IGS INTEGRATED GROUP SERVICES

Value | Innovation | Trust

34-35 South Steyne, Manly

Noise Impact Assessment

29 June 2022
Project No. VE-N22_017

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Document Control

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R0	20/05/2022	Preliminary	Oudai Awad	OA	Mays Chalak	MC
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R2	29/06/2022	Final	Oudai Awad	OA	Mays Chalak	MC

Contents

1 INTRODUCTION

Integrated Group Services (IGS) has been engaged to undertake an acoustic assessment for the proposed commercial development to be located at 34-35 South Steyne, Manly project.

The proposed project includes the following:

1. 2 Basement levels including car parking and commercial floor space.
2. Ground floor including a retail tenancy.
3. 3 Levels of commercial space.
4. A roof top communal area.

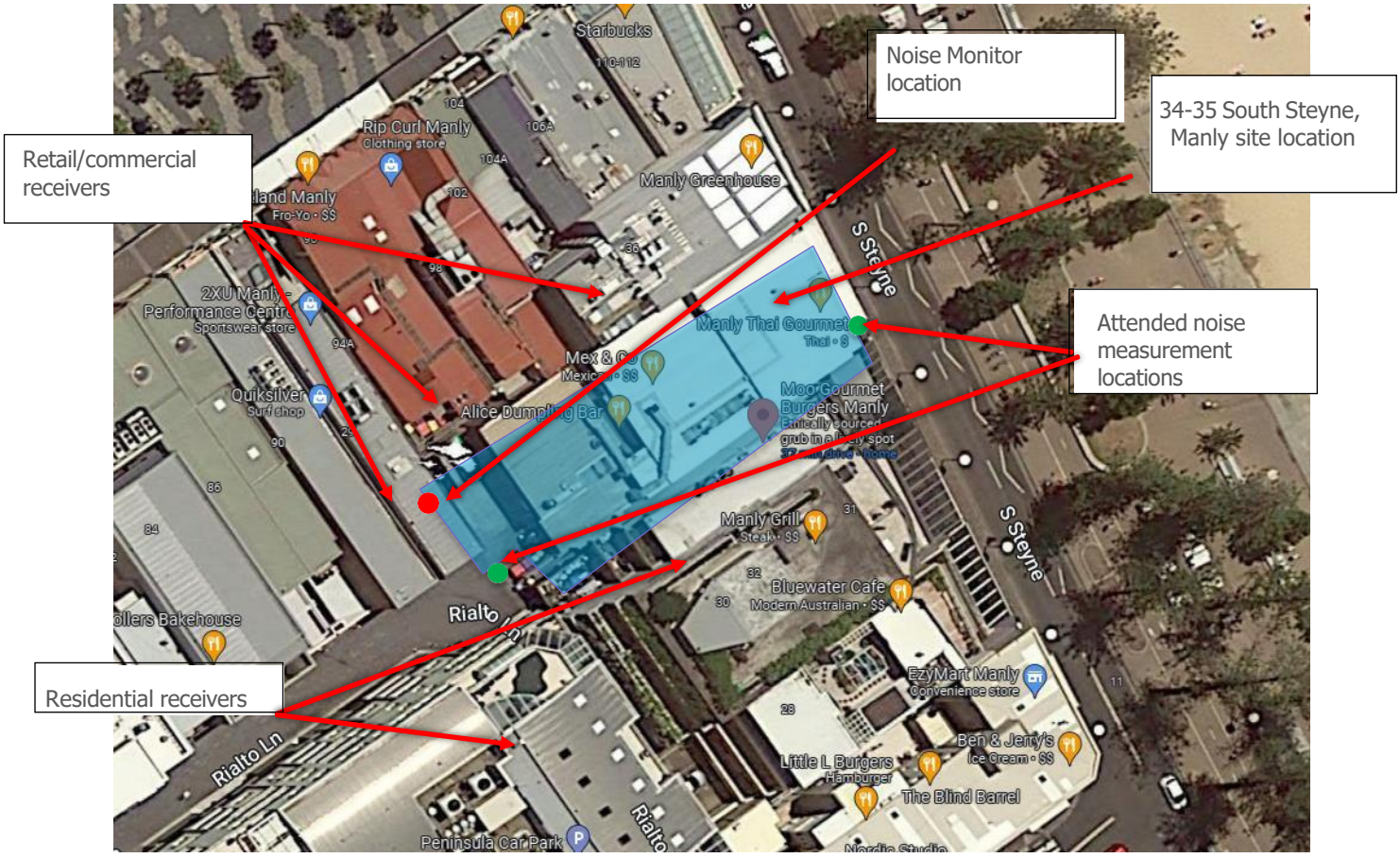
This assessment includes the acoustic investigation into the potential for noise impacts from the operation of the completed project as well as potential noise impacts from existing noise sources within the vicinity of the site which predominantly includes traffic noise from surrounding roadways as well as the train line to the north of the site.

2 PROJECT DETAILS

The proposed development is located at 34-35 South Steyne, Manly. The surrounding receivers to the site include exiting residential, commercial and retails receives.

The site location is detailed in Figure 2-1 below.

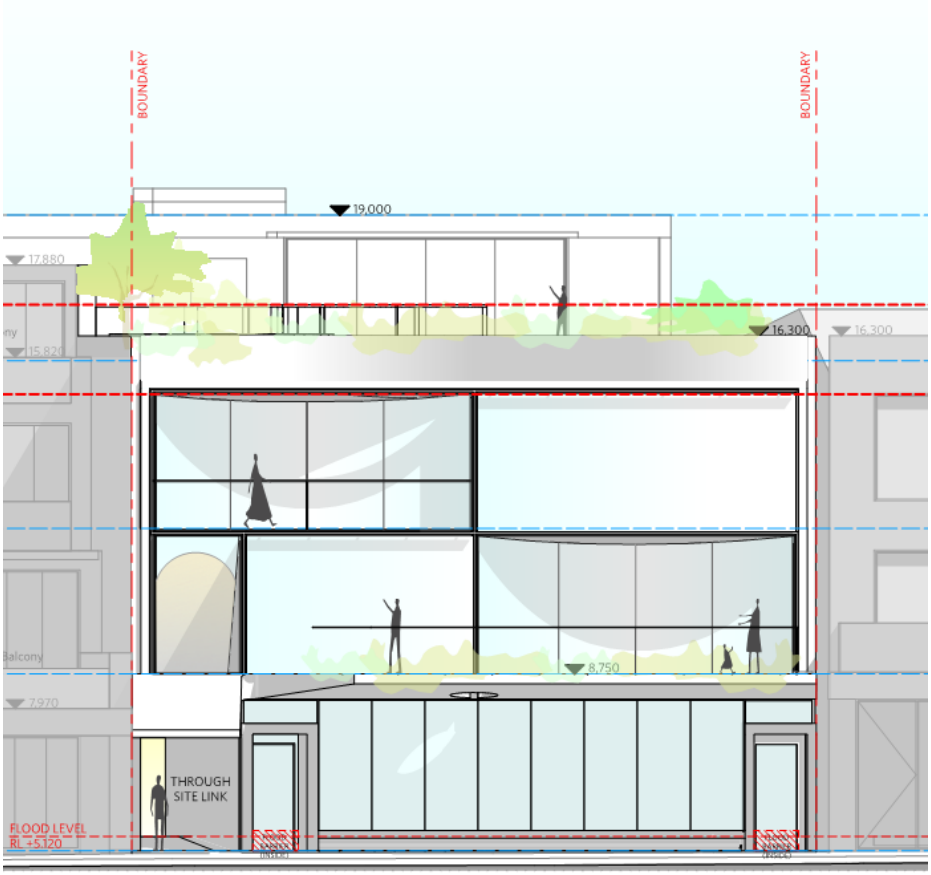
Figure 2-1 Site location and Noise Measurement Locations



