

Church House 90 Deansgate Manchester

Environmental Noise Survey and Noise Impact Assessment Report

32108/NIA1

18 March 2025

For:
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Document Control

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1.0 Introduction

Hann Tucker Associates Limited (Hann Tucker) has been commissioned by Criterion Capital to undertake a noise assessment for a site in Deansgate, Manchester.

The site, which is located on Deansgate, is being considered for development into a hotel. The existing building comprises several stripped out office spaces which are to be set to be replaced by the proposed development.

The site is subject to road traffic noise from surrounding road networks, plant noise from neighbouring fixed plant items, as well as entertainment/music/nightlife noise associated with surrounding bars and clubs.

Baseline noise conditions have been established by means of a detailed noise survey, presented herein. The findings have subsequently been used to assess the suitability of the site for hotel use. Measures required to mitigate noise impacts for the proposed development (when operational) have been discussed in context with relevant national & local planning policies, design standards and good practice guides.

2.0 Objectives

To undertake an environmental noise survey to establish the existing L_{Amax} , L_{Aeq} and L_{A90} environmental road, rail and air traffic noise levels at selected accessible positions.

To undertake attended noise level measurements at the site to establish existing glazing performance.

To obtain data that can be used to determine the requirements for sound insulation of the external facades at a later date.

Based on the results of the survey, to undertake a noise assessment to assess the suitability of the site for hotel use in accordance with the Noise Policy Statement for England (NPSE), National Planning Policy Framework (NPPF), Planning Practice Guidance (ProPG), British Standard BS8233:2014 and Local Authority requirements.

To discuss noise mitigation and acoustic design solutions to achieve acceptable noise levels in residential areas.



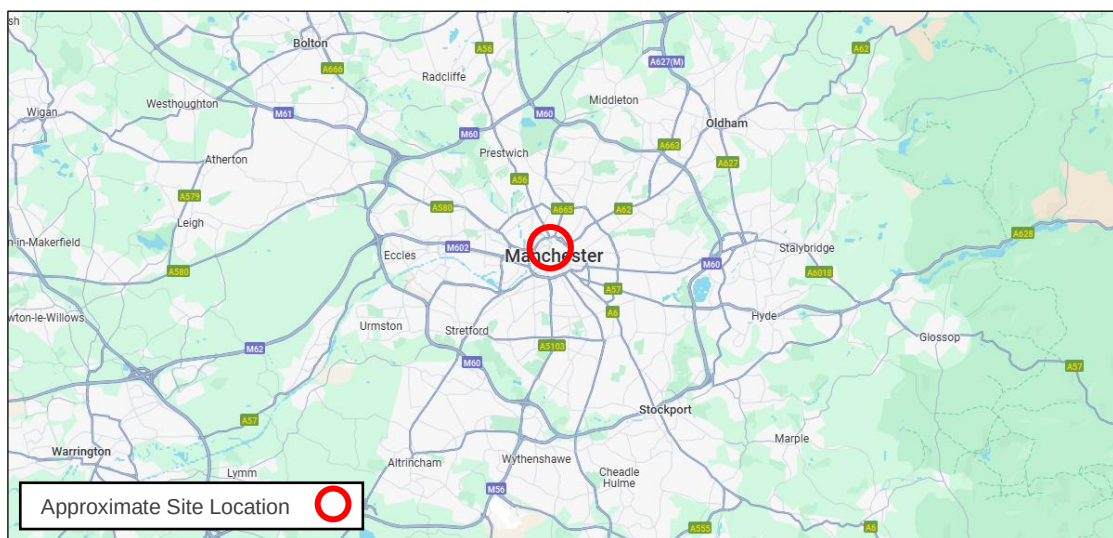
3.0 Acoustic Terminology

For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.

4.0 Site Description

4.1 Location

The site is in central Manchester. The location is shown in the Location Map below.



Location Map (Map data ©2025 Google - see above)

The site falls within the jurisdiction of Manchester city Council.

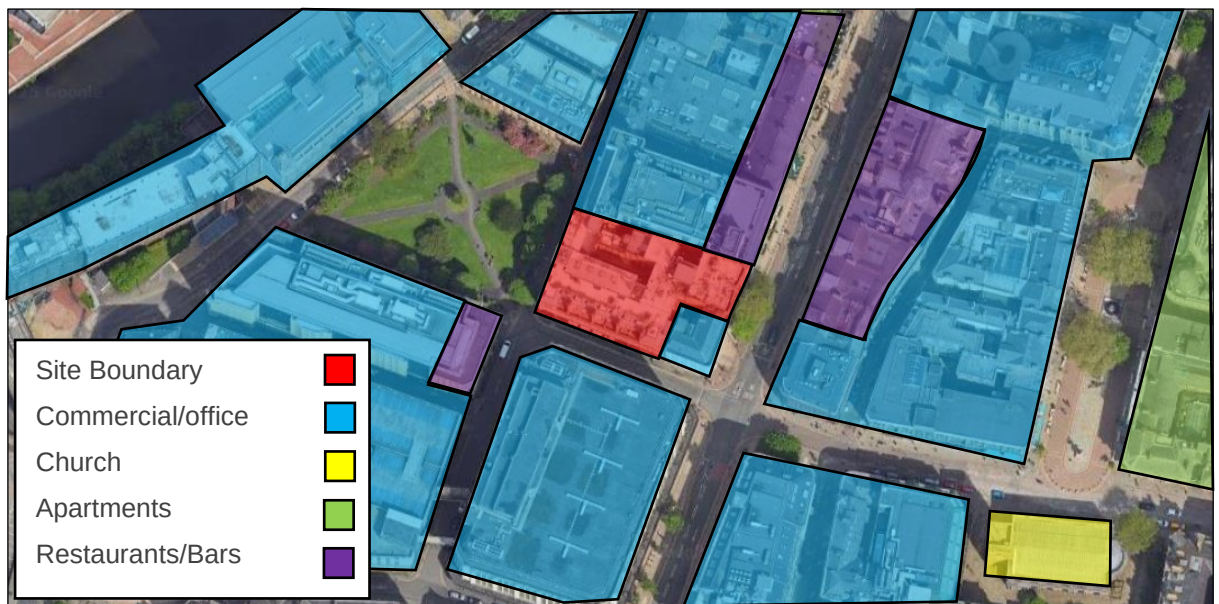
4.2 Description

The site is located at the junction of Deansgate and St. Mary's Street in Manchester within a dense urban setting comprising commercial and retail premises, including restaurants, coffee shops, and department stores. It is bounded by Deansgate to the east, a major road with significant, single lane, traffic flow, St. Mary's Street to the south, providing access to commercial properties and Parsonage Gardens to the west.

The surrounding buildings are predominantly ground plus two to four storeys, occupied by retail and hospitality businesses. There are a number of pubs/bars located around the site namely; Revolution located next to Parsonage Gardens (open until 01:00 at the weekend), Be at One , Roxy and the Moon Under Water located along Deansgate, all open until at least 02:00 at the weekend.



The site is shown in the Site Plan below.



Site Plan (Imagery ©2025 Airbus, Maxar Technologies, Map data ©2025- see above)

5.0 Proposed Development

The current building was former office space and is currently being stripped. The site is being considered for conversion into a hotel, with general back of house areas (staff room, changing, refuse, plantrooms) situated within the basement.

Existing facades are to be retained, and it is understood that there is a desire to retain the existing glazing where possible.

The site plans are presented in Appendix D for reference.

6.0 Planning Policies, Standards & Guidance

6.1 Policies & Guides

In order to provide a suitable assessment a number of national planning policies have been considered, including:

- The National Planning Policy Framework (NPPF), 2024
- The Noise Policy Statement for England (NPSE), 2010
- Planning Practice Guidance – Noise (PPGN), 2019



The above documents highlight the importance of considering the potential noise effects on any new residential/hotel development and provide a qualitative approach to assessment. However, each of the above does not provide any quantitative guidance. As such, all quantitative guidance used to form a noise impact assessment is taken from various other standards, guidance, and Local Authority requirements as summarised below:

- Local Planning Policy
- World Health Organisation: 2018
- British Standard BS8233: 2014
- ProPG : Planning & Noise: 2017
- British Standard 4142:2014 + A1:2019
- DEFRA Low Frequency Noise Complaints

Detailed information for relevant planning policies and guidance can be found within Appendix B.

6.2 Specific Local Authority Criteria

Manchester City Council requirements are outlined in Section 3.0 of Manchester City Council's Planning & Noise Technical Guidance document (October 2022).

6.2.1 Internal Noise Levels

Section 3.7.1.1 sets out the following noise levels to be achieved for residential developments (inc. Hotels):

- *Bedrooms (Night time - 23:00 to 07:00): 30dB L_{Aeq} and individual noise events should not normally exceed 45 dB (L_{Amax}).*
- *Living Rooms (Day time 07:00 to 23:00): 35 dB (L_{Aeq}).*
- *Gardens and terraces (daytime) 55 dB (L_{Aeq}).*

We understand there are no gardens or terraces associated with the development and as such external noise levels at the site have not been assessed with respect to the final point above.



6.2.2 Music Noise

Section 3.7.1.2 offers the following guidance regarding entertainment noise, which may be applicable for the retail/ commercial spaces within the proposed development.

“Noise from entertainment venues e.g. noise from recorded music, live bands, or karaoke, can be particularly annoying for local residents and businesses if it is not adequately contained within the venue. When considering the potential impact of a proposal for an entertainment venue consultants should consider the overall noise level (Leq) and the 63 Hz and 125 Hz octave band noise levels (Leq).”

The document then proposes the following assessment criteria for structurally connected uses, however, this criteria is often adopted for non-structurally connected dwellings also:

“Music noise levels in the 63Hz and 125Hz octave centre frequency bands (Leq) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (Leq) respectively”.

7.0 Baseline Noise Survey

7.1 Procedure

Fully automated environmental noise monitoring was undertaken by Euan Ellis BA(Hons) and assisted by Jake Howarth BEng(Hons), MIOA from approximately 11:00 hours on Friday 28 February 2025 to 11:00 hours on Monday 3 March 2025, to establish full daytime and night-time noise levels over a typical weekday and weekend period. Measurements were taken continuously of the A-weighted (dBA) L_{90} , L_{eq} , and L_{max} sound pressure levels over discrete 2 and 15-minute periods.

Additional attended measurements were performed between 11:00 hours and 13:00 hours on Friday 28 February 2025 with the purpose of establishing noise levels associated with existing plant noise both in the lightwells and internal spaces across the site. Please note, that the internal spaces had been fully stripped when the noise survey was undertaken.

In addition to the above a façade test, using the existing noise levels in a plant well as the source noise levels, was undertaken on Friday 28 February 2025.



7.2 Measurement Positions

The external noise level measurements were undertaken at 7No. positions as described in the table below.

Position	Type	Description
1	Unattended (External)	Located on the second floor and positioned out of an east facing window over Deansgate. Microphone in façade conditions.
2	Unattended (External)	Located on the first floor and positioned out of a west facing window over College Land/Parsonage Gardens. Microphone in façade level conditions.
3	Unattended (External)	Located on the second floor and positioned out of a south facing window over Mary's Street. Microphone in façade conditions.
4	Attended (Façade Test)	Measurements taken both within an existing lightwell and within an adjoining room on first floor level. These measurements will be used to establish the performance of a typical sash window façade.
5	Attended (External)	Second floor external measurement of lightwell area. Microphone positioned out of a window. Microphone in façade conditions.
6	Attended (Internal)	Floor four internal room measurement taken from centre of room and approximately 1.5 meters above floor level. Capturing noise break in from existing plant located on rooftop level.
7	Attended (External)	Floor four external measurement taken from balcony above lightwell. Free field conditions.

