



Lloyd's House, Manchester

Noise Impact Assessment

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22087-R01-BT Lloyd's House Manchester

Client: Cocktail Takeover Ltd

Date: 15/12/2022

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REVISION HISTORY

Revision	Date	Revision Details	Author	Checked
R01	15/12/2022	Original Issue	<i>Ben Tomlin</i> Ben Tomlin BSc MIOA	<i>Susan Witterick</i> Susan Witterick BSc MIOA

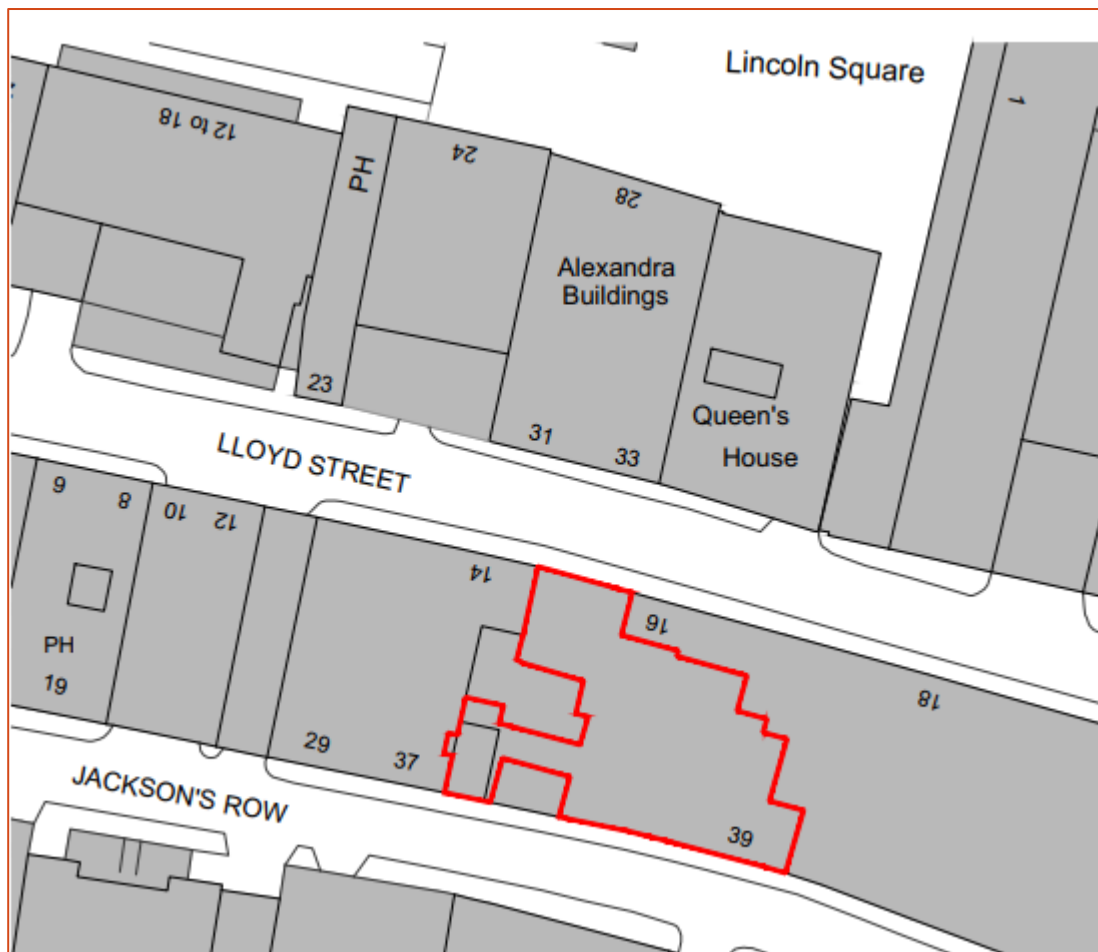
1 INTRODUCTION

- 1.1 dBx Acoustics Ltd has been appointed by Caroline Tamworth Planning, on behalf of Cocktail Takeover Ltd to provide a noise impact assessment to support a planning application for a new cocktail bar at the above site.
- 1.2 It is proposed to convert a basement carpark into a cocktail bar.
- 1.3 The bar will operate from 17:00h-03:00h, seven days a week.
- 1.4 This report provides details of noise surveys and sound insulation measurements undertaken, and a noise impact assessment.
- 1.5 The Local Authority is Manchester City Council.
- 1.6 A glossary of acoustic terminology has been supplied in Appendix A in order to assist the reader.