2.1 Project Description

The proposed commercial development to be located at 34-35 South Steyne, Manly.
The proposed is located within the Northern Beaches Council Local Government area.
The proposed development is detailed in the Durbach Block Jagger architectural drawings and dated June 2022.
The proposed development is included in the figure below.

Figure 2-2 Proposed Development Montage



3 EXISTING ACOUSTIC ENVIRONMENT

The 34-35 South Steyne, Manly site is located with an area which is classified as Suburban residential area as defined by the NSW EPA *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 on surrounding roadways and existing land uses.

The site is located on South Steyne, which is not defined as a busy road 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*.

See the Figure below which includes the site location included on Map 16 of the RTA.

Figure 3-1 Site Location of Map 16 of the RTA's *Traffic Volume Maps for Noise Assessment for Buildings on Land Adjacent to Busy Roads*

3.1 Noise Descriptors and Terminology

Environmental noise constantly varies in level with time. Therefore, it is necessary to measure noise in terms of quantifiable time periods with 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' linear arithmetic does not apply, e.g. adding two sound sources of equal values result in an increase of 3 dB (i.e. 60 dBA plus 60 dB(A) 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 in Appendix A.

3.2 Noise Survey Results

As part of this assessment an acoustic survey has been undertaken at the site which include both long term unattended noise monitoring as well as short term attended measurements. The details of the noise survey conducted at the site are detailed in this section of the report.

3.2.1 Unattended Acoustic Monitoring

To determine the background noise levels at nearby receivers, long term unattended noise monitoring was conducted at the site. The location of the noise monitoring is detailed in Figure 2-1 above. As per Table A1 of the Noise Policy for Industry, the noise logger was placed in the vicinity of the reasonably most or potentially most affected residence for the purpose of assessing representative background noise levels.

3.2.2 Monitoring Instrumentation

Instrumentation used for the noise survey comprised a Rion NL-42 sound level meters / analysers fitted with a microphone windshield. Calibration of the loggers was checked prior to and following the measurements. Drift in calibration did not exceed ±0.5 dBA. 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. These charts, representing each 24 hour period, show the L_{A10}, L_{Aeq} and L_{A90} noise levels measured over 15 minute time periods.

Noise logging was conducted continuously between the 18th and the 25th May 2022 at the location detailed in Figure 2-1 above. The measurements results have been filtered to remove data affected by adverse weather conditions, such as excessively windy or rainy time periods, as recorded by the nearest Bureau of Meteorology weather station at Sydney Airport. Detailed noise logging results are shown in Appendix B.

The measured background noise data of the logger was processed in accordance with the recommendations contained in the NSW Environment Protection Authority's (EPA) *Noise Policy for Industry* (NPI).

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 the night. The RBL $L_{A90\ (15minute)}$ and L_{Aeq} noise levels are presented in Table 3-1 for the unattended logging. The measured noise levels are considered to be representative of the levels to be expected at the nearest and most affected residence to the proposed development.

Table 3-1 Measured ambient noise levels in accordance with the NSW NPI

Measurement Location	Daytime[1] 7:00 am to 6:00 pm		Evening[1] 6:00 pm to 10:00 pm		Night-time[1] 10:00 pm to 7:00 am	
	L_{A90}[2]	L_{Aeq}[3]	L_{A90}[2]	L_{Aeq}[3]	L_{A90}[2]	L_{Aeq}[3]
34-35 South Steyne, Manly	46	57	43	57	35	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 LAeq 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 Attended Noise Measurements

Attended noise testing was conducted at the site to supplement the noise logging completed 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 ($L_{90\ (t)}$) as well as the impact from traffic movements ($Leq_{(t)}$).

Attended noise level measurements were undertaken at the site on the 20th May 2022 during the afternoon period of 3pm to 5pm. The results of the attended noise level measurements are detailed in the table below.

Table 3-2 Measured ambient noise levels in accordance with the NSW NPI

Measurement Location	Time of measurement	Measured $L_{Aeq,\ 15min}$ dB(A)	Measured $L_{A90,\ 15min}$ dB(A)	Comments
Attended noise measurement South Steyne	3pm to 3.15pm	64	52	Noise levels resulting from natural noise sources and traffic noise from roadways within vicinity of the site
Attended noise measurement Rialto Lane	3.25pm to 3.40pm	52	41	

4 INTERNAL NOISE LEVEL ASSESSMENT

Internal noise levels within the future occupancies have been based on the relevant noise levels as detailed within the Australian Standard AS2107:2000 *Acoustics - Recommended design sound levels and reverberation times for building interiors*.

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

Table 4-1 Project Internal Environmental Noise Level Criteria

Type of Occupancy/Activity	**Design sound level maximum ($L_{Aeq,t}$)**
Common areas (e.g. foyer, lift lobby)	55 $L_{Aeq\ 24\ hour}$
Retail Tenancies	50 $L_{Aeq\ 15\ hour}$
Commercial Tenancies	45 $L_{Aeq\ 15\ hour}$
Toilets	45 $L_{Aeq15\ hour}$
Note 1: The criteria for commercial areas included within the Australian Standard have been used for the assessment of the proposed boarding house development.	

5 ENVIRONMENTAL NOISE INTRUSION ASSESSMENT

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 and aircraft 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.

5.1.1 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 5-1 External Glass Acoustic Requirements

Façade Orientation	Level	Room Type	Recommended Glass Construction	Minimum Façade Acoustic Performance[1]
Facing South Steyne	All Levels	Common Areas	10.38mm Laminated	Rw 35
		Commercial	10.38mm Laminated	Rw 35
		Retail	6.38mm Laminated	Rw 30
All other Façade Orientations	All Levels	Common Areas	6.38mm Laminated	Rw 30
		Commercial	6.38mm Laminated	Rw 30
		Retail	6.38mm Laminated	Rw 30
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 bulb seals.				

The recommended glass constructions detailed in the table above include those required to ensure the acoustic requirements of the project are achieved. Thicker glazing may be required to achieve other project requirements such as structural, thermal, safety or other requirements and is to be advised by others.

5.1 External Building Elements

The proposed external building elements including masonry or concrete external walls and roof are acoustically acceptable without additional acoustic treatment.

Any lightweight external pasteboard walls should be constructed from a construction with a minimum acoustic performance of Rw 45 to all façade elements.

