



Azymuth Acoustics UK

Professional Acoustic Services

Acoustic Testing Report

Ref: AA0498

Finlay's Yard

Mangle Street,
Manchester

On behalf of

Stephenson Hamilton Risley Studio

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1.0 Introduction

Azymuth Acoustics UK (henceforth Azymuth) were appointed by Stephenson Hamilton Risley Studio in September 2023 to undertake acoustic testing at Finlay's Yard, Manchester.

Additional testing has been instructed in order to assist with the discharge of a planning condition in relation to internal noise levels. The purpose of the testing is to confirm that previously issued mitigation advice 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 2no. SvanTek 971 type 1 precision sound level meters. 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 Bedroom and Living Room windows in Flat 10. 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 the night-time.

Measurements in both the Bedroom and Living Room of Flat 10 were taken over a continuous period between 16:15hrs on Friday 3rd and 08:45hrs on Monday 6th November 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 Number: 115529/FO/2017

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 Number: 115529/FO/2017

Condition 5 of the planning application states that:

'The development shall be implemented in accordance with the approved acoustic and window specification information so as to achieved the internal noise criterion as follows:

- Bedrooms (night-time – 23.00 – 07.00) 30dB L_{Aeq} (individual noise events should not normally exceed 45dB L_{Amax} by more than 15 times)

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

Additionally, where entertainment noise is a factor in the noise climate the sound insulation scheme shall be designed to achieve internal noise levels in the 63Hz and 125Hz octave centre frequency bands so as not to exceed (in habitable rooms) 42dB and 36dB, respectively.

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 confirms 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.

Reason – To ensure an acceptable development in the interests of residential amenity, pursuant to policy DM1 of the Core Strategy'

3.0 Assessment of Results

3.1 Flat 10: Bedroom

The following table summarises the noise measurement data for the Bedroom of Flat 10 over the measurement period.

Location	Period	L_{Amax}	L_{Aeq}	L_{A10}	L_{A50}	L_{A90}
Flat 10 Bedroom	Day	40.3	23.5	24.2	22.5	21.2
Flat 10 Bedroom	Night	38.0	20.1	20.4	18.6	17.5

Table 2 – Summary of daytime and night-time noise levels, Flat 10 Bedroom

- 15th highest night-time L_{Amax} value = 45dB



3.2 Flat 10: Living Room

The following table summarises the noise measurement data for the Living Room of Flat 10 over the measurement period.

Location	Period	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Flat 10 Living Room	Day	44.0	25.1	25.7	23.6	22.1
Flat 10 Living Room	Night	37.0	21.1	22.1	19.8	18.4

Table 3 – Summary of daytime and night-time noise levels, Flat 10 Living Room

- 15th highest night-time L_{Amax} value = 42.9dB

A graph of the noise measurement data is included in Appendix C of this report.

4.0 Summary

Azymuth were appointed by Stephenson Hamilton Risley Studio in September 2023 to undertake acoustic (noise break-in) testing at Finlay's Yard, Manchester.

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 relevant internal noise level targets had been met.

The internal noise level targets are 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}

The daytime noise levels in the Bedroom of Flat 10 were measured to be 23.5dB L_{Aeq, 16hr}, the night-time noise levels in the bedroom were measured to be 20.1dB L_{Aeq, 8hr}. The 15th highest night-time L_{Amax} value was measured to be 45dB. The measured noise levels are compliant with the target criteria.

The daytime noise levels in the Living Room of Flat 10 were measured to be 25.1dB L_{Aeq, 16hr}, the night-time noise levels in the bedroom were measured to be 21.1dB L_{Aeq, 8hr}. The 15th highest night-time L_{Amax} value was measured to be 42.9dB. The measured noise levels are compliant with the target criteria.

It is worth noting that owing to restricted availability of the flat (ie restricted dates) the measurements were recorded over the weekend of "Bonfire Night" therefore it is quite likely that fireworks or other loud events would have taken place into the night-time period and as such the results can be deemed to be very much worst case in terms of environmental noise.

