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REDCAPE HOTEL GROUP PTY  
LTD.

**80 O'SULLIVAN RD,  
LEUMEAH**

**NOISE IMPACT  
ASSESSMENT**

**wsp**

JUNE 2021

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80 O'Sullivan Rd, Leumeah  
Noise Impact Assessment

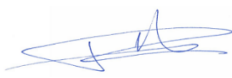


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APPENDIX A NOISE MONITORING LOGGER GRAPHS

# 1 INTRODUCTION

WSP Australia Pty Ltd (WSP) has been engaged by Redcape Hotel Group Pty Ltd to provide acoustic consultancy services for the proposed mixed used development located at 80 O'Sullivan Rd, Leumeah, NSW.

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## 1.1 PROJECT DESCRIPTION

The project site is located at 80 O'Sullivan Rd, Leumeah, NSW within Campbelltown City. The proposed site boundary is surrounded by commercial and residential developments.

The proposed development consists of the following:

- Two residential towers
- Ground floor retail and hotel/pub

This assessment establishes acoustic criteria for the proposed development:

- Noise emissions from mechanical plant;
  - Noise from road traffic generation;
  - Noise from traffic onto the development site;
  - Acoustic separation and BCA criteria; and
  - Entertainment Noise Limits from the hotel/pub.
- 

## 1.2 PROJECT INFORMATION

This report must be read in conjunction with the following project documentation:

- Redscape new residential development Leumeah, 19 May 2021 by Integrated Design Group (architectural documentation)
- 

## 1.3 DESIGN STANDARDS AND REFERENCE DOCUMENTS

This report has been written with reference to the following project documentation:

- Leumeah Precinct – Land Use and Infrastructure Analysis Plan dated November 2017
- Campbelltown (Sustainable City) Development Control Plan (DCP) 2015
- National Construction Code: Building Code of Australia 2019 (BCA)
- NSW Noise Policy for Industry 2017 (NSW NPfI)
- NSW Road Noise Policy 2011 (NSW RNP)
- NSW Interim Construction Noise Guideline 2009 (NSW ICNG)
- NSW State Environmental Planning Policy (Infrastructure) 2007 (NSW ISEPP)
- NSW Office of Liquor, Gaming and Racing 2013 standard conditions (NSW OLGR)
- Australian Standard 1055:2018 Acoustics – Description and Measurement of Environmental Noise (AS 1055)

## 2 EXISTING ENVIRONMENT

### 2.1 SITE LOCATION AND SENSITIVE RECEIVERS

The site is bounded by two street frontages being O'Sullivan Road to the west and Pembroke Road to the south of the site.

Receivers sensitive to noise as defined in the NPfI, have been identified in the area surrounding the Project.

Sensitive receiver locations are identified in Figure 2.1. A summary of the nearest receivers by type and distance to the proposed site are presented in Table 2.1.

Table 2.1 Identified nearest noise sensitive receivers

RECEIVER/ LOCATION	ADDRESS	TYPE OF RECEIVER (AS PER NSW NPfI)	APPROXIMATE DISTANCE FROM PROJECT SITE (m) <sup>1</sup>
R1	Residences along Pembroke Rd.	Residential	74
R2	6 Rudd Road	Commercial	135
R3	25 O'Sullivan Road	Commercial	104
R4	11 Rudd Road	Residential	140
R5	Residences along O'Sullivan Road (West)	Residential	77
R6	Residences along O'Sullivan Road (East)	Residential	Adjacent to the site
R7	4a O'Sullivan Road	Commercial	48
R8	Residences along 11 Old Leumeah Road	Residential	105

(1) Noted distances are approximate and for illustrative purposes only. Noise modelling to be undertaken based on actual distances from noise source to receiver.

The attended and unattended noise monitoring locations were conducted along the perimeter of the existing Leumeah Hotel as shown in Figure 2.1 to characterise the existing noise environment at the site as follows:

- NM01: on the roof of Leumeah Hotel (attended and unattended)
- NM02: at the carpark of Leumeah Hotel (attended only)





Figure 2.1 Project site and sensitive receiver locations



## 2.2 UNATTENDED NOISE SURVEY

This section provides a summary of the relevant baseline noise data, including the location, dates and measured noise levels.

The prevailing external noise environment must be established for the required assessment of acoustic sound insulation to mitigate noise egress.

The prevailing background and ambient noise levels surrounding the site were determined through a combination of unattended and operator attended noise surveys in accordance with the Australian Standard 1055:2018 *Acoustics – Description and Measurement of Environmental Noise* (AS 1055) and the NSW *Noise Policy for Industry* (NPfI).

### 2.2.1 WEATHER CONDITIONS

In accordance with the NSW NPfI, any noise monitoring results during adverse weather conditions have been excluded from the dataset. A number of adverse weather conditions were noted as occurring during the monitoring period.

Adverse weather conditions are defined in the NSW NPfI during periods with:

- Wind speeds higher than 5 m/s; and/or
- Any rain in the 15-minute period

Weather observations from Campbelltown weather station 94757 indicated some periods of adverse weather impacts.

Noise logging graphs including periods where data has been excluded due to weather conditions are presented in Appendix A.

### 2.2.2 INSTRUMENTATION AND QUALITY CONTROL

Details of the equipment used to conduct the noise and vibration survey are outlined within Table 2.2.

Table 2.2 Noise monitoring equipment

MANUFACTURER AND MODEL NO.	MANUFACTURER AND MODEL NO.	SERIAL NO.	CALIBRATION DUE DATE
Unattended Noise Logging (NM02)	Svantek Svan 958	36659	11 June 2022
Attended noise monitoring (NM01 & NM02)	Norsonic Nor140	1406502	4 February 2022
Calibrator	Rion NC-73	11248294	12 August 2021

The monitoring equipment was fitted with windshields and field calibrated before and after monitoring. No significant drifts in calibration ( $\pm 0.5$  dB) were noted.

All the monitoring equipment has a current certified calibration certificate (National Association of Testing Authorities, NATA) at the time of use

### 2.2.3 UNATTENDED NOISE MEASUREMENTS RESULTS

Unattended noise monitoring was conducted from Monday 7 June to Wednesday 16 June 2021.

The Rating Background Noise Level (RBL) is the background noise level used for assessment purposes at the nearest potentially affected receiver. The RBL is defined as the 90<sup>th</sup> percentile of the daily background noise levels during each assessment period. A summary of the measured RBL levels and  $L_{Aeq;15\text{minute}}$  noise levels are presented in Table 2.3.

Table 2.3 Summary of unattended noise measurements

LOCATION ID	TIME PERIOD	Ambient Noise Level, dBA $L_{eq,15\text{minute}}$ (as per NSW NPfl) <sup>1</sup>	dBA RBL (as per NSW NPfl) <sup>1</sup>	dBA RBL (as per NSW OLGR) <sup>2</sup>	TRAFFIC NOISE (as per NSW ISEPP) <sup>3</sup>
NM01	Day	60	54	52	60 dBA $L_{eq}$ (15hr, day)
	Evening	59	55		
	Night	55	50	50	56 dBA $L_{eq}$ (9hr, night)

(1) Day: the period from 7.00 am to 6.00 pm Monday to Saturday; or 8.00 am to 6.00 pm Sundays and public holidays; Evening: the period from 6.00 pm to 10.00 pm; Night: the remaining periods (as per the NPfl).

(2) Day: the period from 7.00 am to midnight; Night: midnight to 7.00 am (as per NSW OLGR for liquor licencing)

(3) Day: the period from 7.00 am to 10.00 pm; Night: 10.00 pm to 7.00 am (as per the ISEPP).

Average octave band noise levels measured by the unattended monitor used for the assessments outlined in this report are presented in Table 2.4.

Table 2.4 Measured octave band noise levels

LOCATION	TIME	OVERALL	dB at 1/1 OCTAVE BAND CENTRE FREQUENCY (Hz)								
			31.5	63	125	250	500	1k	2k	4k	8k
NM01	Day (7am to midnight)	52 dBA $L_{90}$ (15-minute)	52	51	48	49	44	50	44	32	35
NM01	Night (midnight to 7am)	50 dBA $L_{90}$ (15-minute)	51	51	47	49	42	47	41	34	37
NM01	Day (7am to 10pm)	60 dBA $L_{eq}$ (15hr, day)	-	62	61	56	54	55	53	51	44
NM01	Night (10pm to 7am)	56 dBA $L_{eq}$ (9hr, night)	-	59	58	54	53	52	48	42	38

## 2.3 OPERATOR ATTENDED NOISE MEASUREMENTS

WSP carried out operator attended measurements to characterise the noise environment and identify the contributors to the acoustic environment. Operator attended measurements were conducted on Monday 7 June 2021.

The results of the attended noise surveys and observations are detailed in Table 2.5.



Table 2.5 Summary of attended noise monitoring results

LOCATION	TIME	dBA L <sub>eq,15minute</sub>	dBA L <sub>90,15minute</sub>	OBSERVATIONS
NM01	2:30 pm to 2:45pm	56	52	<p>Key sources of noise included are train, traffic, carpark and bird noise. Road traffic noise on Pembroke Road perceived to be dominant noise source</p> <p>Train passby: 53 dBA, 54 dBA</p> <p>Birds chirping: 55 dBA</p> <p>Traffic noise on Pembroke Road: 54 dBA, 59 dBA</p> <p>Carpark movement: 59 dBA, 62 dBA</p>
NM02	2:45 pm to 3:10 pm	57	49	<p>Train passby: 52 dBA, 50 dBA</p> <p>Vehicle passby: 59 dBA, 63 dBA, 66 dBA</p> <p>Birds chirping: 53 dBA</p>

## 3 PROJECT CRITERIA

### 3.1 DESIGN STANDARDS

Noise and vibration criteria applicable to the project are derived from various Australian Standards, local and state policies and industry guidelines.