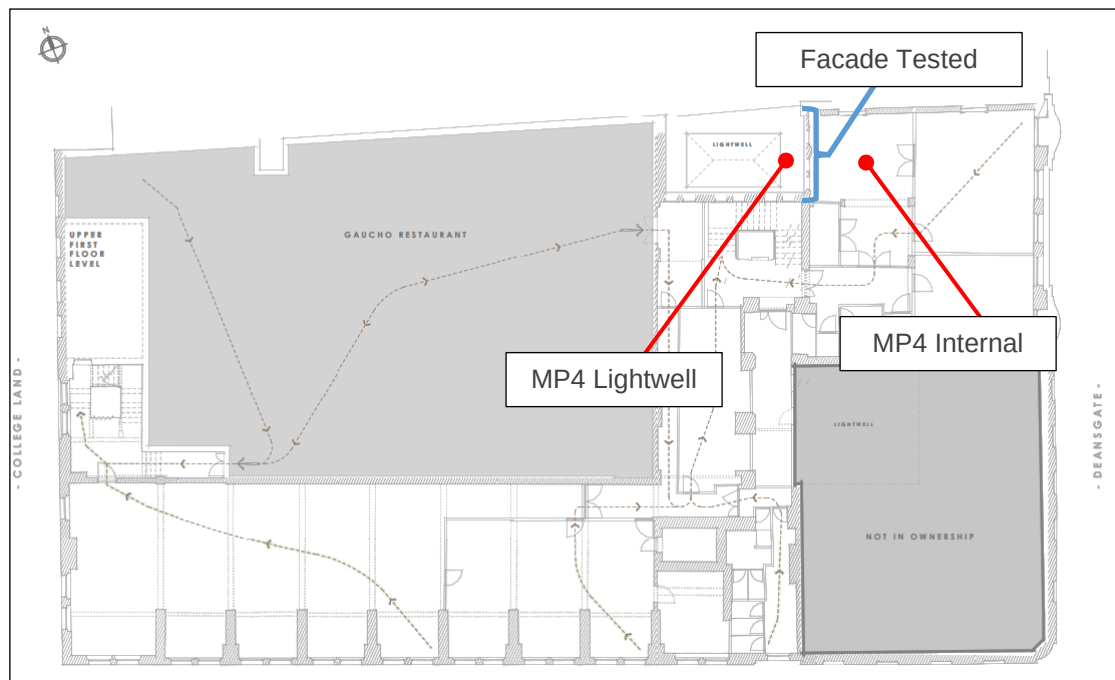
The positions for unattended measurements are shown on the plan below.



Plan Showing Measurement Positions (Imagery ©2025 Airbus, Maxar Technologies, Map data ©2025 - see above)

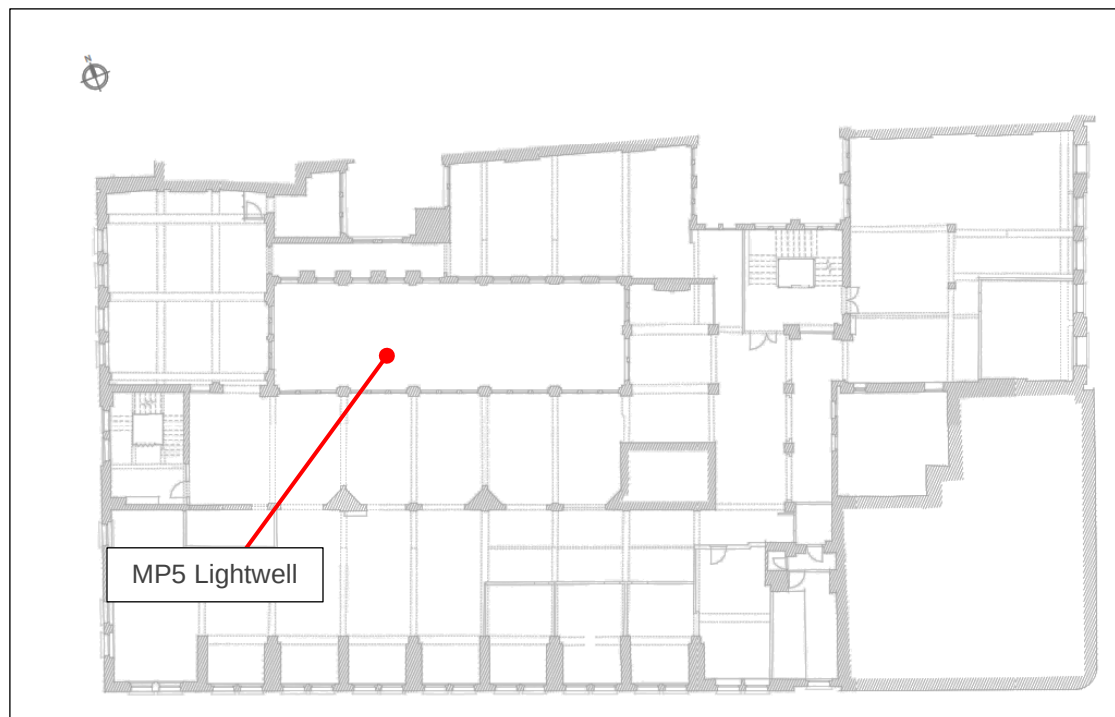


The following markup presents the positions for attended façade test measurements.

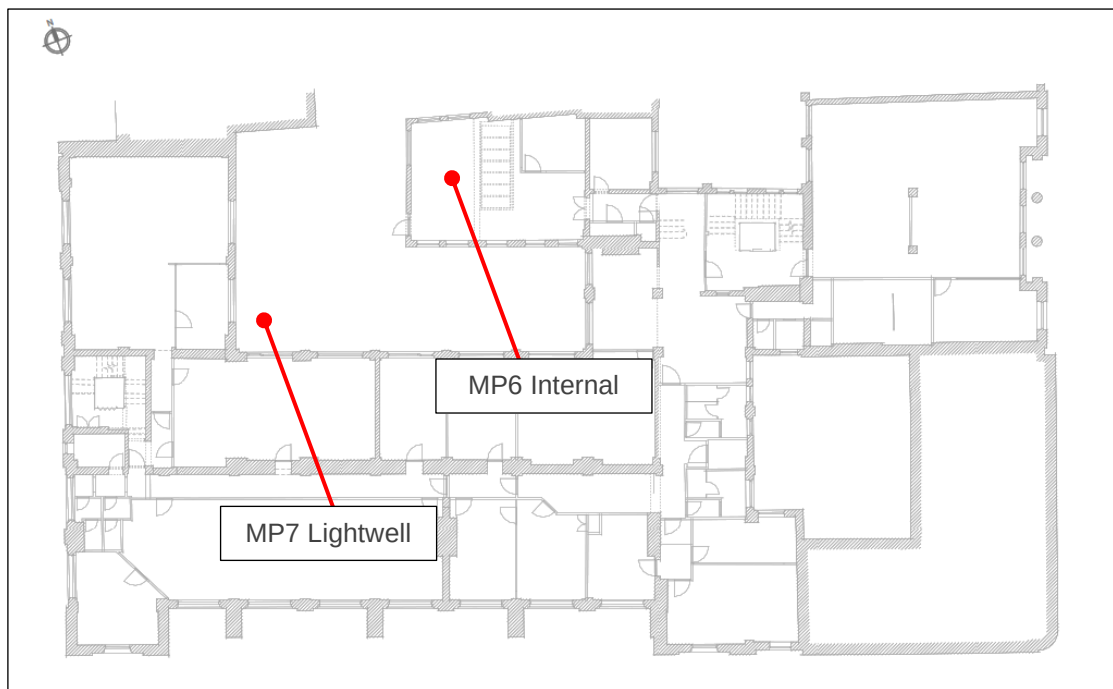


Plan showing measurement position 4 location (Drawing No. 10036-BUT-XX-01-DR-A-01002-SK02)

The positions for attended measurements are shown on the plans below.



Plan showing measurement position 5 location (Drawing No. 10036-BUT-XX-02-DR-A-01003-SK02)



Plan showing measurement position 6 and 7 location (Drawing No. 10036-BUT-XX-04-DR-A-01005-SK02)

7.3 Weather Conditions

For the unattended survey between Friday 28 February 2025 and Monday 3 March 2025, local weather reports indicated no notable periods of prolonged and/or heavy rainfall, with temperatures ranging from 1 °C (night) to 10 °C (day) and wind speeds less than 1 m/s. During our time on site, skies were clear with patchy cloud cover, wind conditions were calm and from a southerly direction and road surfaces were dry.

During the attended survey on Friday 28 March 2025, the weather was generally clear and dry with no periods of rainfall and calm wind conditions.

7.4 Instrumentation

The instrumentation used during the survey is presented in the table below:

Meter	Description	Manufacturer	Type	Serial Number	Calibration
1	Type 1 Data Logging Sound Level Meter	Svantek	958	28447	08/10/2024
2	Type 1 Data Logging Sound Level Meter	Larson Davis	LxT	4568	30/05/2024



Meter	Description	Manufacturer	Type	Serial Number	Calibration
3	Type 1 Data Logging Sound Level Meter	Svantek	958	23380	14/10/2024
4-7	Type 1 Data Logging Sound Level Meter	Brüel and Kjær	2250	3007292	25/01/2024
1-3	Calibrator	Larson Davis	Cal200	3083	28/02/2025
4-7	Calibrator	Brüel and Kjær	4231	2271905	22/08/2024

Each sound level meter, including the extension cable, was calibrated prior to and on completion of the surveys. No significant changes were found to have occurred (no more than 0.3 dB).

Each sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. Each microphone was fitted with a windshield.

7.5 Results

7.5.1 External Environmental Noise levels

The results have been plotted on Time History Graphs 32108/TH1 to 32108/TH3 enclosed presenting the 15-minute A-weighted (dBA) L_{90} , L_{eq} and L_{max} levels at each measurement position throughout the duration of the survey.

In order to compare the results of our survey with the relevant guidelines it is necessary to convert the measured $L_{Aeq(15\text{ minute})}$ noise levels into single figure daytime $L_{Aeq(16\text{-hour})}$ (07:00-23:00 hours) and night-time $L_{Aeq(8\text{-hour})}$ (23:00-07:00 hours) levels.

A summary of the results, as used to inform subsequent assessments against current guidelines, is presented in the table below. The L_{A90} values presented are the 'representative' levels determined through statistical analysis of the 15-minute readings, in line with BS 4142 (See Appendix C). The $L_{A_{fmax}}$ values are the '10th highest' 2-minute value.



Position	Day/Period	Daytime (07:00 – 23:00 hrs)		Night-time (23:00 – 07:00 hrs)		
		L _{Aeq,16hr}	Typical L _{A90}	L _{Aeq,8hr}	Typical L _{A90}	L _{Amax}
1	28/02/2025	66 ^[1]	53	67	46	87
	01/03/2025	68		67		88
	02/03/2025	61		59		79
	03/03/2025	61 ^[1]		N/A		N/A
2	28/02/2025	64 ^[1]	52	56	47	79
	01/03/2025	64		55		78
	02/03/2025	59		56 ^[2]		75
	03/03/2025	79 ^[1]		N/A		N/A
3	28/02/2025	63 ^[1]	51	64	47	84
	01/03/2025	64		62		84
	02/03/2025	58		57		77
	03/03/2025	61 ^[1]		N/A		N/A

Note 1: Measurement Periods during daytime of less than 16hrs and impacted by construction noise within the building

Note 2: Noise levels between 6:30 and 6:45 removed from results. Assumed to be due to bin collections.

Based on the Time History Plots presented in Appendix B, there are elevated night-time noise levels around the site on Friday and Saturday night until around 02:00. As these elevated levels are likely caused by nearby bars, the table below shows the “typical” worst case octave band noise levels in each unattended position between 23:00 and 02:00. These levels will be used in subsequent noise break-in calculations.



Position	Typical Worst Case Night-time Noise Level, L_{eq} , (dB) at each Octave Band Centre Frequency, Hz							dBA
	63	125	250	500	1000	2000	4000	
1	78	71	69	70	68	64	55	72
2	72	65	61	60	62	55	48	64
3	74	66	62	60	59	56	55	64

7.5.2 Attended Noise Levels

The results of the attended measurements are presented below.

Position	Start Time (Duration)	Measured Sound Pressure Level (dB)	
		L_{Aeq}	L_{A90}
5	12:20:55 (30 Seconds)	68	63
6	12:36:54 (60 Seconds)	47	44
7	12:36:54 (60 Seconds)	67	64

The measured octave band noise levels measured, both internally and externally, in Position 4 are presented below. These will be used to quantify the acoustic performance of the existing sash windows.

