

PROPOSED BAR AT 1 SALMON STREET, MANCHESTER

NOISE IMPACT ASSESSMENT

On behalf of:

Scott Martin

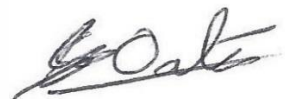
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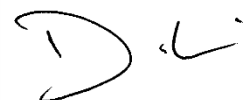
Report prepared by:
Hepworth Acoustics Ltd
21 Little Peter Street
Manchester
M15 4PS

On behalf of:
Scott Martin

Report prepared by:
Samuel Oates BSc MSc AMIOA - Consultant



Report checked by:
Donald Quinn BSc FIOA - Managing Director



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1.0 INTRODUCTION

- 1.1 Hepworth Acoustics Ltd was commissioned by Scott Martin to carry out a noise impact assessment in connection with a proposed planning application for a new bar at 1 Salmon Street in Manchester city centre.
- 1.2 This assessment has been carried out to determine the potential noise impact from the proposed bar to be located on the first/second floors of the building, on the nearest existing dwellings understood to be located in the first and second floors of the adjacent building above the Hare and Hounds pub. The location and orientation of the development relative to the nearest dwellings is shown in Figure 1. We understand that ground floor space underneath the proposed bar will be a café/off-licence. The bar entrance will be via a door at ground floor level leading to a staircase to the first floor at the top of which will be a secondary door. Thus, the entrance arrangement will form an effective lobby.
- 1.3 It is understood from the client that the party wall between the proposed development and the adjacent dwelling is comprised of two structurally separate twin leaf masonry walls, as well as the proposed bar and the adjacent approved hotel. We have been informed that this construction is due to the development building being built later than the adjacent building resulting in a new external wall being built adjacent to the existing external wall. Such an arrangement will provide a good level of sound insulation.
- 1.4 Proposals for externally mounted plant equipment, are not yet available. We have therefore recommended appropriate cumulative plant noise limits that can be used by the M&E consultant to design the system so as to adequately control noise impact where plant will be mounted on the front elevation.
- 1.5 It has been confirmed that there is to be no live music of any kind or prominent foreground recorded music reproduction and only 'background' music will be played in the bar played at modest levels.
- 1.6 The proposed trading hours for the bar are as follows: 11:00 - 02:00 (Sun - Wed), 11:00 - 03:00 (Thurs - Sat) with an additional 30 minutes at the end of trading within which patrons will vacate the premises.

1.7 The noise assessment has included:

- An inspection of the site and surrounding area;
- Measurement of noise levels during a weekend and weekday period;
- Determination of appropriate plant noise limits at the front elevation;
- Assessment of penitential trading noise transmission to the adjacent dwellings;
- Assessment of potential trading noise breakout from the building envelope to the adjacent dwelling; and,
- Recommendation of appropriate noise mitigation measures.

1.8 This report is an update of the original report ('P18-427-R01v1' dated January 2019) which has been requested to take into account comments from the EHO. The update includes:

- Current proposed trading hours;
- Latest proposed floor plan layouts 'A103 - Proposed Floor Plans 1.100 - A3';
- Evaluation of the effect of the proposed ventilation strategy on the sound insulation of the building envelope;
- Discussion of the potential noise impact upon the new approved adjacent hotel;
- Discussion of the potential noise impact from patrons smoking outside the premises and patrons leaving after trading has ceased;
- Maximum recommended background music noise levels; and,
- Comment on the potential noise impact from the proposed ground floor café.