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}
Friday 3 rd November 2023							
16:15:00	10 BD	00:30:00	81.4	45.2	24.2	21.9	20.7
16:45:00	10 BD	00:30:00	34.1	23.8	24.8	23.5	22.3
17:15:00	10 BD	00:30:00	47.1	24.9	25.1	23.6	22.4
17:45:00	10 BD	00:30:00	41.9	24.1	25.1	23.7	22.5
18:15:00	10 BD	00:30:00	42.8	24.1	25.2	23.7	22.5
18:45:00	10 BD	00:30:00	44	24	25.1	23.6	22.4
19:15:00	10 BD	00:30:00	35	23.8	24.9	23.5	22.4
19:45:00	10 BD	00:30:00	39.2	24.8	26.1	24	22.7
20:15:00	10 BD	00:30:00	34.3	23.8	24.9	23.5	22.4
20:45:00	10 BD	00:30:00	39.6	24.3	25.4	23.7	22.4
21:15:00	10 BD	00:30:00	35.7	23.8	24.8	23.5	22.3
21:45:00	10 BD	00:30:00	36	23.8	24.8	23.5	22.3
22:15:00	10 BD	00:30:00	35.3	23.7	24.7	23.4	22.3
22:45:00	10 BD	00:30:00	42.2	23.2	24.2	22.7	21.5
23:15:00	10 BD	00:30:00	40.2	22.1	23.1	21.6	20.3
23:45:00	10 BD	00:30:00	35.6	21.5	22.7	21.2	19.9
Saturday 4 th November 2023							
00:15:00	10 BD	00:30:00	58.4	24.6	23.1	21.2	19.9
00:45:00	10 BD	00:30:00	45.9	22.4	22.7	21	19.8
01:15:00	10 BD	00:30:00	38.3	21.7	22.6	21	19.7
01:45:00	10 BD	00:30:00	42.4	21.1	22.2	20.8	19.6
02:15:00	10 BD	00:30:00	26.4	21	22.2	20.7	19.5
02:45:00	10 BD	00:30:00	33.7	20.8	22	20.6	19.3
03:15:00	10 BD	00:30:00	31.8	20.9	22.1	20.6	19.4
03:45:00	10 BD	00:30:00	38.3	20.8	22	20.6	19.3
04:15:00	10 BD	00:30:00	38.2	20.7	21.9	20.5	19.3
04:45:00	10 BD	00:30:00	33.2	20.9	22.1	20.6	19.3
05:15:00	10 BD	00:30:00	36.6	20.9	22	20.4	19.3
05:45:00	10 BD	00:30:00	42.3	20.8	21.9	20.5	19.3
06:15:00	10 BD	00:30:00	47.1	21.2	22.2	20.6	19.3
06:45:00	10 BD	00:30:00	34	21	22.2	20.5	19.3
07:15:00	10 BD	00:30:00	33.3	22.5	23.6	22.2	21
07:45:00	10 BD	00:30:00	35	22.5	23.7	22.2	21
08:15:00	10 BD	00:30:00	33.6	22.6	23.7	22.3	21.1
08:45:00	10 BD	00:30:00	42.4	22.6	23.6	22.2	21
09:15:00	10 BD	00:30:00	34.4	22.7	23.7	22.3	21.1
09:45:00	10 BD	00:30:00	34	22.6	23.7	22.3	21.1
10:15:00	10 BD	00:30:00	43.1	22.9	23.8	22.4	21.2
10:45:00	10 BD	00:30:00	29	22.7	23.9	22.5	21.3
11:15:00	10 BD	00:30:00	35.3	23.4	24.4	23.1	21.9
11:45:00	10 BD	00:30:00	36.6	23.6	24.7	23.3	22.1
12:15:00	10 BD	00:30:00	52.9	24.6	25	23.5	22.3
12:45:00	10 BD	00:30:00	44.6	23.9	24.9	23.3	22.1
13:15:00	10 BD	00:30:00	38.2	23.5	24.5	23.2	22
13:45:00	10 BD	00:30:00	70.2	45.2	25.1	23.3	22.1