Position	Location	Measured Noise Level, L_{eq} , (dB) at each Octave Band Centre Frequency, Hz					
		125	250	500	1000	2000	4000
4	Internal	69	69	62	63	53	47
4	External	49	47	34	32	26	20

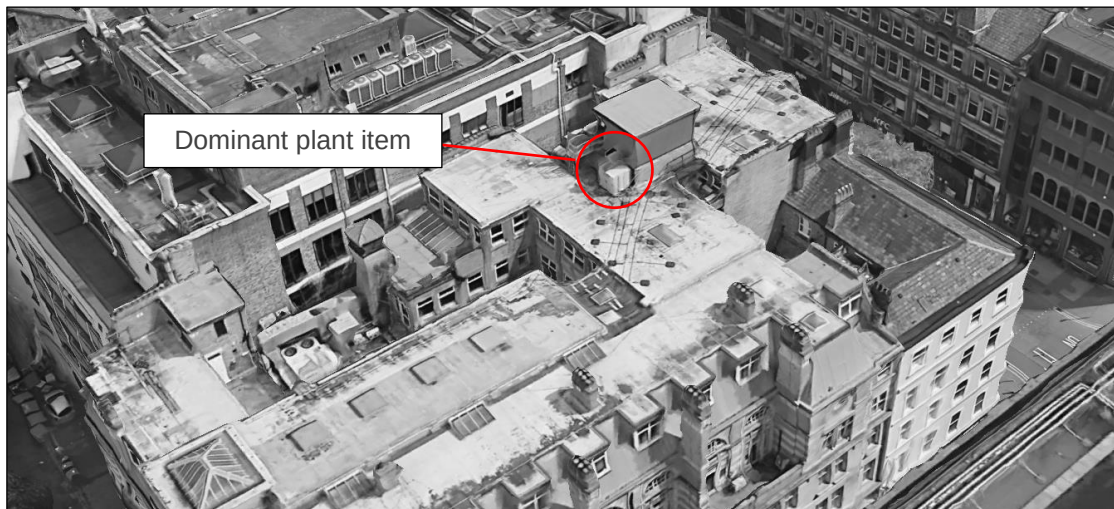
7.5.3 Discussion of Noise Climate

Due to the nature of the unattended survey, i.e. unattended, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However, at the beginning and end of the survey period the noise climate in MP1, MP2 and MP3 was noted to be dominated by road traffic noise along Deansgate and St Mary's Street as well as existing plant noise.



The results show elevated noise levels in all measurement positions during Friday and Saturday night which falls dramatically at approximately 02:00, which is a strong indicator of music/pub noise. As there are no specific music venues in the area, we believe that the elevated noise levels at these times are caused by cumulative activity of nearby bars, restaurants, and general night life. Therefore, it is appropriate to conduct a low frequency music noise assessment and provide glazing specification for 63 Hz and 125 Hz.

The noise levels within the existing lightwells (MP4, MP5 and MP6) were dominated by existing plant noise. The plant noise was audible internally, breaking through the existing façade. The lightwells contain a significant amount of plant so it is likely that they all contribute somewhat to the overall noise levels. However, there is a particularly loud plant item located on the flat roof of the building overlooking the large centralised lightwell, as shown below:



Noise levels in MP3 were impacted by assumed bin collections between 06:30 and 06:45 on 03 March 2025. It is understood that MCC are requesting the bins are moved internally as part of the regeneration of the area.

In MP6, noise from rooftop plant was perceived to be breaking in through all windows, including the ceiling skylight window.



8.0 Existing Façade Sound Insulation

To establish the existing performance of the existing glazing, attended measurements were carried out both externally and internally with a view to establishing the level difference across the windows and to provide an estimation of the in-situ weighted sound reduction index (R'_w).

The details of the room/façade tested are as follows:

Internal Location	Room Volume (m ³)	Façade Area (m ²)	Measured Reverberation Time
MP4	127	8.6	0.46*

*Presented as a T_{mf} for brevity, however, full 1/3 octave band reverberation times were used in the calculations

Based on the measured noise levels and the room parameters noted above, the existing in-situ level difference and sound reduction indices have been calculated. These are presented in the table below.

Location	Calculated $R'_w (+C_{tr})$ dB
MP4	20

Based on the above, measured performance of the façade is expected to be in the region of 20 dB $R'_w + C_{tr}$. As the windows in the façade tested were considered to be in good condition, this performance is considered to be typical for the sash window facades throughout the development.

9.0 Predicted Incident Noise Levels

The following plans show the predicted noise levels at each Façade Zone based on the results of the survey. Low frequency noise levels at 63Hz and 125Hz are also provided in the relevant Façade Zones due to the presence of cumulative night-time entertainment noise measured in the surrounding area.

Façade Zone	Calculated Incident Noise Level at Façade (dB)				
	Daytime ($L_{Aeq,16h}$)	Night-time ($L_{Aeq,8h}$)	Night-time ($L_{AFmax,2min}$)	Night-time ($L_{eq,63Hz,5min}$)	Night-time ($L_{eq,125Hz,5min}$)
Purple	65	64	85	75	68
Red	62	61	81	69	62



Façade Zone	Calculated Incident Noise Level at Façade (dB)				
	Daytime (L _{Aeq} ,16h)	Night-time (L _{Aeq} ,8h)	Night-time (L _{AFmax} ,2min)	Night-time (L _{eq} ,63Hz,5min)	Night-time (L _{eq} ,125Hz,5min)
Orange	61	53	76	75	62
Green	66	66 ^[1]	66 ^[1]	-	-

[1] – On-site observations indicate noise levels in these locations to be plant dominant as such, the night-time L_{Aeq} is likely to be similar to daytime



Plan showing Façade Zones (Relevant to all Levels) (Drawing No. 10036-BUT-XX-02-DR-A-04003-SK03)

In addition to the facade glazing, the existing level 4 skylight will need to achieve the specification for the Green Façade Zone. This location is highlighted below for clarity:



Plan showing Level 04 Skylight Location

10.0 Achieving Internal Noise Levels

There are 2No ventilation conditions applicable to proposed hotel dwellings. These are Background Ventilation as described in Approved Document F (Part F) and Purge Ventilation (odour and smells). It is assumed that overheating control will be achieved using dedicated FCUs per room.

10.1 Purge Ventilation

It should be noted that the internal noise level guidelines are generally not applicable under “*purge ventilation*” conditions as defined by Part F, as this should only occur occasionally (e.g. to remove odours or from burnt food).

As such, acoustic conditions are generally not a concern during purge ventilation.

10.2 Background Ventilation Condition

10.2.1 Criteria

With reference to the acoustic standards and guidelines as reviewed in Appendix B, the external noise intrusion levels from environmental sources should be controlled so as to not exceed the following criteria.



Activity	Location	Desirable Internal Ambient Criteria	
		07:00 – 23:00	23:00 – 07:00
Resting	Living Rooms	35 dB $L_{Aeq,16hour}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,16hour}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$ 45 dB L_{Amax}

The above criteria considers noise from anonymous sources such as road traffic. However, given the amount of plant noise impacting proposed rooms overlooking the lightwell, the ingress of noise from building services systems that do not directly serve the room should be controlled in accordance with BS 8233:2014. As such, the background noise level within any hotel bedroom, arising from building services systems serving other areas of the development, should not exceed NR20 L_{eq} .

Manchester City Council Planning and Noise policy states the following with regards to low frequency music noise:

‘Music noise levels in the 63Hz and 125Hz octave centre frequency bands (L_{eq}) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB ($L_{eq,5min}$), respectively’.

As such, the above will also been considered when assessing the level of noise break-in.

10.2.2 Proposed Ventilation Strategy

It is understood that the design intent for the scheme is to provide mechanical ventilation. As such, there will be no façade ventilators to consider acoustically.

10.2.3 Preliminary Facade Specifications

From the results of the assessment, the following minimum preliminary acoustic performance specifications are recommended. These are intended for planning use only, and detailed design stage octave band acoustic specifications will need to be developed for tender. The Façade Zones in the table relate to the Façade Zone specified in Section 9.0



Façade Zone	Façade Element	Preliminary Minimum Sound Reduction Specification		
		Low Frequency Performance (63Hz)	Low Frequency Performance (125Hz)	Weighted Sound Reduction Performance
Purple	Window	28 dB R	28 dB R	40 dB $R_w + C_{tr}$
Red	Window	24 dB R	24 dB R	35 dB $R_w + C_{tr}$
Orange	Window	20 dB R	20 dB R	30 dB $R_w + C_{tr}$
Green	Lightwell Window	-	-	45 dB $R_w + C_{tr}$

10.2.4 Example Glazing Configurations

Comparing the outline specifications set out in Section 10.2.3 and the existing performance of the sash window facades, it is clear that the existing windows do not have a suitable acoustic performance. As such the glazing will need to be enhanced or replaced to achieve the outline specifications.

The glazing specifications aim to ensure that environmental noise and entertainment noise do not exceed the internal noise limits presented in Section 8.2.1. Due to the attenuation required it is likely that secondary glazing systems or high performance non-sash type windows will be required.

It is understood that the sash type windows will likely be provided to be in-keeping with the existing aesthetic of the building. Therefore it is likely that secondary glazing systems will be required to all areas.

Example configurations are provided in the table below, although this should be confirmed by the glazing manufacturer and lab test data provided for review during detailed design stage.

Weighted Glazing Specification	Low frequency performance		Example Configuration
	63Hz	125 Hz	
45 dB $R_w + C_{tr}$	-	-	Retained sash – 200mm cavity – 6mm secondary glazing
40 dB $R_w + C_{tr}$	28 dB R	28 dB R	Retained sash – 200mm cavity – 6mm secondary glazing
35 dB $R_w + C_{tr}$	24 dB R	24 dB R	Retained sash – 200mm cavity – 4mm secondary glazing
30 dB $R_w + C_{tr}$	20 dB R	20 dB R	Retained sash – 200mm cavity – 4mm secondary glazing



11.0 Fixed Plant & Equipment

Based on the results of the noise survey and the requirements of the Local Authority, we propose that the following plant noise emission criteria be achieved incident at the nearest noise sensitive residential windows, in free-field conditions, with all plant operating simultaneously.

Receptor	Plant Noise Emission Criteria ($L_{Aeq,T}$ dB)	
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
Off-site Receptor	41	36
On-site Receptor ^[1]	54	54

[1] – Limits set at 10dB below measured L_{A90} to prevent noise creep and avoid further impact on the future hotel

Noise shall be assessed in accordance with BS 4142:2014 with corrections applied for any plant emitting noise of a tonal or irregular quality. The above limits shall be subject to the final approval of the Local Authority.

Below are the façade zone where the plant noise emission criteria will need to be achieved. The facades of the development itself, intended to be a hotel, are considered the primary noise sensitive receptors.

12.0 Internal Noise Transfer

The proposed guestrooms are located above existing retail/commercial spaces. As a minimum the sound insulation between the retail/commercial spaces and the guestrooms should achieve the requirements of Approved Document E (ADE). However, from a usability point, and to limit the impact on hotel guests, the minimum required under ADE may not be appropriate.

As such, in-line with MCC guidance for external commercial noise egress, the levels of noise transfer between the retail/commercial units and the guestrooms should be limited to 5 dB below the background noise level in the bedroom.

The 'background' noise levels in guestroom are expected to be NR25 when considering contributions from external noise intrusion and any ventilation/cooling systems. At low frequency, research for the threshold of 'virtual' inaudibility at 63 Hz and 125 Hz has been carried out and maximum levels of 47 dB and 41 dB respectively are considered to have a low impact.



As such, at this stage, noise transfer should be limited to the following:

Receptor	Noise Transfer Criteria ($L_{eq,T}$, dB) at each Octave Band Centre Frequency, Hz						
	63	125	250	500	1000	2000	4000
On-site Receptor	47	41	30	24	20	17	15

It should be noted that the above are indicative limits as the background noise level in the hotel rooms is unknown at this stage. The overriding criteria should be to achieve 5 dB below the background noise level in the guestrooms with fixed limits of 47 and 41 dB at 63Hz and 125Hz respectively.

13.0 Conclusions

A detailed environmental noise survey has been undertaken in order to establish the currently prevailing environmental noise climate around the site. The survey found that the key noise considerations at the site are night-time entertainment noise and noise from existing plant installation.

