auricl
acoustic consulting

300 Gray's Inn Road
London

Noise Assessment Report

18 May 2023

For

Platignum Properties Limited

Contents

SUMMARY

It is proposed to refurbish and extend the existing building at 300 Gray's Inn Road in London to create a mixed commercial and residential development.

auricl has undertaken a noise survey at the site to assess environment noise levels that will affect the development façades, as well as background noise levels at the nearest noise sensitive properties.

An assessment of external noise intrusion has been undertaken, in relation to current industry standards and Camden Council requirements, with recommendations made for suitable glazing and ventilators. It was concluded that suitable internal noise levels should be achievable using standard constructions.

An assessment of noise intrusion has also been undertaken for the scenario when windows are open to control overheating. It was concluded that open windows would be acoustically acceptable means of controlling overheating on the southern and eastern façades. However, the assessment concluded that open windows would not be acoustically acceptable means of controlling overheating on the northern and western façades.

Plant noise limits have been proposed based on the results of the noise survey and the Camden Council standard requirements.

In addition, **auricl** has been undertaken an assessment of noise emissions associated with the proposed terraces.

Noise emissions associated with the proposed terraces are predicted to be negligible, when compared with the IEMA noise impact assessment guidelines.

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1.0 Introduction

It is proposed to refurbish and extend the existing building at 300 Gray's Inn Road in London to create a mixed commercial and residential development.

auricl has been commissioned to undertake an environmental noise survey to assess the levels of external noise affecting the external façades, and to determine background noise levels which can be used to set limits for external noise emissions due to building services plant.

The following report presents the methodology and results of the noise survey along with plant noise limits at the nearest noise sensitive properties.

This report is technical by nature, therefore a glossary of acoustic terms is included in Appendix A.

2.0 Description of Site

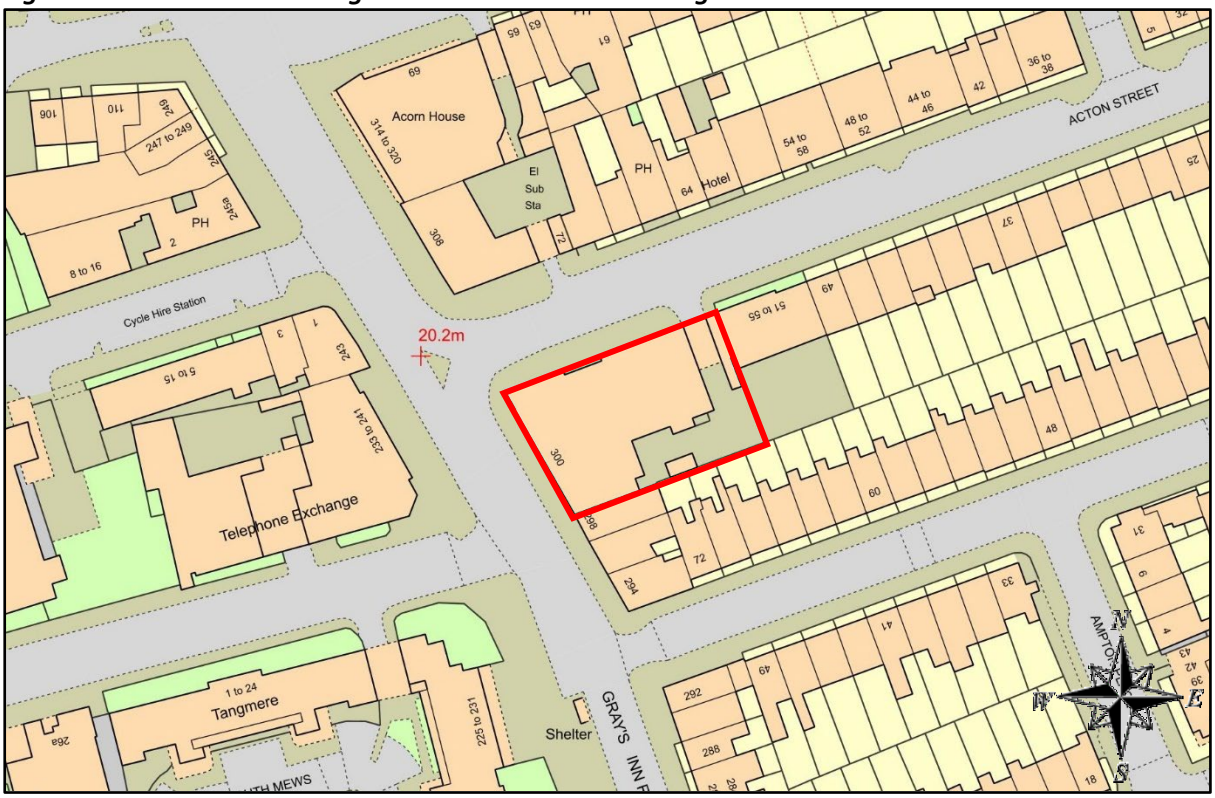
The site of the proposed refurbishment and extension is located at 300 Gray's Inn Road in London WC1X 8DX.

The site occupies a prominent corner site on the junction of Acton Street and Gray's Inn Road, in the Bloomsbury Conservation Area in the London Borough of Camden. The existing building is a part 3, part 8 storey building currently occupied by BUPA within a commercial, business and service (Class E) use, a small area of hard standing is located to the ear accessed from Acton Street.

The site is bounded by commercial/residential properties to the south-west, residential properties to the south and east, Gray's Inn Road (A5200) to the west and Acton Street (A501) to the north.

Figure 2.1 shows the existing site extent in **red** in relation to the surrounding area.

Figure 2.1 Site Plan Indicating Site Extent and Surroundings



The refurbishment and extension of the building to provide residential flats (Class C3) and commercial, business and service use (Class E) including external alternations for new façades to all elevations, the introduction of terraces, reconfiguration of entrances and servicing arrangements, new hard and soft landscaping, provision of cycle parking and other ancillary works.

