



Blackfriars House, Manchester

Noise Impact Assessment

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Client: Dragonfly Contracts Ltd
Date: 20/05/2022

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REVISION HISTORY

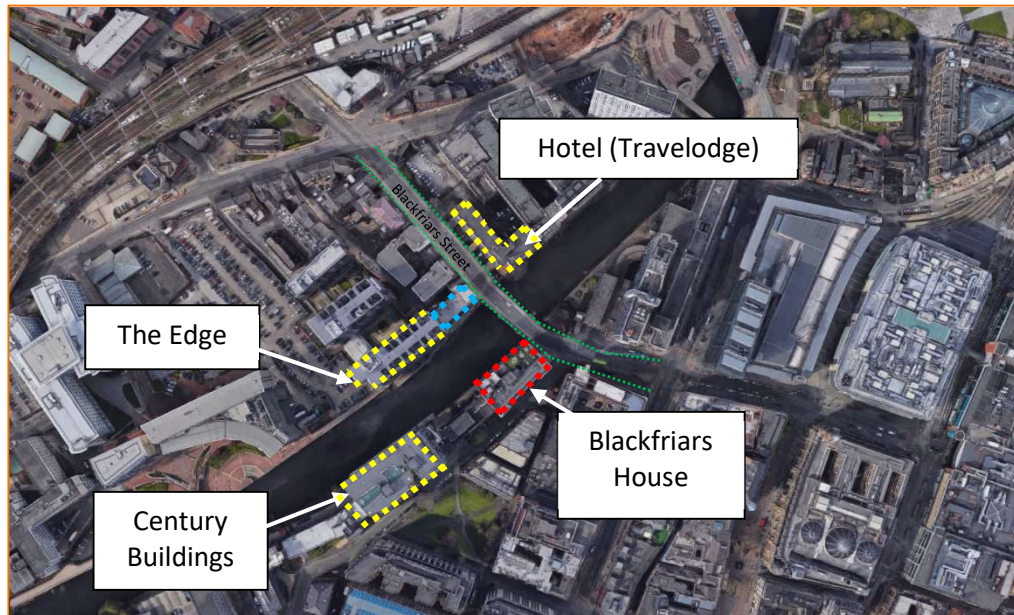
Revision	Date	Revision Details	Author	Checked
R01	20/05/2022	Original Issue	 Angela Lamacraft MSc IEng MIOA	 Susan Witterick BSc MIOA

1 INTRODUCTION

Background

- 1.1 dBx Acoustics Ltd has been instructed by Dragonfly Contracts Ltd to update the plant noise impact assessment for roof plant at Blackfriars House, Blackfriars Road, Manchester M3 2JA, to consider changes to the equipment specification. Figure 1 provides the site location.

Figure 1: Site Location



- 1.2 Planning permission reference 21979/FO/2018 for change of use from office (use class B1) to cafe (use class A3) was approved by Manchester City Council (MCC) on 28th January 2019.
- 1.3 Condition 7 of the planning permission states:

"7) a) Any externally mounted ancillary plant, equipment and servicing for the building 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.

In order to achieve this the scheme hereby approved shall be implemented in accordance with the recommendations in the submitted dBx Noise Impact Assessment received 9th October 2019.

b) Upon completion of the development and before any of the external plant is first operational (excluding for testing purposes), a verification report will be required to validate that the work undertaken confirms to the above noise criteria. The report shall give the results of post-completion testing to confirm that the proposed noise limits are being achieved once the plant and any mitigation measures have been installed. Any instances of non-conformity with the above criteria shall be detailed along with any measures required to ensure compliance. These measures shall be approved in writing by the City Council as Local Planning Authority and the development shall be implemented in full in accordance with the approved details before the plant is first brought into use.

