



Blackfriars House, Manchester

Planning Condition 9 - Verification Noise Survey

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23025-R01-JT- Blackfriars House

Client: Bruntwood

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REVISION HISTORY

Revision	Date	Revision Details	Author	Checked
R01	08/03/2023	Original Issue	 Joseph Tony (Mar 8, 2023 15:24 GMT) Joseph Tony BTech MIOA	 Susan Witterick BSc MIOA

1 INTRODUCTION

- 1.1 dBx Acoustics Ltd has been appointed by Bruntwood Ltd to undertake a verification survey of the entertainment noise from the rooftop restaurant, 'Climat', at Blackfriars House, Blackfriars Road, Manchester M3 2JA.
- 1.2 Planning Condition 9 Part B requires that upon completion of the scheme, a verification report shall be provided to confirm that the recommendations within dBx Acoustics' report reference *18087 Blackfriars House R01C* dated 8th October 2019.
- 1.3 This report therefore presents the results of activity noise measurements of the rooftop restaurant, and to assess the impact of activity noise on the nearby noise sensitive receptors with reference to the assessment submitted in support of planning.

2 BASIS OF ASSESSMENT

Manchester City Council

2.1 The noise impact assessment within this report is intended to satisfy Part B of Condition 9 of planning permission reference 21979/FO/2018.

2.2 'Condition 9' of the planning permission states:

9) a) 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.

Where entertainment noise is proposed the L_{Aeq} (entertainment noise) shall be controlled to 10dB below the L_{A90} (without entertainment noise) in each octave band at the facade of the nearest noise sensitive location, and internal noise levels at structurally adjoined residential properties in the 63Hz and 125Hz octave frequency bands shall be controlled so as not to exceed (in habitable rooms) 47dB and 41dB, respectively.

In order to achieve this the scheme hereby approved shall be implemented in accordance with the recommendations in the response from the applicant to EHO queries received 23rd August 2019 and the submitted dBx Noise Impact Assessment received 9th October 2019.

b) 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.

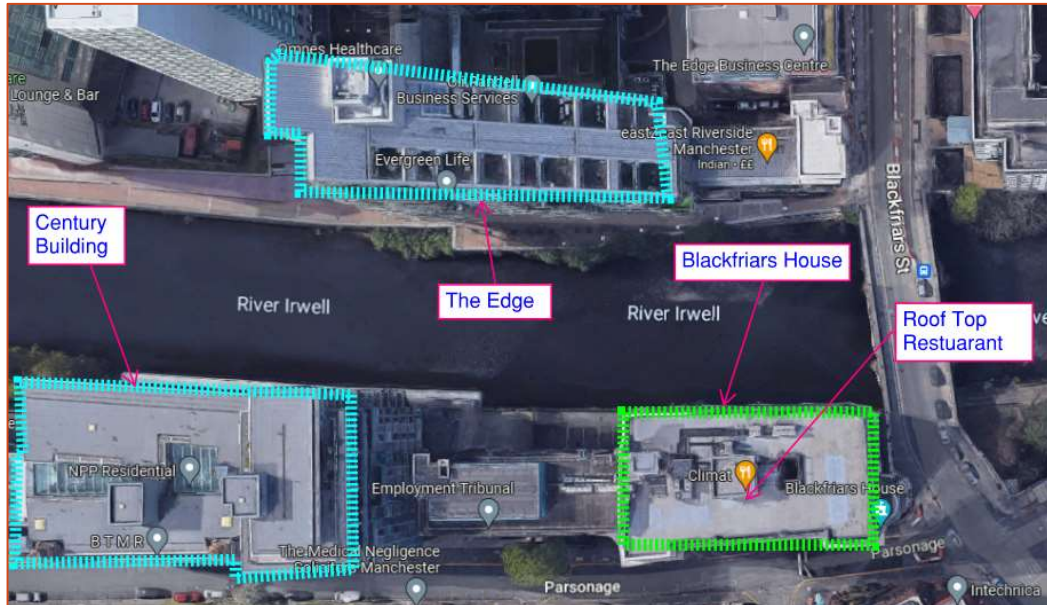
Reason - To safeguard the amenities of the occupiers of nearby residential accommodation, pursuant to policies SP1 and DM1 of the Core Strategy.

2.3 The dBx Acoustics report referenced in Part A of this condition is report reference 18087 Blackfriars House R01C dated 8th October 2019.

