Clifford Avenue, Fairlight

Noise Impact Assessment

Allen Group Developments Pty Ltd

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1 INTRODUCTION

Pulse White Noise Acoustics Pty Ltd (PWNA) has been engaged to undertake an acoustic assessment of the proposed residential development located at Clifford Avenue, Fairlight.

The assessment looks at the potential environmental noise intrusion impacts on the development and noise emissions to nearby receivers from mechanical plant associated with the development. As well as potential noise impacts from existing noise sources within the vicinity of the site which predominantly includes traffic noise from surrounding roadways and environmental noise. This report will discuss the acoustic criteria which have been adopted as well as the outcome of the assessment.

The development includes:

- Carparking on 2 levels.
- A 5 story of residential building.

A list of acoustic terminology used in this report is included in Appendix A.

1.1 Relevant Guidelines

Acoustic criteria which have been adopted in this assessment include requirements from the local and state authorities and, in the absence of any applicable criteria from these bodies, Australian and International Standards will be utilised. These include:

- NSW Legislation Protection of the Environment Operations Act 1997;
- NSW EPA Noise Policy for Industry (N2017); and
- Australian/New Zealand Standard AS/NZS 2107:2016 '*Acoustics–Recommended design sound levels and reverberation times for building interiors*'.

1.2 Proposed Development

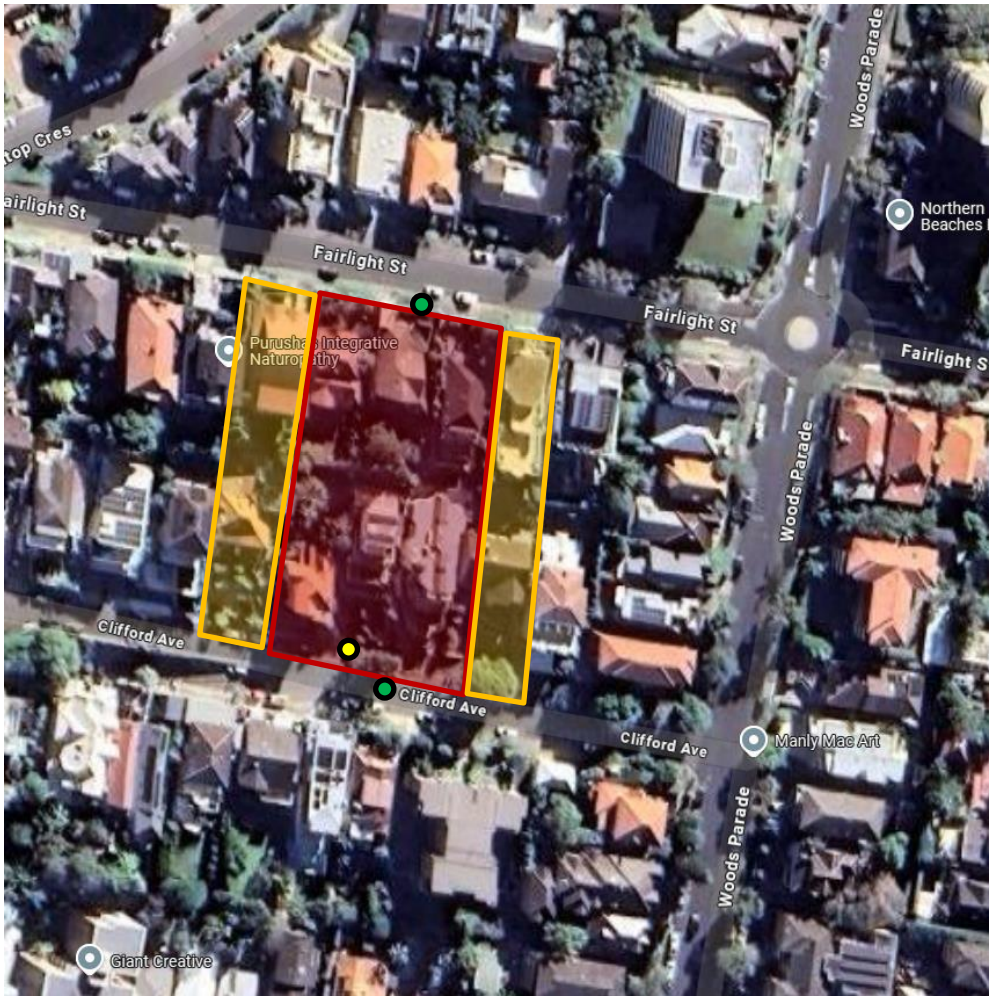
The proposed development includes a five-story residential building include carparking on 2 levels. The site is located on a site which has frontages to both Clifford Avenue to the south and Fairlight Street to the north. The project details are included in the Architectural drawings dated August 2024.

1.3 Site Description

The project site is located in the block with Clifford Avenue to the south and Fairlight Street to the north. The surrounding area includes existing residential dwellings within the vicinity of the site. The site is within and surrounded by an area that is classified as a suburban area within the Northern Beaches Council government area.

A map showing the site location and measurement location, as well as nearest receivers, is provided in Figure 1 below. The surrounding roadways within the vicinity of the site include local traffic only.

Figure 1 Site Map, Measurement Locations and Surrounding Receivers



Legend

Site Location

Residential Receiver

Attended Noise Monitoring Location

Unattended Noise Monitoring Location

N

2 EXISTING ACOUSTIC ENVIRONMENT

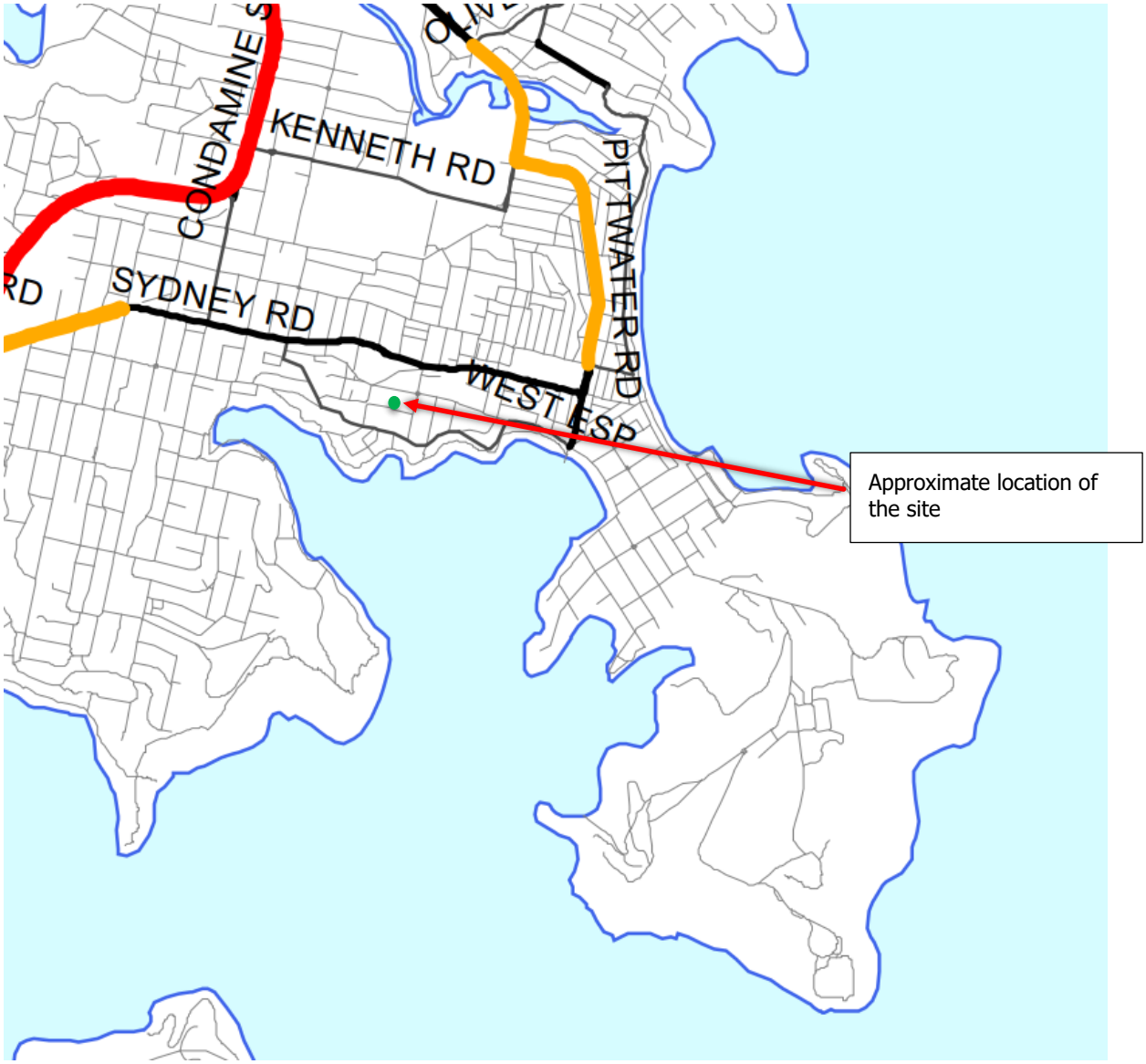
The proposed site is located within an area which would be classified as a *Suburban* area based on the definitions with the EPA's *Noise Policy for Industry*.

