PLANT NOISE ASSESSMENT

Maitland Christian School Extension (Resources Centre)

ID: 11820-2 R01v2

18 February 2022

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This firm is a member of the Association of Australian Acoustical Consultants.

The work reported herein has been carried out in accordance with the terms of membership. We stress that the advice given herein is for acoustic purposes only, and that the relevant authorities should be consulted with regard to compliance with regulations governing areas other than acoustics.

1.0 INTRODUCTION

PKA has been engaged to conduct an acoustic assessment for the proposed plant and equipment pertaining to the Maitland Christian School Extension to the existing school premises located at 75 – 81 Chelmsford Drive, Metford as part of the DA documentation to be determine the likely noise impact on nearby residential receivers.

This report will address the noise breakout from the proposed plant and equipment to sensitive receivers and relevant acoustic treatment and management measures that will need to be incorporated to meet the relevant acoustic criteria from the proposed equipment serving the new MCS Building.

2.0 SUMMARY

An acoustic assessment has been conducted in accordance with the acoustic requirements of the Maitland City Council and NSW EPA Noise Policy for Industry (NPfI) to assess the noise breakout for the proposed development and to set noise goals for future operation and mechanical plant.

Existing background noise was measured for 7 days to establish background noise levels. Following the measurement results, the noise impact was calculated to the nearest sensitive receivers based on architectural and operational plans provided to PKA.

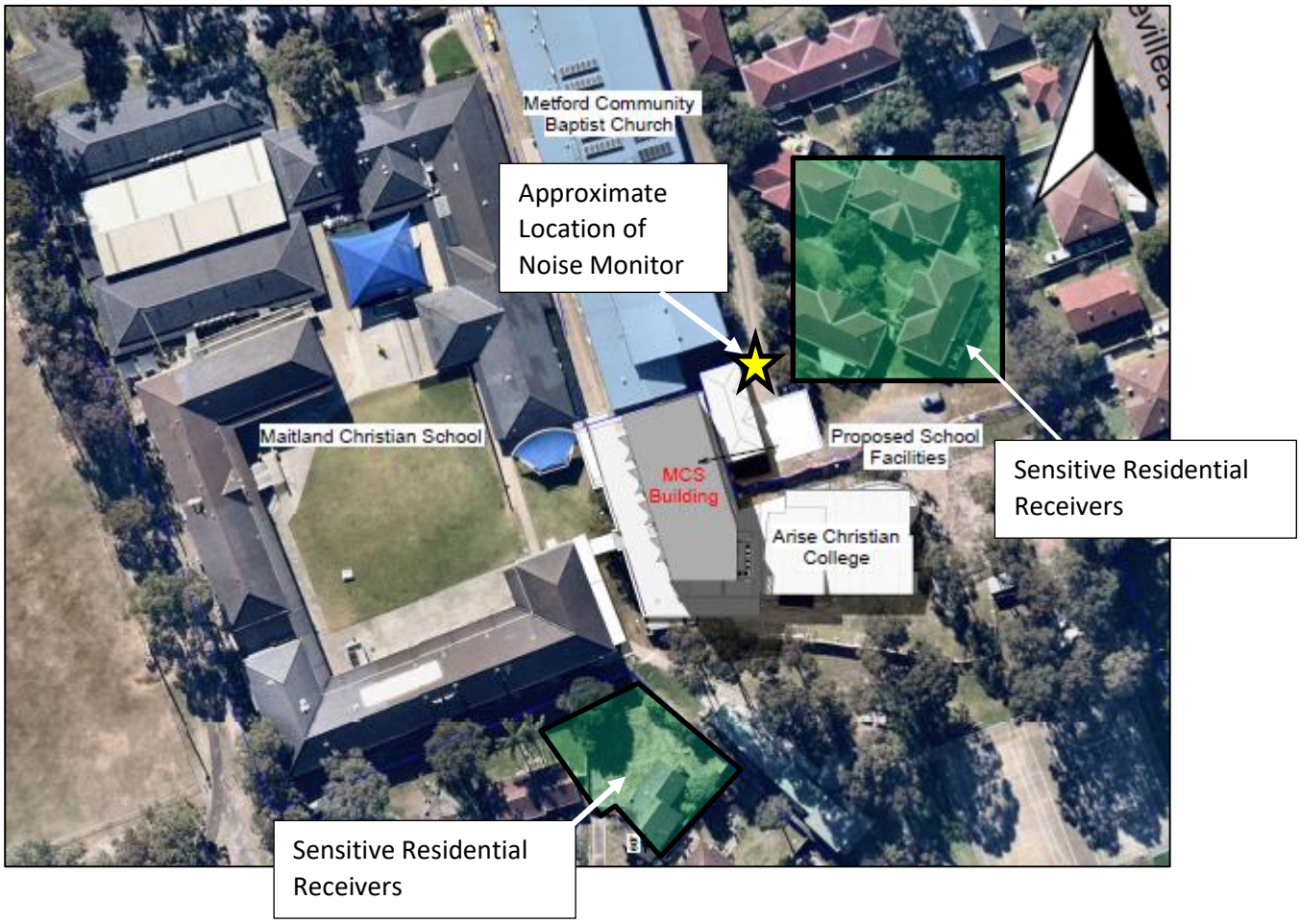
Based on the survey conducted and calculations performed, the proposed development will comply with the *Noise Policy for Industry* (2017) and Maitland City Council if the recommendations made in Section 7.0 of this report are implemented.

3.0 SITE DESCRIPTION

The proposed New Resources Centre (MCS Building) is part of the development works at the existing Maitland Christian School located at 75 – 81 Chelmsford Drive, Metford. The site is located within the existing playground premises located in the southwest area of the college. The MCS Building site is bound by residential properties to the southwest and east and the existing college and playground premises on the remaining sides.

The site location is shown in Figure 3-1.

Figure 3-1 Site Location



4.0 ACOUSTIC CRITERIA

NSW EPA Noise Policy for Industry (NPfI)

Noise generated from similar premises and from mechanical noise is generally assessed against the requirements of the NSW EPA *Noise Policy for Industry 2017 (NPfI)*.

The 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.

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 4-1 of the policy for the specified time of the day. The NPfI recommends the following Amenity Noise Levels for various receiver premises.

Table 4-1 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 (Suburban)	Day	55 dB(A)
	Evening	45 dB(A)
	Night	40 dB(A)

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).**

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 $L_{Aeq\ 15\ minute} < RBL+5$.

5.0 NOISE SURVEY

Unattended noise monitoring was conducted on site between 3rd and 10th February 2022 to record the existing ambient 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 3-1. The results and summary of the noise monitoring are listed in graphical form in Appendix B of this report. The assessment periods are defined by the NSW NPfI are as Daytime: 7 am to 6 pm, Evening: 6 pm to 10 pm and Night: 10 pm to 7 am.