2 SITE DESCRIPTION

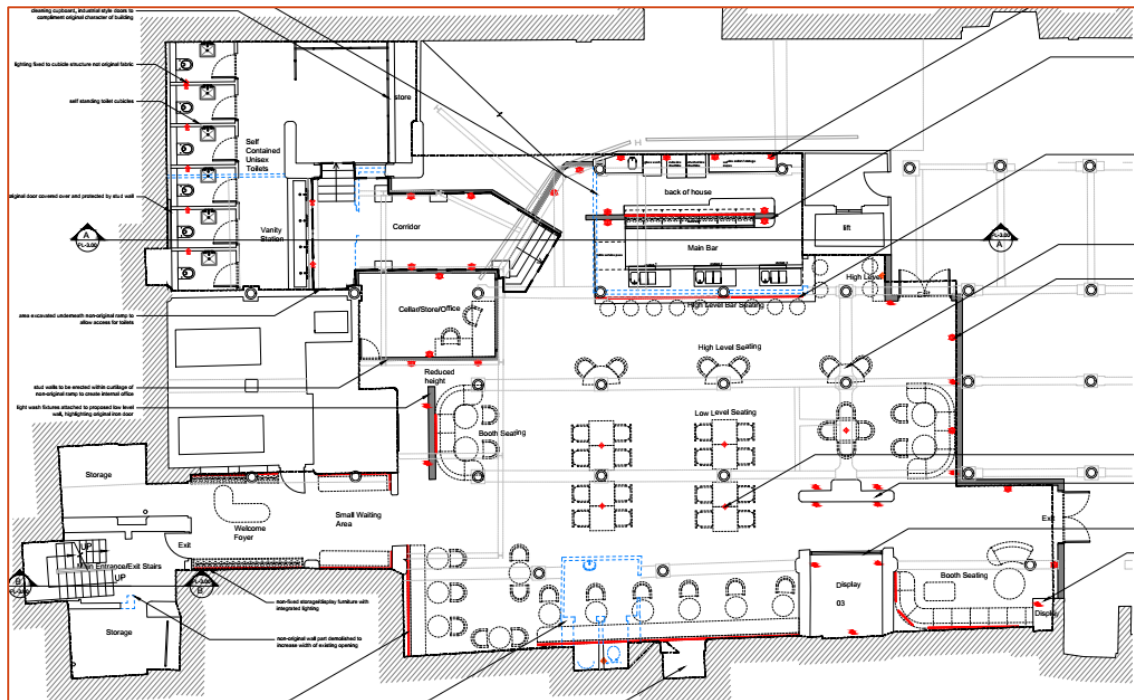
- 2.1 The proposed site is in the basement of Lloyds House, Jackson's Row, Manchester M2 5ND, which is a five storey, Grade II listed building. A site location plan is shown as Figure 1, below.

Figure 1: Site Location Plan



- 2.2 The basement is currently used as a car park.
- 2.3 The ground floor above the proposed bar is currently used as a gym, and another cocktail bar.
- 2.4 The site is completely surrounded by commercial developments – offices, bars and retail units. There are currently no residential units near to the site.
- 2.5 However, planning permission has been granted for a residential scheme at the top floor of the building (5th floor). A noise impact assessment to these future dwellings has therefore been requested by the Local Authority (Graeme Souter via email).
- 2.6 Figure 2, below, shows the proposed basement layout.