Start	Plot	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
14:15:00	10 BD	00:30:00	49.3	24.5	25.3	23.3	22.1
14:45:00	10 BD	00:30:00	36.3	23.6	24.6	23.2	22
15:15:00	10 BD	00:30:00	43.7	23.6	24.5	23.1	22
15:45:00	10 BD	00:30:00	36.9	23.5	24.6	23.2	22.1
16:15:00	10 BD	00:30:00	33.2	23.5	24.6	23.2	22.1
16:45:00	10 BD	00:30:00	35	23.6	24.6	23.3	22.1
17:15:00	10 BD	00:30:00	50.4	25.3	24.7	23.3	22.1
17:45:00	10 BD	00:30:00	45.5	23.8	24.6	23.2	22.1
18:15:00	10 BD	00:30:00	38.7	23.7	24.7	23.4	22.2
18:45:00	10 BD	00:30:00	43.5	24.4	25.8	23.6	22.3
19:15:00	10 BD	00:30:00	51.4	24.3	25.2	23.7	22.4
19:45:00	10 BD	00:30:00	38.4	24.1	25.2	23.6	22.4
20:15:00	10 BD	00:30:00	39.7	24.3	25.5	23.8	22.5
20:45:00	10 BD	00:30:00	36	24.4	25.6	23.8	22.5
21:15:00	10 BD	00:30:00	42.8	24.8	25.5	23.6	22.4
21:45:00	10 BD	00:30:00	39.2	23.8	24.8	23.3	22.2
22:15:00	10 BD	00:30:00	38.5	23.4	24.5	23.2	22
22:45:00	10 BD	00:30:00	51.9	23.8	24.2	22.8	21.3
23:15:00	10 BD	00:30:00	29.7	21.6	22.8	21.3	20
23:45:00	10 BD	00:30:00	34.8	21.7	22.9	21.4	20
Sunday 5 th November 2023							
00:15:00	10 BD	00:30:00	49.8	23.3	23.5	21.8	20.5
00:45:00	10 BD	00:30:00	50.2	21.9	22.7	21	19.7
01:15:00	10 BD	00:30:00	35.2	21.1	22.3	20.9	19.6
01:45:00	10 BD	00:30:00	38.7	21.3	22.4	20.8	19.5
02:15:00	10 BD	00:30:00	46.9	22.2	22.8	20.9	19.5
02:45:00	10 BD	00:30:00	32.6	19.1	21.5	17.7	15.8
03:15:00	10 BD	00:30:00	25.5	16.7	18	16.3	15.4
03:45:00	10 BD	00:30:00	28.5	16.8	18.1	16.4	15.4
04:15:00	10 BD	00:30:00	36.1	16.9	17.8	16.2	15.3
04:45:00	10 BD	00:30:00	27.9	16.4	17.5	16.1	15.3
05:15:00	10 BD	00:30:00	26.7	16.3	17.3	16	15.1
05:45:00	10 BD	00:30:00	33.2	16.6	17.1	16	15.2
06:15:00	10 BD	00:30:00	30	16	16.8	15.7	15
06:45:00	10 BD	00:30:00	42.9	16.9	17.5	16.1	15.3
07:15:00	10 BD	00:30:00	40	16.8	17.5	16.1	15.3
07:45:00	10 BD	00:30:00	37.5	19.4	20.7	19.1	15.9
08:15:00	10 BD	00:30:00	34.7	20	21.2	19.6	18.5
08:45:00	10 BD	00:30:00	35.7	20.7	21.9	20	18.8
09:15:00	10 BD	00:30:00	38.4	20.5	21.6	20	18.8
09:45:00	10 BD	00:30:00	49.3	23	22.1	20.1	18.9
10:15:00	10 BD	00:30:00	34.8	20.5	21.6	20.2	18.9
10:45:00	10 BD	00:30:00	64.6	26.5	22.6	21.2	20.2
11:15:00	10 BD	00:30:00	33.6	21.7	22.7	21.4	20.3
11:45:00	10 BD	00:30:00	47.6	22.5	23.1	21.5	20.4
12:15:00	10 BD	00:30:00	37.4	22.6	24.2	21.9	20.5
12:45:00	10 BD	00:30:00	47.4	24	25.2	23.3	22.1
13:15:00	10 BD	00:30:00	40.9	23.8	24.7	23.2	22
13:45:00	10 BD	00:30:00	40.9	24.2	25	23.3	22.1



