



Azymuth Acoustics UK

Professional Acoustic Services

BREEAM Pol05 Planning Noise Compliance Report Ref: AA0138

Pearl Assurance House

23 Princess Street,
Manchester,
M2 4HH

On behalf of

GMI Construction

Middleton House,
Westland Road,
Leeds,
LS11 5UH

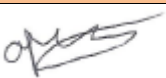


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1.0 Introduction

Azymuth Acoustics UK (henceforth Azymuth) has been contracted by GMI Construction Limited to perform acoustic testing to demonstrate BREEAM Pol05 and noise planning compliance at the new Malmaison Hotel located in the former Pearl Assurance House, Manchester.

This report sets out the design targets and noise levels agreed as part of the planning process together with the results of noise measurements carried out (on 19/09/2023) as part of the commissioning process and assessments of the results against the aforesaid design targets.

2.0 Results of Background Noise Survey

The following section sets out the baseline noise levels measured at the planning stage of the project. The ambient noise measurements were undertaken using the sound level meter microphone at the locations shown in Figure 1 below.

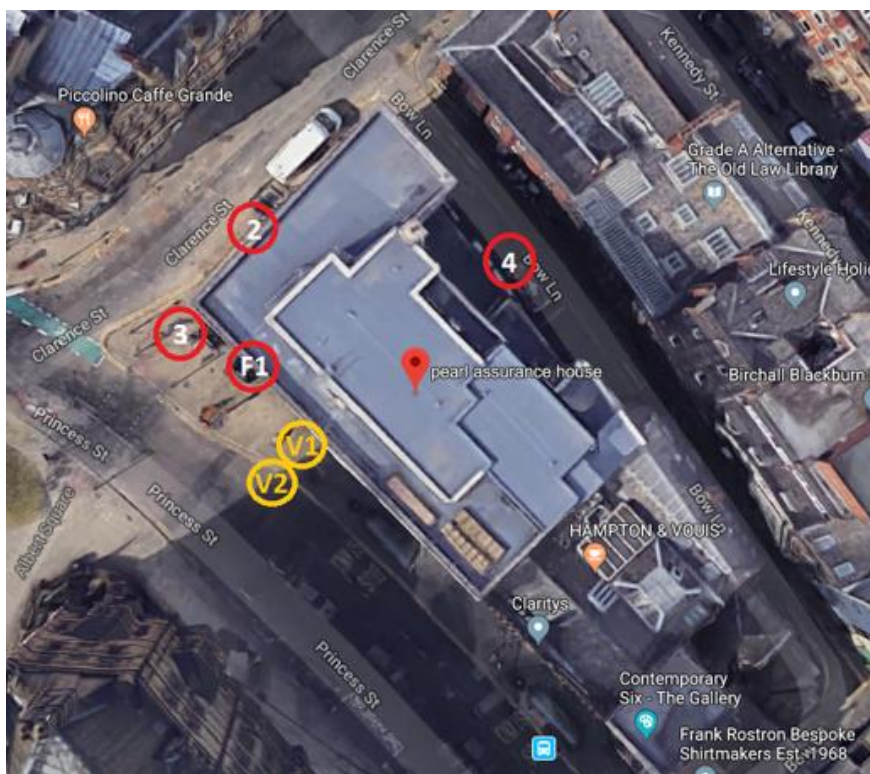


Figure 1 - noise measurement locations for the baseline noise surveys



The following table summarises the results of the noise measurements undertaken at the proposed site in terms of the average daytime (07:00hrs – 23:00hrs) and night-time (23:00hrs – 07:00hrs) statistical noise levels that were carried out in June 2019. Measurements were carried out in accordance with the guidance contained in BS 7445.