Table 3.1 Summary of noise sources and applicable policies and guidelines

ASSESSMENT	APPLICABLE POLICIES AND GUIDELINES	RELEVANT ASPECTS OF DEVELOPMENT
Environmental noise emissions	NSW EPA Noise Policy for Industry (NPfI) Campbelltown (Sustainable City) Development Control Plan (DCP) 2015	— Noise from sources (such as mechanical plant) associated with the development — Noise emissions from vehicular movements on the site, car parking and loading dock/waste pickup activities
External noise intrusion	Campbelltown (Sustainable City) Development Control Plan (DCP) 2015	— Noise from road and rail traffic onto the development
Road traffic noise emissions	NSW Road Noise Policy 2011 (NSW RNP)	— Noise from additional traffic on public road generated by the development
Sound insulation	Building Code of Australia, Part F5	— Sound insulation between sole occupancy units
Entertainment noise	NSW Office of Liquor, Gaming and Racing 2013 standard conditions (NSW OLGR)	— Patron noise and amplified music from licenced and gaming areas.
Construction noise	NSW Interim Construction Noise Guideline (NSW ICNG)	— Noise from construction activities

### 3.2 CAMPBELLTOWN CITY DEVELOPMENT CONTROL PLAN

The Campbelltown City Development Control Plan (DCP) 2015 outlines the following acoustic requirements applicable to the proposed development:

#### 3.4 General Requirements for all Type of Residential Development

##### *3.4.3.1 Acoustic Privacy – Design Requirements*

*a) Development that adjoins significant noise sources, (such as main roads, commercial/industrial development, public transport interchanges and railways) shall be designed to achieve acceptable internal noise levels, based on recognised Australian Standards and any criteria and standards regulated by a relevant State Government Authority.*

*b) Development shall incorporate noise attenuation measures that are compatible with the scale, form and character of the street.*

*c) On-site noise generating sources including, but not limited to, plant rooms and equipment, air conditioning units, pool pumps, and recreation areas shall be designed and located to ensure that the noise levels generated by such facilities do not exceed 5 dBA above background levels at the property boundary.*

Compliance with the above clause is included in the determination of the Project Noise Trigger Levels as outlined in Section 3.3.2.

### 3.5 Ancillary Residential Structures

#### 3.5.3.2 Swimming Pools/Spas – Setbacks

*e) Adequate measures shall be implemented to ensure the amenity (noise/privacy) of adjoining neighbours is maintained.*

*f) The pool pump/filter shall be located as far away as practicable from neighbouring dwellings and shall be enclosed in an acoustic enclosure to minimise noise impacts on adjoining properties.*

Compliance with the above clause is expected where noise emissions from the pool complies with the Project Noise Trigger Levels as outlined in Section 3.3.2.

### 5.4 General Requirements for Residential Flat Buildings & Mixed-Use Development

#### 5.4.4 Acoustic Privacy

*a) Residential flat buildings, and the residential component of a mixed-use development shall provide noise mitigation measures to ensure that the following LAeq levels are not exceeded:*

*i) in any bedroom in the building—35 dBA,*

*ii) anywhere else in the building (other than a garage, kitchen, bathroom or hallway)—40 dBA.*

*Note: Noise mitigation measures for residential flat buildings and the residential component of a mixed use development may include insulating building elements such as doors, walls, windows, floors, roof and ceilings. Options for window design include sealing air gaps around windows and doors, laminated or thick glass, and double-glazing.*

Compliance with the above clause is expected where internal noise levels comply with the criteria as outlined in Section 3.4.

### 7.7 Environmental Management

#### 7.7.3 Noise – Design Requirements

*a) Any development that is likely to or capable of generating levels of noise exceeding the requirements of the Industrial Noise Policy (published by the Office of Environment and Heritage) shall demonstrate appropriate measures to mitigate against noise pollution.*

The NSW Industrial Noise Policy 2000 was superseded by the NSW Noise Policy for Industry 2017. As per the guidance notes in the NSW NPfI, compliance with the above clause expected with the NPfI assessment in Section 3.3.13.3.1 and the determination of the Project Noise Trigger Levels as outlined in Section 3.3.2.

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## 3.3 ENVIRONMENTAL NOISE EMISSIONS

### 3.3.1 NOISE POLICY FOR INDUSTRY

The following section provides an overview of the relevant acoustic criteria applicable to the proposed mixed use residential development based on the requirements of the NSW NPfI.

### 3.3.1.1 OVERVIEW

The NSW NPfI sets out NSW EPA requirements for assessment and management of noise from Industry in NSW. The NSW NPfI prescribes methods for determining the statutory environmental noise limits that apply to noise sensitive receivers with regards to individual noise sources only.

The assessment procedure for industrial noise sources has two components:

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

In assessing the noise impact of industrial sources, both components must be considered for noise sensitive receivers. In most cases, only one will become the limiting criterion and form the project-specific noise levels for the industrial source under assessment. The intrusive noise criteria do not apply to non-residential receivers, instead an amenity criterion is applicable to these receivers.

In addition to the above, the potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered.

### 3.3.1.2 PROJECT INTRUSIVENESS NOISE LEVEL

The assessment of intrusive noise due to industrial sources states:

*The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the  $L_{Aeq}$  descriptor), measured over a 15-minute period, does not exceed the background noise level by more than 5 dB when beyond a minimum threshold.*

The intrusiveness criterion for residential receivers prescribed may be summarised as:

$$L_{Aeq, 15\text{-minute}} \leq \text{Rating Background Level (} L_{A90} \text{)} + 5 \text{ dB}$$

Based on the background noise level measured during the day, evening and night periods, the RBL and intrusiveness criterion shown in Table 3.2 has been established for the proposed development in accordance with the NSW NPfI.

Table 3.2 Established Project Intrusiveness Noise Level, residential receivers only

RECEIVER LOCATION	NSW NPfI TIME PERIOD <sup>1</sup>	RBL dBA	PROJECT INTRUSIVENESS NOISE LEVEL (RBL + 5 dB) dBA $L_{eq,15\text{minute}}$
Residential receivers	Day	54	59
	Evening	55	59 <sup>2</sup>
	Night	50	55

- (1) Day: the period from 7.00 am to 6.00 pm Monday to Saturday; or 8.00 am to 6.00 pm Sundays and public holidays; Evening: the period from 6.00 pm to 10.00 pm; Night: the remaining periods.
- (2) As per Section 2.3 of the NSW NPfI, it is recommended that the project intrusiveness level for evening and night periods are no greater than the project intrusiveness noise level for day.

### 3.3.1.3 PROJECT AMENITY NOISE LEVEL

To limit continuing increases in noise levels from application of the intrusiveness level alone, the ambient noise level within an area from all industrial noise sources combined should remain below the recommended amenity noise levels prescribed in the NSW NPfI where feasible and reasonable.

The recommended amenity noise levels (ANL) represent the objective for total industrial noise at a receiver location, whereas the project amenity noise level represents the objective for noise from a single industrial development at a receiver location.

**Project amenity noise level for industrial development = recommended amenity noise level (Table 2.2 of NSW NPfI) minus 5 dB(A)**

The amenity criterion has been established at the identified receivers based on the results of the unattended noise survey. The established amenity criteria applicable to the proposed development are presented in Table 3.3.

Where the resultant project amenity noise level is 10 dB or more lower than the existing industrial noise level, noise levels are unlikely to reduce over time. In this case the project amenity noise levels can be set at 10 dB below existing industrial noise levels (as per note 3 of Section 2.4 of the NSW NPfI).

Table 3.3 Established Project Amenity Noise Level

LOCATION	TYPE OF RECEIVER	RECOMMENDED AMENITY NOISE LEVEL (ANL) dBA $L_{eq, period}$	PROJECT AMENITY NOISE LEVEL (ANL -5dB) dBA $L_{eq, period}$	PROJECT RESULTANT ANL dBA $L_{eq, period}$		
				DAY <sup>1</sup>	EVENING <sup>1</sup>	NIGHT <sup>1</sup>
Residences west, east and south of subject site	Residential (suburban)	Day: 55 Evening: 45 Night: 40	Day: 50 Evening: 40 Night: 35	50	$(59-10)^2$ 49	$(55-10)^2$ 45
Commercial areas north and west of the subject site	Commercial Premises	65 (When in use)	60 (When in use)	60 (When in Use)		

(1) Day: the period from 7.00 am to 6.00 pm Monday to Saturday; or 8.00 am to 6.00 pm Sundays and public holidays; Evening: the period from 6.00 pm to 10.00 pm; Night: the remaining periods.

(2) The resultant project amenity noise can be set at 10 dB below existing industrial noise levels as outlined in Table 2.3.

### 3.3.1.4 MAXIMUM NOISE LEVEL EVENT ASSESSMENT

The potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages.

Where the subject development/premises night-time noise levels at a residential receiver exceed the following, a detailed maximum noise level event assessment should be undertaken.

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

Table 3.4 summarises the maximum noise level event screening criteria for this project. These criteria are recommended levels which should not be exceeded at the nearest residences to prevent sleep disturbances.