The exiting noise levels at the site are predominantly as a result from traffic noise within the vicinity of the site including surrounding roadways and environmental noise. Existing receivers within the vicinity of the site include existing residential receivers.

The site is located on Fairlight Crescent which is not defined as a busy road which does not carrying over 20,000 Annual Average Daily Traffic (AADT) number as defined in Map 16 of the RTA's Traffic Volume Maps for Noise Assessment for Buildings on Land Adjacent to Busy Roads.

Based on the site location an assessment using the Department of Planning Development Near Rail Corridor and Busy Roads – Interim Guideline (DNRCBR) is not required to be undertaken, however the assessment has included the recommended internal noise levels as detailed within the DNRCBR.

Figure 2 Site Location of Map 16 of the RTA's Traffic Volume Maps for Noise Assessment for Buildings on Land Adjacent to Busy Roads



2.1 Noise Descriptors & Terminology

Environmental noise constantly varies in level with time. Therefore, it is necessary to measure environmental noise in terms of quantifiable time periods and statistical descriptors. Typically, environmental noise is measured over 15-minute periods and relevant statistical descriptors of the fluctuating noise are determined to quantify the measured level.

Noise (or sound) consists of minute fluctuations in atmospheric pressure capable of detection by human hearing. Noise levels are expressed in terms of decibels, abbreviated as dB or dBA, the "A" indicating that the noise levels have been frequency weighted to approximate the characteristics of normal human hearing. Because noise is measured using a logarithmic scale, 'normal' arithmetic does not apply, e.g., adding two sound sources of equal values result in an increase of 3dB (i.e., 60 dBA plus 60 dBA results in 63 dBA). A change of 1 dB or 2 dB in the sound level is difficult for most people to detect, whilst a 3 dB – 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change roughly corresponds to a doubling or halving in loudness.

The most relevant environmental noise descriptors are the L_{Aeq}, L_{A1}, L_{A10} and L_{A90} noise levels. The L_{Aeq} noise level represents the "equivalent energy average noise level". This parameter is derived by integrating the noise level measured over the measurement period. It represents the level that the fluctuating noise with the same acoustic energy would be if it were constant over the measured time period.

The L_{A1}, L_{A10} and L_{A90} levels are the levels exceeded for 1%, 10% and 90% of the sample period. These levels can be considered as the maximum noise level, the average repeatable maximum and average repeatable minimum noise levels, respectively.

Specific acoustic terminology is used in this assessment report. An explanation of common acoustic terms is included as Appendix A.

2.2 Unattended Noise Monitoring

As part of this assessment an acoustic survey of the site has been undertaken including long term unattended noise logging which is suitable for the assessment of representable background noise levels.

The unattended noise survey was conducted between the 18th and 24th September 2024 on the site as detailed in Figure 1 above. the logger unattended noise monitor was positioned which is suitable for the assessment of background noise levels at the site.

This survey was conducted in order to measure the existing ambient noise level which is representative of the nearest noise affected receivers. Data affected by adverse meteorological conditions and by spurious and uncharacteristic events have been excluded from the results, and also excluded from the data used to determine the noise emission criteria. Meteorological information has been obtained from the Observatory Hill weather station (ID 066214).

Instrumentation for the survey comprised one ARL EL-215 type noise monitor with serial number 194662. Calibration of the logger was checked prior to and following the measurements. Drift in calibration did not exceed ±0.5 dB. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates.

Charts presenting summaries of the measured daily noise data are attached in Appendix B. The charts present each 24-hour period and show the L_{A1}, L_{A10}, L_{Aeq} and L_{A90} noise levels for the corresponding 15-minute periods. This data has been filtered to remove periods affected by adverse weather conditions based on weather information.

2.2.1 Results in accordance with the NSW EPA *Noise Policy for Industry (NPI) 2017* (RBL's)

In order to assess the acoustical implications of the development at nearby noise sensitive receivers, the measured background noise data of the logger was processed in accordance with the NSW EPA's *Noise Policy for Industry* (NPI, 2017).

The Rating Background Noise Level (RBL) is the background noise level used for assessment purposes at the nearest potentially affected receiver. It is the 90th percentile of the daily background noise levels during each assessment period, being day, evening and night. RBL $L_{A90\ (15minute)}$ and L_{Aeq} noise levels are presented in Table 1.

Table 1 Measured Noise Logging Results

Measurement Location	Daytime[1]		Evening[1]		Night-time[1]	
	L_{A90}[2] (dBA)	L_{Aeq}[3] (dBA)	L_{A90}[2] (dBA)	L_{Aeq}[3] (dBA)	L_{A90}[2] (dBA)	L_{Aeq}[3] (dBA)
Clifford Avenue , Fairlight	45	58	44	58	34	54

Note 1: For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am.

Note 2: The L_{A90} noise level is representative of the "average minimum background sound level" (in the absence of the source under consideration), or simply the background level.

Note 3: The L_{Aeq} is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

2.3 Attended Noise Measurements

Attended noise testing was conducted at the site and detailed in the sections above. Attended noise level testing was undertaken using a Bruel and Kjaer 2236C type meter. The meter was calibrated before and after testing and no significant drift was recorded.

The attended and unattended noise locations were selected to obtain suitable noise levels for the assessment of background noise levels ($LA_{90\ (t)}$) as well as the impact from traffic movements ($LAeq_{(t)}$).

Attended noise level measurements were undertaken at the site on the 24th September 2024 during various periods of the day. The results of the attended noise level measurements are detailed in the table below and supplement the unattended noise logging for the assessment of traffic noise impacts on the site.

Table 2 Attended Noise Level Measurements

Measurement Location	Time of measurement	Measured $L_{Aeq,\ 15min}$[1] dB(A)	Measured $L_{A90,\ 15min}$[2] dB(A)	Comments
Attended noise measurement location on Clifford Avenue	9.20am to 9.35am	58	45	Noise level at the site dominated by vehicle movements on surrounding roadways and environmental noise
Attended noise measurement on Fairlight Street	9.40am to 9.555am	57	45	

Note 1: The L_{A90} noise level is representative of the "average minimum background sound level" (in the absence of the source under consideration), or simply the background level.