1.9 The various noise units and indices referred to in this report are described in Appendix I. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2.0 GUIDANCE AND NOISE CRITERIA

- 2.1 Manchester City Council Planning & Noise Technical Guidance 2015 provides guidance for assessing the potential impact from entertainment noise on residential dwellings.
- 2.2 For plant noise the guidance states: *'The noise assessment should be based on BS 4142: 2014 and any application for fixed plant, equipment or machinery must demonstrate 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 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location'.'*
- 2.3 To ensure that the development is suitable within the context of the planning permission being sought, the guidance states that *"...applicants and consultants should predict the noise impact of a proposed entertainment venue using noise levels that are representative of those found in 'typical' venues of the kind being applied for."*
- 2.4 The guidance also states that *"When considering the potential impact of a proposal for an entertainment venue consultants should consider the overall noise level (L_{Aeq}) and the 63 Hz and 125 Hz octave band noise levels (L_{eq})."*
- 2.5 To account for potential low frequency noise, the Manchester City Council Technical Guidance provides the following criteria for new developments:
- "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}), respectively'."***
- 2.6 The guidance considers that operation within these criteria would result in *'inaudible'* or *'virtually inaudible'* entertainment noise, which would be desirable.
- 2.7 The following guidance is also provided regarding entertainment venues that are not structurally attached to the nearest dwelling, which may also be appropriate for attached dwellings in some cases:
- 2.8 *'A planning application for a new entertainment venue that is structurally detached from other building uses should demonstrate that music noise from the proposal will not be 'audible' in nearby residential properties, assuming that the residential properties in question have their windows open. The criterion here is: 'Entertainment noise (LAeq) should be controlled to 10dB below the background noise level*

(LA90) without the entertainment noise present, in each octave band at the nearest noise sensitive location'.

2.9 Therefore, in this case we have adopted the following noise criteria to take into account the broadband L_{Aeq} noise levels and the 63Hz and 125Hz octave band noise levels (in L_{eq}) in line with the Manchester City Council Guidance discussed above:

- Trading noise levels in the 63Hz and 125Hz octave centre frequency bands (L_{Zeq}) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (L_{Zeq}), respectively; and,
- The trading noise levels (L_{Zeq}) should be 10 dB lower than the prevailing background noise levels (L_{Z90}) in each octave band.
- Cumulative noise levels from externally mounted plant (L_{Zeq}) should be 5 dB lower than the prevailing background noise levels (L_{Z90}) in each octave band.

3.0 NOISE SURVEY

- 3.1 Automated noise measurements were carried out between 14:35 on Friday 18 and 09:15 on Tuesday 22 January 2019. The measurements were taken at two locations in the elevations of the existing building, as follows:
- Location A: In the front elevation overlooking Salmon Street; and
 - Location B: In the rear elevation overlooking Shudehill.
- 3.2 The noise measurements were taken in 15-minute periods, 1m from the building façade. Calibration checks were carried out both before and after the measurement periods with no variance in levels.
- 3.3 Weather conditions during the noise survey were suitable for sound level measurements, full details of the weather conditions and the equipment used can be seen in Appendix II.
- 3.4 Full results of the noise survey can be seen in Appendix II, and a summary of the measured noise levels is shown in Table 1. The summarised data is presented as the arithmetic means for L_{Amax} and L_{A90} values and the logarithmic means for L_{Aeq} values. The daytime period covers 07:00-23:00 and the night period covers 23:00-07:00.

Table 1: Summary of Measured Noise Levels (dB)

Day	Period	Location A - Front Elevation			Location B - Rear Elevation		
		L_{Amax}	L_{Aeq}	L_{A90}	L_{Amax}	L_{Aeq}	L_{A90}
Friday	Daytime	80	64	58	85	70	63
Friday/Saturday	Night	77	62	54	83	66	56
Saturday	Daytime	81	66	57	86	70	62
Saturday/Sunday	Night	77	62	55	84	66	57
Sunday	Daytime	78	62	55	83	68	59
Sunday/Monday	Night	75	60	49	82	67	50
Monday	Daytime	81	64	56	86	69	62
Monday/Tuesday	Night	75	60	50	81	66	52