There is a desire to retain the existing sash windows. As such, the performance of an existing façade with sash windows presented has been established via on-site measurements. The measured results showed a limited acoustic performance.

The noise impact upon the proposed hotel has been assessed in the context of and national and local planning policies. Appropriate target internal noise levels have been proposed and it is clear that the existing sash windows are unlikely to be capable of meeting the internal noise level targets. As such, it is likely that secondary glazing systems will be required across the development.

Plant noise limits have been set both at the nearest noise sensitive receptor and the on-site receptors. Indicative internal noise transfer limit have been set between the retail/commercial units and the proposed guestrooms.

The assessment shows the site, subject to appropriate mitigation measures, is suitable for hotel development in terms of noise.

Appendix A

Acoustic Terminology

The acoustic terms used in this report are defined as follows:

dB Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. $30\text{dB} + 30\text{dB} = 33\text{dB}$, not 60dB).

dBA The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The _A subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted

It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.

L_{90,T} L₉₀ is the noise level exceeded for 90% of the period *T* (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.

L_{eq,T} L_{eq,T} is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, *T*.

L_{max} L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.

L_p Sound Pressure Level (SPL) is the sound pressure relative to a standard reference pressure of 2×10^{-5} Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).

L_w Sound Power Level (SWL) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).

Appendix B

Planning Policies, Standards & Guidance

B.1 Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) was published in March 2010 (i.e. before the NPPF). The NPSE is the overarching statement of noise policy for England and applies to all forms of noise other than occupational noise, setting out the long term vision of Government noise policy which is to:

“Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.”

That vision is supported by the following NPSE noise policy aims which are reflected in three of the four aims of planning policies and decisions in paragraph 123 of the NPPF (see paragraph 8.2 (b) below):

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.”*

The Explanatory Note to the NPSE has three concepts for the assessment of noise in this country:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.

LOAEL – Lowest Observable Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

None of these three levels are defined numerically and for the SOAEL the NPSE makes it clear that the noise level is likely to vary depending upon the noise source, the receptor and the time of day/day of the week, etc. The need for more research to investigate what may represent an SOAEL for noise is acknowledged in the NPSE and the NPSE asserts that not stating specific SOAEL levels provides policy flexibility in the period until there is further evidence and guidance.

The NPSE concludes by explaining in a little more detail how the LOAEL and SOAEL relate to the three NPSE noise policy aims listed above. It starts with the aim of avoiding significant adverse effects on health and quality of life, then addresses the situation where the noise impact falls between the LOAEL and the SOAEL when *“all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development.”* The final aim envisages pro-active management of noise to improve health and quality of life, again taking into account the guiding principles of sustainable development which include the need to minimise travel distance between housing and employment uses in an area.

B.2 National Planning Policy Framework (NPPF)

The following paragraphs are from the NPPF (published December 2023):

191. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.

In doing so they should:

- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and
- c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

193. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”

Paragraph 185 also references the Noise Policy Statement for England (NPSE). This document does not refer to specific noise levels but instead sets out three aims:

- “Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.”

B.3 Planning Practice Guidance on Noise

Planning Practice Guidance (PPG) under the NPPF has been published by the Government as a web based resource at <http://planningguidance.planningportal.gov.uk/blog/guidance/>. This includes specific guidance on Noise although, like the NPPF and NPSE the PPG does not provide any quantitative advice. It seeks to illustrate a range of effect levels in terms of examples of outcomes as set out in the following table:

Perception	Examples of Outcomes	Increasing effect level	Action
Not noticeable	No effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	

Perception	Examples of Outcomes	Increasing effect level	Action
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, 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.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable hard, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

B.4 World Health Organisation

The current Environmental Noise Guidelines 2018 for the European Region (ENG) supersede the Guidelines for Community Noise from 1999 (CNG). Nevertheless, the ENG recommends that all CNG indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) remain valid.

A summary of the guidance from the ENG and CNG is shown in the table below.

Source	CNG guideline indoors all sources	ENG guideline outdoors noise from specific source only
Road traffic noise	35 L _{Aeq} , 16h	53 dB L _{den}
	30 L _{Aeq} , 8h	45 dB L _{night}
Railway noise	35 L _{Aeq} , 16h	54 dB L _{den}
	30 L _{Aeq} , 8h	44 dB L _{night}
Aircraft noise	35 L _{Aeq} , 16h	45 dB L _{den}
	30 L _{Aeq} , 8h	40 dB L _{night}

With regard to single-event noise indicators, Section 2.2.2 of the WHO Environmental Noise Guidelines 2018 state:

“In many situations, average noise levels like the L_{den} or L_{night} indicators may not be the best to

explain a particular noise effect. Single-event noise indicators – such as the maximum sound pressure level ($L_{A,max}$) and its frequency distribution – are warranted in specific situations, such as in the context of night-time railway or aircraft noise events that can clearly elicit awakenings and other physiological reactions that are mostly determined by $L_{A,max}$. Nevertheless, the assessment of the relationship between different types of single-event noise indicators and long-term health outcomes at the population level remains tentative. The guidelines therefore make no recommendations for single-event noise indicators.”

B.5 British Standard BS8233: 2014

British Standard 8233: 2014 “Guidance on sound insulation and noise reduction for buildings” provides guidance for the control of noise in and around buildings.

Internal Areas

BS8233:2014 Section 7.7.2 titled “Internal ambient noise levels for dwellings” states:

“In general for steady external noise sources, it is desirable that internal ambient noise levels do not exceed the following guideline values:

Activity	Location	Desirable Internal Ambient Criteria	
		07:00 – 23:00	23:00 to 07:00
Resting	Living Rooms	35 dB $L_{Aeq,16hour}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,16hour}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

Note 1 The above table provides recommended levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources. Groundborne noise is assessed separately and is not included as part of these targets, as human response to groundborne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.

Note 2 The levels shown in the above table are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the levels recommended in the above table.

Note 3 These levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year’s Eve.

Note 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$ depending on the character and

number of events per night. Sporadic noise events could require separate values.

Note 5 If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.

If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.

Note 6 Attention is drawn to the Building Regulations.

Note 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.”

External Amenity Areas

BS8233:2014 Section 7.7.3.2 titled “Design criteria for external noise” states:

“For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}^{-1}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens, and terraces, which might be intended to be used for relaxation. In high-noise areas consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space.”

B.6 ProPG : Planning & Noise : 2017

The primary goal of the ProPG is to assist the delivery of sustainable development by promoting good health and well-being through the effective management of noise. It seeks to do that through encouraging a good acoustic design process in and around proposed new residential development having regard to national policy on planning and noise. It is applicable to noise

from existing transport sources (noting that good professional practice should have regard to any reasonably foreseeable changes in existing and/or new sources of noise). The recommended approach is also considered suitable where some industrial or commercial noise contributes to the acoustic environment provided that is “not dominant”.

This ProPG advocates a systematic, proportionate, risk based, 2-stage, approach. The approach encourages early consideration of noise issues, facilitates straightforward accelerated decision making for lower risk sites, and assists proper consideration of noise issues where the acoustic environment is challenging.

The two sequential stages of the overall approach are:

- **Stage 1 – an initial noise risk assessment of the proposed development site; and**
- **Stage 2 – a systematic consideration of four key elements.**

The four key elements to be undertaken in parallel during Stage 2 of the recommended approach are:

- **Element 1 – demonstrating a “Good Acoustic Design Process”;**
- **Element 2 – observing internal “Noise Level Guidelines”;**
- **Element 3 – undertaking an “External Amenity Area Noise Assessment”; and**
- **Element 4 – consideration of “Other Relevant Issues”.**

The ProPG considers suitable guidance on internal noise levels found in “BS8233:2014: Guidance on sound insulation and noise reduction for buildings”. Table 4 in Section 7.7.2 of the standard suggests that “in general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values”. The standard states (Section 7.7.1) that “occupants are usually more tolerant of noise without a specific character” and only noise without such character is considered in Table 4 of the standard.

Activity	Location	07:00 – 23:00 Hours	23:00 – 07:00 Hours
Resting	Living Room	35dB $L_{Aeq,16hr}$	-
Dining	Dining Room / Area	40dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16hr}$	30dB $L_{Aeq,16hr}$ 45dB $L_{Amax,F}$

NOTE 1 the Table provides recommended internal L_{Aeq} target levels for overall noise in the

design of a building. These are the sum total of structure-borne and airborne noise sources. Ground-borne noise is assessed separately and is not included as part of these targets, as human response to ground-borne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.

NOTE 2 The internal L_{Aeq} target levels shown in the Table are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the L_{Aeq} target levels recommended in the Table.

NOTE 3 These internal L_{Aeq} target levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.

NOTE 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events (see Appendix A).

NOTE 5 Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded, subject to the further advice in Note 7.

NOTE 6 Attention is drawn to the requirements of the Building Regulations.

NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5dB, the more that most people are likely to regard

them as “unreasonable”. Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10dB, they are likely to be regarded as “unacceptable” by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing “unacceptable” noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form (See Section 3.D).

B.7 British Standard 4142:2014 + A1:2019

When setting plant noise emission criteria reference is commonly made to BS 4142:2014 “Methods for rating and assessing industrial and commercial sound”.

The procedure contained in BS 4142:2014 provides an assessment of the likely effects of sound on people when comparing the specific noise levels from the source with representative background noise levels. Where the noise contains “a tone, impulse or other characteristic” then various corrections can be added to the specific (source) noise level to obtain the “rating level”.

BS 4142 states that: “The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs”. An estimation of the impact of the specific noise can be obtained by the difference of the rating noise level and the background noise level and considering the following:

- “Typically, the greater this difference, the greater the magnitude of the impact.”
- “A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.”
- “A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.”
- “The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.”

The determination of the “rating level” and the “background level” are both open to interpretation, depending on the context.

B.8 Defra NANR45: Assessment of Low Frequency Noise Complaints

This document aims to recommend an objective method for assessing low frequency noise suitable for use by Environmental Health Officers in the UK.

Criteria already in use in Germany, Sweden, Denmark, Netherlands and Poland were reviewed and compared against the experience from these countries in applying the criteria, which was found to be generally positive.

The above study was supplemented by field and laboratory studies to subsequently inform the proposed criteria (Moorhouse Curve) in 1/3 octave bands between 10 Hz and 160 Hz.

When logarithmically summed, the Moorhouse Curve provides limits at 63 Hz and 125 Hz of 47 dB L_{eq} and 41 dB L_{eq} , respectively, with a relaxation of 5 dB during daytime hours.

The above levels provide a good practical basis to assess low frequency noise and are now implemented as a criterion for planning applications across many Local Authorities.