5.1 Instrumentation

Noise measurements were conducted using the following equipment:

- Sound analyser NTi XL2 Type Approved, Serial No. A2A-09467-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.

5.2 Project Noise Criteria

Data from the noise monitors were processed to obtain background noise levels and noise criteria.

As a guide, the noise criteria defined in the *Noise Policy for Industry* (NPfI) is listed below. The assessment periods are defined by the NSW NPfI are as follows:

- Daytime: 7 am to 6 pm
- Evening: 6 pm to 10 pm
- Night: 10 pm to 7 am

Table 5-1 NPfI Project Noise Trigger Levels

All values in dB(A)

Receiver Type	Period	Measured RBL (L_{A90})	Acceptable Noise Levels $L_{Aeq(period)}$	NSW Noise Policy for Industry Criteria		Project Trigger Levels $L_{Aeq15min}$
				Amenity $L_{Aeq15min}$	Intrusiveness $L_{Aeq15min}$	
Residential (Sub-Urban)	Day	45	55	53	50	50
	Evening	43	45	43	48*	43
	Night	37	40	38	42*	38

*The evening and night-time criteria have been presented for informational purposes as the school is proposed to be operating only during the daytime.

6.0 DISCUSSION

6.1 Proposed Equipment

PKA has been advised that the following air condenser units will be used. The table below also presents the manufacturer published noise data which is the maximum allowable noise levels for the corresponding equipment to ensure acoustic complaince is achieved.

Table 6-1 Manufacturer Sound Pressure Levels at 1m (Outdoor Condenser Unit)

Daikin Condenser Unit model	dB(A) for Each Unit	Sound Pressure Level at 1m - Octave Band Frequency (dB)							
		63	125	250	500	1000	2000	4000	8000
REYQ18TAY1 (1x) *CU2*	**62**	64	63	64	60	56	50	46	42
REYQ24TAY1 (2x) *CU1 & CU3*	**64**	68	70	64	59	60	57	49	43

6.2 Calculations

The following table presents the results of the calculations showing the estimated noise impact from the proposed condenser unit selections. The noise calculations below consider effects of distance loss, directivity and shielding. Please refer to Section 7.0 for recommendations that are assumed to be implemented (considered in the below calculations).

Table 6-2 Calculated Noise Impact at Residential Receivers from Mechanical Plant

Combined Source Noise Level (SPL at 1m)	Period	NPfI Project Trigger Levels	Calculated noise impact at nearest identified Residential Boundary	Compliance (Y/N)
$L_{Aeq\text{-}15min}$ 66 dB(A)	Day 7am to 6pm	$L_{Aeq\text{-}15min}$ 50 dB(A)	$L_{Aeq\text{-}15min}$ 43 dB(A)	Yes

7.0 RECOMMENDATIONS

Based on the calculations performed above, the following acoustic treatment recommended by PKA must be implemented to achieve and retain acoustic complaince.

Equipment Selection

The equipment selection must have manufacturer rated noise data that does not exceed the octave band sound pressure levels listed in Table 6-1.

In case of any changes to the equipment, the final selections of any future outdoor mechanical and plant equipment must be checked by PKA to ensure that the rated sound power/pressure levels will comply at the boundary of the sensitive residences with the criteria listed in Table 5-1.

Architectural Treatment

Specification A		min. 1.8m high acoustic fence (blue)
Specification B		External Walls and Glazing to be upgraded as per Table 7-1 below.

Specification A

Acoustic fences of 1.8m height is required to be installed as shown in the figure above. The acoustic fences must have a minimum acoustic performance of R_w of 25. The barrier must be of solid construction (no air gaps or penetrations including the connections and structural bases) such as:

- Polycarbonate Transparent Sheeting (selection must ensure the R_w rating is met)
- Timber fence with double lapped boards.
- Aerated Concrete panels such as Hebel
- Masonry or Precast concrete panels
- Any combination of the above

Specification B

To minimise noise intrusion from the plant deck into the adjacent classroom/teaching space, the external walls identified above must be designed to have a minimum sound insulation rating of R_w 40. The following are indicative construction options. Other constructions are possible as long as the R_w ratings are met.

Table 7-1 R_w 40 External Facade Option

Wall	Minimum Configuration	Construction Notes
Wall R_w40	**Option 1:** Standard Brick or other Masonry Construction **Option 2:** Light-weight Construction External lining: 1 x 9mm Fibre Cement Lining (min. 13 kg/m2) Top hats as required Vapour barrier as required. 90mm studwork 75mm glasswool insulation (min. 14kg/m3) Internal lining: 1 x 13 mm plasterboard (min. 8.4 kg/m^2).	
Glazing/Glazed elements R_w35	10.38mm laminated glass	Acoustic-rated seals and frame

General Disclaimer

1. The acoustic recommendations made are ones that satisfies the acoustic requirements only. No representation is given that it is fit for any other purpose. The build-up 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 R_w ratings required in either instance.

APPENDIX A DRAWINGS USED TO PREPARE REPORT

This report was prepared using mechanical drawings provided by Marline, Job No. MN12542.

No.	Rev.	Title	Date
ME-00-000	1	Cover sheet	-
ME-00-001	2	Mechanical Services	15/02/2022
ME-10-001	2	Mechanical Services	15/02/2022
ME-10-002	2	Mechanical Services	15/02/2022
ME-10-003	2	Mechanical Services	15/02/2022
ME-30-001	1	Mechanical Services	15/02/2022

APPENDIX B NOISE MONITORING RESULTS (GRAPHICAL)

11820-2 Maitland Christian College, MSC Buildin

PKA Acoustic Consulting

Project Address: 75-81 Chelmsford Drive, Metford NSW 2323

Logger Location: At Residential Boundary Near Proposed Plant Room

		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		Sunday or Public Holiday?	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	
Thursday	3/02/2022			43.8	43.8	39.2	40.0				49.8	49.8	48.8	50.3	
Friday	4/02/2022	44.8	45.1	44.2	44.2	35.0	**40.5**		56.5	**53.8**	50.7	50.7	47.7	49.1	
Saturday	5/02/2022	45.2	45.6	43.6	43.6	36.7	36.7		53.2	53.0	51.2	51.2	49.3	50.3	
Sunday	6/02/2022	45.1	46.7	43.3	43.3	36.3	35.2		53.8	53.3	51.7	51.7	52.1	51.1	Y
Monday	7/02/2022	44.6	45.9	42.7	43.2	38.9	38.8		52.7	51.3	56.0	57.8	50.3	50.5	
Tuesday	8/02/2022	40.4	40.4	40.6	40.6	36.5	36.5		51.1	51.1	53.0	53.0	44.2	44.2	
Wednesday	9/02/2022	39.3	39.3	38.9	38.9	36.3	36.3		52.4	52.4	46.6	46.6	44.7	44.7	
Thursday	10/02/2022	40.1	40.1	38.6	38.6	35.8	35.8		53.2	53.2	47.8	47.8	45.1	45.1	
Friday	11/02/2022														
Rating Background Level (RBL)		**45**	**45**	**43**	**43**	**36**	**37**		**Average Noise Level (L_{Aeq})**		**54**	**53**	**52**	**52**	**49**	**49**	