Position	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A90}
F1) Princess Street (outside 1 st floor window)	Day	82.2	67.1	68.6	58.1
	Night	78.3	63.4	65.5	53.3
2) Clarence St	Day	81.4	63.4	65.2	58.1
3) Princess St – pavement level	Day	82.6	67.6	70.0	60.7
4) Bow Lane	Day	79.2	61.6	63.2	58.4

Table 1 – The results of baseline noise survey undertaken in June 2019

3.0 Design / Assessment Criteria

In order to assess the extent of any measures required in order to comply with suitable conditions relating to potential noise sources, Azymuth has reviewed various guidance documents and standards, these include:

- Manchester City Council planning conditions
- BREEAM: Non-domestic Buildings Refurbishment and Fit-out 2014

3.2 Manchester City Council Planning Conditions

Manchester City Council (MCC) have issued the following planning conditions in relation to the hotel development.

Manchester City Council Planning and Noise Conditions
Before the development commences a scheme for acoustically insulating and mechanically ventilating (a) the hotel accommodation against noise from adjacent roads and (b) any noise transfer from the A3 and A4 areas of the hotel use to the hotel rooms above and below, shall be submitted to and approved in writing by the City Council as local planning authority.
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. The approved noise insulation scheme shall be completed before each of the approved uses commence.
Prior to occupation a post completion report to verify that all of the recommended mitigation measures have been installed and effectively mitigate any potential adverse noise impacts in adjacent residential accommodation arising directly from the proposed development shall be submitted and agreed in writing by the City Council as local planning authority. Prior to occupation any noncompliance shall be suitably mitigated in accordance with an agreed scheme.
Reason - To secure a reduction in noise in order to protect future residents from noise nuisance, pursuant to policies SP1 and DM1 of the Core Strategy and saved UDP Policy DC26. This information is required at pre-commencement stage as the required measures need to be included in the construction of the scheme.

Table 2 – Manchester City Council Planning Conditions

3.3 BREEAM: Non-domestic Buildings Refurbishment and Fit-out 2014

The primary aim of BREEAM UK Refurbishment and Fit-out is to promote the delivery of sustainable refurbishment and fit-out, in order to mitigate the life cycle impacts of existing buildings on the environment in a robust and cost-effective manner. This is achieved through integration and use of the scheme by clients and their project teams at key stages in the design and refurbishment/fit-out works process.

3.3.1 Pol 05: Acoustic Performance

The following is required to demonstrate compliance:

1. Where there are, or will be, no noise-sensitive areas or buildings within 800m radius of the assessed site.

OR

2. Alternatively, where the building does have noise-sensitive areas or buildings within 800m radius of the site, one credit can be awarded as follows:

a. Where a noise impact assessment in compliance with BS 7445 has been carried out and the following noise levels measured/determined:

i. Existing background noise levels at the nearest or most exposed noise-sensitive development to the proposed development or at a location where background conditions can be argued to be similar.

ii. The rating noise level resulting from the new noise source (see CN7).

3. The noise impact assessment must be carried out by a suitably qualified acoustic consultant holding a recognised acoustic qualification and membership of an appropriate professional body (see Relevant definitions in the Additional information section)

4. The noise level from the proposed site/building, as measured in the locality of the nearest or most exposed noise-sensitive development, is a difference no greater than +5dB during the day (07:00 to 23:00) and +3dB at night (23:00 to 07:00) compared to the background noise level.

5. Where the noise source(s) from the proposed site/building is greater than the levels described in criterion 4, measures have been installed to attenuate the noise at its source to a level where it will comply with criterion 4.

4.0 Environmental Noise Tests

4.1 Equipment and Test Procedures

All measurements were in accordance with BS7445 on 19/09/2023 by Azymuth Acoustics. For each measurement, the minimum averaging time for each third octave band centre frequency was 60s. This method was used in both source and receiver rooms.

For the Sky Bar sound insulation tests 2no. loudspeaker positions were used for airborne measurements with 2no. 30s traverses measured at each (internal and external) measurement position i.e. 4no. measurements in total.

Where background noise level difference was less than 10dB a correction was applied to the signal level as detailed in the appropriate section of ISO 140-4 or ISO 140-7.

