

Liverpool Road Manchester

Noise Impact Assessment Report

29922/NIA1

13 June 2023

For:

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1.0 Introduction

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

The site, which is located on Liverpool Road, is being considered for residential (hotel) development. The proposals are for the refurbishment of existing building and extending the rear portion of the building upwards by 2no. Additional floors providing 42no. new hotel rooms.

The site is subject to road traffic noise from Liverpool Road and the surrounding road network, as well as railway noise from the tracks approximately 45m to the south.

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 residential 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 inspect the site to familiarise ourselves with its layout and surroundings in order to identify suitable accessible locations for environmental noise measurements.

To establish by means of an unmanned 3-day survey the existing L_{Amax} , L_{Aeq} and L_{A90} environmental road, rail and air traffic noise levels at up to 2No secure and accessible on-site positions, using fully computerised noise monitoring equipment.

Measurement procedures shall be in general accordance with British Standard BS 7445 "Description and measurement of environmental noise".

The survey will enable noise emission limits from the development to be identified with reference to the requirements of the Local Authority and/or the application of BS 4142: 2014 and to minimise the possibility of noise nuisance to neighbours.

Based on the results of the unmanned survey, to undertake a noise assessment to assess the suitability of the proposed development 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 guidance/requirements.



To present our methodology and findings in a detailed Environmental Noise Survey and Noise Impact Assessment Report to accompany the planning application.

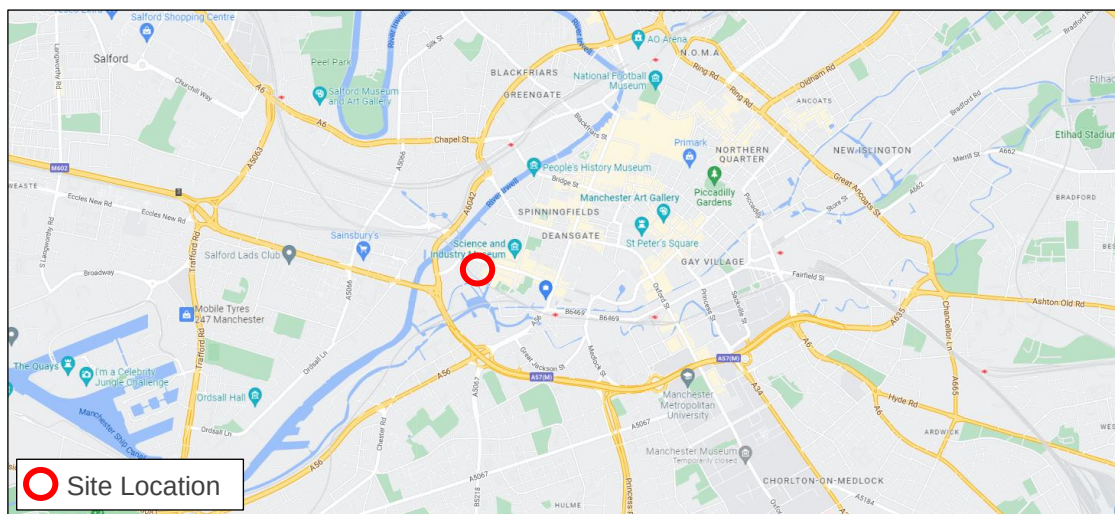
3.0 Acoustic Terminology

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 located on Liverpool Road, Manchester and falls within the jurisdiction of Manchester City Council See Location Map below.



Location Map (Google Maps 2022)