3.0 Noise Survey Methodology and Results

3.1 Methodology

An unmanned noise survey was carried out over a 24-hour period between Monday 30 May 2022 and Tuesday 31 May 2022. The purpose of the survey was to assess environmental noise levels affecting the south and west façades of the building and to determine existing background noise levels at the nearest noise sensitive properties to the south/east and west of the site.

Manned measurements were undertaken at two additional manned measurement positions on Friday 27 May 2022 in order to assess any difference in noise level between the unmanned measurement positions and ground floor level.

The approximate locations of the measurement positions are indicated on Figure 3.1 in **purple** and described in Table 3.1.

Figure 3.1 Site Plan Indicating Noise Measurement Positions

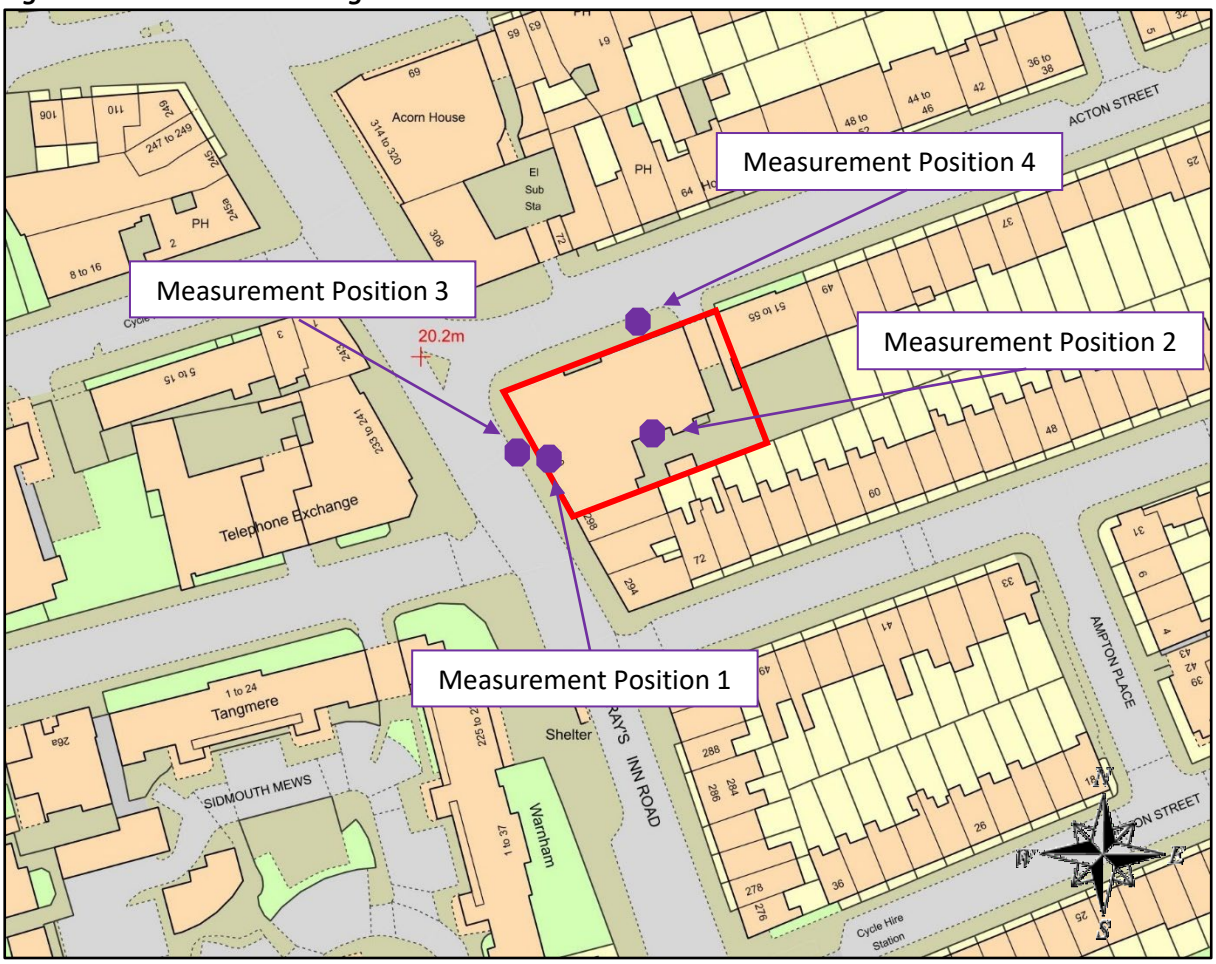


Table 3.1 Description of Measurement Positions

Measurement Position	Description
1	Measurement microphone protruding from a third-floor window overlooking Gray's Inn Road
2	Measurement microphone protruding from a second-floor window overlooking the gardens of the surrounding residential properties towards the east of the site
3	Measurement microphone mounted on a tripod 1.5m above ground level on the western site boundary, close to Gray's Inn Road
4	Measurement microphone mounted on a tripod 1.5m above ground level on the northern site boundary, close to Acton Street

Measurement position 1 was selected to assess noise levels affecting the site due to road traffic using Gray's Inn Road, as well as background noise levels at noise sensitive receptors to the west of the site.

Measurement position 2 was selected to assess background noise levels at noise sensitive receptors to the west of the site.

Measurement positions 3 and 4 were selected to assess any difference in noise level between ground floor level and unmanned measurement positions 1 and 2 respectively.

The equipment used for the noise survey is summarised in Table 3.2.

Table 3.2 Description of Equipment used for Noise Survey

Measurement Position	Item	Make & Model	Serial Number
1 and 3	Type 1 automated sound level meter	01dB Fusion	14156
	Type 1 ½" external microphone	GRAS 40CE	466797
2 and 4	Type 1 automated sound level meter	01dB Fusion	12032
	Type 1 ½" external microphone	GRAS 40CE	330829
Calibrator		01dB CAL	95401

L_{Amax}, L_{Aeq} and L_{A90} sound pressure levels were measured throughout the survey over contiguous 125-millisecond intervals.