Equipment Type	Serial Number	Date of last Calibration check.	Cal. Certificate Number
NTi Audio XL2-TA sound level analyser	A2A-16190-E0	30.06.21	UCRT21/1807
Larson Davis CAL200	16088	24.06.22	UCRT22/1801
Svantek Sv977	46460	16.10.22	2022-1104
Thump 12A Loudspeaker	2051072AKLA0110	NA	NA
NTi Audio Minirator MR2 (audio signal generator)	G2L-RABQU-G0	NA	NA

Table 1 - Testing equipment used and calibration information.

4.2 Results of Sound Testing

The following table summarizes the results of the commissioning noise measurements in the vicinity of the fixed plant at the Malmaison hotel.

Measurement Position	L _{Aeq}	L _{A90}	Octave Band Centre Frequency (Hz)							
			63	125	250	500	1k	2k	4k	8k
Next to AHU casing	62.3	60.6	72.4	65.5	59.0	55.1	52.6	54.7	56.9	53.2
AHU atmosphere connection	62.0	60.1	68.4	67.3	62.2	58.2	56.4	55.8	50.7	43.9
Adjacent to Condensers	59.5	58.4	68.7	64.0	59.0	55.3	51.8	49.9	51.4	48.2
1m from Roof Plant Louvre	57.1	55.8	66.3	63.6	58.7	53.5	51.3	48.7	42.4	34.0
Bow Lane main louvre @1m	62.3	61.5	60.6	58.9	57.5	60.7	58.0	54.6	49.1	41.1
Bow Lane small louvre @1m	75.0	73.5	64.6	64.4	67.6	73.7	70.5	67.6	62.5	58.5

Table 4 – Results of noise measurements for the fixed plant at Malmaison Hotel, Princess St

In addition to these plant noise measurements Azymuth Acoustics have also carried out noise break-out sound tests on the Sky Bar (which will be controlled by the sound insulation of the glazing).

The following table summarizes the results of the sound insulation (break-out) tests and includes calculations of the music noise break out based on the likely worst case internal noise levels associated with a function in the Sky Bar.



Measurement Parameter	Overall value		Octave Band Centre Frequency (Hz)							
			63	125	250	500	1k	2k	4k	8k
Measured sound insulation of Sky Bar glazing	Dnw 28dB		20.3	19.4	22.5	24.8	28.2	30.6	37.4	39.4
	L _{Aeq}	L _{A90}	63	125	250	500	1k	2k	4k	8k
Typical worst case music level inside Sky Bar	95	91	93	93	93	91	90	87	83	77
(Music break-out) Sound level @1m outside Sky Bar	68	63	72	73	71	66	61	57	46	38

Table 5 – results of sound insulation tests on Sky Bar glazing and extrapolated external noise.

5.0 Assessment of Test Results

As the planning conditions relating to noise for the scheme are set out in terms of the noise levels at the nearest receptors the results of the commissioning noise survey have been added to a SoundPlan computer noise model of the building and the surrounding area in order to extrapolate the measurements beyond the site and to locations representative of the receptor locations.

5.1 Entertainment Noise Break-out

The following table summarizes the extrapolated entertainment noise levels based on the (95dB L_{Aeq} worst case) noise levels set out above employing the SoundPlan noise model to propagate the noise levels across the area.

Receiver Location	External noise prediction	Noise Level inside (through an open window)	Assessment
Townhouse Hotel @25m height	37.5 dBA 49.0dB at 63Hz 45.4dB at 125Hz	25.5dBA 37.0dB at 63Hz 33.4dB at 125Hz	Overall level over 15dB below background. Octave bands 10dB better than target
The Chambers Clarence St / King St	37.1dBA 48.6dB at 63Hz 45.0dB at 125Hz	25.1dBA 36.6dB at 63Hz 33.0dB at 125Hz	
Manchester Town Hall façade	52.2 dBA	n/a	Not strictly applicable as offices and commercial premises unlikely to be occupied after 10pm

Table 6- Assessment of the worst-case entertainment noise levels against planning conditions

The following figure shows a cross section noise map showing how the noise levels from the Sky Bar are attenuated by propagation and by the screening effect of the roof of the Malmaison building itself.