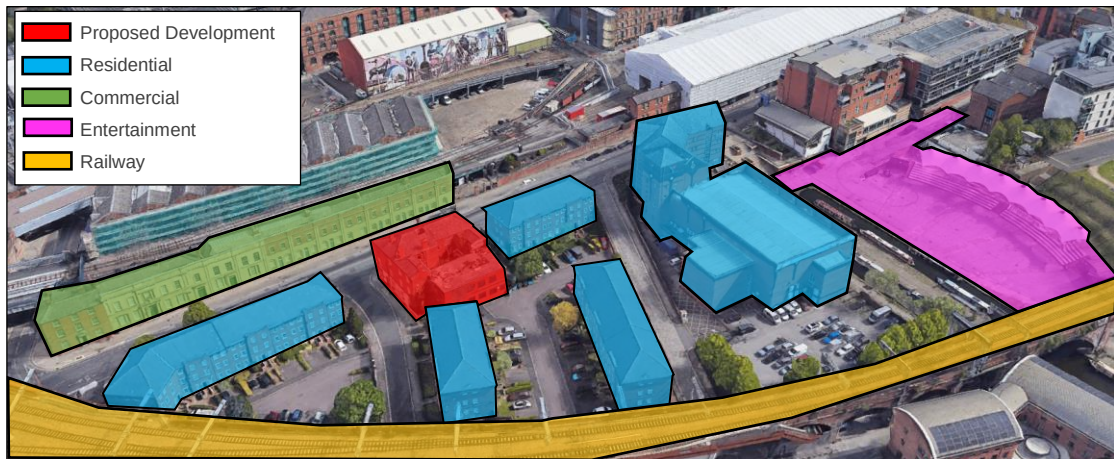
4.2 Description

The site lies approximately 3m from the edge of Liverpool Road, on the junction of Woollam Place. The closest railway tracks lie 45m south of the site and are elevated on a Viaduct to approximately 10m. Additional tram and railway tracks lie approximately 180m southeast of the site.

The large historic building to the north is part of the old Manchester Liverpool Road Railway Station, which is no longer operational. The immediate buildings in the southern vicinity of the proposed site are residential, with some small commercial properties, including pubs and restaurants lying eastwards along Liverpool Road.



The Castlefield Bowl lies approximately 100m southeast of the site, which is an 8450 capacity outdoor venue that is used for food festivals and occasional, up to 8No annually, music gigs during the summer months. The site has been highlighted on the plan below:



Site Plan (Google Earth 2022)

5.0 Planning Policy, Standards & Guidance

5.1.1 National Planning Policies

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

- The National Planning Policy Framework (NPPF), 2021
- 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 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 and guidance as detailed in the following sections.

A detailed summary of each of the above National Planning Policies is provided in Appendix B for reference.



5.2 Standards & Guides

5.2.1 ProPG: Planning & Noise

ProPG: Planning & Noise ‘Professional Practice Guidance on Planning & Noise’ was issued in May 2017 with the primary goal of assisting the delivery of sustainable residential 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”.

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.
 - 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 BS 8233 (see below) with the addition of an $L_{Amax,f}$ requirement for bedrooms at night, as below.

“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 45 dB $L_{Amax,F}$ 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.”



5.2.2 BS 8233:2014

British Standard 8233: 2014 “Sound insulation and noise reduction for buildings” recommends design criteria for internal ambient noise levels for dwellings, in this case a hotel, providing a reasonable or good level of protection from external noise. It states that it is desirable that ambient noise levels do not exceed the following guidelines:

Activity	Location	Desirable Internal Ambient Noise Levels	
		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 $L_{Aeq,8hour}$

Note 1: the above provides recommended levels for overall noise in the design of a building. However, 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: 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.

Note 3: 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.

Note 4: The levels detailed in the table above are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise and are not appropriate in all locations. Where atypical external noise levels are measured (ie high levels of traffic during certain times of the night) an appropriate alternative assessment period (eg 1 hour) and an assessment of individual night time events in terms of SEL or $L_{Amax,F}$ may be more suitable.

5.2.3 World Health Organisation (WHO)

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.

Noise Source	CNG guideline indoors all sources	ENG guideline outdoors noise from specific source only
Road traffic	35 dB $L_{Aeq, 16h}$	53 dB L_{den}
	30 dB $L_{Aeq, 8h}$	45 dB L_{night}
Railway	35 dB $L_{Aeq, 16h}$	54 dB L_{den}
	30 dB $L_{Aeq, 8h}$	44 dB L_{night}
Aircraft	35 dB $L_{Aeq, 16h}$	45 dB L_{den}
	30 dB $L_{Aeq, 8h}$	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_{Amax}) 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.”

5.2.4 BS 4142:2014

BS 4142: 2014 describes methods for rating and assessing the effects of outdoor sound levels, of an industrial and/or a commercial nature, *“on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident”*.