Note 2: The L_{Aeq} is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

3 ACOUSTIC CRITERIA

The acoustic criteria which have been adopted for this assessment are outlined below. All criteria have been separated into; *Noise Intrusion* (Assessment of building envelope), and *Noise Emissions* (Assessment of noise to surrounding receivers).

3.1 NSW Legislation Protection of the Environment Operations (POEO) Act 1997

A review of the information contained in the POEO Act has been undertaken and no specific acoustic criteria is listed. In the absence, the NSW EPA *NPI 2017* (below) will be adopted.

3.2 NSW EPA Noise Policy for Industry (NPI) 2017

In NSW, the control of noise emissions is the responsibility of Local Governments and the NSW Environment Protection Authority (NSW EPA).

The NSW EPA has recently released a document titled *Noise Policy for Industry* (NSW NfPI) which provides a framework and process for determining external noise criteria for the assessment of noise emission from industrial developments. The NSW NfPI criteria for industrial noise sources have two components:

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

3.2.1 Intrusive Noise Impacts (Residential Receivers)

The NSW NfPI states that the noise from any single source should not intrude greatly above the prevailing background noise level. Industrial noises are generally considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (L_{Aeq}), measured over a 15-minute period, does not exceed the background noise level measured in the absence of the source by more than 5 dB(A). This is often termed the Intrusiveness Criterion.

The 'Rating Background Level' (RBL) is the background noise level to be used for assessment purposes and is determined by the methods given in the NSW NPfI. Using the rating background noise level approach results in the intrusiveness criterion being met for 90% of the time. Adjustments are to be applied to the level of noise produced by the source that is received at the assessment point where the noise source contains annoying characteristics such as tonality or impulsiveness.

3.2.2 Protecting Noise Amenity (All Receivers)

To limit continuing increase in noise levels, the maximum ambient noise level within an area from industrial noise sources should not normally exceed the acceptable noise levels specified in Table 2.2 of the NSW NPI. That is, the ambient L_{Aeq} noise level should not exceed the level appropriate for the particular locality and land use. This is often termed the 'Background Creep' or Amenity Criterion.

The amenity assessment is based on noise criteria specified for a particular land use and corresponding sensitivity to noise. The cumulative effect of noise from industrial sources needs to be considered in assessing the impact. These criteria relate only to other continuous industrial-type noise and do not include road, rail or community noise. If the existing (measured) industrial-type noise level approaches the criterion value, then the NSW NPI sets maximum noise emission levels from new sources with the objective of ensuring that the cumulative levels do not significantly exceed the criterion.

Project amenity noise level for industrial developments is specified as the recommended amenity noise level (Table 2.2 of the NPI) minus 5 dB(A). To standardise the time periods for the intrusiveness and amenity noise levels, this policy assumes that the $L_{Aeq,15min}$ will be taken to be equal to the $L_{Aeq,period}$ + 3 decibels (dB).

Where the resultant project amenity noise level is 10 dB or more lower than the existing industrial noise level, the project amenity noise levels can be set at 10 dB below existing industrial noise levels.

3.2.2.1 Area Classification

The site is located within an areas which is classified and "Suburban" noise environment, which has been used in this assessment and detailed in the table below.

Table 3 NSW NPI – Recommended L_{Aeq} Noise Levels from Noise Sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day[1]	Recommended Amenity Noise Level ($L_{Aeq, period}$)[2] (dBA)
Residence	Suburban	Day	55
		Evening	45
		Night	40

Note 1: For Monday to Saturday, Daytime 7:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 6:00 pm; Evening 6:00 pm – 10:00 pm; Night-time 10:00 pm – 8:00 am.

Note 2: The L_{Aeq} is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

3.2.3 Project Trigger Noise Levels

The intrusive and amenity criteria for industrial noise emissions derived from the measured data are presented in Table 4. The amenity and intrusive criterion are nominated for the purpose of determining the operational noise limits for noise sources associated with the development which can potentially affect noise sensitive receivers.

For each assessment period, the lower (i.e., the more stringent) of the amenity or intrusive criteria are adopted, which are shown in bold text in Table 4.

Table 4 External noise level criteria in accordance with the NSW NPI

Location	Time of Day [1]	Project Amenity Noise Level, $L_{Aeq, period}$ [3] (dBA)	Measured $L_{A90, 15\ min}$ (RBL) [2] (dBA)	Measured $L_{Aeq, period}$ [3] Noise Level (dBA)	Intrusive $L_{Aeq, 15\ min}$ [3] Criterion for New Sources (dBA)	Amenity $L_{Aeq, 15\ min}$ Criterion for New Sources (dBA) [3 5]
Residential Receivers	Day	50	45	58	**50**	53
	Evening	40	44	58	49	**43**
	Night	35	34	54	39	**37**

Note 1: For Monday to Saturday, Daytime 7:00 am – 10:00 pm; Night-time 10:00 pm – 7:00 am. On Sundays and Public Holidays, Daytime 8:00 am – 10:00 pm; Night-time 10:00 pm – 8:00 am.

Note 2: The L_{A90} noise level is representative of the "average minimum background sound level" (in the absence of the source under consideration), or simply the background level.

Note 3: The L_{Aeq} is the energy average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

Note 4: Project Noise Trigger Levels are shown in bold and underlined.

Note 5: As per Section 2.4.1 of the NPI

3.3 Internal Noise Levels

Recommended ambient noise levels and reverberation times for internal spaces are given in a number of publications including Table 1 of Australian / New Zealand Standard 2107:2016 *"Acoustics - Recommended design sound levels and reverberation times for building interiors"*. Unlike the previous version of this Standard, this latest edition recommends a range with lower and upper levels (rather than "satisfactory" and "maximum" internal noise levels) for building interiors based on room designation and location of the development relative to external noise sources. This change has occurred due to the fact that sound levels below 'satisfactory' could be interpreted as desirable, but the opposite may in fact the case. Levels below those which were listed as 'satisfactory' can lead to inadequate acoustic masking resulting in loss of acoustic isolation and speech privacy.

The recommended levels for various areas of the project are detailed in the following table. The recommended noise levels for residential dwellings near major roadways detailed within AS2107:2016 have been used as the basis of this assessment.

The project internal noise levels criteria are detailed in the table below.

Table 5 Project Internal Noise Level Requirements

Type of Occupancy/Activity	Design sound level maximum ($L_{Aeq,t}$)
Apartment common areas (e.g. foyer, lift lobby)	50 dB(A) 15 hours
Residential - Living areas	40 dB(A) 15 hours
Residential - Sleeping areas (night time)	35[1] dB(A) 9 hours
Toilets	55 dB(A) 15 hours
Note 1: The relevant time period includes the night time period of 10pm to 7am	

4 ACOUSTIC ASSESSMENT

This section of the report details the assessment of potential noise generated as part of the proposed development.

4.1 Mechanical Noise Emissions

Detailed selections of the proposed mechanical plant and equipment to be used on the site, and the exact location of key plant items, are not available at this time. All future plant and equipment are to be acoustically treated to ensure the noise levels at all surrounding receivers comply with noise emission criteria detailed within this report. Experience with similar projects indicated that it is both possible and practical to treat all mechanical equipment such that the relevant noise levels are achieved. Examples of the possible acoustic treatments to mechanical equipment includes the following:

- Supply and Exhaust Fans – location of fans within the building and treated using internally lined ductwork or acoustic silencers.
- General supply and exhaust fans – general exhaust and supply fans such as toilet, kitchen, lobby and other small mechanical fans can be acoustically treated using acoustic flex ducting or internally lined ducting.
- Residential Condensers – The project may include external residential condenser units which will be located within the basement, on balconies, or on the roof-top. Providing condenser equipment is selected using suitable noise level data, then acoustic treatments can be implemented such as screening and treatment to exhaust to ensure that the relevant noise emission criteria will be achieved.