The noise monitoring equipment was calibrated before and after the survey. No significant change was found. Laboratory equipment calibration certificates can be provided upon request.

The weather during the survey periods was dry with clear sky, low wind speeds. These conditions are considered appropriate for undertaking environmental noise measurements.

3.2 Noise Survey Results & Observations

Due to the measurement positions being within 1m from the existing façade, the measured levels have been reduced by 3 dB to represent free-field conditions, in accordance with BS 4142.

Appendix B presents time history graphs showing the L_{Amax}, L_{Aeq} and L_{A90} sound pressure levels measured at each position throughout the unmanned noise survey, incorporating the above correction.

We would consider the levels measured to be reasonable, taking into account the location of the measurement position and the dominant nearby noise sources. The noise climate at all measurement positions was noted to be dominated by road traffic using Gray,s Inn Road (A5200) and Acton Street (A501).

A summary of the calculated $L_{Aeq\ (16\ hour)}$ and $L_{Aeq\ (8\ hour)}$ and measured $L_{Amax\ (10th\ highest)}$ noise levels across the site is presented in Table 3.3.

Table 3.3 Summary of Site Noise Levels

Measurement Position	Measured Sound Pressure Level (dB)		
	Daytime $L_{Aeq\ (16\ hour)}$ (07:00 - 23:00)	Night-time $L_{Aeq\ (8hour)}$ (23:00 – 07:00)	Night-time $L_{Amax\ (10th\ highest)}$ (23:00 – 07:00)
1	63	58	80
2	62	44	59

We would consider the measured noise levels to be reasonable, considering the location of the measurement positions and the dominant nearby noise sources.

Table 3.4 presents the typical (modal) measured background noise levels during daytime and night-time periods.

Table 3.4 Measured Background Noise Levels

Measurement Position	Typical Measured $L_{A90,T}$ Noise Level (dB)	
	Daytime (07:00-23:00 T = 1 hour)	Night-time (23:00-07:00 T = 15 minutes)
1	55	51
2	43	38

Due to the nature of the unmanned noise survey, we are unable to comment on the exact noise climate throughout the entire survey period. However, at the beginning and end of the survey period,

the daytime noise climate at the measurement positions were dominated by road traffic using Gray's Inn Road. We would expect this to also be true of the night-time periods.

4.0 Building Services Plant Noise Emissions

4.1 Camden Council Requirements

Camden Council advises the following in relation to building services plant noise emissions:

"Prior to commencement of installation of any plant equipment, full details (including plans, elevations, manufacturer specifications and sections) shall be submitted to and approved in writing by the Local Planning Authority. The details shall include the external noise level emitted from plant/machinery/equipment and mitigation measures as appropriate. The measures shall ensure that the external noise level emitted from plant/machinery/equipment will be lower than the typical background noise level by at least 10dBA, by 15dBA where the source is tonal, as assessed according to BS 4142: 2014 at the nearest and/or most affected noise sensitive premises, with all machinery operating together at maximum capacity. Approved details shall be implemented prior to occupation of the development and thereafter be permanently retained."

Table 4.1 presents the daytime and night-time plant noise limits for the nearest noise sensitive properties, based on the noise survey results and the above requirements.

Table 4.1 Plant Noise Limits

Noise Sensitive Property	Total Plant Noise Limit L_{Aeq} (dB)	
	Daytime (07:00-23:00)	Night-time (23:00-07:00)
Noise Sensitive Properties to North, South and West of Site	45	41
Noise Sensitive Properties to East and South-East of Site	33	28

The noise limits are to be achieved at a distance of 1m external to the nearest noise sensitive property and apply to the total cumulative noise level with all relevant plant operating simultaneously.

4.2 Noise Control Measures

At this early stage, the building services plant design should be sufficiently flexible to ensure that suitably quiet, non-tonal plant can be procured and where necessary mitigation options can be included to ensure the noise limits are not exceeded.

Noise mitigation measures that could be expected to be implemented as part of the design are as follows:

- Housing of certain items of building services plant within internal plantrooms, to contain radiated noise within the building envelope
- Selection of low-noise fans and condenser units, including night set-back modes
- Considerate location of external plant, so as to maximise distance and screening from noise sensitive façades
- Appropriate casings on external fans and air handling units, so as to limit noise break-out
- Use of appropriate atmospheric duct-mounted attenuators on fans and air handling units

- Use of acoustic mitigation such as plant enclosures and screening where necessary

5.0 External Noise Intrusion

5.1 Indoor Ambient Noise Level Criteria

Camden Council's standard requirements for proposed developments likely to be sensitive to noise are as follows:

"*Special consideration will need to be given to noise sensitive developments that are proposed in areas which are, or expected to become, subject to levels of noise likely to have an adverse effect. The threshold of acceptability of the noise will primarily depend on two factors: the intended use of the noise sensitive development and the source of the noise experienced, or likely to be experienced.*

Table B: Noise levels applicable to noise sensitive residential development proposed in areas of existing noise

Dominant Noise Source	***Assessment Location***	***Design Period***	***LOAEL (Green)***	***LOAEL to SOAEL (Amber)***	***SOAEL (Red)***
Anonymous noise such as general environmental noise, road traffic and rail traffic	*Noise at 1 metre from noise sensitive façade/free field*	*Day*	*< 50 dB $L_{Aeq,\ 16\ hr}$ **	*50 dB to 72 dB $L_{Aeq,\ 16\ hr}$*	*> 72 dB $L_{Aeq,\ 16\ hr}$*
		Night	*< 45 dB $L_{Aeq,\ 8\ hr}$* *< 40 dB L_{night} ***	*45 dB to 62 dB $L_{Aeq,\ 8\ hr}$** *> 40 dB L_{night} ***	*> 62 dB $L_{Aeq,\ 8\ hr}$**
	Inside a bedroom	*Day*	*< 35 dB $L_{Aeq,\ 16\ hr}$ **	*35 dB to 45 dB $L_{Aeq,\ 16\ hr}$*	*> 45 dB $L_{Aeq,\ 16\ hr}$*
		Night	*< 30 dB $L_{Aeq,\ 8\ hr}$* *< 42 dB $L_{Amax,\ fast}$*	*30 dB to 40 dB $L_{Aeq,\ 8\ hr}$* *> 40 dB to 73 dB $L_{Amax,\ fast}$*	*> 40 dB $L_{Aeq,\ 8\ hr}$* *> 73 dB $L_{Amax,\ fast}$*
	Outdoor living space (free field)	*Day*	*< 50 dB $L_{Aeq,\ 16\ hr}$ **	*50 dB to 55 dB $L_{Aeq,\ 16\ hr}$*	*> 55 dB $L_{Aeq,\ 16\ hr}$*