Figure 2: Proposed Basement Layout



3 CRITERIA

- 3.1 The building falls under the jurisdiction of Manchester City Council (MCC).
- 3.2 Manchester City Council's *Planning & Noise Technical Guidance* (October 2022) sets out Manchester City Council's requirements with regard to current guidance and policy, with the aspiration that new developments achieve the highest standards without compromising the health and wellbeing of residents. The guidance refers to the WHO Guidelines for Community Noise 1999, BS 8233:2014, BS 4142:2014, NPPF and NPSE as described below.
- 3.3 In terms of noise breaking out of 'entertainment' venues, MCC require that;
- 'Entertainment noise ($L_{Aeq,5min}$) should be controlled to 5dB below the typical background noise level (L_{A90}) in each octave band at the nearest noise sensitive location'.*
- 3.4 MCC has adopted the following internal noise limits for residential properties:
- Bedrooms (night time 23:00-07:00h) 30 dB $L_{Aeq,8h}$ (individual noise events should not normally exceed 45 dB $L_{Amax,F}$ more than 15 times);
 - Living Rooms (daytime – 07:00-23:00h) 35 dB $L_{Aeq,16h}$.
- 3.5 MCC also requires that externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5 dB $L_{Ar,Tr}$ below the typical background L_{A90} level at the nearest noise sensitive location.

National Planning Policy Framework

- 3.6 The revised National Planning Policy Framework (NPPF, last updated February 2019) supersedes the 2012 and 2018 versions of the NPPF. The purpose of the planning system is to contribute to the achievement of sustainable development. There are three dimensions to sustainable development: economic, social and environmental. The environmental role is to contribute to protecting and enhancing our natural, built and historic environment; and as part of this, make effective use of land, help to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate to adapt to climate change including moving to a low carbon economy.
- 3.7 One of the core planning principles is to contribute to conserving and enhancing the natural environment. Allocations of land for development should prefer land of lesser environmental or amenity value, where consistent with other policies in the Framework (Paragraph 171). The planning system should contribute to and enhance the natural and local environment by 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, air, water or noise pollution or land instability (Paragraph 170).
- 3.8 Paragraph 185 of the NPPF states:
- "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:*

- 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 (see Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food and Rural Affairs, 2010));
- Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”

3.9 Additionally, Paragraph 187 states:

“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.”

Noise Policy Statement for England

3.10 The Noise Policy Statement for England (NPSE) aims to “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”.

3.11 Based on concepts from toxicology, it introduces three ‘Effect Levels’ relevant to the assessment of noise. These are:

- NOEL: No Observed Effect Level: This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise;
- LOAEL: Lowest Observed Adverse Effect Level: This is the level above which adverse effects on health and quality of life can be detected; and
- SOAEL: Significant Observed Adverse Effect Level: This is the level above which significant adverse effects on health and quality of life occur.

Planning Practice Guidance

3.12 The Planning Practice Guidance for Noise (PPG-N) was published in March 2014 and most recently updated in July 2019. The PPG-N suggests that the most appropriate and cost-effective solutions to potential noise issues are best identified when good acoustic design needs to be considered early in the planning process.

3.13 The PPG-N provides the following advice on how to determine the noise impact on development:

“Plan-making and decision making need to take account of the acoustic environment and in doing so consider:

- *Whether or not a significant adverse effect is occurring or likely to occur;*
- *Whether or not an adverse effect is occurring or likely to occur; and*
- *Whether or not a good standard of amenity can be achieved.”*

In line with the Explanatory note of the noise policy statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation. As noise is a complex technical issue, it may be appropriate to seek experienced specialist assistance when applying this policy.” (Paragraph 003 Reference ID 30-003-20190722).

3.14 The document goes on to acknowledge the levels of noise exposure at which an effect may occur as provided in the NPSE and introduces a fourth effect level:

- UAE: Unacceptable Adverse Effect: Extensive and regular changes in behaviour and/or an inability to mitigate the effect of noise lead to psychological stress or physical effects.