The impact of a specific sound is indicated by subtracting the existing background noise level from the rating level (i.e. noise level from the proposed items of plant/machinery/etc plus any acoustic feature corrections). The standard states that:

- “a difference of around +10dB or more is likely to be an indication of a significant adverse impact”;
- “a difference of around +5dB is of marginal significance is likely to be an indication of an 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”.

The noise from the new development is expressed in terms of a rating level and given as a $L_{Aeq, T}$ noise level. The existing background noise level is expressed in terms of a $L_{A90, T}$ noise level. T is the assessment time interval, which is 1-hour for operations during daytime hours (07:00 to 23:00) and 15-minutes for operations during night-time hours (23:00 to 07:00).

BS 4142:2014 states that if a noise source contains an ‘acoustic feature’, such as tonality, intermittency or impulsiveness, an appropriate penalty should be applied.

5.2.5 ADE

ADE stipulates that the separating floor construction must be designed to achieve a minimum on-site sound insulation performance of 43/45 dB $D_{nT,w} + C_{tr}$. Depending on the tenants of the ground floor commercial areas a higher performance may be required to provide suitable acoustic separation.



5.3 Local Planning Guidance

5.3.1 Commercial Noise

The Manchester City Council requirements for noise are contained in the Planning & Noise Technical Guidance dated October 2022.

With regards to industrial/commercial proposals Section 3.7.1.5 states that:

BS 4142 should be used to assess the likely impact of noise from industrial and commercial sources at noise sensitive premises and that the development should be designed so as to achieve a rating level of 5 dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.

Where this criterion cannot be achieved, the various noise control measures considered as part of the assessment should be fully explained (i.e. relocation of noise sources, use of quieter equipment, enclosures, screening, restriction of the hours of operation) and the achievable noise level should be identified.”

5.3.2 Plant Noise Emission

The Manchester City Council requirements for noise are contained in the Planning & Noise Technical Guidance dated October 2022.

Section 3.7.1.5 also outlines that the noise assessment for fixed plant should be based on BS 4142:2014 and the assessment must demonstrate that:

“Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme so as to achieve a rating level of 5 dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.”

6.0 Baseline Noise Survey

6.1 Procedure

Unattended noise monitoring was undertaken on site over a 4-day period to establish full daytime and night-time noise levels over a typical weekday and weekend period. The monitoring was carried out between 07:00 hours on 19 November 2022 and 15:30 hours on 21 November 2022 with equipment set up to record broadband and spectral (octave band) sound pressure levels over discrete 5 and 15-minute periods.



The survey was performed by Jake Howarth BEng(Hons) MIOA. All measurements were collated in general accordance with BS 7445-1:2003 *Description and Measurement of Environmental Noise*.

6.2 Measurement Positions

The measurement positions were as described and illustrated below.

Position	Type	Description
1	Unattended	Out of a second floor window, approximately 1m from the façade, overlooking Liverpool Road. The window itself did not contain any glass, however, noise levels measured in this position are considered to be façade noise levels.
2	Unattended	Out of a second floor window, approximately 1m from the façade, overlooking Woollam Place. The window itself did not contain any glass, however, noise levels measured in this position are considered to be façade noise levels.



Site Plan (2022 ©earth.google.co.uk)

6.3 Weather Conditions

For the unattended survey between 19 November 2022 and 21 November 2022 local weather reports indicated no notable periods of prolonged rainfall, with wind speeds less than 4 m/s. During our time on site, skies were largely clear with patchy cloud cover, wind conditions were light and road surfaces were largely dry.

Weather conditions were deemed suitable for obtaining representative noise readings.



6.4 Instrumentation

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

Position	Description	Manufacturer	Type	Serial Number	Last Calibration
1	Type 1 Sound Level Meter	Larson Davis	LxT	5111	10/06/2022
2	Type 1 Sound Level Meter	Larson Davis	LxT	4569	10/06/2022
1	Type 1 Calibrator	Larson Davis	Cal200	3083	06/05/2022

The unattended sound level meter was housed in a weatherproof case with the microphone connected via an extension cable. The microphone was fitted with a windshield.

The sound level meter was calibrated prior to and on completion of the survey. No significant deviations occurred (not more than 0.1 dB).