** $L_{Aeq,\ T}$ values specified for outside a bedroom window are façade levels*
*** L_{night} values specified for outside a bedroom window are free field levels*"

We have based our external noise intrusion assessment on the standards presented above.

5.2 External Noise Intrusion via Closed Façades

Based on the measured external noise levels across the site, we have undertaken calculations to predict the internal noise levels in the proposed dwellings. Results of the calculations show that the standards described above could be achieved by using suitable external façade constructions.

Table 5.1 presents the preliminary recommended specifications for glazing and trickle ventilators for habitable rooms to achieve the internal noise standards.

Table 5.1 Preliminary Acoustic Specifications

Façade	Room	Glazing	Ventilation
North	Living Rooms	R_w 34 dB e.g. 6mm glass / 16mm cavity / 6mm glass	See Section 5.4 Below
	Bedrooms	R_w 38 dB e.g. 10mm glass / 12mm cavity / 6.4mm laminated glass	
South	Living Rooms	R_w 34 dB e.g. 6mm glass / 16mm cavity / 6mm glass	$D_{ne,w}$ 37 dB Standard trickle ventilator
	Bedrooms	R_w 34 dB e.g. 6mm glass / 16mm cavity / 6mm glass	$D_{ne,w}$ 37 dB Standard trickle ventilator
East	Living Rooms	R_w 34 dB e.g. 6mm glass / 16mm cavity / 6mm glass	$D_{ne,w}$ 37 dB Standard trickle ventilator
	Bedrooms	R_w 34 dB e.g. 6mm glass / 16mm cavity / 6mm glass	$D_{ne,w}$ 37 dB Standard trickle ventilator
West	Living Rooms	R_w 34 dB e.g. 6mm glass / 16mm cavity / 6mm glass	See Section 5.4 Below
	Bedrooms	R_w 38 dB e.g. 10mm glass / 12mm cavity / 6.4mm laminated glass	

The levels of sound reduction described in Table 5.1 should not be difficult to achieve.

Our calculations have assumed that the non-glazed areas will provide a sound insulation performance of at least R_w 52 dB (i.e. standard brick/block cavity wall or suitable lightweight external wall construction).

Room and window dimensions are yet to be finalised. We have therefore assumed typical dimensions in our calculations (i.e. based on bedrooms 30m^3 with a 25% glazed façade area, living rooms 40m^3 with a 50% glazed façade area).

The specifications above are to demonstrate viability for planning guidance only. Further consideration should be undertaken during the detailed project design stage to determine detailed glazing acoustic specifications to ensure it meets minimum criteria of BS 8233:2014 and WHO Guidelines.

Our calculations, based on the noise survey results presented above, indicate that the Camden Council LOAEL internal noise levels should be achievable in the proposed residential dwellings through the use of suitable external façade constructions.

5.3 Open Windows and Overheating

Where windows are open to control overheating, it is prudent to consider the impact on internal noise levels and residential amenity.

Approved Document O 2021 (adopted 15 June 2022) of the Building Regulations, states the following:

"In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

a. 40dB $L_{Aeq,T,}$ averaged over 8 hours (between 11pm and 7am).

b. 55dB $L_{AFmax,}$ more than 10 times a night (between 11pm and 7am).

***NOTE**: Guidance on reducing the passage of external noise into buildings can be found in the National Model Design Code: Part 2 – Guidance Notes (MHCLG, 2021) and the Association of Noise Consultants' Acoustics, Ventilation and Overheating: Residential Design Guide (2020)."*

The Association of Noise Consultants (ANC) has produced a guidance document entitled "*Acoustics, Ventilation and Overheating Residential Design Guide*", published in January 2020, which states that "*it is considered reasonable to allow higher levels of internal ambient noise for transport sources when higher rates of ventilation are required in relation to the overheating condition*".

A two-stage noise risk assessment is then proposed, based upon the levels of external noise affecting a site as shown in Figure 5.1 and the subsequent internal noise levels shown Figure 5.2.