Appendix C

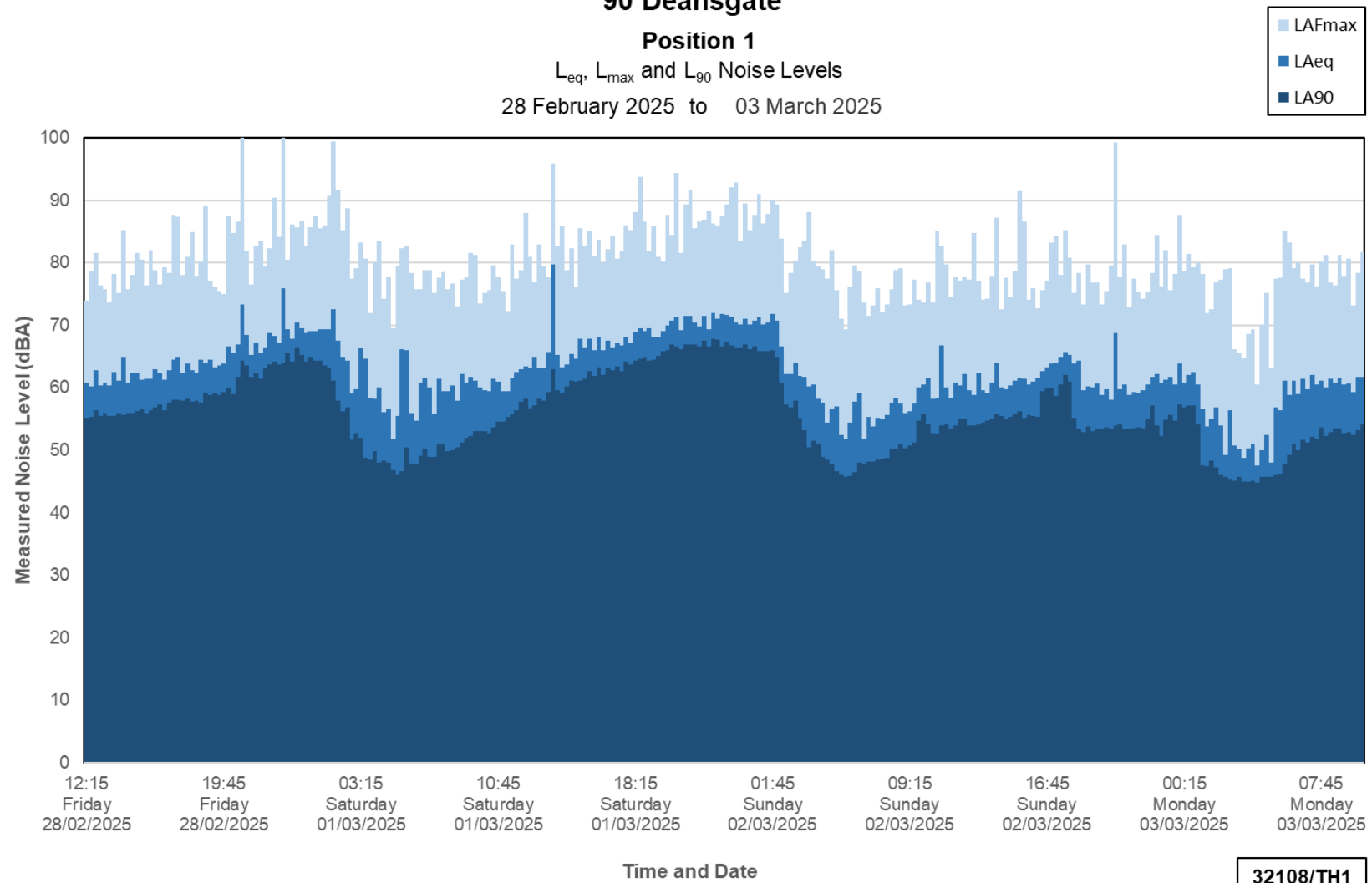
Time History Graphs

90 Deansgate

Position 1

L_{eq} , L_{max} and L_{90} Noise Levels

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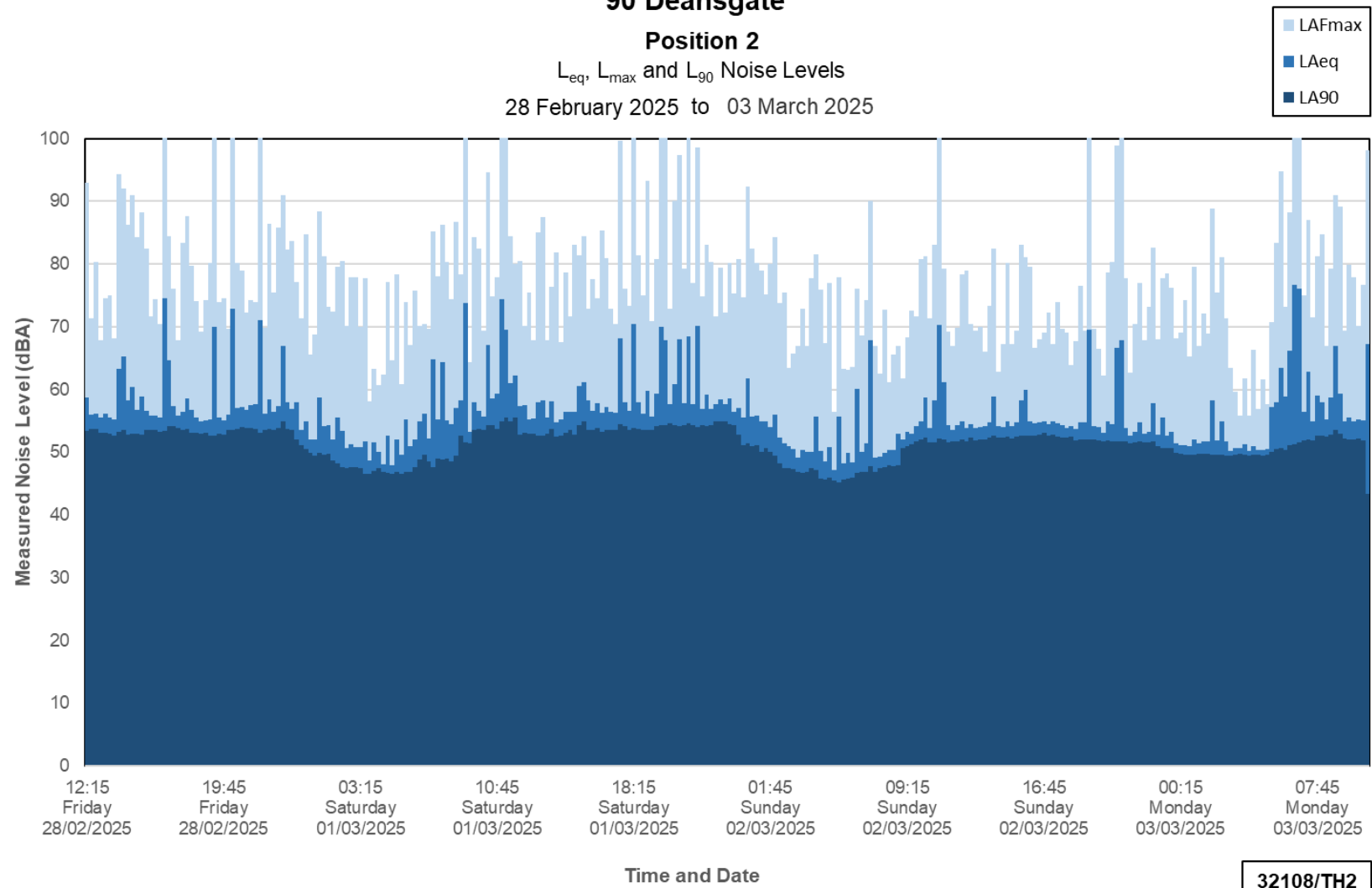
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90 Deansgate

Position 2

L_{eq} , L_{max} and L_{90} Noise Levels

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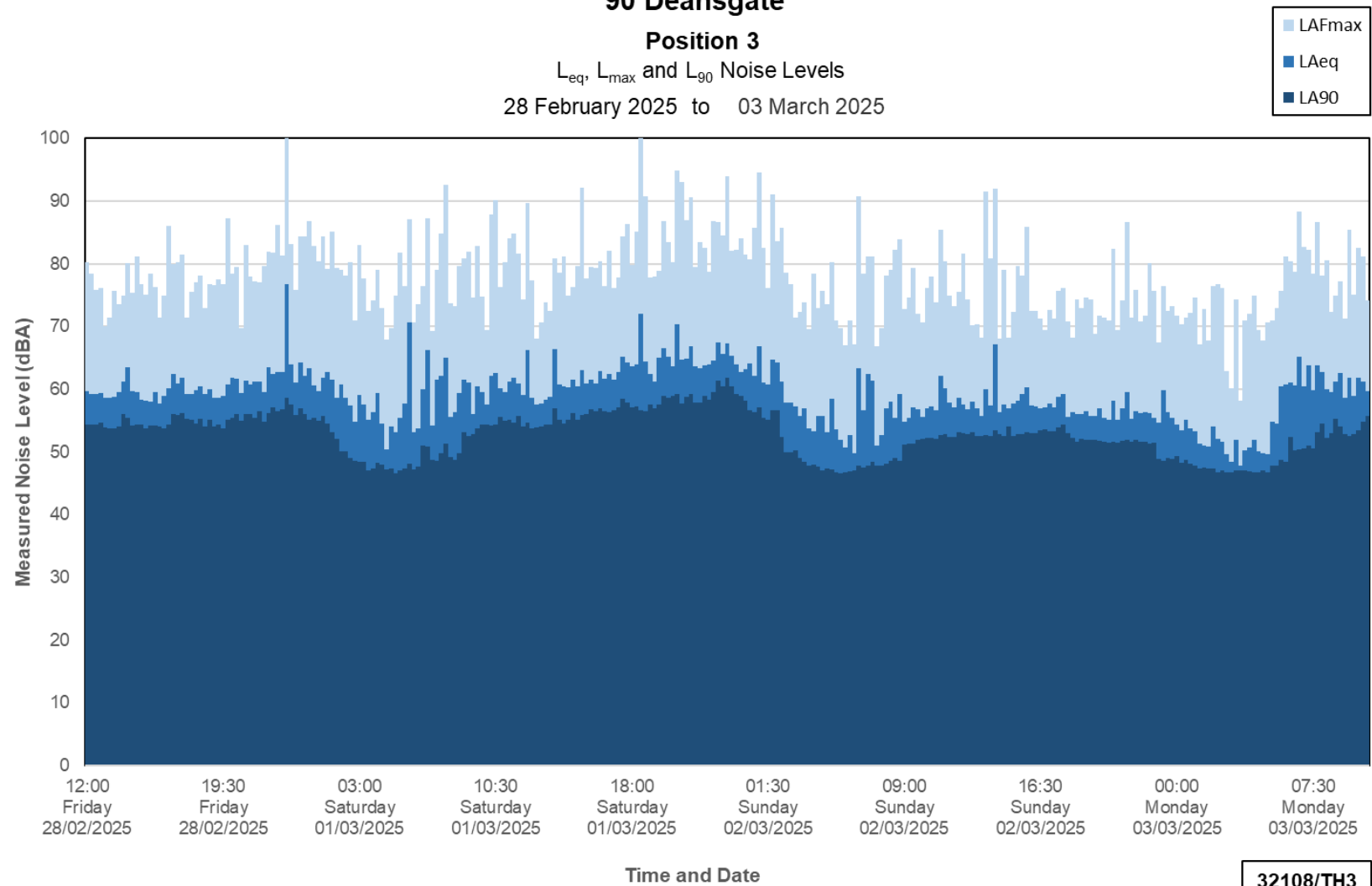
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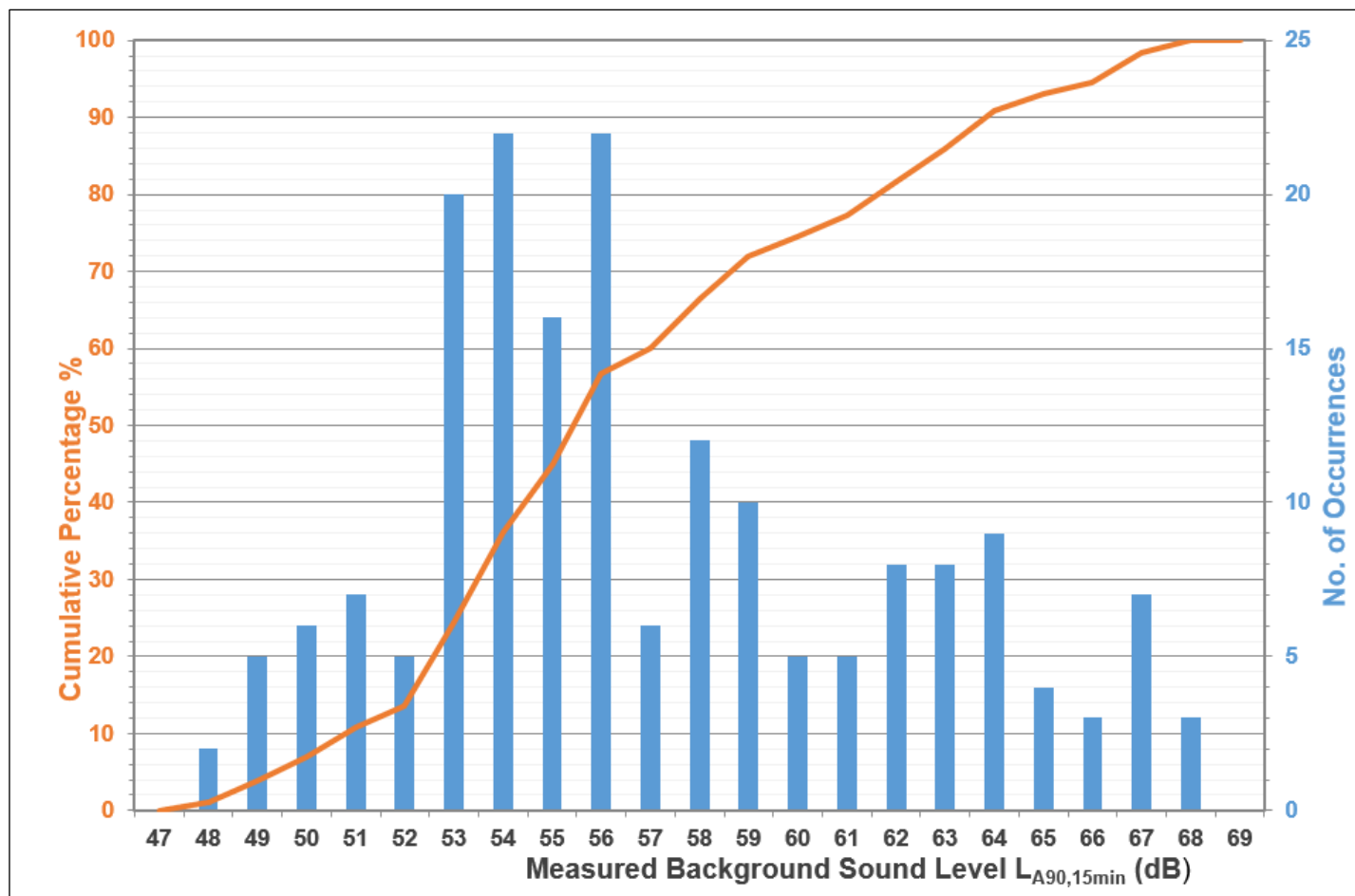
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Position 3