3 SITE DESCRIPTION

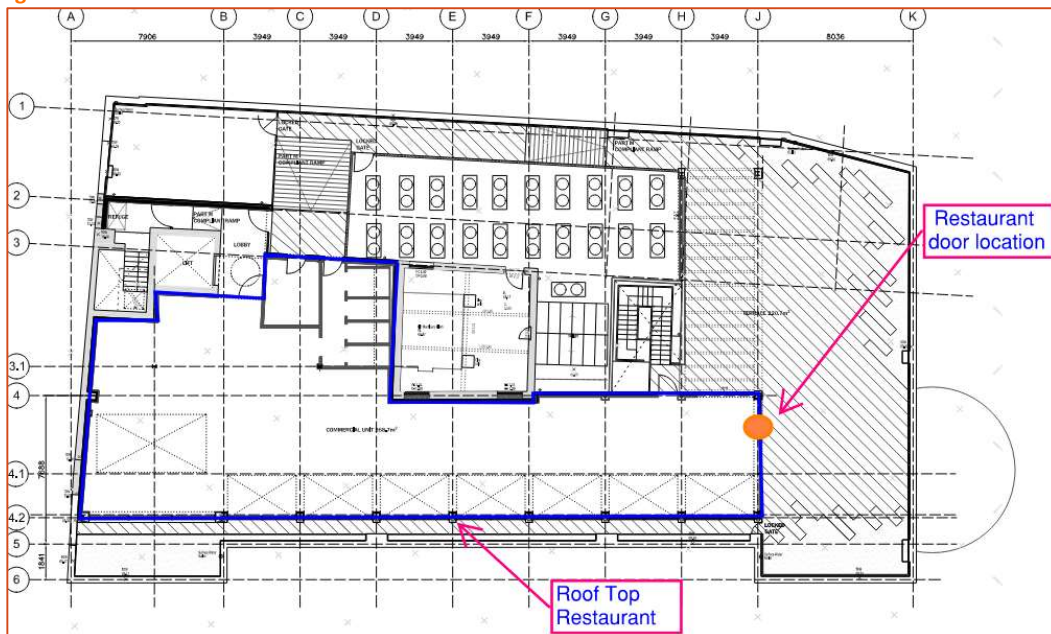
- 3.1 Blackfriars House is a multi-storey development comprising office units. There is a rooftop restaurant, 'Climat', with external terrace area.
- 3.2 The building is bounded by Parsonage Street to the south and Blackfriars Street to the east. The River Irwell lies immediately to the north.

Figure 1: Location Plan Showing Site and Noise Sensitive Receptors



- 3.3 Figure 2 below shows the Blackfriars House roof layout.

Figure 2 : Roof Location



Noise Sensitive Receptors (NSRs)

- 3.4 The nearest noise sensitive receptors identified to the site are residential properties (dwellings located at 'The Edge') approximately 40m to the north of the site boundary on the far side of the River Irwell, and Century Buildings, on Parsonage Gardens approximately 50m to the west of the site boundary.
- 3.5 The restaurant is fully enclosed but has a door to the external terrace as indicated on Figure 2. The door represents the acoustically weakest area in the envelope of the restaurant.
- 3.6 The Edge is therefore considered to be the noise sensitive receptor potentially most affected by activity noise from the restaurant, as Century Buildings are fully acoustically screened from this area by the intervening construction.

4 NOISE SURVEY

Methodology

- 4.1 A noise survey was carried out at the site on Friday 3rd March 2023 from 19:00h onwards. This was intended to capture a typical 'busy' period of activity within the restaurant, and the majority of tables were in use during the measurements. The data captured can therefore be considered representative of noise generation within the restaurant during a busy period.
- 4.2 Measurements were taken inside the restaurant, and at various locations on the roof with the restaurant door both open and closed.
- 4.3 The noise monitoring locations are presented in Figure 3 below.