Figure 5.1 Level 1 Noise Risk Assessment – External Noise Levels

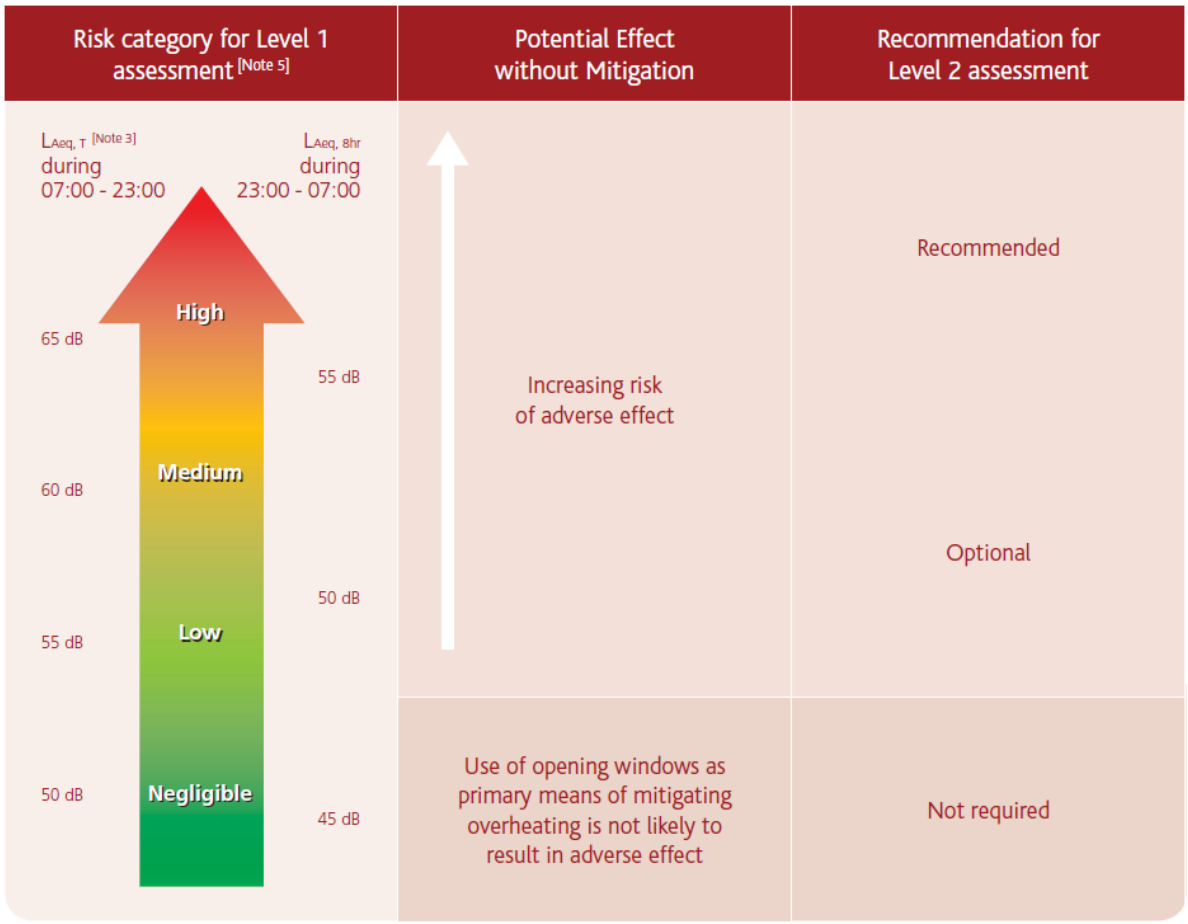


Figure 5.2 Level 2 Noise Risk Assessment – Internal Noise Levels

Internal ambient noise level [Note 2]			Examples of Outcomes [Note 5]	
$L_{Aeq,T}$ [Note 3] during 07:00 – 23:00 [Note 6]	$L_{Aeq,8h}$ during 23:00 – 07:00	Individual noise events during 23:00 – 07:00 [Note 4]		
> 50 dB	> 42 dB	Normally exceeds 65 dB $L_{AF,max}$	Noise causes a material change in behaviour e.g. having to keep windows closed most of the time	Avoiding certain activities during periods of intrusion. Having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.
			Increasing likelihood of impact on reliable speech communication during the day or sleep disturbance at night	At higher noise levels, more significant behavioural change is expected and may only be considered suitable if occurring for limited periods. As noise levels increase, small behaviour changes are expected e.g. turning up the volume on the television; speaking a little more loudly; having to close windows for certain activities, for example ones which require a high level of concentration. Potential for some reported sleep disturbance. Affects the acoustic environment inside the dwelling such that there is a perceived change in quality of life. At lower noise levels, limited behavioural change is expected unless conditions are prevalent for most of the time. [Note 8]
≤ 35 dB	≤ 30 dB	Do not normally exceed $L_{AF,max}$ 45 dB more than 10 times a night	Noise can be heard, but does not cause any change in behaviour	Noise can be heard, but does not cause any change in behaviour, attitude, or other physiological response[Note 9]. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

Figures 5.1 and 5.2 are related by the 13 dB attenuation typically provided by an open window.

It can be seen from Figure 5.1 that for a site affected by low levels of external noise, no further consideration is required and "*use of opening windows as a primary means of mitigation overheating is not likely to result in adverse effect*".

For noisier sites, the risk of an adverse effect increases with increasing noise level and further consideration may be required.

Comparing the measured external noise levels with the ADO and ANC criteria presented above, gives the daytime and night-time noise risk categories shown in Table 5.2.

Table 5.2 Noise Risk Categories

Location	Predicted External Noise Level at Façade	Noise Risk Category	Internal Noise Level with Windows Open
North	63 dB Daytime $L_{Aeq\ (16\ hour)}$	**High**	50 dB Daytime $L_{Aeq\ (16\ hour)}$
	58 dB Night-time $L_{Aeq\ (8\ hour)}$	**High** **Exceeds ADO Limit**	45 dB Night-time $L_{Aeq\ (8\ hour)}$
	80 dB Night-time $L_{Amax\ (10th\ highest)}$	**Exceeds ADO Limit**	67 dB Night-time $L_{Amax\ (10th\ highest)}$
South	62 dB Daytime $L_{Aeq\ (16\ hour)}$	**High**	49 dB Daytime $L_{Aeq\ (16\ hour)}$
	44 dB Night-time $L_{Aeq\ (8\ hour)}$	**Low/Negligible** **Less than ADO Limit**	31 dB Night-time $L_{Aeq\ (8\ hour)}$
	59 dB Night-time $L_{Amax\ (10th\ highest)}$	**Less than ADO Limit**	46 dB Night-time $L_{Amax\ (10th\ highest)}$
East	62 dB Daytime $L_{Aeq\ (16\ hour)}$	**High**	49 dB Daytime $L_{Aeq\ (16\ hour)}$
	44 dB Night-time $L_{Aeq\ (8\ hour)}$	**Low/Negligible** **Less than ADO Limit**	31 dB Night-time $L_{Aeq\ (8\ hour)}$
	59 dB Night-time $L_{Amax\ (10th\ highest)}$	**Less than ADO Limit**	46 dB Night-time $L_{Amax\ (10th\ highest)}$
West	63 dB Daytime $L_{Aeq\ (16\ hour)}$	**High**	50 dB Daytime $L_{Aeq\ (16\ hour)}$
	58 dB Night-time $L_{Aeq\ (8\ hour)}$	**High** **Exceeds ADO Limit**	45 dB Night-time $L_{Aeq\ (8\ hour)}$
	80 dB Night-time $L_{Amax\ (10th\ highest)}$	**Exceeds ADO Limit**	67 dB Night-time $L_{Amax\ (10th\ highest)}$