4.0 NOISE IMPACT ASSESSMENT

Plant Noise

- 4.1 We have provided suitable plant noise limits for externally mounted plant installed on the front elevations of the development in line with BS 4142:2014 guidance and MCC criteria.
- 4.2 In order to determine a representative background noise level, we have used the noise levels measured on the Front - Salmon Street elevation. As the plant could potentially operate during the night which is the most sensitive period we have determined the representative background noise level by method of statistical analysis of the measured L_{A90} levels over the survey night periods. The adopted background level is 53 dB L_{A90} , which is the mode of the measured night time levels which is clearly the most frequently occurring level - in line with BS 4142:2014 guidance.
- 4.3 The arithmetic mean of the measured night time L_{Z90} spectra has been adopted and 5dB has been subtracted from the levels to derive the cumulative plant noise limits at the nearest dwelling for any externally mounted plant. The plant noise limits are shown below in Table 2.

Table 2: Cumulative Plant Noise Limits in terms of L_{90} (dB)

Description	Octave band centre frequency (Hz)								A
	63	125	250	500	1k	2k	4k	8k	
Plant Noise Limit (L_{90})	52	48	47	45	44	40	33	24	48

- 4.4 Any externally mounted plant to be installed at the Front - Salmon Street elevation of the development should be controlled to operate within the noise limits presented in Table 2.

Trading Noise

- 4.5 As the proposals for the bar are for an establishment which will not include prominent music amplification as part of its operation, the trading noise will largely be due to patron noise. Therefore, in order to provide an accurate and fair assessment we have adopted trading noise levels previously measured at a similar establishment, in line with the Manchester Guidance.
- 4.6 The adopted trading noise levels were measured during a busy weekend trading evening but with background music only, hence, the measured noise levels are predominantly due to patron noise. The adopted trading noise levels are shown below in Table 3.

Table 3: Adopted Trading Noise Levels (dB)

Description	Octave band centre frequency (Hz)								A
	63	125	250	500	1k	2k	4k	8k	
Adopted Trading Noise Levels (L_{eq})	66	72	75	81	80	76	69	57	84

Noise Transmission via the Party Wall

- 4.7 Whilst the construction of the party wall is understood to be two double masonry walls, the exact construction is not known. Nevertheless, we have used INSUL sound insulation software to estimate the likely sound insulation of the arrangement.
- 4.8 The sound reduction index (SRI) used in our calculation is based upon the INSUL estimated values for two structurally independent 140mm brick walls with 100mm cavity. The SRI values, the calculated transmitted noise levels are shown in Table 4 overleaf, along with the criteria.

Table 4: Noise Transmission via the Party Wall (dB)

Description	Octave Band Centre Frequency (Hz)								A
	63	125	250	500	1k	2k	4k	8k	
Adopted Trading Noise Levels (L_{eq})	66	72	75	81	80	76	69	57	84
2 x 140mm brick walls	50	62	71	67	74	>80	>80	>80	
Calculated resulting transmitted levels	16	10	4	14	6	<0	<0	<0	13
Manchester criteria	47	41	-	-	-	-	-	-	-
Difference	-31	-31	-	-	-	-	-	-	-

- 4.9 Based on our findings as can be seen in Table 4, the separating wall arrangement will provide adequate sound insulation in order to control the low frequency noise to within the Manchester City Council criteria.

Determination of Representative Background Noise Levels During Trading Hours

- 4.10 In order to determine appropriate background noise levels on which to base the criteria for trading noise levels, statistical analysis was carried out of the measured L_{A90} levels over the proposed trading hours including the additional 30 minutes for patrons to vacate the premises as a worst case.

- 4.11 The mode of the measured night-time levels (from 23:00 until 30 minutes after the end of trading), which is the most frequently occurring level has been ascertained for each night as shown in Table 5 below.

