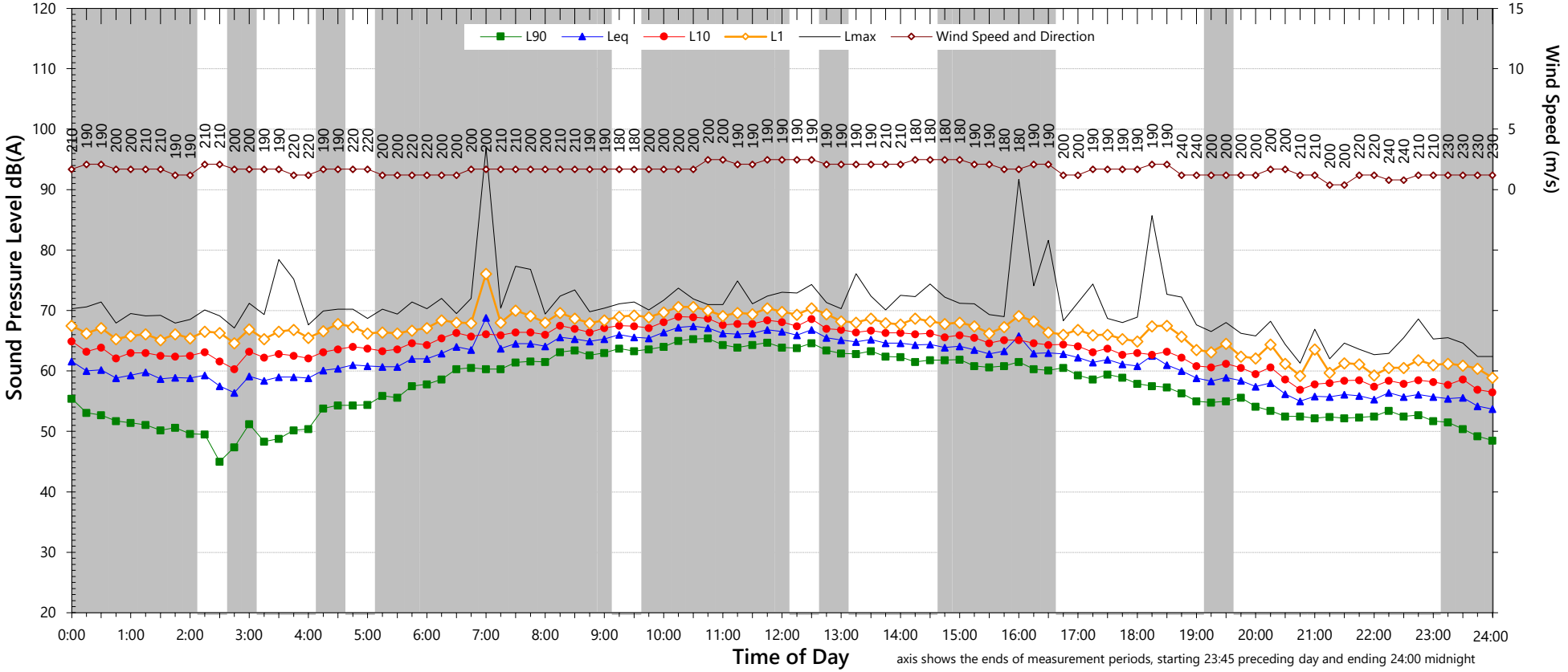
Notes:

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)

Unattended Noise Monitoring Results

Backyard of 13 Buttonderry Way, 14m south of house

Saturday, 27 November 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	-	52	-
L_{Aeq}	-	58	-

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	93	to	93
L_{AFMax} - L_{Aeq} (Range)	32	to	32

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
$L_{Aeq\ 1hr}$ upper 10 percentile	-	61
$L_{Aeq\ 1hr}$ lower 10 percentile	-	54

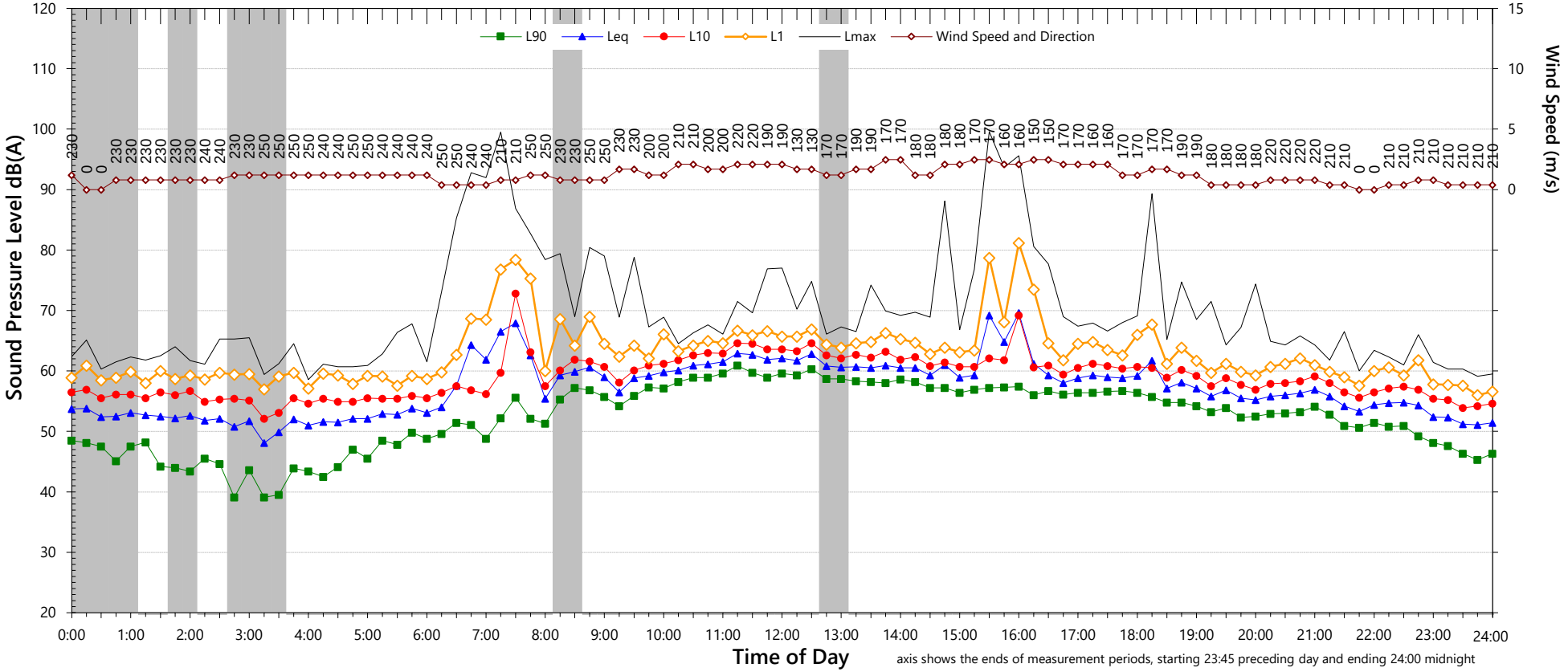
Notes:

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

Backyard of 13 Buttonderry Way, 14m south of house

Sunday, 28 November 2021



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	56	51	42
L_{Aeq}	62	57	57

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	64	59
$L_{Aeq\ 1hr}$ upper 10 percentile	66	60
$L_{Aeq\ 1hr}$ lower 10 percentile	59	53

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	69	to	101
L_{AFMax} - L_{Aeq} (Range)	16	to	37

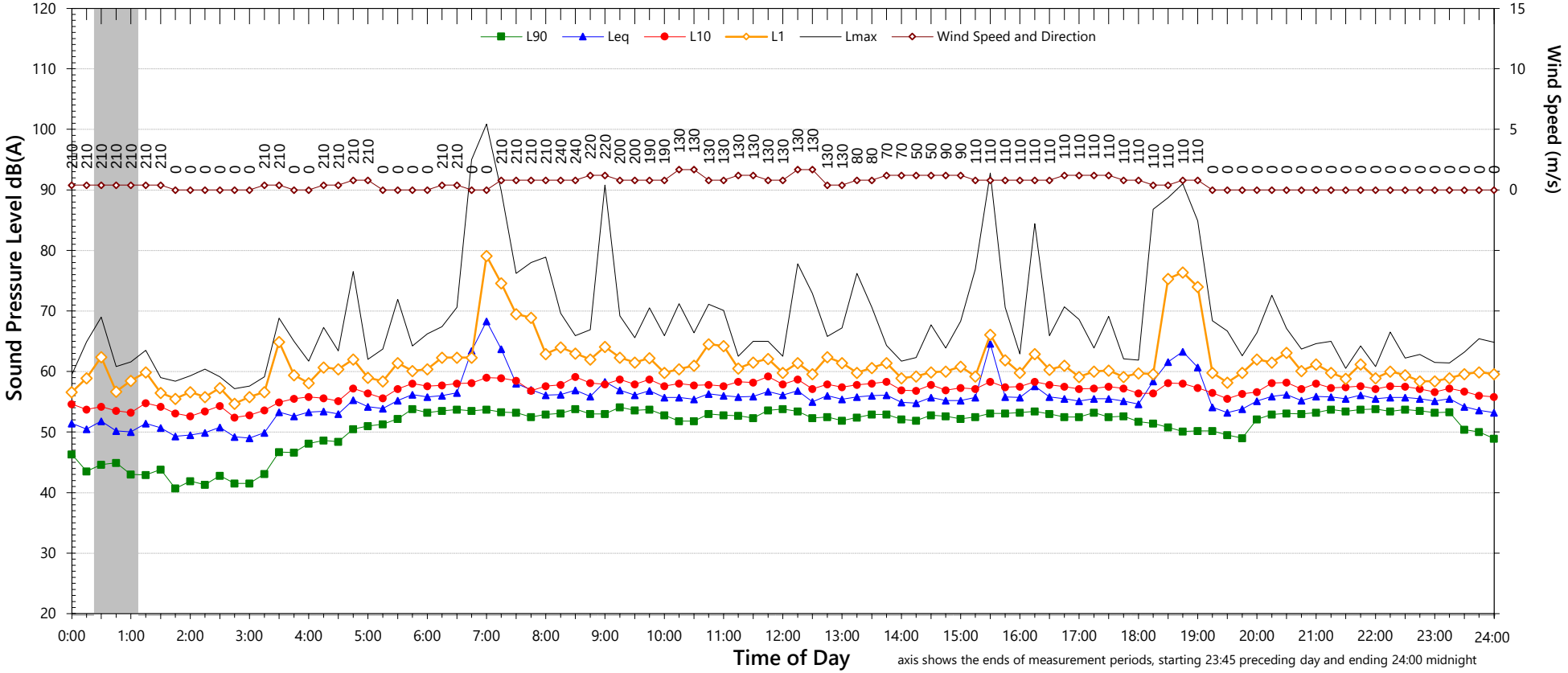
Notes:

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

Backyard of 13 Buttonderry Way, 14m south of house

Monday, 29 November 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	52	50	44
L_{Aeq}	57	58	54

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	70	to	76
L_{AFMax} - L_{Aeq} (Range)	17	to	19

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	60	57
$L_{Aeq\ 1hr}$ upper 10 percentile	62	59
$L_{Aeq\ 1hr}$ lower 10 percentile	58	54

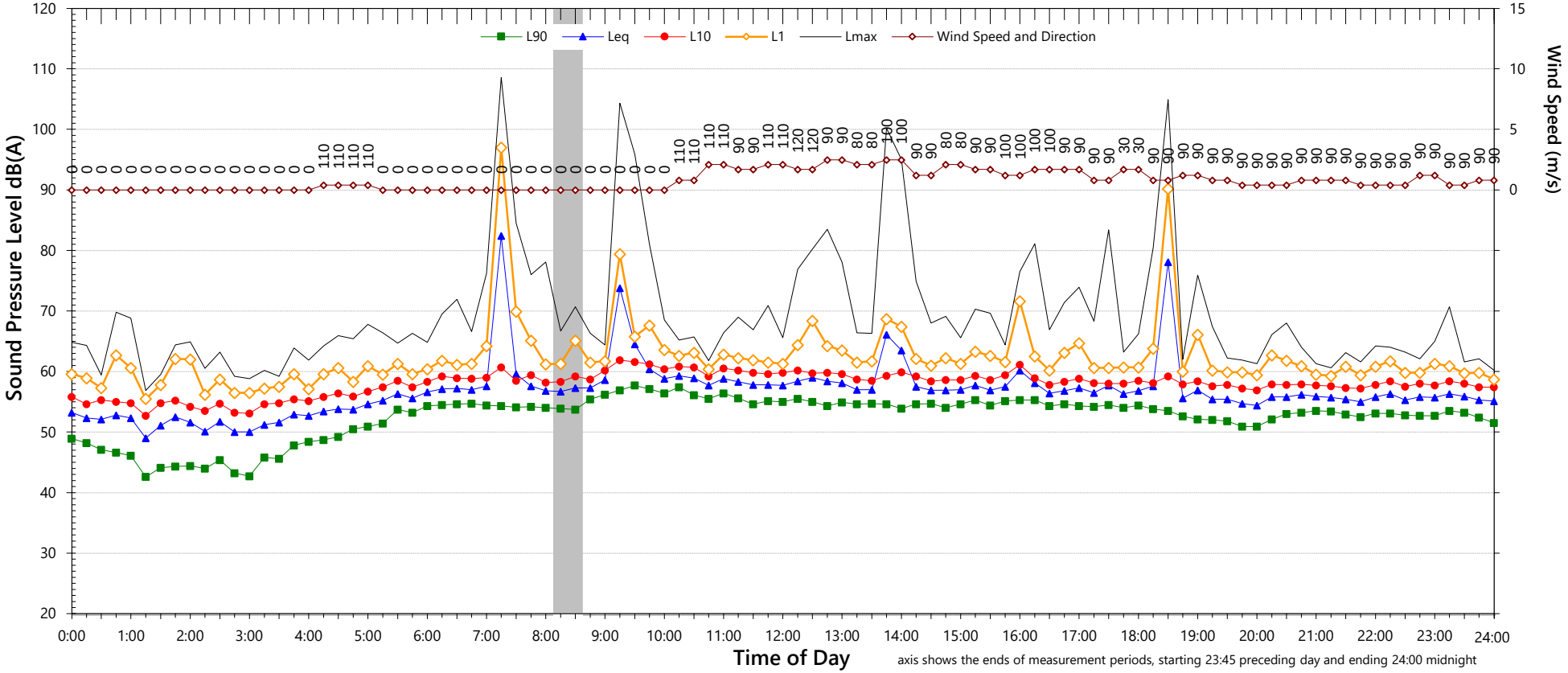
Notes:

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

Backyard of 13 Buttonderry Way, 14m south of house

Tuesday, 30 November 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{A90} ABL	54	51	44
L_{Aeq}	67	66	56

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	**Day**	**Night[5]**
	7am-10pm	**10pm-7am**
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	70	59
$L_{Aeq\ 1hr}$ upper 10 percentile	73	60
$L_{Aeq\ 1hr}$ lower 10 percentile	58	55

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	70	to	91
L_{AFMax} - L_{Aeq} (Range)	15	to	30

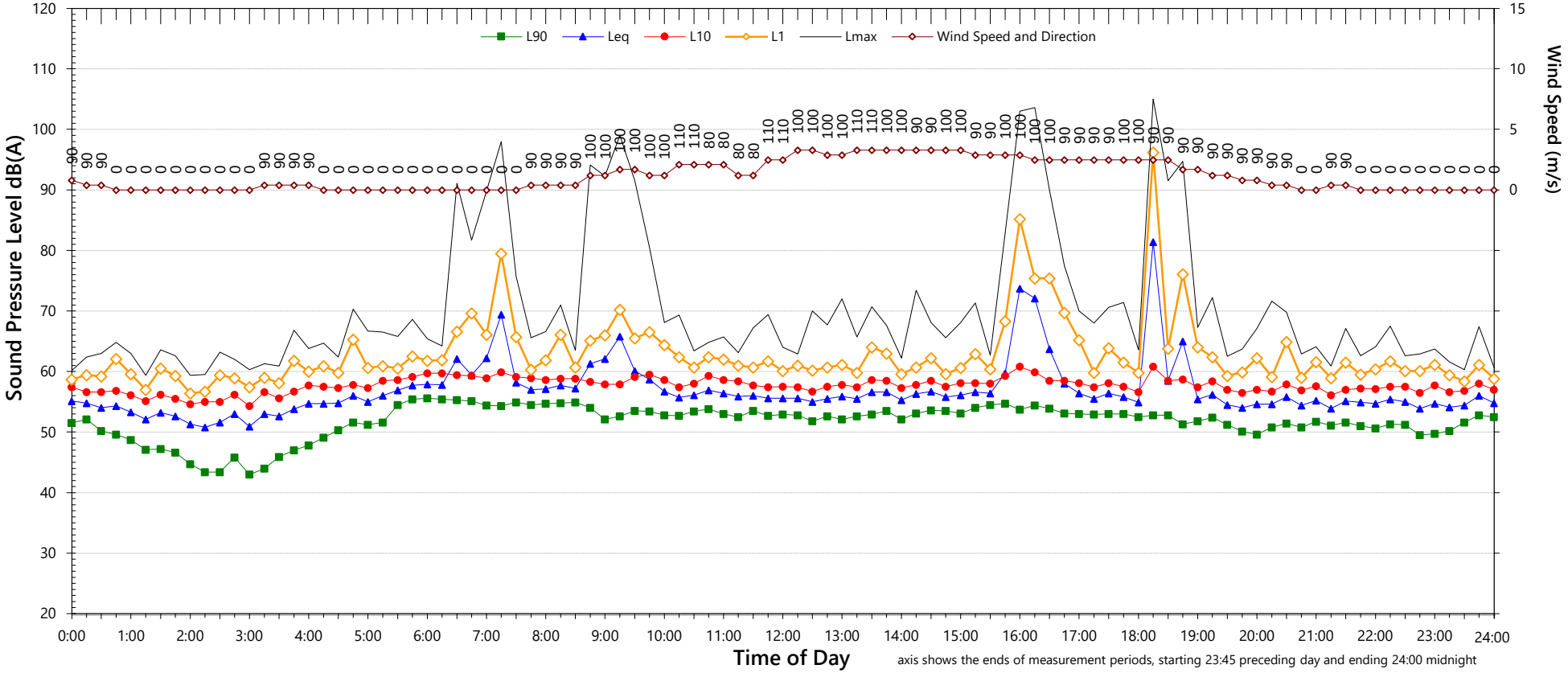
Notes:

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

Backyard of 13 Buttonderry Way, 14m south of house

Wednesday, 1 December 2021



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	53	50	50
L_{Aeq}	62	70	56

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	68	59
$L_{Aeq\ 1hr}$ upper 10 percentile	70	60
$L_{Aeq\ 1hr}$ lower 10 percentile	57	56

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	70	to	92
L_{AFMax} - L_{Aeq} (Range)	16	to	31

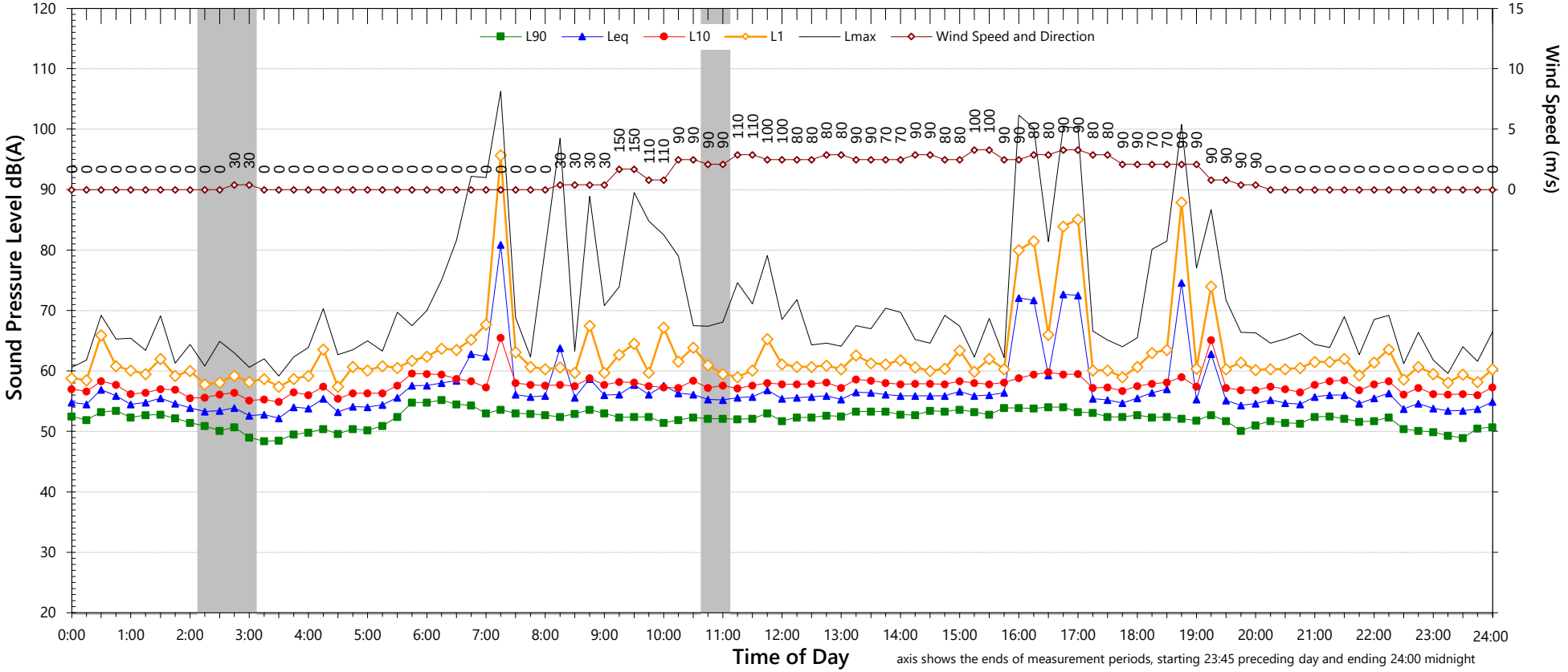
Notes:

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

Backyard of 13 Buttonderry Way, 14m south of house

Thursday, 2 December 2021



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	52	51	49
L_{Aeq}	67	63	56

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	69	58
$L_{Aeq\ 1hr}$ upper 10 percentile	73	60
$L_{Aeq\ 1hr}$ lower 10 percentile	58	56

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	94	to	94
L_{AFMax} - L_{Aeq} (Range)	33	to	33

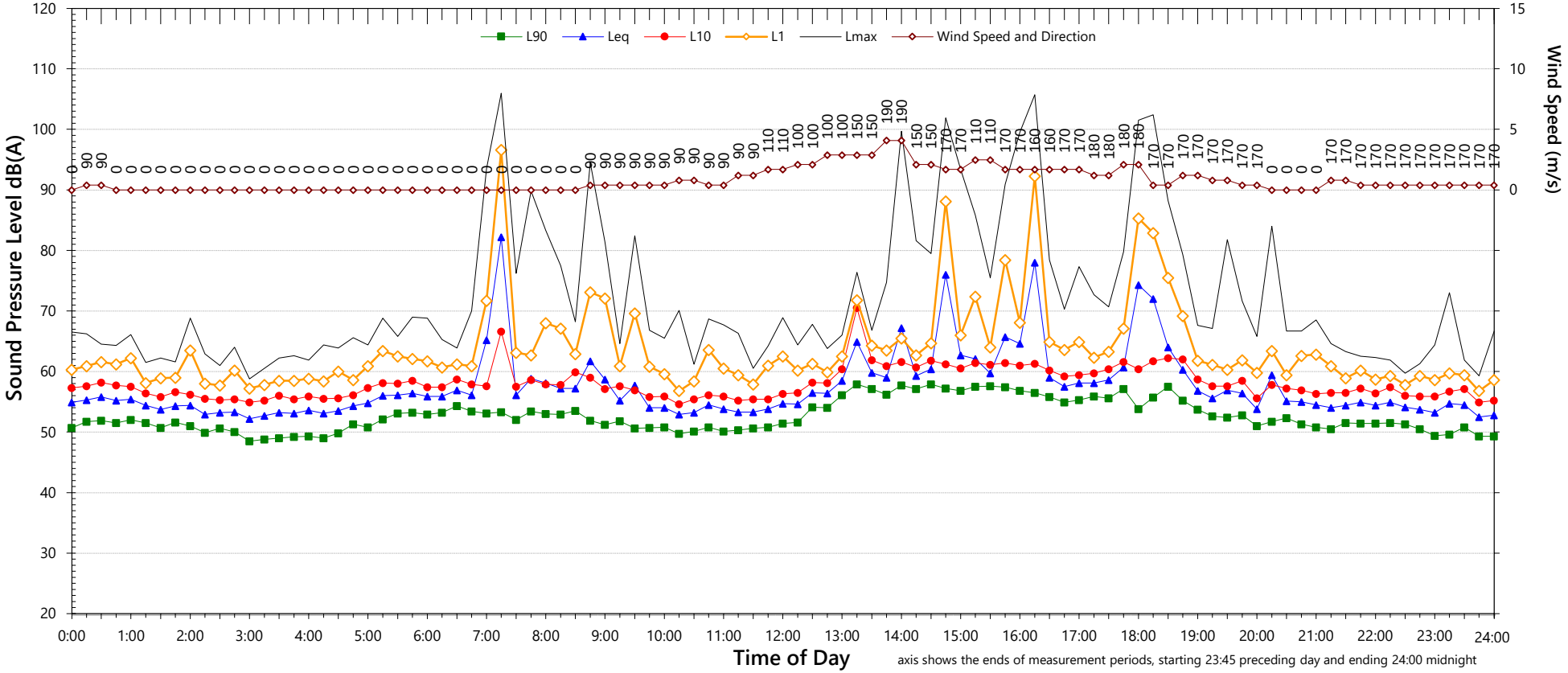
Notes:

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

Backyard of 13 Buttonderry Way, 14m south of house

Friday, 3 December 2021



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	51	51	41
L_{Aeq}	69	62	52

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	70	55
$L_{Aeq\ 1hr}$ upper 10 percentile	74	57
$L_{Aeq\ 1hr}$ lower 10 percentile	57	51

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	69	to	73
L_{AFMax} - L_{Aeq} (Range)	17	to	19

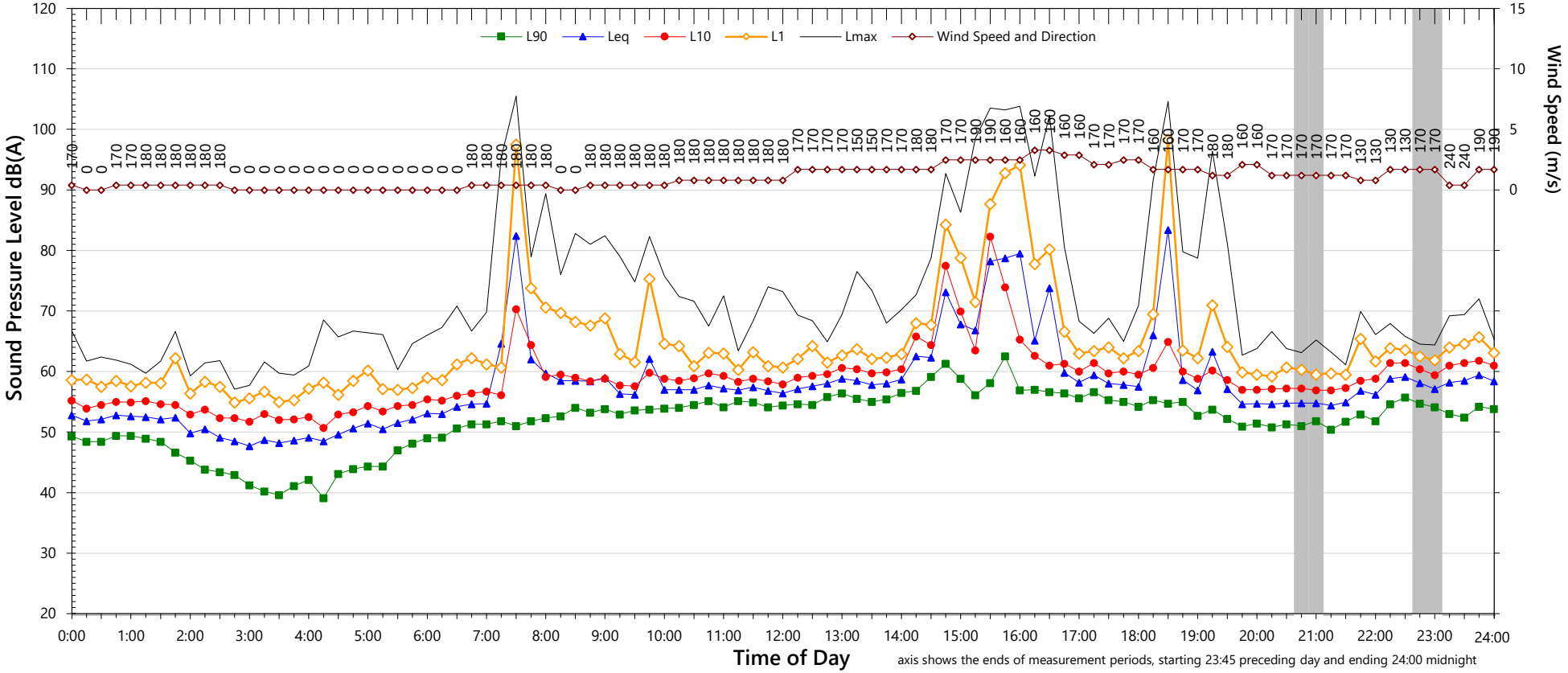
Notes:

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

Backyard of 13 Buttonderry Way, 14m south of house

Saturday, 4 December 2021



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	53	51	-
L_{Aeq}	70	72	-

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	72	to	72
L_{AFMax} - L_{Aeq} (Range)	18	to	18

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	73	58
$L_{Aeq\ 1hr}$ upper 10 percentile	80	61
$L_{Aeq\ 1hr}$ lower 10 percentile	59	56

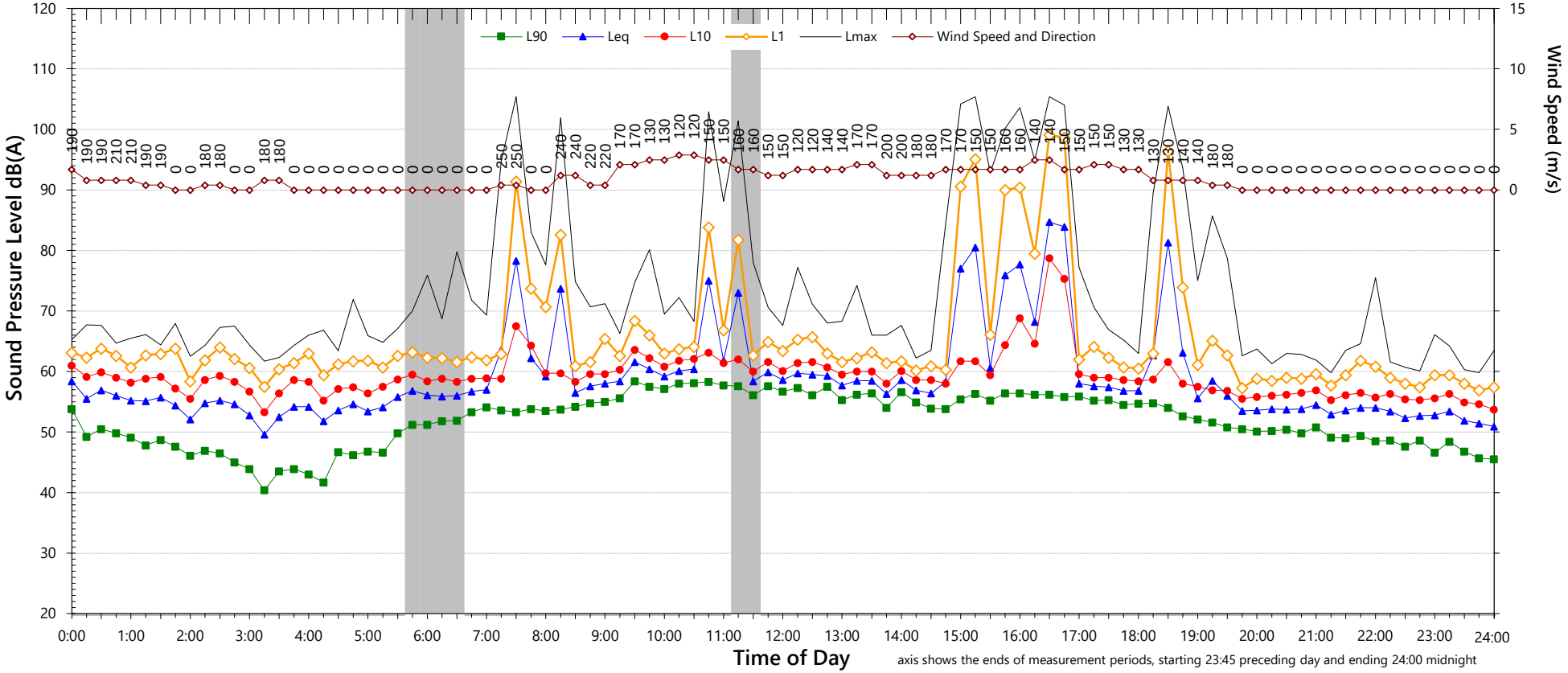
Notes:

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

Backyard of 13 Buttonderry Way, 14m south of house

Sunday, 5 December 2021



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	54	49	42
L_{Aeq}	74	70	59

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	75	61
$L_{Aeq\ 1hr}$ upper 10 percentile	79	60
$L_{Aeq\ 1hr}$ lower 10 percentile	57	52

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	66	to	101
L_{AFMax} - L_{Aeq} (Range)	15	to	34

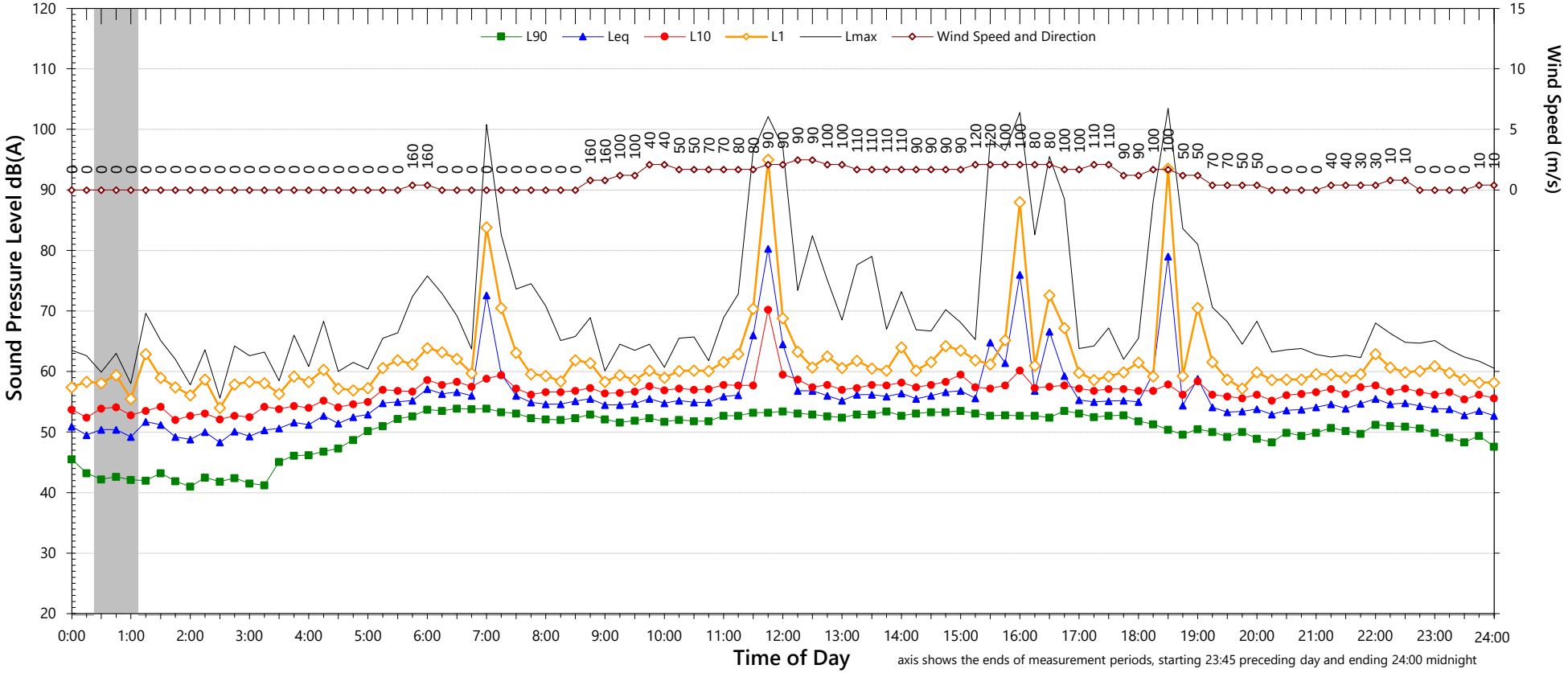
Notes:

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

Backyard of 13 Buttonderry Way, 14m south of house

Monday, 6 December 2021



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	52	49	44
L_{Aeq}	66	67	54

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	68	to	90
L_{AFMax} - L_{Aeq} (Range)	16	to	32

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	69	57
$L_{Aeq\ 1hr}$ upper 10 percentile	75	58
$L_{Aeq\ 1hr}$ lower 10 percentile	57	54

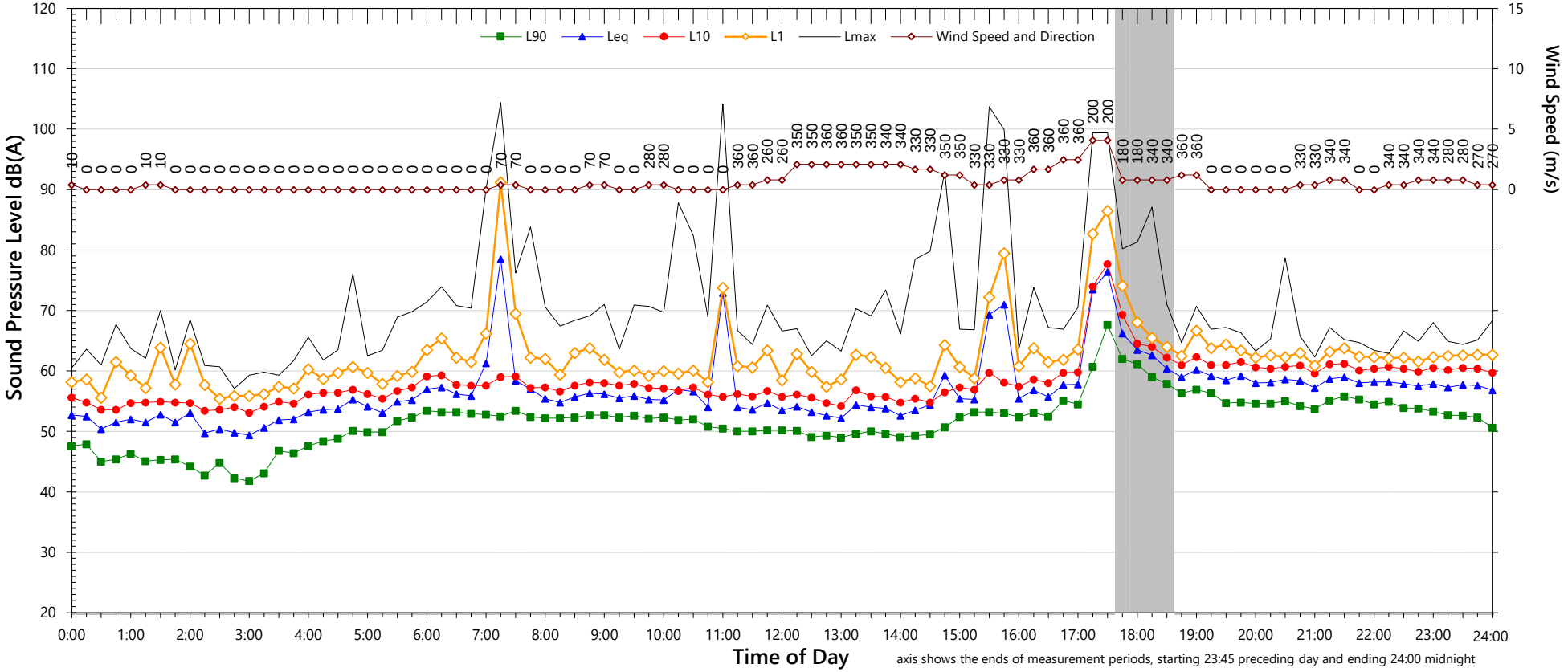
Notes:

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

Backyard of 13 Buttonderry Way, 14m south of house

Tuesday, 7 December 2021



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	49	54	47
L_{Aeq}	67	59	60

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	68	62
$L_{Aeq\ 1hr}$ upper 10 percentile	73	64
$L_{Aeq\ 1hr}$ lower 10 percentile	56	57

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	70	to	96
L_{AFMax} - L_{Aeq} (Range)	15	to	30

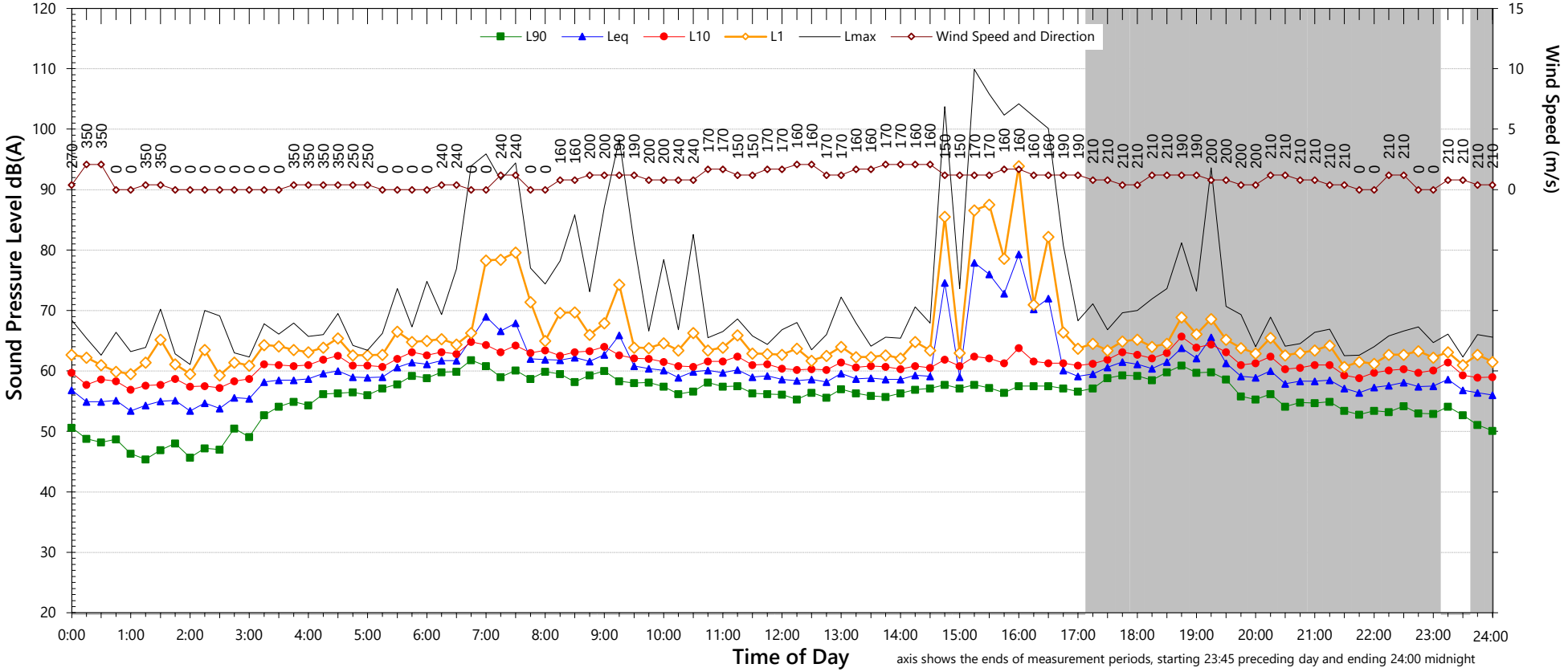
Notes:

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

Backyard of 13 Buttonderry Way, 14m south of house

Wednesday, 8 December 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	56	-	-
L_{Aeq}	69	-	-

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	-	-

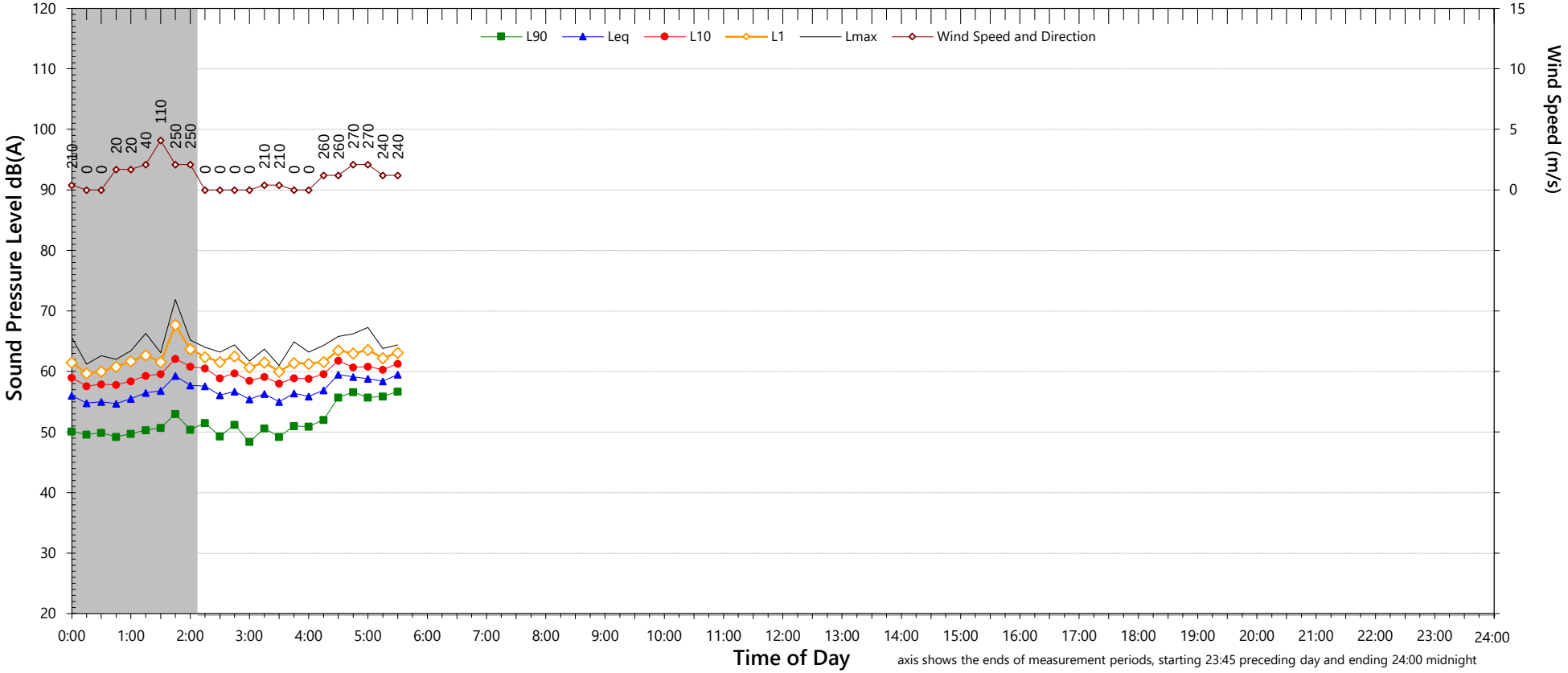
Notes:

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)

