

Assessment of operational noise transmission from a proposed public house

Lowry House, 18-20 Fountain Street, Manchester



Client: Brewdog

Report Reference: 200208-R004

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0. SUMMARY

- 0.1. Manchester City Council has granted planning consent for the change of use and amalgamation of an existing restaurant/bar (Class A3/A4) and betting shop (Sui Generis) at 18-20 Fountain Street, Manchester, to form a public house (Class A4), subject to various conditions.
- 0.2. ACA Acoustics have been commissioned by Brewdog Retail Limited to assess the impact of operational noise emissions from the proposed bar. The assessment is required to demonstrate the development will comply with criteria set out in planning condition 5 of Decision Notice reference 125264/FO/2019. This report presents results of the assessment.
- 0.3. ACA Acoustics have identified the closest non-associated residential properties as being new flats currently being developed on Sickle Street, around 35-40m from the closest end of the proposed development and screened from the entrance doors by the building itself. Hotel bedrooms will overlook the new external ground floor seating area, however windows to the bedrooms are to be fixed closed, reducing the acoustic impact to these receptors.
- 0.4. A sound level survey was carried out over nominally a 24-hour period between 13th and 14th February 2020. Whilst on site, the author considered the sound climate during the daytime period to comprise primarily of traffic on nearby routes and construction activity on several building sites in the vicinity. At night, the acoustic climate comprised of traffic and pedestrian activity. The lowest measured LA90 sound level to 02:00 hours was 49dB.
- 0.5. A computer model has been set up to calculate sound emissions from inside the proposed ground floor bar to nearby residential properties. Sound levels due to operational noise, including music playing at background level inside the bar, would be below LAeq 25dB to outside the residential properties. Music sound levels would be at least 24dBA below the underlying background LA90 sound level and more than 10dB below the L90 sound level in each octave band at all times. This fully complies with Manchester City Council's planning requirement.
- 0.6. Sound insulation tests have been conducted on the existing separating floor between the ground floor bar and existing open-plan first-floor offices and the level of operational noise transmission from the proposed bar calculated. Calculated sound transmission between the ground floor bar and future first floor hotel bedrooms will be below LAeq 29dB and achieves the low frequency criteria included in condition 5. Sound levels in the hotel bedrooms will achieve an acceptable standard and will not be disturbing to future guests.
- 0.7. In conclusion, noise emissions from use of the proposed planning consent criteria and no further noise mitigation measures will be required. It is recommended that the City Council may approve the proposed scheme.

1. INTRODUCTION

Planning consent has been granted for the change of use and amalgamation of an existing restaurant/bar (Class A3/A4) and betting shop (Sui Generis) to form a public house (Class A4) at Lowry House, 20 Fountain Street, Manchester, subject to various conditions.

ACA Acoustics Limited has been commissioned by Brewdog to carry out an assessment of operational noise emissions from the proposed bar and, where necessary, make recommendation to reduce sound levels to ensure that the amenity of nearby noise-sensitive properties is not compromised.

This report presents results of sound level surveys, computer modelling, and assessment.

2. ACOUSTIC CRITERIA

Manchester City Council has granted consent for the development, subject to various conditions.

Condition 5 of Decision Notice 125264/FO/2019 relates to noise operational noise emissions from the public house:

5. The premises shall be acoustically insulated and treated to limit the break out of noise in accordance with a noise study of the premises and a scheme of acoustic treatment that has been submitted to and approved in writing by the City Council as local planning authority. The scheme shall be implemented in full before the use commences or as otherwise agreed in writing by the City Council as local planning authority. The assessment shall also include an assessment of break in to the existing adjoining uses within the building.

Where entertainment noise is proposed the LAeq (entertainment noise) shall be controlled to 10dB below the LA90 (without entertainment noise) in each octave band at the façade of the nearest noise sensitive location, and internal noise levels at structurally adjoined properties in the 63Hz and 125Hz octave frequency bands shall be controlled so as not to exceed (in habitable rooms) 47dB and 41dB, respectively.

Upon completion of the development a verification report will be required to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic consultant's report. The report shall also undertake post completion testing to confirm that acceptable criteria has been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria.