6.5 Results

6.5.1 Unattended Survey

The results of the unattended survey have been plotted on Time History Graph 29922/TH1 and 29922/TH2 enclosed. The graph presents the 15 minute A-weighted (dBA) L_{90} , L_{eq} and L_{max} levels at Position 1 and Position 2 throughout the duration of the survey.

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 analysis of the 15-minute readings, Appendix A of the MCC Planning and Noise Technical Guidance Note. L_{Amax} values are the '10th highest' 5-minute value. All results are free-field levels.

Position	Daytime (07:00 – 23:00 hrs)		Night-time (23:00 – 07:00 hrs)		
	$L_{Aeq,16hr}$	L_{A90}	$L_{Aeq,8hr}$	L_{A90}	10 th Highest L_{Amax}
1	69	51	66	45	82
2	64	49	62	43	76



6.6 Discussion of Noise Climate

Due to the nature of the 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 was noted to be dominated by road traffic noise from Liverpool Road to the North.

It should be noted that during an event at Castlefield Bowl the noise level in the area is expected to be elevated. However, from discussions with the Client the decision has been made to not specifically mitigate music noise from ad-hoc events as the likelihood is that the occupants of the hotel would be attending the event.

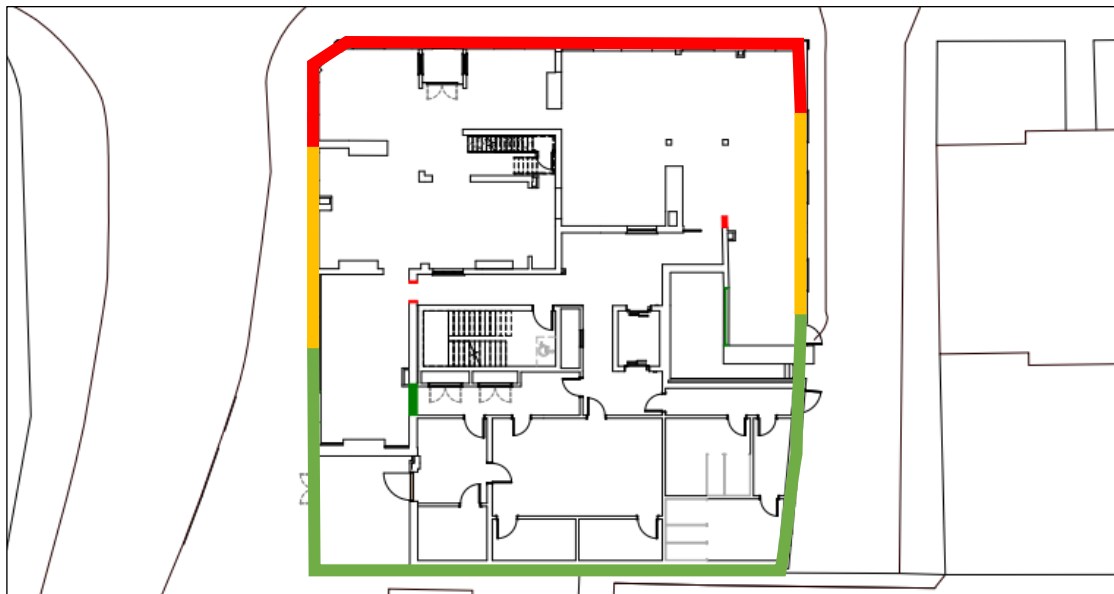
7.0 Incident Noise Levels

Based on the results of the survey and the proposed building massing, the predicted incident noise levels across each building façade have been calculated.

The table below details the incident noise levels calculated for each façade zone. The façade zones are indicated on the elevations overleaf.

Zone	Daytime (07:00 – 23:00 hrs)	Night-time (23:00 – 07:00 hrs)	
	$L_{Aeq,16hr}$	$L_{Aeq,8hr}$	10 th Highest L_{Amax}
A	69	66	82
B	66	63	80
C	63	60	76

See façade zone mark-ups below:



Façade Zones – Zones apply to all Guestroom levels across the building

8.0 Achieving Internal Noise Levels

8.1 Proposed Criteria

With reference to the acoustic standards and guidelines as reviewed in Section 5.0, we propose external noise intrusion levels from environmental sources be controlled so as to not exceed the following criteria.