5.2 External Roof

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

- Concrete external roof construction – no additional acoustic treatments required.
- Light weight construction – No additional upgrades to a standard construction required.

5.3 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 duct work behind mechanical service openings/grills, treatments to ventilation opening and the like.

6 EXTERNAL NOISE EMISSION ASSESSMENT

This section of the report details the relevant noise level criteria for noise emissions generated on the site once completed.

The relevant authority which provides the required noise level criteria for noise levels generated on the site includes the NSW Environmental Protection Authority's (EPA) Noise Policy for Industry (NPI).

This section contains noise criteria on the operational criteria, construction criteria and vibration criteria.

The following criteria are relevant for the assessment of noise and vibration emissions from the proposed training centre:

- For the assessment of the predicted operational noise emissions by the training facility: The criteria have been derived in accordance with the *Noise Policy for Industry* (EPA, 2017), details are included in the following sections of this report.

6.1 NSW Noise Policy for Industry

In NSW, the control of noise emissions is the responsibility of Local Government and the NSW Environment Protection Authority (NSW EPA). In October 2017, the NSW EPA released the *Noise Policy for Industry* (NSW NPI). The purpose of the policy is to ensure that noise impacts associated with particular industrial developments are evaluated and managed in a consistent and transparent manner. The policy aims to ensure that noise is kept to acceptable levels in balance with the social and economic value of industry in NSW.

The NSW NPI criteria for industrial noise sources have two components:

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

The project noise trigger level is derived from the more stringent value out of the project intrusiveness noise level and the project amenity noise level.

6.1.1 Intrusive Noise Impacts (Residential Receivers)

The NSW NPI 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 NPI. 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.

6.1.2 Protecting Noise Amenity (All Receivers)

To limit continuing increases 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.

6.1.3 Area Classification

The NSW NPI characterises the "Suburban" as an area that has through traffic with constant flows during all times of the day and is within proximity to commercial areas. This area would eb dominated by urban hum.

For the considered receptors in the urban area, the recommended amenity noise level is shown in Table 6-1 below. When the existing noise level from industrial noise sources is close to the recommended "Amenity Noise Level" (ANL) given above, noise from the new source must be controlled to preserve the amenity of the area in line with the requirements of the NSW NPI.

Table 6-1 NSW NPI – Recommended LAeq Noise Levels from Industrial Noise Sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day[1]	Recommended Amenity Noise Level ($L_{Aeq, period}$)[2]
Residence	Suburban	Day	55
		Evening	45
		Night	40
Commercial Receiver	-	When in use	65

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.

6.1.4 Project Trigger Noise Levels

The intrusive and amenity criteria for industrial noise emissions derived from the measured data are presented in Table 6-2. 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 project trigger noise levels are the lower (i.e. the more stringent) of the amenity or intrusive criteria. The project trigger noise levels are shown in bold text in Table 6-2.

Table 6-2 External noise level criteria in accordance with the NSW NPI

Location	Time of Day	Project Amenity Noise Level, $L_{Aeq, period}$ [1] (dBA)	Representative Background Noise level $L_{A90, 15\ min}$ (RBL) [2] (dBA)	Measured $L_{Aeq, period}$ Noise Level (dBA)	Intrusive $L_{Aeq, 15\ min}$ Criterion for New Sources (dBA) [3]	Amenity $L_{Aeq, 15\ min}$ Criterion for New Sources (dBA) [3, 4]
Residential Receivers	Day	50	46	57	**51**	53
	Evening	40	43	57	48	**43**
	Night	35	35	54	40	**38**
Commercial Receiver	When in Use	60	-	-	**-**	**63**

Note 1: Project Amenity Noise Levels corresponding to "Suburban" areas, equivalent to the Recommended Amenity Noise Levels minus 5 dBA

Note 2: L_{A90} Background Noise or Rating Background Level, including L_{A90} Background Noise or Rating Background Level based on the assumed minimum rating of the EPA NPfI.

Note 3: Project Noise Trigger Levels are shown in bold

Note 4: According to Section 2.2 of the NSW NPI, the LAeq, 15 minutes is equal to the LAeq, period + 3 dB

7 OPERATIONAL ACOUSTIC ASSESSMENT

This section of the report details the assessment of potential noise generated as part of the proposed development. The assessment of potential noise impacts from various sources of noise on the site are detailed in the following sections.

7.1 Mechanical Services Equipment

Detailed selections of the proposed mechanical plant and equipment to be used on the site 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:

- Basement 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 internal lined ducting.

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.

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.

7.2 Waste and Garbage Collections

Noise resulting from the removal of waste and garbage from the site, including garbage trucks and the like will be undertaken in accordance with council's waste management requirements.

Noise resulting from the collection of waste from the site will include intermittent collection using approved waste collection vehicles. The resulting noise impact resulting from the site will be similar to noise levels currently experienced by exiting receivers from exiting waste collection services, train noise and vehicle movements on surrounding roadways.

The recommended acoustic treatments to the building facade detailed in this report include those required to ensure internal noise levels within the future dwellings of the project from the collection of waste will be acoustically acceptable and compliant with the recommended internal noise levels.

7.3 Noise Impact on Local Roads

Based on the proposed car parking included within the basement levels an assessment for the potential of noise impact resulting from the additional vehicles using the site has been undertaken.

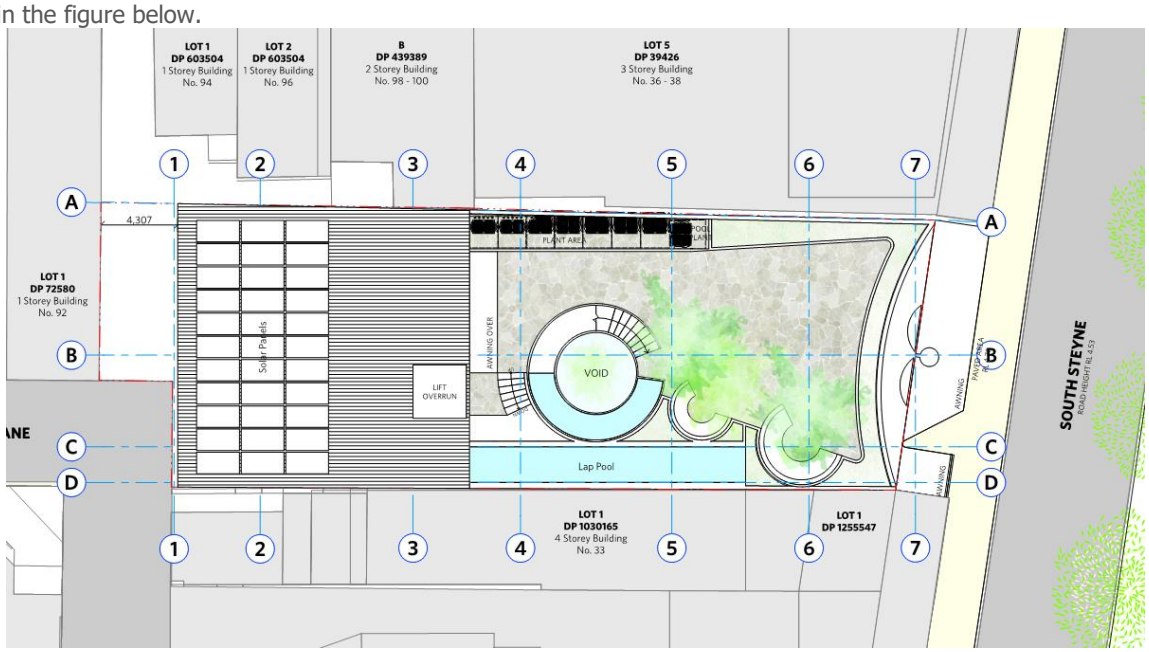
As part of this assessment, it has been assumed that the use of the carparking areas will include a maximum of 12 carparking spaces with the potential for all spaces to be refreshed in any given hour.