3.15 Where residential development is proposed in the vicinity of existing businesses, community facilities or other activities that produce noise, the PPG-N advises that the applicant (or ‘agent of change’) will need to clearly identify the effects of the existing businesses that may cause a nuisance (including noise) and clearly define the mitigation measures being proposed to address any potential significant adverse effects that are identified. The agent of change needs to not only consider the current activities of the business, but the permitted activities too, even if they are not occurring at the time of the application being made. The PPG-N acknowledges that

“It can be helpful for developers to provide information to prospective purchasers or occupants about mitigation measures that have been put in place, to raise awareness and reduce the risk of post-purchase/occupancy complaints.” (Paragraph 009 Reference ID 30-009-20190722).

3.16 It is important to understand that as the PPG-N does not specifically provide any advice with respect to noise levels/limits for different sources of noise, it is appropriate to consider other sources of advice and guidance documents when considering whether new developments would be sensitive to the prevailing acoustic environment and the PPG-N signposts a number of appropriate guidance documents.

BS 8233:2014: 'Guidance on sound insulation and noise reduction for buildings'

Indoor Ambient Noise Levels within Habitable Rooms

- 3.17 BS 8233 gives guidance for noise levels within residential properties for noise without a specific character. It discusses appropriate criteria for reasonable rest and sleep conditions and provides noise levels which are considered to provide appropriate conditions in accordance with WHO guidelines. The guidance on limits from the standard is reproduced in Table .

Table 1: Indoor Ambient Noise Limits (BS 8233)

Activity	Location	07:00 – 23:00 hrs	23:00 – 07:00 hrs
Resting	Living room	35 dB $L_{Aeq,16h}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$

- 3.18 It should be noted that these levels represent the average noise level over the 16-hour day or 8-hour night period. This potentially means that higher noise levels may be experienced internally over a shorter period of time (e.g. individual passing trams or vehicles). These equivalent noise levels over a period of time are the best representation of the average noise level and are generally the main focus when it comes to evaluating noise exposure.
- 3.19 A relaxation of up to 5 dB to provide “reasonable internal conditions” for both day and night-time cases where development is considered necessary or desirable.
- 3.20 To assess the maximum noise levels, the World Health Organisation (WHO) document ‘Guidelines for Community Noise: 1999’ recommends that maximum noise levels (dB L_{AFmax}) do not exceed 45 dB L_{AFmax} more than 10-15 times a night.

Indoor Ambient Noise Levels within Offices

- 3.21 With respect to intrusive external noise, BS 8233 identifies the British Council for Offices (BCO) Guide to Specification for general acoustic guidance on offices. BS 8233 highlights that complaints from office workers typically arise from the intrusion of external noise, high internal noise levels from services, low background noise, excessive reflections from room surfaces, and inadequate sound insulation between offices. Advice is provided within the BS 8233 guidance in respect of the internal design of offices, including open-plan offices for speech privacy and the control of noise.

3.22 The relevant criteria for offices are reproduced in Table .

Table 2: BS 8233 Acoustic Design Criteria for Offices

Activity	Location	Design Range	
		$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)
Study and work requiring concentration	Executive office	35 – 40	50
Work requiring acoustic privacy	Open plan office	45 – 50	55
Speech or telephone Communications	Corridor, circulation space	45 – 55	50

BS 4142:2014 'Methods for Rating and Assessing Industrial and Commercial Sound'