11820-2 Maitland Christian College, MSC Building

PKA Acoustic Consulting

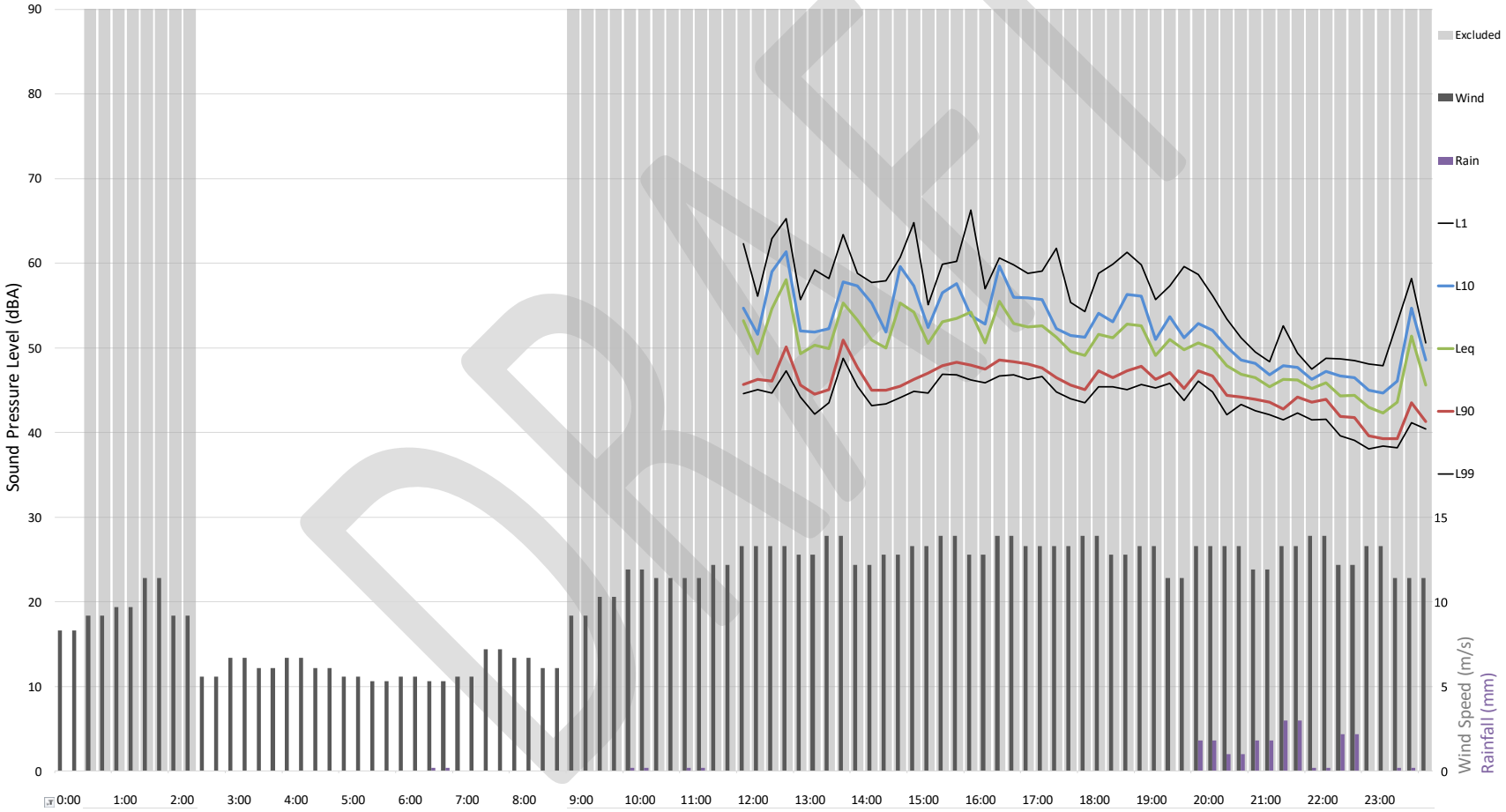
Project Address: 75-81 Chelmsford Drive, Metford NSW 2323
Logger Location: At Residential Boundary Near Proposed Plant Room

BOM weather data: Newcastle Nobbys IDN60901

3/02/2022 Thursday

Existing Ambient Noise Levels (dBA)

	Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00	
	Measured	Corrected	Measured	Corrected	Measured	Corrected
L_{Aeq} dB			49.8	49.8	48.8	50.3
L_{A90} dB			43.8	43.8	39.2	40.0