In order to generate an increase of 2 dB on local road traffic noise, existing traffic volumes should increase by approximately 60%.

Therefore, it is it is expected that the increase on existing traffic noise levels, due to the traffic generation, will be less than 2 dB on local roadways from traffic movements resulting from use of the site and will be acoustically acceptable.

7.4 Roof Top Terrace

The proposed development includes a roof top terrace area to be located on the roof of the building, as detailed in the figure below.



The proposed roof top terrace will include for the occupants of the building and guests only, including use of the lap pool.

For the purpose of this assessment, we have assumed the following noise levels:

- Single person talking – 69 dBA
- Background music– 70 dBA

To mitigate noise levels from the proposed roof top terrace area to within the required noise emission criteria detailed in this report the following acoustic mitigations are recommended:

i) Use of the roof top terrace is permitted for communal activities. The area is not to be used for high noise generating activities such as large gatherings, playing of loud music or parties.
ii) Amplified music is not permitted in the communal area or in the common room at any-time.
iii) Signs must be installed within the area outlining the recommendations above.

Providing the recommended acoustic mitigations detailed in the points above are included in the design and operation of the proposed roof top terrace the resulting noise emissions from the use of the terrace will comply with the noise emission criteria detailed in this report and will be acoustically acceptable.

8 CONCLUSION

Integrated Group Services (IGS) has been engaged to undertake the Noise Impact Assessment of the proposed commercial development located at 34-35 South Steyne, Manly.

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, SEPP and for environmental 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 including the following:

1. Operation of mechanical services on the site.
2. Collection of waste and garbage from the site.
3. The proposed roof top terrace and pool.

9 APPENDIX A: ACOUSTIC TERMINOLOGY

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:

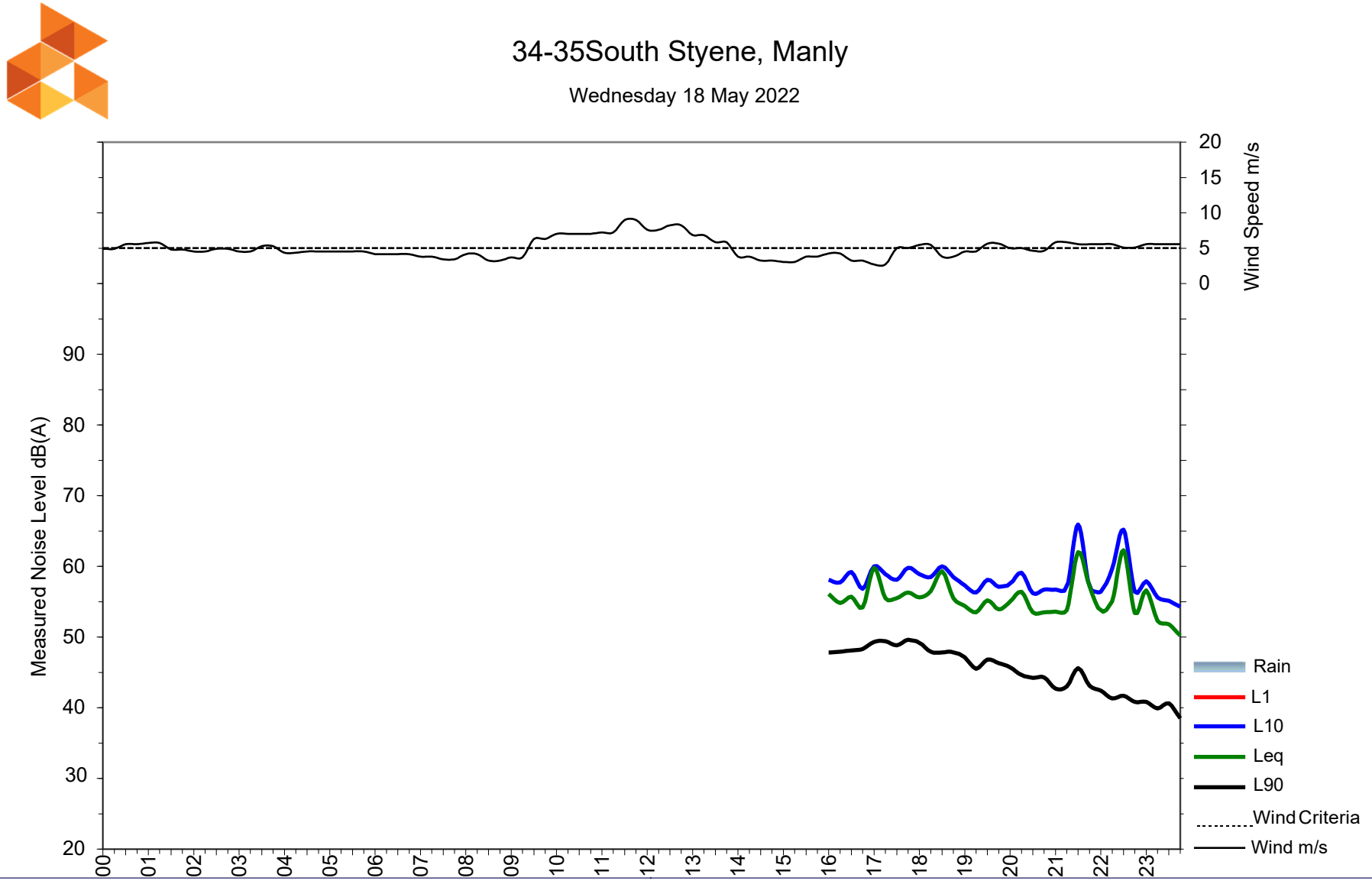
0dB(A)	Threshold of human hearing
30dB(A)	A quiet country park
40dB(A)	Whisper in a library
50dB(A)	Open office space
70dB(A)	Inside a car on a freeway
80dB(A)	Outboard motor
90dB(A)	Heavy truck pass-by
100dB(A)	Jackhammer/Subway train
110 dB(A)	Rock Concert
115dB(A)	Limit of sound permitted in industry
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.