Table 3.4 Maximum noise level event – project screening criteria

	PROVIDED SCREENING CRITERIA	ADJUSTED NOISE LEVEL	PROJECT SCREENING CRITERIA
Sleep disturbance screening criteria	40 dBA $L_{eq, 15 min}$	$(50+5)^1 = 55$ dBA $L_{eq, 15 min}$	<b>55 dBA <math>L_{eq, 15 min}</math></b>
	52 dBA $L_{Fmax}$	$(50 + 15)^2 = 65$ dBA $L_{Fmax}$	<b>65 dBA <math>L_{Fmax}</math></b>

### 3.3.2 PROJECT NOISE TRIGGER LEVEL

In assessing the noise impact of the proposed development on surrounding residential receivers, the lower value of the project intrusiveness noise level and amenity noise level is selected as the project noise trigger level. Exceedance of the



trigger level would indicate a potential noise impact on the community and ‘trigger’ a management response; for example, further investigation of mitigation measures.

It is noted that the intrusiveness criteria have been applied to all noise sensitive receivers (i.e. both residential and commercial) as required per the Campbelltown DCP Section 3.4.3.1 *Acoustic Privacy (General Requirements for all Type of Residential Development; item c.*

As required in Section 2.2 of the NSW NPfI, all project noise trigger levels and limits are expressed as  $L_{Aeq,15min}$ , and therefore a +3dB correction has been applied to the  $L_{eq, period}$  criteria as per Table 3.3. A summary of all relevant criteria is presented in Table 3.5.

Table 3.5 Summary of NSW Noise Policy for Industry Project Noise Trigger Levels (PNTL)

RECEIVER LOCATION	ASSESSMENT/ RECEIVER TYPE	PROJECT NOISE TRIGGER LEVELS dBA Leq 15 minute		
		DAY <sup>1</sup>	EVENING <sup>1</sup>	NIGHT <sup>1</sup>
Residential Receiver				
All Residences	NSW NPfI Intrusiveness and Campbelltown DCP	59	59	55
	NSW NPfI Amenity	53	52	48
	PNTL	53	52	48
Other receivers				
Commercial	Campbelltown DCP	59	60	55
	NSW NPfI	63		
	PNTL	59	60	55

(1) Day: the period from 7.00 am to 6.00 pm Monday to Saturday; or 8.00 am to 6.00 pm Sundays and public holidays; Evening: the period from 6.00 pm to 10.00 pm; Night: the remaining periods.

### 3.3.3 ROAD TRAFFIC NOISE

To assess the effect of the proposed development in terms of the increase of traffic on the nearby residences, the NSW Road Noise Policy (RNP) provides objective criteria. The relevant criteria have been drawn out of the policy and detailed below.

The road policy is used in this assessment to address noise associated with potential traffic increases on the surrounding road network due to the proposed development. To ensure that nearby noise sensitive receivers are not adversely affected, noise emissions must be designed to comply with the NSW RNP.

Noise generated by additional traffic on the road is to be assessed against façade corrected noise levels when measured in front of a building façade. The external criteria are assessed at 1 metre from the affected residential building façades and at a height of 1.5 metres from the floor.

Table 3.6 Noise assessment criteria - residential land uses (Source: NSW RNP Section 2.3.1)

PROJECT TYPE/LAND USE	ASSESSMENT CRITERIA	
	NSW RNP DAY (7AM-10PM)	NSW RNP NIGHT (10PM-7AM)
Land use development with potential to create additional traffic on local roads	55 dBA $L_{eq}$ (1 hour) (external)	50 dBA $L_{eq}$ (1 hour) (external)
Land use development with potential to create additional traffic on arterial, sub-arterial and collector roads	60 dBA $L_{eq}$ (15 hour) (external)	55 dBA $L_{eq}$ (9 hour) (external)

It is noted that the prevailing traffic noise levels measured on-site as outlined in Table 2.3 are already above the criteria for the local road network surrounding the site.

Where existing traffic noise levels are above the noise assessment criteria, the NSW RNP aims to protect against excessive decreases in amenity as the result of a project. Where road traffic noise increases by more than 2dB as a result of a land use development, mitigation should be considered to control excessive increase in noise level. An increase of up to 2dB represents a minor impact that is considered barely perceptible to the average person.

Therefore, a maximum 2dB increase in traffic noise levels is considered to be the applicable assessment criterion for receivers which are currently experiencing traffic noise levels greater than the assessment criteria in Table 3.6.

### 3.3.4 ENTERTAINMENT NOISE EMISSIONS

Noise assessed under the Office of Liquor, Gaming and Racing (OLGR) typically relates to entertainment noise associated with licensed premises including noise generated by patrons and music.

To ensure that nearby noise sensitive receivers are not adversely affected, noise emissions should be considered against the OLGR criteria outlined in the following:

- The  $L_{A10}$  noise level emitted from the licensed premises shall not exceed the background noise level in any Octave Band Centre Frequency (31.5 Hz – 8 kHz inclusive) by more than 5 dB between 07:00 am and 12:00 midnight at the boundary of any affected residence.*
- The  $L_{A10}$  noise level emitted from the licensed premises shall not exceed the background noise level in any Octave Band Centre Frequency (31.5 Hz – 8 kHz inclusive) between 12:00 midnight and 07:00 am at the boundary of any affected residence.*
- Notwithstanding compliance with the above, the noise from the licensed premises shall not be audible within any habitable room in any residential premises between the hours of 12:00 midnight and 07:00 am.*
- The  $L_{A10, 15\text{minute}}$  noise level emitted from the use should not exceed the background noise level ( $L_{A90, 15\text{ minute}}$ ) in any Octave Band Centre Frequency (31.5 Hz to 8 kHz inclusive) by more than 3 dB when assessed indoors at any affected commercial premises.*

Based on the octave band noise levels measured at receiver NM01 (refer to Table 2.4), the above conditions have been translated into noise limits as summarised in Table 3.7 at the boundary of the surrounding receivers applying the corrections detailed in the above OLGR criteria.

It has been assumed that compliance with clause d) external to the commercial premises, would result in compliance when assessed indoors.

Table 3.7 Octave band criteria at various noise sensitive receivers

RECEIVER	TIME	OLGR CRITERIA, dB L <sub>10</sub> AT 1/1 OCTAVE BAND CENTRE FREQUENCY (HZ)								
		31.5	63	125	250	500	1k	2k	4k	8k
Residential	7am to midnight	57	56	53	54	49	55	49	37	40
Residential	Midnight to 7am	51	51	47	49	42	47	41	34	37
Commercial	7am to midnight	55	54	51	52	47	53	47	35	38
Commercial	Midnight to 7am	54	54	50	52	45	50	44	37	40

## 3.4 EXTERNAL NOISE INTRUSION

External traffic noise intrusion onto the residential areas is to be assessed as outlined in the Campbelltown DCP. The wording used in the DCP is similar as per the NSW ISEPP and the NSW Department of Planning's *Development Near Rail Corridors and Busy Roads – Interim Guideline*

It is therefore assumed that an assessment and nominated criteria as per this guideline can be adopted for this development. Applicable project criteria for external noise intrusion to residential areas of the development are provided in Table 3.8.

Table 3.8 Internal noise criteria - residential areas

TYPE OF OCCUPANCE, RESIDENTIAL BUILDINGS	NOISE LEVEL	APPLICABLE TIME PERIOD
Sleeping areas (bedroom)	35 dBA L <sub>eq</sub> (9hr, night)	Night 10 pm to 7 am
Other habitable rooms (excl. garages, kitchens, bathrooms & hallways)	40 dBA L <sub>eq</sub> (15hr, day)	At any time

There are no external noise intrusion requirements for non-residential areas of the development.

## 3.5 BUILDING CODE OF AUSTRALIA

### 3.5.1 INTERNAL SEPARATION FOR RESIDENTIAL AREAS

The proposed residential areas of the development are classified as Class 2 under the *Building Code of Australia* (BCA). The Building Code of Australia Part F5 (BCA 2019) provides performance requirements for partitions separating sole occupancy units.

The relevant requirements have been summarised in Table 3.9.

Table 3.9 BCA sound insulation requirements for residential areas of the development.

BUILDING ELEMENT	DESCRIPTION	IMPACT NOISE REQUIREMENTS	AIRBORNE NOISE REQUIREMENTS
Walls	Separating sole occupancy units	—	$R_w + C_{tr} \geq 50$
	Separating a habitable room of a sole occupancy unit from a bathroom, sanitary compartment, laundry or kitchen in an adjacent sole occupancy unit	Discontinuous construction	$R_w + C_{tr} \geq 50$
	Separating a sole occupancy unit and a stairway, public corridor, public lobby or the like	—	$R_w \geq 50$
	Separating a sole occupancy unit and a plant room and lift shaft	Discontinuous construction	$R_w \geq 50$
	A door between a sole occupancy unit and a stairway, public corridor, lobby or the like.	—	$R_w \geq 30$
Floors	Separating sole-occupancy units and separating sole-occupancy units and a plant room, lift shaft, stairway, public corridor, public lobby or the like.	$L_{n,w} \leq 62$	$R_w + C_{tr} \geq 50$
Services	A duct, soil, waste, water supply pipe and stormwater pipe located in a wall or floor cavity, serves or passes through more than one sole occupancy unit if the adjacent room is a habitable room (other than a kitchen)	—	$R_w + C_{tr} \geq 40$
	A duct, soil, waste, water supply pipe and stormwater pipe located in a wall or floor cavity, serves or passes through more than one sole occupancy unit if the adjacent room is a kitchen or any other non-habitable room.	—	$R_w + C_{tr} \geq 25$
Pumps	The point of connection between the service pipes in a building and any circulating or other pump.	A flexible coupling at the connection	—

### 3.5.2 INTERNAL SEPARATION FOR COMMERCIAL AREAS

There are no acoustic criteria outlined in the BCA for commercial areas of the development.