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PKA Acoustic Consulting

Project Address: 75-81 Chelmsford Drive, Metford NSW 2323

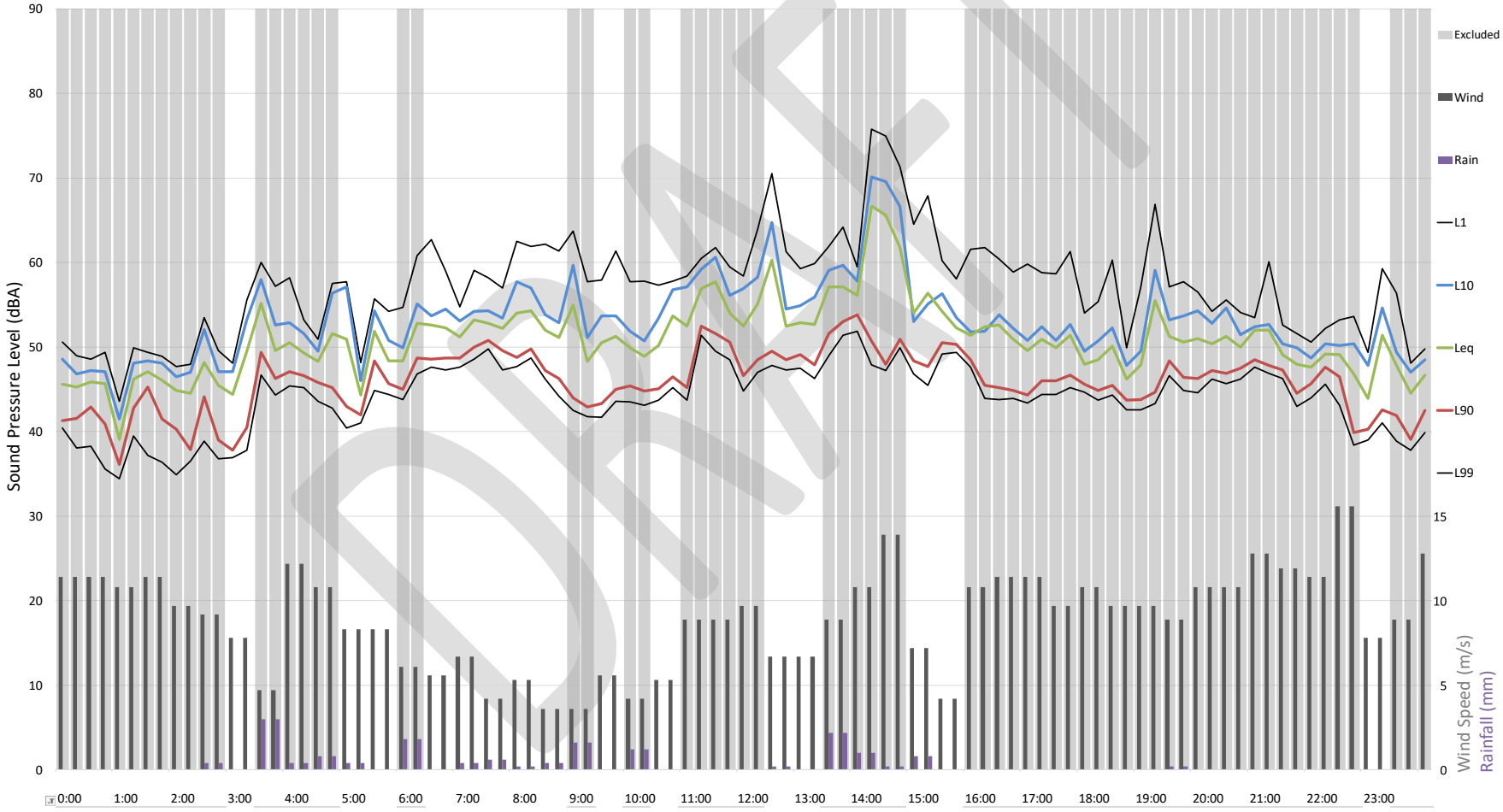
Logger Location: At Residential Boundary Near Proposed Plant Room

BOM weather data: Newcastle Nobbys 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	56.5	**53.8**	50.7	50.7	47.7	49.1
L_{A90} dB	44.8	45.1	44.2	44.2	35.0	**40.5**

4/02/2022 Friday

Existing Ambient Noise Levels (dBA)



11820-2 Maitland Christian College, MSC Building

PKA Acoustic Consulting

Project Address: 75-81 Chelmsford Drive, Metford NSW 2323

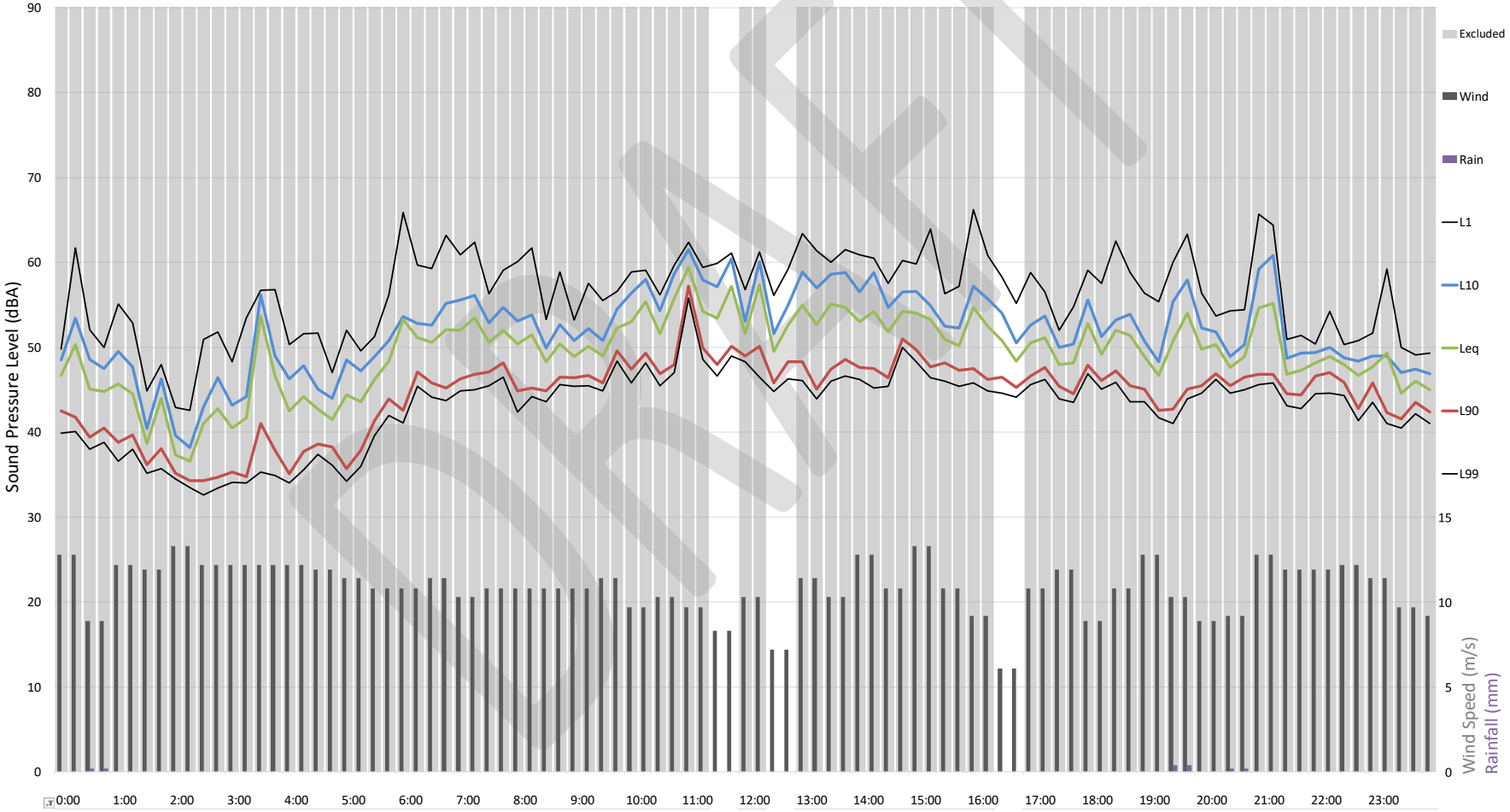
Logger Location: At Residential Boundary Near Proposed Plant Room