*Definitions of a number of terms have been adapted from Australian Standard AS1633:1985 *"Acoustics – Glossary of terms and related symbols"*

10 APPENDIX B: UNATTENDED NOISE LOGGING


34-35South Styene, Manly
Wednesday 18 May 2022
Measured Noise Level dB(A)
Wind Speed m/s
20
15
10
5
0
90
80
70
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50
40
30
20
00
01
02
03
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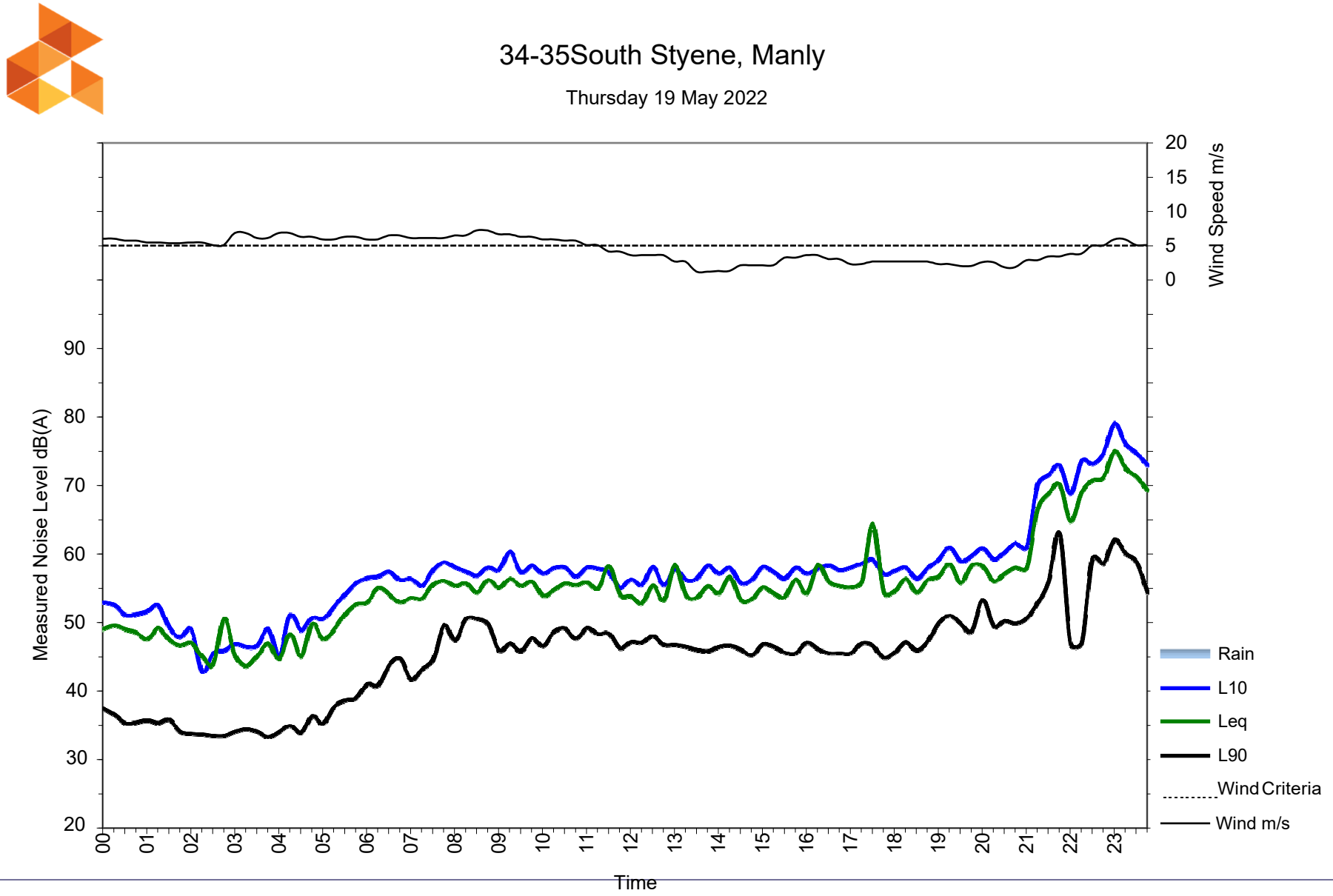
