Attachment 7

Revised Acoustic Report

PKA Acoustics

DA ACOUSTIC REPORT

St Leonards South, Lot 18, 19, & 20 East Quarter

ID: 11967 R01v3

10 August 2022

Prepared For:
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1.0 INTRODUCTION

PKA Acoustic Consulting (PKA) has been commissioned to prepare a DA acoustic report for submission to the Lane Cove Municipal Council for the proposed multi-residential development (site) at St Leonards - East Quarter.

The purpose of this DA acoustic report is to establish the following:

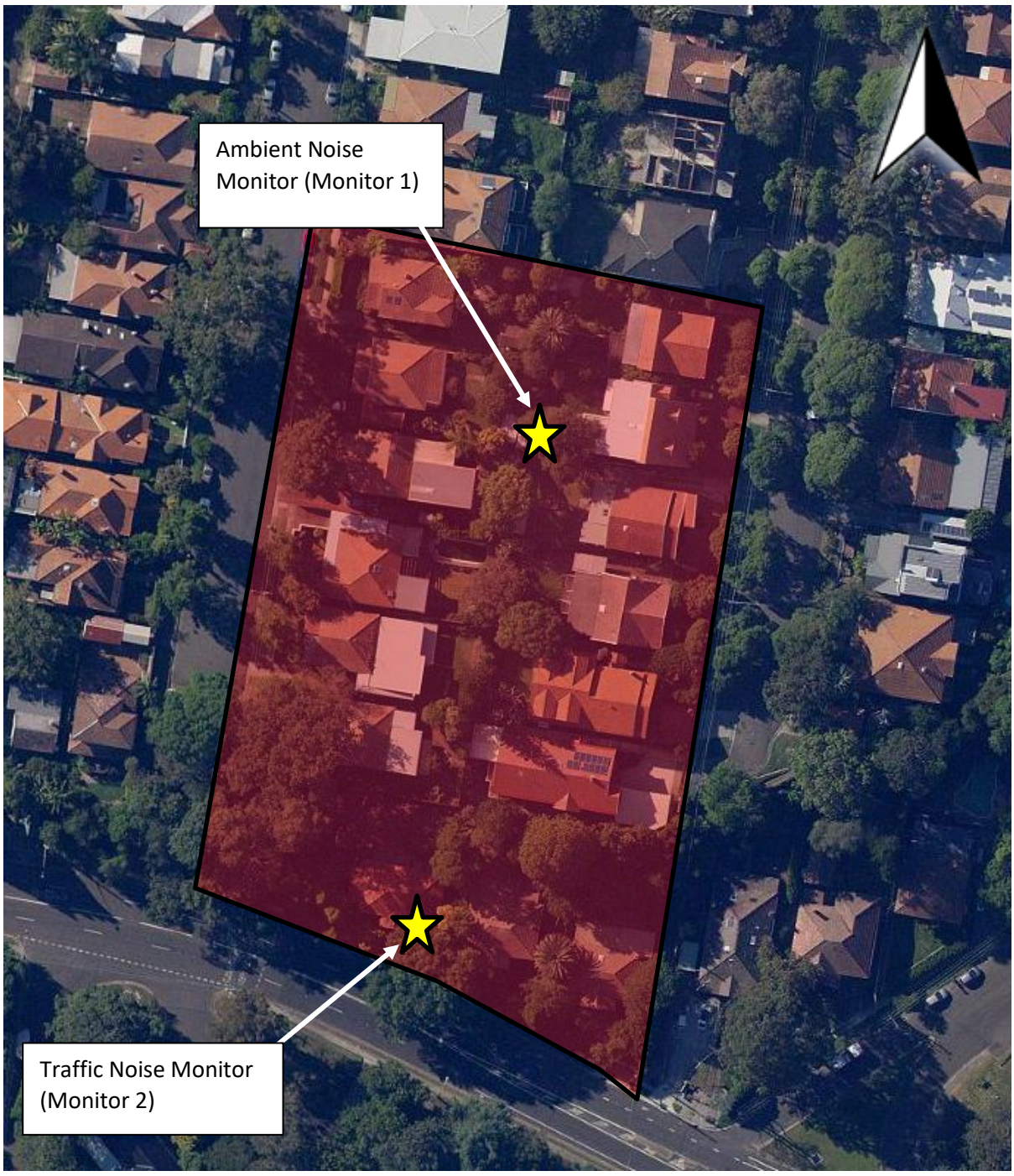
- Existing ambient (background) noise levels at the site and surrounding residential receivers.
- Mechanical plant noise breakout goals for future detailed design.
- Internal wall and floor/ceiling acoustic requirements to comply with sound insulation requirements of the Building Code of Australia (BCA).
- Establishment of Construction Noise & Vibration Goals.

Section 5.0 of the report details the acoustic recommendations to ensure with the relevant acoustic criteria.

2.0 SITE DESCRIPTION

The project development site is St Leonards South masterplan development area 18, 19 & 20, which entails sixteen lots that include existing residential house numbers 22, 24, 26, 28, 30, 32, and 34 Berrys Road, 21, 23, 25, 27, 29, and 31 Holdsworth Avenue, and 42, 44, and 46 River Road St Leonards. The site is bound by River Road to the south, Berry Road to the west, and Holdsworth Avenue to the east and other residential premises adjacently to the north. The site location is shown below. The nearest sensitive receivers are the existing residential premises to the north, west and east.

Figure 2-1 Site Location



3.0 ACOUSTIC CRITERIA

3.1 NSW EPA Noise Policy for Industry (NPfI)

Noise from mechanical plant and multi-storey residential developments are typically assessed by the NSW EPA Noise Policy for Industry 2017 (NPfI). The NPfI policy sets out two separate criteria to ensure environmental noise objectives are met. The first criterion considers intrusive noise to residential properties and the second is set to ensure the amenity of the land use is protected. The lower value of both criteria is considered to be the Project noise trigger level, which is the limit of the $L_{Aeq\ 15min}$ noise level that must not be exceeded for the corresponding period of the day.

Intrusiveness Criterion

The intrusiveness of a stationary noise source may be considered acceptable if the average of the maximum A-weighted levels of noise, $L_{Aeq\ 15\ minute}$ from the source do not exceed by more than 5dB the Rating Background Level (RBL) measured in the absence of the source. This applies during all times of the day and night. There also exists an adjustment factor to be applied as per the character of the noise source. This includes factors such as tonal, fluctuating, low frequency, impulsive, intermittent etc. qualities of noise. The RBL is determined in accordance with Section 2.3 of the NSW EPA NPfI. The intrusiveness criterion is $L_{Aeq\ 15\ minute}$ < RBL+5.

Amenity Criterion

To limit continuing increases in noise levels, the maximum ambient noise level within an area from commercial noise sources should not normally exceed the levels as specified in Table 2.2 of the policy for the specified time of the day. NSW EPA Noise Policy for Industry recommends the following Amenity Noise Levels for various receiver premises.

Table 3-1 Noise Criteria - Amenity for receiver buildings

All values in dB(A)

Type of receiver	Time of day	Recommended Amenity Noise Level $L_{Aeq\ (period)}$
Residential (Urban)	Day	60
	Evening	50
	Night	45
Residential (Sub-Urban)	Day	55
	Evening	45
	Night	40

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

Project amenity noise level for development = recommended amenity noise level **minus 5 dB(A).**

To standardise the time periods for the intrusiveness and amenity noise levels, this policy assumes that the Amenity **$L_{Aeq,15min}$** will be taken to be equal to the **$L_{Aeq, period}$ + 3 decibels (dB).**

Amenity noise levels in areas of high traffic noise

The level of transport noise, road traffic noise in particular, may be high enough to make noise from an industrial source effectively inaudible, even though the L_{Aeq} noise level from that industrial noise source may exceed the project amenity noise level. In such cases the project amenity noise level may be derived from the L_{Aeq}, period(traffic) minus 15 dB(A).

High traffic project amenity noise level for developments = $L_{Aeq, period(traffic)}$ minus 15 dB(A)

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

- Traffic noise is identified as the dominant noise source at site.
- The existing traffic level is 10dB 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).

3.2 State Environmental Planning Policy (Infrastructure) 2007

The developments located next to major roads or train lines are generally assessed against the acoustic requirements of Department of Planning document "*Developments near rail corridors and busy roads- Interim Guidelines".* The acoustic requirements support specific rail and road provisions of the State Environmental Planning Policy (Infrastructure SEPP) 2007 which considers residential sites adjacent to roads with AADTs more than 40,000 and may also be applied for best practice for sites with AADTs exceeding 20,000.

The DoP Interim Guidelines provide noise criteria for the buildings near the major roads and rail corridors as presented in Table 3-2.

Table 3-2 Internal Noise Goals from DoP Guidelines / SEPP Clause 102

Internal Space	Time Period	Internal Noise Level – Windows Closed	Measurement Descriptor
Sleeping areas (bedroom)	Night (22:00 - 07:00)	35 dB(A)	$L_{eq(9hr)}$ Night
Other habitable rooms (exc. garages, kitchens, bathrooms & hallways)	Day or Night	40 dB(A)	$L_{eq(15hr)}$ Day or $L_{eq(9hr)}$ Night

Section 3.6.1 of the DoP guidelines sets internal noise criteria for residences with windows closed. It also states that:

> *"if internal noise levels with windows or doors open exceed the criteria by more than 10 dB(A), the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also meet the ventilation requirements of the Building Code of Australia".*

3.3 BCA Sound Insulation Requirements – Class 2 Buildings

The BCA, in Volume 1 Section F5 "Sound Transmission and Insulation" states that walls and floors separating places of occupancy *"must provide insulation against the transmission of airborne and impact generated sound sufficient to prevent illness or loss of amenity to the occupants"*. The following summarises the BCA sound insulation requirements, brevity necessitates detail in the BCA taking precedence over the tables below.

Table 3-3 Walls – Deemed-to-Satisfy Provisions

Wall Description	BCA Reference	Airborne	Impact
Separating sole-occupancy units (SOUs) habitable areas	F5.5(a)(i)	$R_w + C_{tr} \geq 50$	
Separating SOUs wet to habitable areas	F5.5(a)(i) F5.5(a)(iii)	$R_w + C_{tr} \geq 50$	Discontinuous Construction
Separating SOUs with corridor, stairway, lobby or different classification	F5.5(a)(ii)	$R_w \geq 50$	
Separating SOUs with plantroom or lift shaft	F5.5(a)(ii) F5.5(a)(iii)	$R_w \geq 50$	Discontinuous Construction
Separating SOU habitable area with services from another SOU	F5.6(a)(i)	$R_w + C_{tr} \geq 40$	
Separating SOU wet area with services from another SOU	F5.6(a)(ii)	$R_w + C_{tr} \geq 25$	
Doors separating SOU with corridor, stairway, lobby	F5.5(b)	$R_w \geq 30$	

Wall Type	Reference	Discontinuous Construction Requirement
Masonry	F5.3(c)(i)	Wall having a minimum 20mm cavity between the 2 separate leaves, with resilient wall ties if necessary
Other than masonry	F5.3(c)(ii)	Wall having a minimum 20mm cavity with no mechanical linkage except at the periphery

Table 3-4 Floors – Deemed-to-Satisfy Provisions

Floor Description	BCA Reference	Airborne BCA	Impact BCA	Impact PKA*
Separating sole-occupancy units (SOUs)	F5.4(a)(i)	$R_w + C_{tr} \geq 50$	$L_{n,w} \leq 62$	$L_{n,w} \leq 55$
Separating SOUs with plantroom, lift shaft, corridor, stairway, lobby or different classification	F5.4(a)(ii)	$R_w + C_{tr} \geq 50$	$L_{n,w} \leq 62$	$L_{n,w} \leq 55$
Separating SOU habitable area with services from another SOU	F5.6(a)(i)	$R_w + C_{tr} \geq 40$		
Separating SOU wet area with services from another SOU	F5.6(a)(ii)	$R_w + C_{tr} \geq 25$		

* Discussion of BCA Floor Impact

PKA considers the BCA floor impact sound insulation criteria of $L_{n,w} \leq 62$ and verification criteria of $L_{nT,w} \leq 62$ to be of a poor standard which typically results in noise complaints from adjoining occupants.

The Association of Australian Acoustical Consultants (AAAC) in their document *"Guideline of Apartment and Townhouse Acoustic Rating 2010"* rates the BCA impact sound insulation criteria to be a 2 Star Rating.

PKA recommends achieving a AAAC 3 Star Rating of $L_{n,w} \leq 55$ for impact sound insulation of floors separating SOUs which provides at least an additional 7dB of improvement over the BCA criteria. This upgrade is **not mandatory** but is a consideration for the client to provide a higher acoustic quality development.

Other BCA Acoustic Issues

The builder must also ensure that the project complies with following BCA acoustic requirements:

Chasing of Masonry Elements

The BCA specifically precludes chasing of services into concrete or masonry elements. (Clause 2. (e)(i)).

Fixing of Water Supply Pipework

Note Clause 2. (iii) (A) and (B).

A water supply pipe must:

(A) Only be installed in the cavity of discontinuous construction; and

(B) In the case of a pipe that serves only one sole occupancy unit, not be fixed to the wall leaf on the side adjoining any other sole-occupancy unit and have a clearance not less than 10mm to the other wall leaf.