Unattended Noise Monitoring Results

Backyard of 13 Buttonderry Way, 14m south of house

Thursday, 9 December 2021



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	-	-

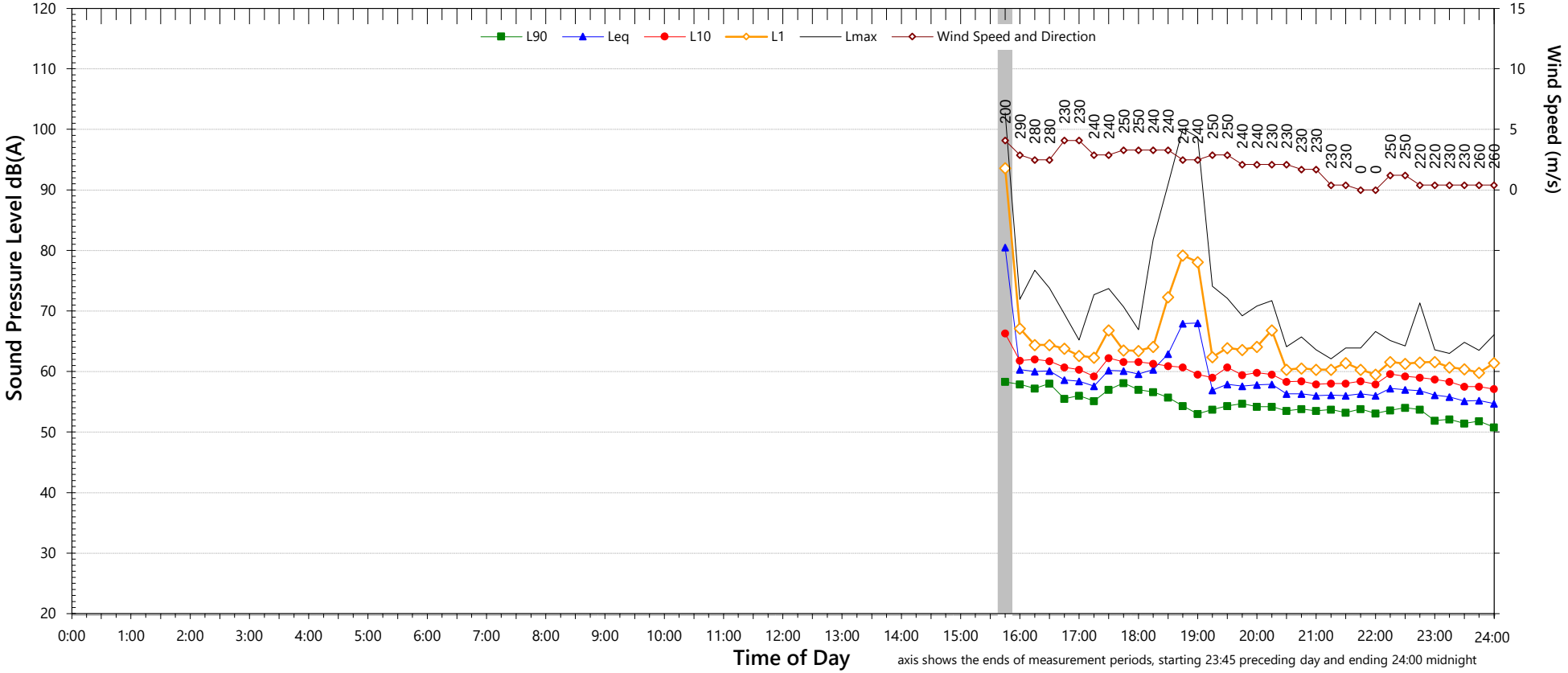
Notes:

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)

Unattended Noise Monitoring Results

Backyard of 13 Buttonderry Way, 14m south of house

Friday, 10 December 2021



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	-	53	44
L_{Aeq}	-	61	56

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	67	to	101
L_{AFMax} - L_{Aeq} (Range)	15	to	38

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
$L_{Aeq\ 1hr}$ upper 10 percentile	-	60
$L_{Aeq\ 1hr}$ lower 10 percentile	-	54

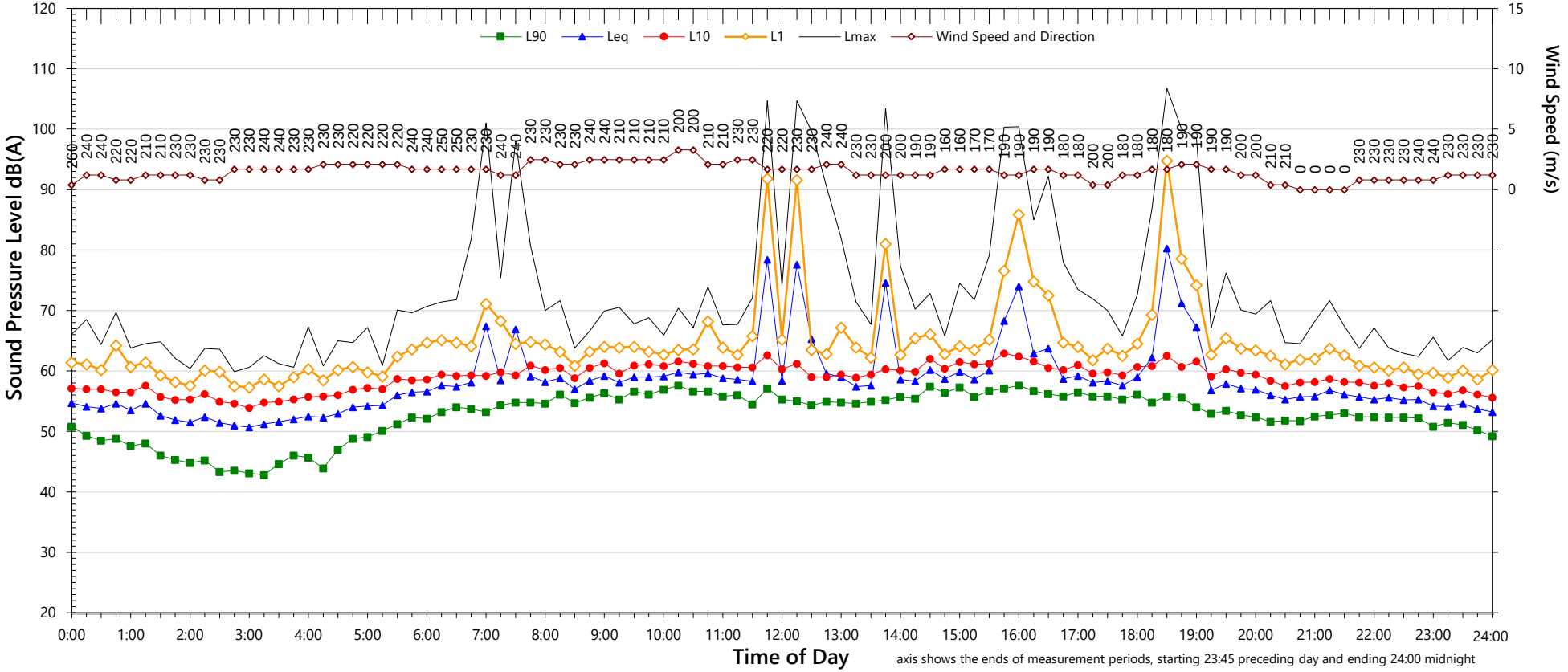
Notes:

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

Backyard of 13 Buttonderry Way, 14m south of house

Saturday, 11 December 2021



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	55	52	40
L_{Aeq}	67	69	60

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	70	58
$L_{Aeq\ 1hr}$ upper 10 percentile	75	59
$L_{Aeq\ 1hr}$ lower 10 percentile	59	51

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	66	to	101
L_{AFMax} - L_{Aeq} (Range)	17	to	38

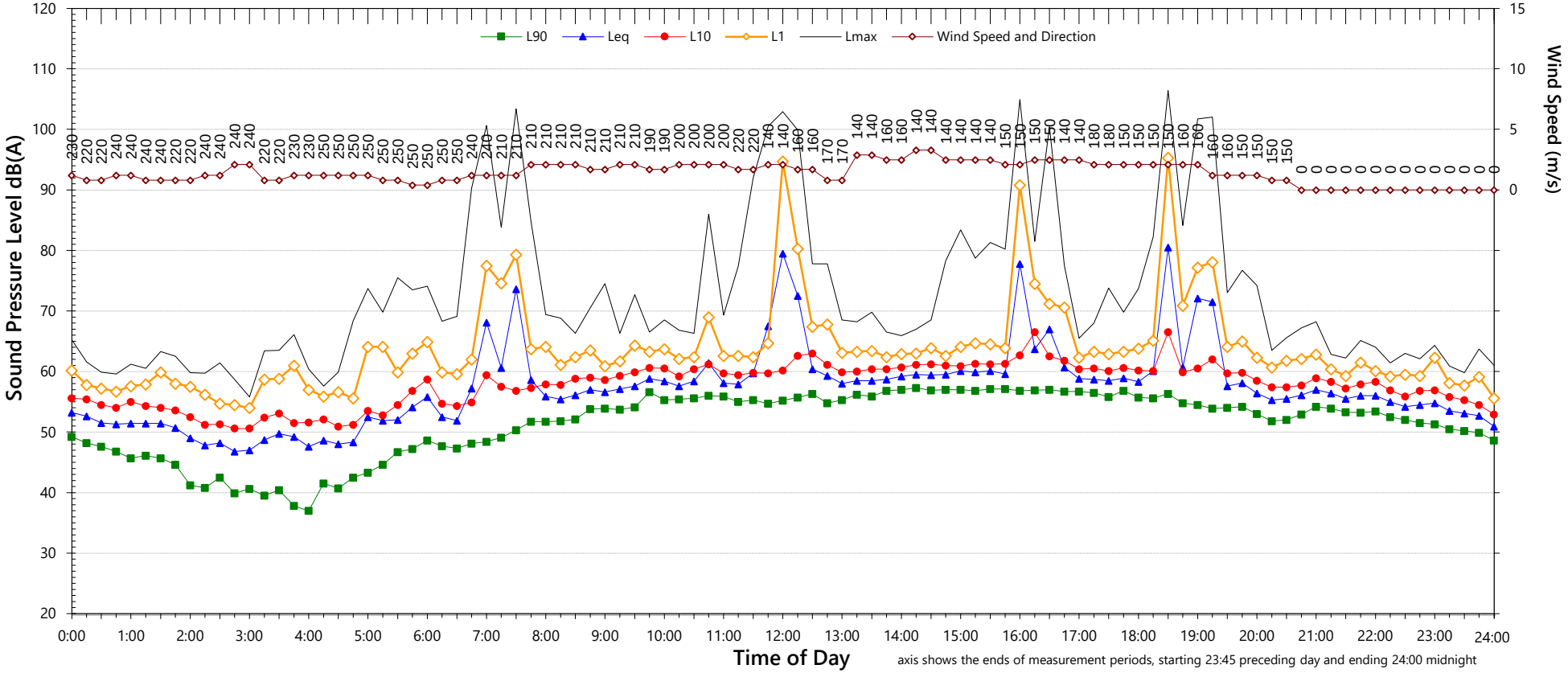
Notes:

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

Backyard of 13 Buttonderry Way, 14m south of house

Sunday, 12 December 2021



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	54	52	44
L_{Aeq}	67	70	55

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	69	to	90
L_{AFMax} - L_{Aeq} (Range)	17	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 $L_{Aeq\ 9\ hr}$	71	57
$L_{Aeq\ 1hr}$ upper 10 percentile	76	60
$L_{Aeq\ 1hr}$ lower 10 percentile	59	53

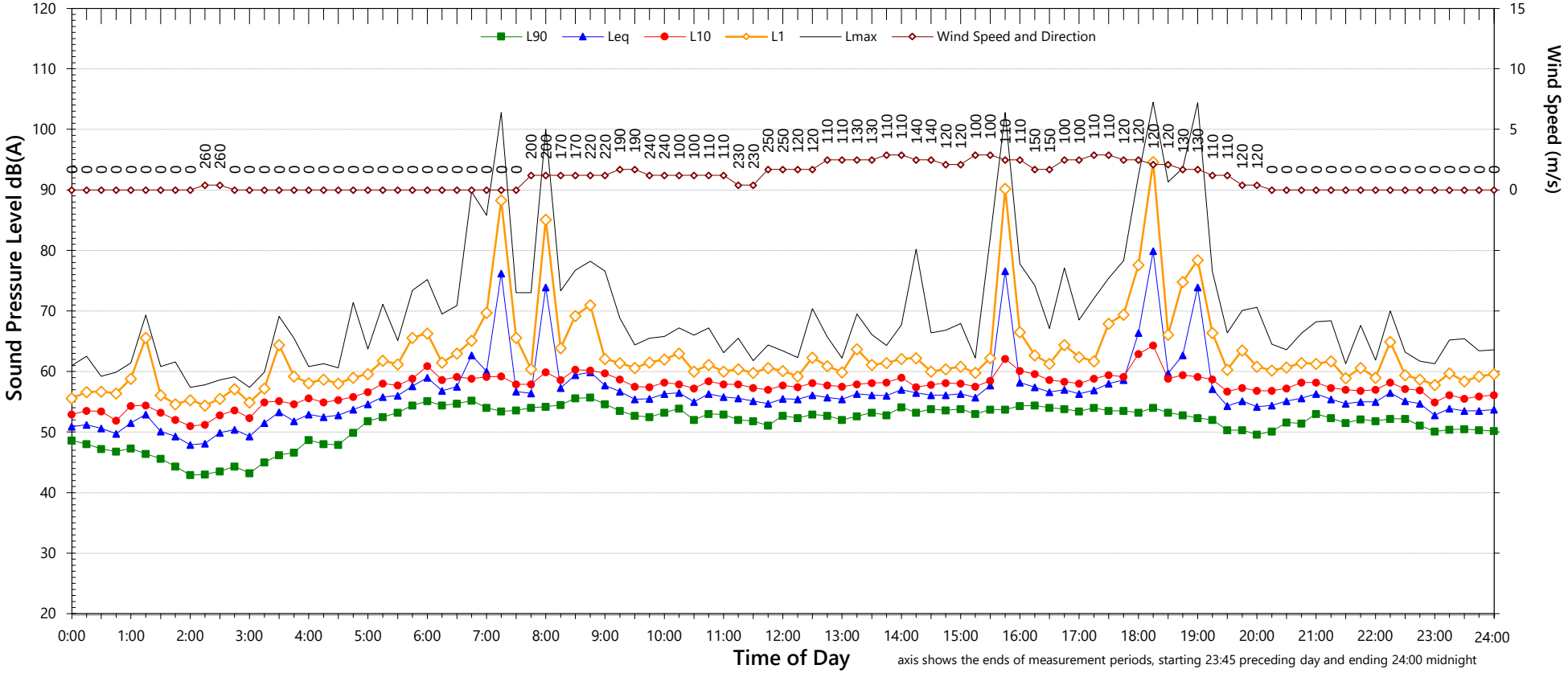
Notes:

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

Backyard of 13 Buttonderry Way, 14m south of house

Monday, 13 December 2021



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	52	50	47
L_{Aeq}	65	69	55

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	70	to	82
L_{AFMax} - L_{Aeq} (Range)	15	to	24

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	69	57
$L_{Aeq\ 1hr}$ upper 10 percentile	74	60
$L_{Aeq\ 1hr}$ lower 10 percentile	58	55

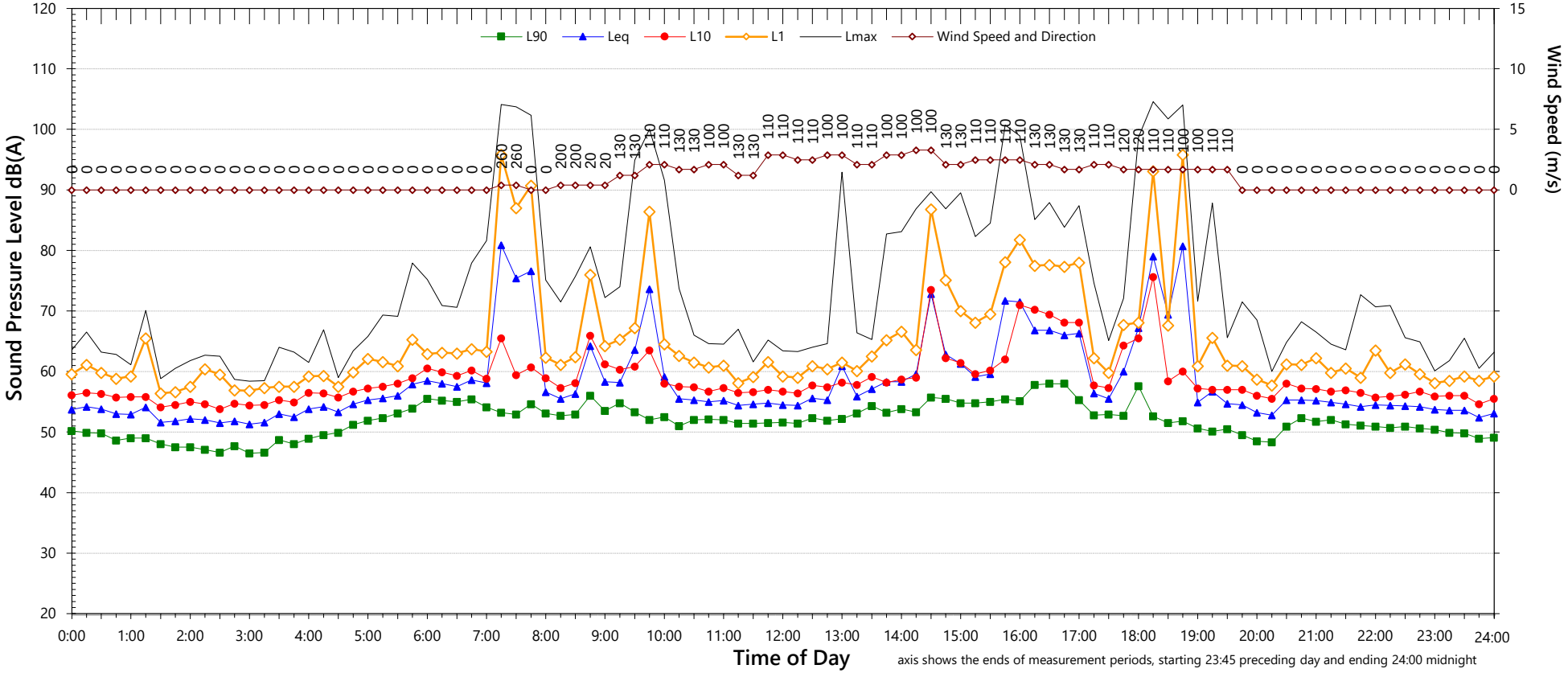
Notes:

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

Backyard of 13 Buttonderry Way, 14m south of house

Tuesday, 14 December 2021



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	52	49	47
L_{Aeq}	69	71	55

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	71	to	85
L_{AFMax} - L_{Aeq} (Range)	17	to	27

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	72	57
$L_{Aeq\ 1hr}$ upper 10 percentile	76	59
$L_{Aeq\ 1hr}$ lower 10 percentile	57	55

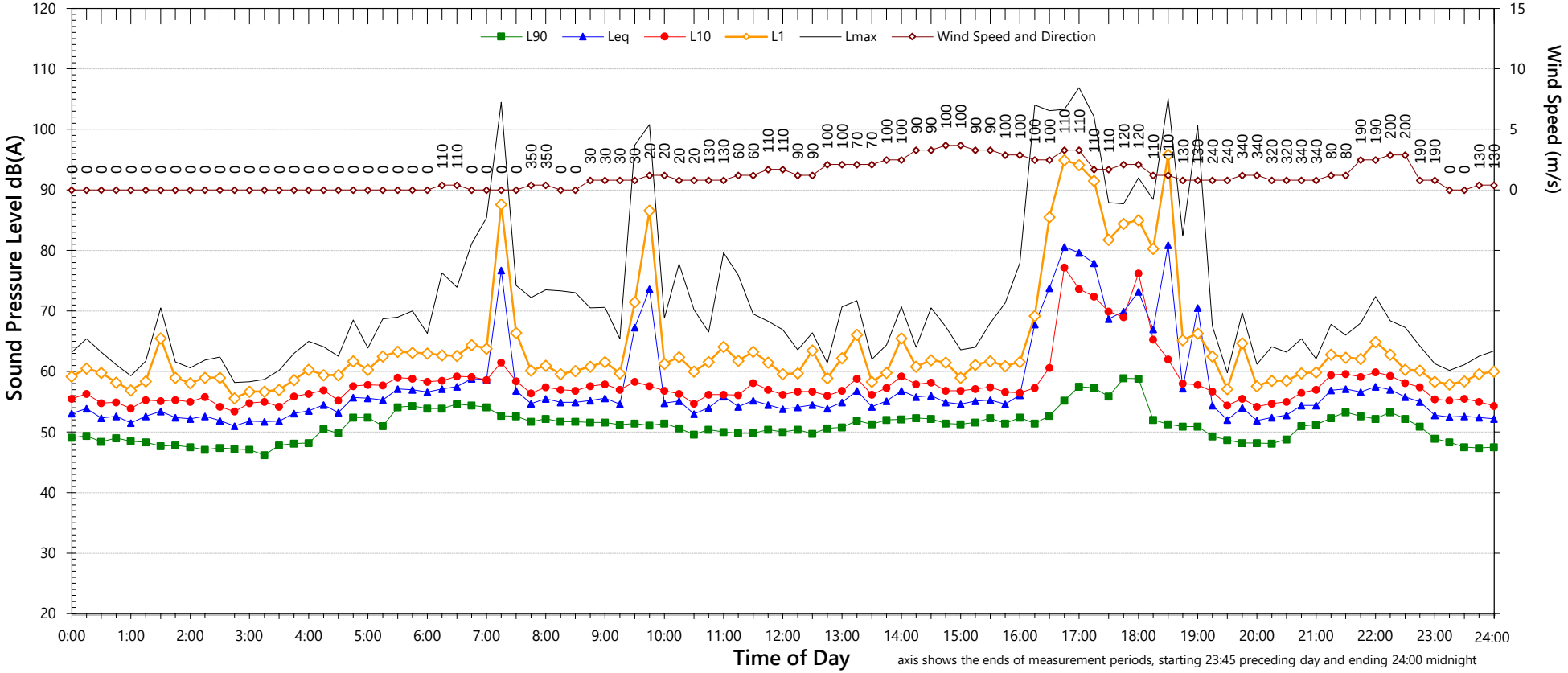
Notes:

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

Backyard of 13 Buttonderry Way, 14m south of house

Wednesday, 15 December 2021



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	50	48	46
L_{Aeq}	70	70	54

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	72	56
$L_{Aeq\ 1hr}$ upper 10 percentile	77	59
$L_{Aeq\ 1hr}$ lower 10 percentile	56	53

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	82	to	83
L_{AFMax} - L_{Aeq} (Range)	26	to	26

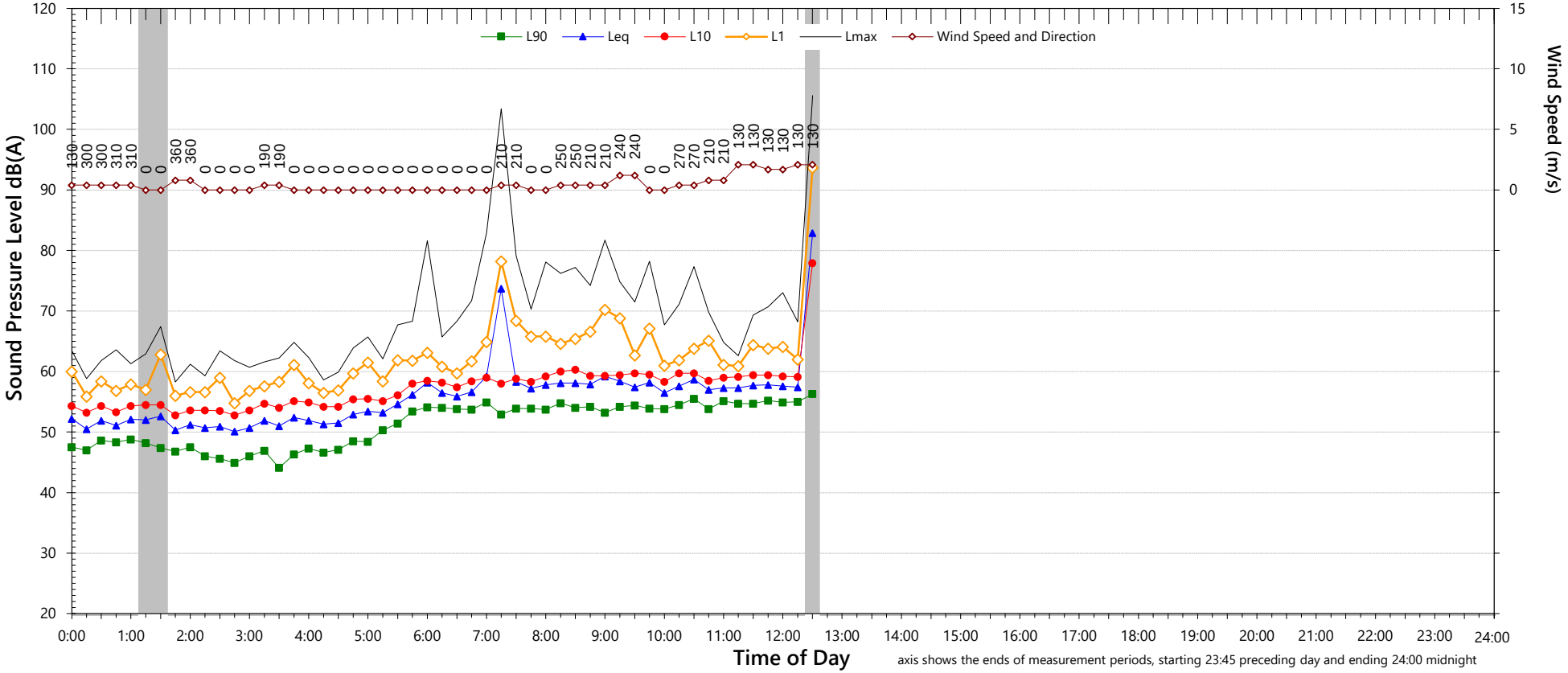
Notes:

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

Backyard of 13 Buttonderry Way, 14m south of house

Thursday, 16 December 2021



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)

RENZO TONIN & ASSOCIATES
inspired to achieve

Acoustics
Vibration
Structural Dynamics

sydney@renzotonin.com.au
www.renzotonin.com.au

Monitoring ID: L3
Address: 4 The Downs, Jilliby
Description: Front yard of 4 The Downs, 20m up driveway

Background & Ambient Noise Monitoring Results

	L_{A90} Background Noise Levels				L_{Aeq} Ambient Noise Levels			
	Day[1]	Evening[2]	Night[3]	Shoulder[4,6]	Day[1]	Evening[2]	Night[3]	Shoulder[4]
Representative Week[5]	43	46	39	-	58	58	50	-

Notes:

1. Day: 7.00am to 6.00pm Monday to Saturday and 8.00am to 6.00pm Sundays & Public Holidays
2. Evening: 6.00pm to 10.00pm Monday to Sunday & Public Holidays
3. Night: 10.00pm to 5.00am Monday to Sunday & Public Holidays
4. Shoulder period: 5:00am to 7:00am
5. Rating Background Level (RBL) for L_{A90} and logarithmic average for L_{Aeq}
6. Shoulder period RBL levels determined as per NPfI Fact Sheet A3

Road Monitoring Results (at one metre from façade[4])

	L_{Aeq} Noise Levels[4]	
	Day[1]	Night[2]
Representative Week[3]	57	52

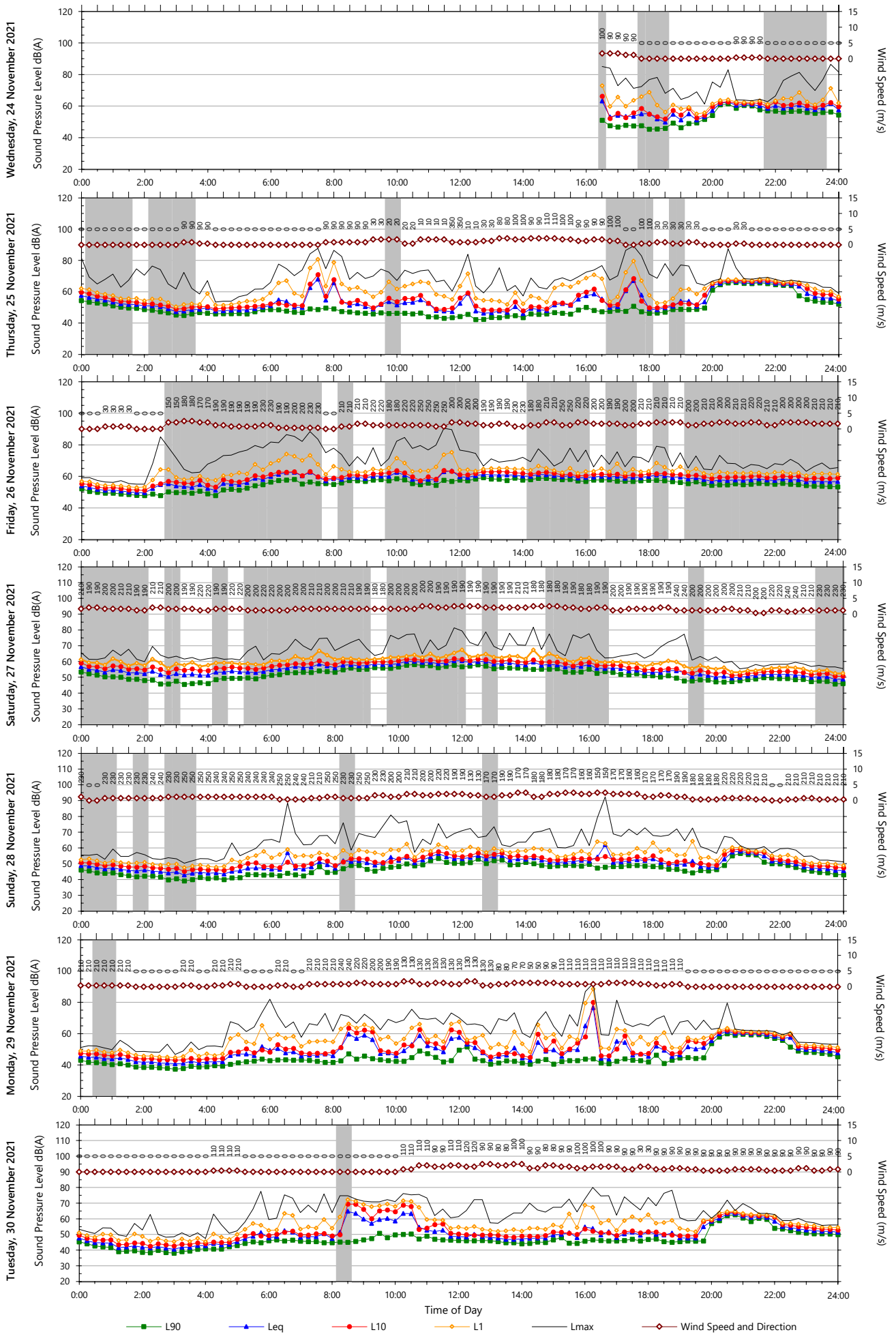
Notes:

1. Day is 7:00am to 10:00pm 2. Night is 10:00pm to 7:00am 3. Median of daily L_{Aeq}
4. Values are calculated at the facade. 2.5dB is added to results if logger is placed in the free field

Logger location photograph	Logger location map
	

Unattended Monitoring Results

Location: Front yard of 4 The Downs, 20m up driveway

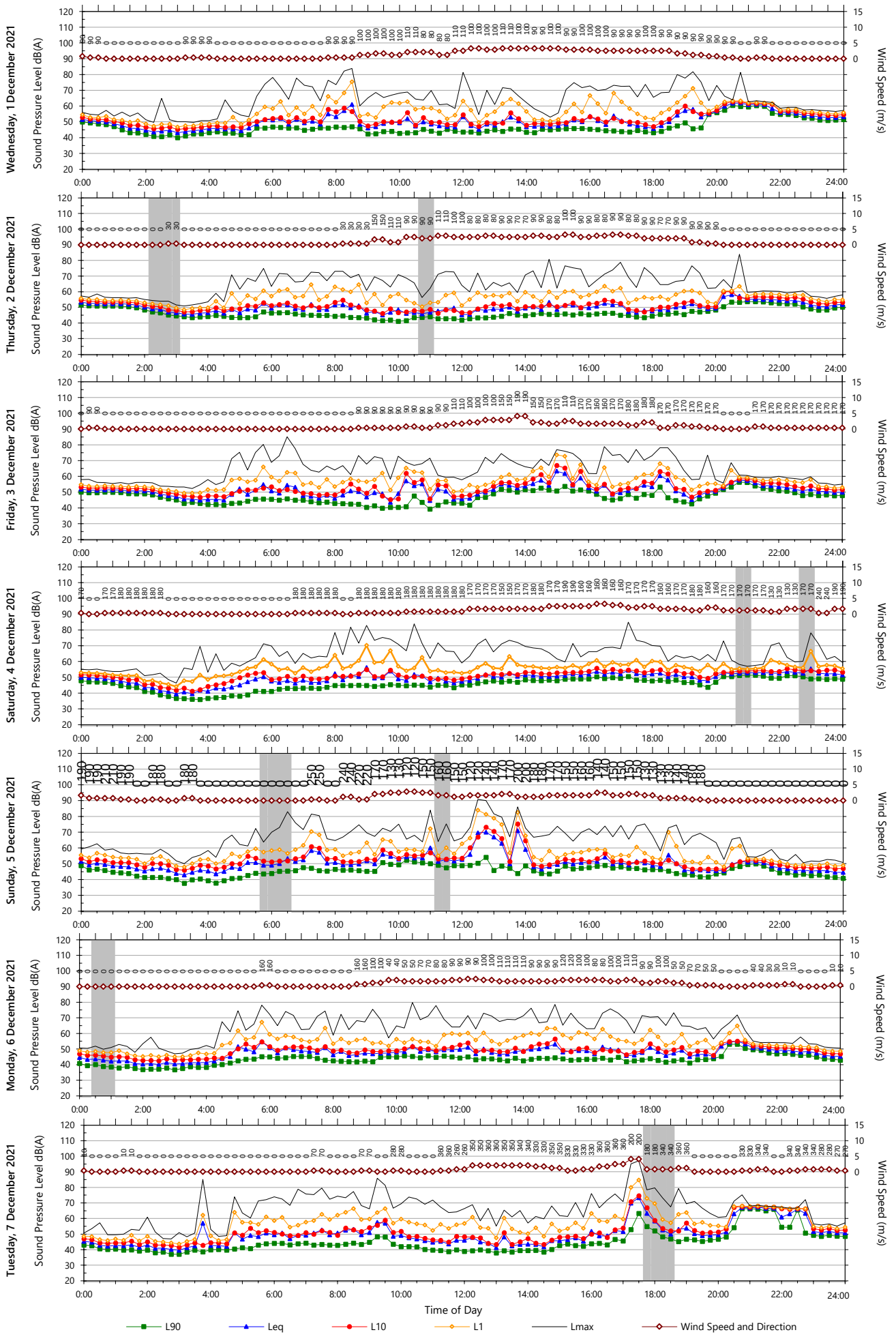


Data File: 2021-11-24_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r38)

Unattended Monitoring Results

Location: Front yard of 4 The Downs, 20m up driveway

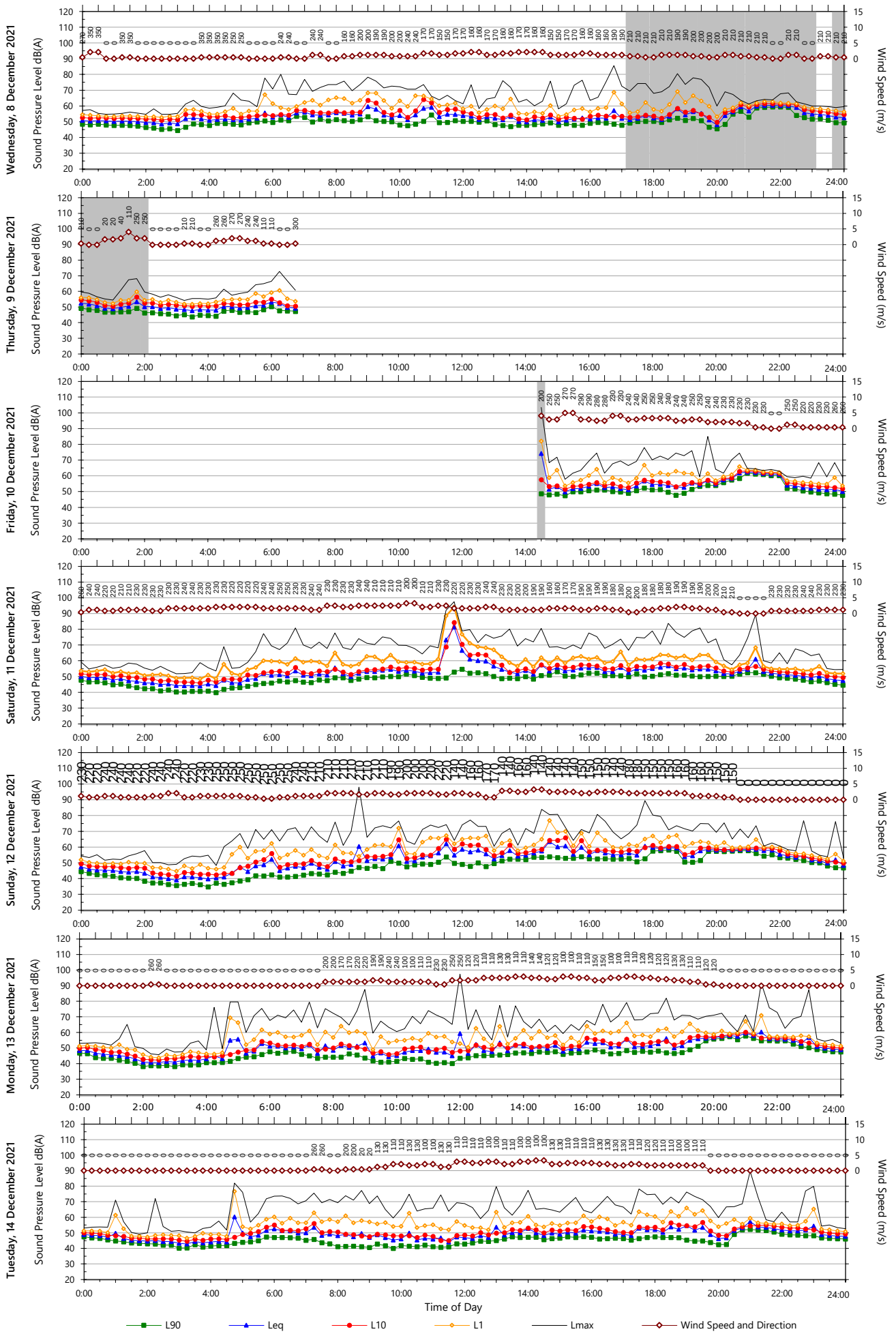


Data File: 2021-11-24_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r38)

Unattended Monitoring Results

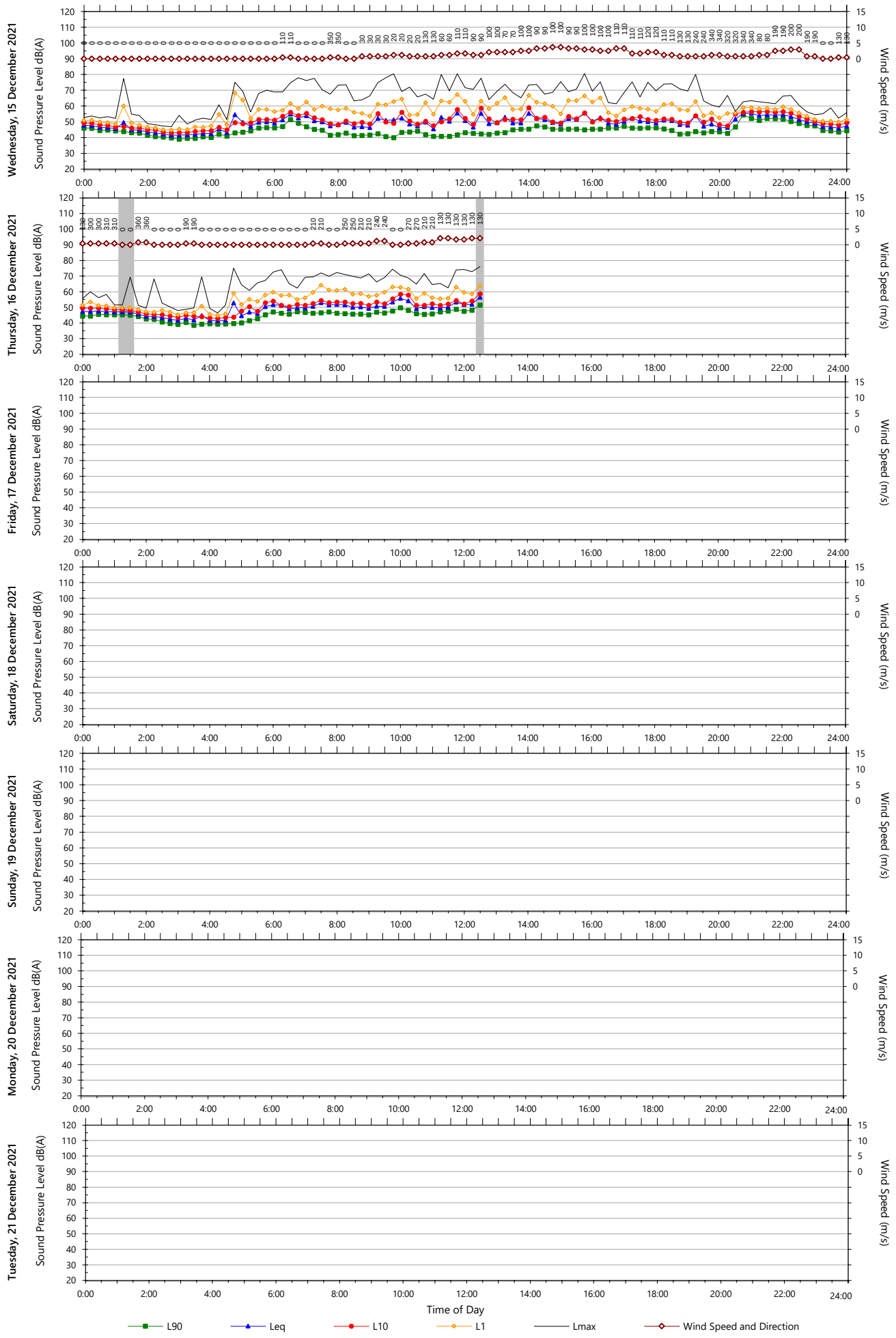
Location: Front yard of 4 The Downs, 20m up driveway



Data File: 2021-11-24_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r38)

Unattended Monitoring Results **Location: Front yard of 4 The Downs, 20m up driveway**



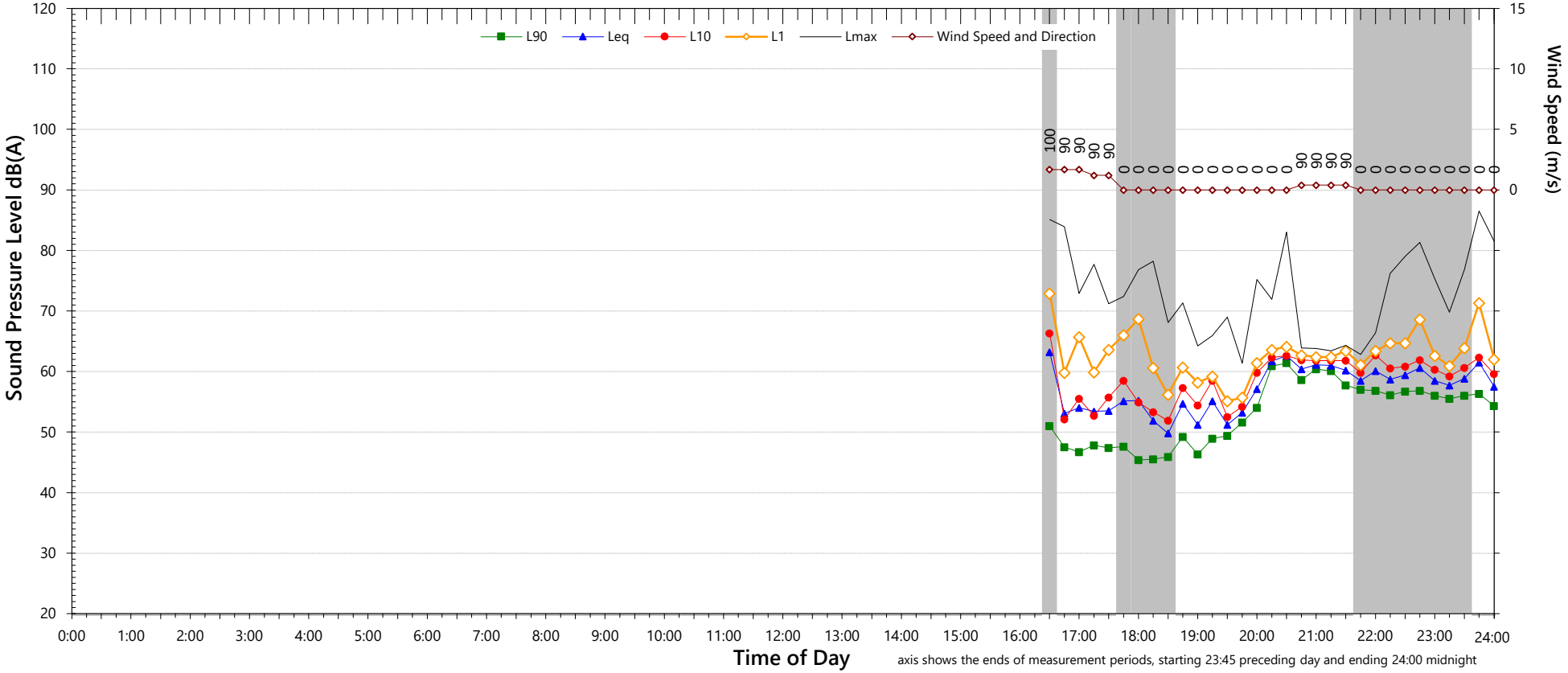
Data File: 2021-11-24_SLM_000_123_Rpt_Report.txt

Template: QTE-26 Logger Graphs Program (r38)

Unattended Noise Monitoring Results

Front yard of 4 The Downs, 20m up driveway

Wednesday, 24 November 2021



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)	66	to	87
L_{AFMax} - L_{Aeq} (Range)	16	to	27

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	-	-

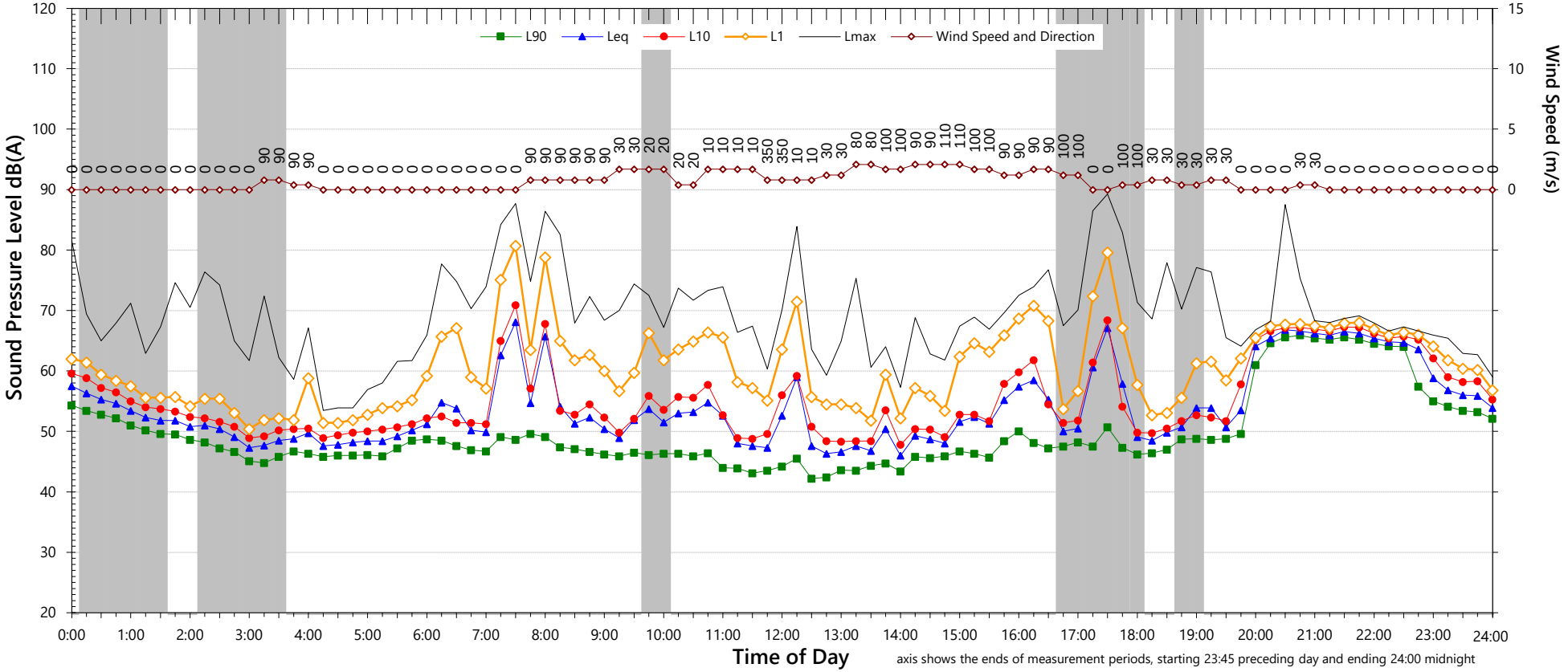
Notes:

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)

Unattended Noise Monitoring Results

Front yard of 4 The Downs, 20m up driveway

Thursday, 25 November 2021



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	43	47	-
L_{Aeq}	57	64	-

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	63	-
$L_{Aeq\ 1hr}$ upper 10 percentile	68	-
$L_{Aeq\ 1hr}$ lower 10 percentile	52	-