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

1.4 Condition 8 of the planning permission states:

"8) a) Notwithstanding the provisions of Condition 7, prior to occupation of the development a scheme for the acoustic insulation of any externally mounted ancillary equipment associated with the Rooftop Restaurant and Ground Floor Café (A3 uses) to ensure that it achieves a background noise level of 5dB below the existing background (La90) at the nearest noise sensitive location shall be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the equipment. The approved scheme shall be completed before the premises is occupied.

b) Upon completion of the development and before any of the external plant is first operational (excluding for testing purposes), a verification report will be required to validate that the work undertaken confirms to the above noise criteria. The report shall give the results of post-completion testing to confirm that the proposed noise limits are being achieved once the plant and any mitigation measures have been installed. Any instances of non-conformity with the above criteria shall be detailed along with any measures required to ensure compliance. These measures shall be approved in writing by the City Council as Local Planning Authority and the development shall be implemented in full in accordance with the approved details before the plant is first brought into use.

Reason - To secure a reduction in noise from equipment associated with the proposed uses in order to protect future occupiers and adjacent residents from noise nuisance, and ensure the proposed uses do not commence before the noise levels of the proposed plant has been assessed and approved pursuant to policies SP1 and DM1 of the Core Strategy and saved UDP Policy DC26."

1.5 This updated Noise Impact Assessment has been prepared to allow Part a) of Conditions 7 and 8 to be discharged.

Previous Noise Assessment

- 1.6 dBx Acoustics issued a Noise Impact Assessment on 8th October 2019 (reference: 18087 Blackfriars House R01C). The assessment considered 16 no. Mitsubishi PURY-P550YSNW-A R2 units screened using a Caice single bank acoustic louvre.
- 1.7 The noise sensitive receptors (NSR) most affected by plant noise were demonstrated to be the dwellings located at The Edge, located approximately 40 m to the northwest of the site.
- 1.8 A BS 4142 assessment concluded that the plant rating noise level was significantly more than 5 dB below the lowest measured night-time background sound level, therefore no adverse noise impact was anticipated due to plant operation, and the requirements of MCC with regard to plant noise emissions were met.

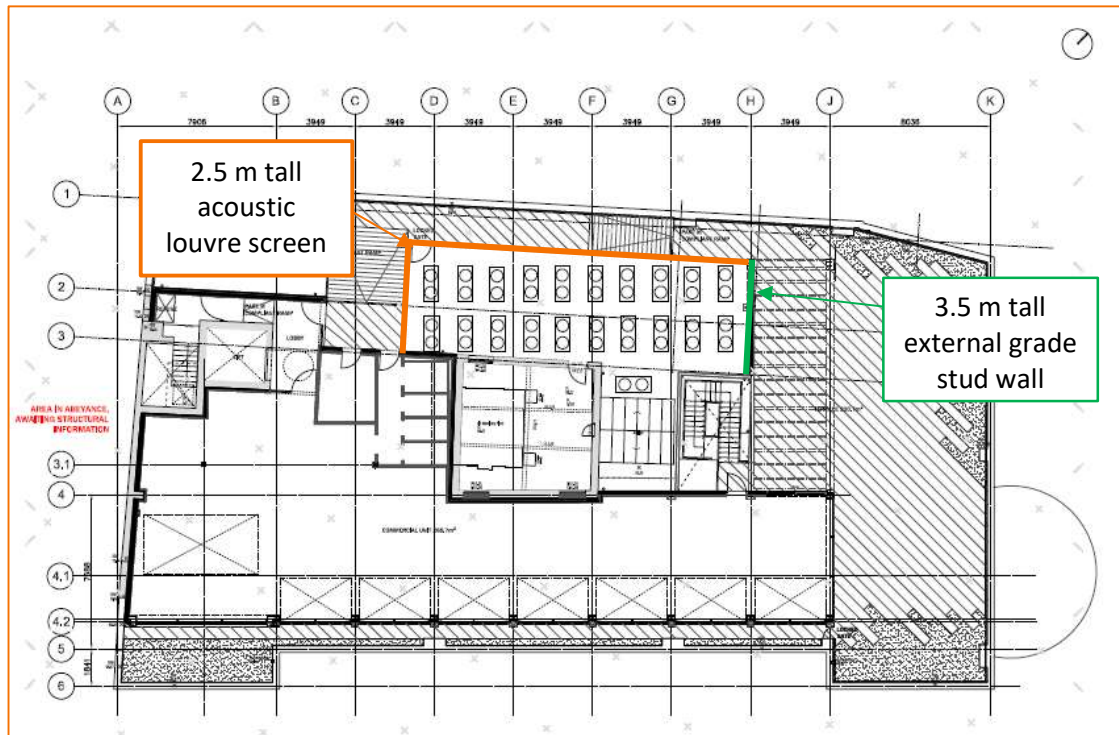
Installed Plant

- 1.9 The following plant items are understood to have been installed at Blackfriars House :