(i.e. the cavity must not be bridged by any pipework)

Electrical Outlets

The BCA requires that any electrical outlets must be offset from each other:

(A) in masonry walling, not less than 100 mm; and

(B) in timber or steel framed walling, not less than 300 mm

Ducts

Ducts serving or passing through more than one SOU per F5.6(a) must be separated from another SOU by masonry or plasterboard construction having a minimum $R_w + C_{tr}$ of 40 for habitable rooms and $R_w + C_{tr}$ of 25 for non-habitable rooms.

3.4 EPA NSW Interim Construction Noise Guidelines (ICNG)

The *NSW EPA Interim Construction Noise Guideline* (ICNG) is used for the assessment. The document aims at managing noise from construction works regulated by the EPA. Details of noise limits are presented in the following Table 3-5.

Table 3-5 Noise Levels Residential Receivers (Extract from EPA ICNG)

Time of day	Management level $L_{Aeq(15\ min)}$	Application
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL + 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.
	Highly noise affected 75 dB	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 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 5 dB above the noise affected level, the proponent should negotiate with the community.

3.5 Construction Vibration Criteria

As demolition and excavation are proposed, there is the potential for vibration impact on the neighbouring buildings' amenity and on structures. The EPA ICNG states that human comfort (amenity) vibration is to be measured and assessed in accordance with *Assessing Vibration – a technical guideline* (DECC 2006).

In general, structural damage due to vibration can be of concern when hammering, blasting, vibration rolling, crushing, piling and other vibration inducing construction works are carried out.

The EPA ICNG does not have specific structural vibration damage criteria however the RTA Environmental Noise Management Manual (2001) recommends the use of the following Standards:

- British Standard BS 7385: Part 2: Evaluation and Measurement for Vibrations in Buildings – Part 2 Guide to Damage Levels from Ground-Borne Vibration
- AS 2187.2 Explosives-Storage, transport and use, Part 2: Use of Explosives
- German Standard DIN 4150, Part 3: Structural Vibration in Buildings: Effects on Structures

4.0 NOISE SURVEY AND PROJECT NOISE GOALS

Unattended noise monitoring was conducted on site between 22nd February to the 1st March to record the existing traffic noise levels.

The noise monitor was programmed to store the L_n percentile noise levels for each 15-minute sampling period. Measurements were made of L_{min}, L_{max}, L_{90}, and L_{eq} and were later retrieved for analysis.

The position of the noise monitor is shown in Figure 2-1. The results and summary of the noise monitoring are listed in graphical form in Appendix B of this report.

4.1 Instrumentation

Noise measurements were conducted using the following equipment:

- Sound analyser NTi XL2 Type Approved, Serial No. A2A-15268-E0.
- Sound analyser NTi XL2 Type Approved, Serial No. A2A-15295-E0.
- Sound calibrator B&K 4230, Serial number 830447.

The instruments were calibrated before and after the noise measurements and there were no adverse deviations between the two. The analysers are type 1 and comply with AS IEC 61672.2-2004. The instruments carry traceable calibration certificates.

4.2 Measured Levels and Noise Goals

Data from the noise monitors were processed to obtain the ambient noise levels and the noise goals.

4.2.1 Mechanical Plant Noise Goals

The table below presents the results of the noise monitor measurements. The noise criteria defined in the *Noise Policy for Industry* (NPfI) is listed below. The assessment periods are defined by the NSW NPfI are Daytime: 7 am to 6 pm, Evening: 6 pm to 10 pm and Night: 10 pm to 7 am.

Table 4-1 NPfI Project Noise Trigger Levels at Residential Receivers (Shielded from Traffic)

All values in dB(A)

Receiver Type	Period	Measured RBL ($L_{A90\text{-}period}$)	Acceptable Noise Levels ($L_{Aeq\text{-}period}$)	NSW Noise Policy for Industry Criteria		Project Noise Trigger Levels $L_{Aeq15min}$
				Amenity $L_{Aeq15min}$	Intrusiveness $L_{Aeq15min}$	
Residential (Sub-urban)	Day	42	55	53	47	**47**
	Evening	40	45	43	45	**43**
	Night	40	40	38	45	**38**

Table 4-2 NPfI Project Noise Trigger Levels at Residential Receivers (Exposed to Traffic)

All values in dB(A)

Receiver Type	Period	Measured RBL (L_{A90})	Acceptable Noise Levels ($L_{Aeq\ -period}$)	Measured Traffic Noise (L_{Aeq})	NSW Noise Policy for Industry Criteria		Project Noise Trigger Levels $L_{Aeq15min}$
					Amenity $L_{Aeq15min}$	Intrusiveness $L_{Aeq15min}$	
Residential (Urban)	Day	57	60	69	58	62	**58**
	Evening	52	50	68	56*	57	**56**
	Night	41	45	63	51*	46	**46**

*Corrected for amenity noise levels in areas of high traffic noise as per the Noise Policy for Industry Section 2.4.1.

In the above tables, the amenity criteria for residential boundaries exposed to traffic noise were based on the urban zoning criteria as per Table 2.3 of the Noise Policy for Industry. All other shielded boundaries were based on the sub-urban amenity criteria.

4.2.2 Traffic Noise and Reduction Required

Table 3-2 below presents the traffic noise levels at the ground floor of the residential setback (approximately 10m) from River Road. The below values were corrected to the rest of the development based on measured results from other monitors and attended measurements.

Table 4-3 Traffic Noise Levels Measurements and Noise Reduction Required

Period	Measured Traffic Noise Level at proposed setback	Internal Noise Goal – Windows Closed	Internal Location	Traffic Noise Reduction Required
Night (2200 - 0700) $L_{eq\ 9hr}$	59 dB(A)	35 dB(A)	Sleeping areas (bedroom)	24 dB(A)
Day (0700 - 2200) $L_{eq\ 15hr}$	66 dB(A)	40 dB(A)	Other habitable rooms (exc. garages, kitchens, bathrooms & hallways)	26 dB(A)

4.2.3 Construction Noise Goals

Assuming the construction is proposed during normal daytime working hours 7am to 6 pm, the noise criteria are presented in the following table.

Table 4-4 EPA NSW Interim Construction Noise Guidelines Criteria for Site

Residential Receivers	Daytime Background, dB(A)	Noise affected level (Criterion), dB(A)
Exposed to Traffic	42dB(A)	52 dB(A)
Shielded from Traffic	57dB(A)	67dB(A)

The “Highly Noise Affected” criterion has a set level of 75 dB(A).

5.0 RECOMMENDATIONS

5.1 General Notes

All recommendations must be checked by respective assessing representatives to ensure compliance with other non-acoustic requirements.

1. The acoustic systems shown in the descriptions is one that satisfies the acoustic requirements only. No representation is given that it is fit for any other purpose. The construction must be checked and designed by others to verify that it complies with all necessary fire rating, structural, waterproofing, durability and any other non-acoustic requirements.
2. Any additional construction or fixtures must be acoustically detailed to seal to the room and ceiling construction without degrading the sound insulation rating (R_w) required in either instance.

5.2 Traffic Noise Intrusion

Calculations were performed to estimate the acoustic requirements of the façade and elements as presented below.

5.2.1 External Walls

The calculations show that the external wall should have a Weighted Sound Reduction index of **R_w 42**. This can be achieved with standard construction that satisfy general BASIX requirements.

5.2.2 Roof

The calculations show that the roof should have a Weighted Sound Reduction index of **R_w 42**. This can be achieved with standard concrete construction that is typically proposed for similar developments.

5.2.3 Windows/Doors

The minimum R_w rating for each window will vary from room to room and are shown below. The following table presents the glazing requirements and suitability of each space for natural ventilation.

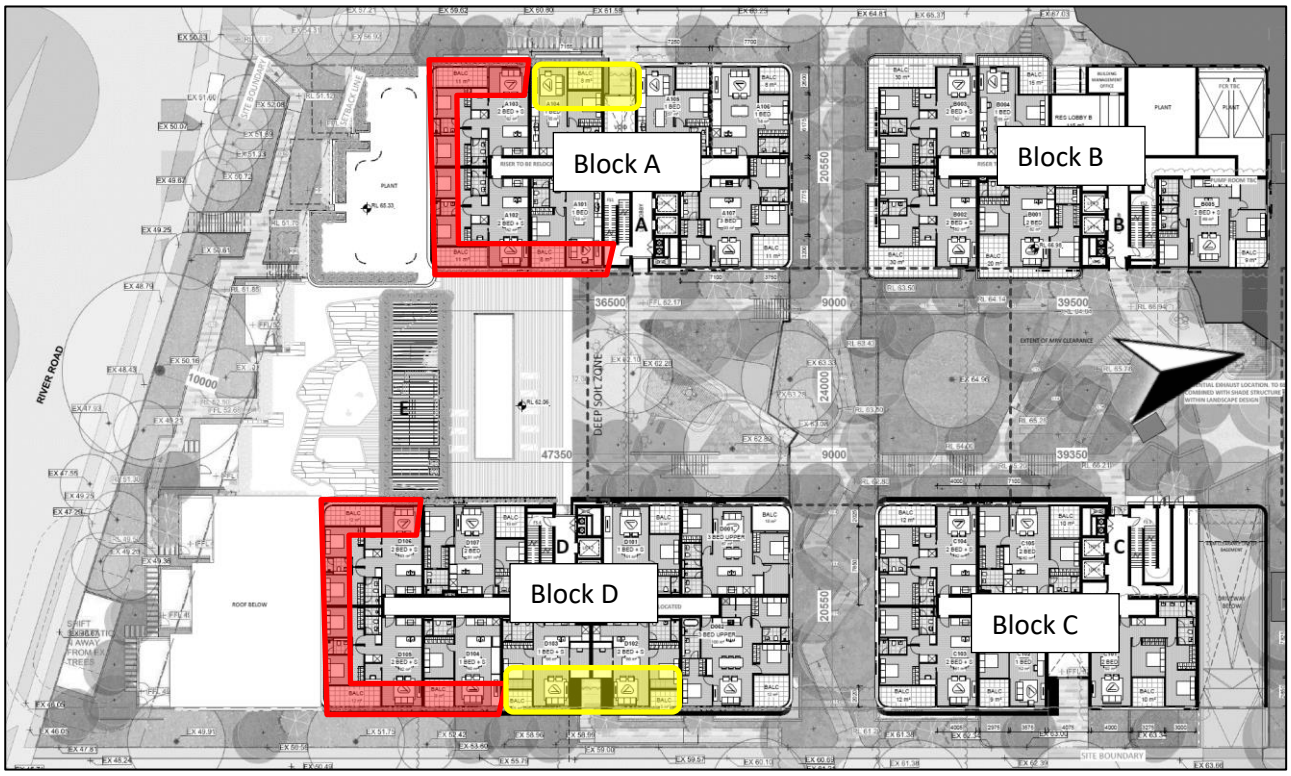
Table 5-1 Glazing/Door R_w Requirements

Glazed Elements (Figure 5-1)	Minimum (R_w) Requirement	Indicative Thicknesses *(Refer to notes in Section 5.2.4)*	Can be used for natural ventilation?
Glazed elements located in **Zone 1** of markup (Basement 4 to Level 5)	33	6mm lam with acoustic seals	No
All glazed elements located in **Zone 2** of markup (Basement 4 to Level 5)	28	5mm lam with acoustic seals	Yes
All other glazed elements out of above zones (all levels)	24	4mm lam with acoustic seals	Yes

(Page to be viewed in colour)

The markup below shows Level 01 for reference but all living and bedrooms directly facing the main road on all levels from basement 04 to Level 05 must along the marked façade below must also be upgraded. All non-marked facades can be acoustically standard construction.

Figure 5-1 Markup for Traffic Intrusion Requirements for Glazing



Legend	Zone
	Zone 1
	Zone 2

Disclaimer: At the time of preparation of this report, a glazing schedule was unavailable. The above recommendations are based on indicative measurements based on the plans provided to

PKA. These recommendations must be checked during CC based on the measured levels to ensure compliance prior to construction following the availability of a glazing schedule and exact dimensions.

5.2.4 Notes for Glazed Systems

1. Windows in Zone 1 must be closed to comply with internal noise goals. Passive methods or other alternate ventilation such as mechanical or passive systems may be required. The relevant ventilation personnel should be consulted to determine which rooms will require alternate ventilation in accordance with the relevant guidelines.
2. The R_w rating is required for the complete glazing and frame assembly. The glazing thicknesses (if specified above or on data sheets) will not necessarily meet the required R_w rating without an appropriate frame system. It will therefore be necessary to provide a window glass and frame system having a laboratory tested acoustic performance meeting the required values provided in table above.
3. The entire frame to the glazing must be sealed into the structural opening using acoustic mastics and backer rods. Normal weather proofing details do not necessarily provide the full acoustic insulation potential of the window system. The manufacturers' installation instructions for the correct acoustic sealing of the frame must be followed. The sliding doors and windows should be fitted with proper acoustic seals (e.g. silicon Schlegel Q-Lon seals). **No brush seals**.
4. The above glazing thicknesses assume single glazing. Acoustically, double glazing (in particular DGU units) can have reduced performances where the stated R_w rating may not result in compliance with the internal noise criteria. If double glazing is recommended for reasons other than acoustics (e.g. thermal, wind loading etc.), the glazing selections must be checked by PKA or a qualified acoustic consultant to determine compliance.
5. It is possible that structural demands for wind loading or fire rating or the like may require more substantial glass and framing assemblies than nominated above. Where this is the case, the acoustic requirements must clearly be superseded by the structural or fire rating demands.
6. The window systems must be tested in accordance with the following:
    - Australian Window Association Industry Code of Practice Window and Door – Method of Acoustic Testing.
    - AS 1191 *Acoustics – Method for laboratory measurement of airborne sound insulation of building elements*.

