



Azymuth Acoustics UK

Professional Acoustic Services

Acoustic Testing Report

Ref: 98415.6

**Happi Block,
Bowes Street,
Manchester**

On behalf of

Rowlinson Constructions Limited

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1.0 Introduction

Azymuth Acoustics UK (henceforth AAUK) were appointed by Rowlinson Construction Ltd. on 20th April 2022 to perform additional acoustic testing on the Happi Block at the new build development site located on Bowes Street, Manchester. The site is situated beside the busy A5103 and is therefore susceptible to noise from traffic.

Additional testing has been instructed in order to assist with the discharge of a planning condition in relation to internal noise levels. The planning application refers to a noise impact assessment that was carried out on site by another acoustic consultancy (noise.co.uk) in September 2018. The purpose of the testing is to confirm that the mitigation advice issued in this assessment is accurate and that the internal noise levels are of an acceptable level.

1.1 Measurement Procedure

The instrumentation used for the acoustic testing consisted of a NTi Audio XL2-TA type 1 precision sound level meter. The equipment was calibrated before and after measurements. The sound level meter measured A-weighted (fast response) noise levels as well as octave bands noise levels for all measurement record.

Measurements were taken ~1m from the living room window in Apartment 8 located on the ground floor of the development. The instrumentation measured the internal noise levels to be experienced by the apartment over a continuous time period taking into account rush-hour as well as night-time.

Measurements in the living room of Apartment 8 were undertaken over a continuous period between 08:37hrs on Wednesday 11th and 08:00hrs on Thursday 12th January 2023.

Full results of the noise levels recorded during the course of the survey are included in Appendix B of this report.

2.0 Assessment Criteria

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

- British Standard 8233:2014
- World Health Organisation Guidelines on Community Noise
- Manchester City Council: Planning Application 127796/JO/2020, Condition 12

2.1 British Standard 8233: 2014

BS 8233 provides a code of practice for the sound insulation of a variety of building types affected by general environmental noise. It provides recommendations for control of noise in and around buildings and suggests appropriate internal ambient noise level criteria / limits for a variety of different situations including residential properties.

The following table summarises the noise limits suggested by BS 8233 applying to residential properties:

Activity	Room	Good Design Range $L_{Aeq, T}$ dB	
		07:00-23:00hrs	23:00-07:00hrs
Resting	Living Room	35	-
Dining	Dining Room / Area	40	-
Sleeping (daytime resting)	Bedroom (at night)	35	30

Table 1 – Noise Limits for Residential Properties Suggested in BS 8233

2.2 World Health Organisation Environmental Noise Guidelines (ENG) 2018

The main purpose of the 2018 WHO guidelines is to provide recommendations for protecting human health from exposure to environmental noise originating from the following sources: transportation (road traffic, railway and aircraft), wind turbines and leisure activities.

The guidelines set out to define recommended exposure levels for environmental noise in order to protect population health. Exposure limits are average levels defined over a period of one year, measured outdoors in free field at the most exposed façade. It should be noted that the document does not provide guideline limit values for multiple noise sources in combination.

The 2018 guidelines supersede the Community Noise Guidelines from 1999. Nevertheless, the document recommends that all CNG indoor guideline values and any values not covered by the current guidelines should remain valid. As such, the following guidance would remain appropriate:



For protection against sleep disturbance inside dwellings, night-time noise levels should not exceed 30dB L_{Aeq} for continuous noise and 45dB L_{Amax} for typical single sound events (which are exceeded 15 times or more per night – see ProPG Appendix A.12 for more details). To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise (interpreted as noise from all sources combined) should not exceed 55dB L_{Aeq} on balconies, terraces and in outdoor living areas.

It should be noted that exposure levels defined in ENG and CNG are for guidance purposes as relates potential adverse health impacts and should not be interpreted as absolute limits or regulations.