3. SOUND LEVEL SURVEY

Details of the sound level survey carried out by ACA Acoustics are provided below.

An unattended sound level survey was carried out using a single measurement position at roof level of the site, considered to likely provide a similar indication of the acoustic climate at the closest residential properties on Sickie Street.

The survey was conducted between 13th and 14th February 2020. The weather during the survey was primarily cold and dry and would not have adversely impacted the sound level survey results.

The author returned to the site at around midnight to take subjective observations of the acoustic climate at that time. Subjectively noise sources were noted to comprise primarily of traffic and pedestrian activity, which remained relatively high into the late evening/night-time period. There were some non-associated mechanical equipment items which were audible, particularly further down the street away from the site.

The following equipment was used during the survey; the sound level meter was calibrated before the survey and checked after with no deviation noted.

Equipment	Serial Number
NTi Audio Class 1 sound level meter type XL2, complete with weatherproof and lockable outdoor environmental kit	A2A-06294-E0
Svantek calibrator type SV33B. Compliant to IEC 60942-1:2003 (Calibrated to a reference traceable to NIST)	83826

Table 1: Equipment used

Measurement results are shown in Table 2 and Figure 1 below.

Assessment Period	Residual Sound Level LAeq, dB	Background Sound Level LA90, dB
Daytime – 07:00 to 23:00	63dB	50dB
Evening – 19:00 to 23:00	54dB	50dB
Night – 23:00 to 07:00	54dB	48dB
Daytime – 08:00 to 19:00	65dB	52dB
Night – 23:00 to 02:00	53dB	49dB

Table 2: Summary of sound level survey results

There is no significant reduction of sound levels later into the night-time period and measured sound levels remain relatively consistent throughout the evening and night.