5.3 BCA Part F5 Sound Insulation Requirements

All walls and floors separating sole occupancy units must comply with the construction ratings listed in Section 3.3 of this report.

5.4 Mechanical Noise Mitigation

The selection and placement of any outdoor mechanical equipment such as condenser units, exhausts serving car parks and toilets, roller doors for access etc. must be designed to acoustically comply with the criteria established in Section 4.2.1 of this report. This must be checked by an

acoustic consultant and the appreciate criteria must be selected depending on the location of the equipment and the positioning of the residential receiver's boundary from the main road (to check if shielded from traffic noise).

5.5 Construction Noise & Vibration

If the preparation of a Construction Noise & Vibration Management Plan is required by the certifying authority, the noise criteria established in Sections 3.4, 3.5 and Section 4.2.3 must be considered.

APPENDIX A DRAWINGS USED TO PREPARE REPORT

This report was prepared using drawings provided by Koichi Takada Architects.

No.	Rev.	Title	Date
A0000	D	Cover Sheet	-
A0001	F	Project Summary	29/04/2022
A0002	B	Perspective 01 - Berry Road	29/04/2022
A0003	B	Perspective 02 - River Road	29/04/2022
A0004	B	Perspective 03 - Holdsworth Avenue	29/04/2022
A0005	A	Perspective 04 – Green Spine	29/04/2022
A0030	D	Context Plan	29/04/2022
A0031	C	Site Analysis	29/04/2022
A0032	D	Site Plan	29/04/2022
A0033	J	Demolition Plan	29/04/2022
A0095	J	Basement 04 (River Road Ground)	29/04/2022
A0096	K	Basement 03	29/04/2022
A0097	K	Basement 02	29/04/2022
A0098	K	Basement 01	29/04/2022
A0099	J	Basement Mezzanine	29/04/2022
A0100	K	Ground Floor Plan	29/04/2022
A0101	K	Level 01 Floor Plan	29/04/2022
A0102	K	Level 02 Floor Plan	29/04/2022
A0103	K	Level 03 Floor Plan	29/04/2022
A0104	K	Level 04 Floor Plan	29/04/2022
A0105	K	Level 05 Floor Plan	29/04/2022
A0106	K	Level 06 Floor Plan	29/04/2022
A0107	K	Level 07 Floor Plan	29/04/2022
A0108	K	Level 08 Floor Plan	29/04/2022
A0109	K	Level 09 Floor Plan	29/04/2022
A0110	J	Level Roof	29/04/2022
A0200	F	Elevation North	29/04/2022
A0201	F	Elevation East	29/04/2022
A0202	F	Elevation South	29/04/2022
A0203	F	Elevation West	29/04/2022
A0204	E	Green Spine West Elevation	29/04/2022
A0205	E	Green Spine East Elevation	29/04/2022
A0206	D	Green Spine North Elevation	29/04/2022

No.	Rev.	Title	Date
A0207	D	Green Spine South Elevation	29/04/2022
A0300	E	Site Section 01	29/04/2022
A0301	E	Site Section 02	29/04/2022
A0302	F	Site Section 03	29/04/2022
A0303	F	Site Section 04	29/04/2022
A0304	D	Site Sections 01 02 With Context	29/04/2022
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A0403	G	GFA Diagrams 2	29/04/2022
A0405	F	Cross Ventilation 01	29/04/2022
A0406	F	Cross Ventilation 02	29/04/2022
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A0410	F	Sun Eye Views 01 – June 21	29/04/2022
A0411	F	Sun Eye Views 02 – June 21	29/04/2022
A0412	F	Sun Eye Views 03 – June 21	29/04/2022
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A0460	G	Apt Type 1B A Adaptable	29/04/2022
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A0497	A	Shadows Diagram 02	29/04/2022
A0500	C	Materials Sample Board	29/04/2022

APPENDIX B NOISE MEASUREMENTS (GRAPHICAL)

Noise Monitor 1

11967 St Leonards South - East Quarter

PKA Acoustic Consulting

Project Address: 23 Holdsworth Avenue, St Leonards

Logger Location: At Western Boundary of 23 Holdsworth Avenue, Shielded from Traffic, Measuring Existing Ambient Noise Levels

		Background Noise Levels L_{A90} dB							Existing Noise Levels L_{Aeq} dB							
		Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00			Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00			
		Measured	Corrected	Measured	Corrected	Measured	Corrected		Measured	Corrected	Measured	Corrected	Measured	Corrected		Sunday or Public Holiday?
Tuesday	22/02/2022			39.5	39.0	39.0	37.9	Tuesday	22/02/2022			56.2	**45.6**	53.8	**44.7**	
Wednesday	23/02/2022	43.3	43.4	41.0	40.9	41.4	41.5	Wednesday	23/02/2022	52.5	52.2	60.3	**48.8**	50.0	**47.9**	
Thursday	24/02/2022	41.8	41.6	39.6	39.8	42.0	41.9	Thursday	24/02/2022	50.5	50.1	52.3	**47.0**	52.8	51.0	
Friday	25/02/2022	41.9	41.8	41.0	40.8	39.8	39.6	Friday	25/02/2022	51.6	51.2	53.6	**50.5**	52.0	**47.8**	
Saturday	26/02/2022	39.9	39.9	38.7	38.5	33.8	33.7	Saturday	26/02/2022	50.7	**46.9**	52.8	**46.1**	43.7	**40.6**	
Sunday	27/02/2022	37.5	37.5	38.1	38.3	35.6	**37.9**	Sunday	27/02/2022	43.3	43.3	51.8	**44.2**	46.4	45.5	Y
Monday	28/02/2022	42.6	42.5	39.9	39.7	39.5	39.5	Monday	28/02/2022	48.6	46.8	49.9	**44.8**	48.5	46.7	
Tuesday	1/03/2022							Tuesday	1/03/2022							
Rating Background Level (RBL)		**42**	**42**	**40**	**40**	**40**	**40**	**Average Noise Level (L_{Aeq})**		**50**	**49**	**55**	**47**	**51**	**47**	

11967 St Leonards South - East Quarter

PKA Acoustic Consulting

Project Address: 23 Holdsworth Avenue, St Leonards

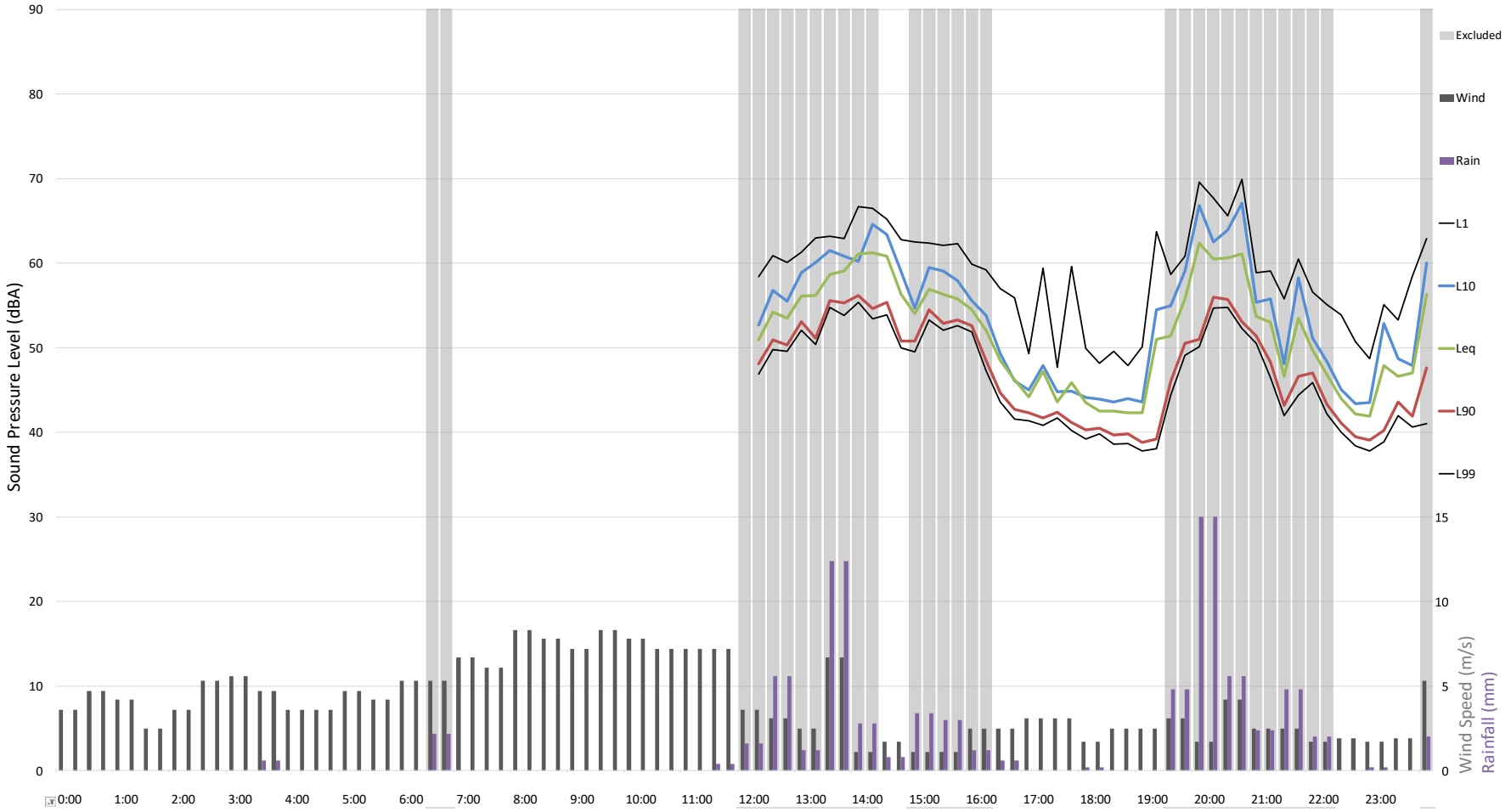
Logger Location: At Western Boundary of 23 Holdsworth Avenue, Shielded from Traffic, Measuring Existing Ambient Nois

BOM weather data: Sydney - Observatory Hill IDN60901

	Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00	
	Measured	Corrected	Measured	Corrected	Measured	Corrected
L_{Aeq} dB			56.2	45.6	53.8	44.7
L_{A90} dB			39.5	39.0	39.0	37.9

22/02/2022 Tuesday

Existing Ambient Noise Levels (dBA)



11967 St Leonards South - East Quarter

PKA Acoustic Consulting

Project Address: 23 Holdsworth Avenue, St Leonards

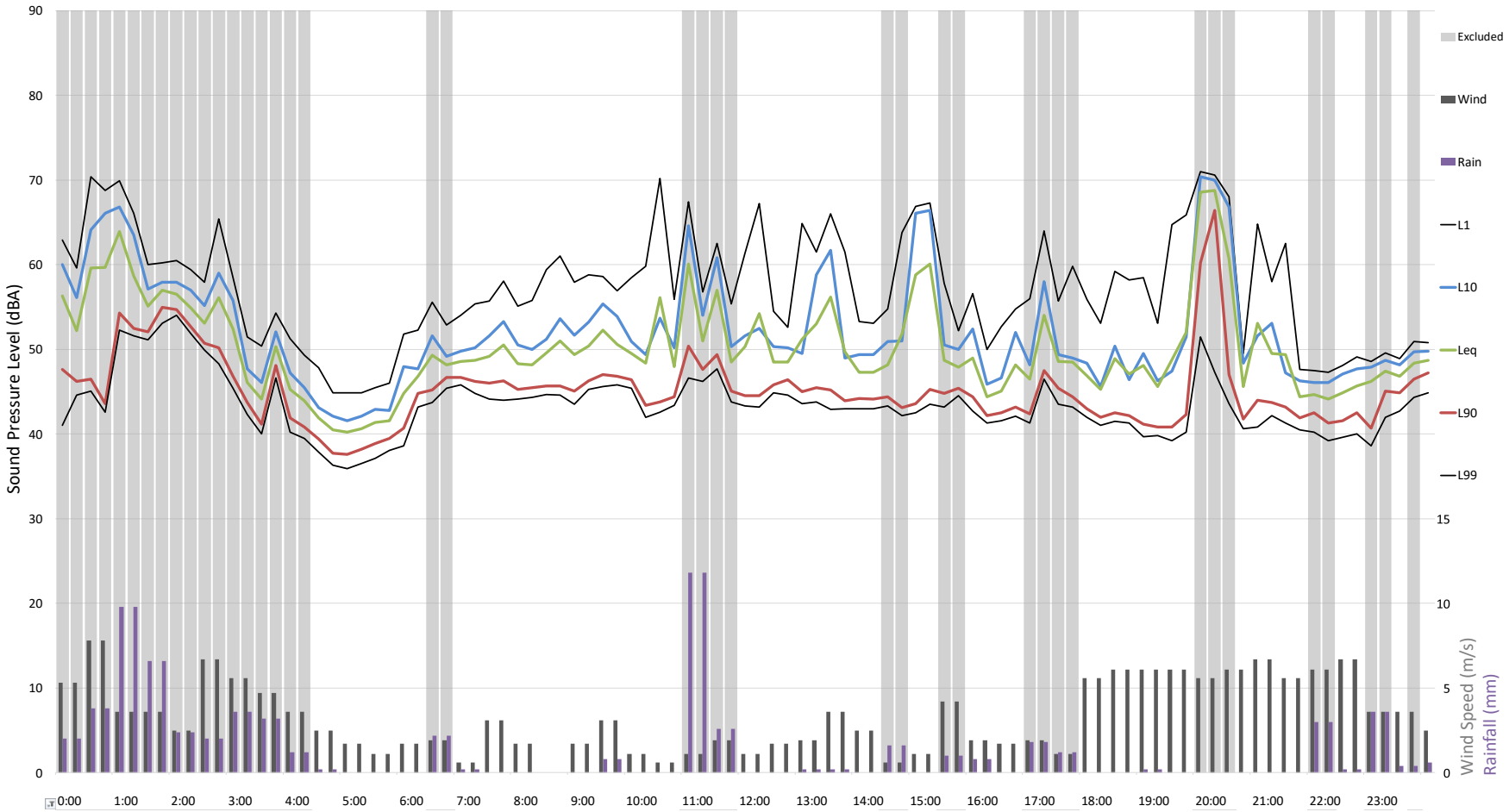
Logger Location: At Western Boundary of 23 Holdsworth Avenue, Shielded from Traffic, Measuring Existing Ambient Nois