Activity	Location	Desirable Ambient Criteria	
		07:00 – 23:00	23:00 – 07:00
Sleeping (Daytime Resting)	Bedroom	$L_{Aeq,16hour}$ 35 dB	$L_{Aeq,8hour}$ 30 dB L_{Amax} 45 dB ^[1]

[1] regular noise events such as trains, aircraft (10th highest)

8.2 Assessment of Open Windows

In order to assess the ventilation requirements for the site, we have calculated the internal noise levels with the windows open taking into account the measured noise levels at the site and the typical level of attenuation provided by an open window.

In this regard, BS 8233:2014 states that: “If partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15 dB”. Taking this reduction into account the calculated internal noise levels are set out for each measurement position below:



Position	Daytime (07:00 – 23:00 hrs)	Night-time (23:00 – 07:00 hrs)	
	$L_{Aeq,16hr}$	$L_{Aeq,8hr}$	10 th Highest L_{Amax}
1	54	51	67
2	49	47	61

Based on the above, a reliance upon openable windows as a means of background ventilation is unlikely to be suitable across the development as internal noise levels in all facade zones would likely exceed the proposed criteria in Section 8.1.

As such, suitable façade specifications for glazing and ventilators would be required to achieve suitable internal noise levels with windows closed whilst maintaining suitable ventilation rates. These are discussed in Section 8.3.

8.3 Preliminary Guidance for Windows & Ventilators

8.3.1 Overview

The current façade design proposals allow for cavity masonry external walls to be suitably upgraded in terms of the thermal performance with punched-in double glazed sash windows with provision for secondary glazing. Background ventilation will be provided to each Guestroom by means of MVHR.

Our calculations follow BS 8233 procedures and consider the typical apartment room dimensions and window sizes, as per the latest design drawings (at the time of writing).

8.3.2 Windows to Guestrooms

The following specification for glazing and doors provides our recommended minimum octave band sound reduction indices for Bedrooms. In all cases, it is essential that the system is tested in accordance with BS EN ISO 10140-2 and that the quoted minimum sound reduction specifications are met by the system as a whole (not just the glass).

Where structural glass or non-vision spandrel panels are proposed, they should provide a sound reduction performance at least equal to that required of the walls to maintain the acoustic integrity of the building envelope.



Zone	Min. Sound Reduction, R (dB) at Octave Band CF (Hz)							Min. Overall $R_w + C_{tr}$
	63	125	250	500	1000	2000	4000	
A	23	25	27	35	45	45	46	35
B	23	23	24	32	40	43	46	32
C	23	23	21	30	35	40	43	30

The above requirements are not extremely onerous and would be typical for a development in a city centre. However, sash windows tend to perform poorly acoustically. This is particularly evident at mid to high frequencies due to the window not being sealed as well as a casement window would be.

The maximum performance that could be expected from a sash window is given below and it can be seen that it under performs slightly even for the lowest specification (ie Zone C).

Construction	Sound Reduction, R (dB) at Octave Band CF (Hz)					
	125	250	500	1000	2000	4000
6.4/16/10 – Fixed Panel 6/16/6 – Sash Panel	26	27	28	28	33	37

Based on the above, secondary glazing should be installed to increase the sound reduction performance. Secondary glazing is very effective and it is likely that a secondary glazed system would outperform the minimum requirements for the scheme. The data presented below consists of a 6mm primary glazing float, hinged secondary glazing with 4mm float and a 200mm cavity between the primary and secondary glazing.

Zone	Sound Reduction, R (dB) at Octave Band CF (Hz)					
	125	250	500	1000	2000	4000
6mm Primary with 4mm Secondary Glazing	34	44	50	55	50	55

Based on the above, where sash windows are proposed, providing a minimum 4mm secondary glazing system would likely ensure that internal noise is suitably controlled. This is summarised for each façade zone in the table below:

Zone	Sash Window Suitable	Recommended Sash Solution
A	No	Sash Window with Minimum 4mm Secondary Pane over minimum 150mm cavity
B	No	
C	No	



8.4 Overheating

All spaces will be comfort cooled.

9.0 Internal Sound Insulation

9.1 Floors

Given the heritage of the building the Design Team developed a number of different solutions to control the sound insulation between the different spaces within the building. The outcome of these are the floor types shown on Tim Groom Architects Series 95230 Drawing for the conversion part of the development.