Table 5: Most Frequently Occurring Noise Levels During Night Trading Periods (dB)

Trading Period	Front Elevation - Salmon Street	Rear Elevation - Shudehill
Friday Night (L_{A90})	55	58
Saturday Night (L_{A90})	59	60
Sunday Night (L_{A90})	53	54
Monday Night (L_{A90})	53	52

- 4.12 In order to ensure a robust assessment, the lowest mode has been used as the representative background levels for the front and rear elevations, these being 53 dB L_{A90} and 52 dB L_{A90} respectively.
- 4.13 The arithmetic mean of the L_{Z90} spectra measured during the night trading hours has been adopted and 10dB has been subtracted from the levels to derive the trading noise limits outside the nearest dwelling. The trading noise limits are shown below in Table 6.

Table 6: Trading Noise Limits (dB)

Trading Noise Limits	Octave Band Centre Frequency (Hz)								A
	63	125	250	500	1k	2k	4k	8k	
Front Elevation Salmon Street (L_{eq})	45	43	42	40	38	35	30	22	43
Rear Elevation Shudehill (L_{eq})	44	42	41	39	37	34	29	21	42

Noise Break-out via the Front Elevation

- 4.14 The front elevation, overlooking Salmon Street contains three existing windows at the first-floor level. The windows are of double-glazed construction, which we have assumed to be a standard 4mm glass - 12mm cavity - 4mm glass build.
- 4.15 We have calculated the trading noise break-out via the first-floor of the front elevation taking into account the existing windows, the wall and a 3m distance between the windows and the nearest dwelling windows. The calculated noise break-out is shown in Table 7 along with the trading noise limits.

Table 7: Noise Transmission via the Front Elevation (dB)

Description	Octave Band Centre Frequency (Hz)								A
	63	125	250	500	1k	2k	4k	8k	
Adopted Trading Noise Levels (L_{eq})	66	72	75	81	80	76	69	57	84
Trading Noise Limit (L_{eq})	45	43	42	40	38	35	30	22	43
Calculated Noise Break-out (L_{eq})	32	32	39	40	29	22	18	3	38
Difference	-12	-11	-3	0	-9	-12	-12	-19	-5

- 4.16 As can be seen in Table 7, the calculated noise break-out is within the trading noise limits outside the nearest dwelling with the existing windows in place.

Noise Break-out via the Rear Building Envelope

- 4.17 The rear building envelope, overlooking Shudehill contains one existing windows at the first-floor level. The window is a double-glazing construction, which we have assumed to be a standard 4mm glass - 12mm cavity - 4mm glass build.
- 4.18 We have calculated the trading noise break-out via the first-floor of the rear building envelope taking into account the existing window, the outer wall and a 3m distance between the windows and the nearest dwelling windows. The calculated noise break-out is shown in Table 8 along with the trading noise limits.

Table 8: Noise Transmission via the Rear Elevation (dB)

Description	Octave Band Centre Frequency (Hz)								A
	63	125	250	500	1k	2k	4k	8k	
Adopted Trading Noise Levels (L_{eq})	66	72	75	81	80	76	69	57	84
Trading Noise Limit (L_{eq})	44	42	41	39	37	34	29	21	42
Calculated Noise Break-out (L_{eq})	29	29	35	36	26	19	14	0	35
Difference	-15	-13	-6	-3	-12	-15	-15	-21	-7

- 4.19 As can be seen in Table 8, the calculated noise break-out is within the trading noise limits outside the nearest dwelling with the existing window in place.

Noise Break-out via the Roof

- 4.20 In the centre of the development building away from the front and rear elevations there is a slanted tiled roof above the part of the proposed first-floor bar. This roof adjoins a courtyard which is indicated in Figure 1. We understand that some of the windows in the adjacent building overlooking the courtyard may be dwellings windows.
- 4.21 No access to the courtyard or a window overlooking the courtyard was provided, therefore it was not possible for us to measure noise levels in the courtyard. However, the lowest adopted background noise levels are likely to be representative of typical levels outside windows overlooking the courtyard. Based on these considerations and the available data we consider it reasonable to adopt the lowest elevation trading noise limit of 42 dB L_{Aeq} for assessing trading noise break-out from the roof.
- 4.22 We understand that the client plans to renovate this roof resulting in the following construction build-up: Existing roof tiles and rafters to be retained with 12mm plasterboard ceiling and 100mm Kingspan insulation.
- 4.23 We have calculated the trading noise break-out via the roof taking into account the existing window, and a 4m distance to the nearest dwelling windows. The calculated noise break-out is shown in Table 9 along with the trading noise limits.