Details of the required mechanical services equipment and acoustic treatments to ensure the relevant noise level criteria is achieved will be provided as part of the CC submission of the project.

Based on the location of the equipment acoustic mitigations can be included in the design of the mechanical services equipment including internally lined ductwork, acoustic silencers and screening (which are included in the mechanical layouts included in the figure above) such that the relevant project external noise level requirements detailed in Section 3.2.3 of this report will be achieved.

Experience with similar projects indicates that the acoustic treatment of the proposed mechanical equipment to be installed on the project is both possible and practical for all equipment proposed as part of the project.

4.2 Noise from Additional Traffic

Noise impacts from the increase in vehicle movements along the surrounding roadways is to be assessed in accordance with the NSW EPA Road Noise Policy (RNP) 2011.

A peak hour increase proposed for the number vehicles associated with the development will not exceed a 2dBA increase at the nearest residential receivers. As summarised in the NSW EPA RNP, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person and is therefore considered acoustically acceptable.

4.3 Building Envelope

This section of the report details the assessment of environmental noise intrusion into the proposed development and the recommended acoustic treatments to ensure the recommended internal noise levels detailed in the Sections above (including environmental noise intrusion) are achieved.

Internal noise levels within the future areas of the development will result from the noise intrusion into the building through the external façade including glass, masonry and other façade elements. Typically, the acoustic performance of building elements including the relatively light weight elements of the building façade, including glass and/or plasterboard constructions, will be the determining factors in the resulting internal noise levels.

Calculations of internal noise levels have been undertaken based on the measured traffic and calculated environmental noise levels at the site and the characteristics of the building, including window openings, buildings constructions and the like.

4.3.1 External Glass Elements

The recommended acoustic constructions to the buildings external façade glass elements are detailed in the table below to ensure the recommended internal noise levels detailed above are achieved, with the façade building openings closed.

Table 6 External Glass Acoustic Requirements

Façade Orientation	Room Type	Recommended Glass Construction	Minimum Façade Acoustic Performance[1]
All Façade orientations and levels	Bedrooms	6.38mm Laminated	Rw (C;Ctr): 30 (0;-3)
	Living Rooms	6.38mm Laminated	Rw (C;Ctr): 30 (0;-3)
	Wet Areas	6.38mm Laminated	Rw (C;Ctr): 30 (0;-3)
	Commercial Areas	6.38mm Laminated	Rw (C;Ctr): 30 (0;-3)
Note 1: The acoustic performance of the external façade includes the installed glazing and frame including (but not limited to) the façade systems seals and frame. All external glazing systems are required to be installed using acoustic seals.			

Please note for windows, this performance is not only subject to the glazing selection but also to the construction of the window frame and the frame seal selection. Therefore, it is recommended that the window manufacturer should confirm that the required sound insulation can be achieved. It is anticipated that the window system should comprise Q-Lon (or equivalent) or fin seals with deep C channels as part of the window track (i.e., Performance levels outlined above need to be achieved with glazed panels + frame + seals).

4.3.2 External Building Elements

If external wall constructions are constructed either from existing concrete or masonry construction no further acoustic upgrading is required. If penetrations through any external skin are required, all gaps remaining in the penetration are to be filled with an acoustic grade sealant which provides an equal or better performance to the system being penetrated.

Any light-weight external plasterboard walls should be constructed from a construction with a minimum acoustic performance of Rw 45.

4.3.3 External Roof

The required external roof and ceiling constructions for the project are required to include the following:

1. Concrete external roof construction – no additional treatments required.

2. Light Weight Construction – Install an acoustic insulation within the external roof/ceiling cavity similar to a 75 mm thick 14 kg/m^3 insulation.

If penetrations through any external skin are required, all gaps remaining in the penetration are to be filled with an acoustic grade sealant which provides an equal or better performance to the system being penetrated.

4.3.4 External Opening and Penetrations

All openings and penetrations are required to be acoustically treated such that the performance of the building construction is not compromised. This may require lining of duck work behind mechanical service openings/grills, treatments to ventilation opening and the like.

5 CONCLUSION

Pulse White Noise Acoustics Consultancy Pty Ltd (Pulse White Noise Acoustics) has been engaged to undertake the acoustic assessment of the proposed residential development located at Clifford Avenue, Fairlight.

This report details the required acoustic constructions of the building's façade, including external windows, to ensure that the future internal noise levels comply with the relevant noise levels of the Australian Standard AS2107:2016 for environmental noise including traffic noise intrusion. Providing the recommended constructions detailed in this report are included in the construction of the project the required internal noise levels will be achieved.

External noise emissions from the site have been assessed and detailed in accordance with the NSW Environmental Protection Authorities *Noise Policy for Industry*. The future design and treatment of all building services associated with the project can be acoustically treated to ensure all noise emissions from the site comply with the EPA NPfI criteria.

For any additional information please do not hesitate to contact the person below.

Regards

Ben White
Director
Pulse White Noise Acoustics

APPENDIX A: ACOUSTIC GLOSSARY

The following is a brief description of the acoustic terminology used in this report:

Sound power level	The total sound emitted by a source
Sound pressure level	The amount of sound at a specified point
Decibel [dB]	The measurement unit of sound
A Weighted decibels [dB(A])	The A weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds. The A-weighting filter emphasises frequencies in the speech range (between 1kHz and 4 kHz) which the human ear is most sensitive to, and places less emphasis on low frequencies at which the human ear is not so sensitive. When an overall sound level is A-weighted it is expressed in units of dB(A).
Decibel scale	The decibel scale is logarithmic in order to produce a better representation of the response of the human ear. A 3 dB increase in the sound pressure level corresponds to a doubling in the sound energy. A 10 dB increase in the sound pressure level corresponds to a perceived doubling in volume. Examples of decibel levels of common sounds are as follows:
	0dB(A) Threshold of human hearing 30dB(A) A quiet country park 40dB(A) Whisper in a library 50dB(A) Open office space 70dB(A) Inside a car on a freeway 80dB(A) Outboard motor 90dB(A) Heavy truck pass-by 100dB(A) Jackhammer/Subway train 110 dB(A) Rock Concert 115dB(A) Limit of sound permitted in industry 120dB(A) 747 take off at 250 metres
Frequency [f]	The repetition rate of the cycle measured in Hertz (Hz). The frequency corresponds to the pitch of the sound. A high frequency corresponds to a high pitched sound and a low frequency to a low pitched sound.
Ambient sound	The all-encompassing sound at a point composed of sound from all sources near and far.
Equivalent continuous sound level [L_{eq}]	The constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy.
Reverberation	The persistence of sound in a space after the source of that sound has been stopped (the reverberation time is the time taken for a reverberant sound field to decrease by 60 dB)
Air-borne sound	The sound emitted directly from a source into the surrounding air, such as speech, television or music
Impact sound	The sound emitted from force of one object hitting another such as footfalls and slamming cupboards.
Air-borne sound isolation	The reduction of airborne sound between two rooms.
Sound Reduction Index [R] *(Sound Transmission Loss)*	The ratio the sound incident on a partition to the sound transmitted by the partition.
Weighted sound reduction index [R_w]	A single figure representation of the air-borne sound insulation of a partition based upon the R values for each frequency measured in a laboratory environment.