- Building services plant:
 - 14 no. Mitsubishi PURY-P550YSNW-A;
 - 1 no. Panasonic VRV unit U-10ME1E81;
 - 1 no. Panasonic VRV unit U-20ME1E81; and
 - 3 no. Mitsubishi PUHZ-ZRP35VKA.
- Rooftop Restaurant and Ground Floor Café plant:
 - 1 no. Mitsubishi PURY-P400YNW-A.

- 1.10 Figure 2 provides the roof layout indicating the plant location.

Figure 2: Roof Layout



- 1.11 A Caice single bank acoustic louvre screen has been constructed in the position illustrated on Figure 2. The performance of the louvre screen is provided in Table 1.

Table 1: Sound Reduction of the Caice Single Bank Louvre Screen

Sound Reduction Index (dB R) in Octave Band Centre Frequency (Hz)								Weighted Sound Reduction Index (R _w)
63	125	250	500	1000	2000	4000	8000	
6	6	9	13	21	20	16	13	17

2 ACOUSTIC DESIGN CRITERIA

Manchester City Council

- 2.1 The MCC requirement for plant noise within the planning conditions is 5 dB below the existing background sound level.

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

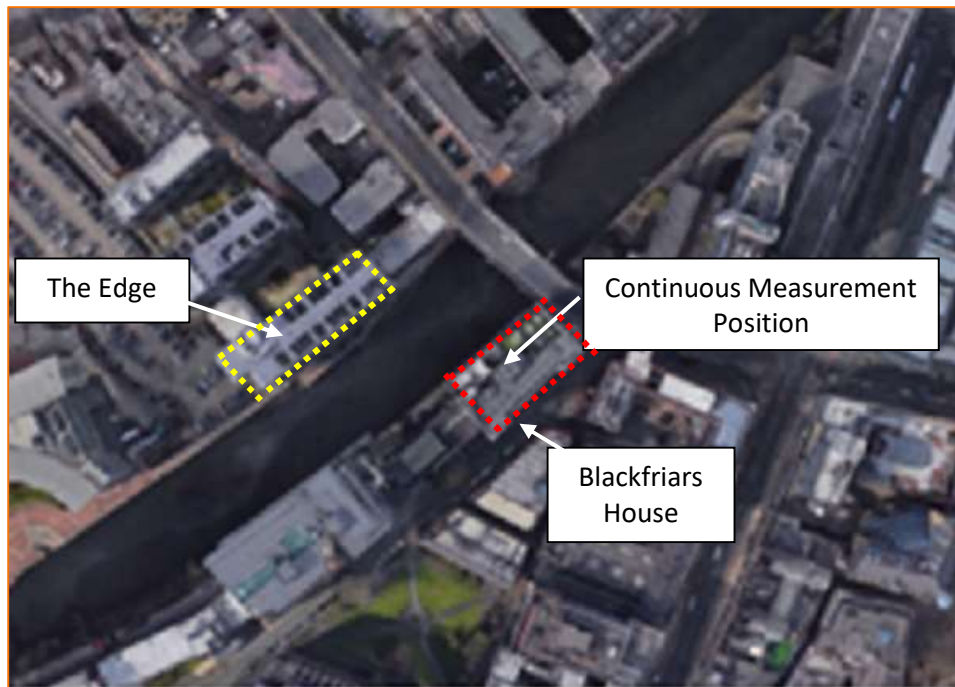
- 2.2 BS 4142:2014 sets out a procedure for assessing noise impact whereby a noise rating is determined and compared with the existing local background sound level. The MCC guidance refers to a noise rating level for externally mounted ancillary plant.
- 2.3 The rating level ($\text{dBL}_{\text{Ar,T}}$) is evaluated from the specific noise level by including several, cumulative corrections to account for factors such as distinguishable tone, impulse, intermittency or other readily distinguishable sound characteristics.
- 2.4 BS 4142:2014 seeks to determine a “representative” background sound level, stating that “...the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods”.