Start	Plot	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
14:15:00	10 BD	00:30:00	34.7	23.5	24.6	23.3	22.2
14:45:00	10 BD	00:30:00	47.7	24.1	25.5	23.4	22.2
15:15:00	10 BD	00:30:00	37.4	24.5	27	23.6	22.3
15:45:00	10 BD	00:30:00	41.4	23.9	24.9	23.5	22.3
16:15:00	10 BD	00:30:00	55.4	24.8	25.3	23.6	22.4
16:45:00	10 BD	00:30:00	38.6	23.9	25	23.4	22.2
17:15:00	10 BD	00:30:00	36	23.7	24.8	23.5	22.3
17:45:00	10 BD	00:30:00	39.5	24	25.1	23.5	22.3
18:15:00	10 BD	00:30:00	34	24.5	26	23.9	22.5
18:45:00	10 BD	00:30:00	39.2	24	25.6	23.5	21
19:15:00	10 BD	00:30:00	48.1	23.6	25.4	22	20.2
19:45:00	10 BD	00:30:00	43.2	23.8	26.2	22	20.2
20:15:00	10 BD	00:30:00	43	23.4	26.8	21.4	19.8
20:45:00	10 BD	00:30:00	44.7	22	23.1	20.8	19.4
21:15:00	10 BD	00:30:00	40.7	21.2	22.5	20.5	19.3
21:45:00	10 BD	00:30:00	35.3	20.9	22.1	20.4	19.1
22:15:00	10 BD	00:30:00	35.2	20.4	21.5	20	18.8
22:45:00	10 BD	00:30:00	34.6	19.2	21.1	18.7	16
23:15:00	10 BD	00:30:00	47.9	19.3	19.9	17.2	15.9
23:45:00	10 BD	00:30:00	42.8	18.7	19.6	17.2	16.1
Monday 6 th November 2023							
00:15:00	10 BD	00:30:00	34.9	17.4	18.7	16.8	15.8
00:45:00	10 BD	00:30:00	37.1	18.2	18.5	16.6	15.6
01:15:00	10 BD	00:30:00	38.1	16.8	17.8	16.2	15.3
01:45:00	10 BD	00:30:00	44.3	18.2	18.7	16.3	15.3
02:15:00	10 BD	00:30:00	44.4	17.3	17.6	15.9	15.1
02:45:00	10 BD	00:30:00	41.1	18.2	18.7	16.9	15.8
03:15:00	10 BD	00:30:00	45	18.6	20.8	16.2	15.3
03:45:00	10 BD	00:30:00	38	16.5	16.6	15.6	14.9
04:15:00	10 BD	00:30:00	36.5	16.3	16.9	15.8	15.1
04:45:00	10 BD	00:30:00	31.6	16	16.5	15.6	14.9
05:15:00	10 BD	00:30:00	41.5	16.6	17.1	16	15.3
05:45:00	10 BD	00:30:00	36	17.2	18	16.4	15.5
06:15:00	10 BD	00:30:00	40.1	19.4	20.4	16.9	15.9
06:45:00	10 BD	00:30:00	39	19	20.7	17.5	16.4
07:15:00	10 BD	00:30:00	36.8	20.4	22	19.8	17.2
07:45:00	10 BD	00:30:00	68.7	31.8	23.6	21	19.7
08:15:00	10 BD	00:30:00	52	26.9	27	21.6	20
08:45:00	10 BD	00:30:00	63.5	33	37	21.5	20
Measurements highlighted in grey have been removed from the summary measurements as these are instances of noise intrusion from someone likely entering the flat during the measurement procedure							

Table B1 – Fully tabulated internal noise measurement results for Flat 10 Bedroom