## 3.6 CONSTRUCTION NOISE

The measured background noise levels (RBL) presented in Section 2.2.3 are to be used to determine the construction Noise Management Levels (NMLs) as per the definitions in the NSW ICNG.

### 3.6.1 RESIDENTIAL RECEIVERS

NMLs are the level of noise above which receivers are considered to be ‘noise affected’. They are based on the measured RBL plus an additional allowance of 10 dB during standard hours and 5 dB outside of standard hours.

Where construction noise levels are above 75 dBA at residential receivers during standard hours, they are considered ‘highly noise affected’ and require additional considerations to mitigate potential impacts.

Table 3.10 Construction noise management levels for residential receivers and working hours (Source: Table 2 of the NSW ICNG)

NSW ICNG TIME OF DAY	NML dBA $L_{eq,15\text{ minute}}^{1,2}$	HOW TO APPLY
<b>Recommended standard hours:</b> Monday - Friday 7:00 am – 6:00 pm  Saturday 8:00 am – 1:00 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 dBA $L_{eq,15\text{ minute}}$ 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 dBA	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: <ol style="list-style-type: none"> <li>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).</li> <li>if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.</li> </ol>
<b>Outside recommended standard hours</b>	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.

- (1) Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.
- (2) The RBL is the overall background noise level representing each assessment period (NSW ICNG day/evening/night) over the whole monitoring period. The term RBL is described in detail in the NSW NPfI.

### 3.6.2 OTHER SENSITIVE LAND USES

The NSW ICNG provides maximum noise levels for typical industrial premises, offices and retail outlets Table 3.11 presents the NMLs for non-residential sensitive receivers at the building exterior. External noise levels are to be assessed at the most affected point within 50 m of the area boundary.



Table 3.11 Construction noise management levels at sensitive land uses (other than residences) (Source: Table 3 of the NSW ICNG)

RECEIVER	NML DBA L <sub>EQ;15 MINUTE</sub> (APPLIES WHEN PROPERTIES ARE BEING USED)
General Commercial and Retail	70 - external

### 3.6.3 CONSTRUCTION TRAFFIC NOISE

The NSW ICNG does not specify appropriate criteria for noise arising from construction traffic. The NSW RMS CNVG refers to the NSW RNP for assessment of construction traffic on public roads.

A screening test of 2 dB increase due to construction traffic or a temporary reroute from road closure is used to determine further assessment in accordance with the Roads and Maritimes Criteria Guideline. Where noise generated by the proposed construction works is 2 dB or less, no further assessment is required.

# 4 ENVIRONMENTAL NOISE EMISSION ASSESSMENT

The following sections outline a preliminary review of potential environmental noise emissions to nearby sensitive receivers.

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## 4.1 NOISE EMISSIONS FROM THE DEVELOPMENT

All operational noise emissions from the development is required to comply with the noise limits described in the NSW NPfI (Section 3.3.1), and Campbelltown DCP (Section 3.2) and as summarised in Table 3.5.

### 4.1.1 INDUSTRIAL NOISE SOURCES – BUILDING SERVICES EQUIPMENT

As the proposed development is in the early design stages, detailed design of building services equipment has not been undertaken. Therefore, a detailed assessment is not possible at this stage. However, all external (mechanical) plant will be required to be assessed during the detailed design stages to ensure compliance with the applicable acoustic criteria. The assessment will include typical day, evening, and night-time operation, and emergency operations. Where necessary, acoustic mitigation measures will be applied to the design. These may include;

- Selection of quieter equipment
- Selection of equipment location
- Acoustic louvres
- Acoustic attenuators
- Acoustic barriers

### 4.1.2 LOADING DOCK AND WASTE PICKUP ACTIVITIES

We understand all goods and waste associated with the operations of this retail and hotel will be delivered and picked up from the Loading area located in the carpark on Ground Level for retail spaces and Basement 1 for hotel which are shielded from O'Sullivan Road and Pembroke Road, respectively. The delivery and pickup locations are located in the carpark shielded from the noise sensitive receivers.

From our conversation with the client, additional events due to the extension are not expected to increase the frequency and duration per 15-minute period. Therefore, noise emissions of the delivery and pickup activities are expected to remain the same as existing for any 15-minute period. We expect that additional events will not result in an increase in noise levels and loss of amenity for adjacent residential receivers.

### 4.1.3 VEHICLE MOVEMENTS

Increases to road traffic noise due to the operation of the proposed development are subject to the NSW RNP as detailed in Section 3.3.3.

The existing and future traffic flows for the development site have been reviewed based on the traffic assessment provided the traffic consultant TRAFFIX via email dated 8 July 2021.

Traffic flows for the development and the modelled increase in noise levels are summarised in Table 4.1.

Table 4.1 Summary of traffic flow increase in peak periods

LOCATION	TRAFFIC FLOW, VEHICLES/HOUR		TRAFFIC INCREASE, %	INCREASE IN NOISE LEVEL, dB	NSW RNP MAX INCREASE, dB	COMPLIES
	BASE SCENARIO	DEVELOPMENT TRAFFIC				
AM peak						
Pembroke Rd	969	26.2	3%	< 0.5	≤ 2	Yes
O’Sullivan Rd	128	18.8	15%	0.6		Yes
PM peak						
Pembroke Rd	939	69.8	7%	< 0.5	≤ 2	Yes
O’Sullivan Rd	175	50.2	29%	1.1		Yes

Due to the existing traffic along Pembroke and O'Sullivan roads and a comparatively minor predicted increase in traffic volume resulting from the proposed development, the overall acoustic environment is anticipated not to be impacted by the increase of road traffic and the impact to the residential receivers will be negligible.

The predicted less than 2 dB increase in noise level are anticipated not to be significant. Therefore, the minor increase in road traffic noise will not be discussed further in this report.

## 4.2 LICENSED AREAS

The proposed development will include various dining, pub and licensed areas.

Noise emissions from all licensed (e.g. Restaurant, Pub and Function areas) areas will need to be designed to comply with the entertainment noise limits outlined in Section 3.3.4 and as per guidance from the NSW Office of Liquor, Gaming and Racing (NSW OLGR). It is anticipated that the façade and floor construction are capable of being designed to control entertainment noise emissions to suitable levels.

As the project is currently in the early design stages, a full assessment has not been undertaken as part of this assessment. It is assumed that this assessment will be undertaken as part of the future tenant's fitout DA.

## 4.3 CONSTRUCTION NOISE AND VIBRATION

A Construction Noise and Vibration Management Plan (CNVMP) should be developed by the builder in consultation with the Stakeholders and an Acoustic Engineer prior to construction commencement on site.

## 5 NOISE IMPACT UPON RESIDENTIAL AREAS OF THE DEVELOPMENT

Internal acoustic amenity requirements for residential areas are as outlined in Section 3.4 and the Campbelltown DCP. Detailed design of the glazing will be conducted during design development and detailed design stages of the project to identify any special requirements for the internal spaces.

Preliminary acoustic calculations have been conducted in line with Australian Standard AS 3671:1989 *Acoustics – Road Traffic Noise Intrusion – Building Siting and construction* (AS 3671). The assessment is based on the external noise levels and building dimensions shown in the current architectural design package.

The provisions presented as outlined in Table 5.1 are for the worst affected internal residential receiver. Actual façade requirements can be further developed and rationalised based on the final siting location of each building, internal layouts and window sizing to maintain internal noise level requirements in Section 3.4.

Table 5.1 Preliminary minimum Transmission Loss (dB) overall façade performance

INTERNAL SPACE	MINIMUM PERFORMANCE	TYPICAL EXAMPLE GLAZING
Sleeping areas (bedroom)	34 dB R <sub>w</sub>	10.38mm laminated
Other habitable rooms (excl. garages, kitchens, bathrooms & hallways)	30 dB R <sub>w</sub>	6.38mm laminated

These acoustic requirements can be achieved with commercially available thermal double glazing or laminate single glazing.

The overall façade performance is the composite performance of both the glazing plus framing and non-vision elements. Specific material and construction provisions will need to meet the stated performance requirements in Table 5.1. Doors and openable windows will require acoustically effective seals to maintain the acoustic performance noted.

Other factors such as aesthetic, thermal and structural requirements will need to be considered in the final facade design.

## 6 ACOUSTIC PRIVACY

The project will be required to achieve compliance with the BCA acoustic performance requirements outlined in Section 3.5.

As the Building Code of Australia is common practice for residential developments in NSW, it is anticipated that compliance can be achieved with commercially available constructions.



## 7 CONCLUSION

WSP has conducted a preliminary noise impact assessment for the proposed mixed used development at 80 O'Sullivan Road, Leumeah, NSW.

Noise design requirements were set in accordance with the criteria set out in the Campbelltown Development Control Plan, NSW Noise Policy for Industry, NSW Road Noise Policy, NSW Interim Construction Noise Guideline, and typical criteria from the NSW Office of Liquor, Gaming and Racing following an assessment of existing ambient and background noise levels for the area.

As the development is in the early design stages, a detailed environmental noise emissions assessment has not been undertaken. The proposed development will need to be designed to achieve compliance with the applicable established environmental noise limits as outlined in this report.

Overall, it is concluded that the proposed development will have limited acoustic impacts on the existing environment and the applicable environmental noise criteria can be complied with at the nearest sensitive receivers with appropriate controls in place.