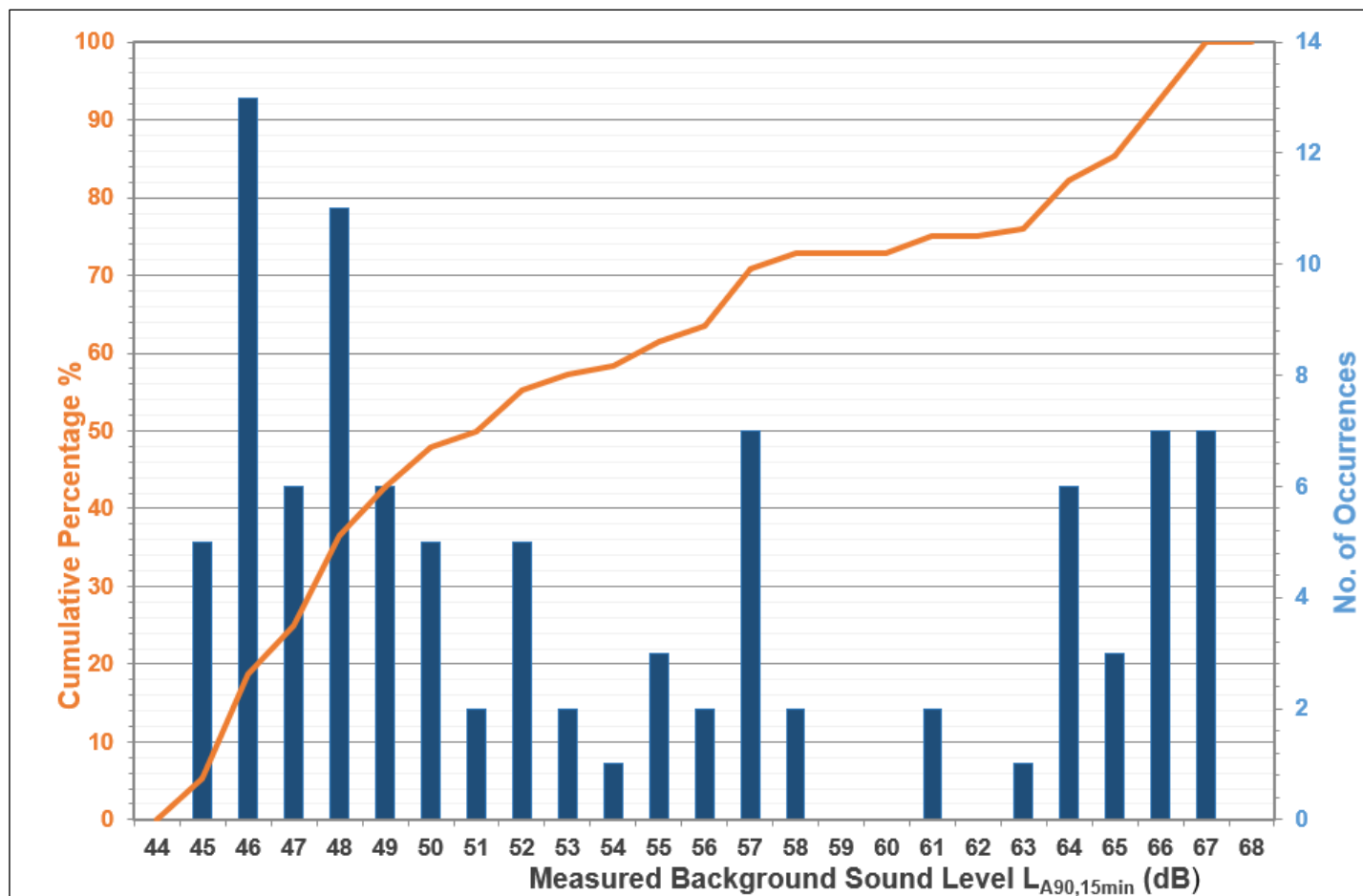
L_{eq} , L_{max} and L_{90} Noise Levels

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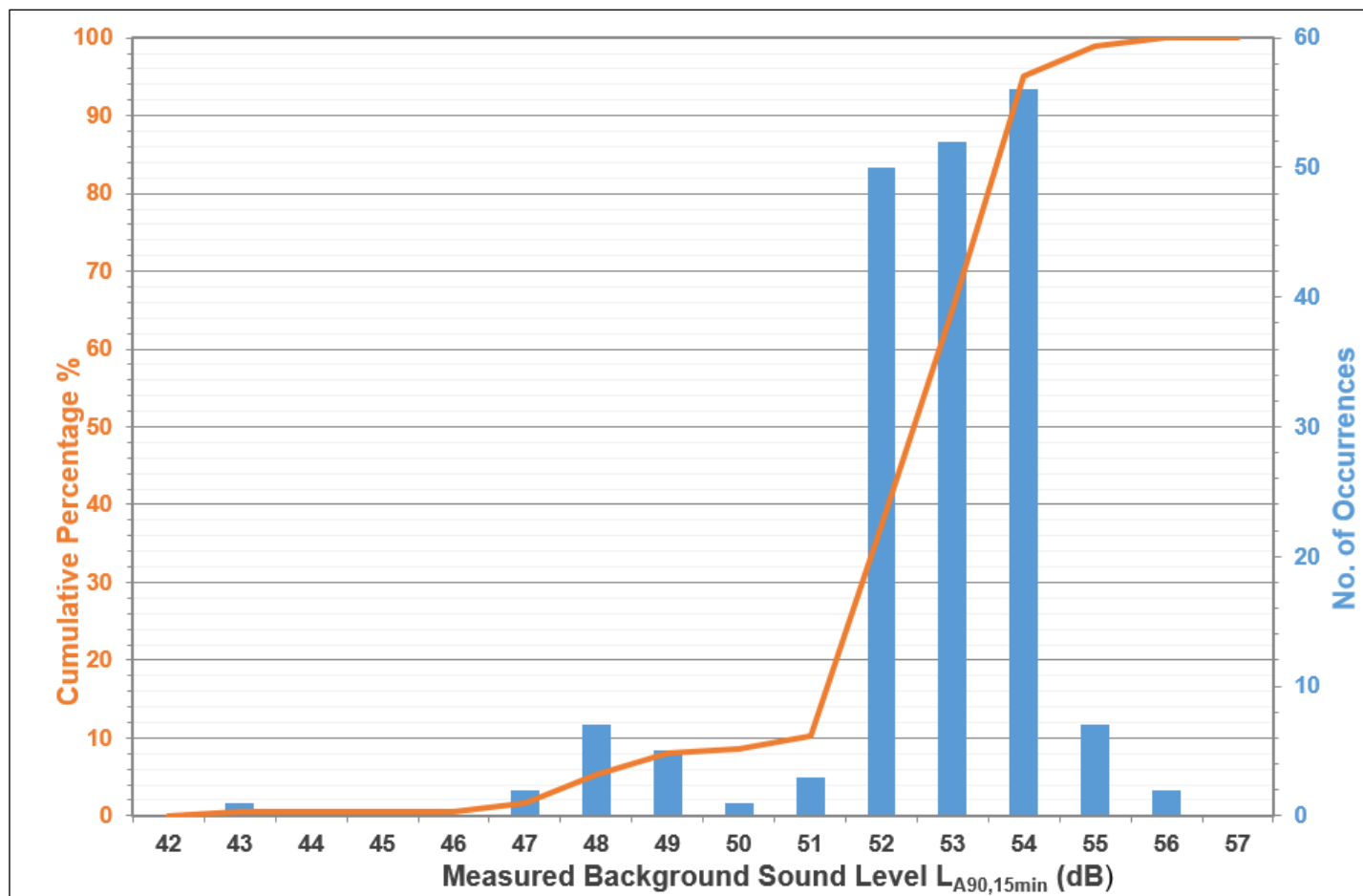