2.3 Manchester City Council: Planning Application 127796/JO/2020, Condition 12

The following planning condition has been issued by Manchester City Council:

'Before the development commences a scheme for acoustically insulating the proposed residential accommodation against noise from Princess Road and the adjacent Health Hub shall be submitted to and approved in writing by the City Council as local planning authority. There may be other actual or potential sources of noise which require consideration on or near the site, including any local commercial/industrial premises. The approved noise insulation scheme shall be completed before any of the dwelling units are occupied.

Noise survey data must include measurements taken during a rush-hour period and night-time to determine the appropriate sound insulation measures necessary. The following noise criteria will be required to be achieved:

Bedrooms (night-time - 23.00 - 07.00) 30dB L_{Aeq} (individual noise events shall not exceed 45 dB $L_{Amax,F}$ by more than 15 times)

Living Rooms (daytime - 07.00 - 23.00) 35dB L_{Aeq}

Gardens and terraces (daytime) 55dB L_{Aeq}

Upon completion of the development and before first occupation of the residential units, 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 the internal noise 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 internal noise criteria'

2.3.1 Noise Impact Assessment Recommendations

The following table details the recommend glazing specification as set out in the initial noise impact assessment from September 2018.

Assessment Location	Façade Sound Insulation, dB	
	Living Rooms	Bedrooms
South facing façade of Happi Block	33dB $R_W + C_{tr}$	37dB $R_W + C_{tr}$

Table 2 – Glazing recommendation



3.0 Assessment of Results

3.1 Apartment 8: Living Room

The following table summarises the noise measurement data for the living room of Apartment 8 over the measurement period.

During the testing procedure work was still being completed on the south facing elevation, noise levels during the time of these works have been discarded from the summary due to suspected noise intrusion.

Location	Period	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Apartment 8: Living Room	Day	44.0	31.3	30.6	26.9	24.9
Apartment 8: Living Room	Night	32.7	23.1	24.0	22.5	21.8

Table 3 – Summary of daytime and night-time noise levels Apartment 8 (living room)

- 15th highest night-time L_{Amax} value = 35.7dB inside living room of apartment 8
- 10th highest night-time L_{Amax} value = 37.3dB inside living room of apartment 8

Graphs of the noise measurement data are included in Appendix C of this report.

4.0 Summary

AAUK were appointed by Rowlinson Construction Ltd. in April 2022 to undertake some acoustic testing on the Happi Block at the Bowes Street site. The site is situated adjacent to the busy A5103 road.

A planning condition was issued by Manchester City Council, this condition stated that a verification report would have to be completed in order to validate that the planning condition had been met.

The planning conditions were as follows:

- Bedrooms (night-time - 23.00 - 07.00) 30dB L_{Aeq} (individual noise events shall not exceed 45dB L_{Amax,F} by more than 15 times)
- Living Rooms (daytime - 07.00 - 23.00) 35dB L_{Aeq}
- Gardens and terraces (daytime) 55dB L_{Aeq}

The daytime noise levels in the living room of Apartment 8 were measured to be 31.3dB L_{Aeq, 16hr}, the night-time noise levels were measured to be 23.1dB L_{Aeq, 8hr}. The 15th highest night-time L_{Amax} value was measured to be 35.7dB. The noise levels are therefore compliant with the planning condition.



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 20Hz to 20kHz. 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 60dB, after the source has been switched off. 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 - 3150Hz 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.

$SRI = L_1 - L_2 + 10 \log (S/A)$, where:

L_1 = Noise level in the source room

L_2 = 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.