BOM weather data: Newcastle Nobbys IDN60901

5/02/2022 Saturday

Existing Ambient Noise Levels (dBA)

	Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00	
	Measured	Corrected	Measured	Corrected	Measured	Corrected
L_{Aeq} dB	53.2	53.0	51.2	51.2	49.3	50.3
L_{A90} dB	45.2	45.6	43.6	43.6	36.7	36.7



11820-2 Maitland Christian College, MSC Building

PKA Acoustic Consulting

Project Address: 75-81 Chelmsford Drive, Metford NSW 2323

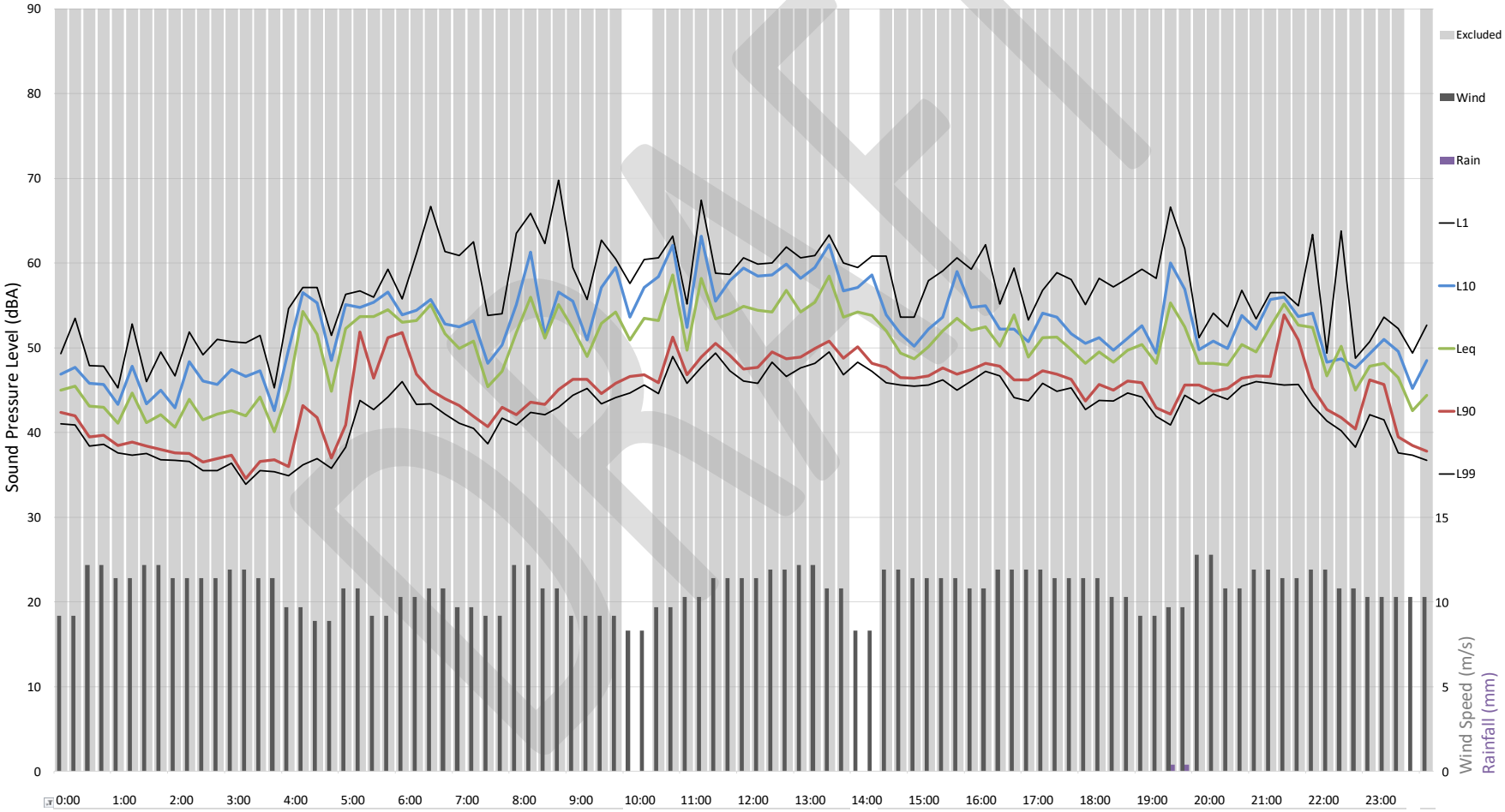
Logger Location: At Residential Boundary Near Proposed Plant Room

BOM weather data: Newcastle Nobbys 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	53.8	53.3	51.7	51.7	52.1	51.1
L_{A90} dB	45.1	46.7	43.3	43.3	36.3	35.2

6/02/2022 Sunday

Existing Ambient Noise Levels (dBA)