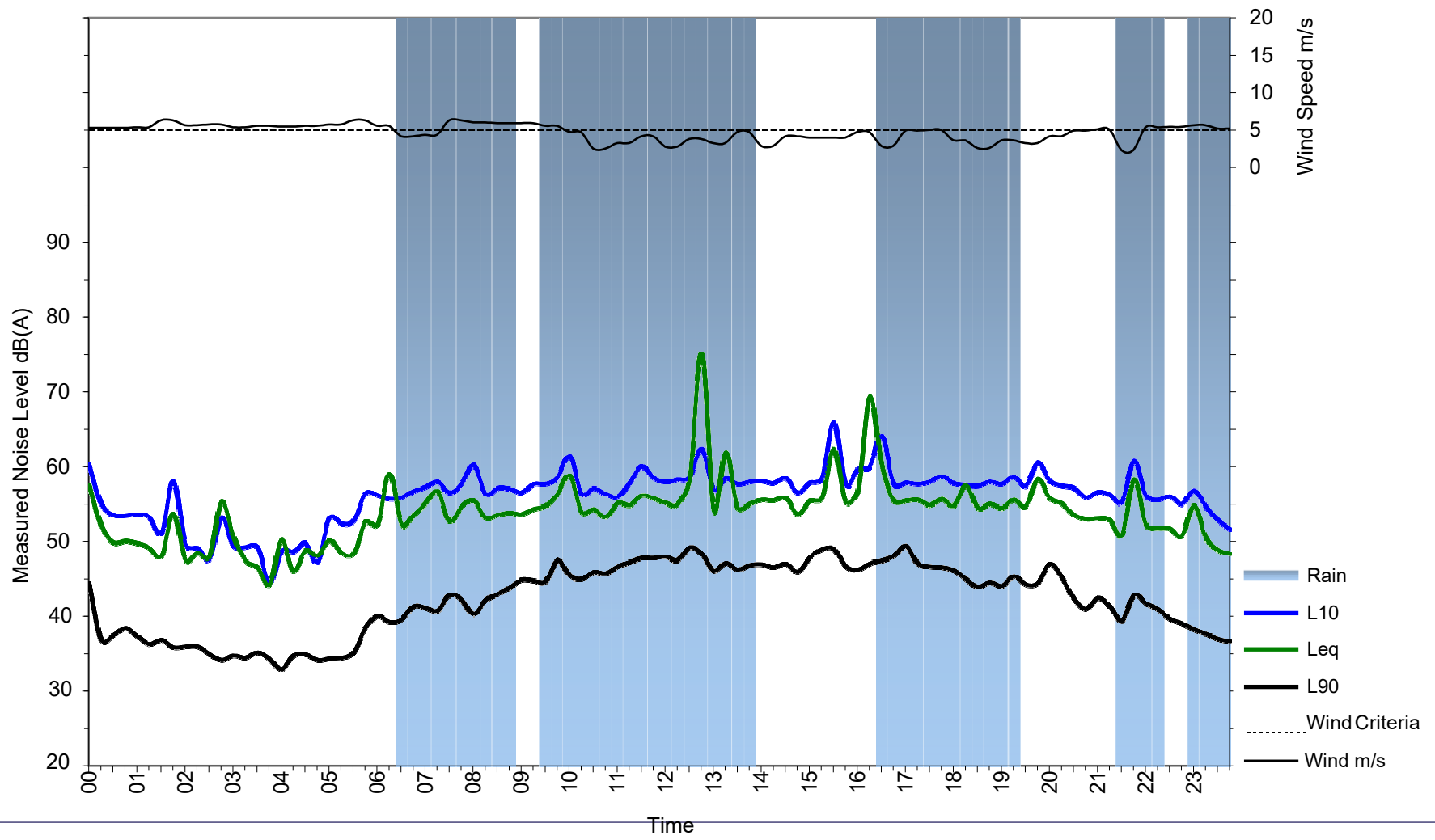
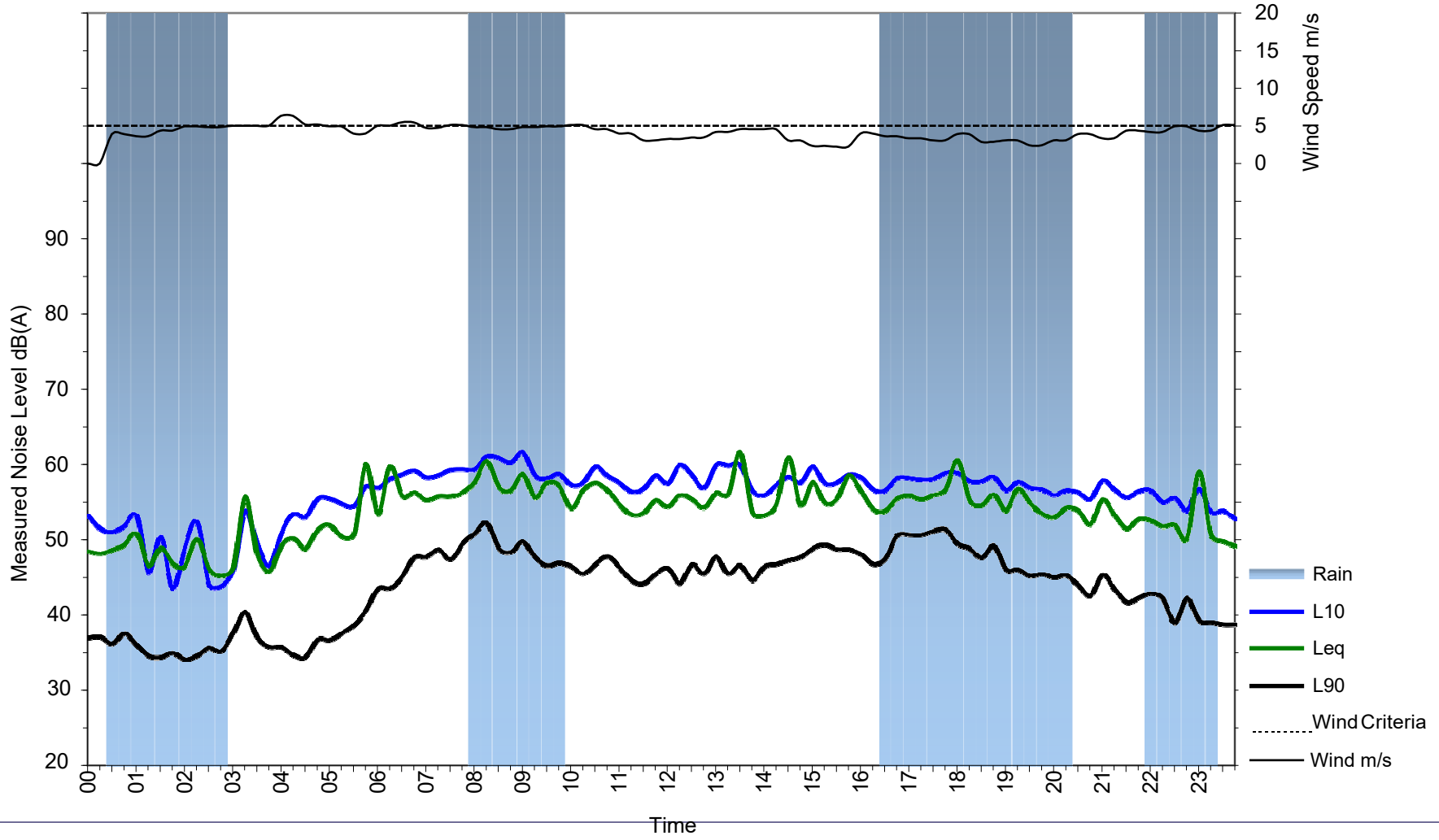
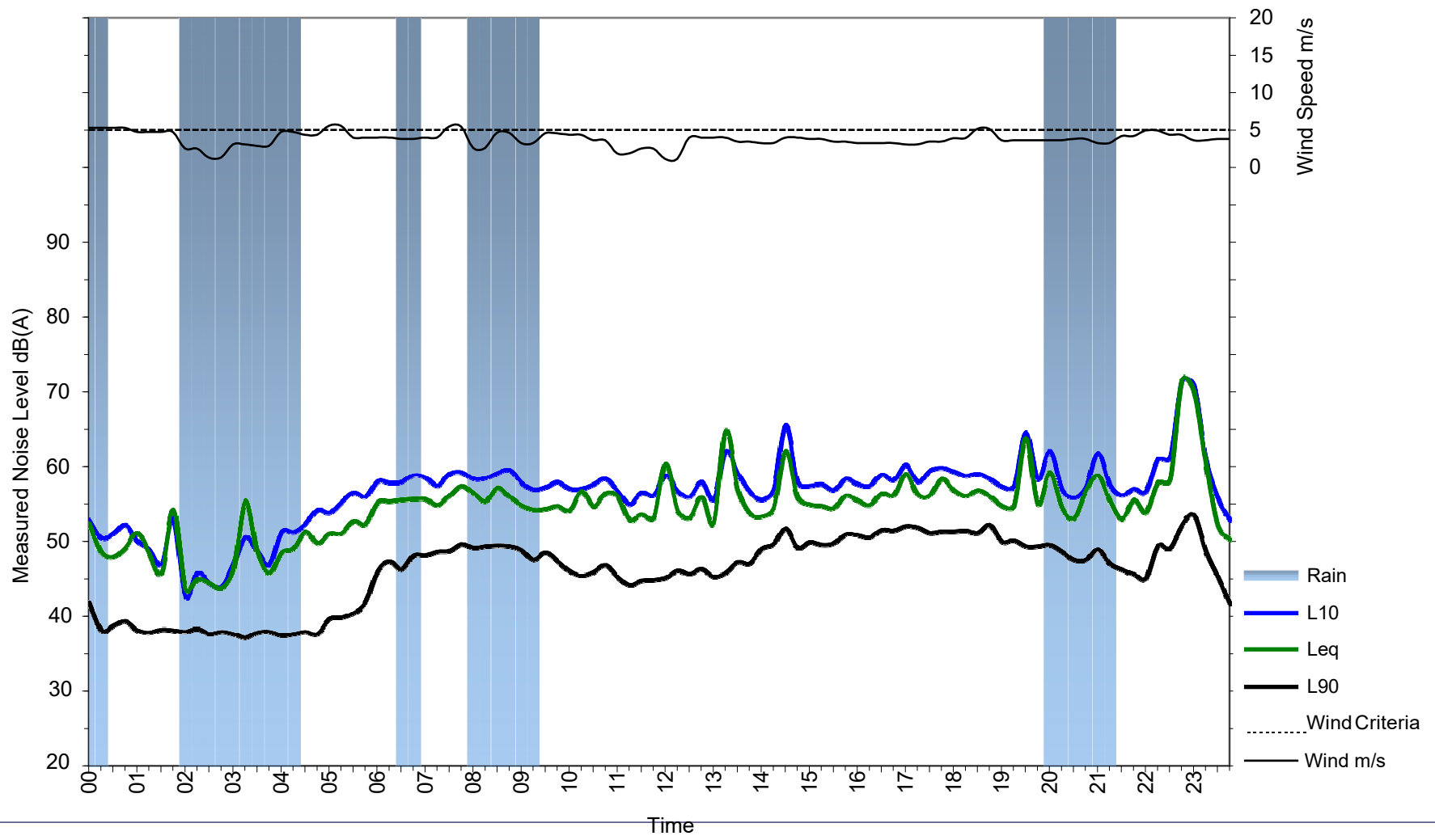
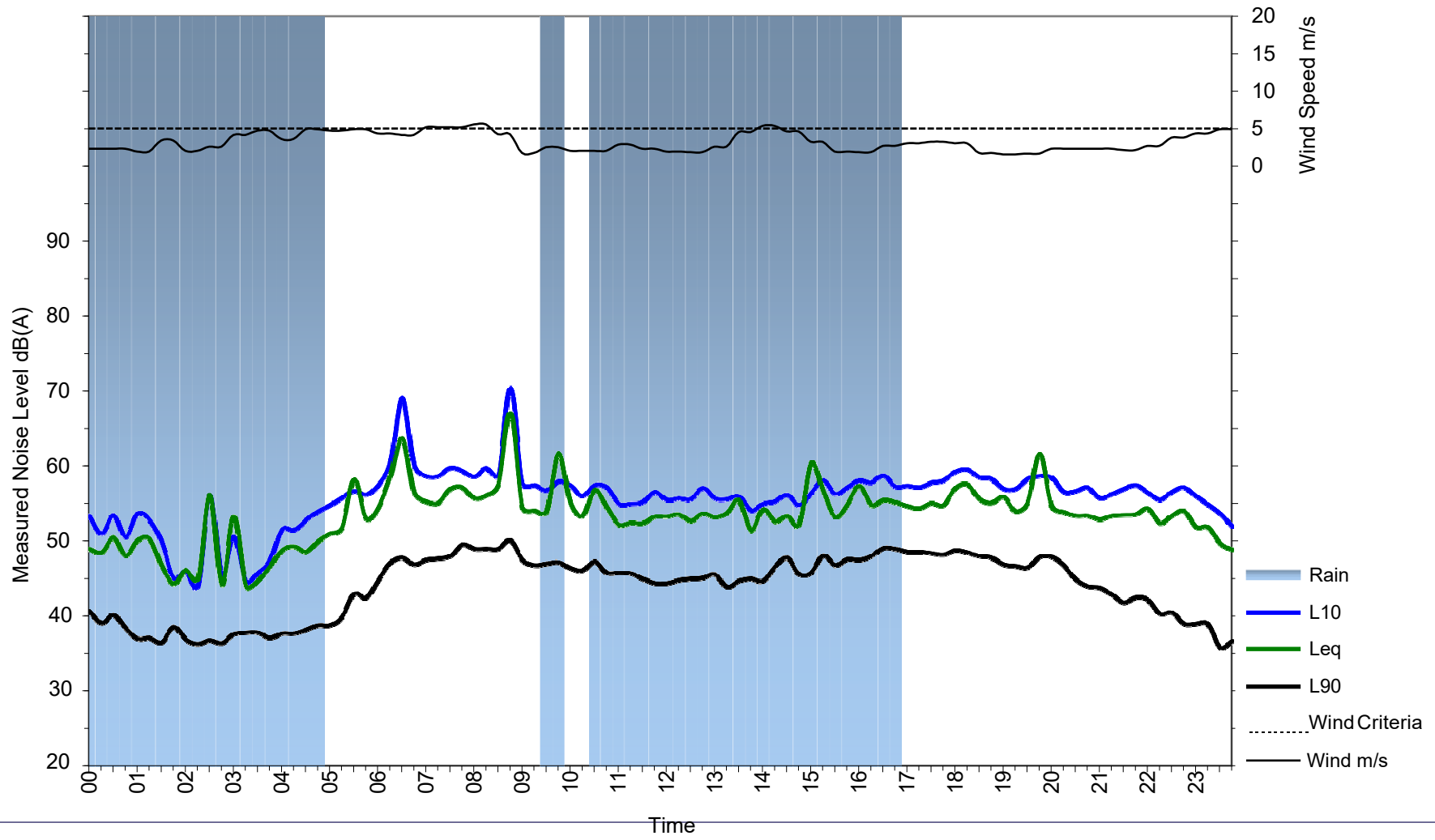
Time
Rain
L1
L10
Leq
L90
Wind Criteria
Wind m/s

