



Azymuth Acoustics UK

Professional Acoustic Services

Acoustic Testing Report

Ref: AA0405.2

31 Bridge Street
Heywood

On behalf of

ERT Developments Ltd

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Rochdale
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This report has been prepared by Azymuth Acoustics UK with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our Standard Terms and Conditions of Business and taking into account the resources devoted to it by agreement with the Client.

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This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own discretion and risk.

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1.0 Introduction

Azymuth Acoustics UK (henceforth AAUK) were appointed by ERT Developments Ltd to undertake acoustic testing on a change of use block of flats located at 31 Bridge Street, Heywood.

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 the mitigation advice issued in the previous noise impact 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 SvanTek 977 type 1 precision noise monitoring system. 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 first-floor Bedroom window in Flat 5. This apartment was chosen as it would be deemed to be one of the worst dwellings affected by the traffic noise. 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 the Bedroom of Flat 8 were undertaken over a continuous period between 13:46hrs on Friday 27th and 7:46hrs on Monday 30th 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
- Rochdale Borough Council: 21/01320/FUL Planning Condition 4

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 Rochdale Borough Council: 21/01320/FUL Planning Condition 4

The following has been issued by Rochdale Borough Council in relation to discharging the planning condition:

'The development hereby approved shall be constructed in complete accordance with the recommendations of sections 5.2-5.4 inclusive of the submitted Noise Impact Assessment ref. AA0405 by Azymuth Acoustics dated 04th January 2021. The development hereby approved shall not be first brought into use until a verification report has been submitted to and approved in writing by the Local Planning Authority'

The recommendations provided in the Azymuth Acoustics report intended to fulfil the following assessment criteria:

- Daytime noise levels not to exceed 35dB $L_{Aeq, 16hr}$ in living rooms / bedrooms
- Daytime noise levels not to exceed 40dB $L_{Aeq, 16hr}$ in dining room / kitchen
- Night-time noise levels in bedrooms not to exceed 30dB $L_{Aeq, 8hr}$
- Night-time single sound events in bedrooms not to exceed 45dB L_{Amax} more than 15 times a night



3.0 Assessment of Results

3.1 Flat 8: Bedroom

The following table summarises the noise measurement data for the Bedroom of Flat 8 over the measurement period.

Location	Period	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Flat 8 Bedroom	Day	49.4	33.8	36.0	31.1	24.0
Flat 8 Bedroom	Night	45.5	27.9	30.8	16.3	8.8

Table 3 – Summary of daytime and night-time noise levels Flat 8 Bedroom

- 15th highest night-time L_{Amax} value = 41.8dB inside Bedroom of Flat 8
- 10th highest night-time L_{Amax} value = 43.1dB inside Bedroom of Flat 8

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

4.0 Summary

Azymuth were appointed by ERT Developments Ltd to undertake acoustic testing at the 31 Bridge Street, Heywood site.

A planning condition was issued by Rochdale Borough Council, this condition stated that a verification report would have to be completed in order to validate that the recommendations, in relation to noise mitigation, had been adhered to.

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 8 were measured to be 33.8dB L_{Aeq, 16hr}, the night-time noise levels in the bedroom were measured to be 27.9dB L_{Aeq, 8hr}. The 15th highest night-time L_{Amax} value was measured to be 41.8dB. The measured noise levels are compliant with the target criteria.