Start	Plot	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Friday 3 rd November 2023							
16:15:00	10 KL	00:30:00	76.2	45.9	26.5	22.7	21.3
16:45:00	10 KL	00:30:00	58.4	26.4	25.7	23.9	22.6
17:15:00	10 KL	00:30:00	59.6	26.6	25.8	24	22.8
17:45:00	10 KL	00:30:00	44.5	25	26	24.2	22.9
18:15:00	10 KL	00:30:00	50.5	26.3	27.2	24.4	23
18:45:00	10 KL	00:30:00	39.3	24.4	25.7	23.9	22.6
19:15:00	10 KL	00:30:00	43.5	25.1	26.8	24.2	22.8
19:45:00	10 KL	00:30:00	51.8	28.1	28.1	25.6	23.6
20:15:00	10 KL	00:30:00	54.3	27.4	27.1	24.5	23
20:45:00	10 KL	00:30:00	53.8	29.5	29.6	25.9	24.1
21:15:00	10 KL	00:30:00	51.9	29.7	29.8	24.9	23.3
21:45:00	10 KL	00:30:00	44	25.1	26.1	24.1	22.8
22:15:00	10 KL	00:30:00	40.5	24.6	25.8	24.2	22.9
22:45:00	10 KL	00:30:00	43.1	23.4	24.8	22.8	21.4
23:15:00	10 KL	00:30:00	41.1	22.4	23.4	21.9	20.6
23:45:00	10 KL	00:30:00	39.6	22	23.2	21.4	20.1
Saturday 4 th November 2023							
00:15:00	10 KL	00:30:00	49.3	23.4	23.1	21.3	20.1
00:45:00	10 KL	00:30:00	37.9	21.6	22.8	21.3	20.1
01:15:00	10 KL	00:30:00	34.8	21.5	22.7	21	19.8
01:45:00	10 KL	00:30:00	42.9	22	22.3	20.9	19.8
02:15:00	10 KL	00:30:00	35.8	21	22.1	20.6	19.6
02:45:00	10 KL	00:30:00	28.6	20.9	22	20.6	19.5
03:15:00	10 KL	00:30:00	38.2	21.1	22.2	20.8	19.7
03:45:00	10 KL	00:30:00	44.5	21.6	22	20.5	19.4
04:15:00	10 KL	00:30:00	27.3	21	22.1	20.7	19.6
04:45:00	10 KL	00:30:00	35.9	20.8	21.8	20.4	19.4
05:15:00	10 KL	00:30:00	39.4	21.4	22	20.5	19.4
05:45:00	10 KL	00:30:00	56.9	23.6	22.8	20.8	19.5
06:15:00	10 KL	00:30:00	35.8	22	23.5	20.7	19.4
06:45:00	10 KL	00:30:00	42.9	22	22.3	20.6	19.6
07:15:00	10 KL	00:30:00	35.7	23.6	25	23.2	21.8
07:45:00	10 KL	00:30:00	37.4	23.8	25.2	23.3	21.9
08:15:00	10 KL	00:30:00	63.7	27	25	23.2	21.8
08:45:00	10 KL	00:30:00	34	23.6	24.9	23.1	21.8
09:15:00	10 KL	00:30:00	38.5	23.7	25.1	23.2	21.9
09:45:00	10 KL	00:30:00	57	24.6	24.9	23.1	21.8
10:15:00	10 KL	00:30:00	46.6	24.3	25.2	23.3	22
10:45:00	10 KL	00:30:00	45.2	23.7	25.1	23.3	21.9
11:15:00	10 KL	00:30:00	39.6	24.3	25.6	23.9	22.5
11:45:00	10 KL	00:30:00	40.8	24.3	25.6	23.9	22.5
12:15:00	10 KL	00:30:00	46.2	24.8	25.8	23.9	22.6
12:45:00	10 KL	00:30:00	51.5	27.2	26.4	23.9	22.5
13:15:00	10 KL	00:30:00	35.3	23.9	25.2	23.5	22.3
13:45:00	10 KL	00:30:00	78.7	55.1	25.8	23.9	22.6
14:15:00	10 KL	00:30:00	52.9	25.4	26.1	23.9	22.4
14:45:00	10 KL	00:30:00	41.5	24.7	25.7	23.8	22.5
15:15:00	10 KL	00:30:00	41.4	24.5	25.5	23.7	22.4