Table 9: Noise Transmission via the Roof (dB)

Description	Octave Band Centre Frequency (Hz)								A
	63	125	250	500	1k	2k	4k	8k	
Adopted Trading Noise Levels (L_{eq})	66	72	75	81	80	76	69	57	84
Trading Noise Limit (L_{eq})	44	42	41	39	37	34	29	21	42
Calculated Noise Break-out (L_{eq})	40	41	40	39	38	33	25	11	42
Difference	-4	0	-1	0	0	-1	-4	-10	0

- 4.24 As can be seen in Table 9, the calculated noise break-out is within the trading noise limits outside the nearest dwelling.

Proposed Ventilation Strategy

- 4.25 We understand that the proposed ventilation strategy is based on installing two passive ventilators in each level of the proposed development, with one in the front and one in the rear elevation on each floor. The proposals are to install Rytons AAC125HP Super Acoustic Controllable LookRyt® AirCore® units which have an SRI of 43 dB $D_{n,e,w}$ with the ventilators in the open position.
- 4.26 Whilst such passive ventilations systems do not strictly conform to the acoustic reciprocity principal, it is reasonable to assume that the ventilators will provide a similar levels of sound insulation for noise break-out as they do for noise break-in. On this basis, it is considered that the proposed ventilation strategy would not reduce the sound insulation performance of the building envelope.

Potential Noise Impact on the Approved New Adjacent Hotel

- 4.27 The potential noise impact upon the adjacent dwellings has been based on calculation of noise transmission through the party walls and break-out via the building envelope. As the party wall construction between the proposed bar and the approved new adjacent hotel is understood to be the same as that between the proposed bar and the adjacent dwellings, and the noise break-out via the building envelope of the proposed bar will be the same; it can be concluded that where calculations predict that the MCC criteria will be met in the adjacent dwellings they will also be met in the approved new adjacent hotel.

Patrons Smoking and Leaving the Premises

- 4.28 A quantitative assessment of noise from patrons smoking outside the premises and patrons leaving the premises after trading has ceased is not readily possible due to its inherently unpredictable nature. Therefore, we have provided outline comments regarding the potential noise impact from these activities based on the proposal and the context of the area.
- 4.29 The proposals for the new bar do not include an outdoor smoking area, which means that patrons wishing to smoke will likely do so outside on Salmon Street itself or nearby. We also understand that there are several premises nearby which cease trading at similar times to the proposed bar. Therefore, potential noise resulting from patrons smoking and leaving the premises once trading has ceased would not result in any significant increase to the existing noise and character of the area.

Proposed Ground Floor Café

- 4.30 Trading noise from a café will generally be lower than trading noise from a bar even where the bar proposals are for background music only, on this basis and the fact that the noise will be generated within and break out through from the same building; it is reasonable to conclude that where calculations show that the proposed bar is capable of operating within the MCC criteria, so is the proposed café.
- 4.31 In summary, the findings of our assessment indicated that the bar would operate within the Manchester City Council criteria if the premises adheres to the current proposals. Nevertheless, we have provided suitable recommendations in Section 5 to ensure that any potential noise impact is minimised.

5.0 RECOMMENDED NOISE MITIGATION MEASURES

- 5.1 The findings of this assessment will only be valid if the operation of the bar adheres to the current proposals. In order to minimise potential noise impact and to ensure that the bar operates within its proposed scope, in this case we have made the following recommendations.
- 5.2 We recommend that background music noise levels within the proposed bar are limited to no higher than those set out in Table 10.