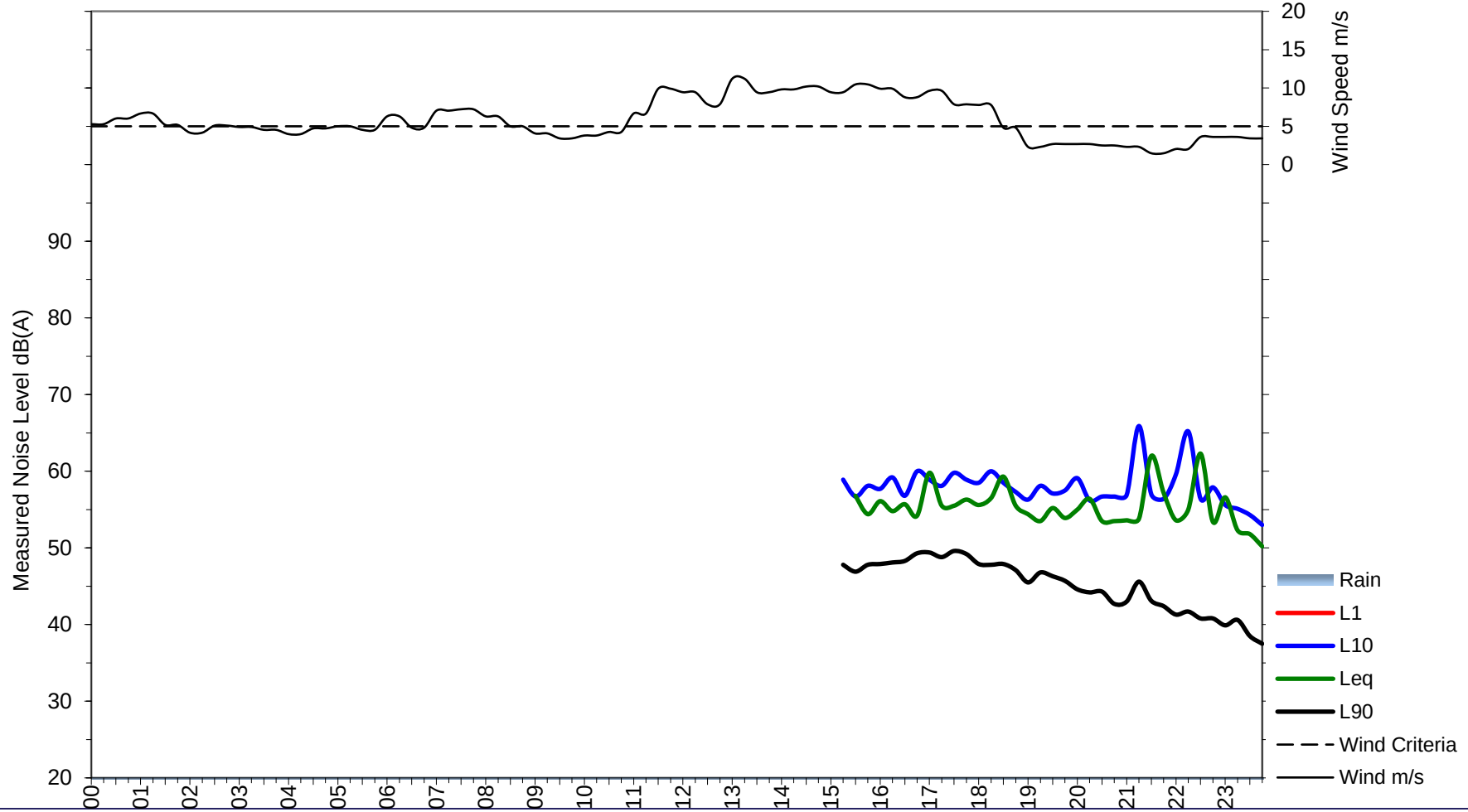
Level difference [D]	The difference in sound pressure level between two rooms.
Normalised level difference [D_n]	The difference in sound pressure level between two rooms normalised for the absorption area of the receiving room.
Standardised level difference [D_{nT}]	The difference in sound pressure level between two rooms normalised for the reverberation time of the receiving room.
Weighted standardised level difference [$D_{nT,w}$]	A single figure representation of the air-borne sound insulation of a partition based upon the level difference. Generally used to present the performance of a partition when measured in situ on site.
C_{tr}	A value added to an R_w or $D_{nT,w}$ value to account for variations in the spectrum.
Impact sound isolation	The resistance of a floor or wall to transmit impact sound.
Impact sound pressure level [L_i]	The sound pressure level in the receiving room produced by impacts subjected to the adjacent floor or wall by a tapping machine.
Normalised impact sound pressure level [L_n]	The impact sound pressure level normalised for the absorption area of the receiving room.
Weighted normalised impact sound pressure level [$L_{n,w}$]	A single figure representation of the impact sound insulation of a floor or wall based upon the impact sound pressure level measured in a laboratory.
Weighted standardised impact sound pressure level [$L'_{nT,w}$]	A single figure representation of the impact sound insulation of a floor or wall based upon the impact sound pressure level measured in situ on site.
C_I	A value added to an L_{nW} or $L'_{nT,w}$ value to account for variations in the spectrum.
Energy Equivalent Sound Pressure Level [$L_{A,eq,T}$]	'A' weighted, energy averaged sound pressure level over the measurement period T.
Percentile Sound Pressure Level [$L_{Ax,T}$]	'A' weighted, sound pressure that is exceeded for percentile x of the measurement period T.
Speech Privacy	A non-technical term but one of common usage. Speech privacy and speech intelligibility are opposites and a high level of speech privacy means a low level of speech intelligibility. It should be recognised that acceptable levels of speech privacy do not require that speech from an adjacent room is inaudible.
Sound Pressure Level, LP dB	A measurement obtained directly using a microphone and sound level meter. Sound pressure level varies with distance from a source and with changes to the measuring environment. Sound pressure level equals 20 times the logarithm to the base 10 of the ratio of the rms sound pressure to the reference sound pressure of 20 micro Pascals.
Sound Power Level, Lw dB	Sound power level is a measure of the sound energy emitted by a source, does not change with distance, and cannot be directly measured. Sound power level of a machine may vary depending on the actual operating load and is calculated from sound pressure level measurements with appropriate corrections for distance and/or environmental conditions. Sound power levels is equal to 10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 picoWatt
Noise Reduction	The difference in sound pressure level between any two areas. The term "noise reduction" does not specify any grade or performance quality unless accompanied by a specification of the units and conditions under which the units shall apply
Audible Range	The limits of frequency which are audible or heard as sound. The normal ear in young adults detects sound having frequencies in the region 20 Hz to 20 kHz, although it is possible for some people to detect frequencies outside these limits.