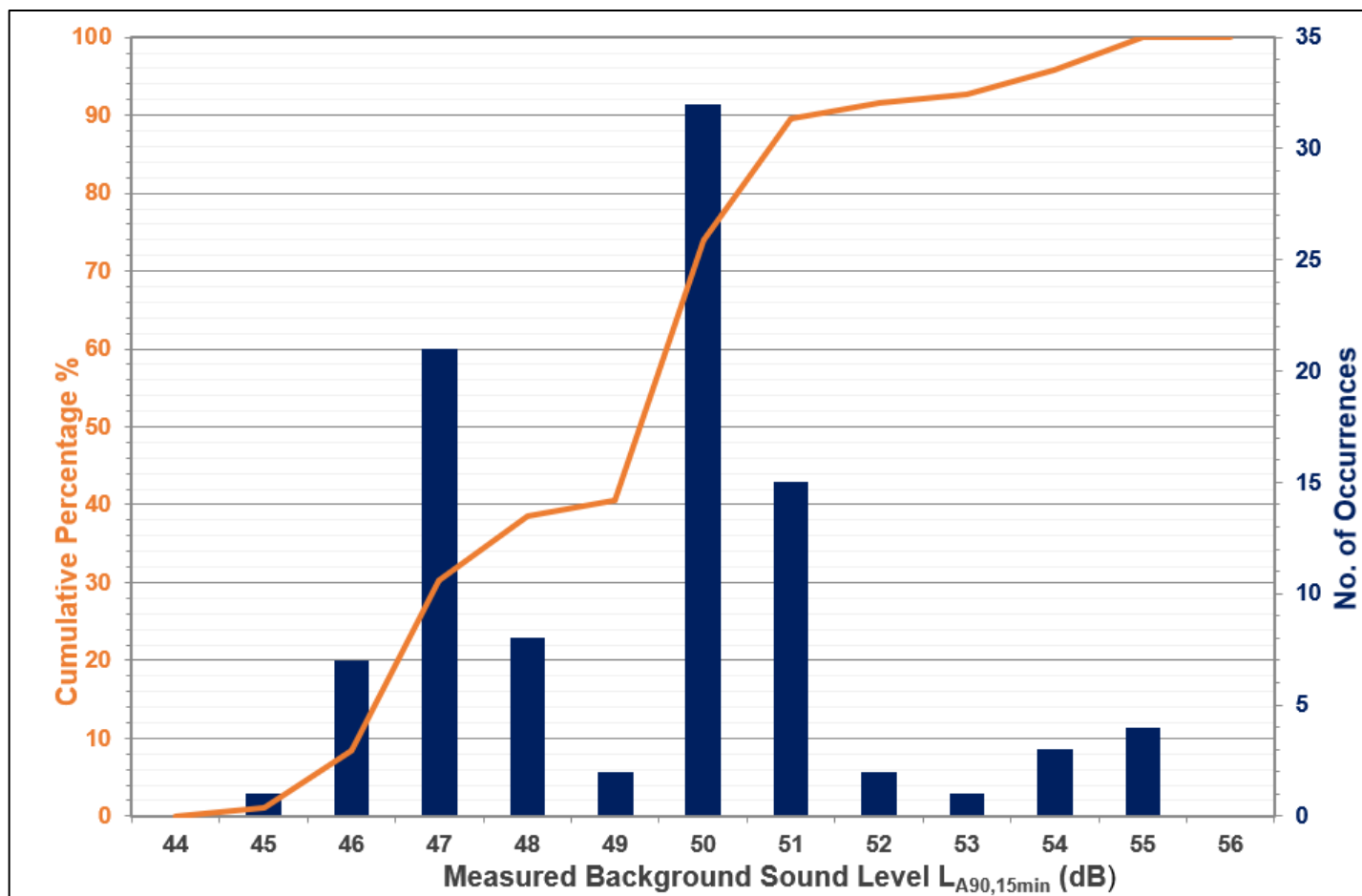
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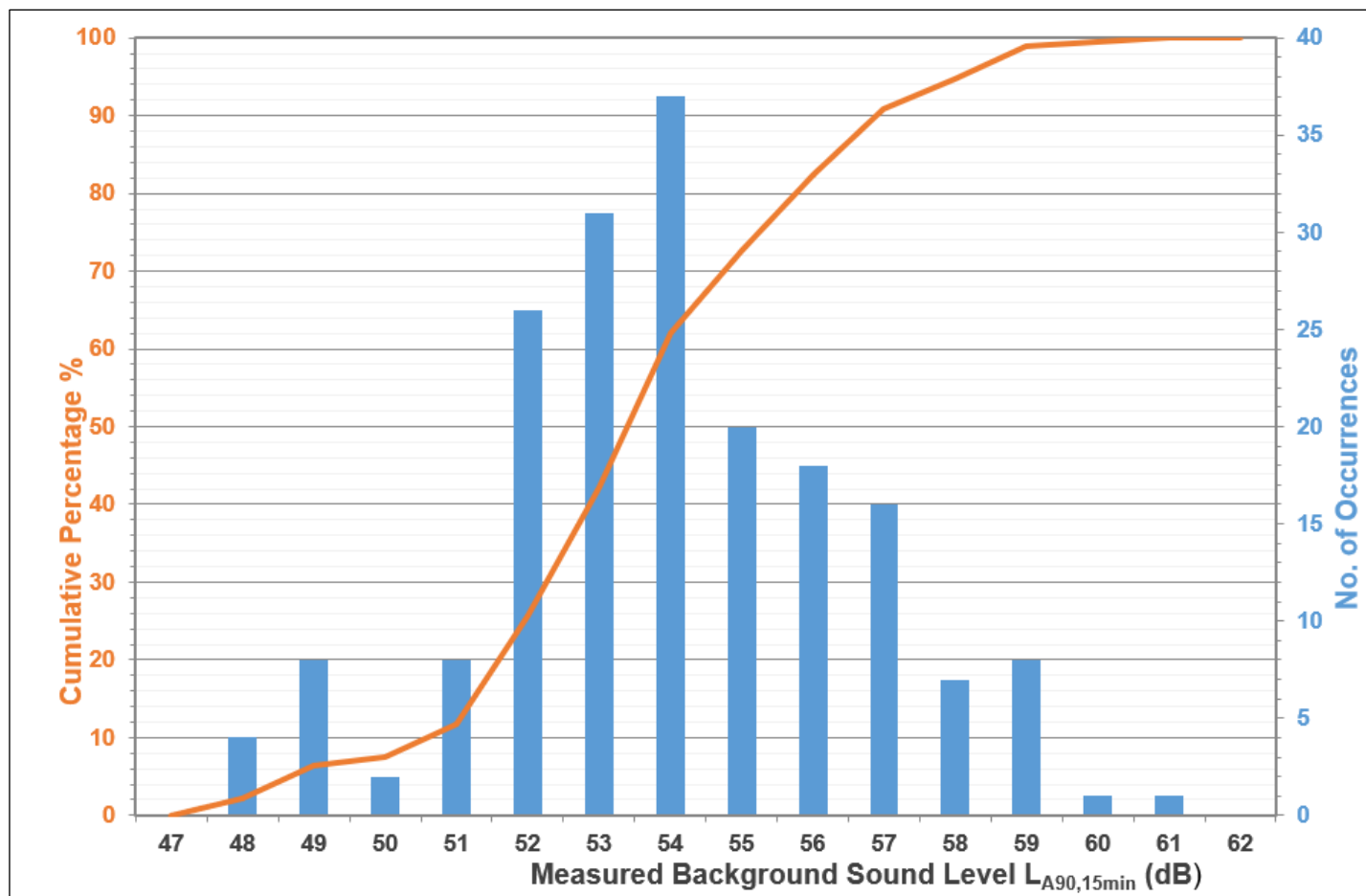
Position 1 Nighttime Histogram (23:00 – 07:00)



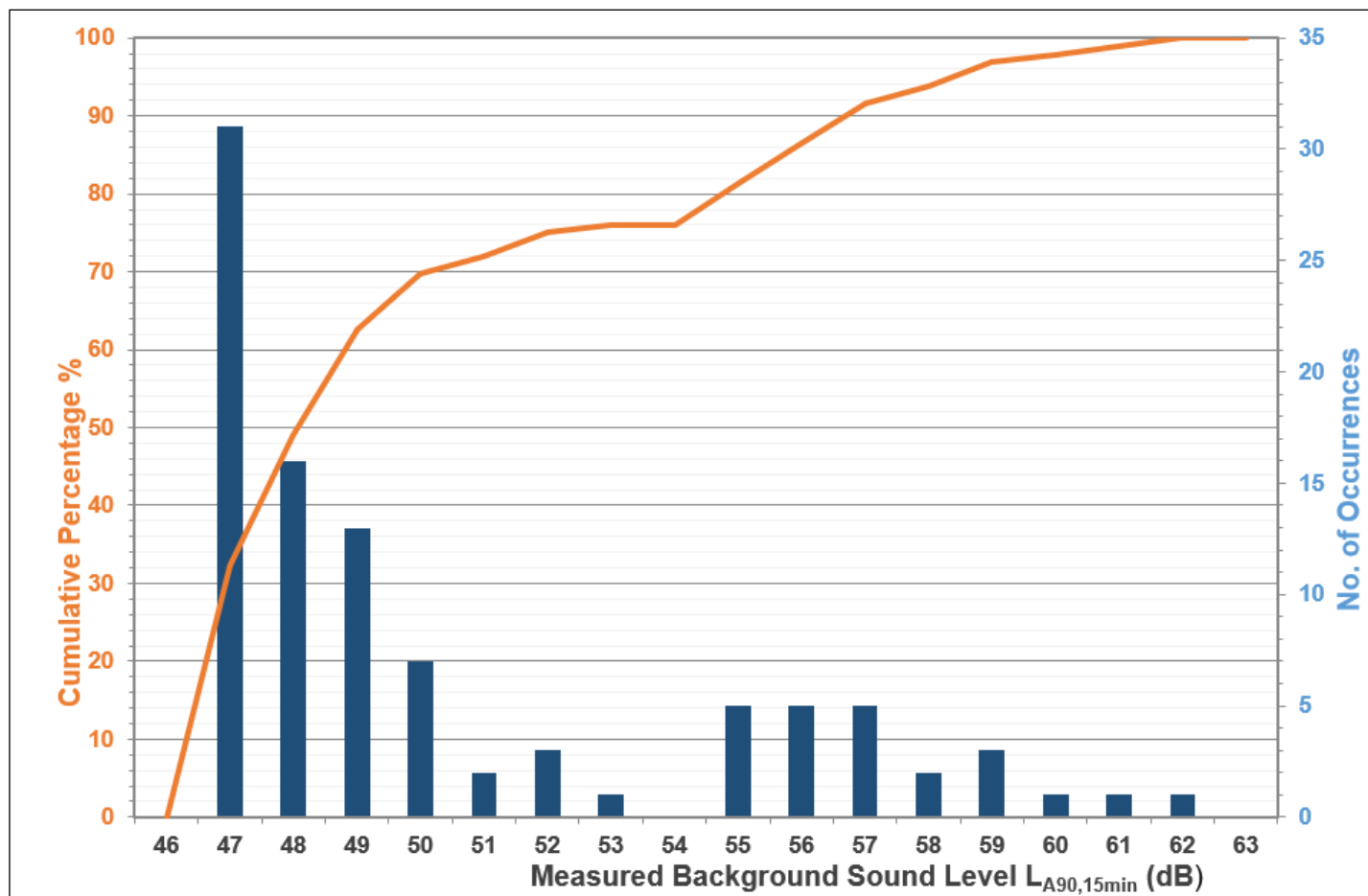
Position 2 Daytime Histogram (07:00 – 23:00)



Position 2 Nighttime Histogram (23:00 – 07:00)



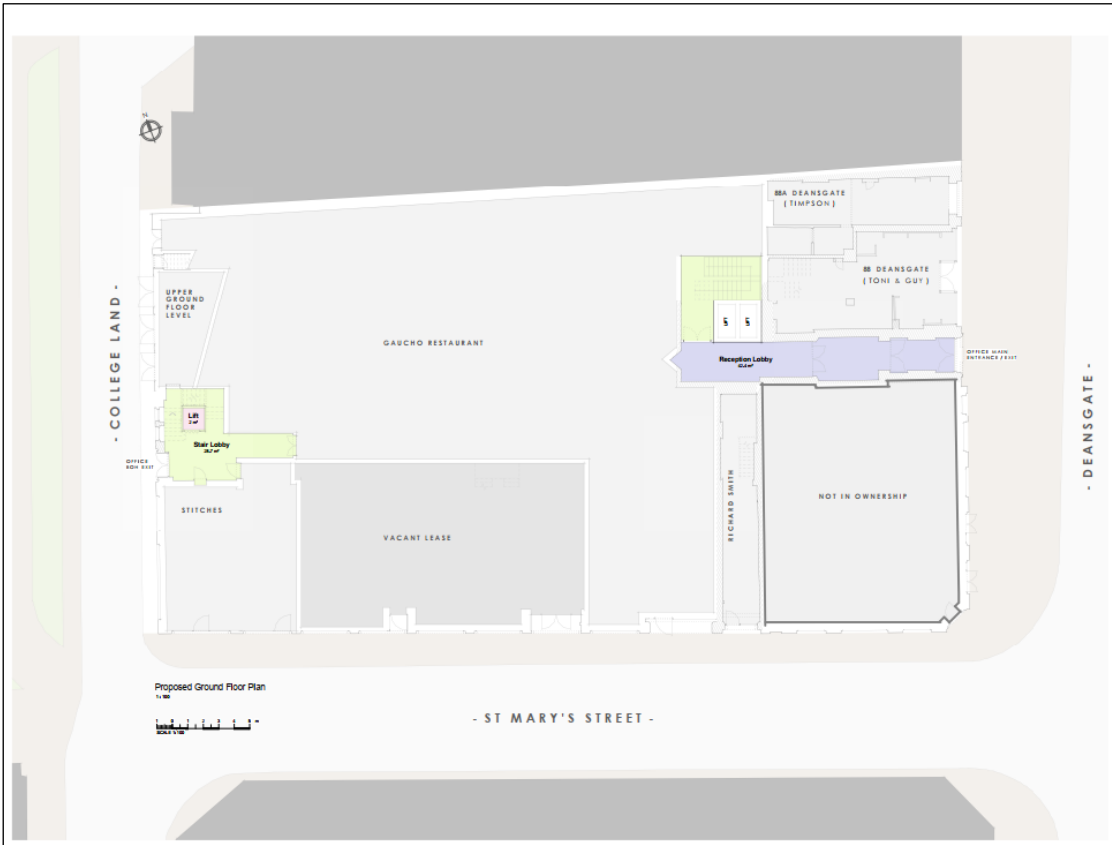
Position 3 Daytime Histogram (07:00 – 23:00)