Figure 3: Noise Monitoring Locations



Table 1 : Noise Monitoring Locations

Monitoring Positions (Figure 3)	Description	Observations and Predominant Noise Sources
A (Inside the Restaurant)	Measurements undertaken inside the restaurant to understand the activity noise levels	Contributory noise from background music, conversation by occupants and typical restaurant activities.
B (North East of the roof)	Measurements at north-east of the roof, approximately 10m from the restaurant door.	Noise climate dominated by noise from building services plant serving the surrounding buildings. Contributory noise from building services plant serving the Blackfriars building and road traffic noise from all local roads.
C (North West of the roof)	Measurements at north-west of the roof, measurement location considered closest and representative to the sensitive receptor, 'The Edge'.	Dominated by noise from nearby fixed plant items at surrounding developments. Contributory noise from building services plant serving the Blackfriars building and road traffic noise from all local roads.

Weather Conditions

- 4.4 Weather conditions during the measurement period was generally cloudy and dry. Wind speeds were within suitable parameters for the measurement of environmental noise (i.e., generally under 5 ms^{-1}). All microphones were protected with a windshield for the duration of the survey. Temperatures varied between 5°C and 6°C throughout the measurement period.

Equipment

- 4.5 The equipment used in the survey is detailed in Table 2, below;

Table 2: Equipment Used in the Survey

Equipment	Manufacturer & Part No.	Serial Number
Sound Level Meter	Norsonic - Nor 140	1403443
Pre-Amp	Norsonic -1209	2967
Microphone	Norsonic -1225	18437
Calibrator	B&K 4231	1821323

- 4.6 The sound level meter was 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, except for the calibrator, which had been calibrated not more than one year prior to the survey.

5 NOISE SURVEY RESULTS

- 5.1 A summary of the noise measurements undertaken at various locations is presented in Table 3, below;

Table 3 : Measured Noise Levels

Location (Figure 2)	Time	Duration (minutes)	Ambient Noise Level (dBL _{Aeq,T})
Loc A – Combination of swept and fixed measurements made inside the restaurant	19:15h	10:00	75
	19:26h	04:00	77
Loc B – North East of the roof with restaurant door to roof partially open	19:35h	02:00	51
Loc B – North East of the roof with restaurant door to roof fully closed	19:42h	02:00	52
	19:44h	02:00	53
Loc C – North West of the roof with restaurant door to roof partially open	19:38h	02:00	53
	19:40h	02:00	53
Loc C – North West of the roof with restaurant door to roof fully closed	19:49h	02:00	54
	19:51h	02:00	53

- 5.2 The measurement undertaken at Location A during 19:15h was fixed microphone location. This location is considered to be representative of restaurant activity noise from the seating area and bar counter area.
- 5.3 The measurement undertaken at Location A during 19:26h was a swept measurement throughout the restaurant. This location is considered to be a worst-case location for measuring restaurant activity noise as it covers the whole restaurant area.

Noise Climate

- 5.4 The noise levels measured at the external roof terrace area (Location B and Location C) was dominated by the noise from building services plant serving the surrounding buildings with contributions from building services plant serving Blackfriars House and road traffic noise from local roads. Activity noise from the restaurant was inaudible externally to the restaurant at all times during the measurement period.

6 ACTIVITY NOISE IMPACT ASSESSMENT

- 6.1 Planning Condition 9 detailed within planning application 21979/FO/2018 requires that entertainment noise (L_{Aeq}) shall be controlled to 10dB below the L_{A90} (without entertainment noise) in each octave band at the facade of the nearest noise sensitive location.
- 6.2 Therefore, the restaurant activity noise impact is undertaken at the nearest noise sensitive residential properties (dwellings located at the Edge) approximately 50m to the north of the restaurant.
- 6.3 As discussed in dBx Acoustics' report reference *18087 Blackfriars House R01C* dated 8th October 2019, this assessment has been undertaken with reference to the measured lowest background sound level (without entertainment noise) during the 2019 noise survey, as presented in Table 4 below.
- 6.4 The measurement data presented on the report (*Report Ref; 18087 Blackfriars House R01C*) is understood to be consistent throughout the survey period with little variation between background noise levels during the day and night time periods.
- 6.5 Based on the above, the background noise levels presented in Table 4 are considered representative of typical lowest background sound level at the nearest noise sensitive residential properties during the restaurant operational hours.