3 ENVIRONMENTAL NOISE SURVEY

Methodology

- 3.1 dBx Acoustics undertook a noise survey between approximately 23:00 hrs on Thursday 20th September and 04:00 hrs on Tuesday 25th September 2018. Details of the noise survey are provided in dBx Acoustics report reference *18087 Blackfriars House R01C* dated 08/10/2019.
- 3.2 Figure 3 illustrates the noise measurement location.

Figure 3: Noise Measurement Location



Noise Survey Results

- 3.3 Subjective observations of the noise climate suggested road traffic noise dominates the noise climate at this location, and hence at residential receptors. The surveyor also observed the noise climate at the façade of the Travelodge hotel and found conditions to be similar.
- 3.4 Table 2 provides a summary of the results of the noise survey.

Table 2: Noise Survey Results

Date	Period	Ambient Noise Level, (dB L _{Aeq, T})	Background Sound Level (dB L _{A90, T})
Thursday 20 Sept	Day (07:00-23:00) ¹	62 ²	52 ²
	Night (23:00-07:00)	58 ²	50 ²
Friday 21 Sept	Day (07:00-23:00)	60 ²	52 ²
	Night (23:00-07:00)	54 ²	50 ²
Saturday 22 Sept	Day (07:00-23:00)	55	51
	Night (23:00-07:00)	54	49
Sunday 23 Sept	Day (07:00-23:00)	55	50
	Night (23:00-07:00)	54	48
Monday 24 Sept	Day (07:00-23:00)	57	49
	Night (23:00-07:00)*	53	48

Note 1: Only part of period measured

Note 2: Heavy rain and wind observed

- 3.5 The measurement data is consistent throughout the survey period (when weather was fine), and there was very little variation in the background noise level L_{A90, T} between the day and night-time periods.
- 3.6 Overall, therefore, a background sound level of 48 dB L_{A90, T} is considered representative of the typical lowest background sound level at the residential properties during both day and night-time periods.
- 3.7 The associated spectrum is provided in Table 3.

Table 3: Lowest Measured Background Sound Level Spectrum

Lowest Background Sound Level (dB L _{90, T}) in Octave Band Centre Frequency (Hz)							Overall A-Weighted Background Sound Level (dB L _{A90, T})
63	125	250	500	1000	2000	4000	
55	50	47	45	43	38	30	48

4 PLANT NOISE ASSESSMENT

Rating Noise Level Limit

- 4.1 Based on the noise survey data presented above, plant should be designed to achieve a rating level of no more than 43 dB $L_{Ar,Tr}$ at the nearest NSR to allow night-time operation (after 23:00 hrs).

Source Noise Levels

- 4.2 Manufacturers' data was provided by Dragonfly Contracts Ltd for the proposed Mitsubishi units. In addition, manufacturers' data for the Panasonic units was obtained online by dBx Acoustics¹.

Building Services Plant Noise

Predicted Noise Levels

- 4.3 Table 4 summarises the calculation undertaken to predict the building services plant noise level at the nearest noise sensitive location (dwellings located at the Edge).

Table 4: Building Services Plant Noise to the Edge

	Noise Level (dB) in Octave Band Centre Frequencies (Hz)								Total A-Weighted (dB)
	63	125	250	500	1000	2000	4000	8000	
Total sound pressure level (dB L_p) at 1 m	88	83	81	79	73	69	66	61	80
Attenuation due to Caice single bank louvre	-6	-6	-9	-13	-21	-20	-16	-13	-
Attenuation due to distance (50 m)	-34	-34	-34	-34	-34	-34	-34	-34	-
Specific sound level ($L_{Aeq,T}$) at the Edge	48	43	38	32	18	15	16	14	34

¹ <https://manuall.co.uk/panasonic-u-10me1e81-air-conditioner>, accessed 13/05/2022

Comparison with Condition 7

- 4.4 Table 5 provides the building services plant noise assessment for noise from plant at Blackfriars House to the dwellings of the Edge.