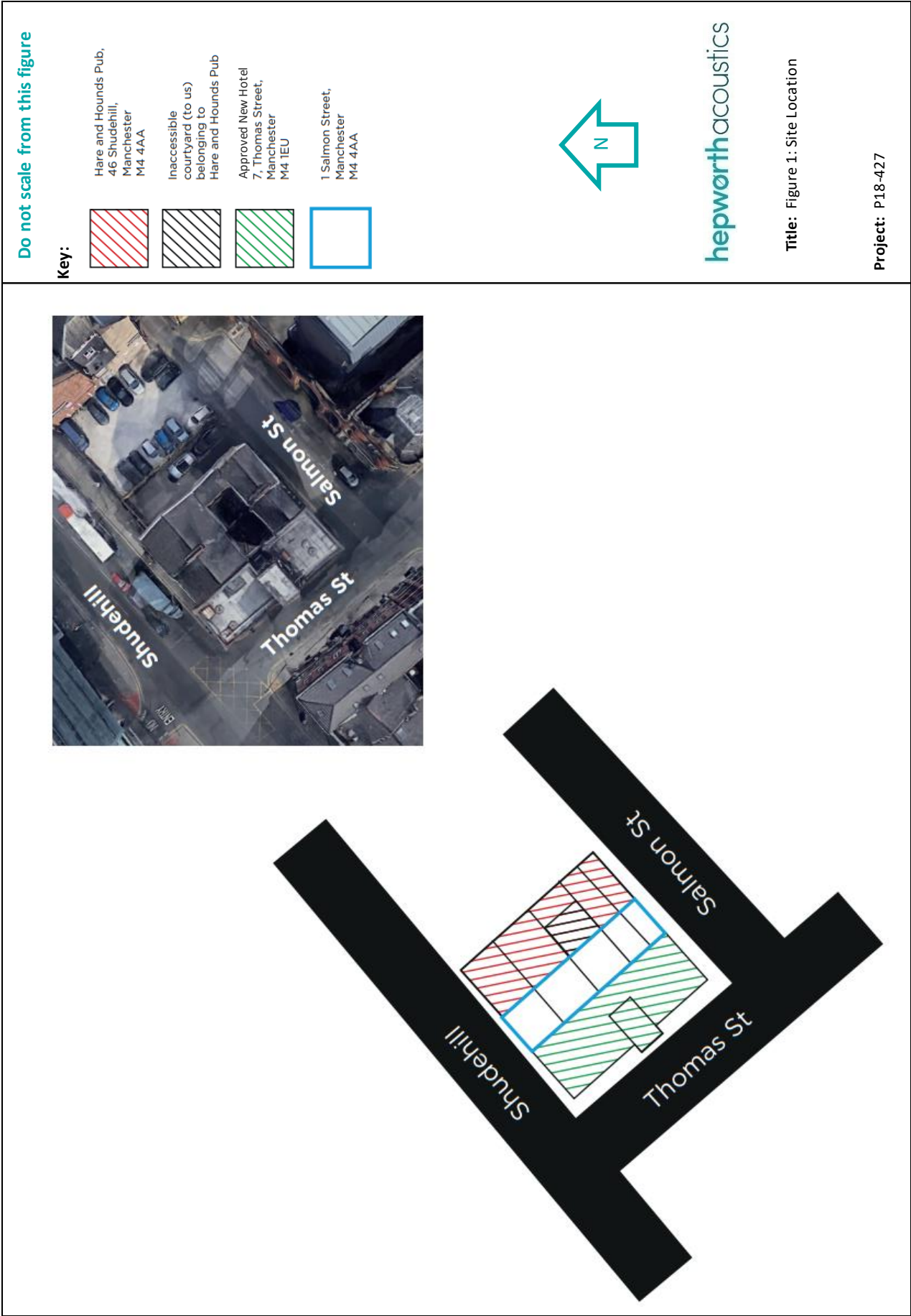
Table 10: Recommended Maximum Background Music Noise Levels (dB)