BOM weather data: Sydney - Observatory Hill IDN60901

	Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00	
	Measured	Corrected	Measured	Corrected	Measured	Corrected
L_{Aeq} dB	52.5	52.2	60.3	**48.8**	50.0	**47.9**
L_{A90} dB	43.3	43.4	41.0	40.9	41.4	41.5

23/02/2022 Wednesday

Existing Ambient Noise Levels (dBA)



11967 St Leonards South - East Quarter

PKA Acoustic Consulting

Project Address: 23 Holdsworth Avenue, St Leonards

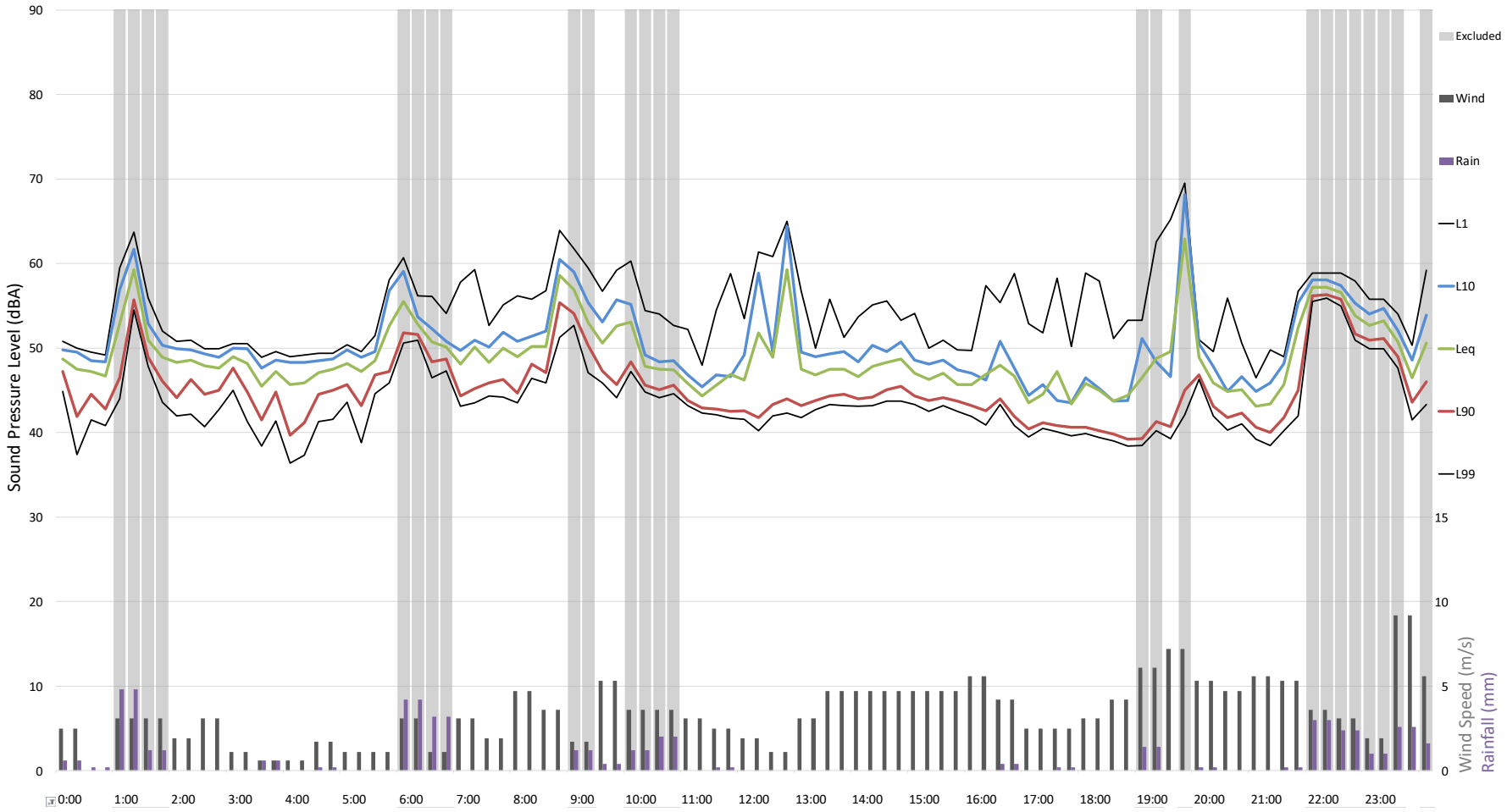
Logger Location: At Western Boundary of 23 Holdsworth Avenue, Shielded from Traffic, Measuring Existing Ambient Nois

BOM weather data: Sydney - Observatory Hill IDN60901

	Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00	
	Measured	Corrected	Measured	Corrected	Measured	Corrected
L_{Aeq} dB	50.5	50.1	52.3	**47.0**	52.8	51.0
L_{A90} dB	41.8	41.6	39.6	39.8	42.0	41.9

24/02/2022 Thursday

Existing Ambient Noise Levels (dBA)



11967 St Leonards South - East Quarter

PKA Acoustic Consulting

Project Address: 23 Holdsworth Avenue, St Leonards

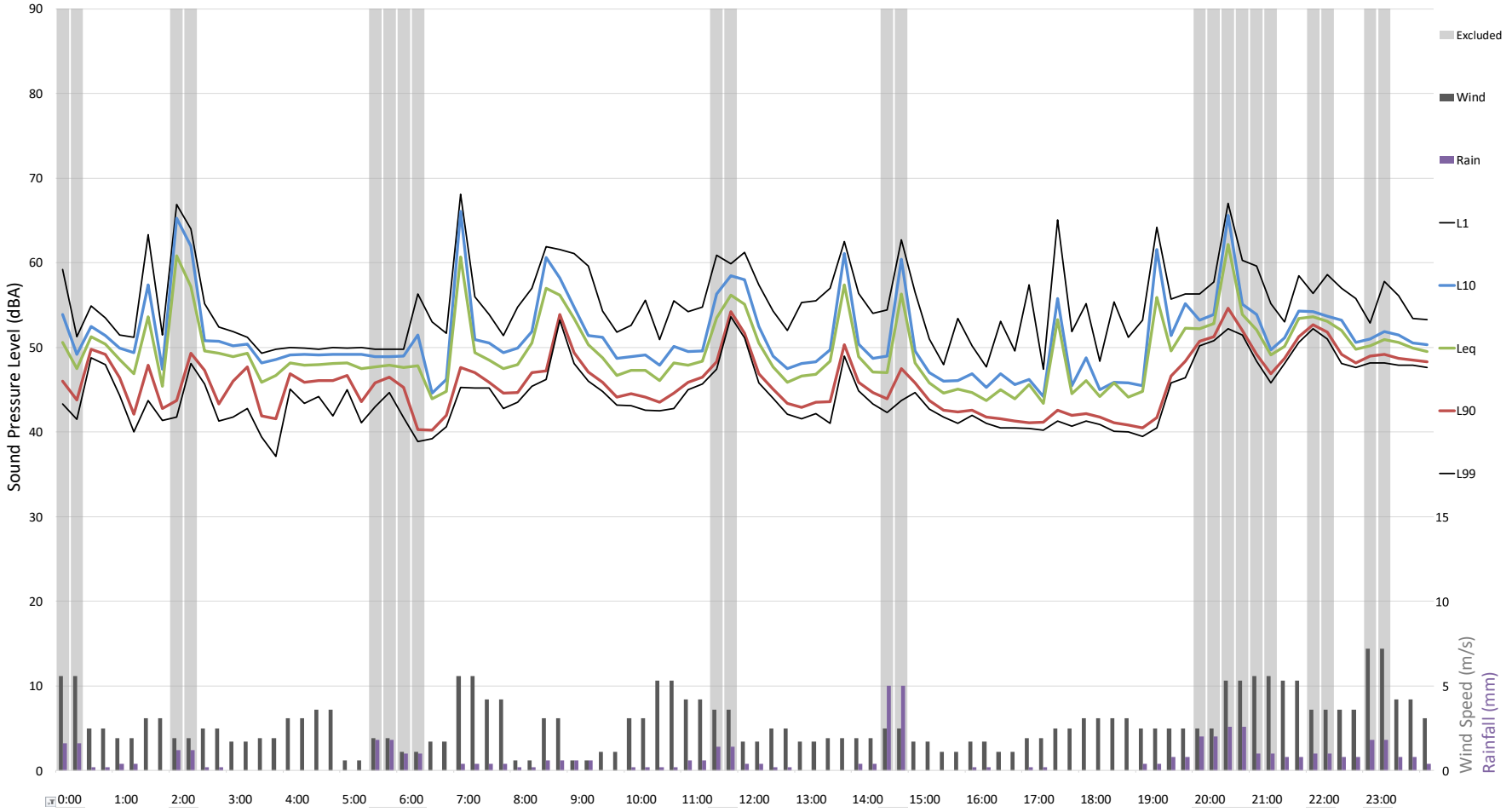
Logger Location: At Western Boundary of 23 Holdsworth Avenue, Shielded from Traffic, Measuring Existing Ambient Nois

BOM weather data: Sydney - Observatory Hill IDN60901

	Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00	
	Measured	Corrected	Measured	Corrected	Measured	Corrected
L_{Aeq} dB	51.6	51.2	53.6	**50.5**	52.0	**47.8**
L_{A90} dB	41.9	41.8	41.0	40.8	39.8	39.6

25/02/2022 Friday

Existing Ambient Noise Levels (dBA)



11967 St Leonards South - East Quarter

PKA Acoustic Consulting

Project Address: 23 Holdsworth Avenue, St Leonards

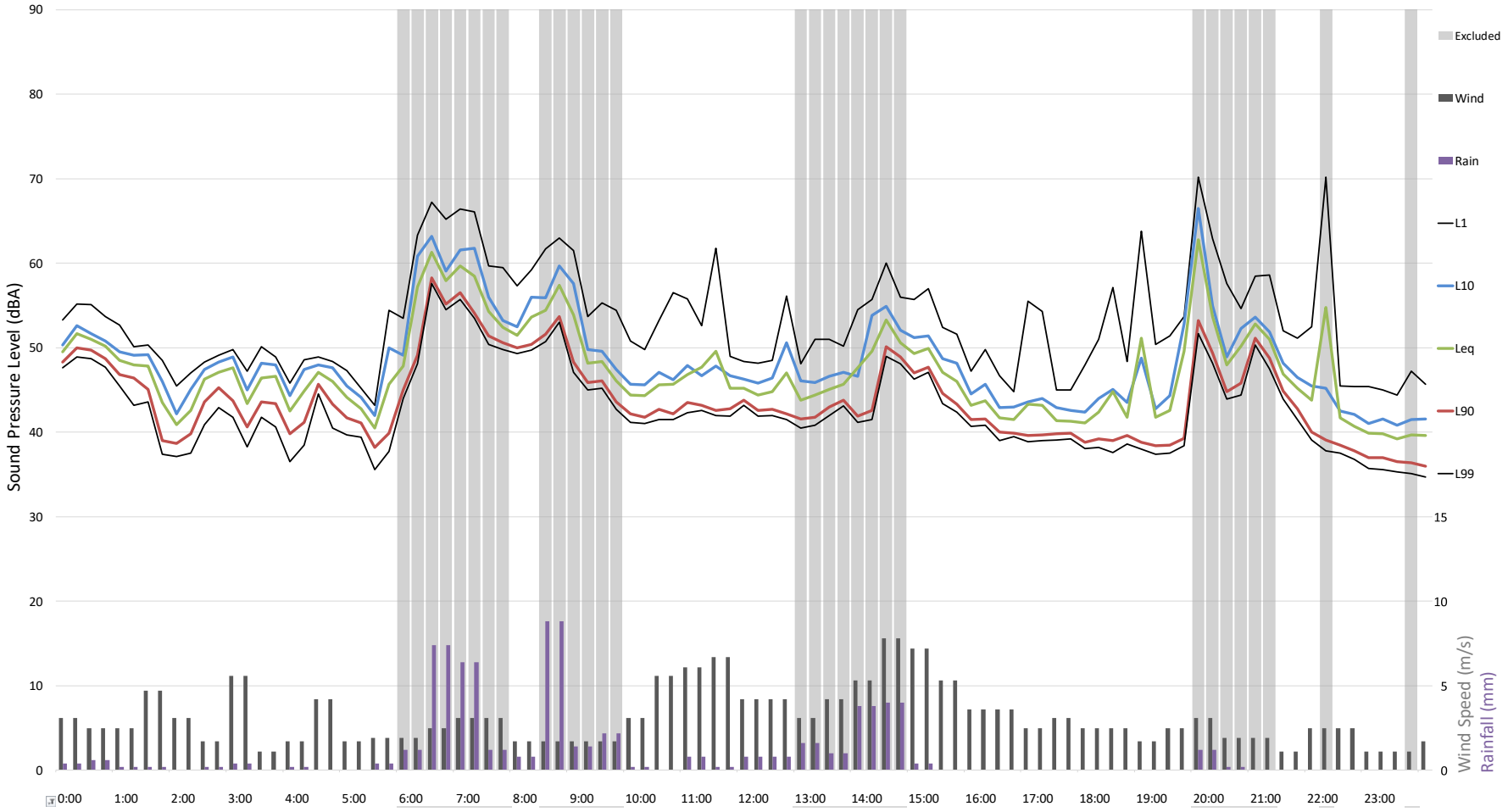
Logger Location: At Western Boundary of 23 Holdsworth Avenue, Shielded from Traffic, Measuring Existing Ambient Nois