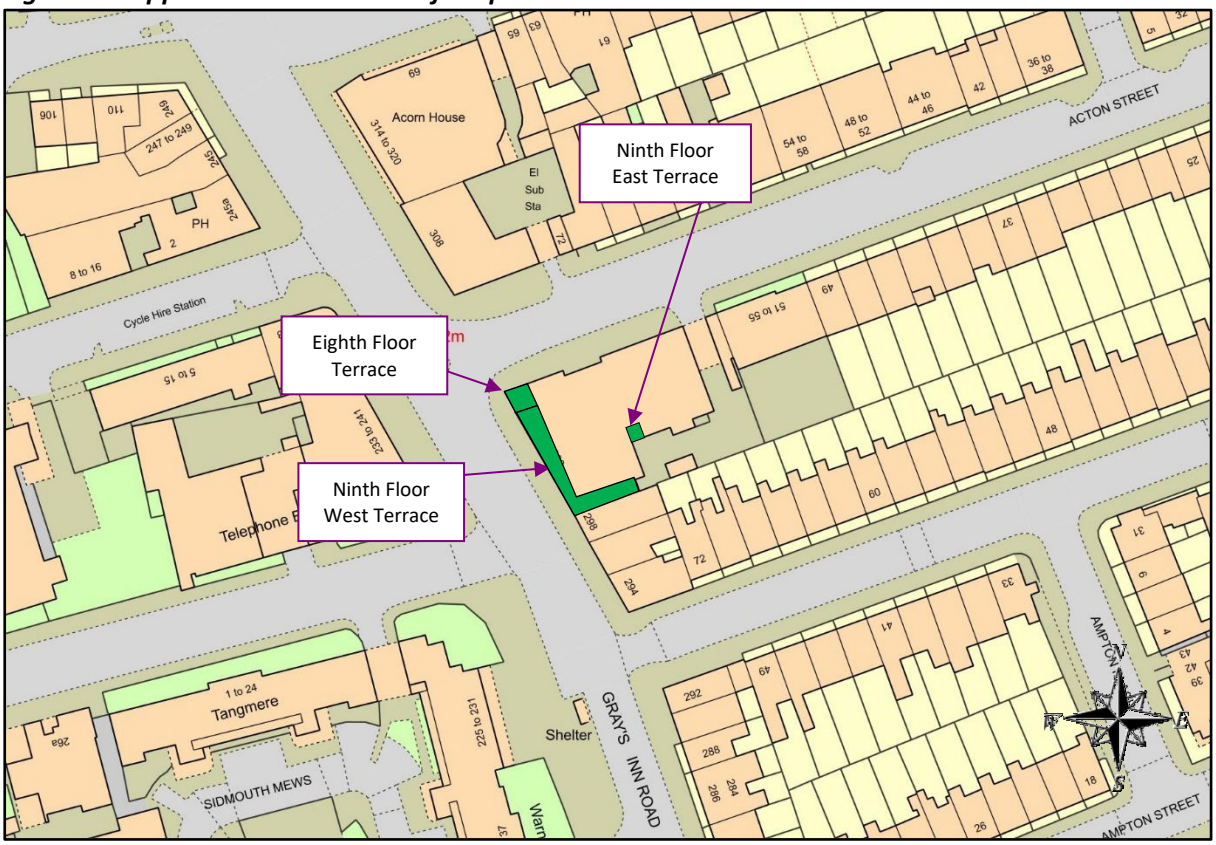
The assessment above indicates that the northern and western façades of the development are predicted to be within the high noise risk category during both the daytime and night-time periods and will exceed the ADO noise limits. Therefore, an alternative method of mitigating overheating should be implemented in these areas since the guidance suggests "*use of open windows as a primary means of mitigating overheating is likely to result in adverse effect*".

The assessment also indicates that the southern and eastern façades of the development are predicted to be within the low noise risk category during night-time periods and below the ADO noise limits. According to guidance, for these façades "*use of opening windows as a primary means of mitigating overheating is not likely to result in adverse effect*".

6.0 Terrace Noise Assessment

External terraces are proposed at eighth and ninth floor level, in the approximate locations indicated in green on Figure 6.1.

Figure 6.1 Approximate Locations of Proposed External Terraces



The maximum occupancy of each terrace area is expected to be as follows:

- Eighth Floor Terrace 10 people
- Ninth Floor West Terrace 19 people
- Ninth Floor East Terrace 10 people

Likely activities on the terraces would be conversations, telephone calls, etc. The proposed usage hours of the terraces are 08:00 – 21:00 hours, Monday to Friday.

The following sections present our assessment of the potential noise impact of these terraces on existing and proposed noise sensitive properties.

6.1 Noise Impact Assessment Criteria

We are not aware of any specific requirements that Camden Council may have for noise from new roof terraces. The noise impact will be therefore assessed against the criteria shown in Table 3.1, which are based on the IEMA document "*Guidelines for Environmental Noise Impact Assessment*" (November 2014).

Table 6.1 Noise Impact Assessment Criteria

Noise Level Change (dB, L_{Aeq})	Noise Impact
< 3	Negligible
3 – 5	Moderate
5 – 10	Substantial
> 10	Very Substantial

Our assessment has therefore considered the above.

6.2 Basis of Assessment

Our assessment has assumed the worst-case maximum occupancies presented above during a typical daytime hour, with half of the guests (5 or 10) talking at typical vocal effort.