Description	Octave band centre frequency (Hz)								A
	63	125	250	500	1k	2k	4k	8k	
Maximum Music Noise Levels (Leq)	56	62	65	71	70	66	59	57	74

- 5.3 No low frequency loudspeakers (subwoofers and bass bins) should be installed in the bar.
- 5.4 Whilst trading noise break-out via the roof will be within the trading noise limits, there is no margin of safety. As such, we recommend that an enhanced ceiling construction is installed to improve the sound insulation of the roof and provide a safety margin. We recommend that the ceiling is formed of at least two layers of 12.5mm plasterboard (with joints staggered and well-sealed) fixed to the underside of the joists with at least 100mm mineral wool insulation (rather than rigid insulation) between the joists.
- 5.5 The windows of the bar should remain closed during trading hours.
- 5.6 Whilst the party wall construction is understood to be substantial and will provide a good level of sound insulation, we nevertheless recommend that it is made good, filling in any holes or gaps with mortar prior to finishing.
- 5.7 We understand that the client proposes to replace the first-floor window of the rear elevation, we recommend that the new window at least standard well-sealed double glazing formed of 4mm glass - (12-20) cavity - 4mm glass, with a minimum sound reduction performance of $25 R_w + C_{tr}$.
- 5.8 For the existing windows that are to be retained in the front elevations, we recommend that these are inspected and made good where necessary and any compromised seals are replaced to ensure optimal sound insulation performance.

6.0 SUMMARY AND CONCLUSION

- 6.1 Hepworth Acoustics Ltd was commissioned by Scott Martin to carry out a noise impact assessment in connection with a proposed planning application for a new bar at 1 Salmon Street, Manchester.
- 6.2 Appropriate noise criteria have been adopted to ensure the residential amenity of the nearest dwelling adjacent to the proposed bar development.
- 6.3 An automated noise survey was carried out over weekend and weekday periods to measure the prevailing noise climate in the area.
- 6.4 Appropriate cumulative noise limits for externally mount plant have been determined based on the noise survey data and Manchester City Council requirements.
- 6.5 Trading noise transmission via the party wall, via the front elevations, via the rear elevation and via the roof has been calculated and assessed in line with Manchester City Council guidance.
- 6.6 Appropriate noise mitigation recommendations have been made in order to ensure that any potential noise impact is minimised.
- 6.7 Our findings show that the proposed bar should not result in an unacceptable noise impact on the nearest dwellings.