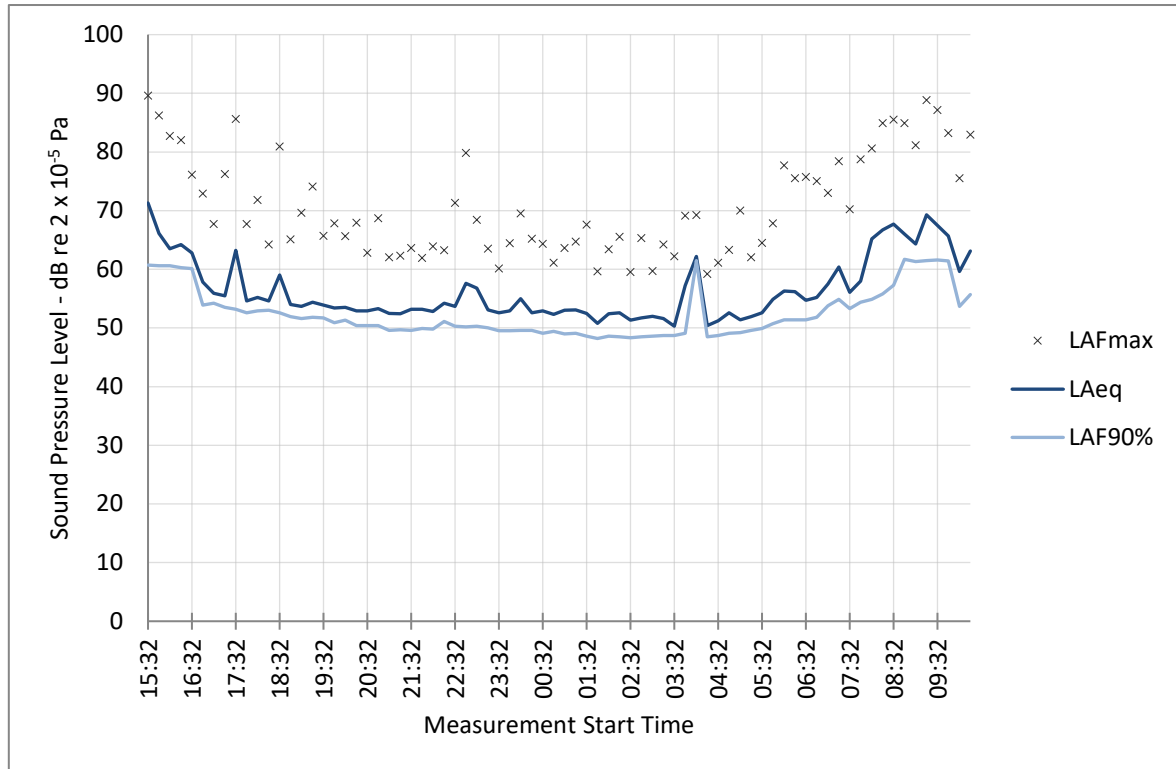


Figure 1: Sound level survey results – 13th to 14th February 2020

The lowest measured L90 values in octave band frequencies over the operating times of the bar are shown in Table 3.

63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
53	50	47	45	44	40	32	21

Table 3: Lowest measured L90 octave band spectra

4. MUSIC NOISE EMISSIONS FROM THE GROUND FLOOR BAR

ACA Acoustics has previously undertaken sound level measurements within an existing Brewdog bar. The style of venue proposed will have music playing at background levels and the dominant source is from patrons talking and laughing. Typical sound levels within the bar on a busy weekend evening will not regularly exceed a level of $LA_{eq, 5-min}$ 83dB. Sound levels measured within an existing Brewdog bar during a typical weekday daytime are around $LA_{eq, 5-min}$ 70-75dB.

Note that these values include significant contribution from patrons and the music sound levels will be consequently lower. To provide a robust assessment at design stage it has been assumed that the music will be set at these levels and the higher weekend evening sound level has been used as the source sound level. Actual music volumes will be lower, providing additional safety within the design.

Allowing for doors to the bar to be open on a busy weekend evening, sound emissions from the bar to outside will be less than 73dBA at 3m from the doors.

A computer model has been set up to calculate sound emissions from the bar to outside the closest noise-sensitive properties. The model is based on the environmental propagation calculation method of ISO 9613-2:1996 and takes account of the radiating source sound power level from the bar allowing for doors to be open, distance of around 50m between the open doors and closest noise sensitive residential windows, acoustic reflections, and acoustic screening provided by the development site and other intervening buildings.

Print-out from the calculation model is included in Appendix A. Summary results are shown in Table 4.

Description	Calculated Sound Level – LAeq	Criteria
Music playing at background level during a busy weekend evening (LAeq <83dB internally within the bar calculated to outside closest noise-sensitive properties)	25dB	≤39dB

Table 4: Summary of music noise emissions to outside residential receptors

As shown in Appendix A, music noise emissions are more than 10dB below the measured background sound level in each octave frequency band and comfortably comply with Manchester City Council’s planning requirements.

It is recommended that a music volume limiter is fitted into the sound system, or a modern music system controller is utilised, allowing a maximum permissible music volume to be set. This would ensure staff cannot override the system and play music at higher volume. ACA Acoustics’ assessment has been undertaken using levels not exceeding LAeq 83dB in the centre of the bar, however the maximum level may be set through measuring sound levels on site and to outside the closest noise-sensitive receptors.

5. SOUND INSULATION TEST OF EXISTING STRUCTURE

Sound insulation tests have been carried out on the existing separating structure between the ground floor bar and existing first-floor open plan office.

Sound insulation tests were carried out generally in accordance with procedures set out in BS EN ISO 16283-1:2014 *Acoustics – Field measurement of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation* by Rob Cant of ACA Acoustics Limited on 16th July 2020.

Results of the measured normalized level difference, in terms of weighted single-figure values, are shown in Table 5 below.

Source Room	Receiving Room	Level Difference DnT,w
Ground Floor	First Floor Open Plan Office	58dB

Table 5: Airborne sound insulation test results

Full results in terms of one-third octave band values are provided in tabular and graphical form in Appendix B.

Subjectively the author considers the existing structure provides a particularly good standard of sound insulation from the ground floor to the first floor above.