BOM weather data: Sydney - Observatory Hill IDN60901

	Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00	
	Measured	Corrected	Measured	Corrected	Measured	Corrected
L_{Aeq} dB	50.7	**46.9**	52.8	**46.1**	43.7	**40.6**
L_{A90} dB	39.9	39.9	38.7	38.5	33.8	33.7

26/02/2022 Saturday

Existing Ambient Noise Levels (dBA)



11967 St Leonards South - East Quarter

Project Address: 23 Holdsworth Avenue, St Leonards

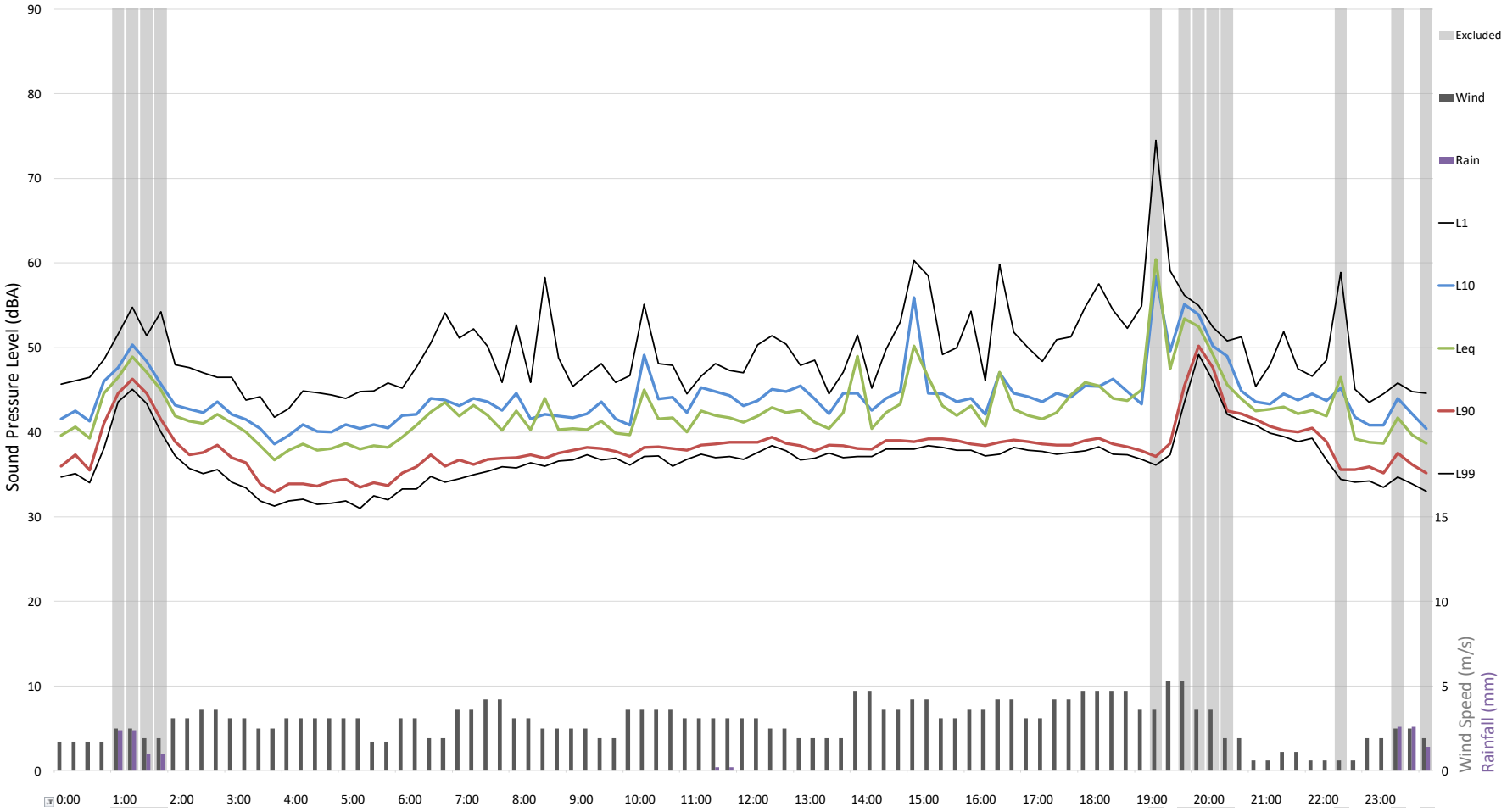
Logger Location: At Western Boundary of 23 Holdsworth Avenue, Shielded from Traffic, Measuring Existing Ambient Nois

BOM weather data: Sydney - Observatory Hill IDN60901

	Daytime 08:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 08:00	
	Measured	Corrected	Measured	Corrected	Measured	Corrected
L_{Aeq} dB	43.3	43.3	51.8	**44.2**	46.4	45.5
L_{A90} dB	37.5	37.5	38.1	38.3	35.6	**37.9**

27/02/2022 Sunday

Existing Ambient Noise Levels (dBA)



11967 St Leonards South - East Quarter

PKA Acoustic Consulting

Project Address: 23 Holdsworth Avenue, St Leonards

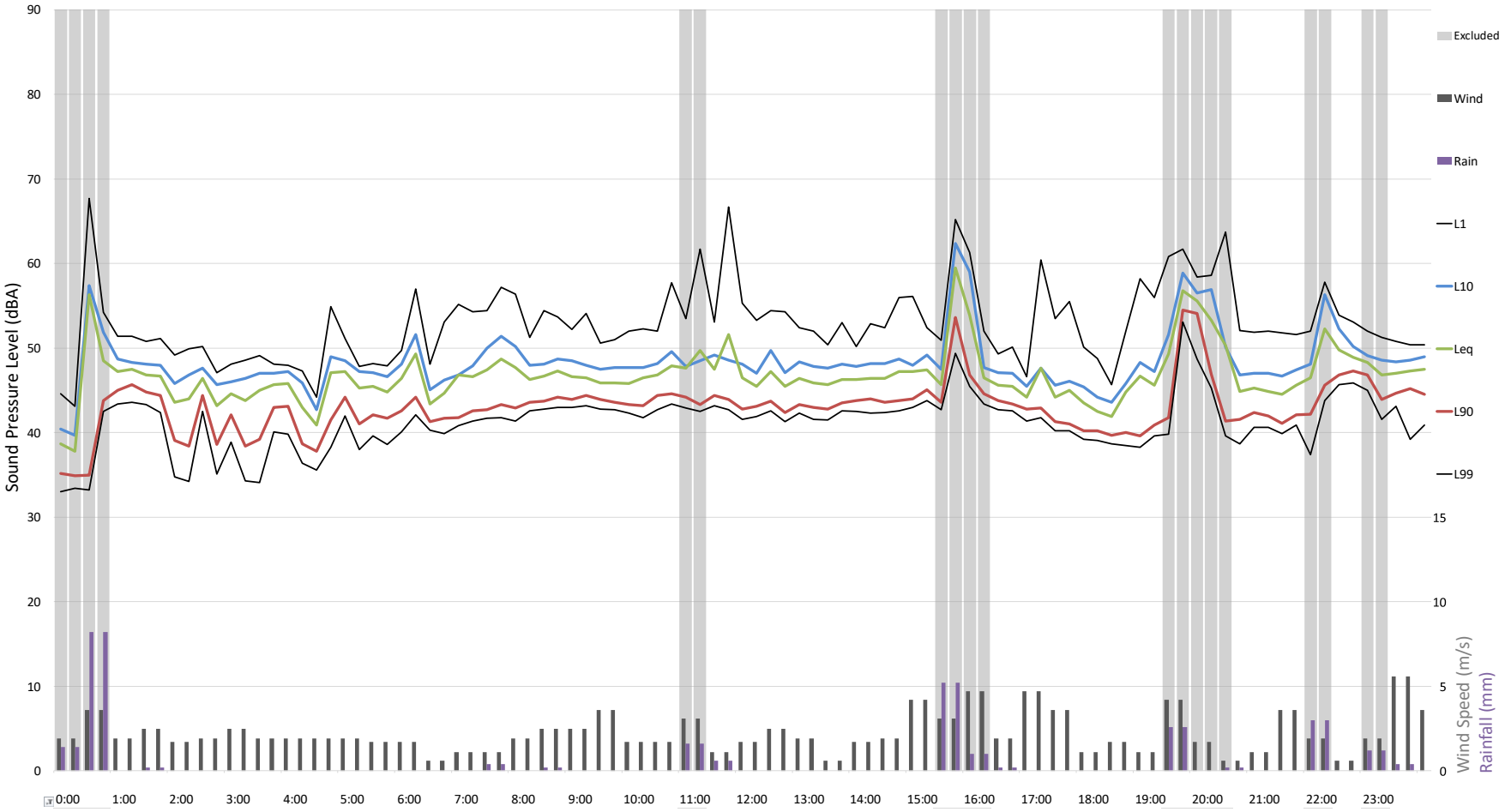
Logger Location: At Western Boundary of 23 Holdsworth Avenue, Shielded from Traffic, Measuring Existing Ambient Nois

BOM weather data: Sydney - Observatory Hill IDN60901

	Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00	
	Measured	Corrected	Measured	Corrected	Measured	Corrected
L_{Aeq} dB	48.6	46.8	49.9	**44.8**	48.5	46.7
L_{A90} dB	42.6	42.5	39.9	39.7	39.5	39.5

28/02/2022 Monday

Existing Ambient Noise Levels (dBA)



11967 St Leonards South - East Quarter

PKA Acoustic Consulting

Project Address: 23 Holdsworth Avenue, St Leonards

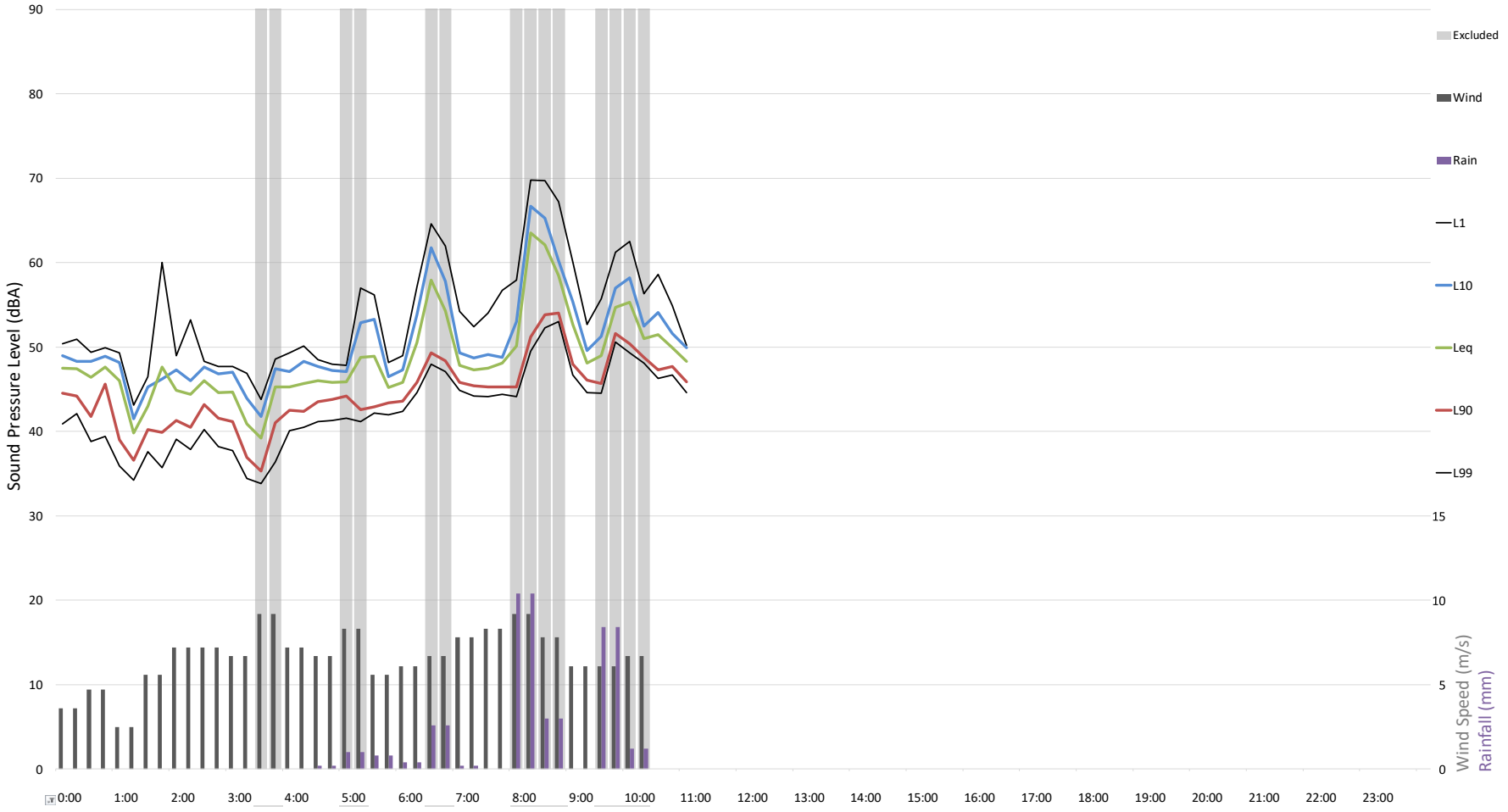
Logger Location: At Western Boundary of 23 Holdsworth Avenue, Shielded from Traffic, Measuring Existing Ambient Nois

	Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00	
	Measured	Corrected	Measured	Corrected	Measured	Corrected
L_{Aeq} dB						
L_{A90} dB						

BOM weather data: Sydney - Observatory Hill IDN60901

1/03/2022 Tuesday

Existing Ambient Noise Levels (dBA)



Noise Monitor 2 (Uncorrected for Façade Reflection)

11967 St Leonards South - East Quarter

Project Address: 46 River Road St Leonards

Logger Location: At 46 River Road Directly Facing the Main Road Measuring Existing Traffic Noise Levels

		Existing Noise Levels dB									
		Leq 15hr		Leq 9hr		L10 18hr	Day Leq 1hr	Night Leq 1hr			
		07:00 - 22:00		22:00 - 07:00		07:00 - 00:00	07:00 - 22:00	22:00 - 07:00			
		7:00		22:00		7:00	7:00	22:00			
		22:00		7:00		0:00	22:00	7:00			
Descriptor		Leq		Leq		L10	Leq 1hr	Leq 1hr			Sunday or Public Holiday?
		Measured	Corrected	Measured	Corrected	Measured	Measured	Measured			
Tuesday	22/02/2022			63.2	64.3	73.8		69.3			
Wednesday	23/02/2022	69.5	69.0	63.1	61.2	73.5	70.4	67.1			
Thursday	24/02/2022	69.1	69.1	63.5	62.9	73.0	70.2	66.4			
Friday	25/02/2022	69.6	69.7	62.7	**60.5**	73.5	70.6	61.3			
Saturday	26/02/2022	68.9	68.8	61.9	61.9	73.0	69.9	64.5			
Sunday	27/02/2022	67.6	67.4	62.0	62.5	72.0	68.5	68.5			Y
Monday	28/02/2022	68.7	68.5	63.4	62.0	73.0	69.8	65.8			
Tuesday	1/03/2022					74.5					
Average Noise Level		**69**	**69**	**63**	**62**	**73**	**70**	**67**			

11967 St Leonards South - East Quarter

PKA Acoustic Consulting

Project Address: 46 River Road St Leonards

Logger Location: At 46 River Road Directly Facing the Main Road Measuring Existing Traffic Noise Levels

		Background Noise Levels L_{A90} dB						Existing Noise Levels L_{Aeq} dB						
		Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00		Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00		Sunday or Public Holiday?
		Measured	Corrected	Measured	Corrected	Measured	Corrected	Measured	Corrected	Measured	Corrected	Measured	Corrected	
Tuesday	22/02/2022			53.2	**55.8**	43.8	42.9			68.2	68.6	63.2	64.3	
Wednesday	23/02/2022	58.1	57.6	54.0	53.8	41.3	41.2	69.6	69.3	69.1	67.9	63.1	61.2	
Thursday	24/02/2022	56.9	56.8	51.9	51.2	41.5	41.3	69.4	69.3	68.2	68.0	63.5	62.9	
Friday	25/02/2022	58.3	58.3	54.3	54.4	41.5	41.3	70.0	70.0	68.1	68.7	62.7	**60.5**	
Saturday	26/02/2022	57.0	57.0	52.4	52.4	41.1	41.0	69.4	69.5	67.3	67.2	61.9	61.9	
Sunday	27/02/2022	51.9	51.9	50.4	50.2	39.9	40.0	68.1	68.1	66.7	**64.7**	63.4	64.0	Y
Monday	28/02/2022	55.5	55.5	49.1	48.9	40.3	40.3	69.1	68.9	67.5	67.4	63.4	62.0	
Tuesday	1/03/2022													
Rating Background Level (RBL)		**57**	**57**	**52**	**52**	**41**	**41**	**Average Noise Level (L_{Aeq})**		**69**	**69**	**68**	**68**	**63**	**63**	

11967 St Leonards South - East Quarter

PKA Acoustic Consulting

Project Address: 46 River Road St Leonards

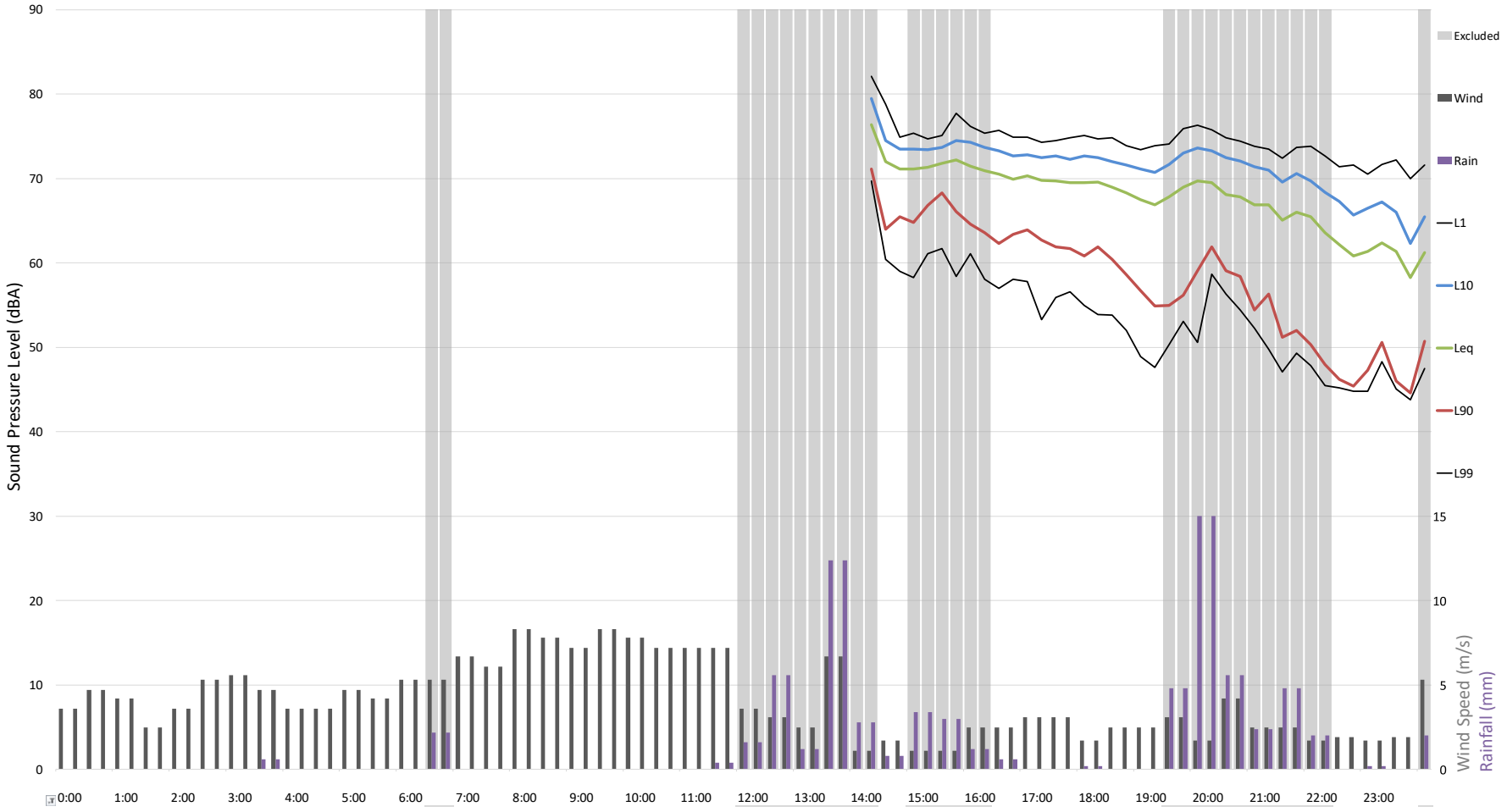
Logger Location: At 46 River Road Directly Facing the Main Road Measuring Existing Traffic Noise Levels

BOM weather data: Sydney - Observatory Hill IDN60901

	Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00	
	Measured	Corrected	Measured	Corrected	Measured	Corrected
L_{Aeq} dB			68.2	68.6	63.2	64.3
L_{A90} dB			53.2	**55.8**	43.8	42.9

22/02/2022 Tuesday

Existing Ambient Noise Levels (dBA)



11967 St Leonards South - East Quarter

PKA Acoustic Consulting

Project Address: 46 River Road St Leonards

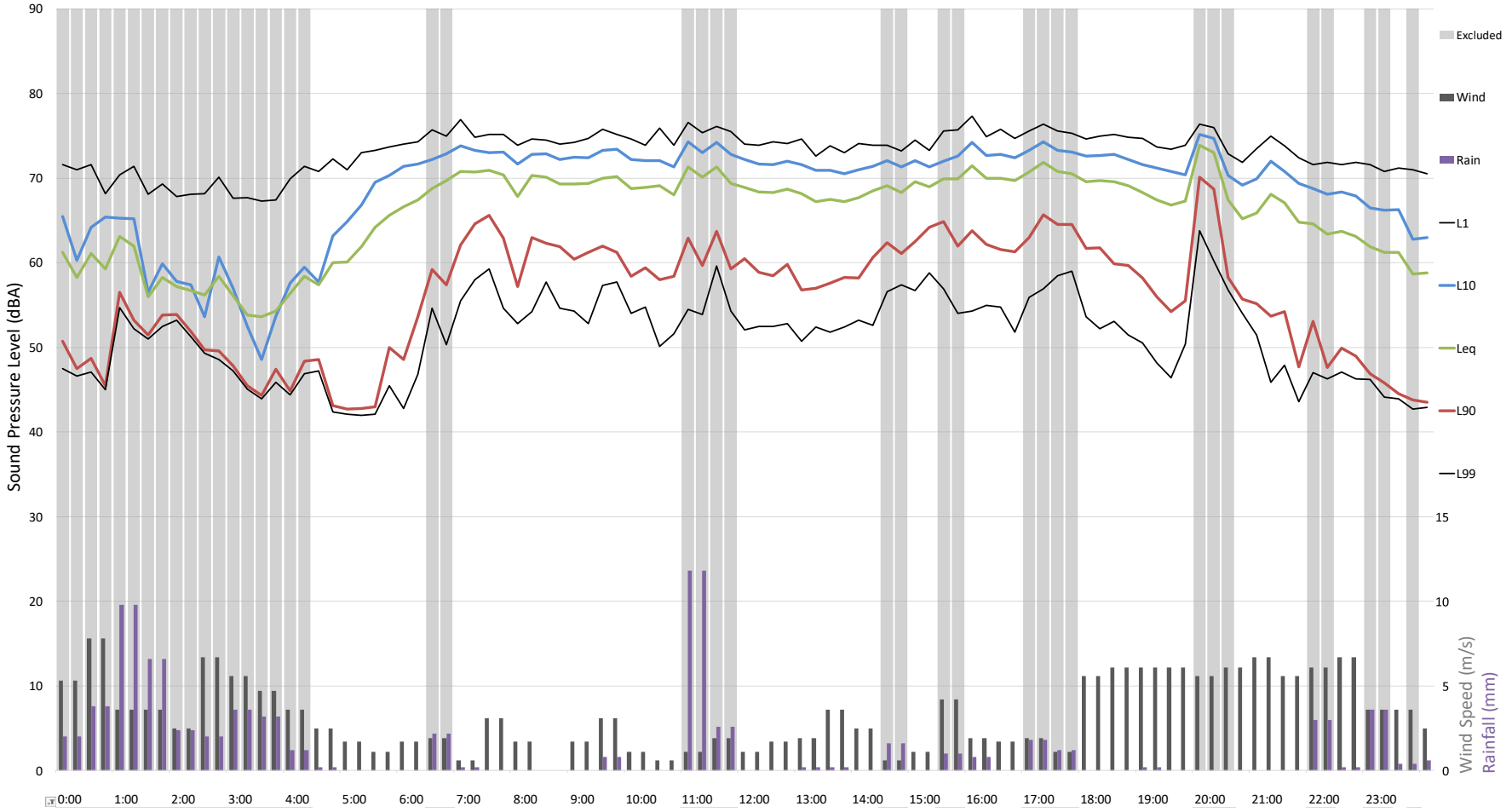
Logger Location: At 46 River Road Directly Facing the Main Road Measuring Existing Traffic Noise Levels