11820-2 Maitland Christian College, MSC Building

PKA Acoustic Consulting

Project Address: 75-81 Chelmsford Drive, Metford NSW 2323

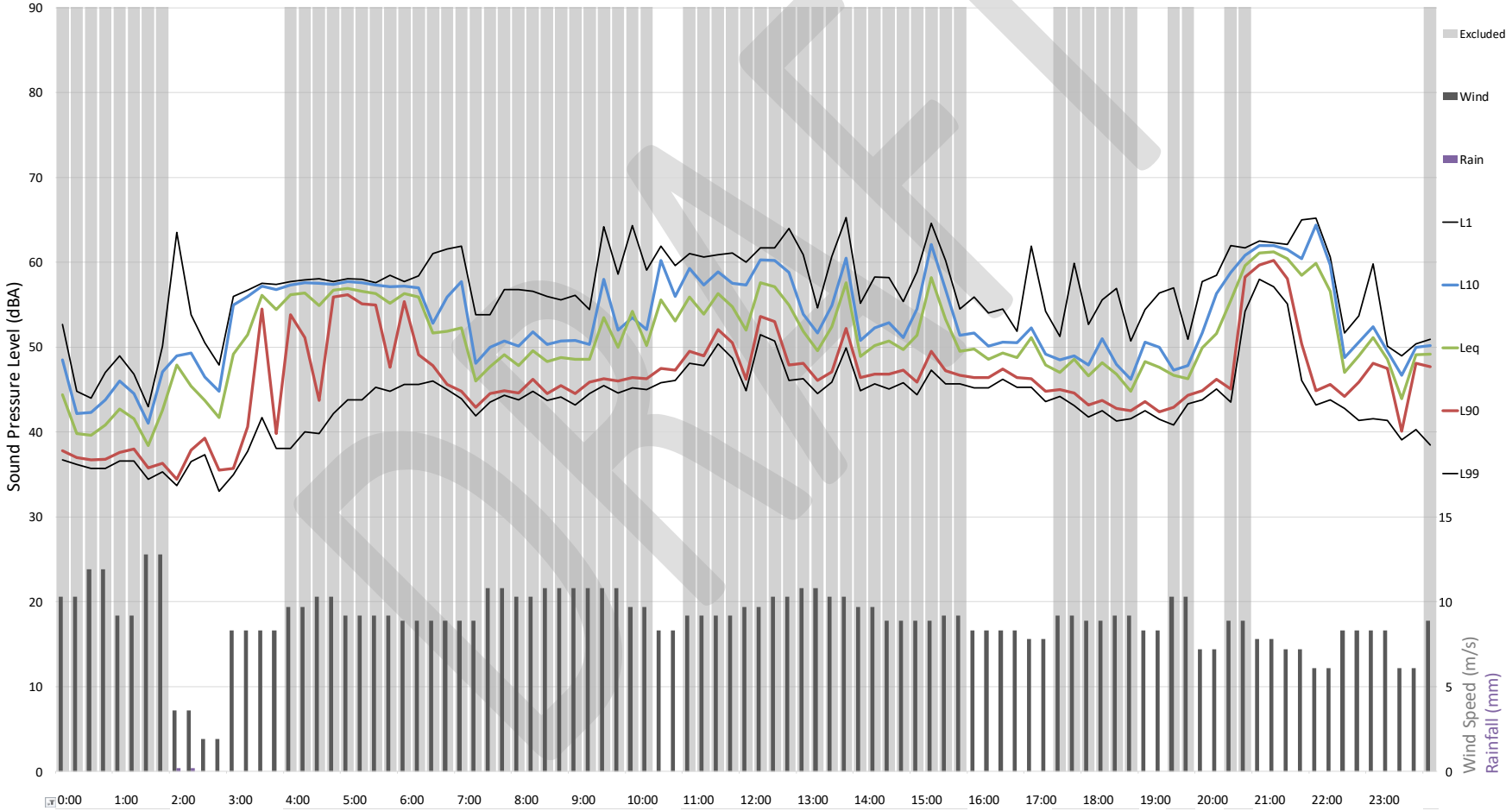
Logger Location: At Residential Boundary Near Proposed Plant Room

BOM weather data: Newcastle Nobbys 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	52.7	51.3	56.0	57.8	50.3	50.5
L_{A90} dB	44.6	45.9	42.7	43.2	38.9	38.8

7/02/2022 Monday

Existing Ambient Noise Levels (dBA)



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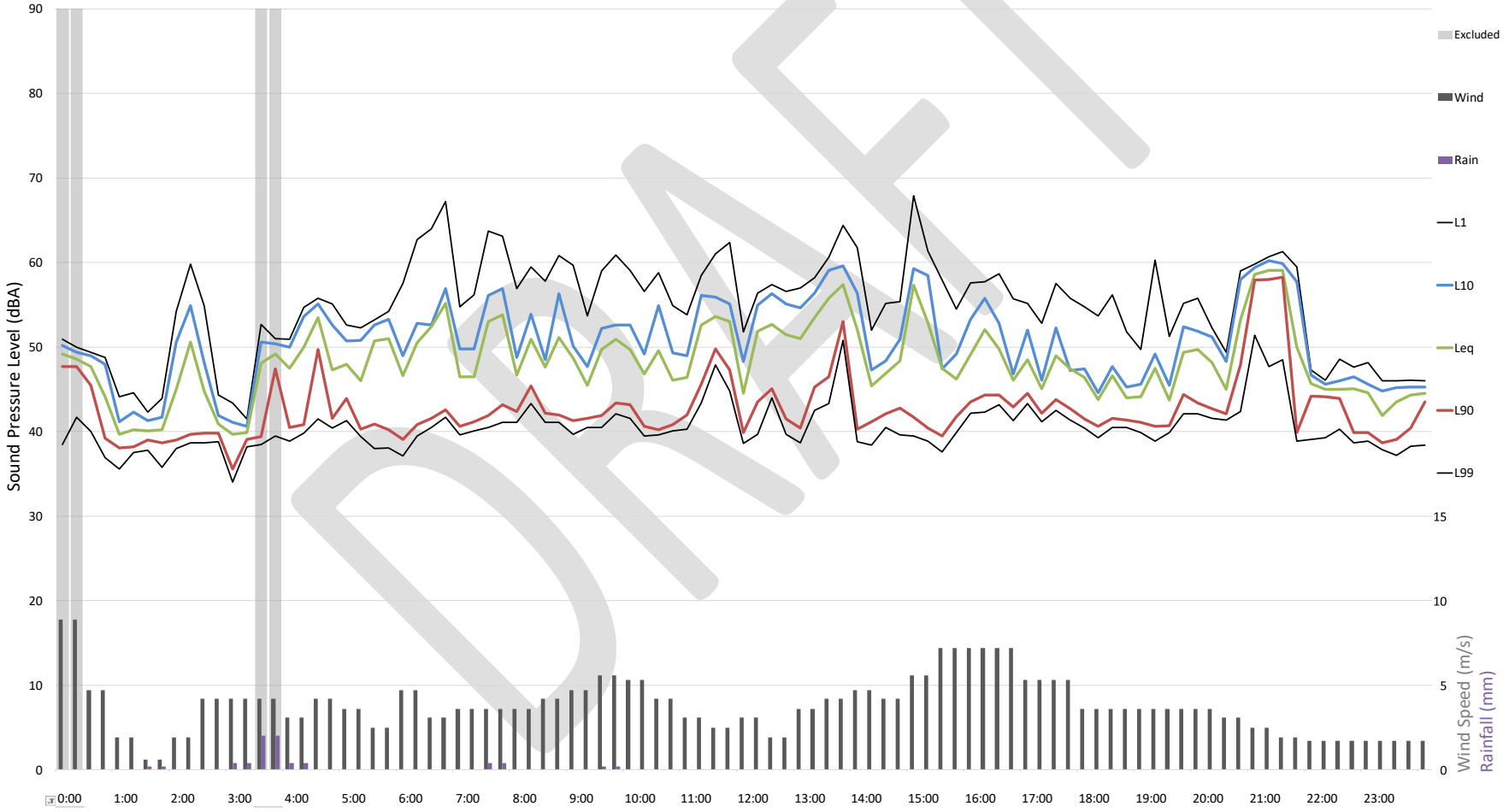
Logger Location: At Residential Boundary Near Proposed Plant Room