6. SOUND TRANSMISSION FROM GROUND FLOOR BAR TO HOTEL BEDROOMS

Sound transmission from the ground floor bar to the adjoining first-floor hotel bedrooms has been calculated using the source sound levels discussed in Section 4 and the measured sound insulation performance.

Calculated sound levels in the hotel bedrooms due to noise transmission from the ground floor bar on a busy weekend evening are shown below.

Receptor Location	Calculated Operational Noise			Criteria
	L _{Aeq} , 5 min	63Hz	125Hz	
First-floor hotel bedrooms	29dB	38dB	33dB	30dBA 63Hz – 47dB 125H – 41dB

Table 6: Calculated sound transmission from ground floor bar to first floor hotel bedrooms

As discussed in Section 4 it is recommended that a music volume limiter is fitted into the sound system, or a modern music system controller is utilised, allowing a maximum permissible music volume to be set. ACA Acoustics' assessment has been undertaken using levels not exceeding LAeq 83dB in the centre of the bar for the background music, with limited bass content, however the maximum level may be set through measuring sound levels on site to inside the first-floor hotel bedrooms.

Loudspeakers should be installed on side walls rather than being hung from the separating floor/ceiling. Supports should incorporate rubber or neoprene vibration isolators to control any potential for structure-borne sound transmission from the speakers to adjoining bedrooms.

Calculated sound levels inside the hotel bedrooms due to operational noise emissions from the ground floor bar will not be detrimental to the amenity of future guests and no further noise control measures are necessary.

7. CONCLUSION

Planning consent has been granted for the change of use of the site to form a new public house, subject to various conditions.

ACA Acoustics have undertaken sound level surveys in the vicinity and sound insulation tests on the existing building structure.

Computer models have been set up to calculate music and operational noise emissions to the closest noise sensitive residential receptors. Sound transmission from the bar has been calculated to adjoining hotel bedrooms.

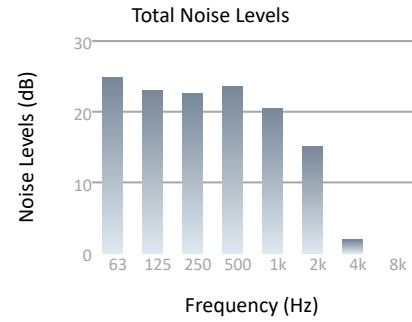
Calculated sound emissions are low and comply with criteria contained within planning condition 5.

It is the author's opinion that the acoustic impact of the proposed development will be low. It is recommended that no further mitigation measures would be required and that the scheme may be approved by the City Council.

Appendix A

Acoustic Calculations of Music Emissions from the Ground Floor Bar

Project Name	Brewdog, Lowry House, Manchester
Project Reference	200208
Reference	Residential Flats - Music
Description	Flats being developed on Sickle Street
Noise Limit	39
dBA	25



Noise Sources

Reference	Quantity	Noise Levels (dB)							
		63	125	250	500	1k	2k	4k	8k
Radiating Lw with Open Doors	1	25	23	23	24	20	15	2	-

Calculation Sheet

Radiating Lw with Open Doors to Residential Flats - Music

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - Radiating Lw with Open Doors								
Sound Power Levels	87.0	88.0	88.0	89.0	86.0	81.0	69.0	-
Noise Control Treatments								
Treatment - None								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
Dc - Directivity								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
Adiv - Geometrical Divergence								
	-45.4	-45.4	-45.4	-45.4	-45.4	-45.4	-45.4	-
Aatm - Atmospheric Absorption								
	0.0	0.0	-0.1	-0.1	-0.2	-0.5	-1.7	-
Agr - Ground Attenuation								
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	-
Abar - Barrier Attenuation								
	-19.7	-22.6	-23.0	-23.0	-23.0	-23.0	-23.0	-
External Receiver								
External Receiver - Residential Flats - Music								
Sound Pressure, Lp:	24.9	23.0	22.6	23.5	20.4	15.1	1.9	-