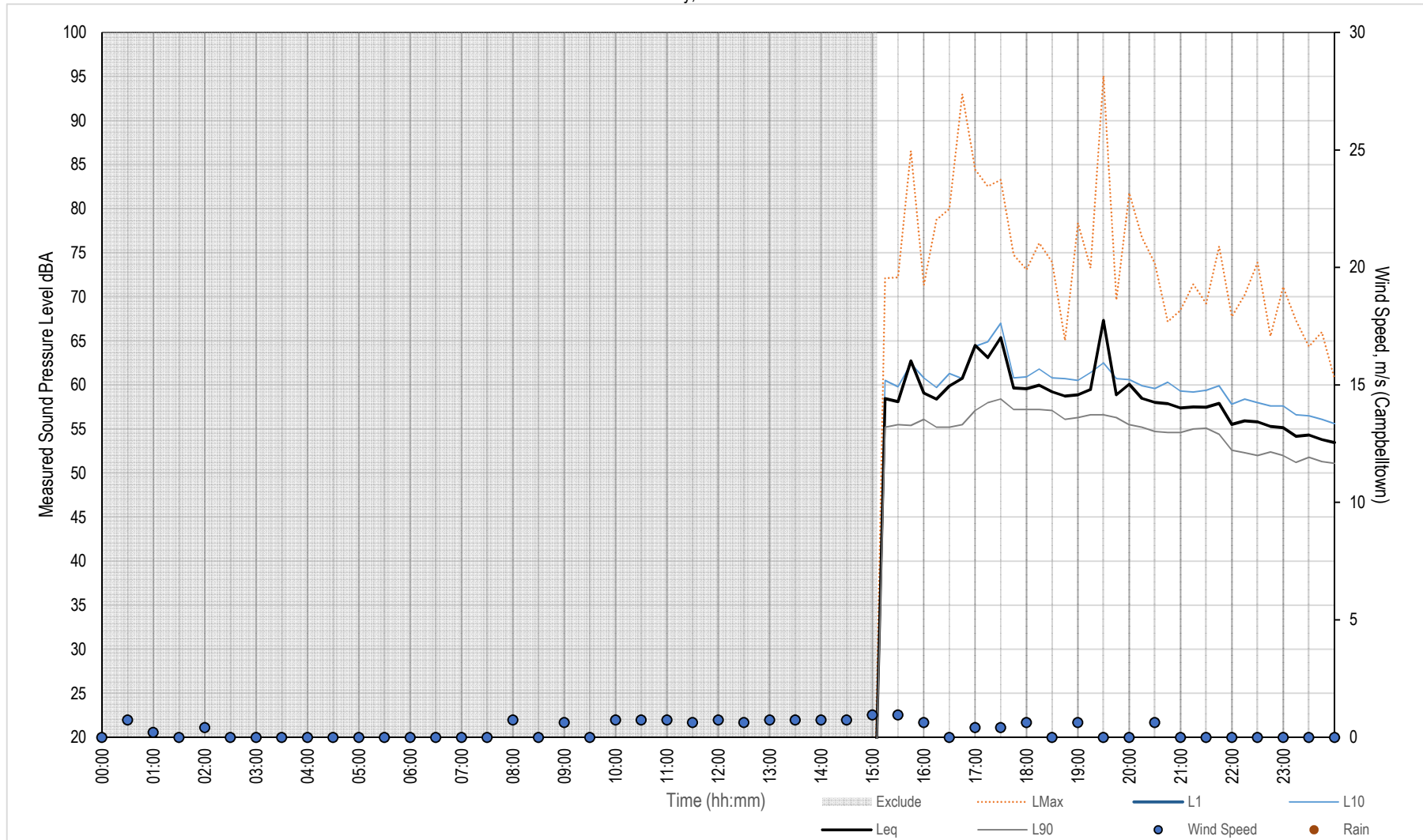
# APPENDIX A

## NOISE MONITORING LOGGER GRAPHS



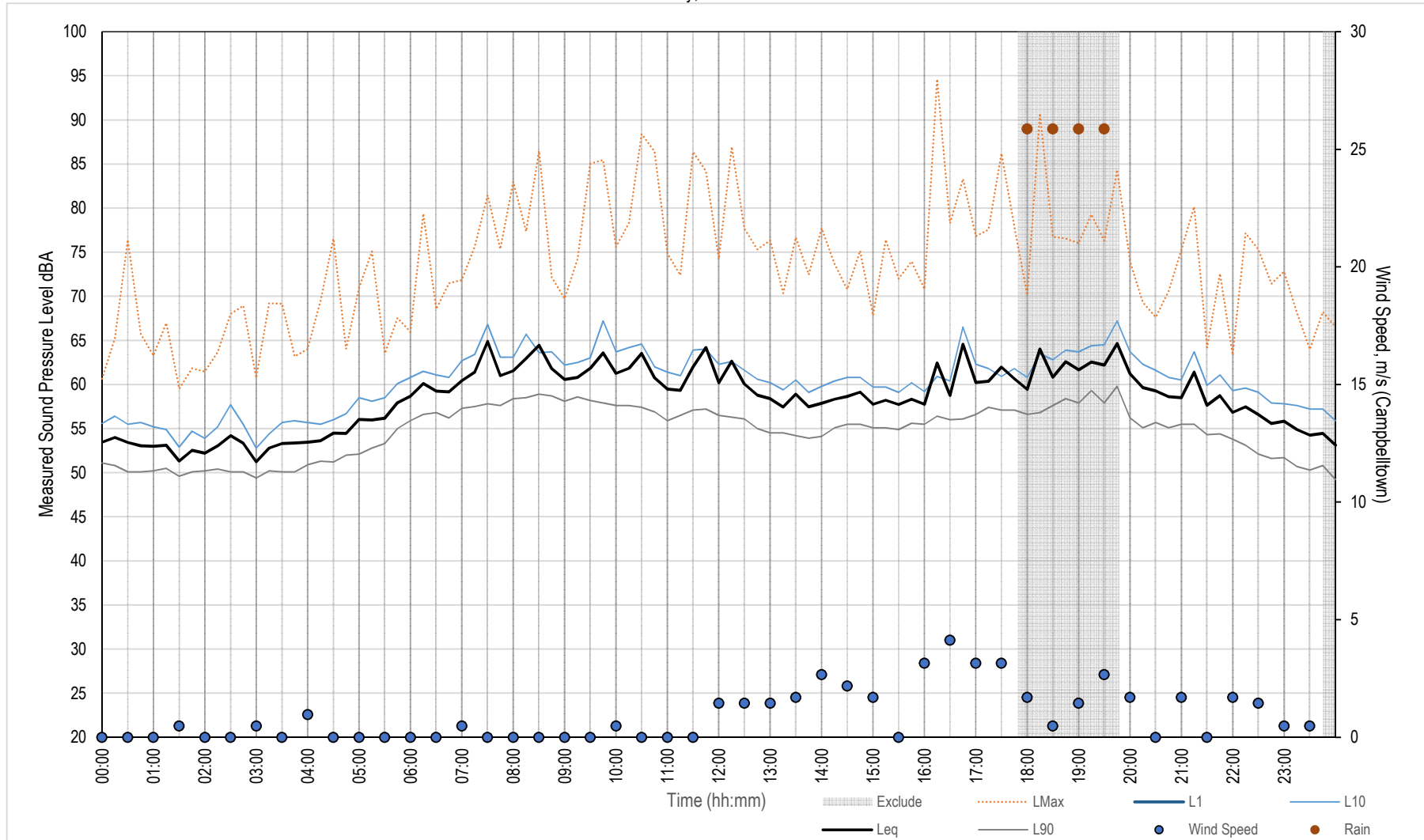
### Measured Noise Levels - Roof of the hotel

Monday, 07 June 2021



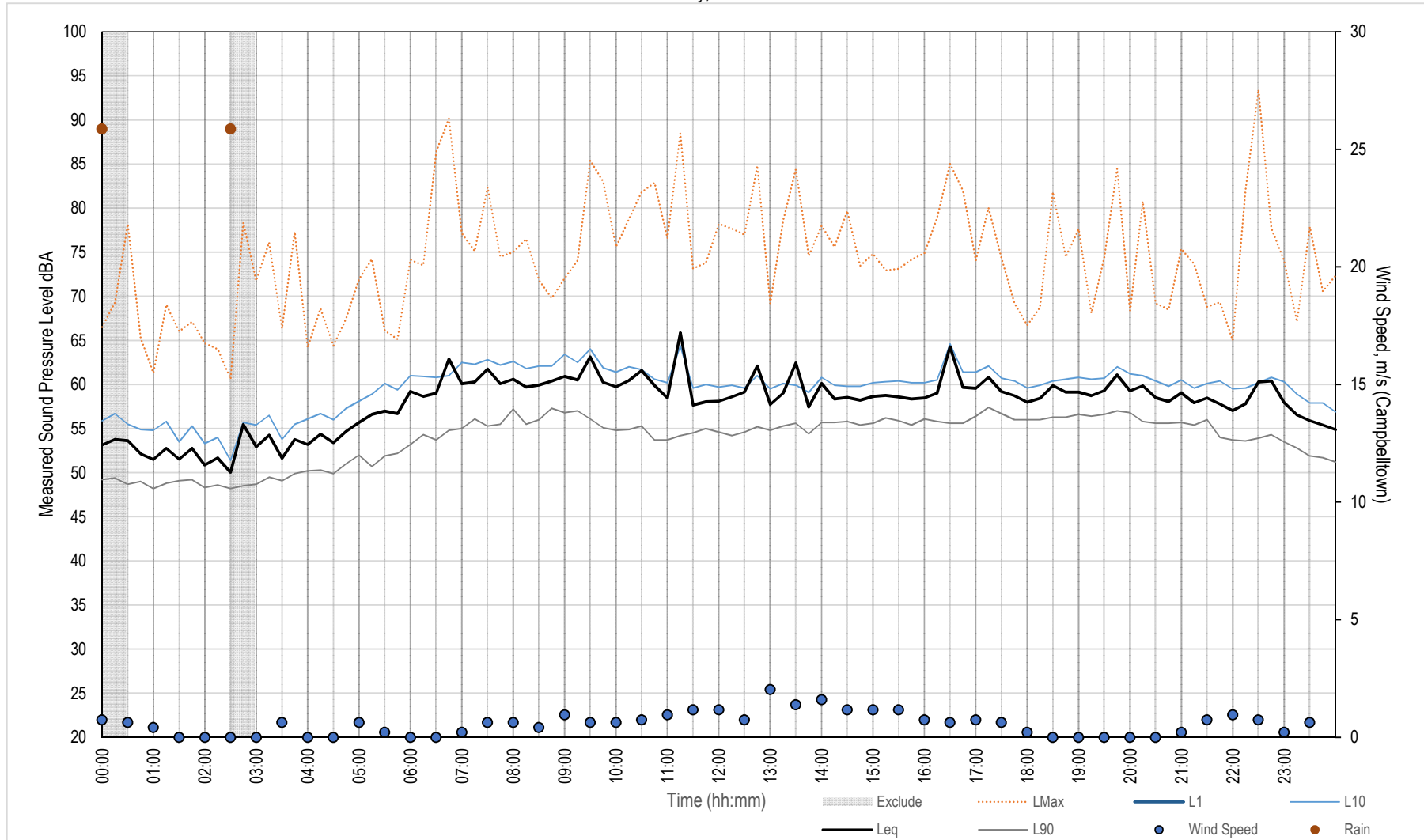
# Measured Noise Levels - Roof of the hotel