BOM weather data: Sydney - Observatory Hill IDN60901

	Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00	
	Measured	Corrected	Measured	Corrected	Measured	Corrected
L_{Aeq} dB	69.6	69.3	69.1	67.9	63.1	61.2
L_{A90} dB	58.1	57.6	54.0	53.8	41.3	41.2

23/02/2022 Wednesday

Existing Ambient Noise Levels (dBA)



11967 St Leonards South - East Quarter

PKA Acoustic Consulting

Project Address: 46 River Road St Leonards

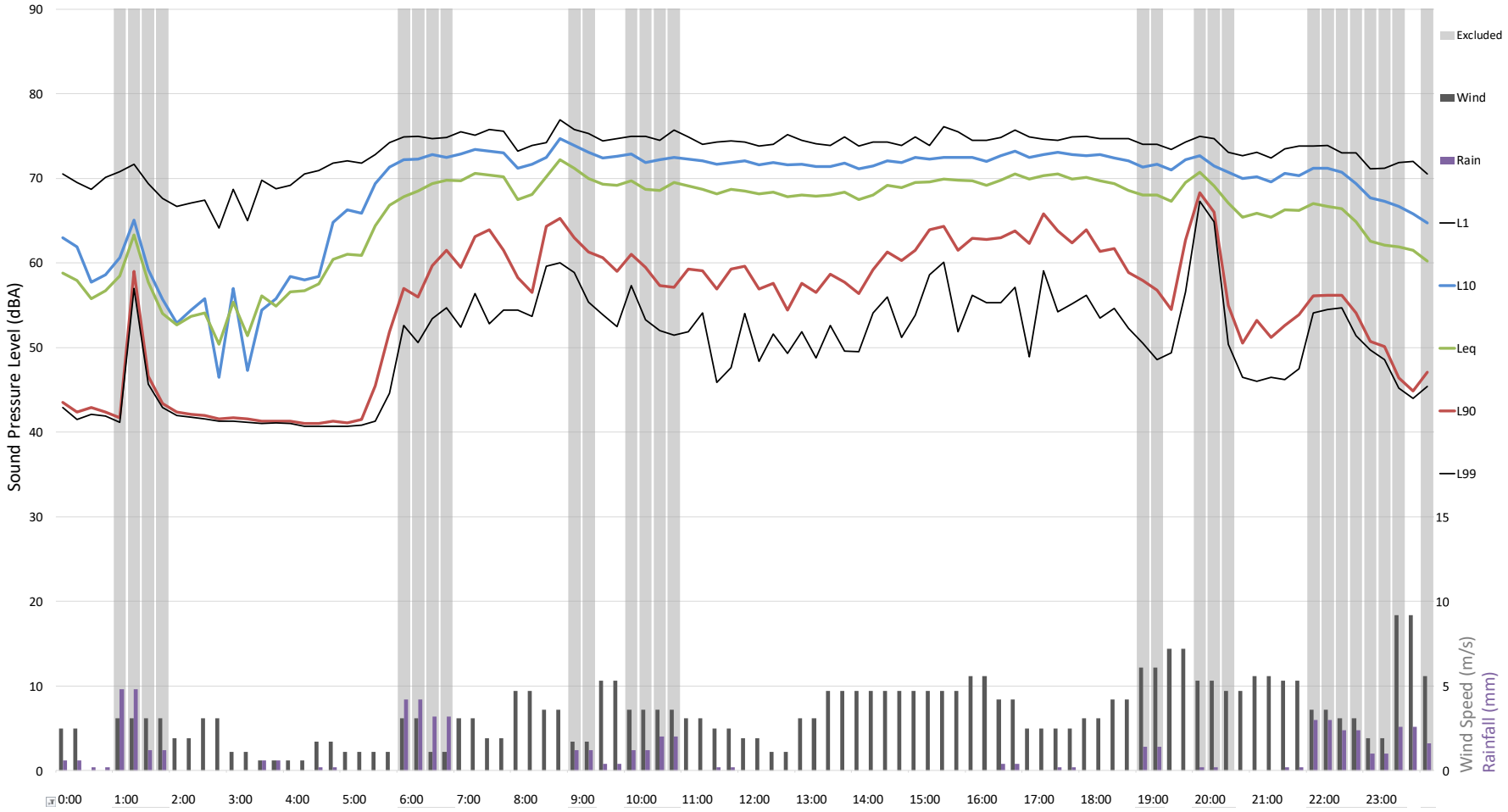
Logger Location: At 46 River Road Directly Facing the Main Road Measuring Existing Traffic Noise Levels

BOM weather data: Sydney - Observatory Hill IDN60901

	Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00	
	Measured	Corrected	Measured	Corrected	Measured	Corrected
L_{Aeq} dB	69.4	69.3	68.2	68.0	63.5	62.9
L_{A90} dB	56.9	56.8	51.9	51.2	41.5	41.3

24/02/2022 Thursday

Existing Ambient Noise Levels (dBA)



11967 St Leonards South - East Quarter

PKA Acoustic Consulting

Project Address: 46 River Road St Leonards

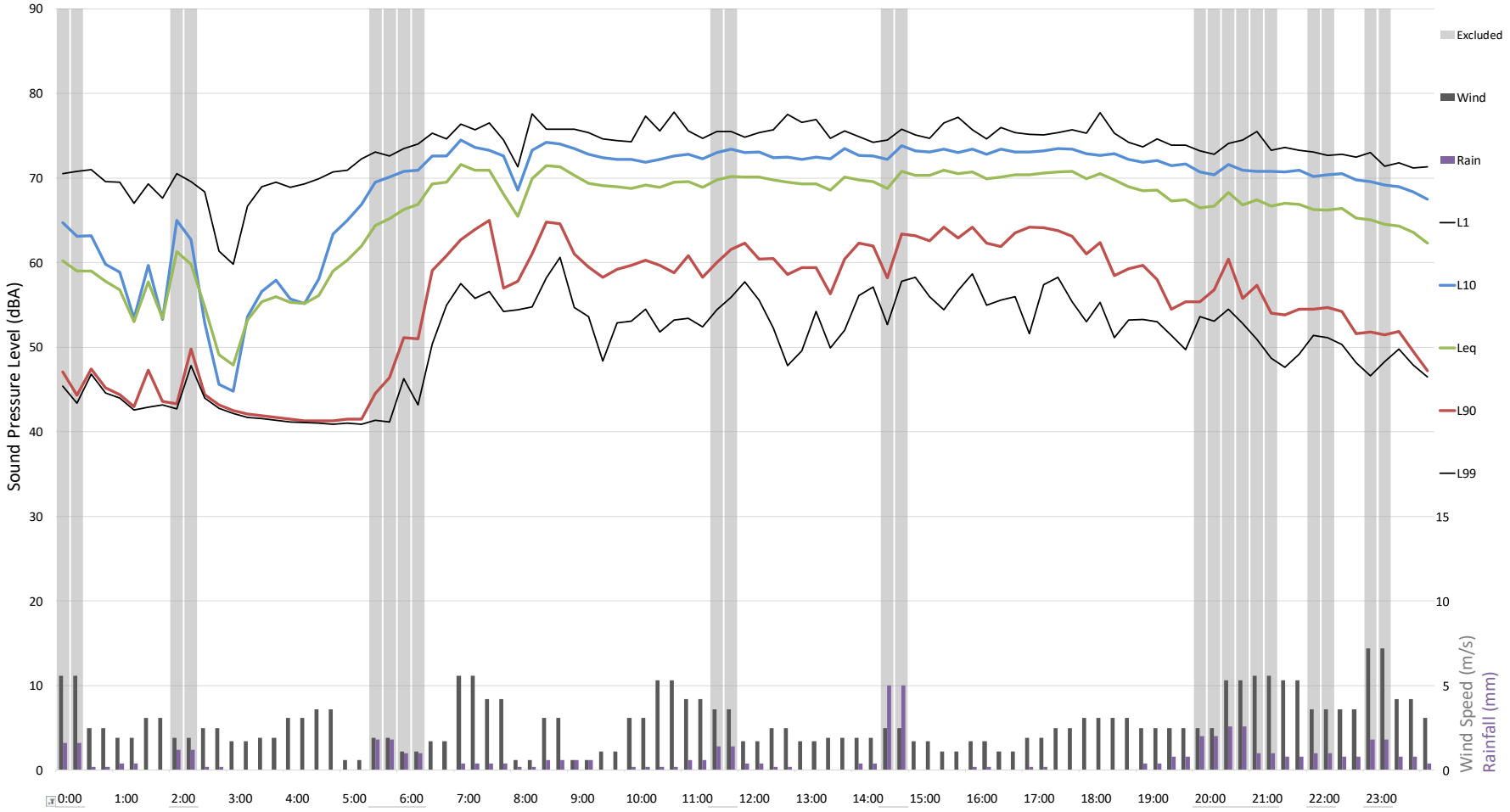
Logger Location: At 46 River Road Directly Facing the Main Road Measuring Existing Traffic Noise Levels

BOM weather data: Sydney - Observatory Hill IDN60901

	Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00	
	Measured	Corrected	Measured	Corrected	Measured	Corrected
L_{Aeq} dB	70.0	70.0	68.1	68.7	62.7	**60.5**
L_{A90} dB	58.3	58.3	54.3	54.4	41.5	41.3

25/02/2022 Friday

Existing Ambient Noise Levels (dBA)



11967 St Leonards South - East Quarter

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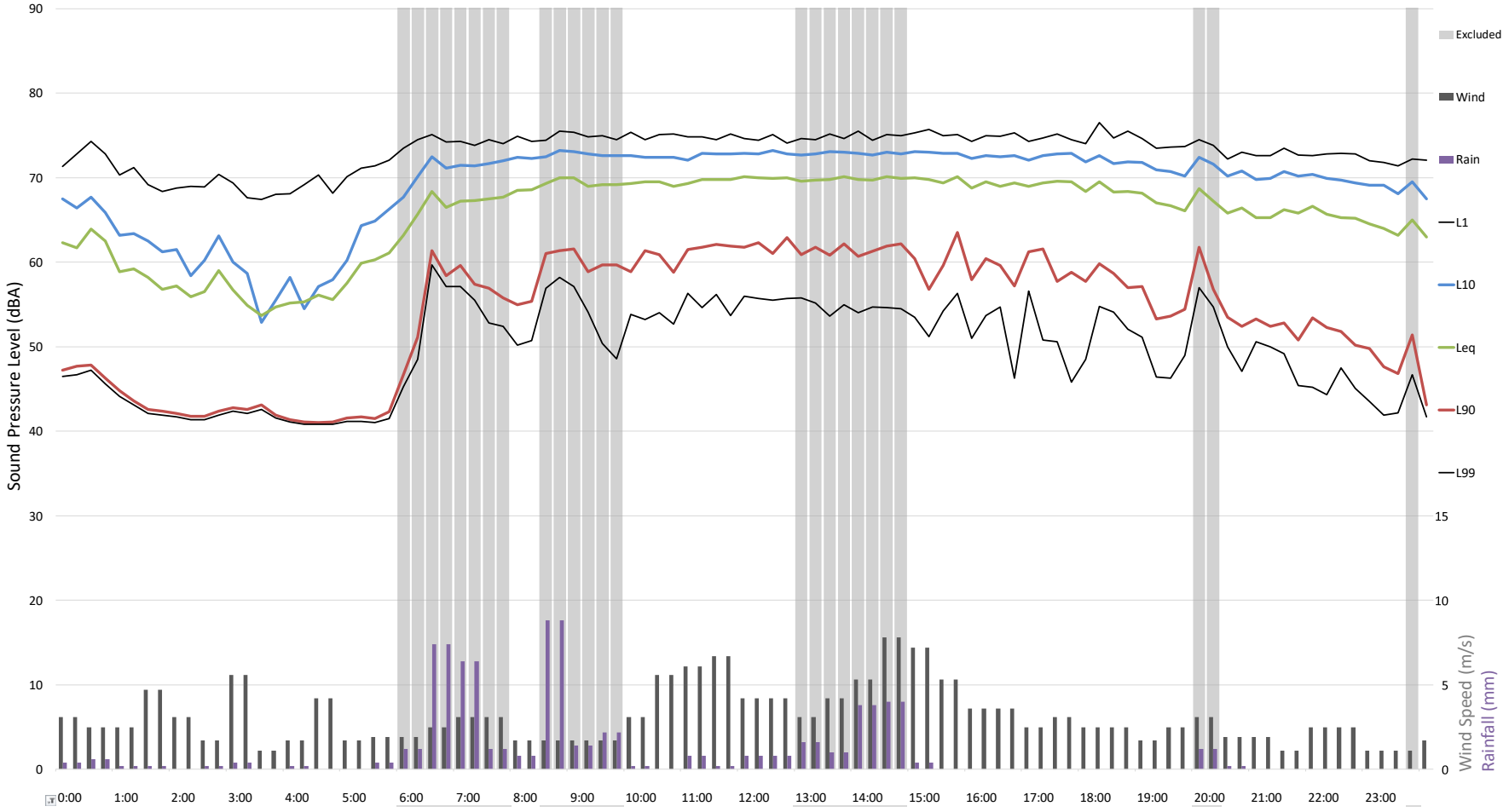
Logger Location: At 46 River Road Directly Facing the Main Road Measuring Existing Traffic Noise Levels