Appendix B

Sound Insulation Test Results

Standardized level difference according to ISO 140-4

Field measurement of airborne sound insulation between rooms

Project Name Brewdog, Lowry House, Manchester
Project Reference 200208

Client Brewdog
Test Date 16/07/2020

200208-SI-AF02

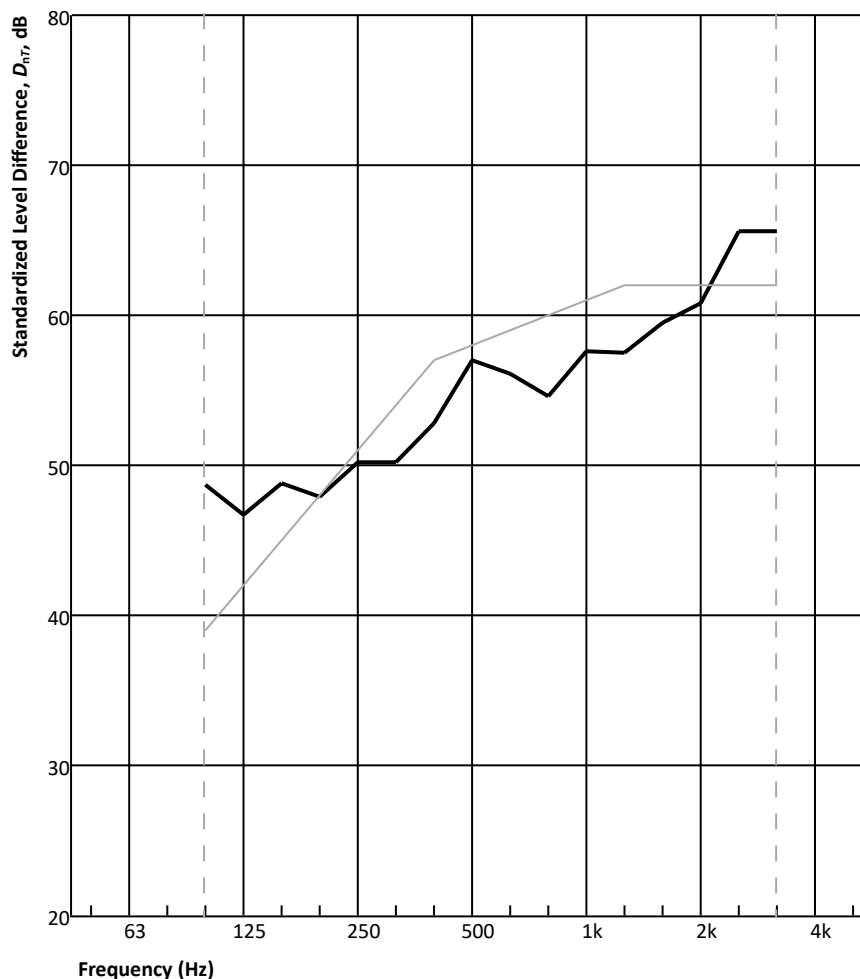
Test on Floor between Ground Floor, Bar and Level 1, Open Plan

Description and identification of the building construction:

Source Room Volume (m³) -
Receive Room Volume (m³) -

--- Frequency range according to the
 — Curve of reference values (ISO 717-1)

	D_{nT} (one-third octave) dB
50	-
63	-
80	-
100	48.7
125	46.7
160	48.8
200	47.9
250	50.2
315	50.2
400	52.8
500	57.0
630	≥ 56.1
800	≥ 54.6
1k	≥ 57.6
1,25k	≥ 57.5
1,6k	≥ 59.5
2k	≥ 60.8
2,5k	≥ 65.6
3,15k	≥ 65.6
4k	-
5k	-



Rating according to ISO 717-1

$D_{nT,w} (C; C_{tr}) = 58 (-1; -3) \text{ dB};$

$C_{50-3150} = - \text{ dB}; C_{50-5000} = - \text{ dB}; C_{100-5000} = 0 \text{ dB}$

Evaluation based on field measurement

$C_{tr, 50-3150} = - \text{ dB}; C_{tr, 50-5000} = - \text{ dB}; C_{tr, 100-5000} = -3 \text{ dB}$

results obtained by an engineering method

Date: 07/08/2020

Name of Test Institute: ACA Acoustics Limited

Report Reference: 200208 R1

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