Start	Plot	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
15:45:00	10 KL	00:30:00	38	24.3	25.5	23.7	22.4
16:15:00	10 KL	00:30:00	36.1	24.4	25.7	24.1	22.8
16:45:00	10 KL	00:30:00	37.3	24.3	25.7	23.9	22.5
17:15:00	10 KL	00:30:00	50.4	25.8	25.7	23.9	22.6
17:45:00	10 KL	00:30:00	47.8	25.4	25.9	23.9	22.6
18:15:00	10 KL	00:30:00	45.4	24.7	25.9	24	22.6
18:45:00	10 KL	00:30:00	43.5	25.1	26.3	24.3	22.9
19:15:00	10 KL	00:30:00	46.1	25	26.3	24.4	22.9
19:45:00	10 KL	00:30:00	38.4	25.4	26.7	24.6	23.1
20:15:00	10 KL	00:30:00	46.1	25.8	27.1	24.6	23.1
20:45:00	10 KL	00:30:00	48.2	27.5	28.6	26	23.9
21:15:00	10 KL	00:30:00	42.1	26.2	27.9	24.6	22.9
21:45:00	10 KL	00:30:00	37.4	24.1	25.4	23.8	22.5
22:15:00	10 KL	00:30:00	38.6	24.2	25.5	23.9	22.6
22:45:00	10 KL	00:30:00	46.8	24	25.2	23.2	21.4
23:15:00	10 KL	00:30:00	34.5	22	23.4	21.6	20.4
23:45:00	10 KL	00:30:00	38.2	22.4	23.4	21.8	20.5
Sunday 5 th November 2023							
00:15:00	10 KL	00:30:00	40.9	22.5	23.4	21.7	20.5
00:45:00	10 KL	00:30:00	35.9	21.9	23.2	21.5	20.3
01:15:00	10 KL	00:30:00	44.6	21.7	22.7	21.1	19.9
01:45:00	10 KL	00:30:00	42	21.9	23	21.1	19.8
02:15:00	10 KL	00:30:00	46.7	22.6	23.1	21.2	19.9
02:45:00	10 KL	00:30:00	36.5	19.7	21.6	18.7	16.9
03:15:00	10 KL	00:30:00	29.5	18.5	19.7	18.2	17.1
03:45:00	10 KL	00:30:00	31.9	18.3	19.4	17.8	16.4
04:15:00	10 KL	00:30:00	28.3	17.9	19.2	17.5	16.1
04:45:00	10 KL	00:30:00	31.4	18.1	19.4	17.7	16.7
05:15:00	10 KL	00:30:00	31.1	17.6	18.6	17.1	16
05:45:00	10 KL	00:30:00	36.6	18.9	19.5	17.7	16.7
06:15:00	10 KL	00:30:00	30.3	17.2	18	17	16.3
06:45:00	10 KL	00:30:00	30.2	18.6	19.5	18	17
07:15:00	10 KL	00:30:00	36.1	19	20.1	18.5	17.2
07:45:00	10 KL	00:30:00	30.4	21.3	23.2	21.1	16.9
08:15:00	10 KL	00:30:00	35.5	22.6	23.9	22.2	20.7
08:45:00	10 KL	00:30:00	42.5	23.7	24.9	22.8	21.1
09:15:00	10 KL	00:30:00	42.5	23.9	25	23.2	21.5
09:45:00	10 KL	00:30:00	51.2	24.5	24.1	22.2	20.8
10:15:00	10 KL	00:30:00	33.9	22.1	23.4	21.8	20.4
10:45:00	10 KL	00:30:00	41.1	24.2	25.1	22.9	21.5
11:15:00	10 KL	00:30:00	51.2	27.1	24.6	22.6	21.3
11:45:00	10 KL	00:30:00	49.1	23.8	24.4	22.6	21.3
12:15:00	10 KL	00:30:00	50.8	27.7	28.1	23.4	21.8
12:45:00	10 KL	00:30:00	47.4	24.6	25.2	23.6	22.3
13:15:00	10 KL	00:30:00	51.6	26	25.8	23.9	22.6
13:45:00	10 KL	00:30:00	48.6	25.5	26.4	23.9	22.6
14:15:00	10 KL	00:30:00	34.3	24	25.2	23.7	22.5
14:45:00	10 KL	00:30:00	42.3	24.5	25.4	23.7	22.5
15:15:00	10 KL	00:30:00	37.5	24.2	25.4	23.8	22.6