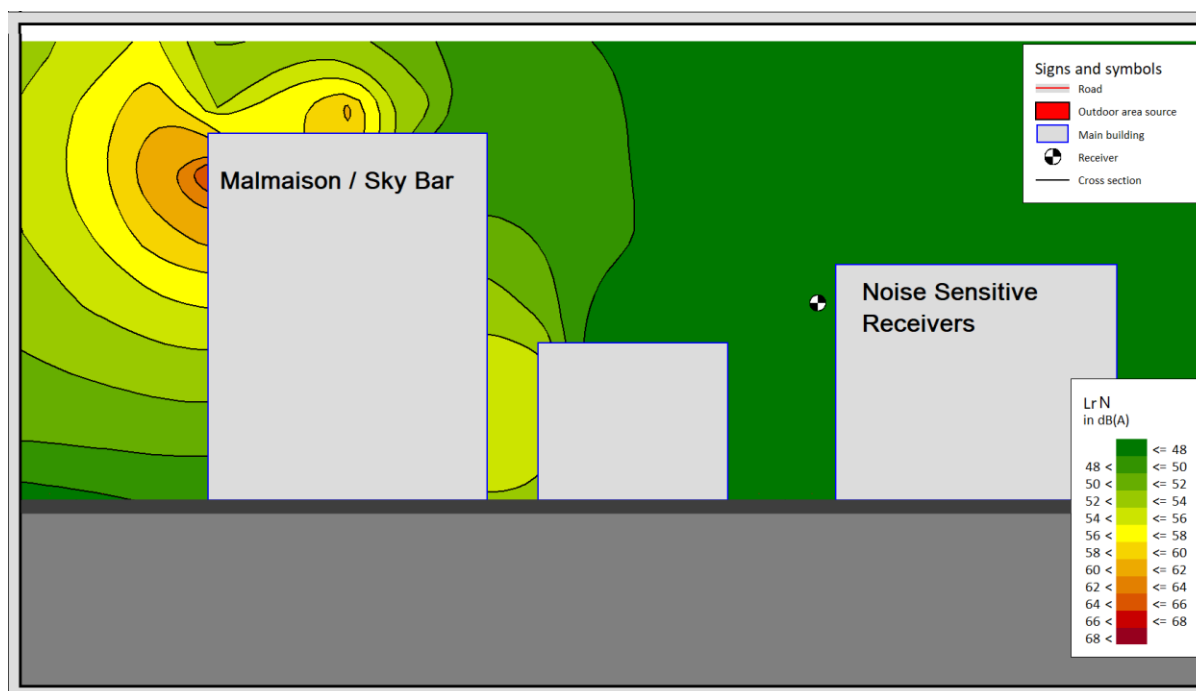


Figure 2- Cross section noise map showing the Malmaison Hotel (sky bar) and the nearest receptors.

5.2 Roof Plant Platform

The following table summarizes the extrapolated noise levels based on the noise levels measured in the vicinity of the roof mounted plant at the Malmaison Hotel, Princess St.

	External noise prediction	(Pre) Existing / baseline night-time L_{A90}	Assessment
Townhouse Hotel @25m height	39.5dBA	53.3 (night)	Complies with MCC targets / complies with BREEAM targets
The Chambers Clarence St / King St	35.9dBA	53.3 (night)	Complies with MCC targets / complies with BREEAM targets
Manchester Town Hall façade	28.4dBA	58.1 (day)	Complies with MCC targets / complies with BREEAM targets

Table 7 – Assessment of the Noise Levels from the roof mounted plant

The following figure shows the noise propagation of the noise levels from the roof mounted plant as experienced at a height of 25m above pavement level. This is representative of the noise propagation that would have a light of sight toward the plant platform and hence is used as a worst case scenario.