Acoustically, the sound insulation between the Principal Rooms is a compromise between the aspirations of the Client (ie providing a high-end hotel) and being sympathetic to the heritage of the building. However, the design should be capable of achieving the minimum requirements of Approved Document E of the Building Regulations (ADE).

The four the remaining floor types have been specified based on the Client aspiration for a high-end quality hotel and are specified to achieve an uplift in performance of the minimum requirements of ADE.

9.2 Walls

The retained walls are all thick brickwork walls and should be suitable with additional linings to comply with at least ADE and, more likely, the Client aspirations. The new walls are to be generally formed of suitable drywall constructions.

10.0 Outdoor Living Spaces

On this scheme there are no outdoor living areas.

11.0 Development-Generating Noise Impacts

11.1 Fixed Plant & Equipment

Based on the results of the noise site 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.



Plant Noise Emission Criteria ($L_{Aeq,T}$ dB)	
Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
44	35

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.

11.1.1 Plant Noise Mitigation Measures

Given the nature of the development, the significant plant items are likely to be air extraction for kitchens and toilets, air conditioning condenser units, etc.

For central plant compounds/outlets, provisions shall be made for the selection of low noise equipment, silencers, enclosures, screens and other acoustic attenuation measures where necessary. The positioning of plant areas should be carefully considered, bearing in mind the likelihood of the nearest receptors being the development's own ground/first floor windows.

11.2 Restaurant and Bar Operations

At ground floor level there is a restaurant and bar. For completeness we advise that operational noise break-out from any proposed use is controlled to no more than 5 dB below the existing background noise levels experienced along Liverpool Road (ie taken from Position 1) as follows:

Period	Commercial noise break-out Limit, L_{Aeq} (dB)
Daytime (07:00-23:00)	49
Night-time (23:00-07:00)	46

We understand that the intent is to replace with glazing and the sash window performance set out in Section 8.3.2 should control environmental noise break-in. To investigate whether the sash window would also be suitable in controlling any noise break-out, limiting internal noise levels have been set based on achieving the LPA noise egress requirements.

The closest and most affected off-site receptor would be the apartments within 129 Liverpool Road.

Based on the sash window performances and the LPA requirements, the maximum allowable internal noise levels have been established and are presented below.



Period	Sound Reduction, R (dB) at Octave Band CF (Hz)						
	63	125	250	500	1000	2000	4000
Day (07:00 – 23:00)	81	85	84	83	88	88	82
Night (23:00 – 07:00)	78	82	81	80	85	85	79

The above noise levels would be comparable to a busy bar with low level background music. However, they would not allow for any live or loud amplified music. We understand that the Bar and Restaurant will not have live events, however, should any live or loud amplified music be proposed, secondary glazing would likely to be required.

12.0 Conclusions

A detailed environmental noise survey has been undertaken in order to establish the currently prevailing environmental noise climate around the site.

The environmental noise impact upon the proposed guestrooms has been assessed in the context of national and local planning policies.

Appropriate target internal noise levels have been proposed. These are achievable using conventional mitigation measures.

Appropriate target internal noise levels have been proposed. These are achievable using conventional mitigation measures. Mitigation advice, including the use of suitably specified glazing and acoustically attenuated ventilation, have been recommended to reduce to a minimum the adverse impact on health and quality life arising from environmental noise.

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. 30dB + 30dB = 33dB, 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}	L ₉₀ is the noise level exceeded for 90% of the period <i>T</i> (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, <i>T</i> .
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 –National Planning Policies

National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) was first published in 2012, replacing the existing Planning Policy Guidance Note 24 (PPG24) “Planning and Noise”, and sets out the government’s planning policies for England and how these are expected to be applied.

The latest revision of the NPPF (July 2021) states that planning system should contribute to, and enhance, the natural and local environment by (amongst others) *“preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or noise pollution or land stability.”*

NPPF advises that planning policies and decisions should ensure:

“...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] *“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”* and *“identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”*

“...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.”

The NPPF makes reference to the Noise Policy Statement for England.

Noise Policy Statement for England (NPSE)

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 the NPPF as 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.