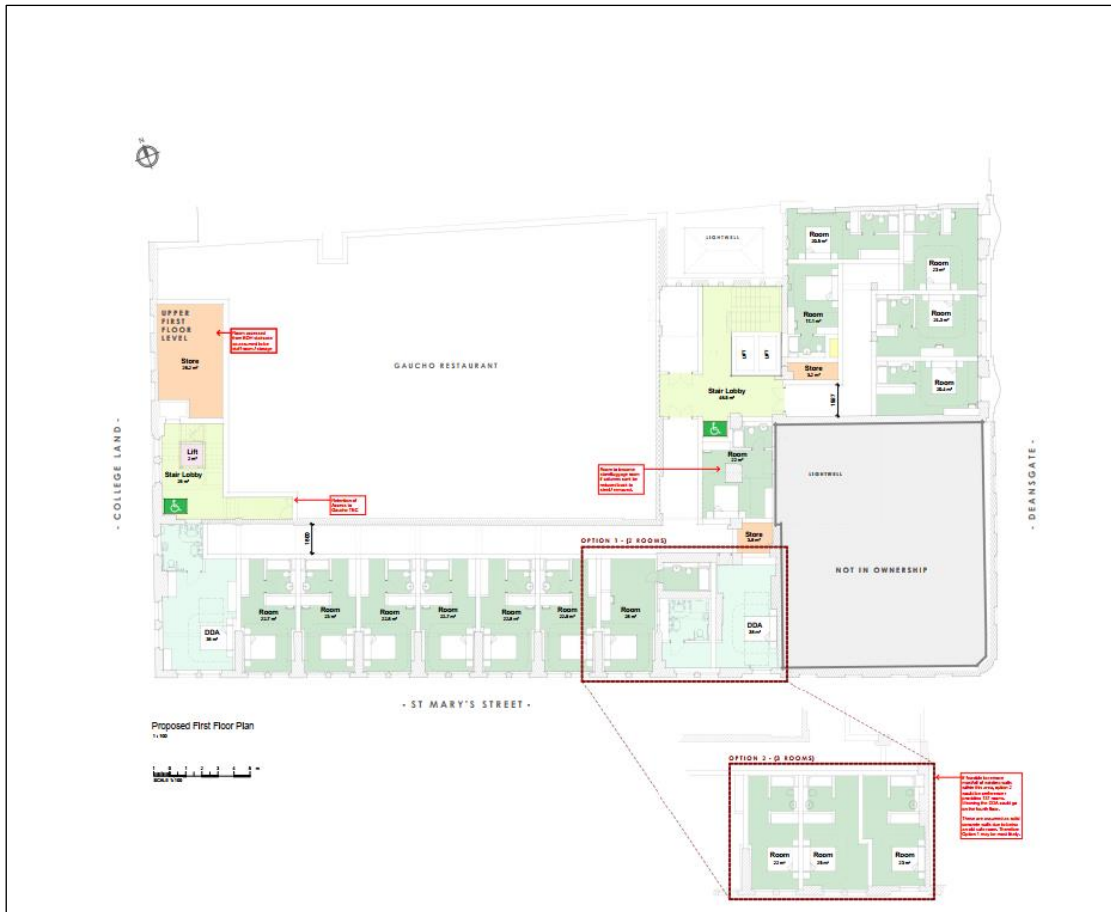
Position 3 Nighttime Histogram (23:00 – 07:00)

Appendix D

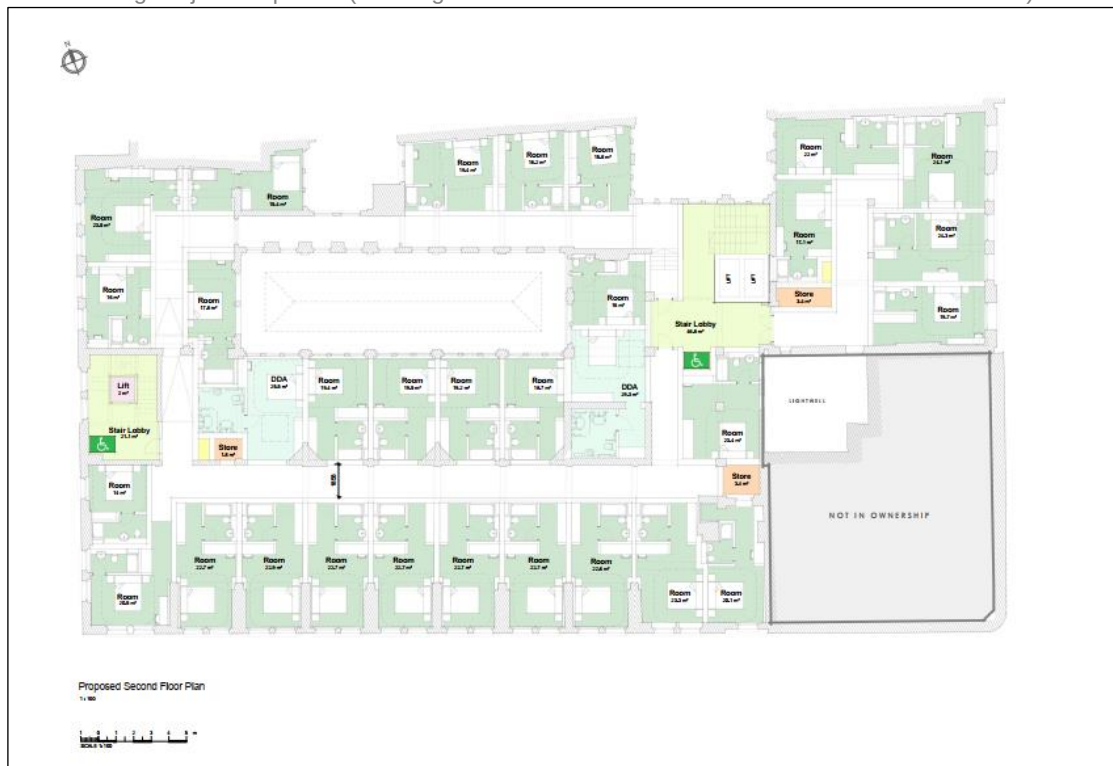
Site Plans



Plan showing Project Proposals (Drawing No. 10036-BUT-XX-00-DR-A-04001-SK03- see above)



Plan showing Project Proposals (Drawing No. 10036-BUT-XX-01-DR-A-04002-SK03- see above)



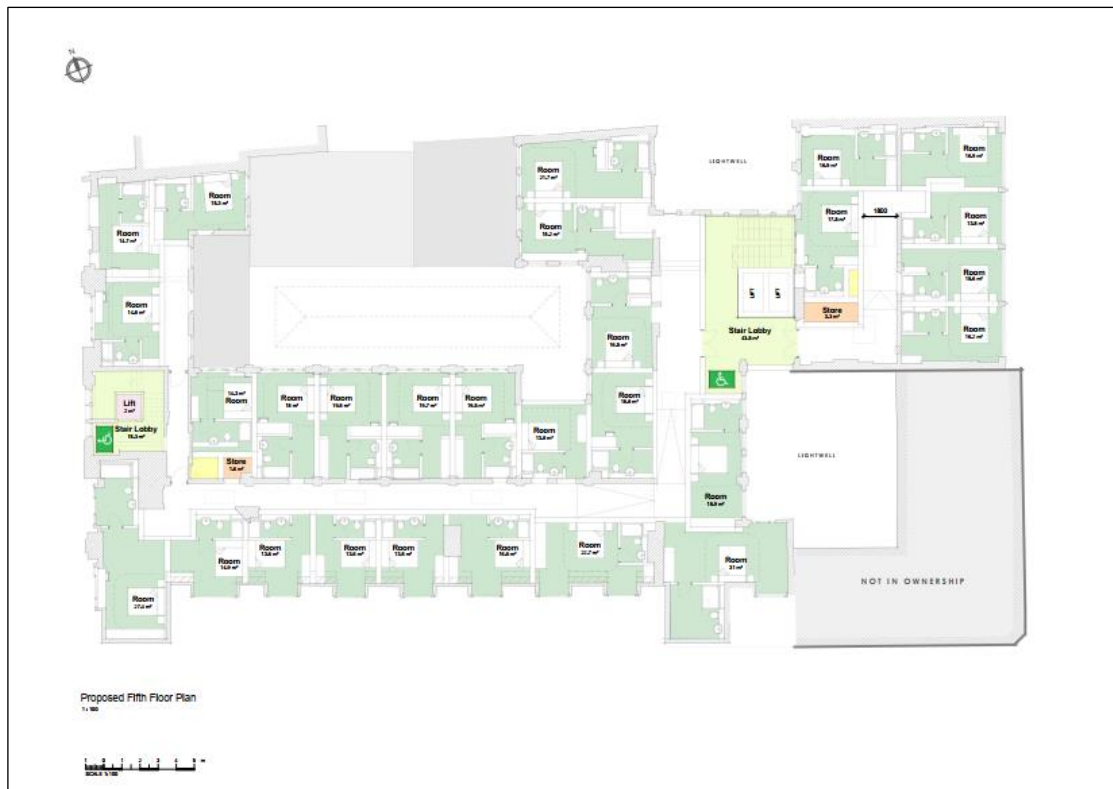
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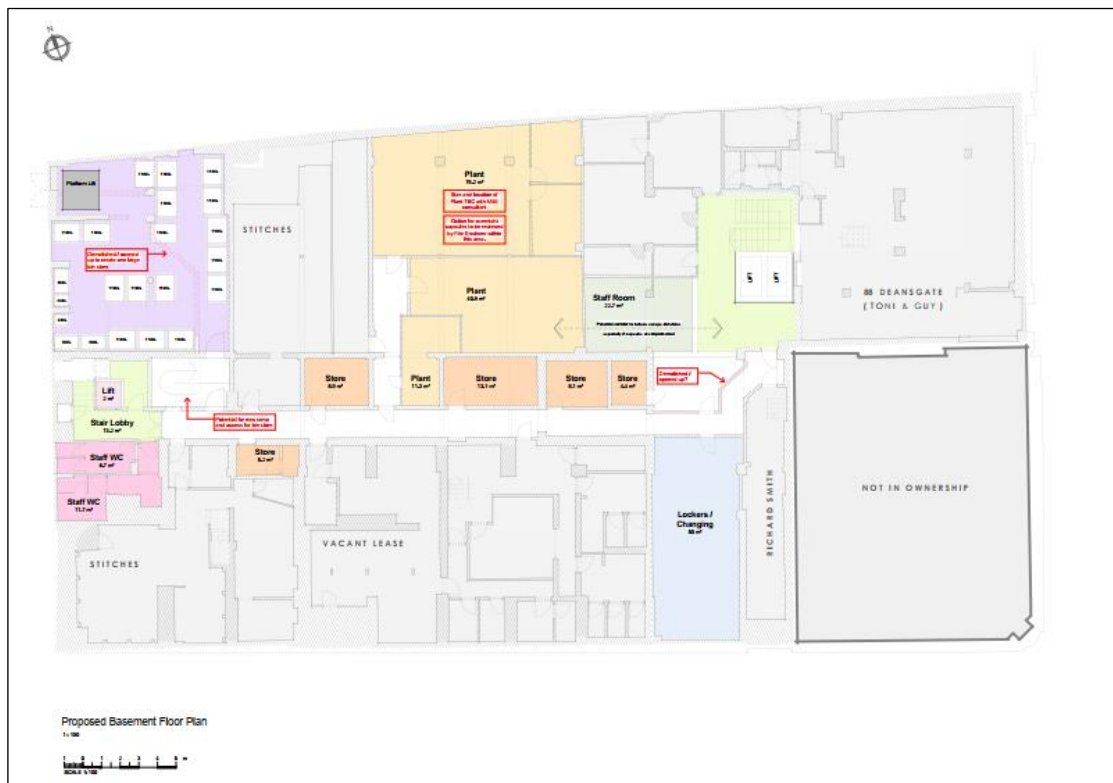
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Plan showing Project Proposals (Drawing No. 10036-BUT-XX-04-DR-A-04005-SK03- see above)



Plan showing Project Proposals (Drawing No. 10036-BUT-XX-05-DR-A-04006-SK03 - see above)



Plan showing Project Proposals (Drawing No. 10036-BUT-XX-B-DR-A-04000-SK03- see above)