Table 4 : Lowest Measured Background Sound Level Spectrum (Without Entertainment Noise)

Description	Noise Level in Octave Band Centre Frequency, Hz							
	63	125	250	500	1000	2000	4000	dBA
Lowest Background, dBL_{90}	55	50	47	45	43	38	30	48

- 6.6 The Edge is considered to be the NSR potentially most affected by the activity noise as discussed above.
- 6.7 The restaurant indoor activity noise level assumed in the noise break-out calculation undertaken during the planning submission stage was $84dBL_{Aeq, T}$.
- 6.8 The actual noise level measured during a typical 'busy' period of activity within the "Climat" restaurant was $77dBL_{Aeq, T}$. This is 7dB lower than was assumed in the planning noise impact assessment.
- 6.9 Based on the above, the activity noise break-out calculation from restaurant has been updated with the measured restaurant activity noise levels as presented in Table 5 below.

Table 5 : Restaurant (Door Open) to The Edge

Description	Noise Level in Octave Band Centre Frequency, Hz							
	63	125	250	500	1000	2000	4000	dBA
Restaurant Activity Noise Level (Measured), dBL_{eq}	71	75	73	75	72	68	63	77
Loss via open door	-5	-5	-5	-5	-5	-5	-5	-5
Screening attenuation (typical)	-10	-10	-10	-10	-10	-10	-10	-10
Distance correction (50m) (20*log(1/50))	-34	-34	-34	-34	-34	-34	-34	-34
Resultant SPL at The Edge from restaurant, dBL_{eq}	22	26	24	26	24	20	14	28
Lowest measured BG, dBL₉₀	55	50	47	45	43	38	30	48
Exceedance	-33	-24	-23	-19	-19	-18	-16	-20

- 6.10 The above calculation demonstrates that the noise impact with lively activity in the restaurant with the door open, based on a 'worst case' for noise generation, is compliant with MCC criteria for entertainment noise to be at least 10dB below background in all octave bands at the nearest noise sensitive receptor.
- 6.11 A review of the data in Table 2 indicates that there no significant variation in the measured noise levels at the roof edge between the 'restaurant door closed' and 'restaurant door open' conditions. This therefore further demonstrates that the restaurant activity noise level is at least 10dB below the measured ambient noise level.
- 6.12 Activity noise break-out from the restaurant was found to be immeasurable and inaudible at the roof edge, providing a positive indication that the consented restaurant can co-exist with existing residential properties, without the need for any noise mitigation measures needing to be introduced.
- 6.13 It can be therefore concluded that at the nearest noise sensitive receptors, activity noise break-out from restaurant is comfortably within the limits required by MCC and therefore compliance with Condition 9 is demonstrated.

7 CONCLUSIONS

- 7.1 dBx Acoustics has been appointed by Bruntwood to carry out a verification noise survey of noise emissions associated with the rooftop restaurant, 'Climat', at Blackfriars House, Blackfriars Road, Manchester M3 2JA.
- 7.2 A noise survey was carried out on Friday 3rd March 2023 from 19:00h onwards. This was intended to capture a typical 'busy' period of activity within the restaurant, and the majority of tables were occupied during the measurements.
- 7.3 The activity noise break-out from the restaurant was found to be immeasurable and inaudible at the roof edge. This therefore indicates that the restaurant activity noise level is at least 10dB below the measured ambient noise level.
- 7.4 A noise break-out calculation is presented based on the measured indoor activity noise levels, which indicates that the noise generation from restaurant is likely to be at least significantly below the background sound level at the receptors, and is compliant with MCC criteria for entertainment noise
- 7.5 Measurements made at the roof edge further demonstrate that activity noise from the rooftop restaurant has no effect on the ambient noise levels. Noise from the restaurant was subjectively inaudible to the surveyor at these locations.
- 7.6 Therefore, compliance with Condition 9 of planning permission reference 21979/FO/2018 is demonstrably achieved.

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).
$D_{n,F,w}$	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.
$D_{n,e,w}$	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_w, 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.

This report (including any enclosures and attachments) has been prepared by dBx Acoustics with reasonable skill and care in accordance with generally accepted acoustic principles and the terms agreed between dBx Acoustics and our Client. Any information provided by third parties and referred to herein may not have been checked or verified by dBx Acoustics unless expressly stated otherwise. This document contains confidential information, and no part of this report should be reproduced, distributed or communicated to any third party without express prior written consent from dBx Acoustics. We do not accept any liability if this report is used for an alternative purpose from that for which it is intended, nor to any third party in respect of this report. Where a noise survey has been undertaken, this report is based on the noise climate at the site at the time of the survey and no warranty is given as to the possibility of changes at differing times.

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Final Audit Report

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