Our calculations have taken into account the approximate distances from the terraces to the nearest existing and proposed noise sensitive properties, which are as follows:

- Eighth Floor Terrace to 298 Gray's Inn Road (third floor level) 24m
- Ninth Floor West Terrace to 298 Gray's Inn Road (third floor level) 14m
- Ninth Floor East Terrace to Proposed Residential (part of development) 14m

A sound power level for speech at normal level of 68 dB L_{wA} (per person) has been used as the basis of the assessment, taken from "*Acoustic Design of Schools: A Design Guide*" (November 2015).

As a worst-case, our assessment has considered all of the terrace areas being occupied simultaneously.

6.3 Existing Ambient Noise Levels

In our assessment of noise due to users of the terraces, we have considered the existing ambient noise levels measured during the proposed operating hours (08:00 – 21:00 hours, Monday to Friday) which ranged from 61 dB to 66 dB $L_{Aeq\ (1\ hour)}$ on the west of the site and 46 dB to 55 dB $L_{Aeq\ (1\ hour)}$ on the east of the site.

6.4 Predictions

Our noise impact calculations are shown in Table 6.2 to Table 6.4 for each proposed terrace respectively.

Table 6.2 Noise Impact Calculations – Eight Floor Terrace

Element	Level (dB)
Speech Sound Power Level	68
Quantity Correction	+10
Acoustic Reflections	+3
Distance Attenuation	-39
Screening Attenuation	-10
Predicted Noise Level	32
Existing Noise Levels	61 – 66
Total Future Noise Levels	61 – 66
Predicted Noise Level Difference	**0**

Table 6.3 Noise Impact Calculations – Ninth Floor West Terrace

Element	Level (dB)
Speech Sound Power Level	68
Quantity Correction	+13
Acoustic Reflections	+3
Distance Attenuation	-34
Screening Attenuation	-10
Predicted Noise Level	41
Existing Noise Levels	61 – 66
Total Future Noise Levels	61 – 66
Predicted Noise Level Difference	**0**

Table 6.4 Noise Impact Calculations – Ninth Floor East Terrace

Element	Level (dB)
Speech Sound Power Level	68
Quantity Correction	+10
Acoustic Reflections	+3
Distance Attenuation	-34
Screening Attenuation	-10
Predicted Noise Level	39
Existing Noise Levels	46 – 55
Total Future Noise Levels	47 – 55
Predicted Noise Level Difference	**0 to +1**

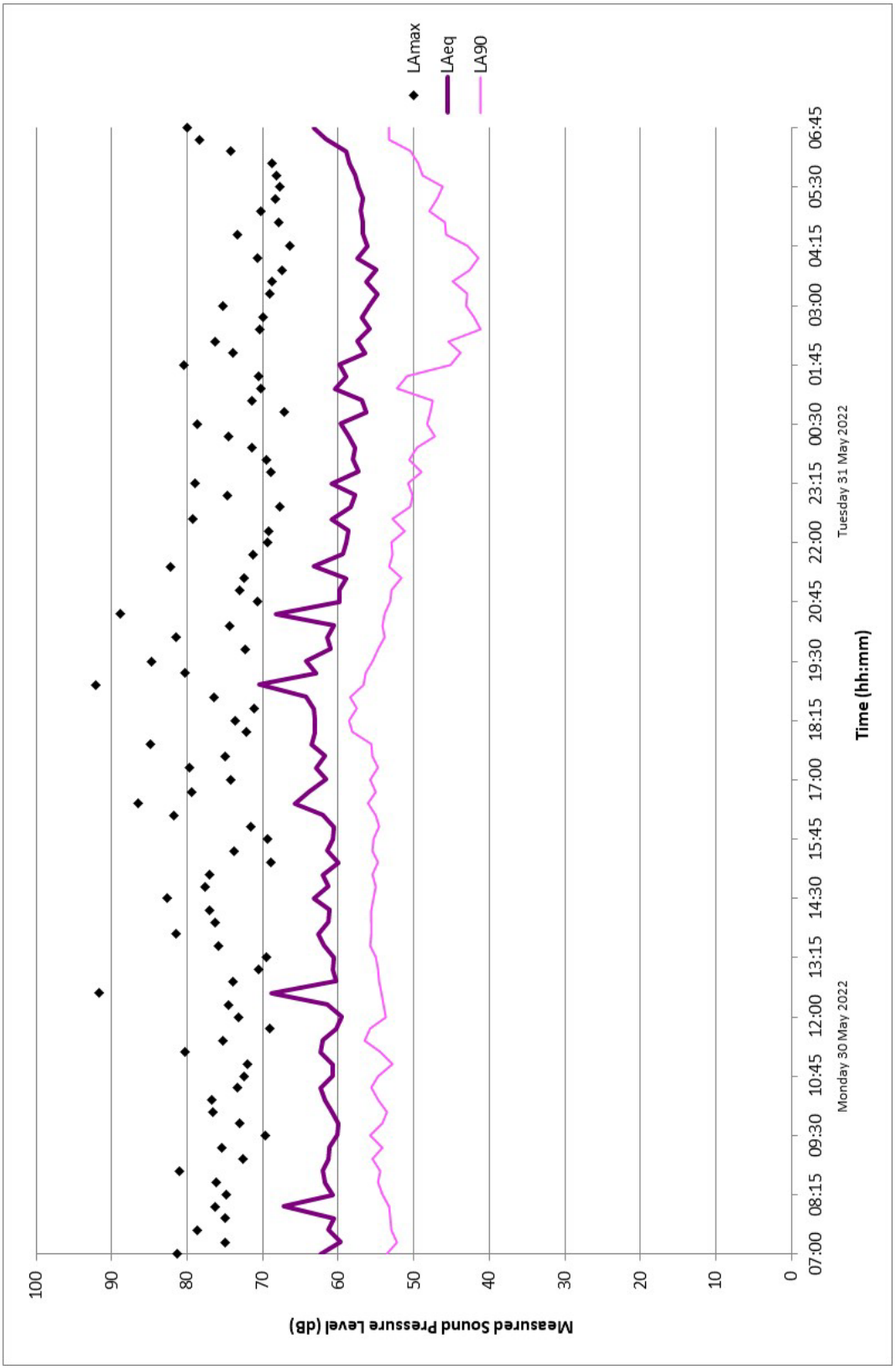
It can be seen that the predicted noise level difference due to guests on each of the external terraces is negligible, when compared with the IEMA criteria described in Section 6.1 above.