Figure 3 – Grid noise map of noise levels propagated at 25m height.

5.3 Ground Floor Plant Room

The following table summarizes the noise levels propagated from the ground floor louvres (located on Bow Lane) at the Malmaison Hotel.

	External noise prediction	(Pre) Existing / baseline night-time L_{A90}	Assessment
Townhouse Hotel @25m height	38.1dBA	53.3 (night)	Complies with MCC targets / complies with BREEAM targets
The Chambers Clarence St / King St	34.3dBA	53.3 (night)	Complies with MCC targets / complies with BREEAM targets
Manchester Town Hall façade	24.0dBA	58.1 (day)	Complies with MCC targets / complies with BREEAM targets

Table 8 - Assessment of the Noise Levels from the ground floor plant room louvres

The noise levels from the ground floor plant room louvres are represented graphically in the following figure with the noise levels propagated at a height of 1.5m.



Figure 5 – Grid noise map of noise levels propagated at 1.5m height.

5.4 Overall Environmental Noise Levels

The following table summarizes the overall environmental noise levels combining the entertainment noise, the roof mounted plant and the ground floor plant room louvres.

	External noise prediction	(Pre) Existing / baseline night time L_{A90}	Assessment
Townhouse Hotel @25m height	41.3dBA	53.3 (night)	Complies with MCC targets / complies with BREEAM targets
The Chambers Clarence St / King St	39.6dBA	53.3 (night)	Complies with MCC targets / complies with BREEAM targets
Manchester Town Hall façade	28.4dBA (day)	58.1 (day)	Complies with MCC targets / complies with BREEAM targets

Table 9 – Assessment of overall environmental noise from Malmaison, Princess St

The following figure shows the noise levels from all of the environmental noise sources combined as propagated to façade point locations on the nearest noise sensitive buildings / receptors.