Tuesday, 08 June 2021



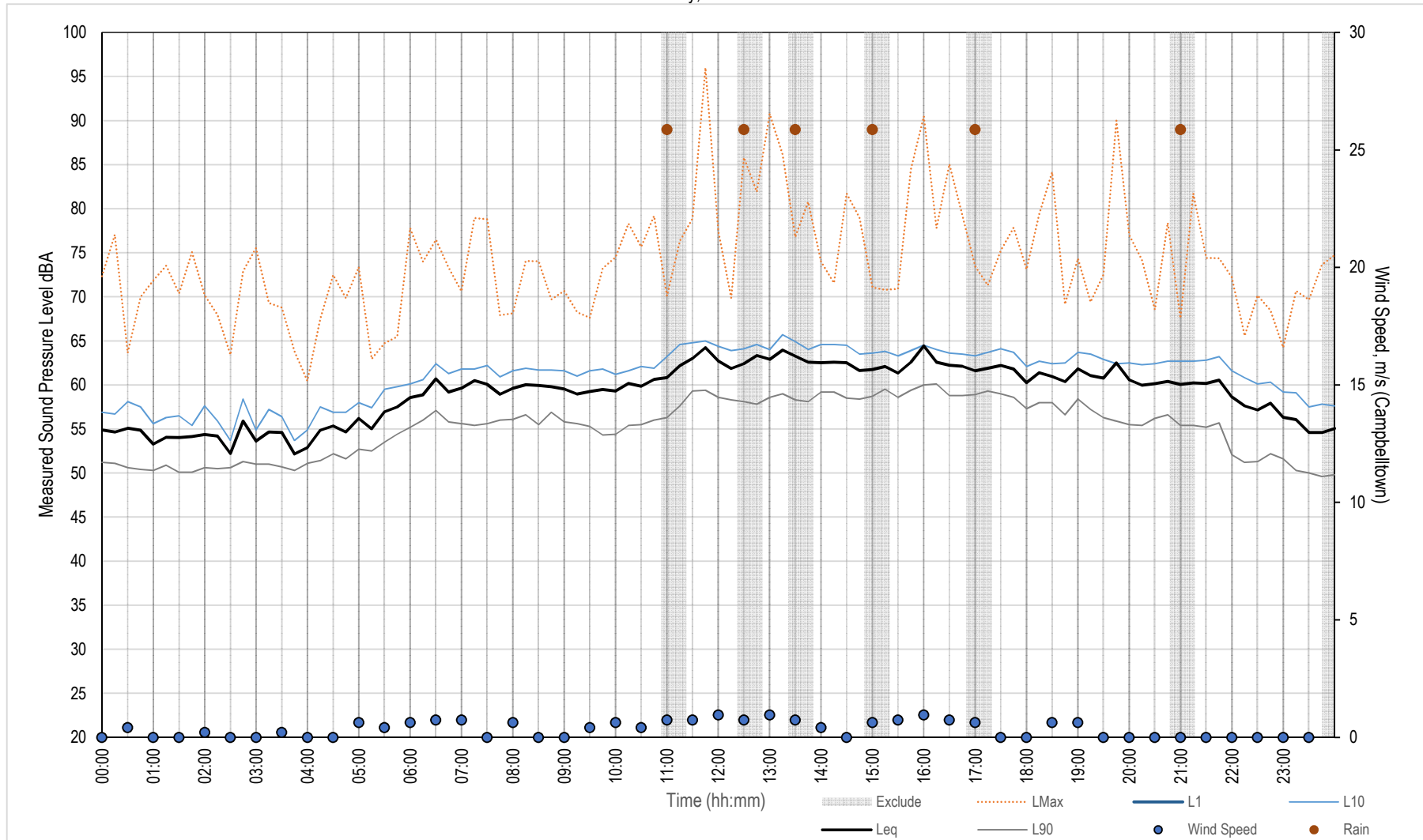
# Measured Noise Levels - Roof of the hotel

Wednesday, 09 June 2021



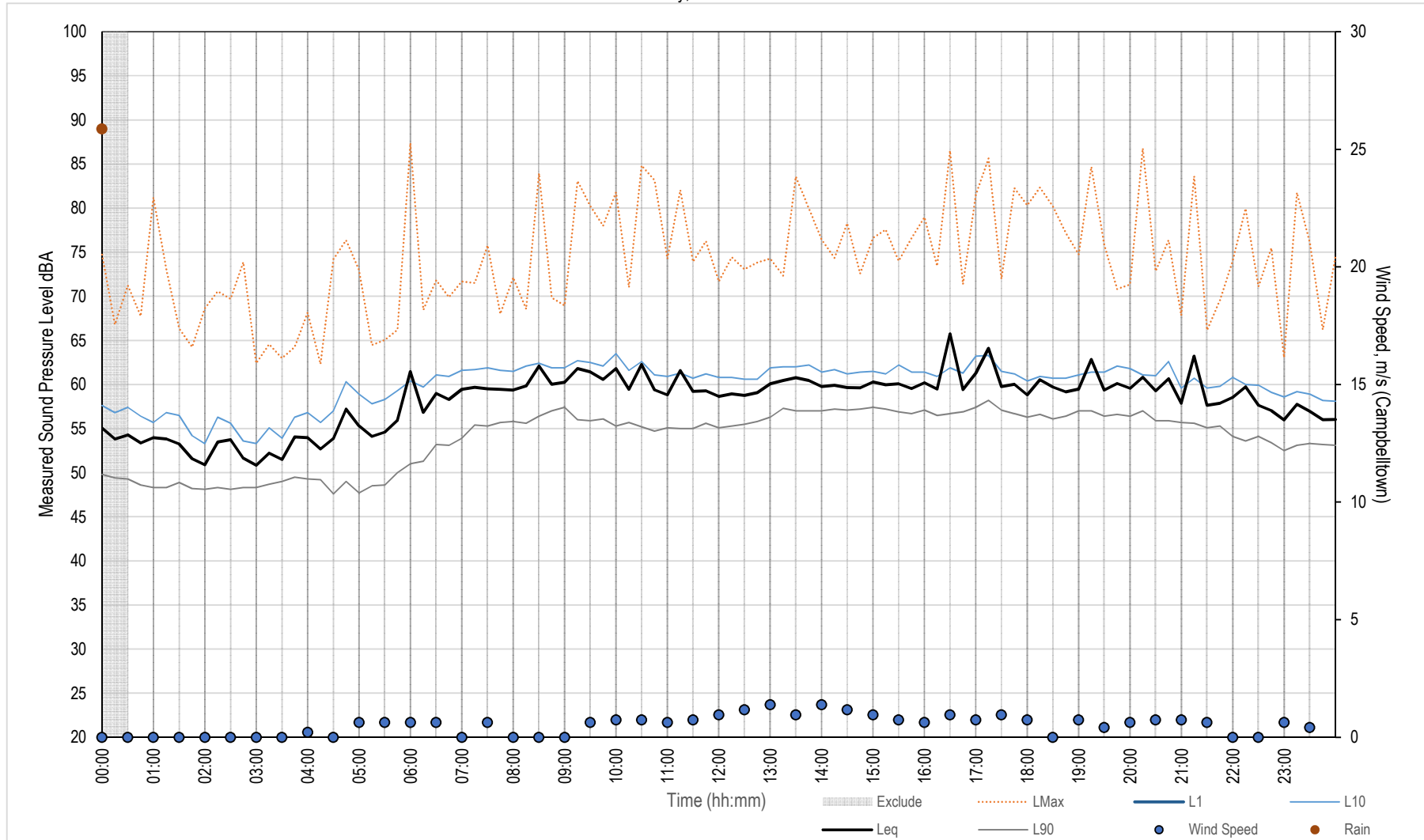
### Measured Noise Levels - Roof of the hotel