Planning Practice Guidance on Noise (PPG)

Planning Practice Guidance (PPG) under the NPPF has been published by the Government as a web based resource. 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:

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	No effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, 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. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, 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
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Liverpool Road

Position 1

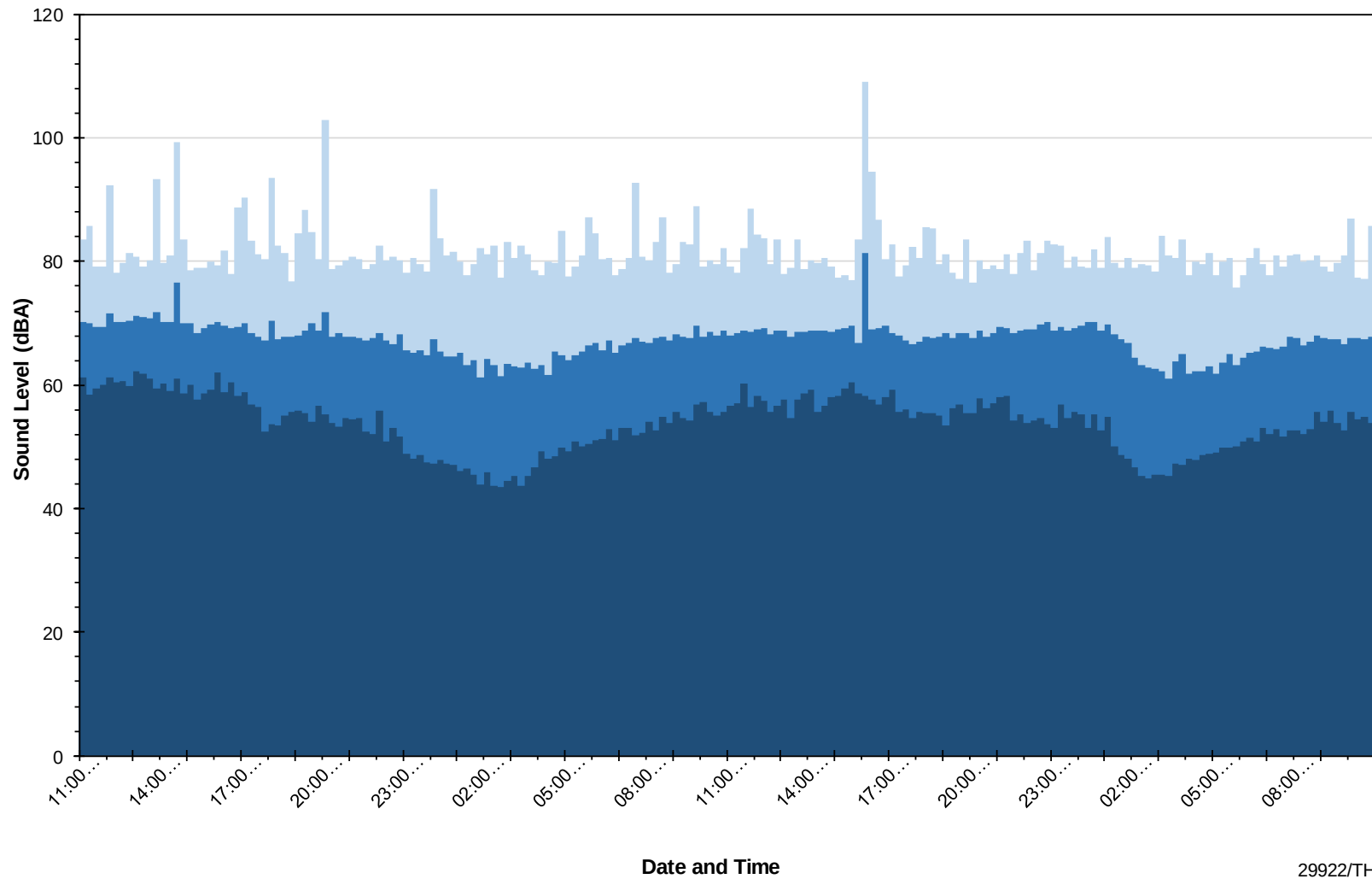
L_{eq} , L_{max} and L_{90} Noise Levels