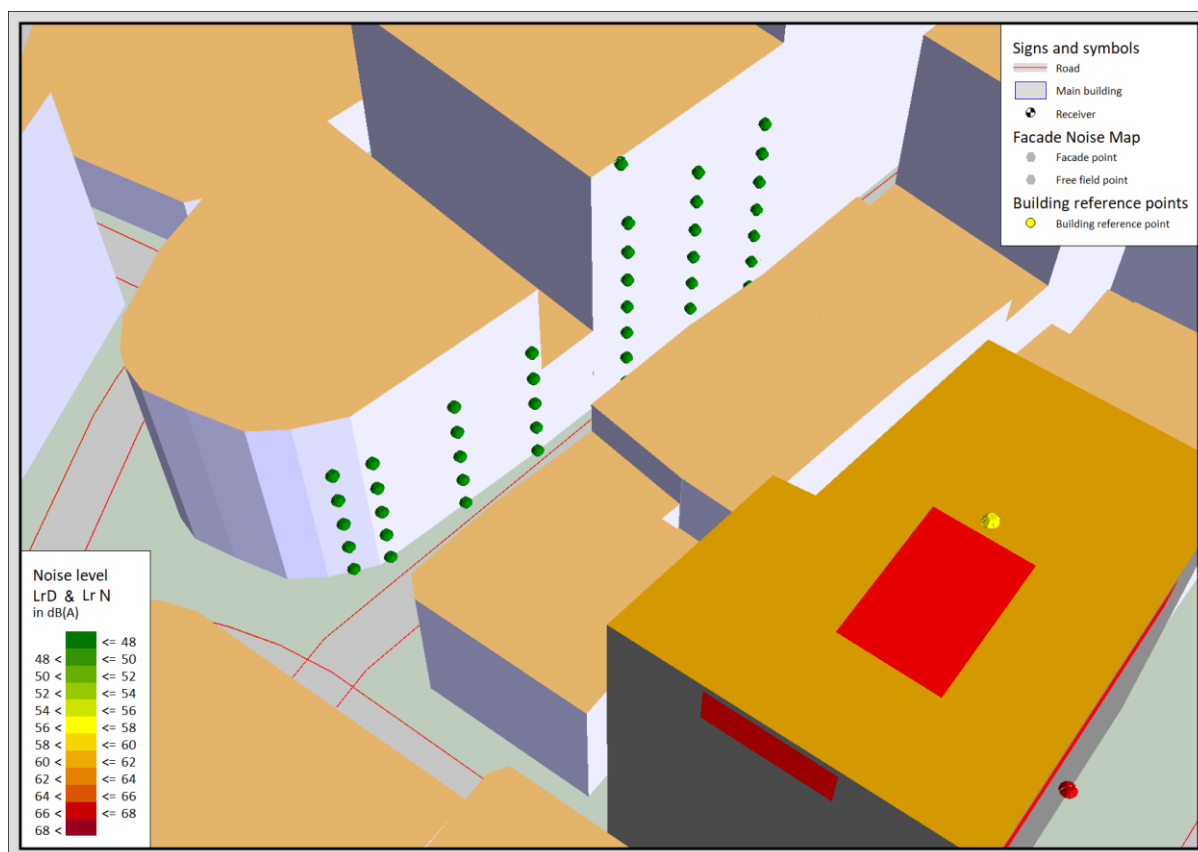


Figure 6 – Façade noise map of noise propagated from the Malmaison, Princess St building.

5.0 Summary

Azymuth has conducted acoustic testing at the new Malmaison hotel located on Princess Street, Manchester. These tests include a number of noise measurement tests on the fixed plant as well as a test of the noise break-out sound insulation performance associated with the Sky Bar (for entertainment noise).

Assessment Criteria	Assessment
Manchester city council planning condition	Complies / octave band noise levels better than targets.
Entertainment noise Fixed Plant	Fixed plant at least 15dB below background noise / complies with MCC Targets
BREEAM - Pol 05	Fully compliant with BREEAM Pol 05 targets for all noise sensitive receptors located within 300m

Table 10 – Overall summary of environmental noise levels

Appendix A – Glossary of Acoustic Terms

Decibel (dB)

This is the unit used to measure sound. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascal to 100 Pascal).

dB (A)

This is a measure of the overall noise level of sound across the audible spectrum with a frequency weighting (i.e. A-weighting) to compensate for the sensitivity of the human ear to sound of different frequencies. The A-weighting curve is implemented in sound level meters using an electronic filter that approximately corresponds to the frequency response of the ear.

Octave Band Noise Level

The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz. The ear is also generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum can be divided into frequency bands. The most commonly used frequency bands are octave bands, in which the mid-frequency of each band is twice that of the band below it.

L_{Aeq}

This is the equivalent steady sound level in dB (A) containing the same acoustic energy as the actual fluctuating sound level over a given time period.

Reverberation Time (RT or sometimes T_{30} or T_{60})

This is the time taken for the reverberant sound energy in an enclosure to decay one millionth of its equilibrium value, i.e. by 60 dB, after the source has been switched off, is known as the reverberation time. The reverberation time is frequency dependent, and it is customary to measure its value in octave or one-third octave bands. Reverberation occurs when sound waves are repeatedly reflected from each surface of the room.

Sound Reduction Index (SRI)

Difference measured between the amount of energy flowing towards the wall in the source room and the total amount of energy entering the receiving room (usual range 100 - 3150 Hz for one third octave band values). The SRI varies with frequency and is measured in a laboratory in either octave or one-third octave bands.

$SRI = L1 - L2 + 10 \log (S/A)$, where:

L1 = Noise level in the source room

L2 = Noise levels in the receiving room

S = Surface area of test specimen

A = Equivalent acoustic absorption area in the receiving room

Weighted Sound Reduction Index (R_w)

This is a weighted single figure descriptor of the sound insulation performance of a partition measured under laboratory conditions. The procedure used to quantify the R_w is to compare the sound reduction index (SRI) in each of the one-third octave bands from 100Hz to 3150Hz against a set of standard reference curves.