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	85	to	85
L_{AFMax} - L_{Aeq} (Range)	31	to	31

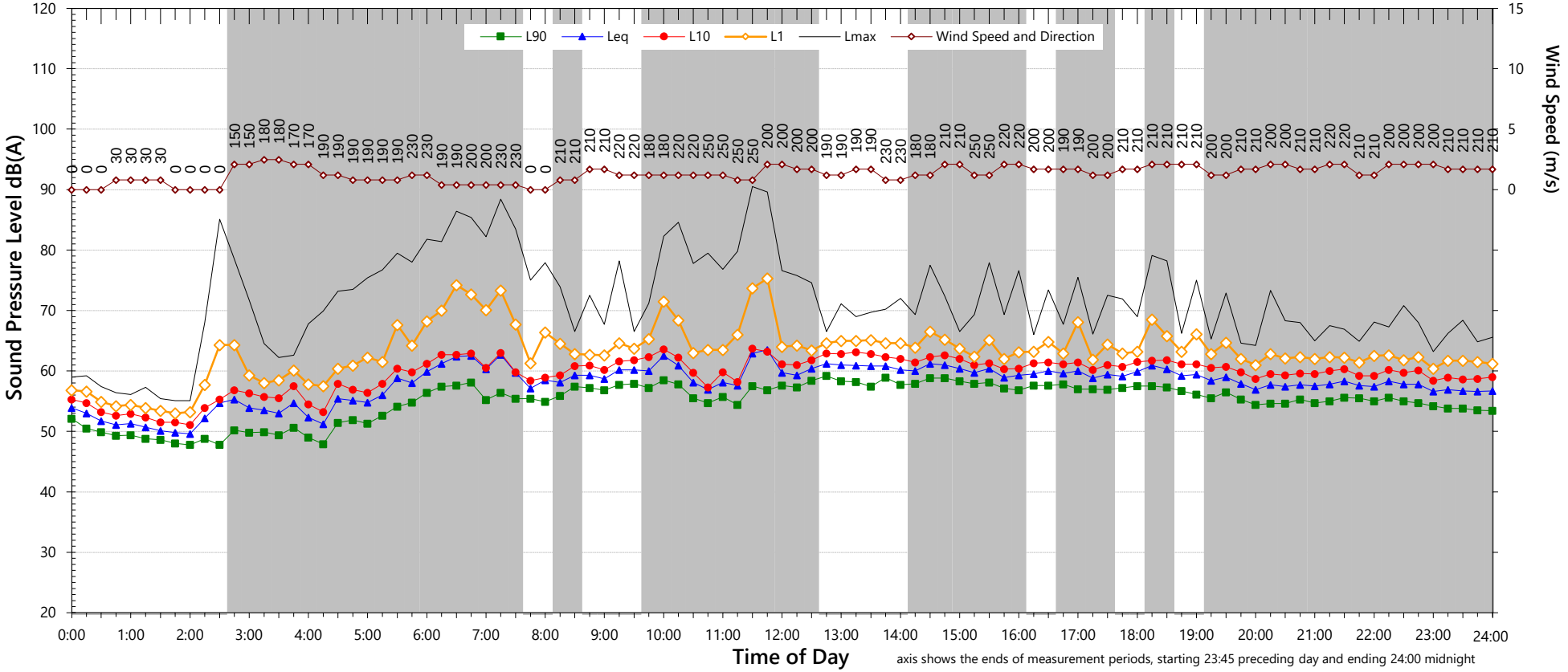
Notes:

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

Front yard of 4 The Downs, 20m up driveway

Friday, 26 November 2021



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)	70	to	70
L_{AFMax} - L_{Aeq} (Range)	17	to	17

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	-	-

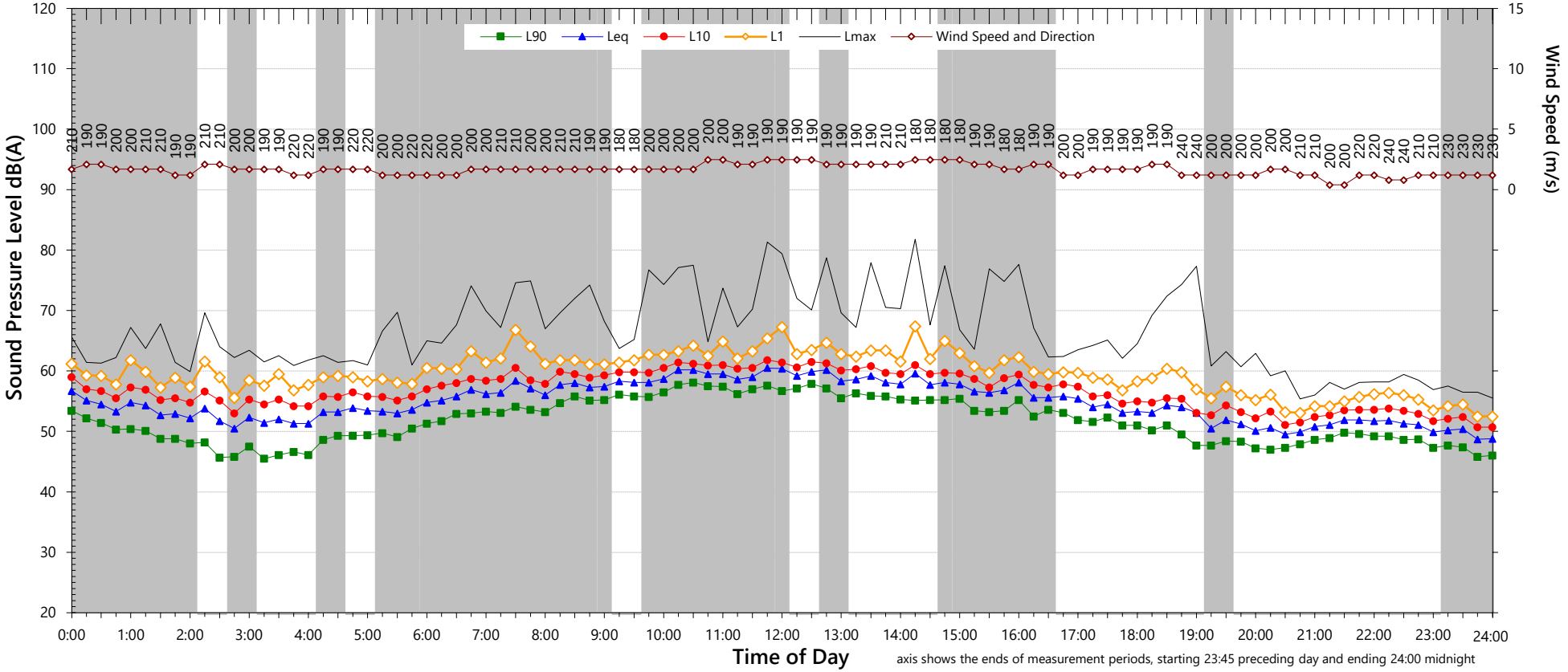
Notes:

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)

Unattended Noise Monitoring Results

Front yard of 4 The Downs, 20m up driveway

Saturday, 27 November 2021



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

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	65	to	89
L_{AFMax} - L_{Aeq} (Range)	18	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	-	54
$L_{Aeq\ 1hr}$ lower 10 percentile	-	47

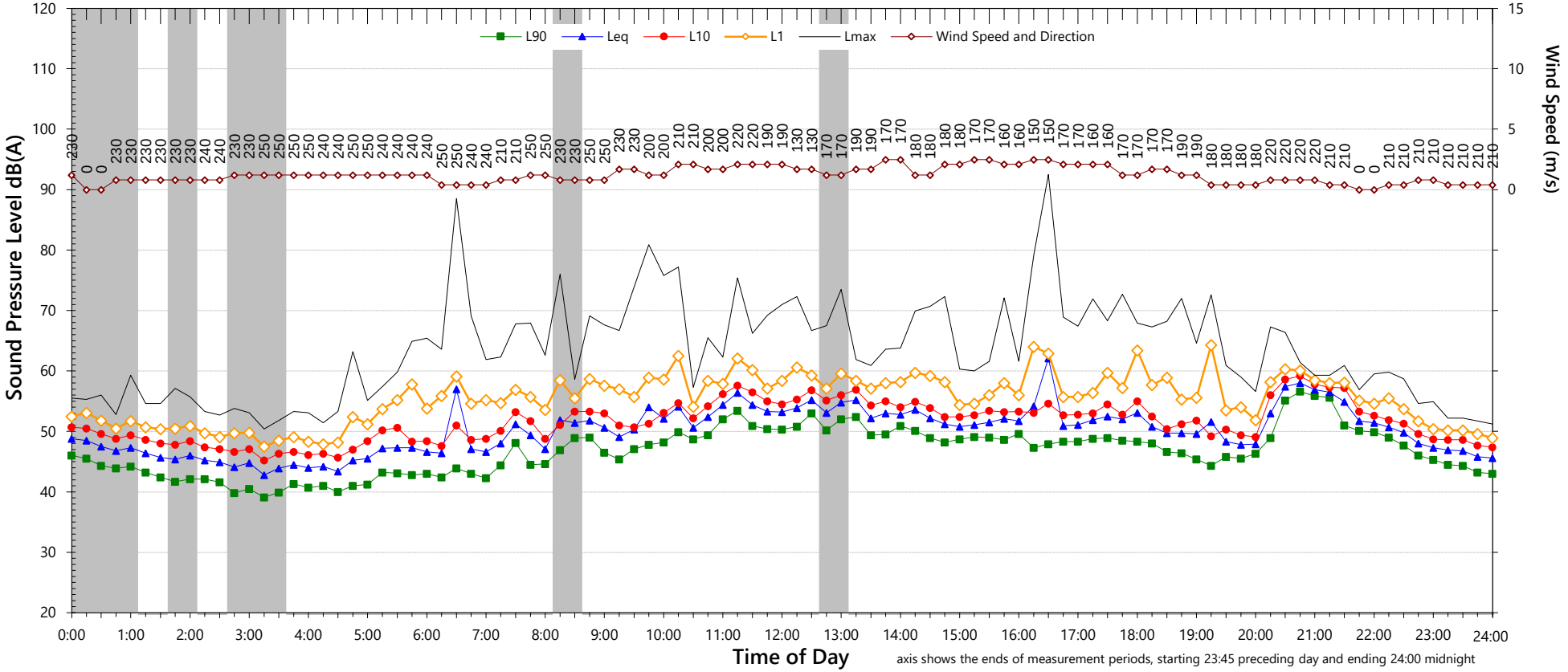
Notes:

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

Front yard of 4 The Downs, 20m up driveway

Sunday, 28 November 2021



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	48	45	38
L_{Aeq}	54	54	46

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	49
$L_{Aeq\ 1hr}$ upper 10 percentile	58	52
$L_{Aeq\ 1hr}$ lower 10 percentile	52	44

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	68	to	82
L_{AFMax} - L_{Aeq} (Range)	23	to	33

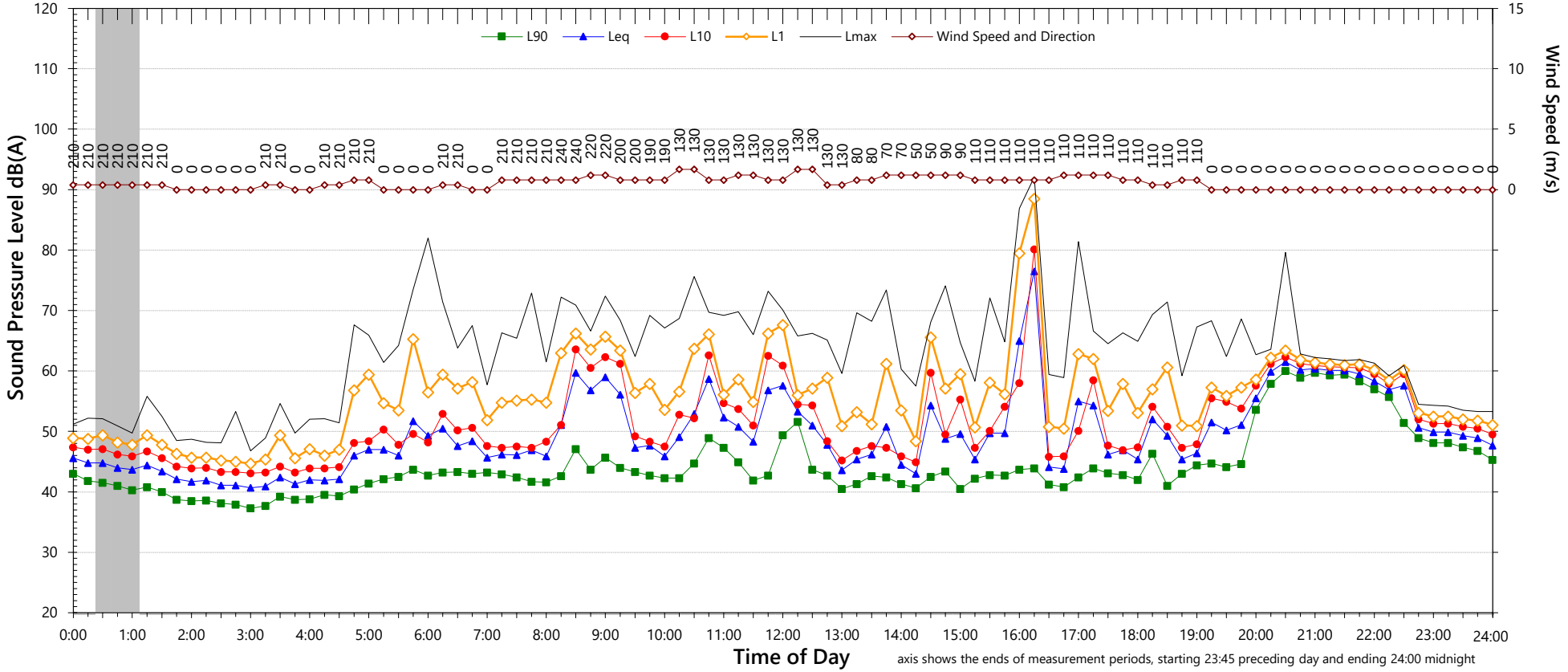
Notes:

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

Front yard of 4 The Downs, 20m up driveway

Monday, 29 November 2021



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	44	39
L_{Aeq}	61	58	49

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	75	to	78
L_{AFMax} - L_{Aeq} (Range)	19	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 $L_{Aeq\ 9\ hr}$	63	51
$L_{Aeq\ 1hr}$ upper 10 percentile	63	54
$L_{Aeq\ 1hr}$ lower 10 percentile	51	44

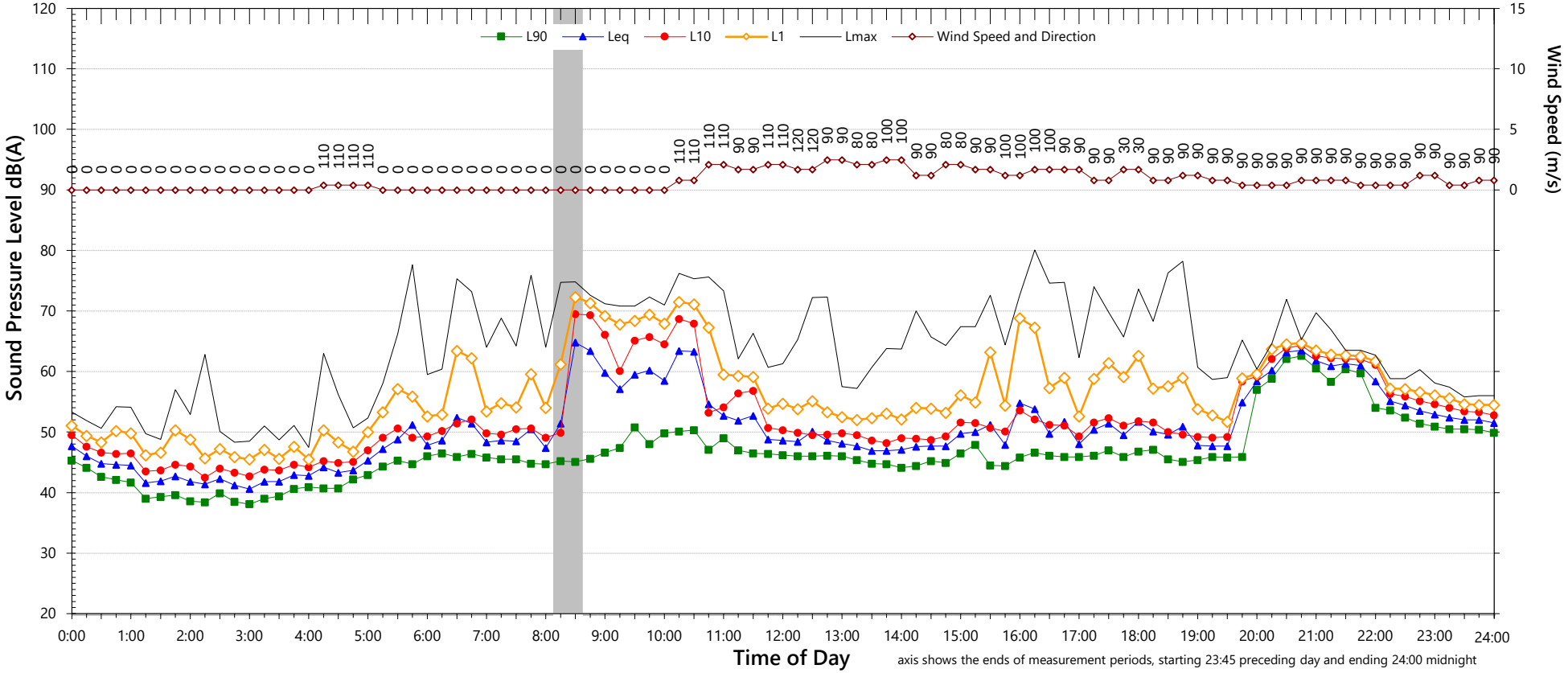
Notes:

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

Front yard of 4 The Downs, 20m up driveway

Tuesday, 30 November 2021



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	45	45	41
L_{Aeq}	55	59	50

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	52
$L_{Aeq\ 1hr}$ upper 10 percentile	64	55
$L_{Aeq\ 1hr}$ lower 10 percentile	51	47

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	78	to	78
L_{AFMax} - L_{Aeq} (Range)	19	to	28

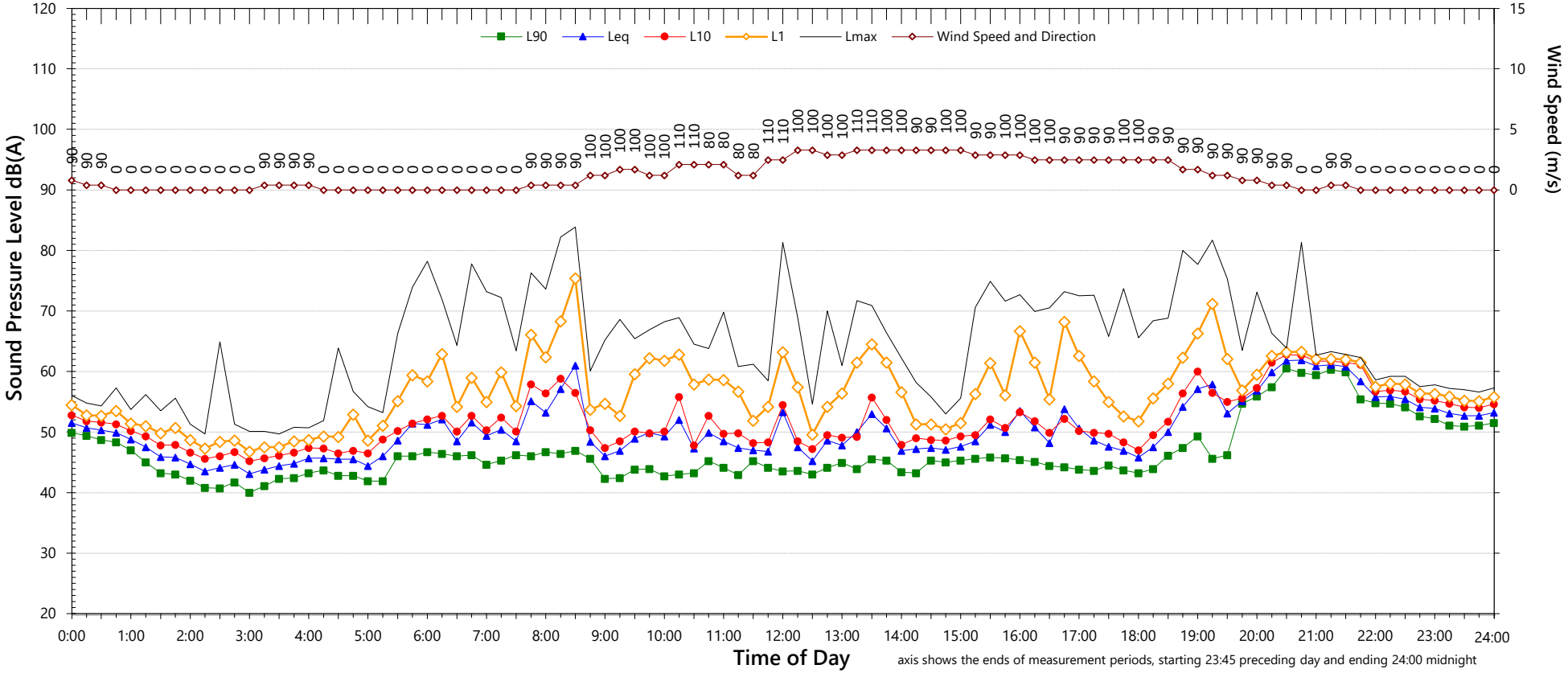
Notes:

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

Front yard of 4 The Downs, 20m up driveway

Wednesday, 1 December 2021



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	43	46	44
L_{Aeq}	51	59	51

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	54
$L_{Aeq\ 1hr}$ upper 10 percentile	61	56
$L_{Aeq\ 1hr}$ lower 10 percentile	50	50

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	71	to	75
L_{AFMax} - L_{Aeq} (Range)	21	to	25

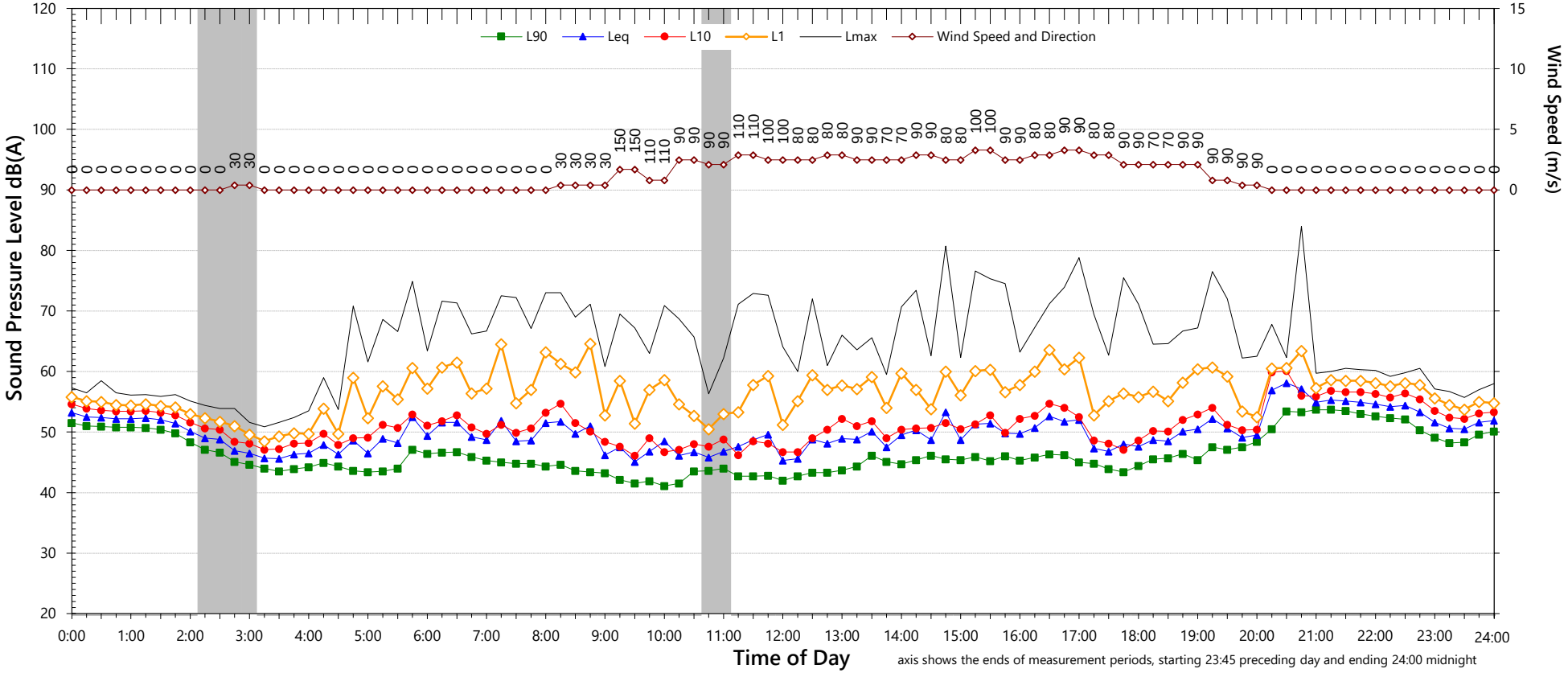
Notes:

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

Front yard of 4 The Downs, 20m up driveway

Thursday, 2 December 2021



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	42	46	43
L_{Aeq}	49	54	51

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	75	to	85
L_{AFMax} - L_{Aeq} (Range)	27	to	33

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	53
$L_{Aeq\ 1hr}$ upper 10 percentile	56	55
$L_{Aeq\ 1hr}$ lower 10 percentile	50	50

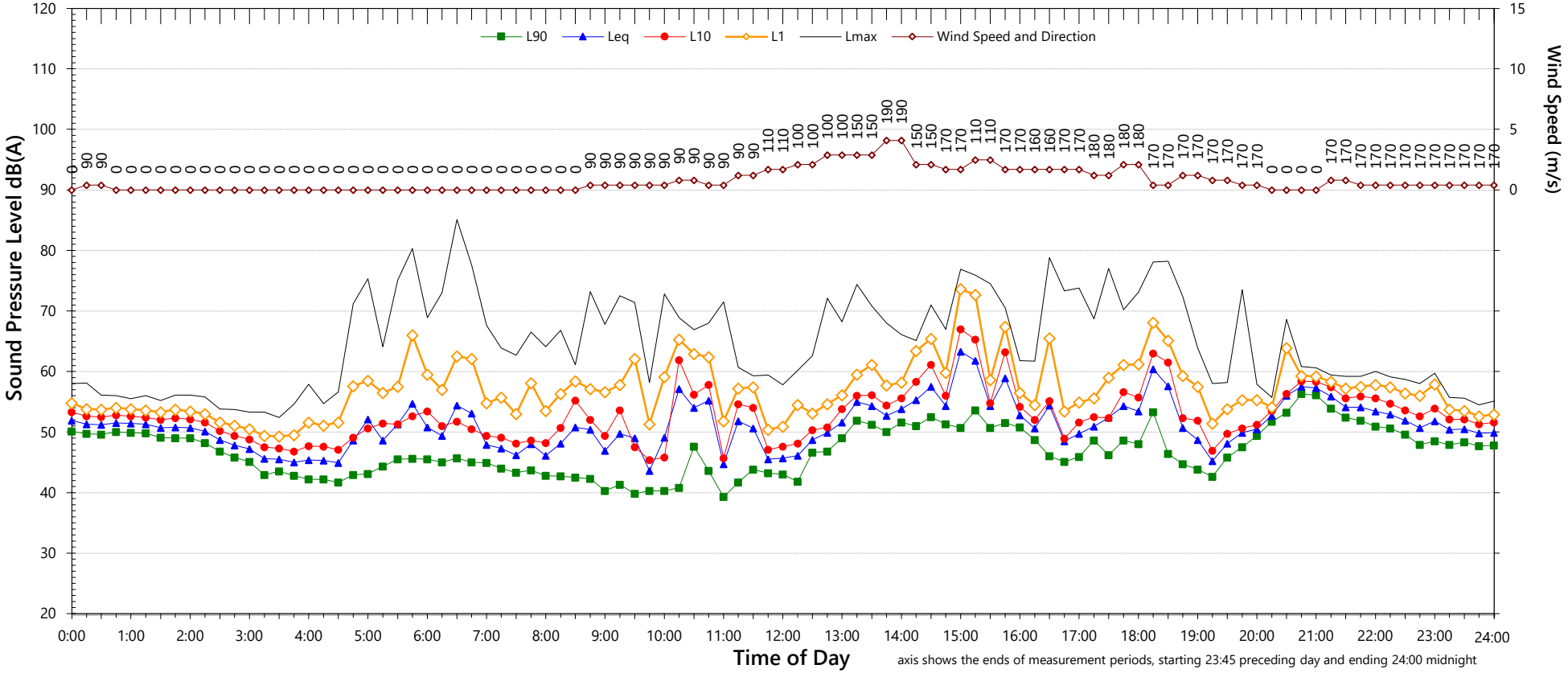
Notes:

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

Front yard of 4 The Downs, 20m up driveway

Friday, 3 December 2021



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	44	37
L_{Aeq}	54	55	48

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	60	53
$L_{Aeq\ 1hr}$ lower 10 percentile	51	44

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	66	to	71
L_{AFMax} - L_{Aeq} (Range)	19	to	29

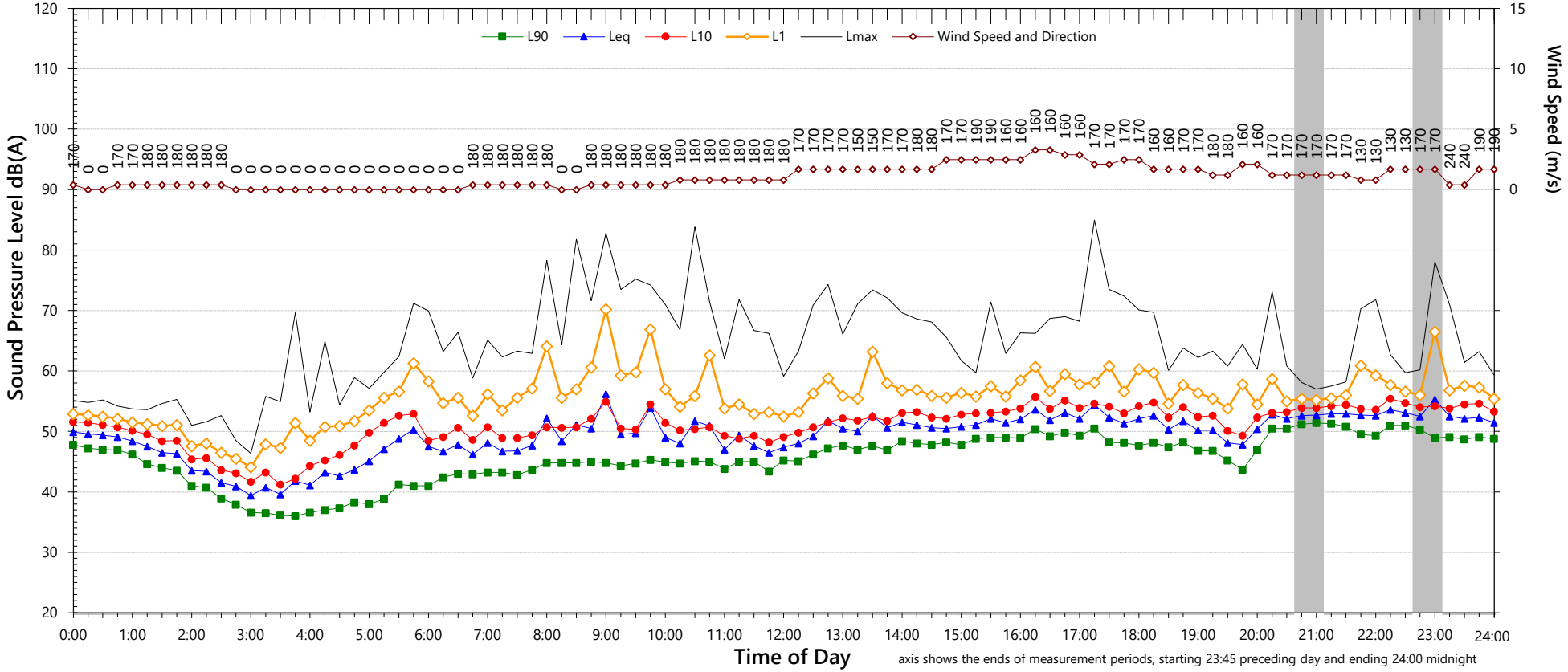
Notes:

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

Front yard of 4 The Downs, 20m up driveway

Saturday, 4 December 2021



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	44	46	-
L_{Aeq}	51	52	-

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	68	to	76
L_{AFMax} - L_{Aeq} (Range)	19	to	24

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	52
$L_{Aeq\ 1hr}$ upper 10 percentile	55	55
$L_{Aeq\ 1hr}$ lower 10 percentile	52	48

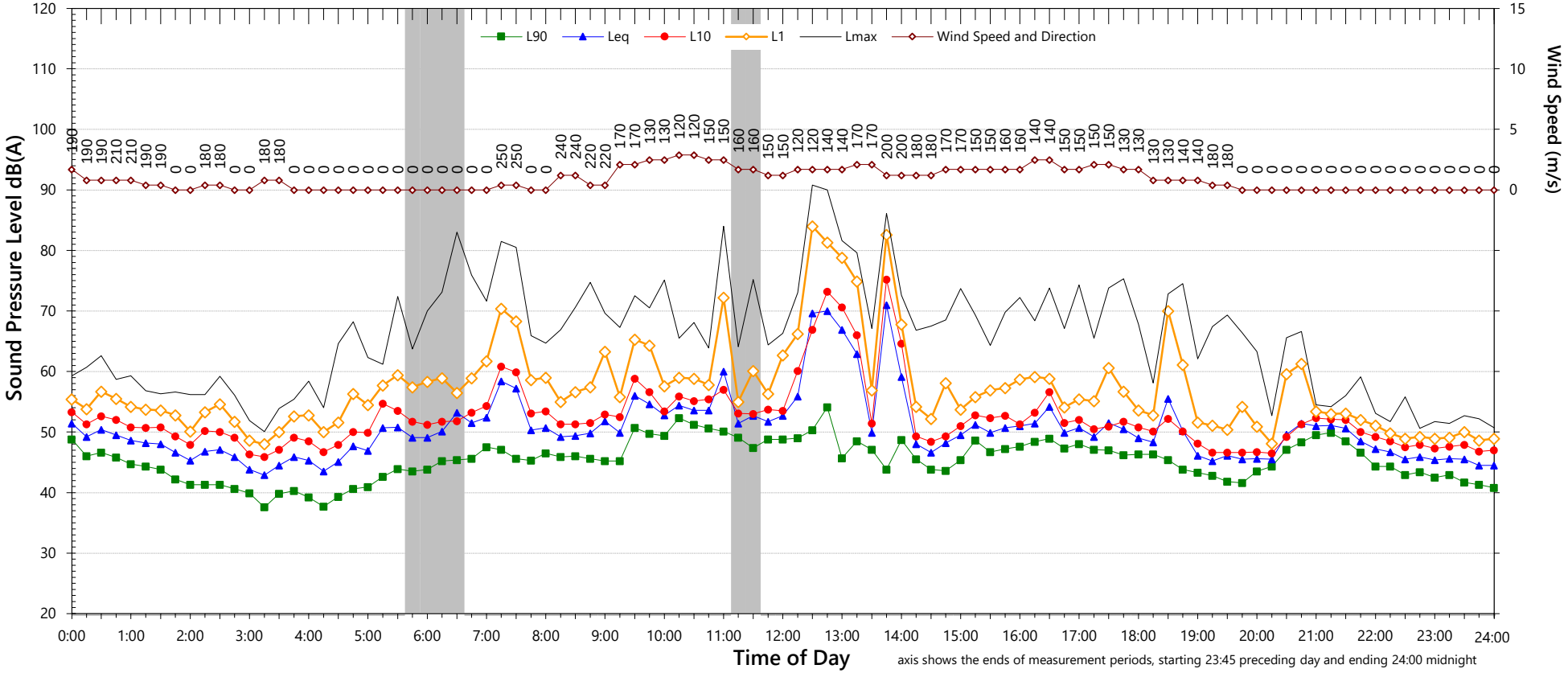
Notes:

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

Front yard of 4 The Downs, 20m up driveway

Sunday, 5 December 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	45	42	37
L_{Aeq}	61	50	47

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	74	to	78
L_{AFMax} - L_{Aeq} (Range)	17	to	27

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	62	49
$L_{Aeq\ 1hr}$ upper 10 percentile	65	52
$L_{Aeq\ 1hr}$ lower 10 percentile	51	44

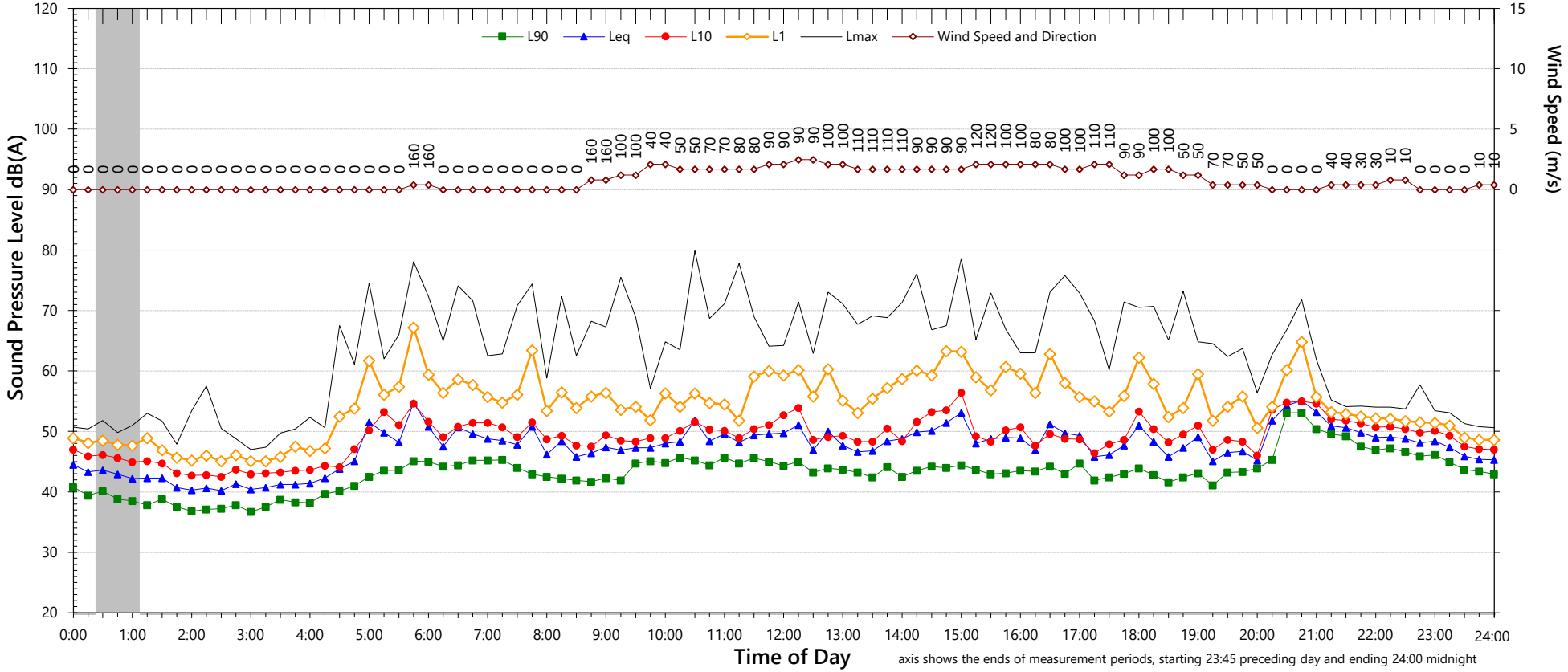
Notes:

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

Front yard of 4 The Downs, 20m up driveway

Monday, 6 December 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	**Day[2]**	**Evening[3]**	**Night[4 5]**
L_{A90} ABL	42	42	38
L_{Aeq}	49	50	48

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	50
$L_{Aeq\ 1hr}$ upper 10 percentile	53	52
$L_{Aeq\ 1hr}$ lower 10 percentile	50	45

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	74	to	85
L_{AFMax} - L_{Aeq} (Range)	18	to	34

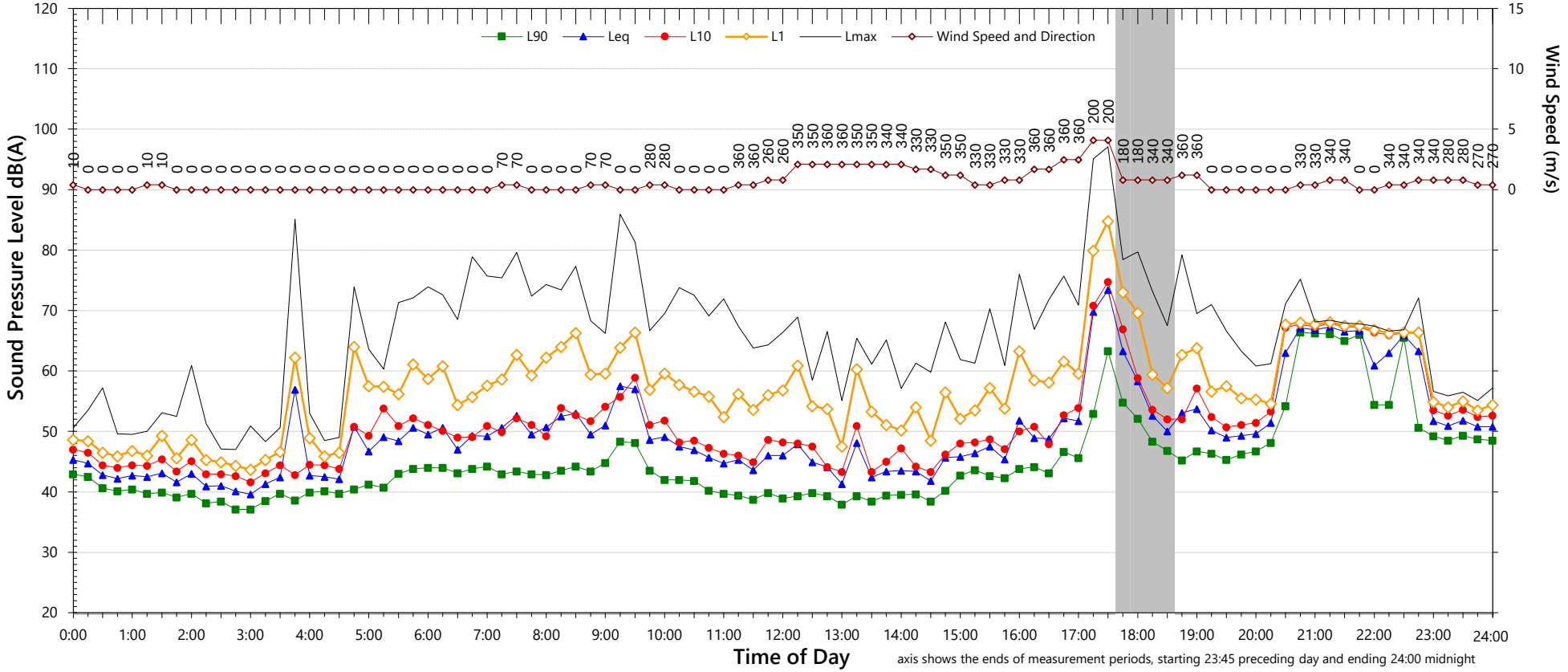
Notes:

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

Front yard of 4 The Downs, 20m up driveway

Tuesday, 7 December 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	39	46	46
L_{Aeq}	59	63	56

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	63	58
$L_{Aeq\ 1hr}$ upper 10 percentile	68	59
$L_{Aeq\ 1hr}$ lower 10 percentile	48	52

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	68	to	80
L_{AFMax} - L_{Aeq} (Range)	17	to	25

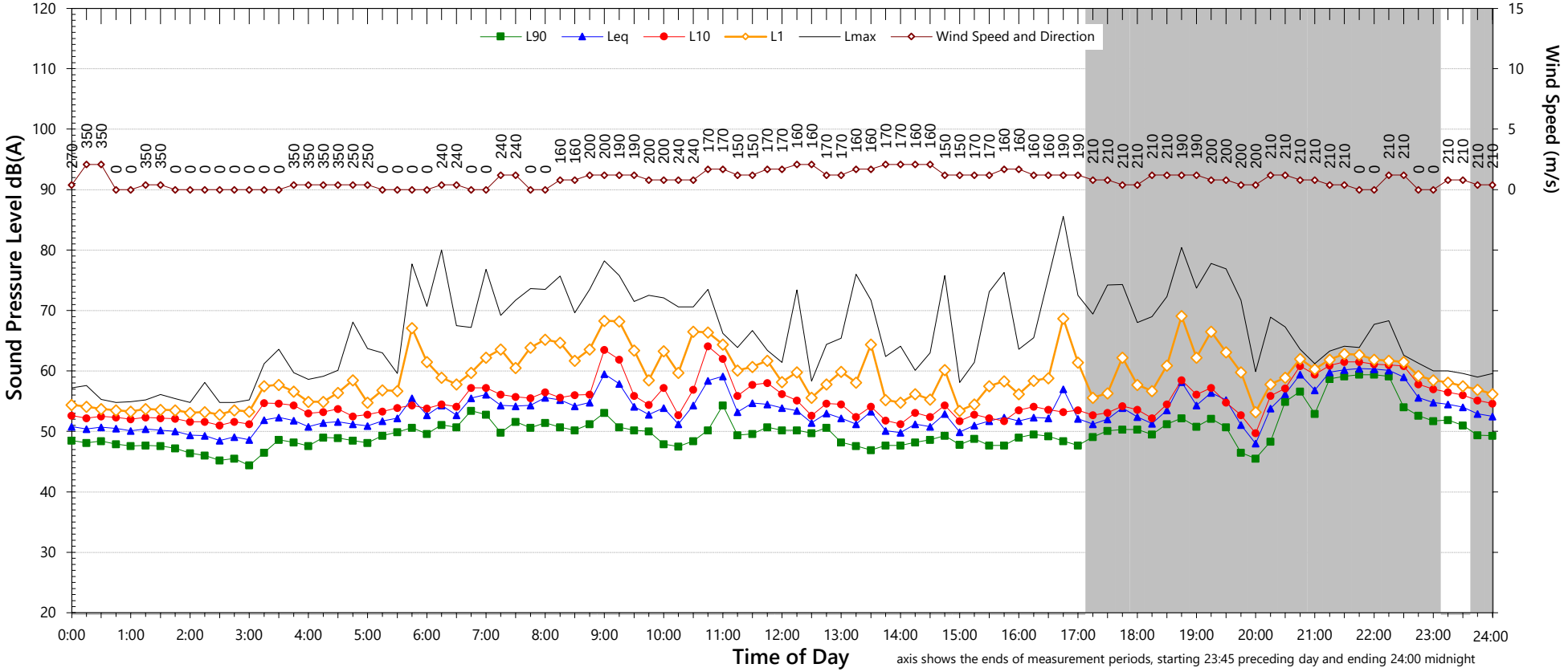
Notes:

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

Front yard of 4 The Downs, 20m up driveway

Wednesday, 8 December 2021



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	48	-	-
L_{Aeq}	54	-	-

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	-	-

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	67	to	73
L_{AFMax} - L_{Aeq} (Range)	15	to	22