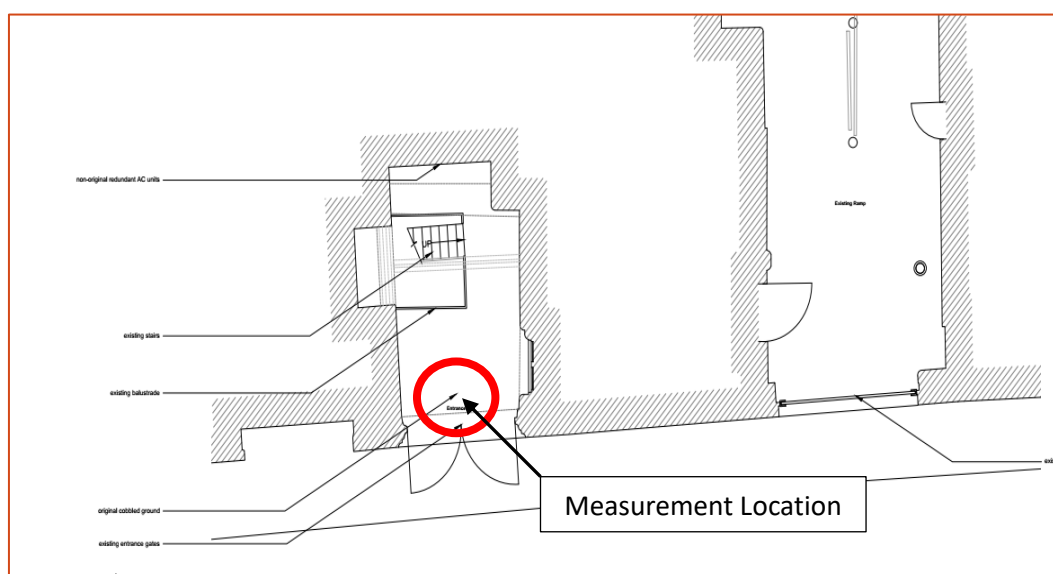
- 3.23 BS 4142:2014 sets out a procedure for assessing noise impact whereby a Noise Rating Level is determined and compared with the existing local Background Sound Level.
- 3.24 The Rating Level ($dB L_{Ar,Tr}$) is evaluated from the Specific Noise Level by including cumulative corrections to account for factors such as distinguishable tone, impulsivity, intermittency or other readily distinguishable sound characteristics.
- 3.25 The assessment of the impact depends upon the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level. An initial estimate of the impact of the specific sound is made by subtracting the Background Sound Level from the Rating Level, while considering the following points:
- a) Typically, the greater this difference, the greater the magnitude of the impact.
 - b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
 - c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
 - d) 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.

4 NOISE SURVEYS

Noise Levels

- 4.1 In order to establish the ambient noise levels at the proposed residential accommodation, long term noise monitoring equipment was set up on site between Friday 11th November and Tuesday 15th November 2022, to measure night-time and weekend noise levels, as requested by Graeme Souter of Manchester City Council via email on 29/9/2022.
- 4.2 The equipment was left in a gated entrance area as indicated in Figure 3, below. The gate was formed of iron bars (not solid) and hence did not affect the noise measurements.

Figure 3: Measurement Location



- 4.3 A summary of the noise levels measured is presented in Table 3, below.

Table 3: Summary of Measured Noise Levels at Long Term Noise Monitoring Location

Day/Date	Period (hh:mm)	Ambient Noise Level (dB L _{Aeq,T})	Typical Background Noise Level (dB L _{A90, 15mins})
Friday 11th November 2022	Daytime (11:45-23:00)	59	53
	Night-Time (23:00-07:00)	64	57
Saturday 12th November 2022	Daytime (07:00-23:00)	61	54
	Night-Time (23:00-07:00)	63	58
Sunday 13th November 2022	Daytime (07:00-23:00)	56	51
	Night-Time (23:00-07:00)	60	49
Monday 14th November 2022	Daytime (07:00-23:00)	66	51
	Night-Time (23:00-07:00)	54	50

- 4.4 The quietest background noise levels were recorded on Sunday 13th at night. A typical spectrum during this period is detailed in Table 4, below.

Table 4: Octave Band Background Noise Levels

Background Noise Level in Octave Band Centre Frequency, dBL _{90,T}								
63	125	250	500	1000	2000	4000	8000	dBA
61	59	51	46	43	38	30	19	49

- 4.5 The airborne sound insulation performance of the floor separating the basement from the first-floor commercial offices was also measured on Friday 11th November 2022.
- 4.6 The single figure weighted level difference was 49dB_{Dw}. Full one-third octave band data was measured, and used in the subsequent calculations.