Appendix B – Noise Survey Data

Start	Plot	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Wednesday 11 th January 2023							
08:37:38	Apt 8	00:22:22	57.7	39.1	37.1	26.2	24.9
09:00:00	Apt 8	00:30:00	69	38.2	37.3	30.3	26
09:30:00	Apt 8	00:30:00	65.9	46.6	48.9	41.4	31.2
10:00:00	Apt 8	00:30:00	64.7	43.9	44.3	32.8	28.7
10:30:00	Apt 8	00:30:00	51.2	34.7	37.1	33.9	29.1
11:00:00	Apt 8	00:30:00	64.8	36.1	39.9	32.3	31
11:30:00	Apt 8	00:30:00	60.9	39.1	41.7	35.2	33.5
12:00:00	Apt 8	00:30:00	68.7	46	44.6	36.6	32.2
12:30:00	Apt 8	00:30:00	67	49.6	52.4	48.2	35.2
13:00:00	Apt 8	00:30:00	68	48.6	52.4	41.2	36.5
13:30:00	Apt 8	00:30:00	61.2	46.1	50.9	41.4	31.5
14:00:00	Apt 8	00:30:00	63.4	43	42.2	34.3	30.8
14:30:00	Apt 8	00:30:00	52.9	36.4	39.8	33.4	30.4
15:00:00	Apt 8	00:30:00	56.8	36.9	39.1	34.1	31.6
15:30:00	Apt 8	00:30:00	62.2	43.9	47.4	39.1	33.5
16:00:00	Apt 8	00:30:00	59.7	36.8	39.4	30.4	28.7
16:30:00	Apt 8	00:30:00	53.2	32.2	35.6	30.1	25.6
17:00:00	Apt 8	00:30:00	44.6	31	34.7	28.8	24.9
17:30:00	Apt 8	00:30:00	51.6	26.4	27.1	25.1	23.2
18:00:00	Apt 8	00:30:00	35.2	24.5	25.9	24.1	22.8
18:30:00	Apt 8	00:30:00	33.8	24.1	25.3	23.6	22.6
19:00:00	Apt 8	00:30:00	33.8	23.6	24.6	23.2	22.4
19:30:00	Apt 8	00:30:00	48.8	29.7	28.3	23.9	22.8
20:00:00	Apt 8	00:30:00	33.6	25.2	26.9	24.4	23.5
20:30:00	Apt 8	00:30:00	48.6	31.4	34.7	25.9	23.8
21:00:00	Apt 8	00:30:00	41.1	25	26.1	24.2	23.2
21:30:00	Apt 8	00:30:00	34	25	26.2	24.6	23.7
22:00:00	Apt 8	00:30:00	37	27.6	29.4	27.5	24.8
22:30:00	Apt 8	00:30:00	33.6	26.1	27.8	25.7	24.6
23:00:00	Apt 8	00:30:00	32.7	25.2	26.4	25	23.8
23:30:00	Apt 8	00:30:00	38.1	25.2	26.7	24.7	23.6
Thursday 12 th January 2023							
00:00:00	Apt 8	00:30:00	32.2	24.3	25.7	24	22.9
00:30:00	Apt 8	00:30:00	32.6	22.9	24	22.5	21.8
01:00:00	Apt 8	00:30:00	30.6	22.1	23	21.8	21.2
01:30:00	Apt 8	00:30:00	30.9	21.6	22.3	21.3	20.9
02:00:00	Apt 8	00:30:00	36.4	21.9	22.5	21.4	21
02:30:00	Apt 8	00:30:00	29.1	21.6	22.4	21.3	21
03:00:00	Apt 8	00:30:00	33.5	22.3	23.2	21.9	21.3
03:30:00	Apt 8	00:30:00	32.5	22.1	22.8	21.7	21.2
04:00:00	Apt 8	00:30:00	30.7	22	23.2	21.4	20.9
04:30:00	Apt 8	00:30:00	29	21.6	22.4	21.3	20.9
05:00:00	Apt 8	00:30:00	31.4	22.2	23.5	21.6	21
05:30:00	Apt 8	00:30:00	31.4	23.2	24.8	22.6	21.7
06:00:00	Apt 8	00:30:00	41.6	24.5	25.8	23.6	22.4



Start	Plot	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
06:30:00	Apt 8	00:30:00	31	24.2	25.8	23.8	22.4
07:00:00	Apt 8	00:30:00	32.3	24.7	25.9	24.5	23.3
07:30:00	Apt 8	00:30:00	41	25.4	26.9	24.6	23.5
08:00:00	Apt 8	00:30:00	57	28.7	30.3	25.1	23.8

Table B1 – Fully tabulated internal noise measurement results for Apartment 8 (living room)