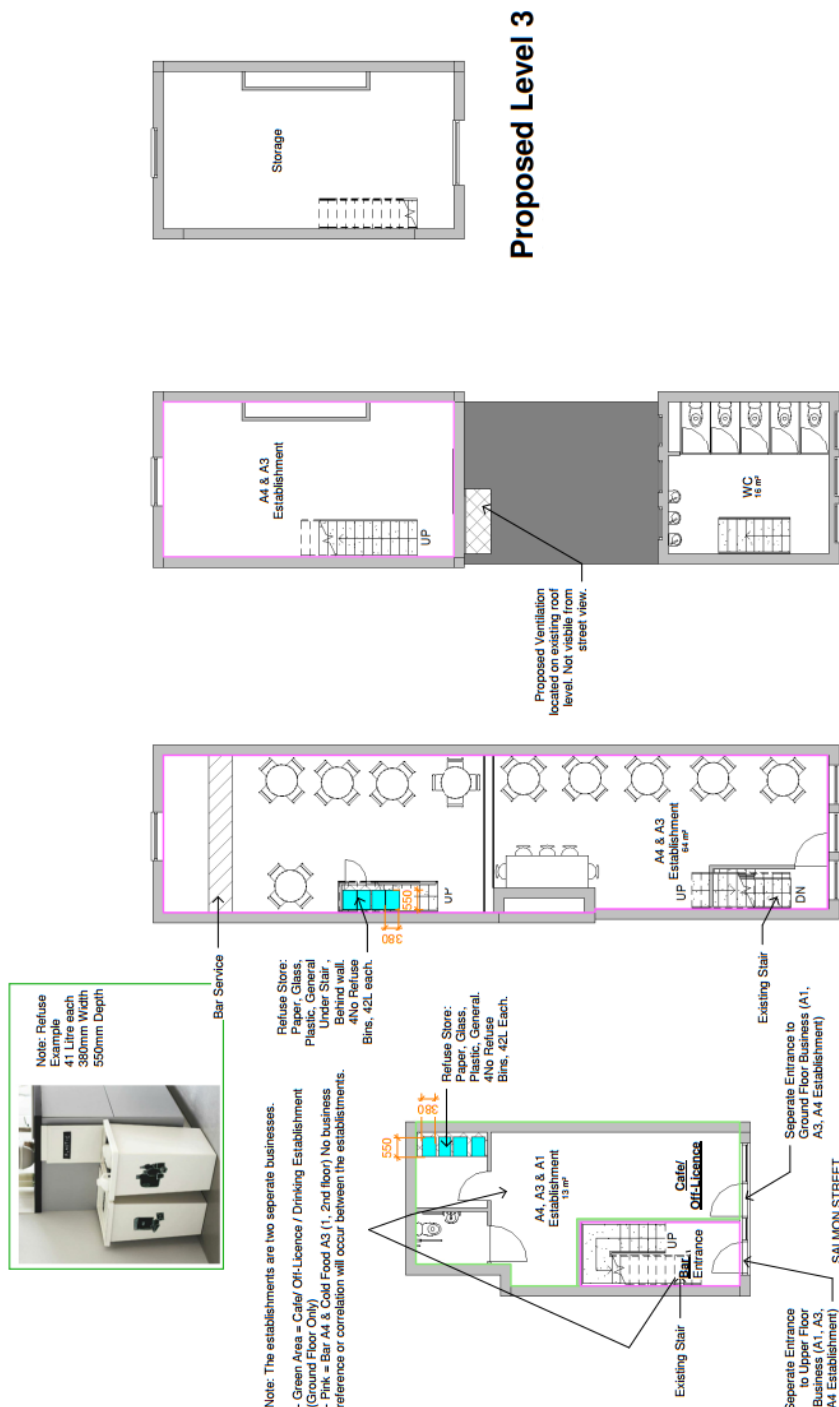
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hepworth acoustics

Title: Figure 2: Proposed Flor
Layouts

Project: P18-427



Proposed GF Plan

Proposed Level 1

Proposed Level 2

Appendix I: Noise Units & Indices

Sound and the decibel

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBA.

Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kiloHertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20 kHz. However, the upper frequency limit gradually reduces as a person gets older.

Glossary of Terms

When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices can be used. The indices used in this report are described below.

- R** This is the 'Sound Reduction Index' as measured in a laboratory, and is a measure of the sound insulation properties of an building element in a stated frequency band.
- R_w** This is the 'Weighted Sound Reduction Index' (L_w), and is a single figure quantity of R, the laboratory measured Sound Reduction Index.
- C_{tr}** This is an A-weighted urban traffic noise spectrum, which can be added to $D_{nT,w}$ or R_w in some standards to take into account different source spectra such as low frequency sound.
- L_{Aeq}** This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.
- L_{Amax}** This is the maximum A-weighted noise level that was recorded during the monitoring period.
- L_{A90}** This is the A-weighted noise level exceeded for 90% of the time period. L_{A90} is used as a measure of background noise.

Appendix II: Noise Survey Results

Date(s): Friday 18 to Tuesday 22 January 2019

Equipment: Rion NL-52 'Class/Type 1' sound level meter (S/N: 00242747) and Rion NL-31 'Class/Type 1' sound level meter (S/N: 01120845) with calibrator and environmental kits

Weather: Generally Dry with some light showers on Saturday afternoon, cool temperatures between 3-6°C with low winds <2m/s and moderate cloud coverage.

Please see noise survey results in the graphs overleaf.