- 4.7 Measurements of typical cocktail bar noise levels were also measured in Speak in Code, also owned by Cocktail Takeover Ltd, to use as source noise levels for the cocktail bar breakout calculations. The worst-case noise levels measured are detailed in Table 5, below.

Table 5: Octave Band Cocktail Bar Noise Levels

Cocktail Bar Noise Level in Octave Band Centre Frequency, dBL _{eq,T}								
63	125	250	500	1000	2000	4000	8000	dBA
83	71	67	68	65	62	56	49	70

Equipment

- 4.8 The equipment used during the noise survey is detailed in Table 6, below.

Table 6: Equipment Used in the Environmental Noise Survey

Measurement	Equipment	Manufacturer & Part No	Serial Number
Long Term	Sound Level Meter	Casella C633C	1716934
	Microphone	CEL 251	000847
	Calibrator	CEL 120/1	2045151
Sound Insulation	Sound Level Meter	NOR 145	14529301
	Microphone	NOR 1227	413880
	Calibrator	NOR 1255	125525453
Cocktail Bar	Sound Level Meter	NOR 140	1403443
	Microphone	NOR 1225	18437
	Calibrator	B&K 4231	1821323

- 4.9 The sound level meters were calibrated before and after measurements, with no significant drift recorded. An accredited laboratory calibrated the equipment not more than two years prior to the measurements being made, with the exception of the calibrators, which had been calibrated not more than one year prior to the survey.

Weather Conditions

- 4.10 Weather conditions throughout the survey period were suitable for environmental measurements with wind speeds of less than 5 m/s. No precipitation was recorded during the noise survey. Temperatures varied between 7°C and 16°C.

5 ASSESSMENT

Noise Break-Out to Proposed Flats

- 5.1 Based on the noise levels detailed in Table 5, noise breaking out of the bar has been calculated at the proposed flats on the fifth floor of the building, as shown in Table 7, below.

Table 7: Noise Breakout Calculation

Situation	Noise Level in Octave Band Centre Frequency								
	63	125	250	500	1000	2000	4000	8000	dBA
Noise Level in Bar, $dB_{Leq,T}$	83	71	67	68	65	62	56	49	70
Breakout via entrance area	-15	-15	-15	-15	-15	-15	-15	-15	-
Distance to flats from ground (16m)	-24	-24	-24	-24	-24	24	-24	-24	-
Sound Pressure Level at 5 th floor	44	32	28	29	26	23	17	10	31
Background Noise Level	61	59	51	46	43	38	30	19	49
Difference	-17	-27	-23	-17	-17	-15	-13	-9	-18

- 5.2 As can be seen in Table 7, noise breakout is predicted to be at least 9dB lower than the octave band background noise levels at the flats. Directivity would reduce this further. This therefore comfortably meets MCC's criterion.
- 5.3 The predicted noise breakout is also at least 23dB lower than typical ambient noise levels at night, and hence would be inaudible.

Noise Break-Out to Commercial Units Above

- 5.4 Based on the measured cocktail bar noise levels, and the measured sound insulation performance of the floor, the predicted noise levels in the commercial areas above are shown in Table 8, below.

Table 8: Sound Insulation Calculation

Situation	Noise Level in Octave Band Centre Frequency								
	63	125	250	500	1000	2000	4000	8000	dBA
Noise Level in Bar, $dB_{Leq,T}$	83	71	67	68	65	62	56	49	70
Sound Insulation Floor, D	55	54	58	55	59	54	42	45	-
Sound Pressure Level above	28	17	9	13	6	8	14	4	18
Background Noise in Office (Bar)	66	65	54	53	45	44	39	31	55
Difference	-38	-48	-45	-40	-39	-36	-24	-27	-37

- 5.5 As can be seen from Table 8, above, the predicted noise level in the rooms above is around $18\text{dBL}_{\text{Aeq,T}}$. This is at least 17dB lower than the recommended indoor ambient noise levels detailed in BS8233.
- 5.6 It is also at least 30dB lower than the measured background noise levels in the office area of the bar above.
- 5.7 Cocktail bar noise would therefore be inaudible in the rooms above.