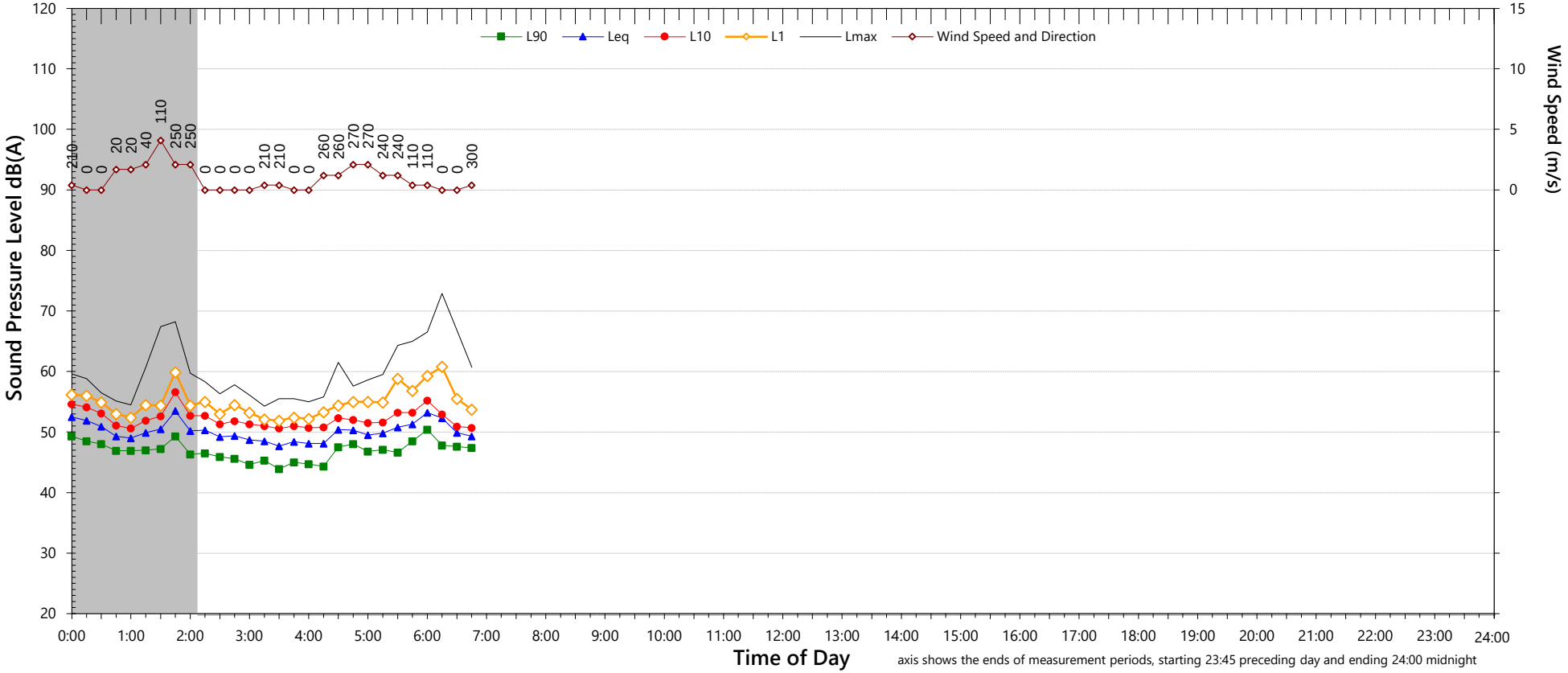
Notes:

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

Front yard of 4 The Downs, 20m up driveway

Thursday, 9 December 2021



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	-	-

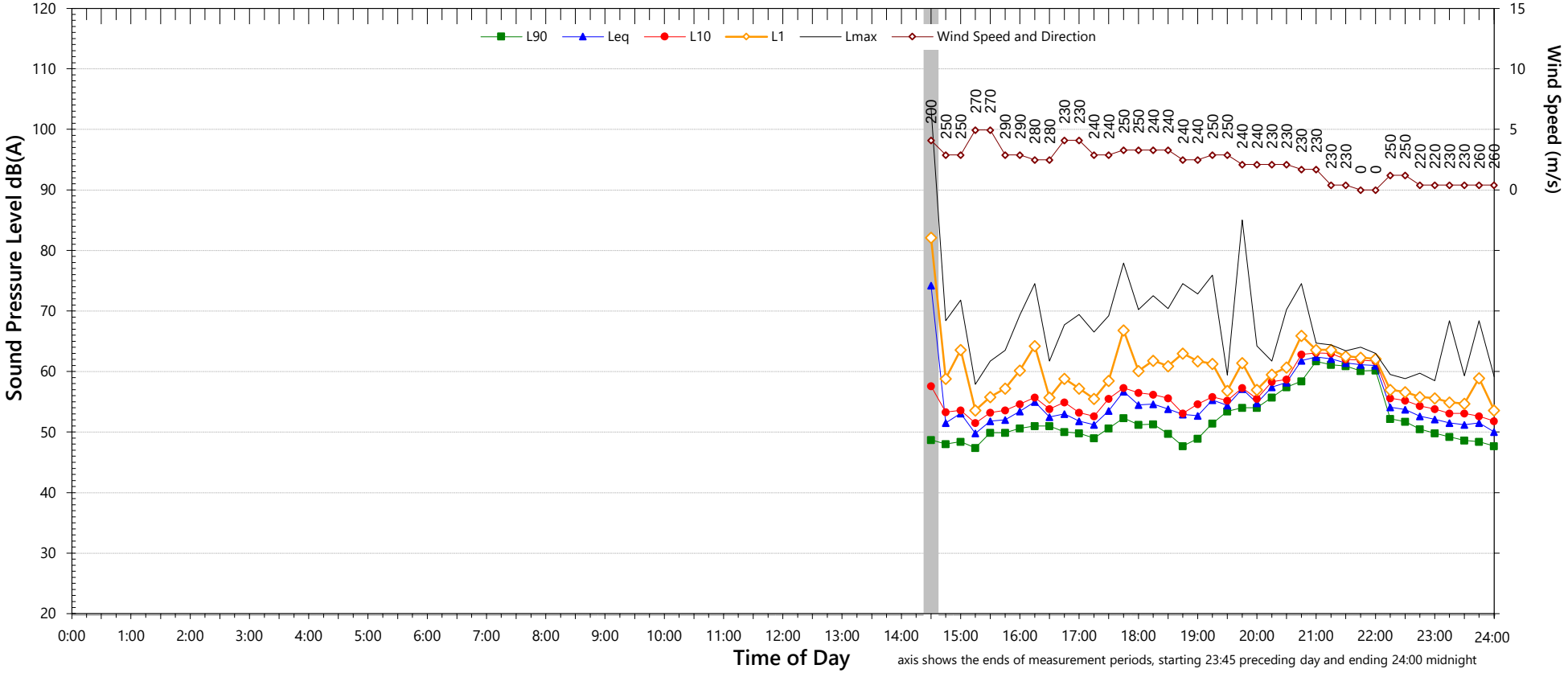
Notes:

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)

Unattended Noise Monitoring Results

Front yard of 4 The Downs, 20m up driveway

Friday, 10 December 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	-	49	41
L_{Aeq}	-	59	50

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	68	to	81
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 $L_{Aeq\ 9\ hr}$	-	52
$L_{Aeq\ 1hr}$ upper 10 percentile	-	54
$L_{Aeq\ 1hr}$ lower 10 percentile	-	47

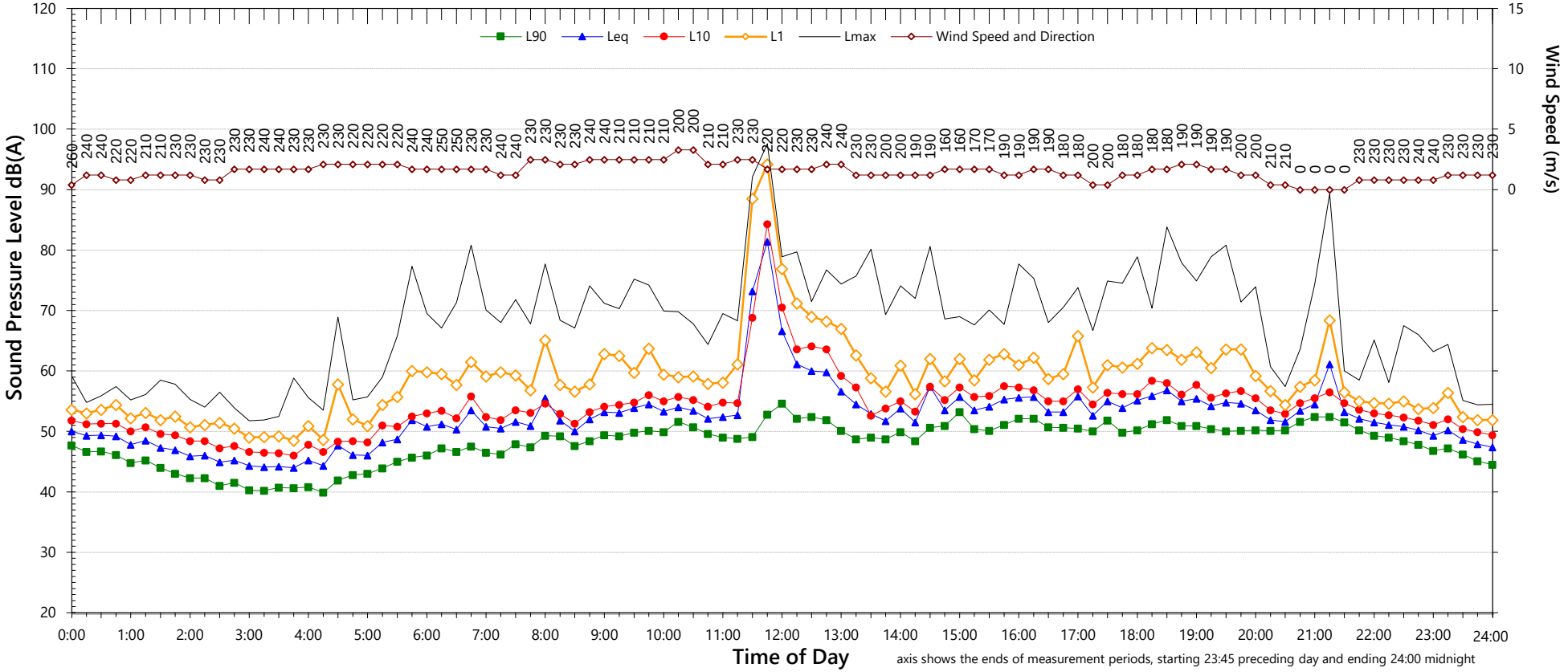
Notes:

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

Front yard of 4 The Downs, 20m up driveway

Saturday, 11 December 2021



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	48	50	36
L_{Aeq}	66	55	47

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	68	to	72
L_{AFMax} - L_{Aeq} (Range)	16	to	26

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	67	49
$L_{Aeq\ 1hr}$ upper 10 percentile	61	52
$L_{Aeq\ 1hr}$ lower 10 percentile	55	43

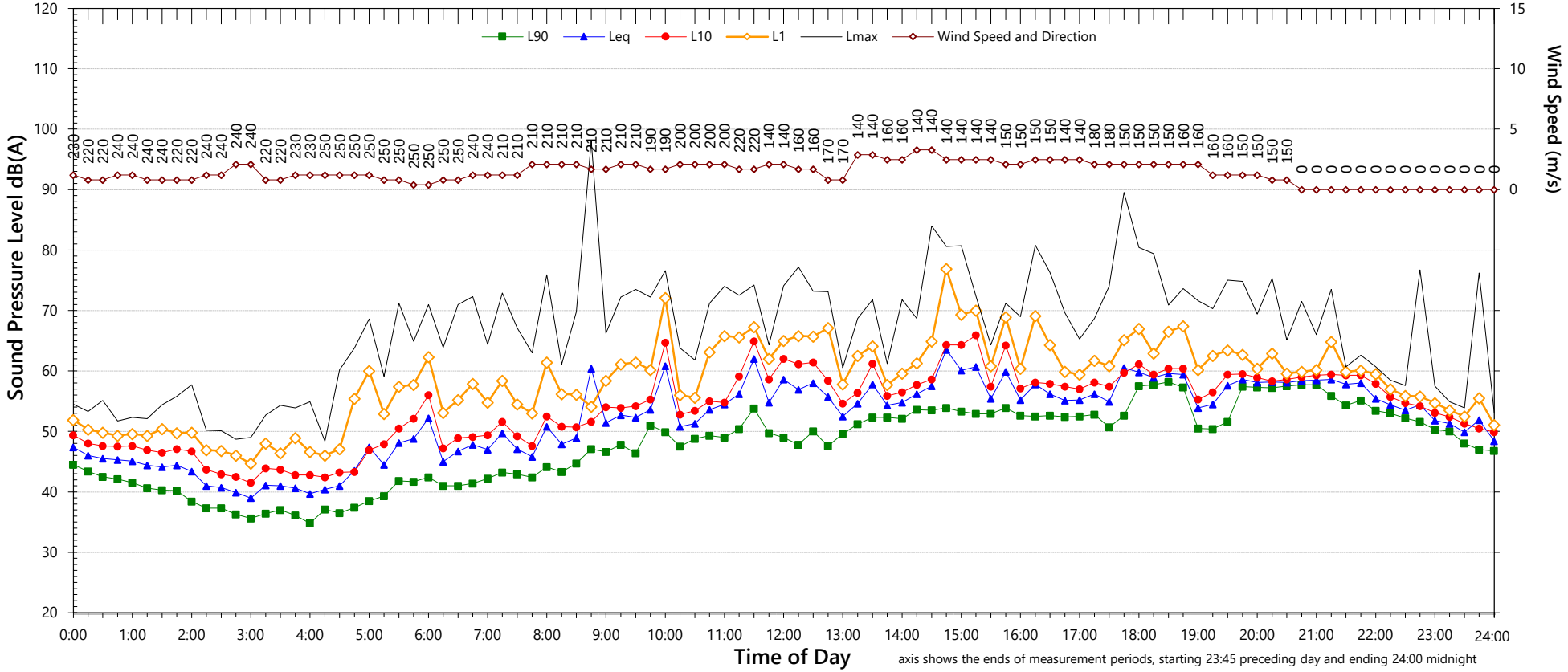
Notes:

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

Front yard of 4 The Downs, 20m up driveway

Sunday, 12 December 2021



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	47	51	39
L_{Aeq}	57	58	50

NSW Road Noise Policy (1m from facade)		(see note 6)
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	60	52
$L_{Aeq\ 1hr}$ upper 10 percentile	61	55
$L_{Aeq\ 1hr}$ lower 10 percentile	56	45

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	65	to	80
L_{AFMax} - L_{Aeq} (Range)	21	to	27

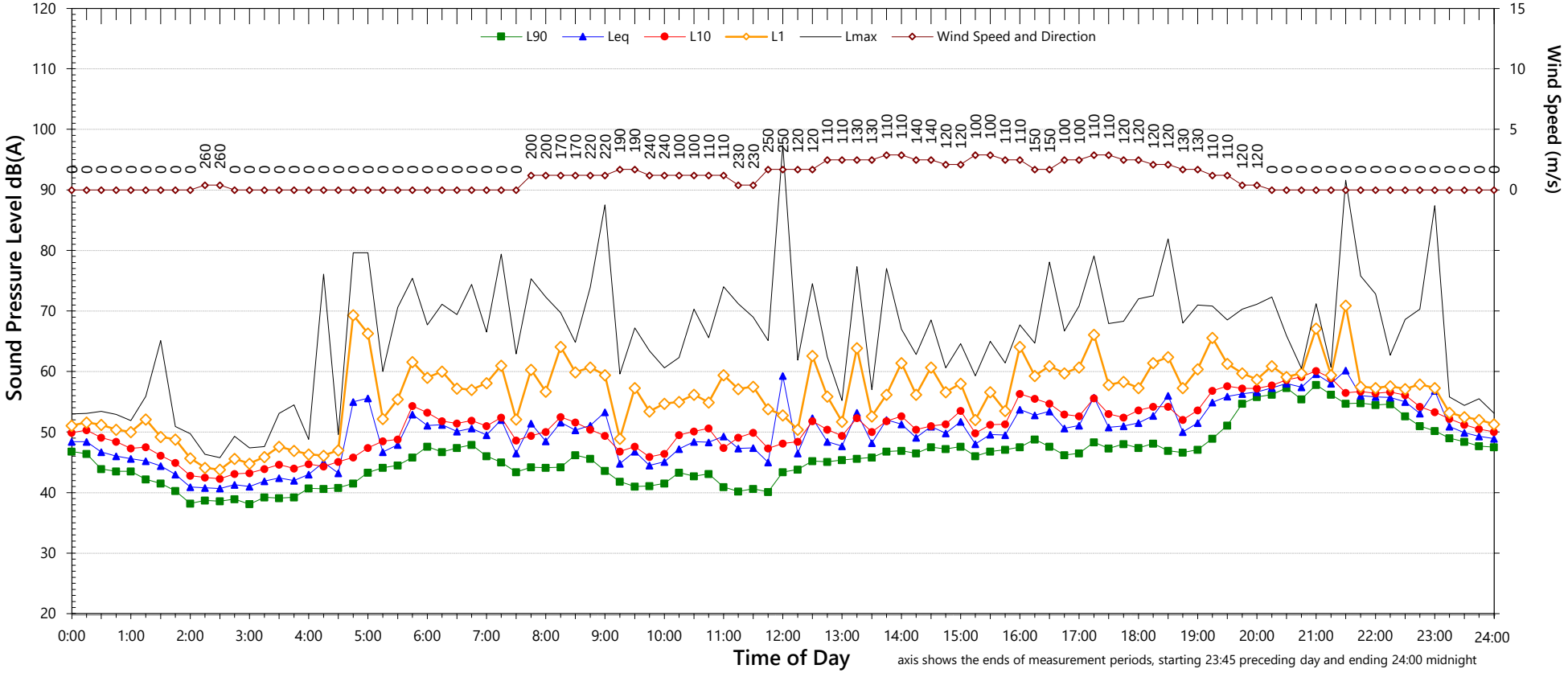
Notes:

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

Front yard of 4 The Downs, 20m up driveway

Monday, 13 December 2021



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	47	42
L_{Aeq}	51	57	51

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	71	to	87
L_{AFMax} - L_{Aeq} (Range)	23	to	32

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	53
$L_{Aeq\ 1hr}$ upper 10 percentile	60	57
$L_{Aeq\ 1hr}$ lower 10 percentile	51	47

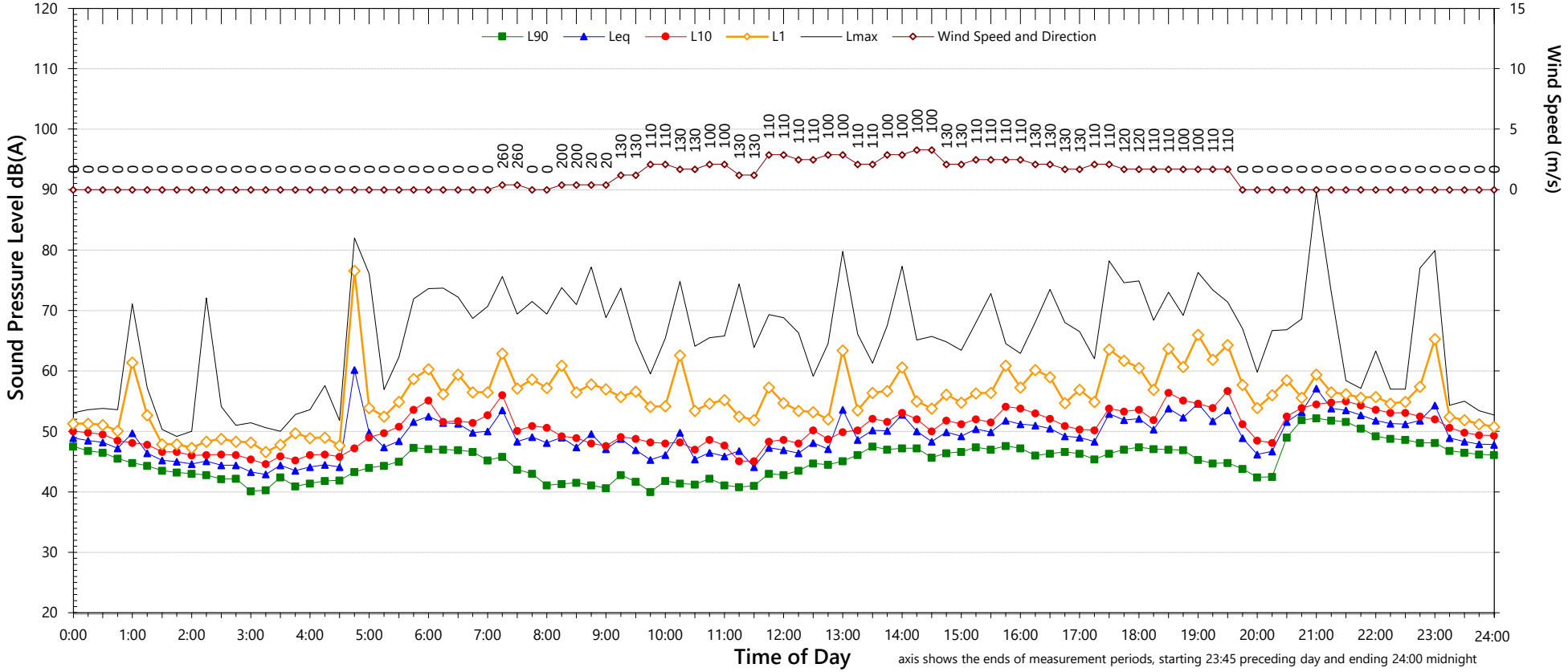
Notes:

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

Front yard of 4 The Downs, 20m up driveway

Tuesday, 14 December 2021



NSW Noise Policy for Industry (Free Field)			
Descriptor	Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL	41	43	40
L_{Aeq}	50	53	49

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	70	to	80
L_{AFMax} - L_{Aeq} (Range)	21	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	52
$L_{Aeq\ 1hr}$ upper 10 percentile	56	55
$L_{Aeq\ 1hr}$ lower 10 percentile	50	45

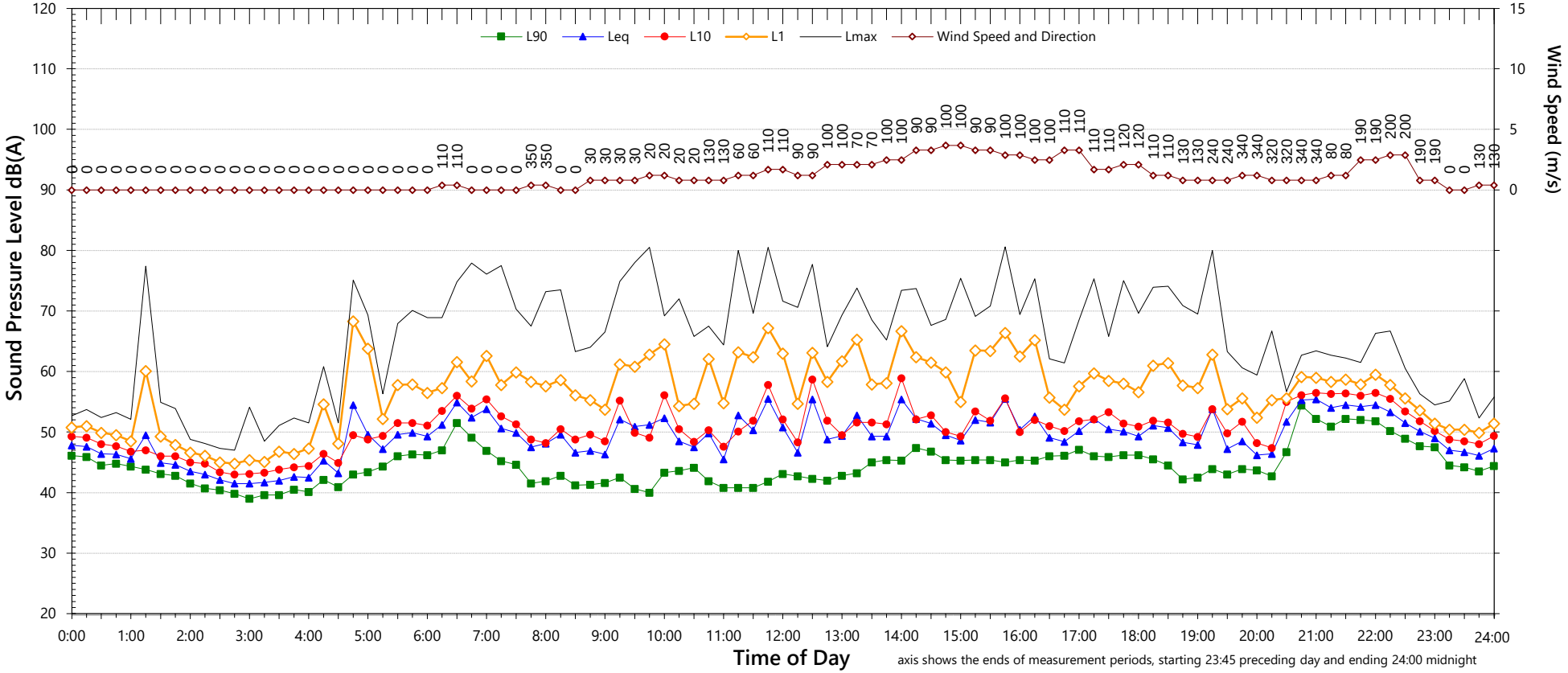
Notes:

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

Front yard of 4 The Downs, 20m up driveway

Wednesday, 15 December 2021



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	43	39
L_{Aeq}	51	52	48

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	67	to	75
L_{AFMax} - L_{Aeq} (Range)	15	to	27

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	56	53
$L_{Aeq\ 1hr}$ lower 10 percentile	51	46