Table 5: Building Services Plant Noise Assessment

Item	Noise Level (dB)
Measured night-time background sound level ($L_{A90,T}$)	48
Specific sound level ($L_{Aeq,T}$)	34
Acoustic feature correction	0
Rating level ($L_{Ar,Tr}$) at the Edge	34
Rating level criterion ($L_{Ar,Tr}$, 5 dB below background sound level)	43
Excess of rating level over criterion at the Edge	-9

- 4.5 Table 5 indicates that the plant installed on the roof of Blackfriars House meets the MCC criterion in Condition 7.

Restaurant and Café Plant Noise

Predicted Noise Levels

- 4.6 Table 6 summarises the calculations undertaken to predict the restaurant and café plant noise level at the nearest noise sensitive location (dwellings located at the Edge).

Table 6: Restaurant and Café Plant Noise to the Edge

	Noise Level (dB) in Octave Band Centre Frequencies (Hz)								Total A-Weighted (dB)
	63	125	250	500	1000	2000	4000	8000	
Total sound pressure level (dB L_p) at 1 m	81	70	70	68	62	59	54	49	69
Attenuation due to Caice single bank louvre	-6	-6	-9	-13	-21	-20	-16	-13	-
Attenuation due to distance (50 m)	-34	-34	-34	-34	-34	-34	-34	-34	-
Specific sound level ($L_{Aeq,T}$) at the Edge	41	30	27	21	7	5	4	2	23

Comparison with Condition 8

- 4.7 Table 7 provides the building services plant noise assessment for noise from plant at Blackfriars House to the dwellings of the Edge.

Table 7: Restaurant and Café Plant Noise Assessment

Item	Noise Level (dB)
Measured night-time background sound level ($L_{A90, T}$)	48
Specific sound level ($L_{Aeq, T}$)	23
Acoustic feature correction	0
Rating level ($L_{Ar, Tr}$) at the Edge	23
Rating level criterion ($L_{Ar, Tr}$, 5 dB below background sound level)	43
Excess of rating level over criterion at the Edge	-20

- 4.8 Table 7 indicates that the plant installed on the roof of Blackfriars House meets the MCC criterion in Condition 8.

Cumulative Noise Assessment

Predicted Noise Levels

- 4.9 Table 8 provides a cumulative assessment for building services plant and restaurant/café plant to the dwellings of The Edge.

Table 8: Restaurant and Café Plant Noise Assessment

Item	Noise Level (dB)
Measured night-time background sound level ($L_{A90, T}$)	48
Specific sound level ($L_{Aeq, T}$)	34
Acoustic feature correction	0
Rating level ($L_{Ar, Tr}$) at the Edge	34
Rating level criterion ($L_{Ar, Tr}$, 5 dB below background sound level)	43
Excess of rating level over criterion at the Edge	-9

- 4.10 Table 8 indicates that the MCC criterion of 5 dB below background sound level is met cumulatively by all plant at Blackfriars House.

5 CONCLUSION

- 5.1 This report details the results of the updated noise assessment undertaken for the building services plant located on the roof of Blackfriars House, Manchester.
- 5.2 dBx Acoustics carried out a noise survey at the site in 2018, which has been used to determine the existing background sound level at the nearest noise sensitive receptor to the site (dwellings at the Edge, approximately 40 m to the north west of the site). The typical background sound level was 48 dB $L_{A90, 15min}$ during the daytime and night-time.
- 5.3 The cumulative rating noise level of the plant is predicted to meet the criterion of 5 dB below background sound level required by Conditions 7 and 8 of the Manchester City Council planning approval for the site (reference 21979/FO/2018), therefore it is considered that Part a) of Conditions 7 and 8 can be discharged.

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.
$L_{Aeq,T}$	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.
$L_{An,T}$	Level in dBA which was exceeded for n% of time, T.
$L_{Ar,Tr}$	The rating level: the equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise.
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.