BOM weather data: Newcastle Nobbys 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	51.1	51.1	53.0	53.0	44.2	44.2
L_{A90} dB	40.4	40.4	40.6	40.6	36.5	36.5

8/02/2022 Tuesday

Existing Ambient Noise Levels (dBA)



11820-2 Maitland Christian College, MSC Building

PKA Acoustic Consulting

Project Address: 75-81 Chelmsford Drive, Metford NSW 2323

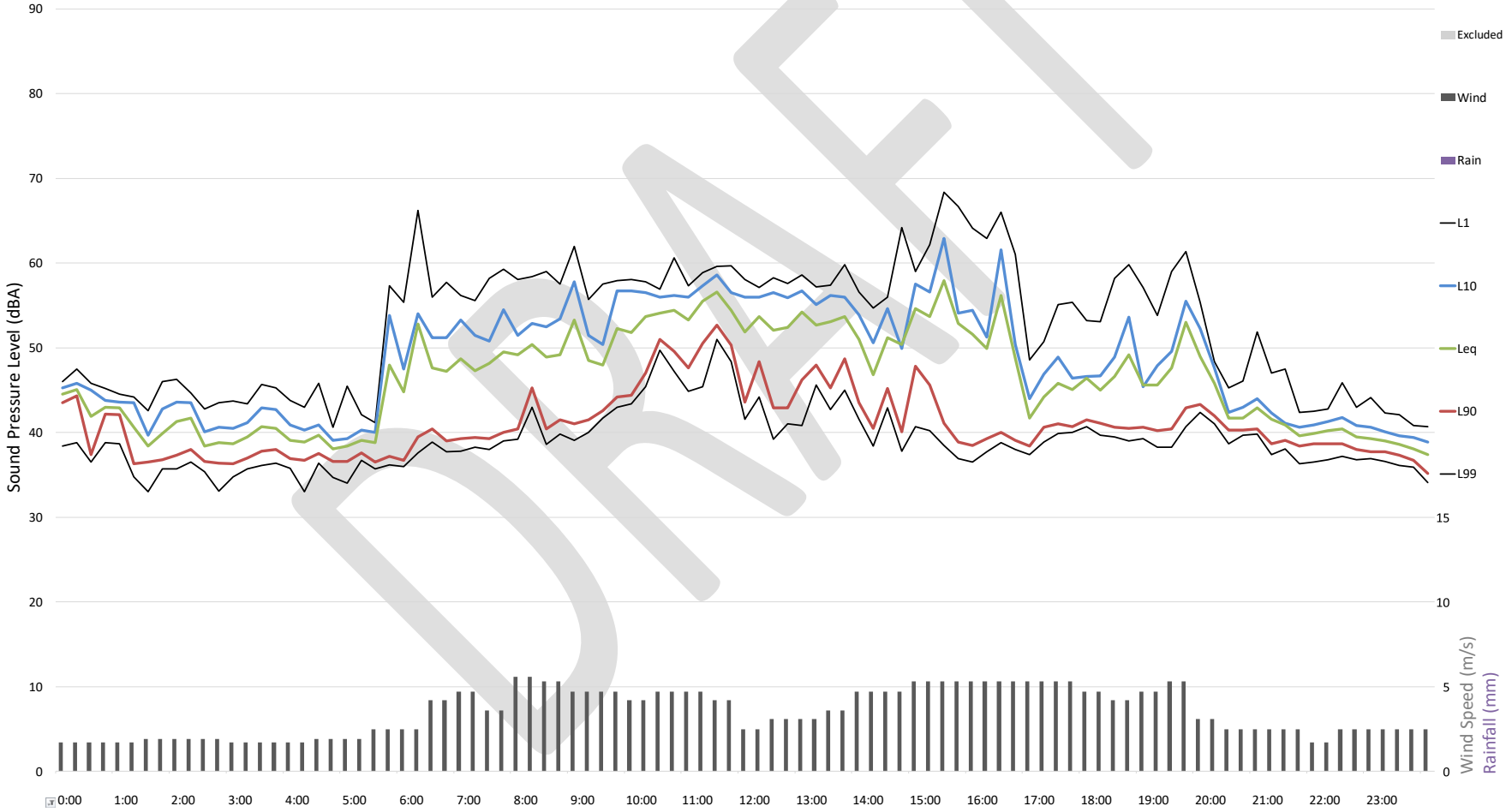
Logger Location: At Residential Boundary Near Proposed Plant Room

BOM weather data: Newcastle Nobbys IDN60901

9/02/2022 Wednesday

Existing Ambient Noise Levels (dBA)

	Daytime 07:00 - 18:00		Evening 18:00 - 22:00		Nighttime 22:00 - 07:00	
	Measured	Corrected	Measured	Corrected	Measured	Corrected
L_{Aeq} dB	52.4	52.4	46.6	46.6	44.7	44.7
L_{A90} dB	39.3	39.3	38.9	38.9	36.3	36.3



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Project Address: 75-81 Chelmsford Drive, Metford NSW 2323