Thursday, 10 June 2021



### Measured Noise Levels - Roof of the hotel

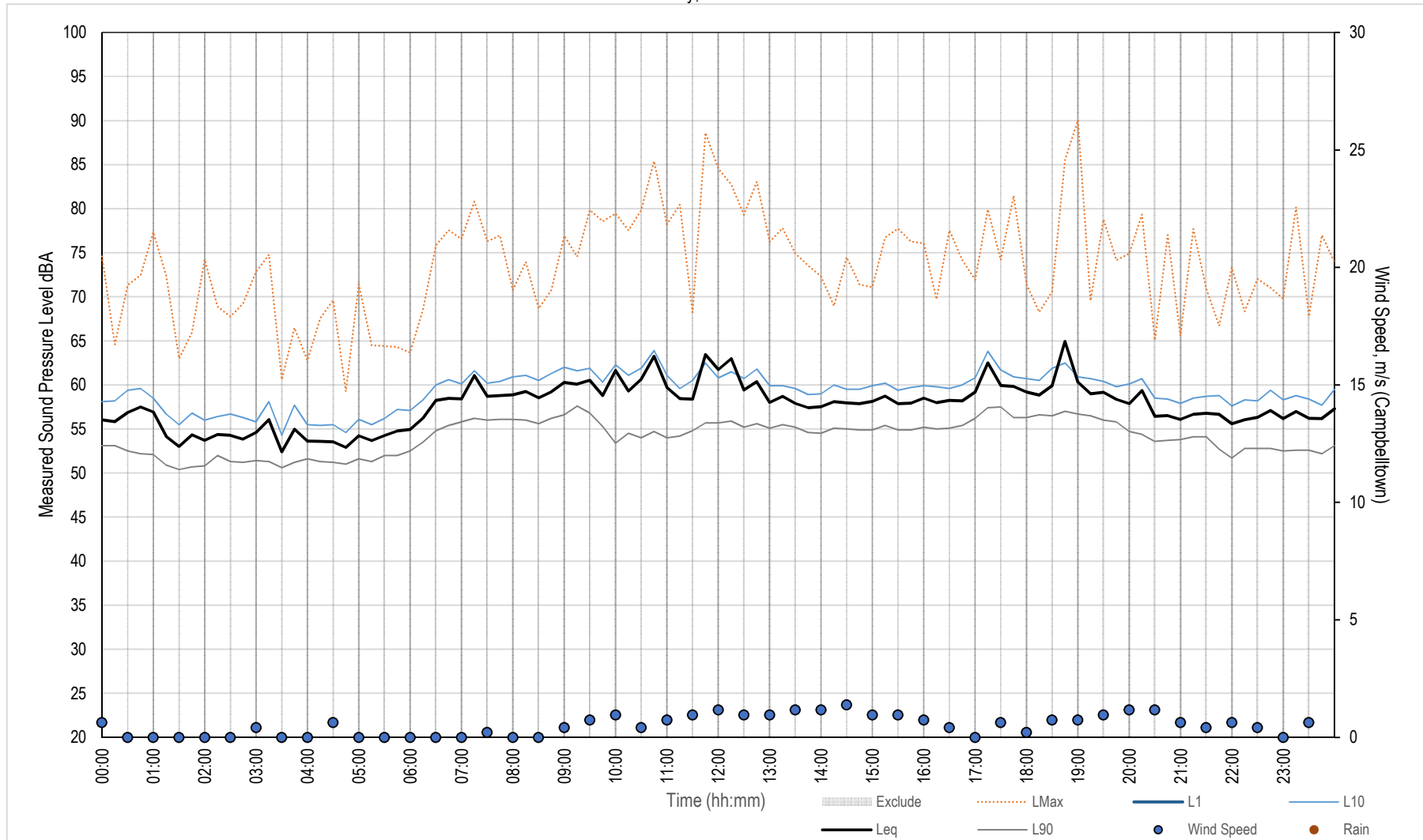
Friday, 11 June 2021





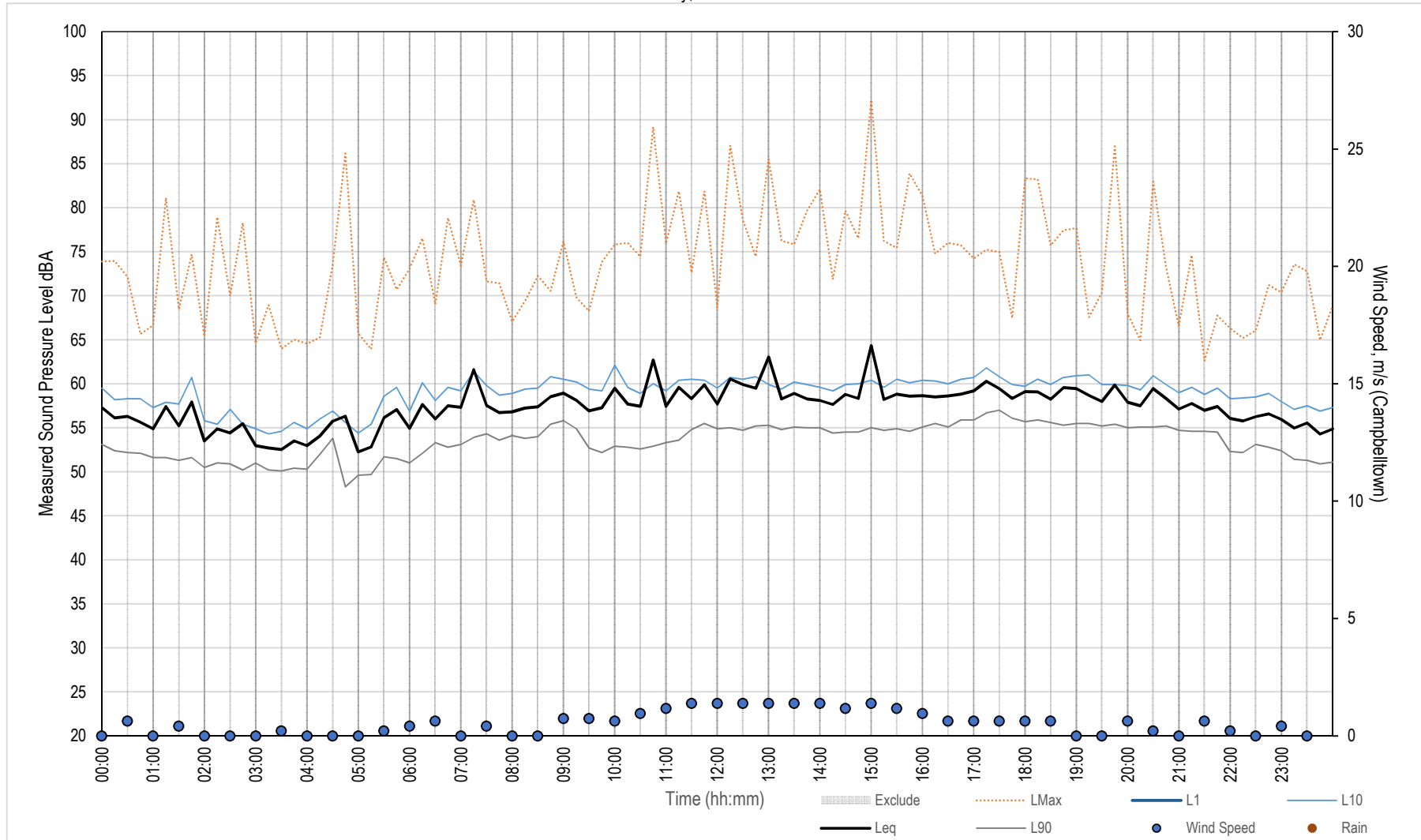
### Measured Noise Levels - Roof of the hotel

Saturday, 12 June 2021



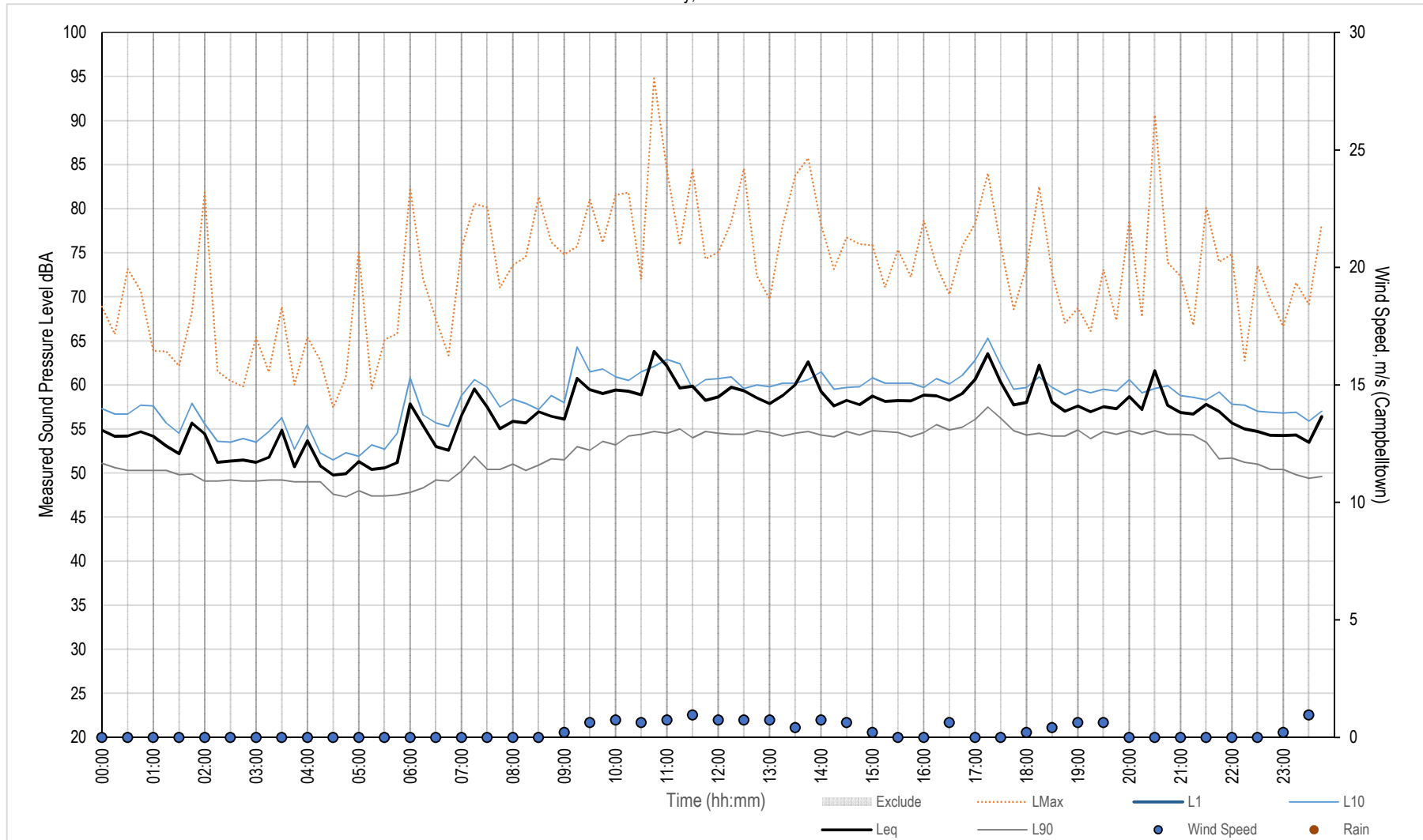
### Measured Noise Levels - Roof of the hotel