Appendix A – Acoustic Terminology

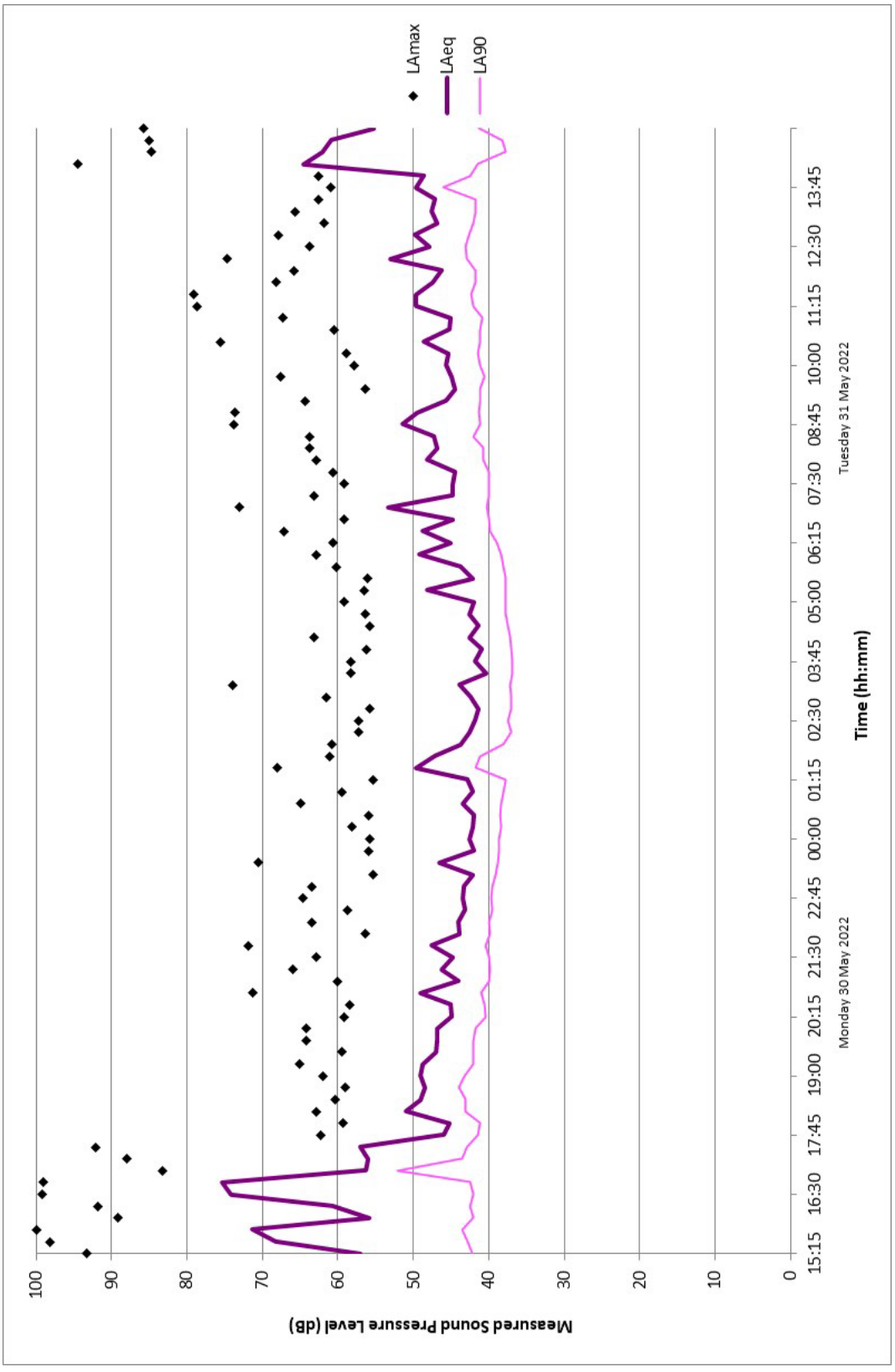
Parameter	Description
Decibel (dB)	A logarithmic scale representing the sound pressure or power level relative to the threshold of hearing ($20x10^{-6}$ Pascals).
Sound Pressure Level (L_p)	The sound pressure level is the sound pressure fluctuation caused by vibrating objects relative to the threshold of hearing.
A-weighting (L_A or dBA)	The sound level in dB with a filter applied to increase certain frequencies and decrease others to correspond with the average human response to sound.
L_{Amax}	The A-weighted maximum noise level measured during the measurement period.
$L_{Aeq,T}$	The A-weighted equivalent continuous noise level over the time period T (typically T= 16 hours for daytime periods, T = 8 hours for night-time periods). This is the sound level that is equivalent to the average energy of noise recorded over a given period.
$L_{A90\ (15\ min)}$	The noise level exceeded for 90% of the time (also referred to as the background noise level), measured over a 15-minute period
R_w	The weighted (w) sound reduction index (R), a single figure rating of the laboratory airborne sound insulation performance of a construction, usually measured across the frequency range 100-3150Hz. The higher the value, the greater the sound insulation, and the more onerous the requirement.
$D_{n,e,w}$	The weighted (w) element (e) normalised (n) level difference (D), a single figure indicator of the ability of a small building element (such as a trickle ventilator) to reduce sound. The higher the value, the greater the sound reduction, and vice versa.

Appendix B – Time History Graphs

Position 1



Position 2


LAmax
LAeq
LA90
Measured Sound Pressure Level (dB)
100
90
80
70
60
50
40
30
20
10
0
15:15
16:30
17:45
19:00
20:15
21:30
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Monday 30 May 2022
Tuesday 31 May 2022
Time (hh:mm)