Friday 18 November 2022 to Sunday 20 November 2022

■ L_{Amax}

■ L_{Aeq}

■ L_{A90}



29922/TH1

Liverpool Road

Position 2

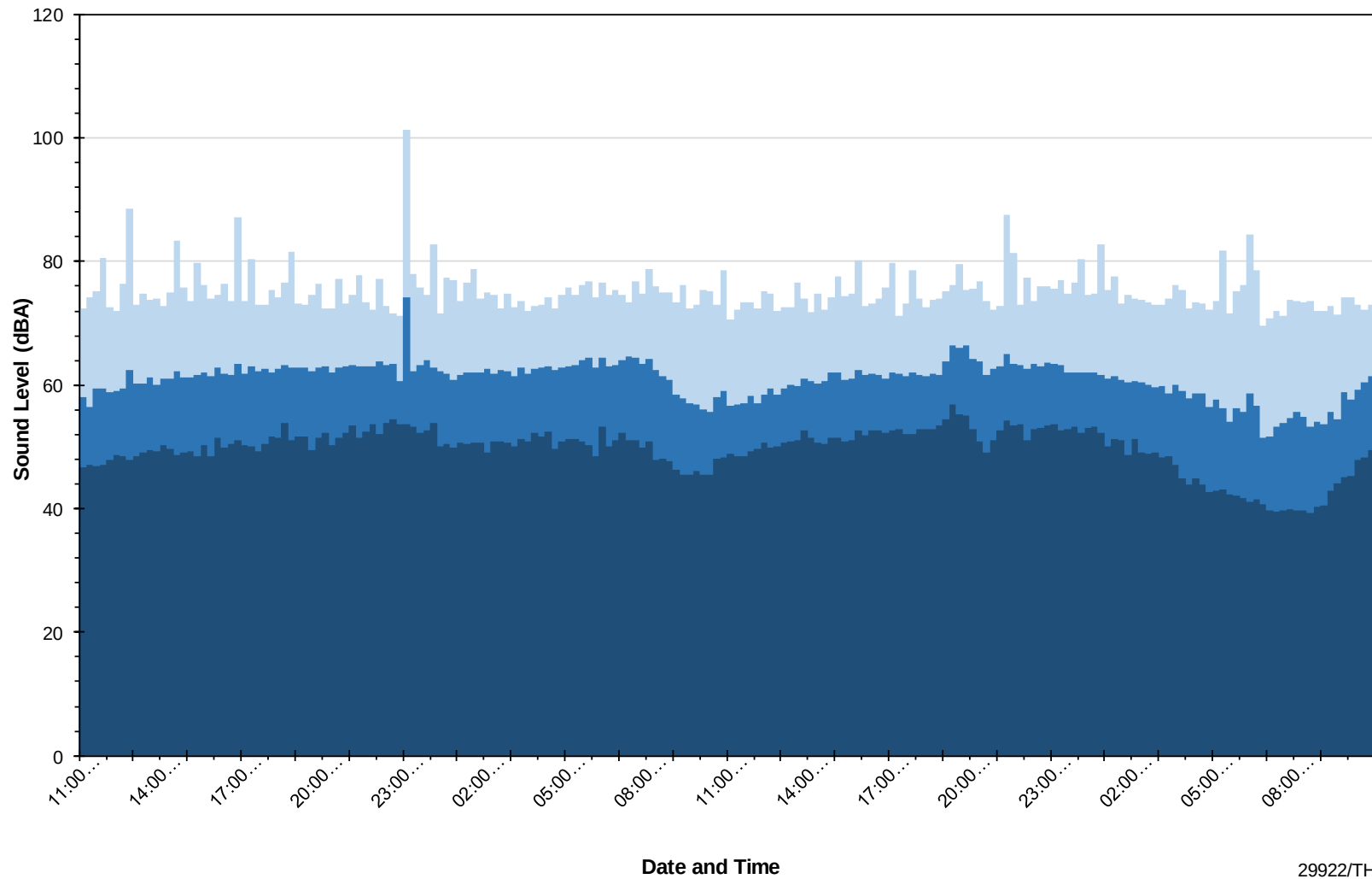
L_{eq} , L_{max} and L_{90} Noise Levels

Saturday 19 November 2022 to Monday 21 November 2022

■ L_{Amax}

■ L_{Aeq}

■ L_{A90}



29922/TH2