Sunday, 13 June 2021



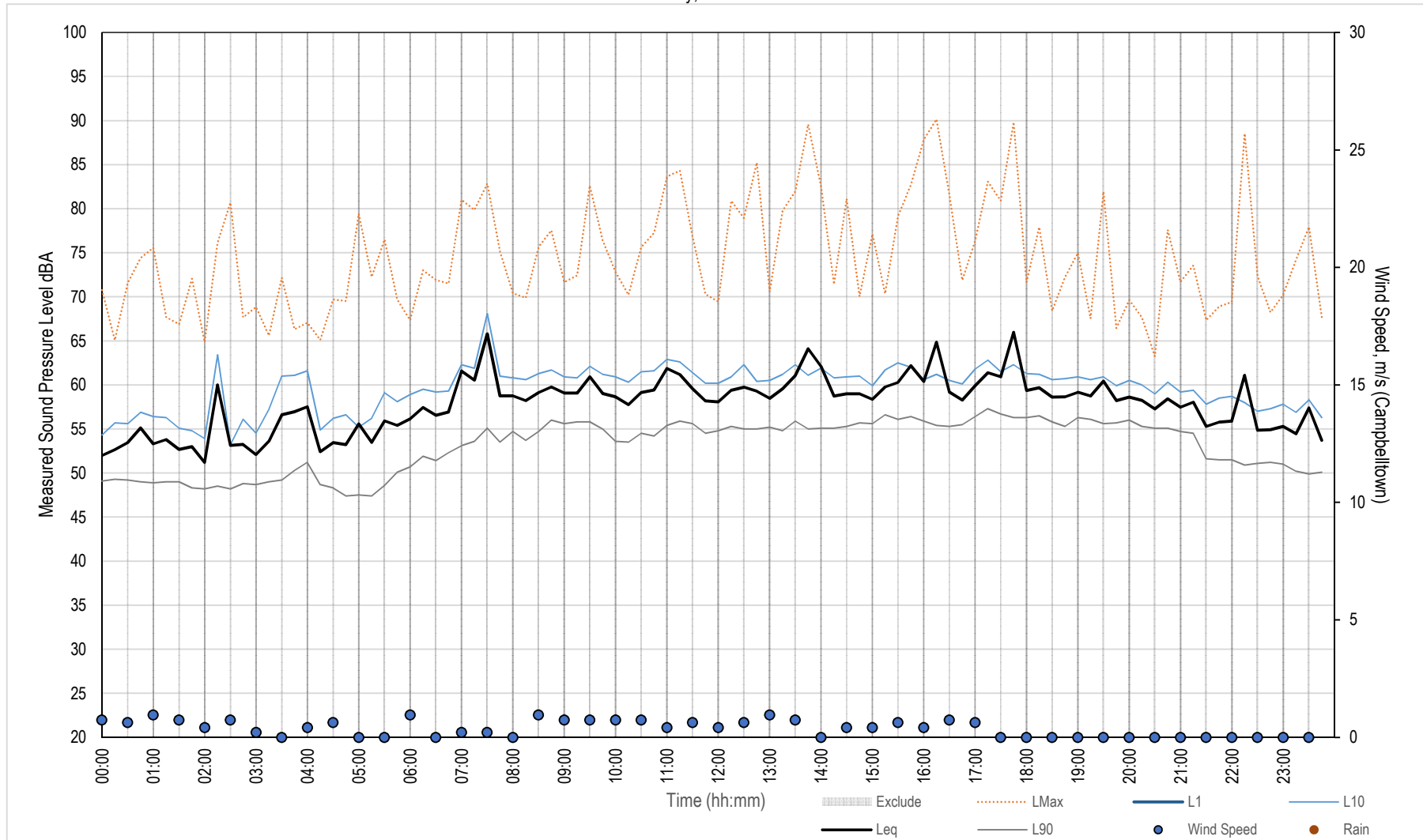
### Measured Noise Levels - Roof of the hotel

Monday, 14 June 2021



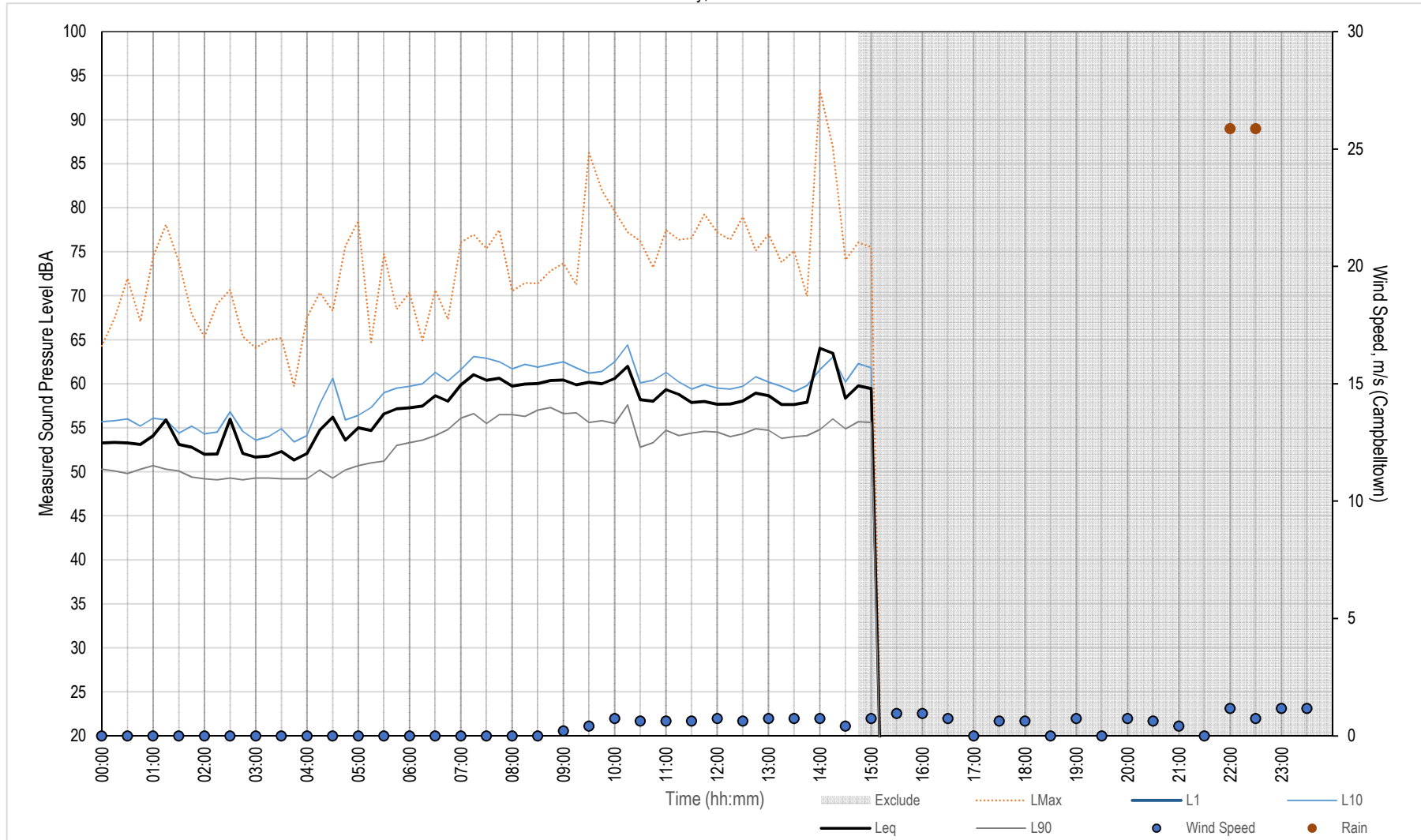
# Measured Noise Levels - Roof of the hotel

Tuesday, 15 June 2021



### Measured Noise Levels - Roof of the hotel

Wednesday, 16 June 2021



## ABOUT US

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