Start	Plot	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
15:45:00	10 KL	00:30:00	45.2	24.3	25.5	23.9	22.6
16:15:00	10 KL	00:30:00	45.4	24.4	25.7	23.8	22.5
16:45:00	10 KL	00:30:00	48.5	27	27.3	24.4	22.8
17:15:00	10 KL	00:30:00	33.8	24.3	25.6	23.9	22.6
17:45:00	10 KL	00:30:00	41.8	24.9	25.8	23.9	22.6
18:15:00	10 KL	00:30:00	43.1	25.2	26.6	24.4	22.9
18:45:00	10 KL	00:30:00	36	24.5	26	24	22.3
19:15:00	10 KL	00:30:00	42.4	26	28.1	23.7	21.5
19:45:00	10 KL	00:30:00	43	27.3	29.9	25.7	22.7
20:15:00	10 KL	00:30:00	42.8	24.2	25.6	23.1	21.5
20:45:00	10 KL	00:30:00	44.9	23.9	24.9	22.6	20.9
21:15:00	10 KL	00:30:00	47.1	23.2	24.5	22.7	21.3
21:45:00	10 KL	00:30:00	43.9	23.4	24.5	22.5	20.9
22:15:00	10 KL	00:30:00	39.1	22.6	24	22.2	20.7
22:45:00	10 KL	00:30:00	36.1	21.4	23.3	20.8	18.3
23:15:00	10 KL	00:30:00	43.9	21.7	23.9	18.4	16.9
23:45:00	10 KL	00:30:00	46.1	23.1	25.3	21.1	18.6
Monday 6 th November 2023							
00:15:00	10 KL	00:30:00	32	22.4	25.7	20.6	17.9
00:45:00	10 KL	00:30:00	41.9	22.4	24.3	20.1	17.8
01:15:00	10 KL	00:30:00	32	20.6	23.4	19.2	16.9
01:45:00	10 KL	00:30:00	37.7	21.9	24.1	19	16.9
02:15:00	10 KL	00:30:00	32	19.5	21.5	18.3	16.6
02:45:00	10 KL	00:30:00	34.1	20.2	22.2	19.4	17.4
03:15:00	10 KL	00:30:00	31.4	19.6	21.4	18.6	17.1
03:45:00	10 KL	00:30:00	34.4	18.4	19.9	17.8	16.5
04:15:00	10 KL	00:30:00	34.3	19.6	21.5	18.6	17.1
04:45:00	10 KL	00:30:00	39.9	19	20.6	18.1	16.9
05:15:00	10 KL	00:30:00	30.1	19.3	20.8	18.7	17.4
05:45:00	10 KL	00:30:00	31.3	19.6	21.3	18.6	17.3
06:15:00	10 KL	00:30:00	41.7	22.2	23.2	19.6	18.1
06:45:00	10 KL	00:30:00	35.3	21.4	23.4	20.1	18.4
07:15:00	10 KL	00:30:00	43.2	22.9	24.4	22	20
07:45:00	10 KL	00:30:00	84.3	47.2	25.7	22.8	21.2
08:15:00	10 KL	00:30:00	54.4	28.8	28.4	23.7	21.9
08:45:00	10 KL	00:30:00	79.3	44.7	40.1	23.9	21.9
Measurements highlighted in grey have been removed from the summary measurements as these are instances of noise intrusion from someone likely entering the flat during the measurement procedure							

Table B1 – Fully tabulated internal noise measurement results for Flat 10 Living Room