6 NEW BUILDING SERVICES NOISE EMISSIONS

- 6.1 Manchester City Council's '*Planning & Noise Technical Guidance*' (October 2022) states that the rated plant noise level should be controlled to 5dB below the background noise level during the periods in which the plant operates.
- 6.2 Consequently, suitable limits to which any new plant noise should adhere have been determined and are presented in Table 9.

Table 1: Proposed Building Service External Noise Limits

Noise Sensitive Receptors (Figure 1)	External Building Services Plant Noise Limit ($L_{A,T,r}$) dB	
	Daytime 07:00 – 23:00 hours (T = 1 hour)	Night-time 23:00 – 07:00 hours (T = 15 minutes)
All Noise Sensitive Receptors	46 dB	44 dB

7 SUMMARY AND CONCLUSION

- 7.1 dBx Acoustics Ltd has been appointed by Caroline Tamworth Planning, on behalf of Cocktail Takeover Ltd to provide a noise impact assessment to support a planning application for a new cocktail bar at the above site.
- 7.2 It is proposed to convert a basement carpark into a cocktail bar.
- 7.3 The bar will operate from 17:00h-03:00h, seven days a week.
- 7.4 This report provides details of noise surveys and sound insulation measurements undertaken, and a noise impact assessment.
- 7.5 Based on the measured data, and assessment, noise from the cocktail bar is expected to meet Manchester City Council's requirements at all nearby noise sensitive locations. Noise breakout is expected to be inaudible at all locations.
- 7.6 Plant noise limits have been set such Manchester City Council's plant noise limit is achieved.
- 7.7 Taking the above into account, noise should not be a limiting factor in any planning application.

APPENDIX A – GLOSSARY OF ACOUSTIC TERMINOLOGY

Decibel, dB	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. For sound pressure level (L_p) the reference quantity is 2×10^{-5} N/m ² . The sound pressure level existing when microphone measured pressure is 2×10^{-5} N/m ² is 0 dB, the threshold of hearing.
L	Instantaneous value of Sound Pressure Level (L_p) or Sound Power Level (L_w).
Frequency	Number of cycles per second, measured in hertz (Hz), related to sound pitch.
A-weighting	Arithmetic corrections applied to values of L_p according to frequency. When logarithmically summed for all frequencies, the resulting single "A weighted value" becomes comparable with other such values from which a comparative loudness judgement can be made, then, without knowledge of frequency content of the source.
$L_{eq,T}$	Equivalent continuous level of sound pressure which, if it actually existed for the integration time period T of the measurement, would possess the same energy as the constantly varying values of L_p actually measured.
$L_{Aeq,T}$	Equivalent continuous level of A weighted sound pressure which, if it actually existed for the integration time period, T, of the measurement would possess the same energy as the constantly varying values of L_p actually measured.
$L_{n,T}$	L_p which was exceeded for n% of time, T.
$L_{An,T}$	Level in dBA which was exceeded for n% of time, T.
L_{Fmax}	The instantaneous maximum sound pressure level which occurred during the measurement. F indicates that the fast time-weighting is used.
L_{AFmax}	The instantaneous maximum A weighted sound pressure level which occurred during the measurement. F indicates that the fast time-weighting is used.
$L_{Ar,Tr}$	The rating level: the equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise.
Reverberation Time, T	The time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped. The descriptor T, often includes other nomenclature to describe the type of reverberation time measurement or if the reverberation time is an average taken for specific frequencies. For example, a T_{mf} is the mid-frequency reverberation time.
Absorption Coefficient, α	The fraction of reverberant sound energy absorbed by a material. It is expressed as a value between 1.0 which equates to perfect absorption and 0 which equates to zero absorption.
Acoustic Class, A - E	Classification of sound absorbers into Sound Absorption Classes A-E, according to BS EN ISO 11654, including frequencies 200-5000 Hz
NRC	A single-number rating system used to compare the sound-absorbing characteristics of building materials. A measurement of the acoustical absorption performance of a material, calculated by averaging its Sound Absorption Coefficients at 250, 500, 1000 and 2000 Hz
STI	Speech Transmission Index , Metric ranging between 0 and 1 representing the transmission quality of speech with respect to intelligibility by a speech transmission channel
R	Sound Reduction Index , the laboratory measured sound insulation properties of a material or building element in octave or third octave bands.
R_w	Weighted Sound Reduction Index , a single number which represents the sound reduction of a material. It is derived by plotting the sound reduction index against a set of reference curves. The curves are shifted until a best-fit is established and the curve which best fits the sound reduction spectrum is used to represent the single figure value.
D_w	Weighted Level Difference , the weighted level difference between a pair of rooms, stated as a single figure.