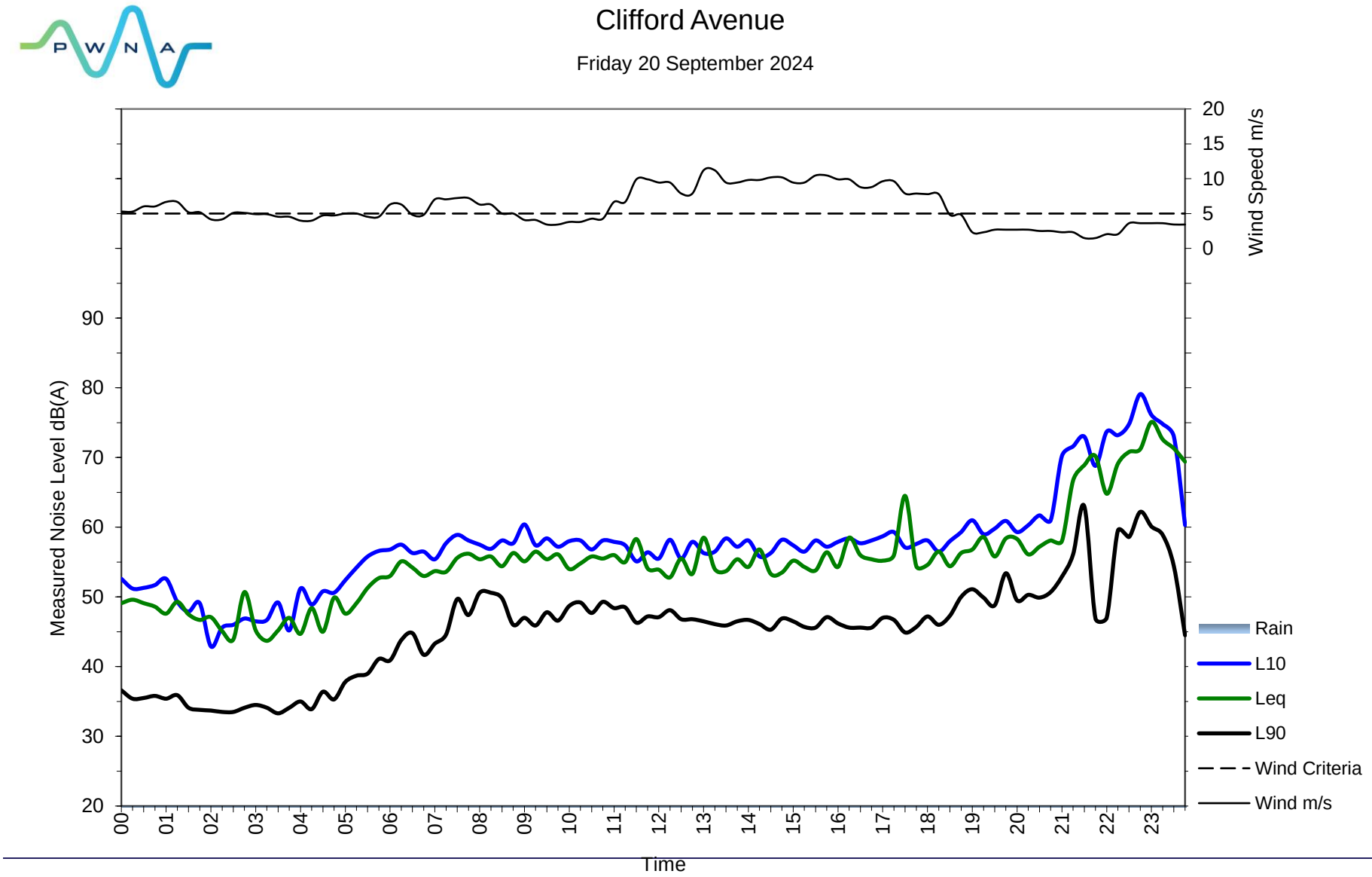
Background Sound Low	The average of the lowest levels of the sound levels measured in an affected area in the absence of noise from occupants and from unwanted, external ambient noise sources. Usually taken to mean the LA90 value
Character, acoustic	The total of the qualities making up the individuality of the noise. The pitch or shape of a sound's frequency content (spectrum) dictate a sound's character.
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on
LMax	The maximum sound pressure level measured over a given period.
LMin	The minimum sound pressure level measured over a given period.
L1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L10	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L90	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).
Leq	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.

APPENDIX B: NOISE LOGGING DATA

Clifford Avenue

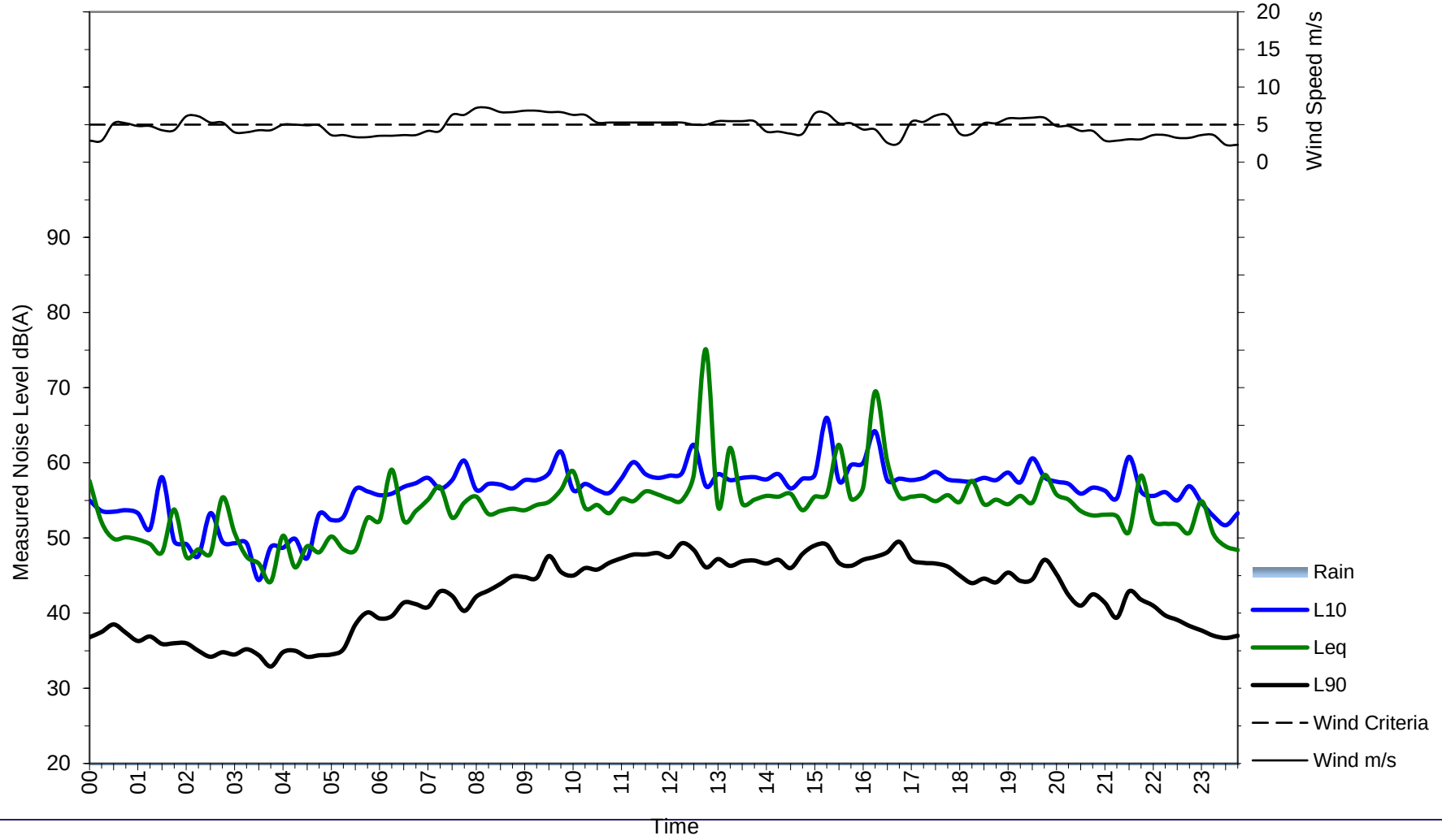
Thursday 19 September 2024




Clifford Avenue
Friday 20 September 2024
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria
Wind m/s