Appendix C – Graphed Results

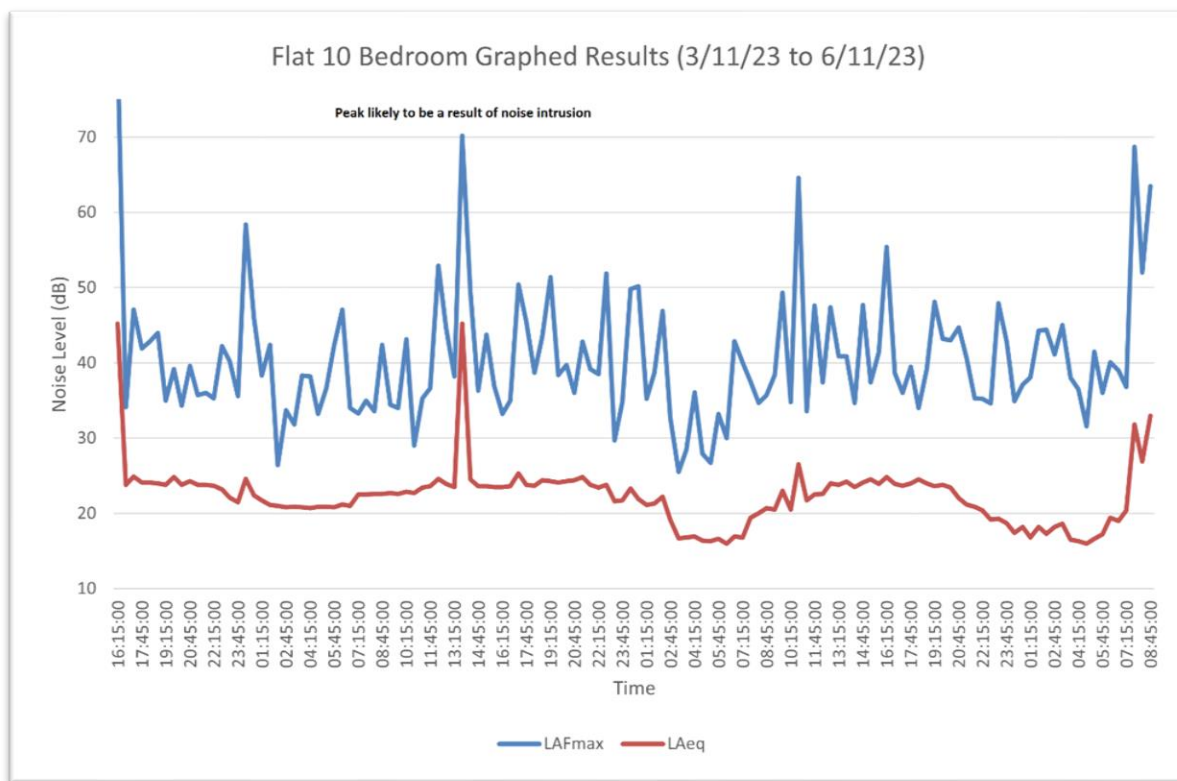


Figure C1 – Flat 10 Bedroom graphed measurement data

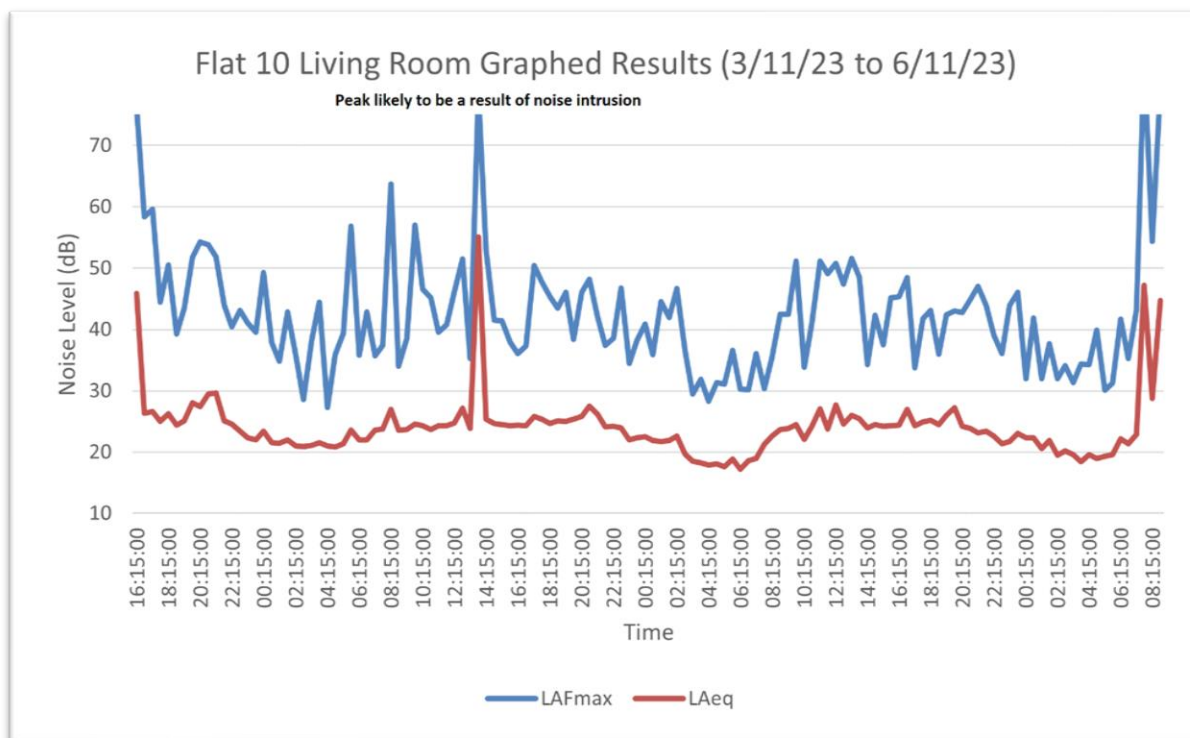


Figure C2 – Flat 10 Living room graphed measurement data