Results in **GREY** were affected by external noise from a cherry picker for the construction of the apartments and have been excluded from the summary of results



Appendix C – Graphed Results

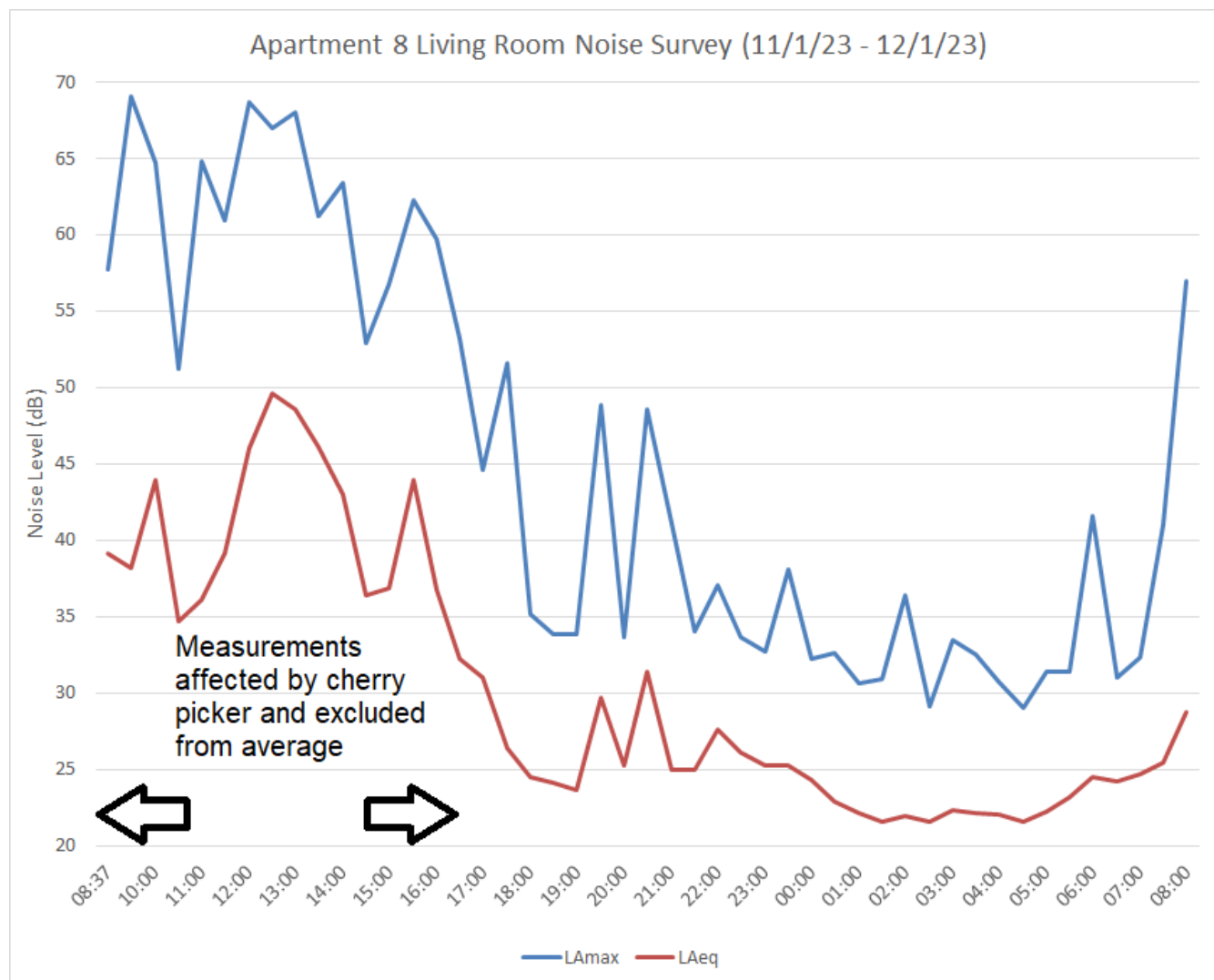


Figure C1 – Apartment 8 (living room) graphed measurement data