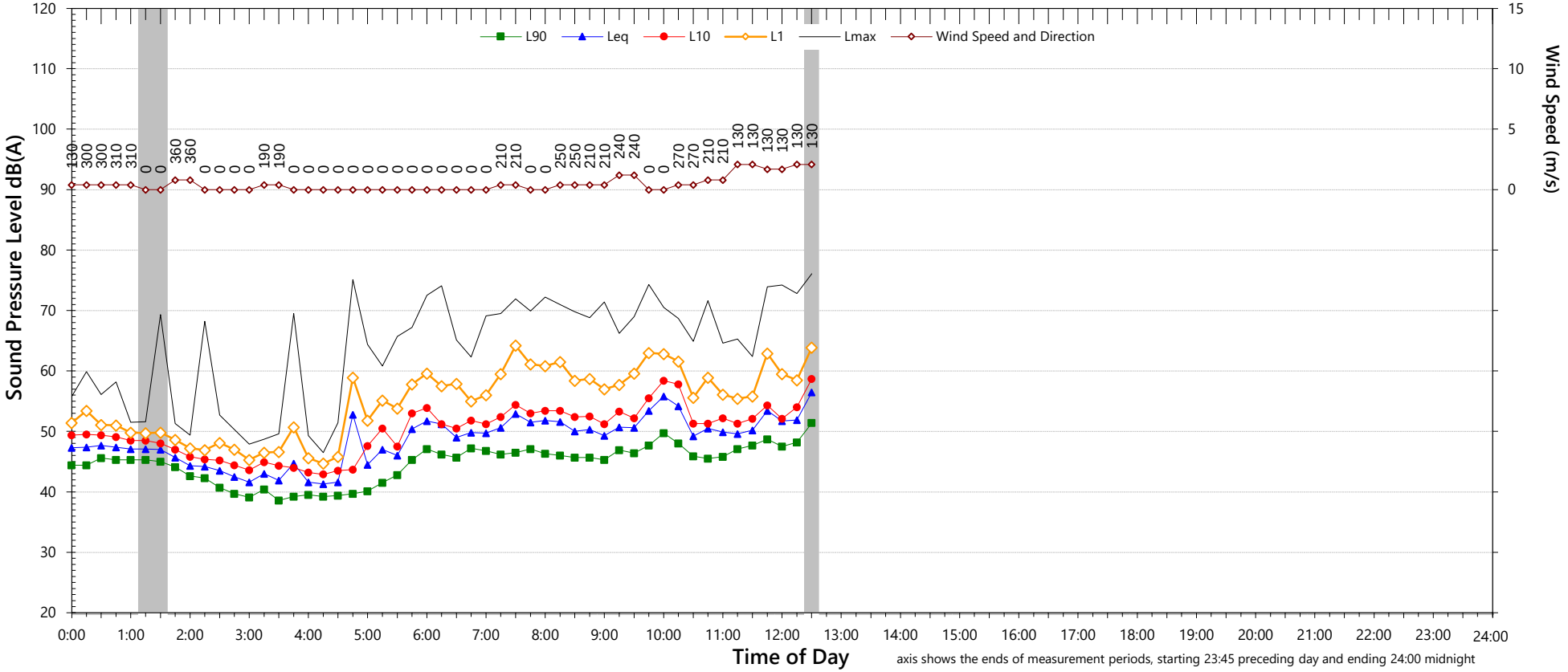
Notes:

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

Front yard of 4 The Downs, 20m up driveway

Thursday, 16 December 2021



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	-	-

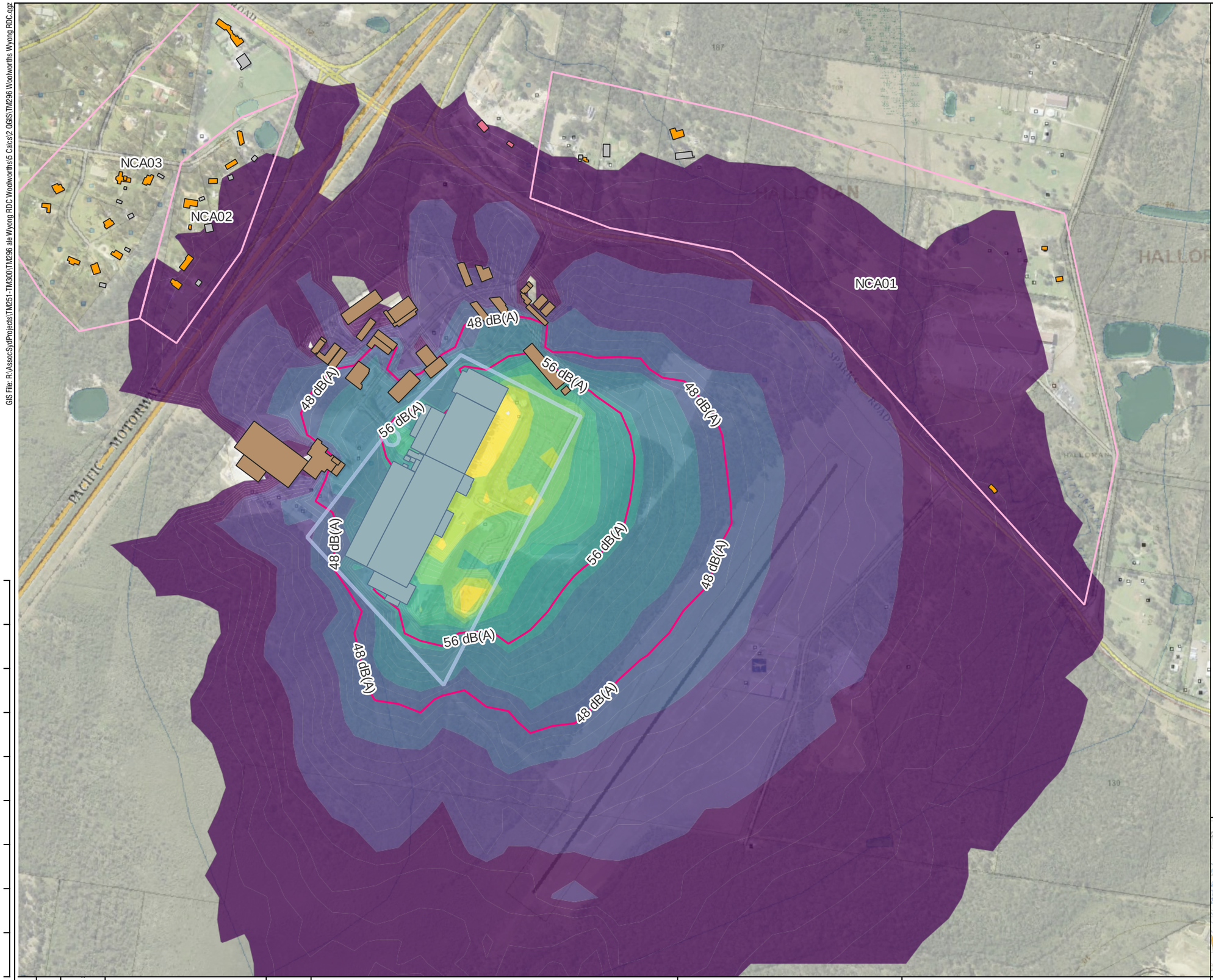
Notes:

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)

APPENDIX D Noise contour maps

Plot Date: 18/03/22 - 11:45 Layout: Appendix D Noise contour maps

GIS File: R:\AssocSydProjects\TM251-TM300\TM296 ale Wyong RDC Woolworths\5 Calcs\2 QGIS\TM296 Woolworths Wyong RDC.qgz



LEGEND

- Site buildings
- Site boundary
- Noise Catchment Area

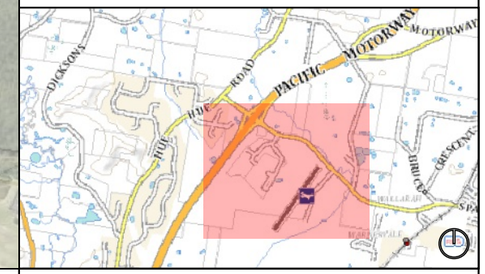
Receiver buildings

- Residential
- Commercial
- Industrial
- Non-residential

Level, dB(A)

Day - LAeq,15min

- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- 75 - 80
- Trigger level



REV	BY	DATE	DESCRIPTION	APPROVED
..	..	..	..	..
..	..	..	..	..
..	..	..	..	..
..	..	..	..	..
..	..	..	..	..
r1	AMo	18/03/22	Update figure	ALe
r0	AMo	22/02/22	Prepare figure	ALe

A3 Original

Co-ordinate System: GDA94 / MGA zone 56

0 140 280 420 560 m

1:8,500

FULL SIZE A3

NOTE: Do not scale from this drawing.

CLIENT

Woolworths Group

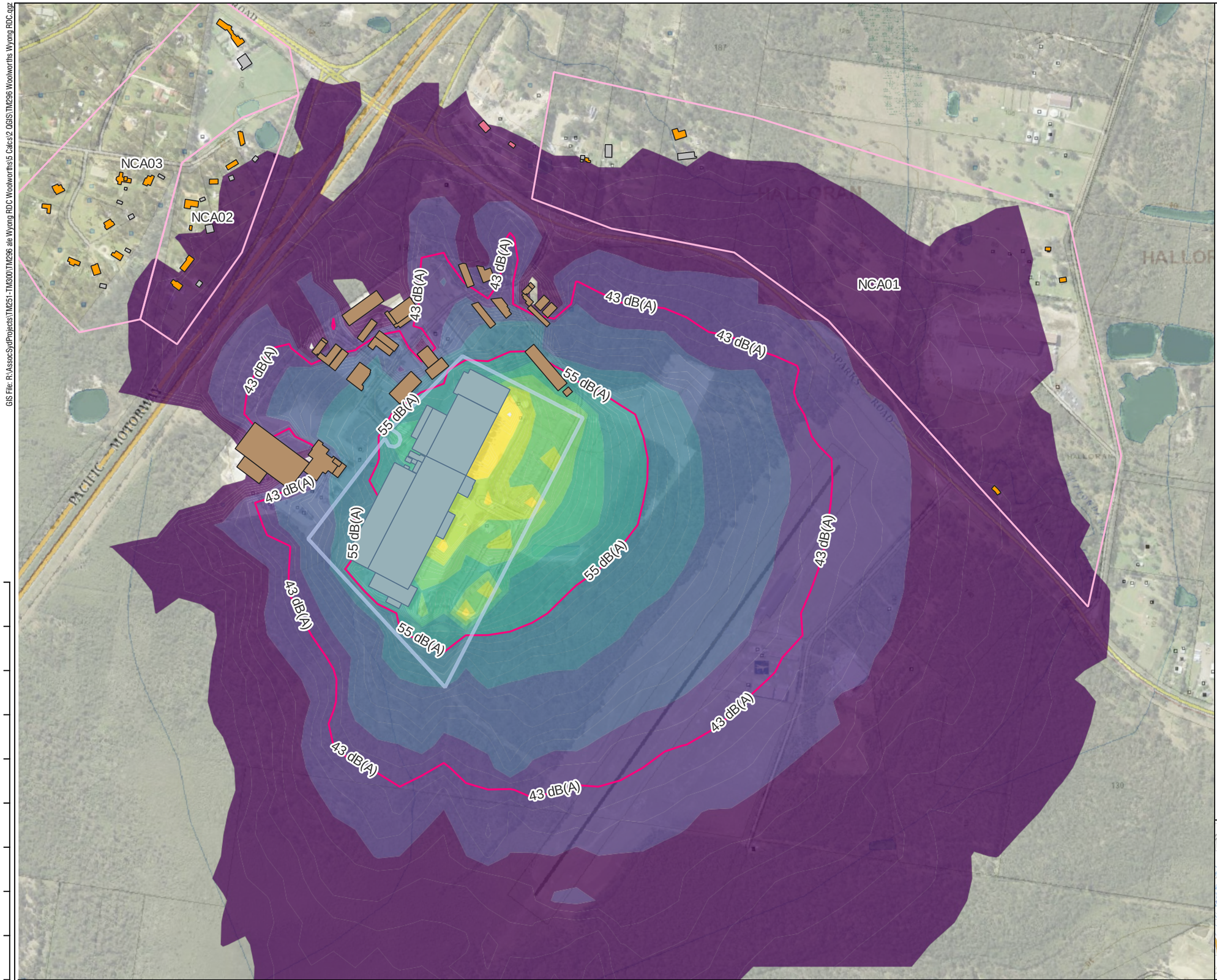
ACOUSTIC CONSULTANT

RENZO TONIN & ASSOCIATES
inspired to achieve
Ph (02) 8218 0500 Fax (02) 8218 0501

Appendix D
Noise Contours Day

Plot Date: 18/03/22 - 11:45 Layout: Appendix D Noise contour maps

GIS File: R:\AssocSydProjects\TM251-TM300\TM296 ale Wyong RDC Woolworths\5 Calcs\2 QGIS\TM296 Woolworths Wyong RDC.qgz



LEGEND

- Site buildings
- Site boundary
- Noise Catchment Area

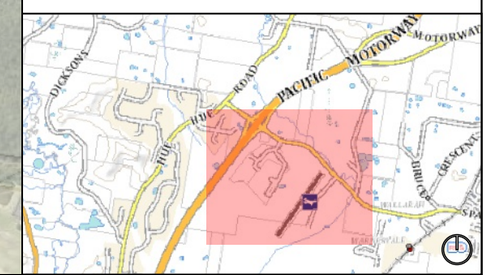
Receiver buildings

- Residential
- Commercial
- Industrial
- Non-residential

Level, dB(A)

Evening - LAeq,15min

- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- 75 - 80
- Trigger level



0 100 200 300 400 500 600 700 800 900 m

REV	BY	DATE	DESCRIPTION	APPROVED
..	..	..	..	..
..	..	..	..	..
..	..	..	..	..
..	..	..	..	..
..	..	..	..	..
r1	AMo	18/03/22	Update figure	ALe
r0	AMo	22/02/22	Prepare figure	ALe

A3 Original

Co-ordinate System: GDA94 / MGA zone 56

0 140 280 420 560 m

1:8,500

FULL SIZE A3

NOTE: Do not scale from this drawing.

CLIENT

Woolworths Group

ACOUSTIC CONSULTANT

RENZO TONIN & ASSOCIATES

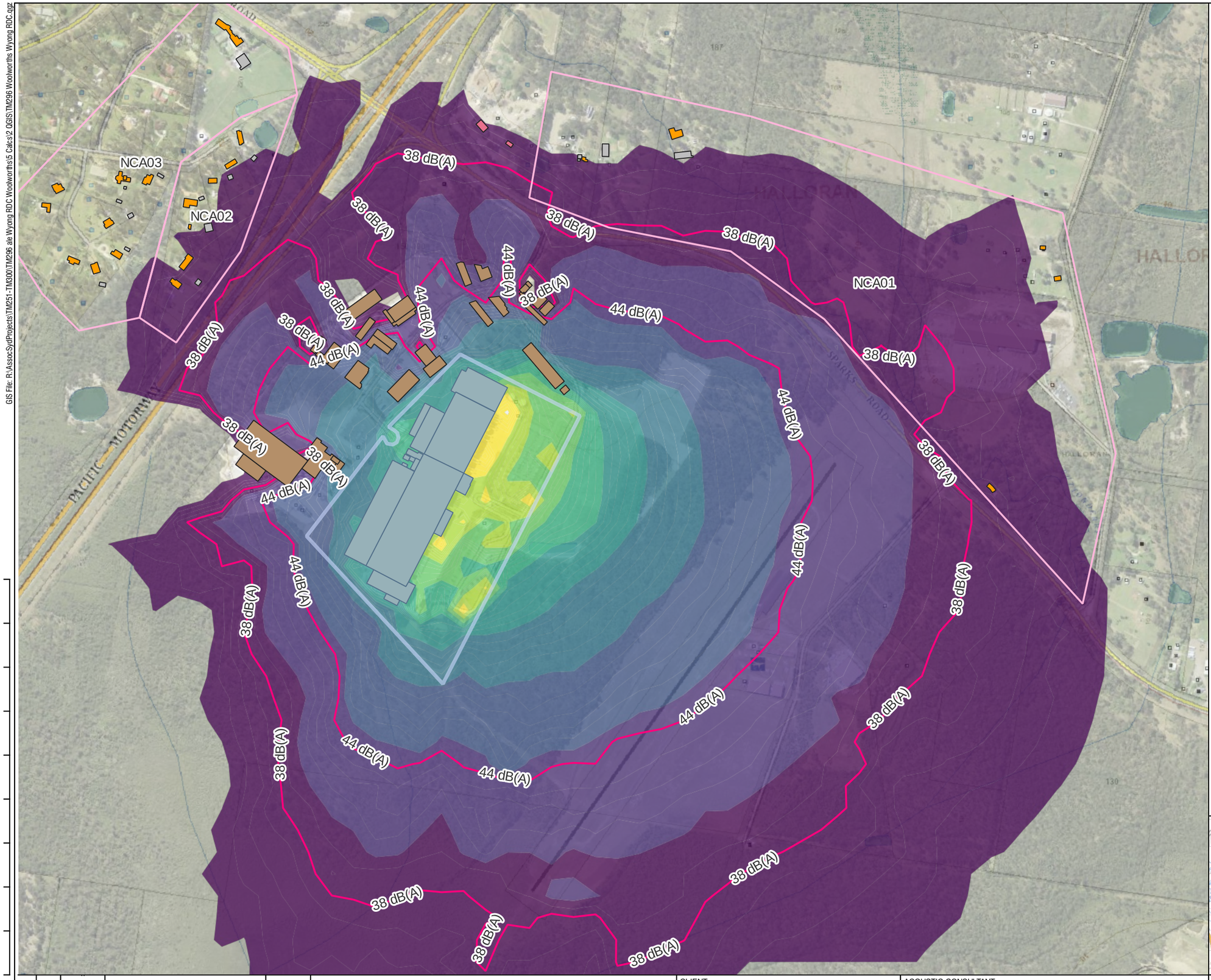
inspired to achieve

Ph (02) 8218 0500 Fax (02) 8218 0501

Appendix D
Noise Contours Evening

Plot Date: 18/03/22 - 11:45 Layout: Appendix D Noise contour maps

GIS File: R:\AssocSydProjects\TM251-TM300\TM296 ale Wyong RDC Woolworths\5 Calcs\2 QGIS\TM296 Woolworths Wyong RDC.qgz



0 100 200 300 400 500 600 700 800 900 m

LEGEND

- Site buildings
- Site boundary
- Noise Catchment Area

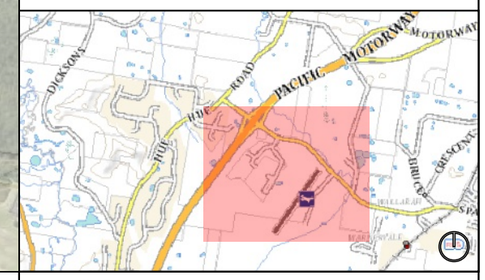
Receiver buildings

- Residential
- Commercial
- Industrial
- Non-residential

Level, dB(A)

Night - LAeq,15min

- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- 75 - 80
- Trigger level



REV	BY	DATE	DESCRIPTION	APPROVED
r1	AMo	18/03/22	Update figure	ALe
r0	AMo	22/02/22	Prepare figure	ALe

0 140 280 420 560 m

1:8,500

FULL SIZE A3

A3 Original

Co-ordinate System: GDA94 / MGA zone 56

NOTE: Do not scale from this drawing.

CLIENT

Woolworths Group

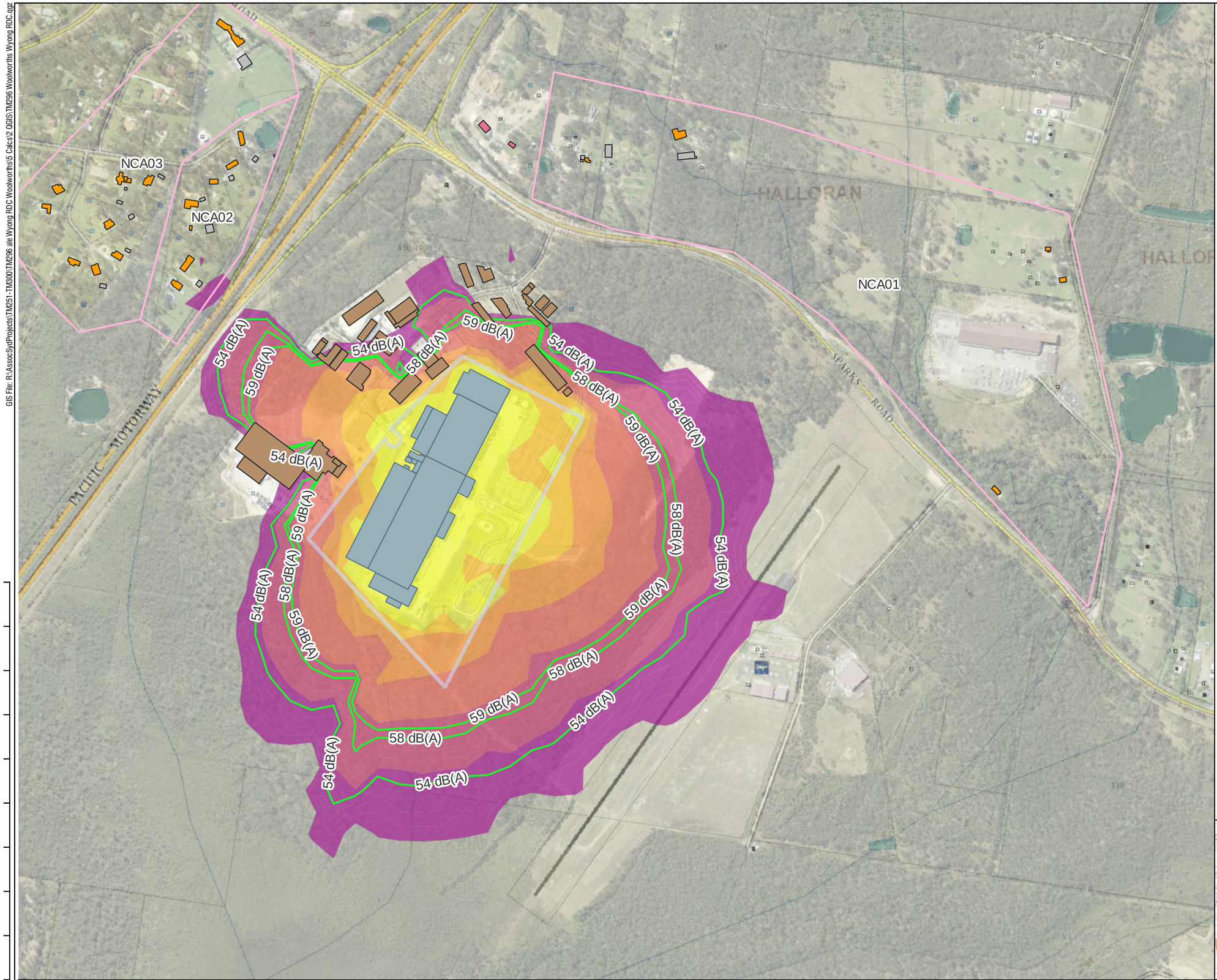
ACOUSTIC CONSULTANT

RENZO TONIN & ASSOCIATES
inspired to achieve
Ph (02) 8218 0500 Fax (02) 8218 0501

Appendix D
Noise Contours Night

Plot Date: 18/03/22 - 11:45 Layout: Appendix D Noise contour maps

GIS File: R:\AssocSydProjects\TM251-TM300\TM296 ale Wyong RDC Woolworths\5 Calcs\2 GIS\TM296 Woolworths Wyong RDC.qgz



LEGEND

- Site buildings
- Site boundary
- Noise Catchment Area

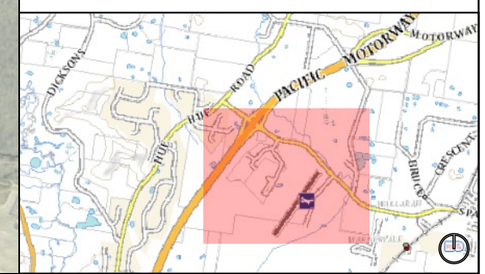
Receiver buildings

- Residential
- Commercial
- Industrial
- Non-residential

Level, dB(A)

Night - LAMax

- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- > 75
- Trigger level (Lmax)



REV	BY	DATE	DESCRIPTION	APPROVED
..	..	..	..	..
..	..	..	..	..
..	..	..	..	..
..	..	..	..	..
..	..	..	..	..
r1	AMo	18/03/22	Update figure	ALe
r0	AMo	22/02/22	Prepare figure	ALe

A3 Original

Co-ordinate System: GDA94 / MGA zone 56

0 140 280 420 560 m

1:8,500

FULL SIZE A3

NOTE: Do not scale from this drawing.

CLIENT

Woolworths Group

ACOUSTIC CONSULTANT

RENZO TONIN & ASSOCIATES

inspired to achieve

Ph (02) 8218 0500 Fax (02) 8218 0501

Appendix D
Noise Contours Lmax