D_{nT}	Standardised Level Difference, a frequency-dependent measurement of airborne sound insulation, calculated using the following formula: $D_{nT} = L_1 - L_2 + 10\log(T/T_0)$ dB Where: L_1 is the energy-averaged sound pressure level due to the pink noise source measured in the source room using a sweep technique. L_2 is the energy-averaged sound pressure level measured in the receiving room using a sweep technique. T is the mean receiving room reverberation time (derived from T_{30} measured in seconds). T_0 is the reference reverberation time (= 0.5s for dwellings).
$D_{nT,w}$	Weighted Standardised Level Difference, a single-figure value of airborne sound insulation performance, derived according to procedures in BS EN ISO 717-1, based on the D_{nT} values at different frequencies (100-3150 Hz third octave bands).
D_{nFw}	Weighted, Normalised Flanking Level Difference, the normalised, weighted difference in sound level between a pair of rooms via a flanking element, such as mullion or ceiling detail. The level difference in octave bands is first normalized to a reference amount of absorption and then plotted against a set of reference curves to establish a single figure value.
D_{ne}	Normalised Element Level Difference, The normalised difference in sound level between a pair of rooms via a small element such as a trickle ventilator. The level difference in octave bands is normalized to a reference amount of absorption.
D_{new}	Weighted, Normalised Element Level Difference, The normalised, weighted difference in sound level between a pair of rooms via a small element such as a trickle ventilator, stated as a single figure. The level difference in octave bands is normalized to a reference amount of absorption and then plotted against a set of reference curves to establish a single figure value.
C_{tr}	Spectrum Adaptation Term, a correction term applied to the sound insulation single-number values (R_w, D_{wT}, and $D_{nT,w}$) in accordance with BS EN ISO 717-1. Applying the C_{tr} penalises a construction's performance if its low frequency performance is poor in relation its performance at higher frequencies.
Impact Sound	The noise generated by an impact on a structure. This is normally used to describe the noise created by people walking or moving furniture on a floor structure.
L_{nT}	Standardised Impact Sound Pressure Level, a frequency dependent measurement of impact sound insulation, calculated using the following formula: $L_{nT} = L_1 + 10\log(T/T_0)$ dB Where: L_1 is the mean sound pressure level due to the tapping machine measured in the receiving room using a sweep technique. T is the mean receiving room reverberation time (derived from T_{30} measured in seconds). T_0 is the reference reverberation time (0.5s for dwellings)
$L'_{nT,w}$	Weighted Standardised Impact Sound Pressure Level, a single-figure value (@ 500 Hz) of impact sound insulation, performance, derived according to BS EN ISO 717-2, based on the L_{nT} values at different frequencies (100Hz- 3150 Hz third octave bands).
Insertion Loss, IL	The reduction of noise level due to the presence of a noise control device such as an attenuator, excluding any regeneration noise created by its presence.
NR	The Noise Rating level. This is a single figure value derived by plotting a noise spectrum against a set of curves. The curve under which the spectrum fits is the resulting NR level.

22087-R01-BT Lloyds House Noise Impact Assessment

Final Audit Report

2022-12-15

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