BOM weather data: Sydney - Observatory Hill IDN60901

	Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00	
	Measured	Corrected	Measured	Corrected	Measured	Corrected
L_{Aeq} dB	69.4	69.5	67.3	67.2	61.9	61.9
L_{A90} dB	57.0	57.0	52.4	52.4	41.1	41.0

26/02/2022 Saturday

Existing Ambient Noise Levels (dBA)



11967 St Leonards South - East Quarter

Project Address: 46 River Road St Leonards

Logger Location: At 46 River Road Directly Facing the Main Road Measuring Existing Traffic Noise Levels

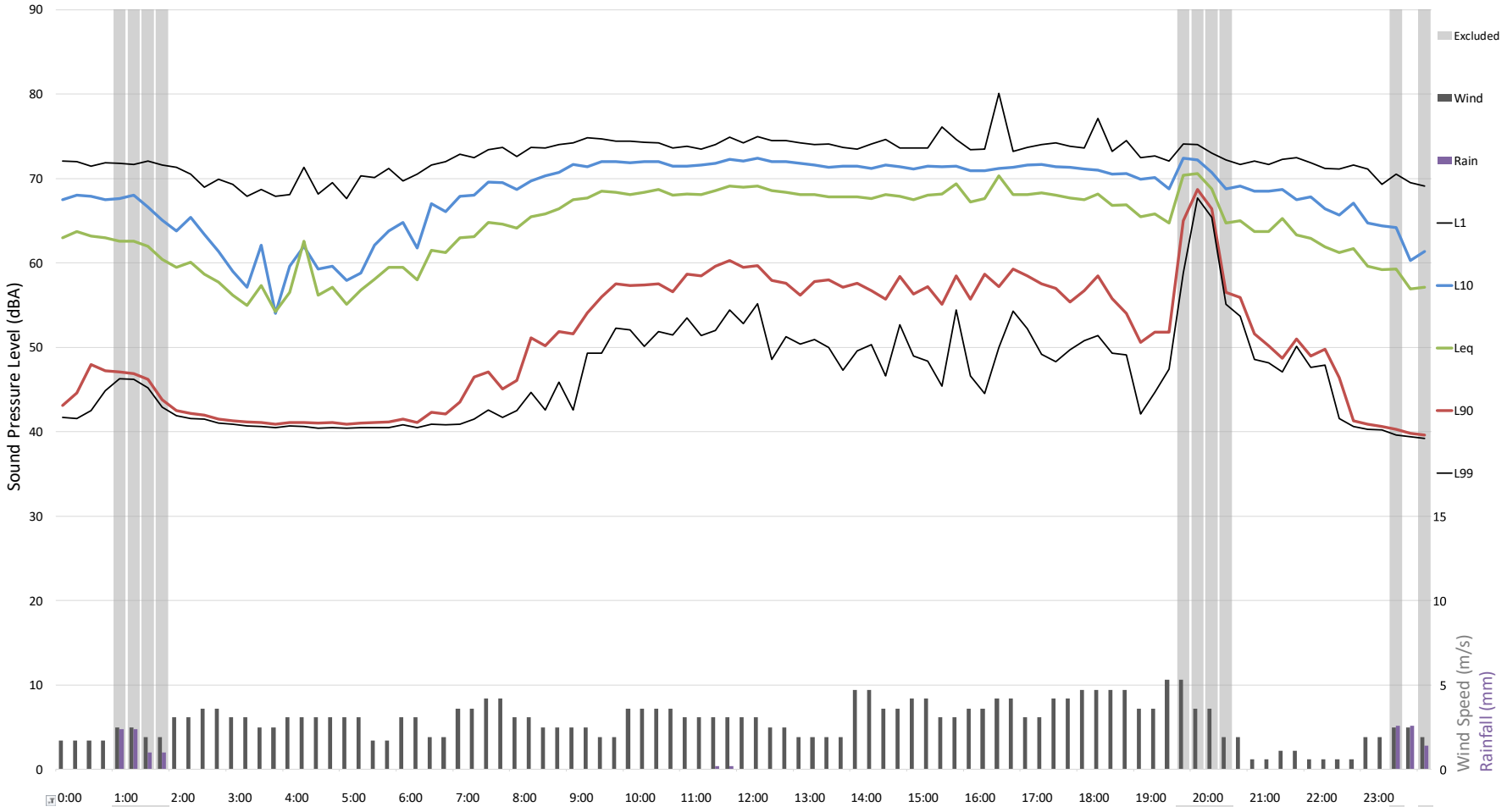
BOM weather data: Sydney - Observatory Hill IDN60901

PKA Acoustic Consulting

	Daytime 08:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 08:00	
	Measured	Corrected	Measured	Corrected	Measured	Corrected
L_{Aeq} dB	68.1	68.1	66.7	**64.7**	63.4	64.0
L_{A90} dB	51.9	51.9	50.4	50.2	39.9	40.0

27/02/2022 Sunday

Existing Ambient Noise Levels (dBA)



11967 St Leonards South - East Quarter

Project Address: 46 River Road St Leonards

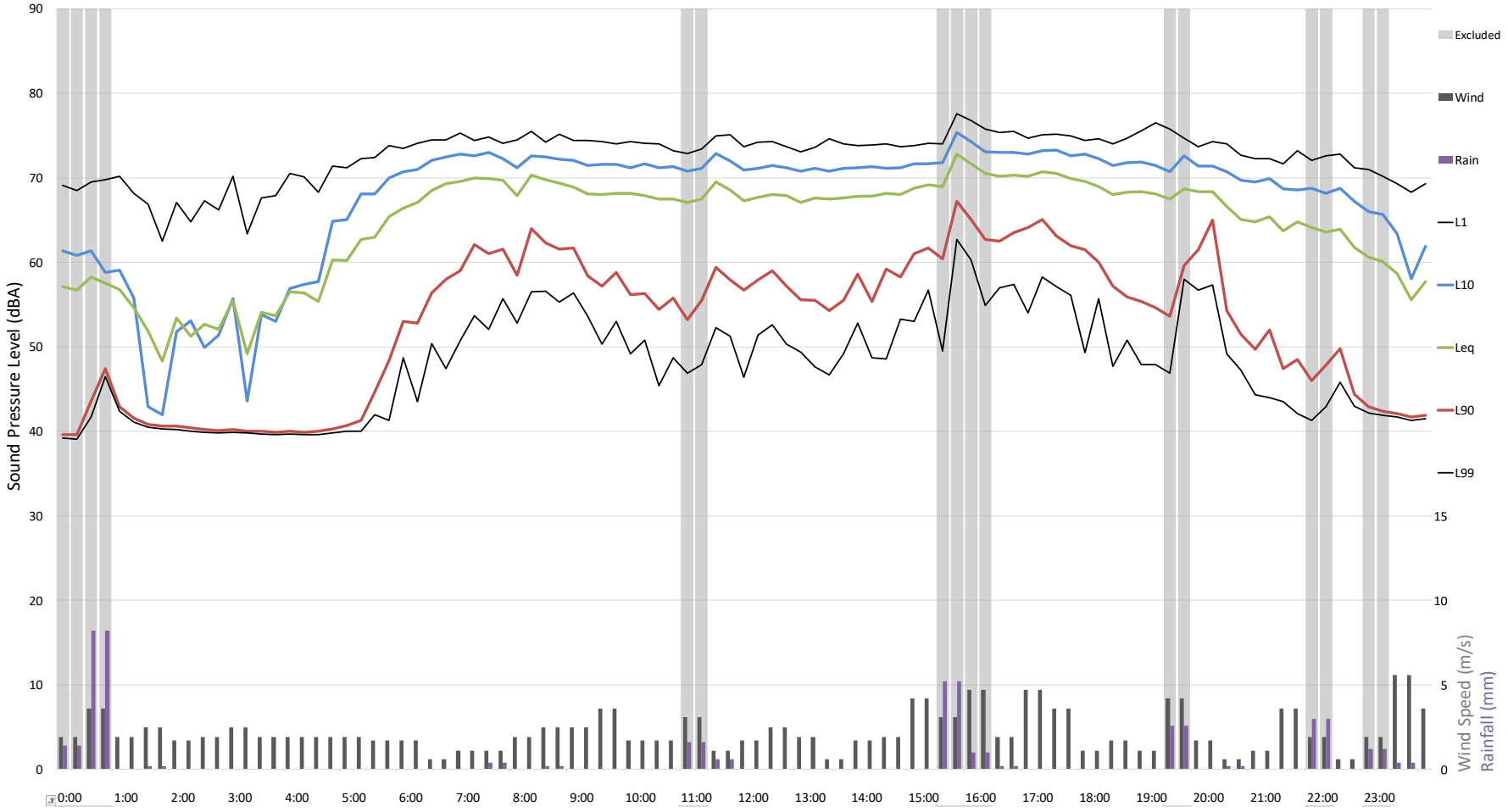
Logger Location: At 46 River Road Directly Facing the Main Road Measuring Existing Traffic Noise Levels

BOM weather data: Sydney - Observatory Hill IDN60901

	Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00	
	Measured	Corrected	Measured	Corrected	Measured	Corrected
L_{Aeq} dB	69.1	68.9	67.5	67.4	63.4	62.0
L_{A90} dB	55.5	55.5	49.1	48.9	40.3	40.3

28/02/2022 Monday

Existing Ambient Noise Levels (dBA)



11967 St Leonards South - East Quarter

Project Address: 46 River Road St Leonards

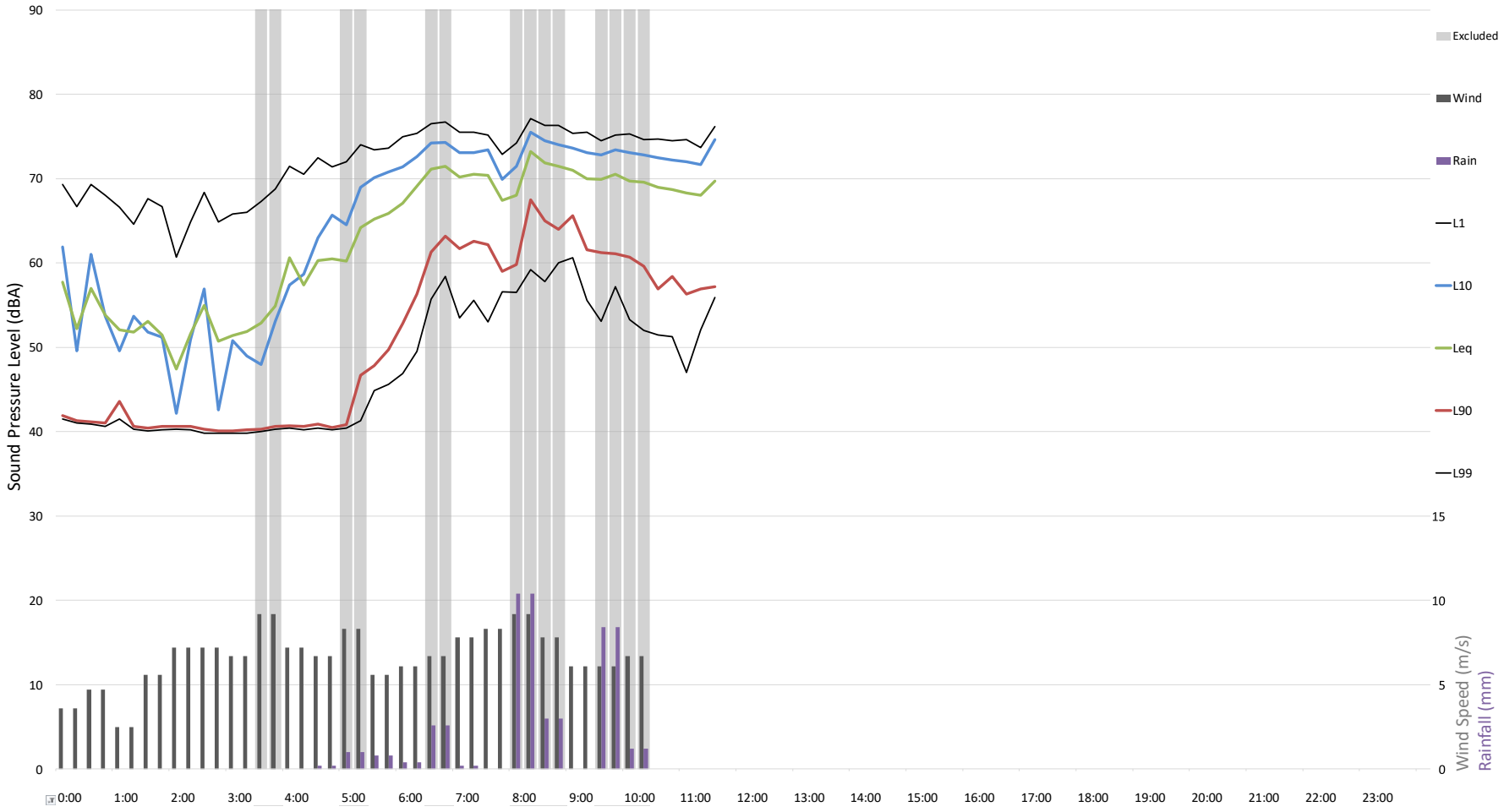
Logger Location: At 46 River Road Directly Facing the Main Road Measuring Existing Traffic Noise Levels

BOM weather data: Sydney - Observatory Hill IDN60901

	Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00	
	Measured	Corrected	Measured	Corrected	Measured	Corrected
L_{Aeq} dB						
L_{A90} dB						

1/03/2022 Tuesday

Existing Ambient Noise Levels (dBA)



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