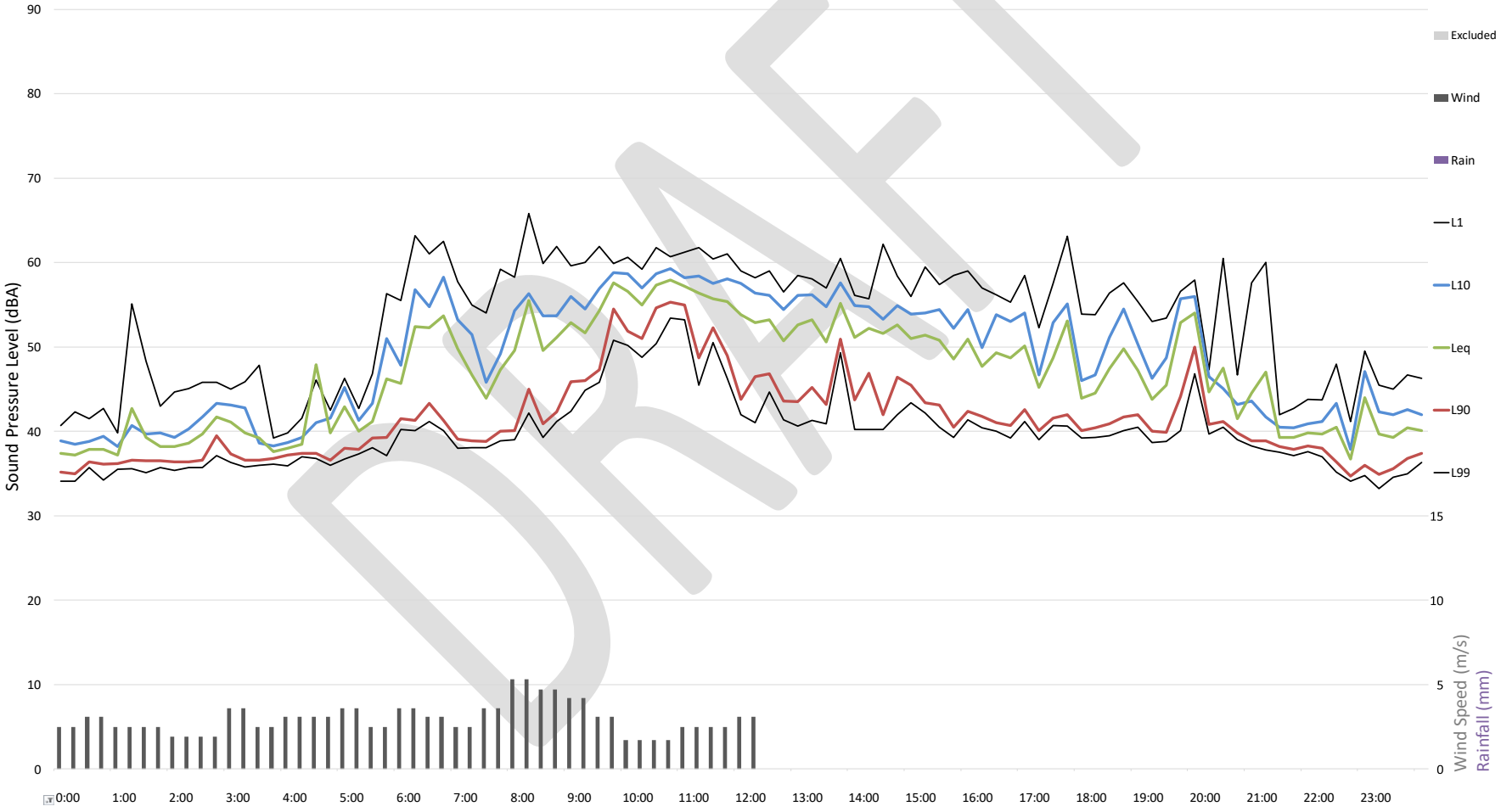
Logger Location: At Residential Boundary Near Proposed Plant Room

BOM weather data: Newcastle Nobbys 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	53.2	53.2	47.8	47.8	45.1	45.1
L_{A90} dB	40.1	40.1	38.6	38.6	35.8	35.8

10/02/2022 Thursday

Existing Ambient Noise Levels (dBA)



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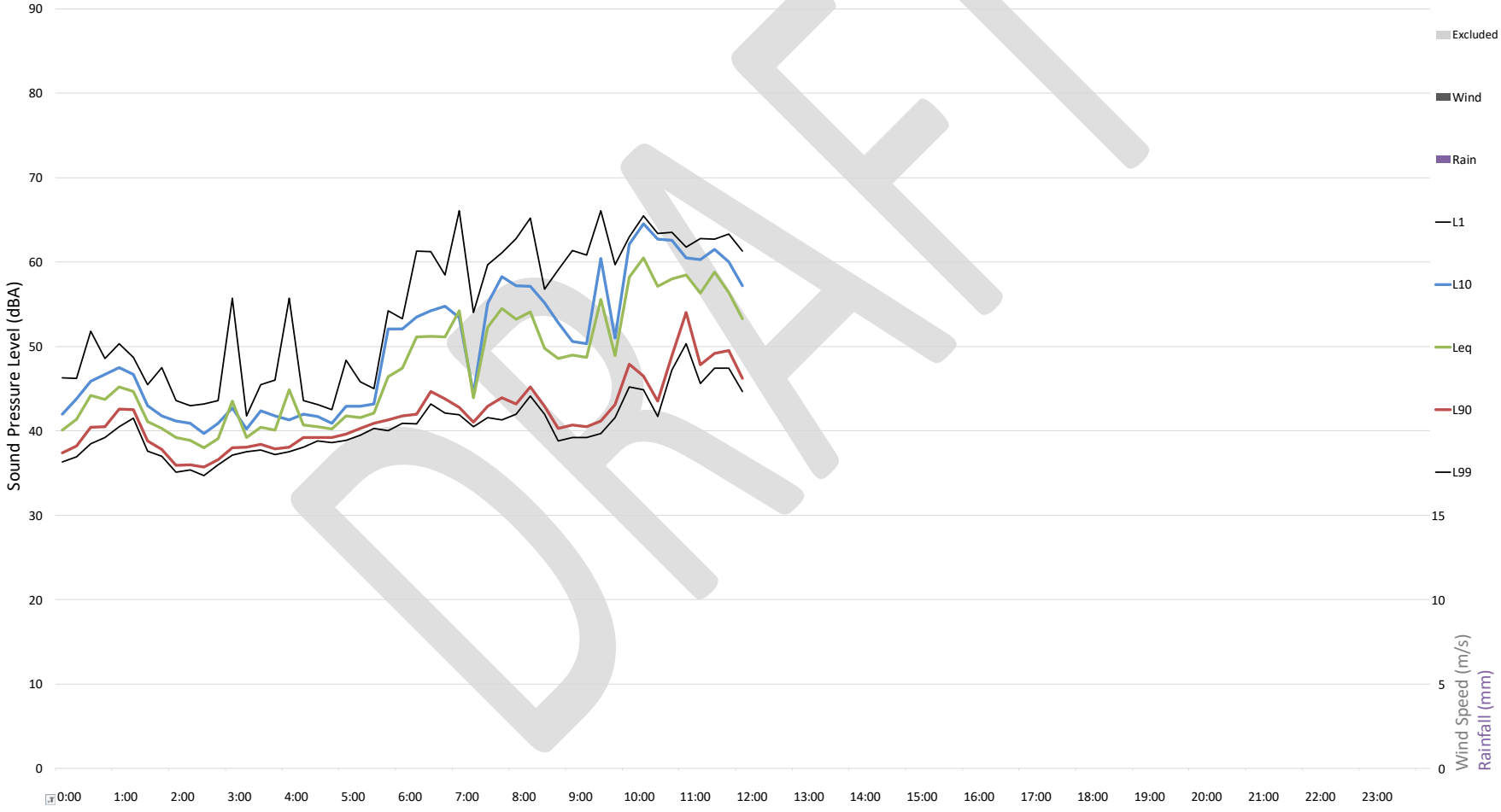
Logger Location: At Residential Boundary Near Proposed Plant Room

BOM weather data: Newcastle Nobbys 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						

11/02/2022 Friday

Existing Ambient Noise Levels (dBA)



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