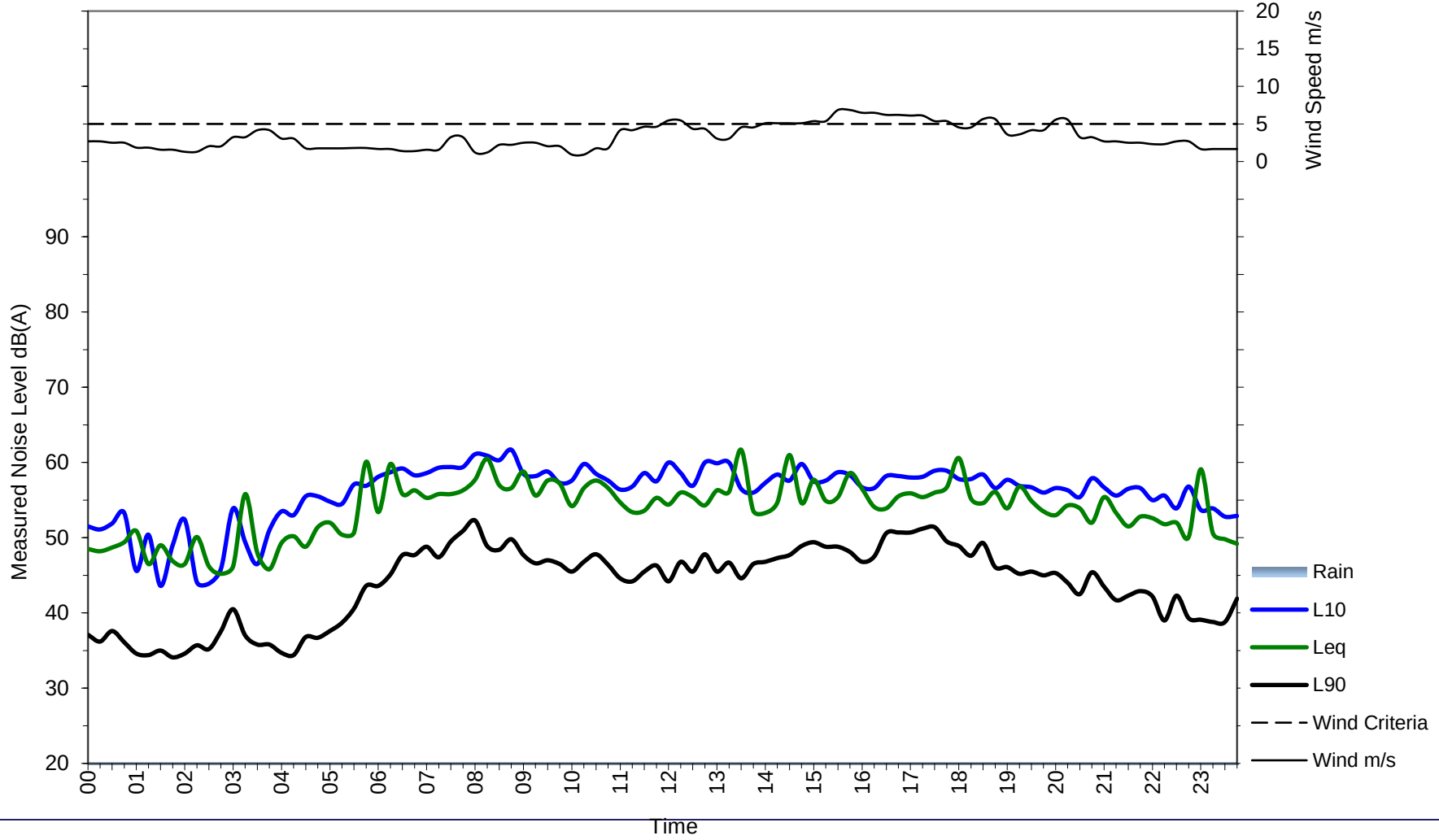
Clifford Avenue

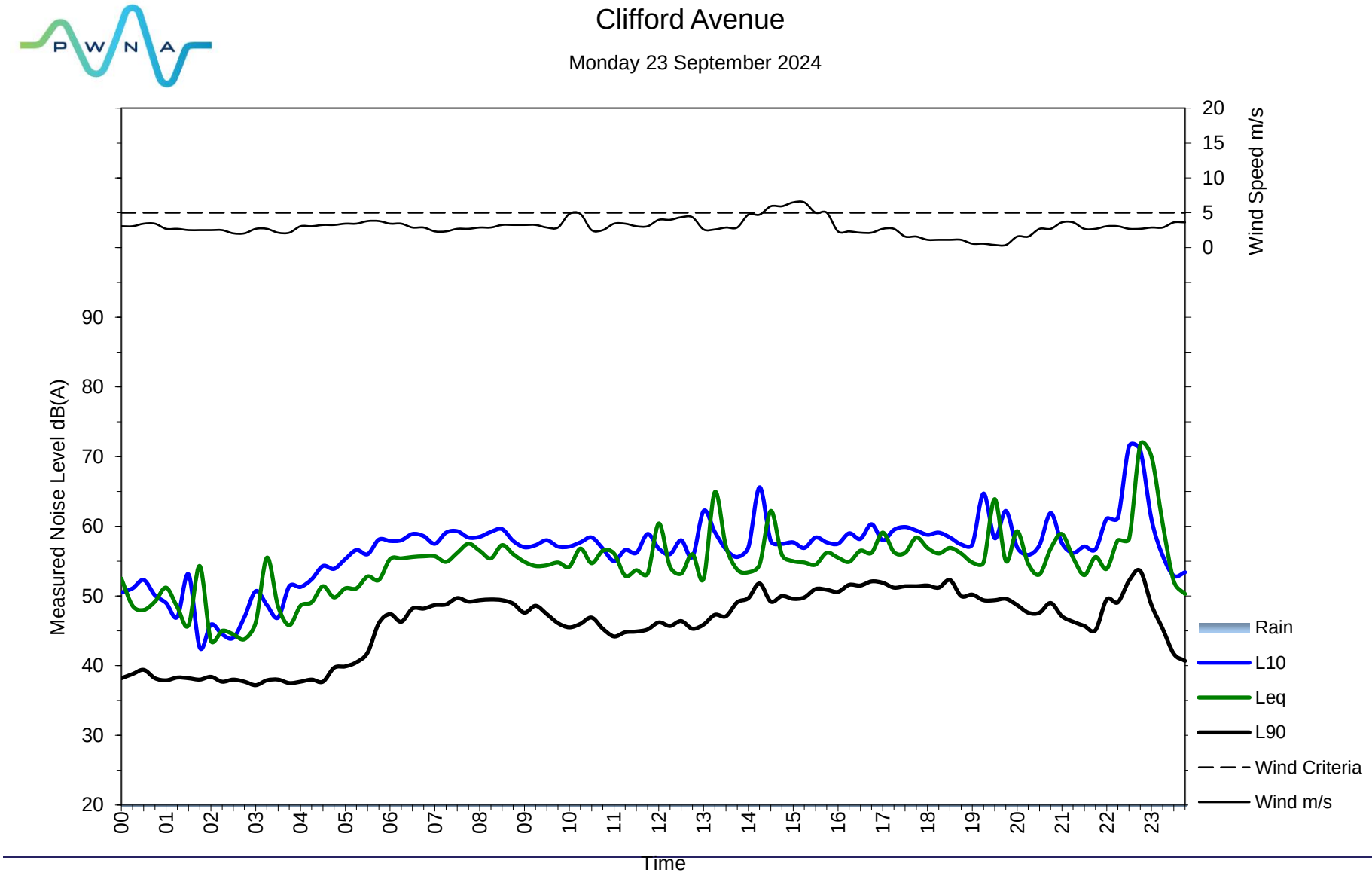
Saturday 21 September 2024

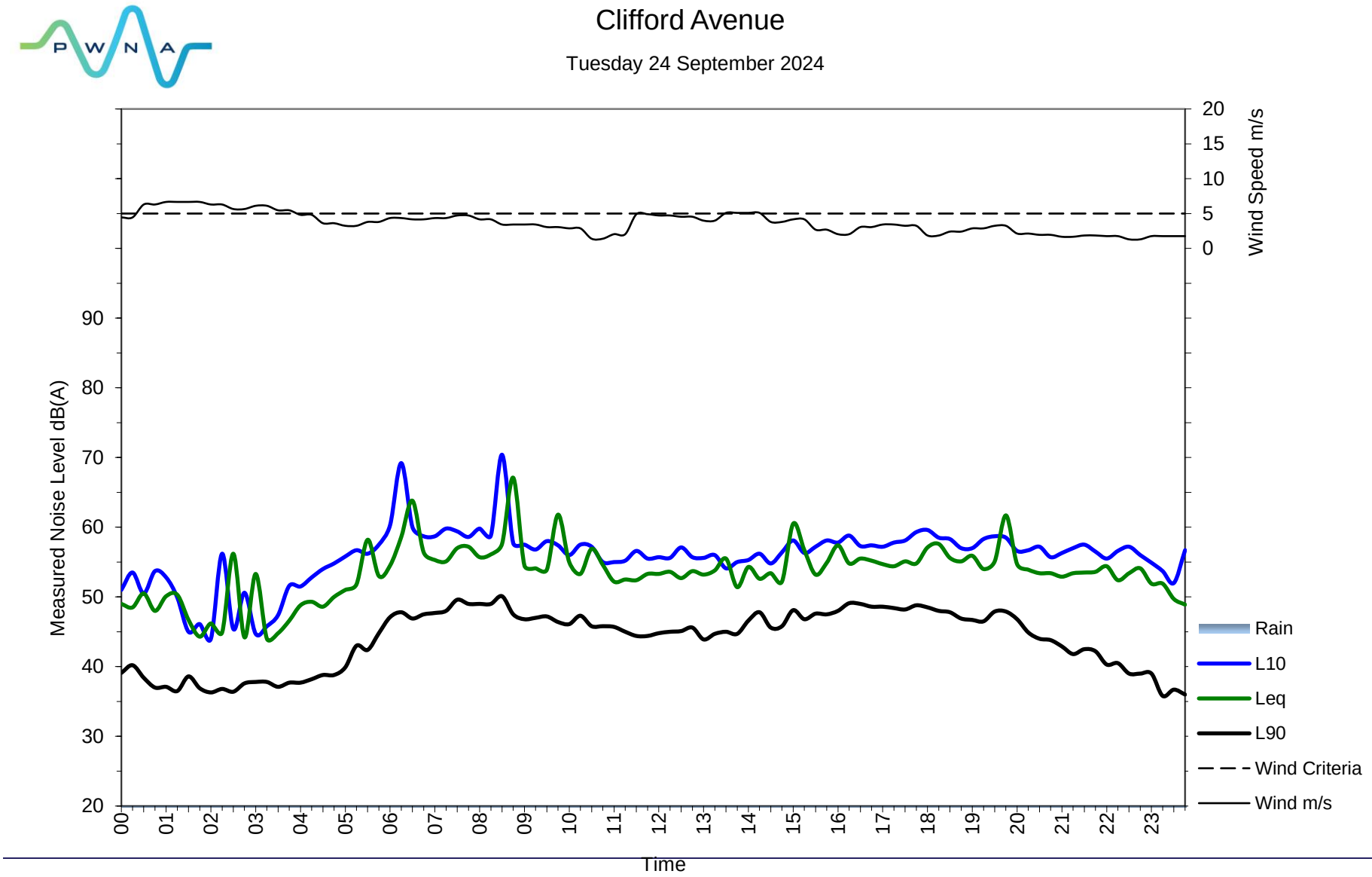


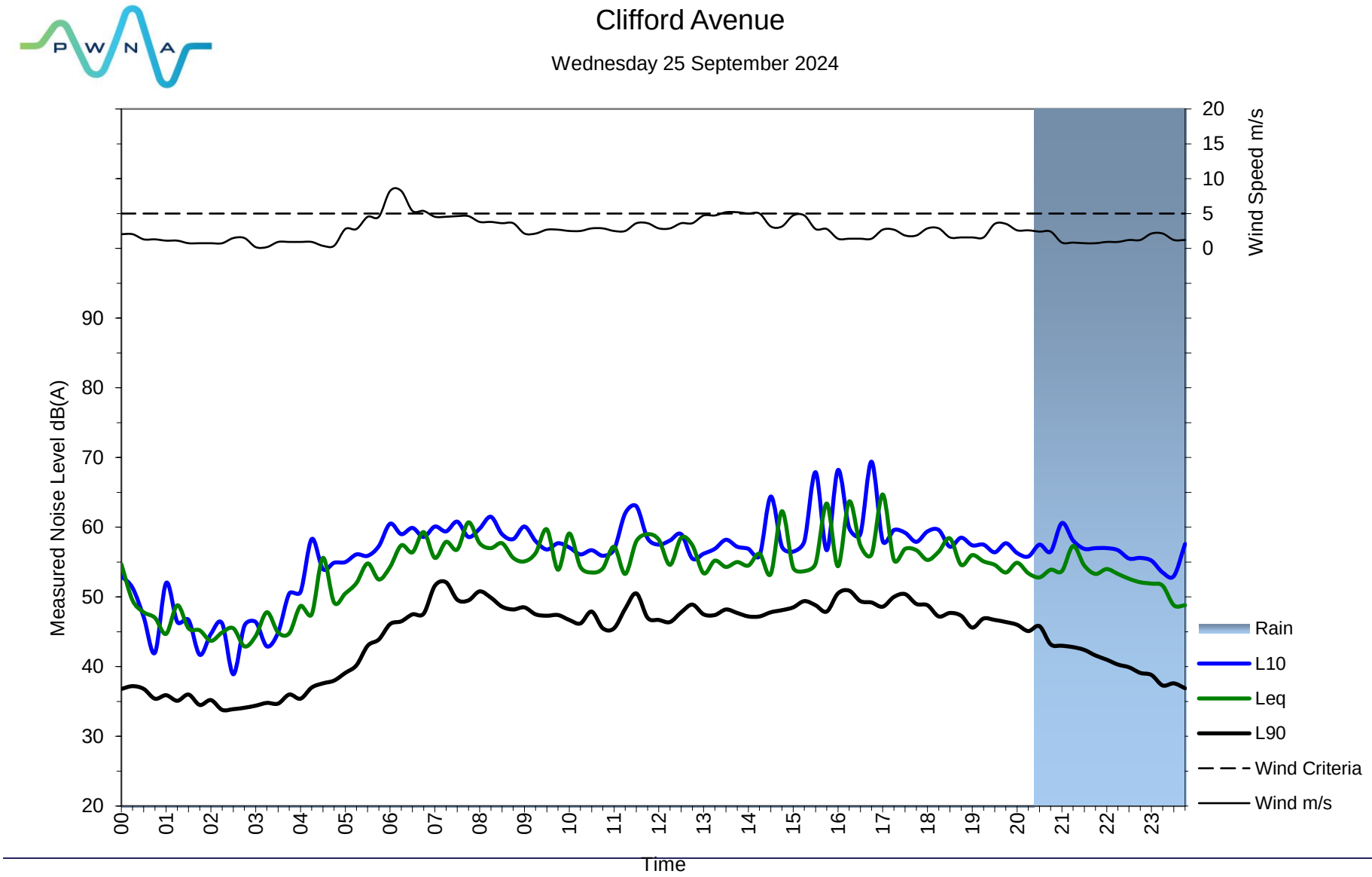
Clifford Avenue

Sunday 22 September 2024




Clifford Avenue
Monday 23 September 2024
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria
Wind m/s


Clifford Avenue
Tuesday 24 September 2024
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria
Wind m/s


Clifford Avenue
Wednesday 25 September 2024
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria
Wind m/s

Clifford Avenue

Thursday 26 September 2024