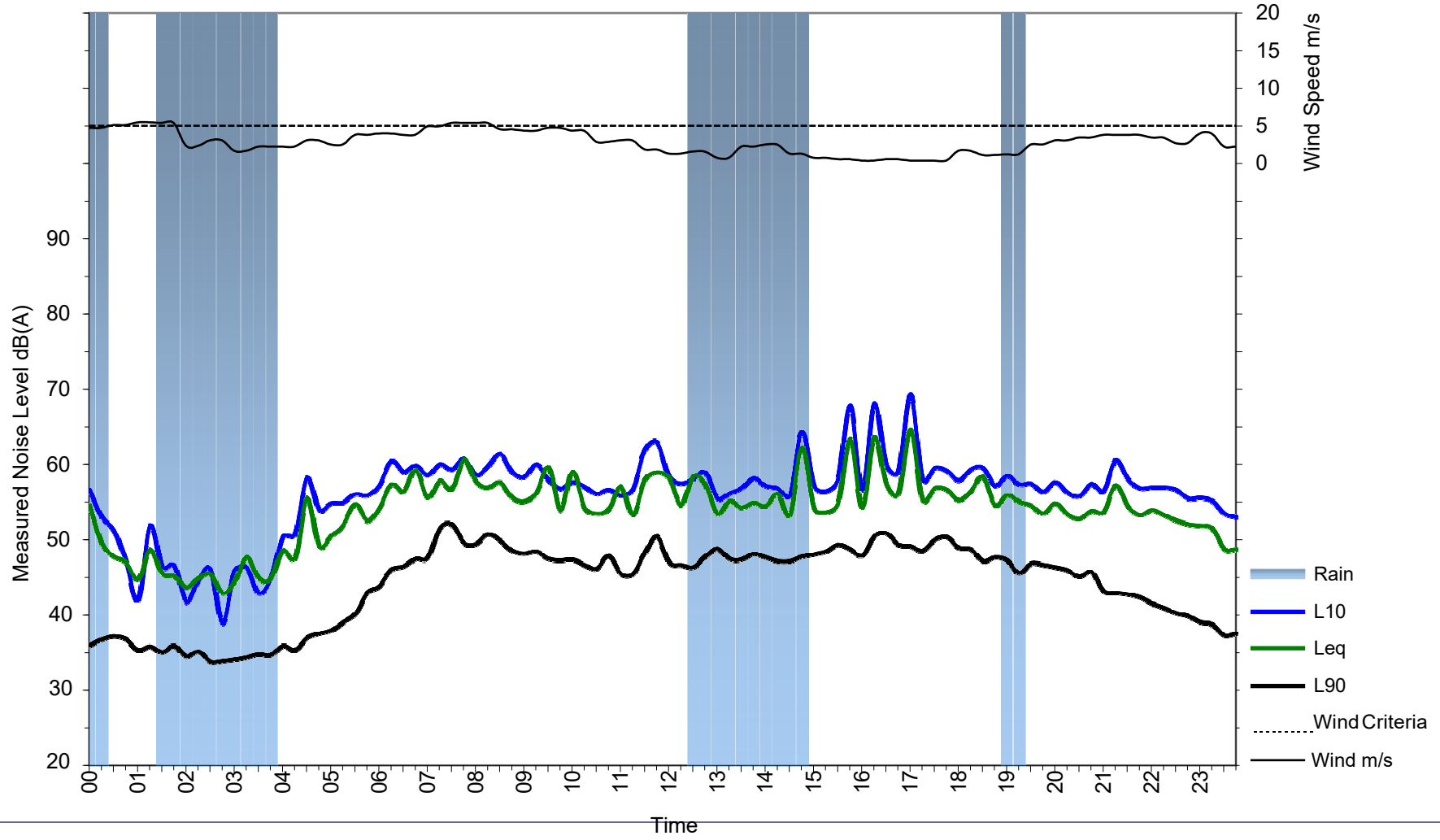

34-35South Styene, Manly
Thursday 19 May 2022
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria
Wind m/s

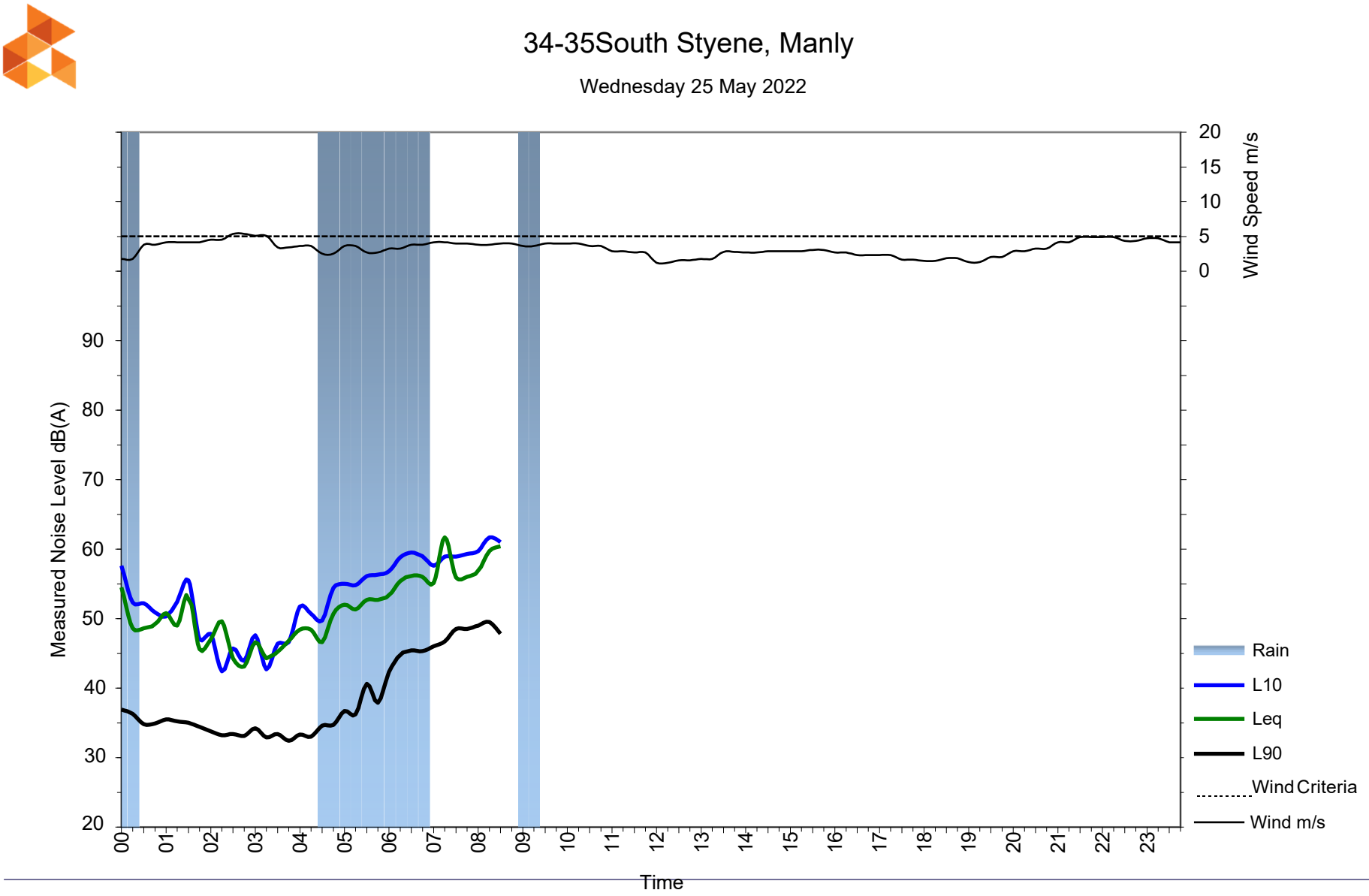

34-35South Styene, Manly
Friday 20 May 2022
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria
Wind m/s


34-35South Styene, Manly
Saturday 21 May 2022
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria
Wind m/s


34-35South Styene, Manly
Sunday 22 May 2022
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria
Wind m/s


34-35South Styene, Manly
Monday 23 May 2022
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria
Wind m/s


34-35South Styene, Manly
Tuesday 24 May 2022
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria
Wind m/s


34-35South Styene, Manly
Wednesday 25 May 2022
Measured Noise Level dB(A)
Wind Speed m/s
Time
Rain
L10
Leq
L90
Wind Criteria
Wind m/s