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 27 th January 2023							
13:46	Flat 8 BD	00:30:00	51.3	34.5	36.9	33.4	28.5
14:16	Flat 8 BD	00:30:00	70.6	43	37.5	33.7	28.9
14:46	Flat 8 BD	00:30:00	48	34	36.6	33	28.2
15:16	Flat 8 BD	00:30:00	45.2	33.3	36.2	31.9	27.5
15:46	Flat 8 BD	00:30:00	46.6	33.8	36.3	32.7	28.3
16:16	Flat 8 BD	00:30:00	53.2	32.6	35.4	31.3	26.9
16:46	Flat 8 BD	00:30:00	42.6	33	35.9	32.2	26.7
17:16	Flat 8 BD	00:30:00	47	32.8	35.4	31.9	27.3
17:46	Flat 8 BD	00:30:00	50.4	33.8	36.5	32.8	27.8
18:16	Flat 8 BD	00:30:00	48.8	33.6	36.4	32.6	27.6
18:46	Flat 8 BD	00:30:00	50.5	34.2	36.9	33.2	27.8
19:16	Flat 8 BD	00:30:00	47.2	34.3	37.2	33.5	27
19:46	Flat 8 BD	00:30:00	61.7	34.3	36.5	32.9	26.4
20:16	Flat 8 BD	00:30:00	51.7	33.6	36.7	32.3	25.4
20:46	Flat 8 BD	00:30:00	48.1	33	36.2	31.4	23.1
21:16	Flat 8 BD	00:30:00	47.9	32.8	36.2	30.9	23.1
21:46	Flat 8 BD	00:30:00	49.1	32.3	35.6	30.2	23.1
22:16	Flat 8 BD	00:30:00	48	32.2	35.7	30.5	23.1
22:46	Flat 8 BD	00:30:00	48.8	31.4	35	29.1	19.8
23:16	Flat 8 BD	00:30:00	46.3	31.4	35.3	29	19.8
23:46	Flat 8 BD	00:30:00	44.3	30.5	34.7	27.1	15.6
Saturday 28 th January 2023							
00:16	Flat 8 BD	00:30:00	43.8	29.1	33.5	22.9	11.1
00:46	Flat 8 BD	00:30:00	43.9	28.6	33.2	21.7	7.8
01:16	Flat 8 BD	00:30:00	45.6	27.6	32.1	18.3	7.6
01:46	Flat 8 BD	00:30:00	59.6	29.8	33.3	19.5	7.6
02:16	Flat 8 BD	00:30:00	43.3	25.4	30.6	12.6	7.2
02:46	Flat 8 BD	00:30:00	43.4	24.7	28.1	7.8	7.1
03:16	Flat 8 BD	00:30:00	52.4	23.7	26.8	7.8	7.1
03:46	Flat 8 BD	00:30:00	42.5	24.4	28.3	7.8	7.1
04:16	Flat 8 BD	00:30:00	41	22.1	24.1	7.7	7.1
04:46	Flat 8 BD	00:30:00	42.7	23.9	28.1	7.8	7.1
05:16	Flat 8 BD	00:30:00	43.1	25.2	29.2	7.9	7.1
05:46	Flat 8 BD	00:30:00	43.6	28.2	33.4	19.5	7.4
06:16	Flat 8 BD	00:30:00	48.9	28.9	34.1	18.2	7.3
06:46	Flat 8 BD	00:30:00	42.6	28.8	33.7	21.3	7.7
07:16	Flat 8 BD	00:30:00	51.2	29.8	33.7	21.4	7.7
07:46	Flat 8 BD	00:30:00	53.4	31.7	35.2	27.3	15.3
08:16	Flat 8 BD	00:30:00	45.7	31.8	35.9	29	17
08:46	Flat 8 BD	00:30:00	47.1	33.6	36.9	32.1	22.9
09:16	Flat 8 BD	00:30:00	44.8	34.3	37.4	33.4	25.7
09:46	Flat 8 BD	00:30:00	46.1	33.6	36.5	33	25.8
10:16	Flat 8 BD	00:30:00	44.4	33.3	36	32.6	27.3
10:46	Flat 8 BD	00:30:00	51.9	33	35.7	31.9	27
11:16	Flat 8 BD	00:30:00	50.5	32.3	34.8	30.8	26.4



Start	Plot	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
11:46	Flat 8 BD	00:30:00	44.5	31.7	34.6	30.7	25.9
12:16	Flat 8 BD	00:30:00	42.8	31.7	34.4	30.9	26.4
12:46	Flat 8 BD	00:30:00	64	34	32.2	28.3	25.2
13:16	Flat 8 BD	00:30:00	44.2	30.7	33.5	29.5	25.3
13:46	Flat 8 BD	00:30:00	49	32.7	35.5	31.1	27.1
14:16	Flat 8 BD	00:30:00	47	31.2	33.8	30.3	25.5
14:46	Flat 8 BD	00:30:00	47.4	32.3	35.3	31.1	25.7
15:16	Flat 8 BD	00:30:00	61.9	33.7	35.9	32.4	26.8
15:46	Flat 8 BD	00:30:00	55.3	33.8	36.4	32.6	26.6
16:16	Flat 8 BD	00:30:00	45.8	33.8	36.6	33.1	27.3
16:46	Flat 8 BD	00:30:00	49.3	34.1	36.8	33.4	28
17:16	Flat 8 BD	00:30:00	47.3	34	36.9	33.1	27.4
17:46	Flat 8 BD	00:30:00	55.2	34.7	36.4	33.2	28.4
18:16	Flat 8 BD	00:30:00	45.9	33.6	36.2	33	27.9
18:46	Flat 8 BD	00:30:00	46.7	34	36.6	33.4	28.1
19:16	Flat 8 BD	00:30:00	53.1	33.6	36.5	32.3	25.9
19:46	Flat 8 BD	00:30:00	46.9	33.2	36.3	32.1	25.4
20:16	Flat 8 BD	00:30:00	53.8	33	36	30.7	22.9
20:46	Flat 8 BD	00:30:00	47.2	31.9	35.5	29.5	22.4
21:16	Flat 8 BD	00:30:00	53.2	33.8	36.6	32	25.9
21:46	Flat 8 BD	00:30:00	49.3	33.7	36.8	32	25.3
22:16	Flat 8 BD	00:30:00	47.4	31.9	35.4	29.8	22.3
22:46	Flat 8 BD	00:30:00	46.7	31.2	35.1	28.5	20
23:16	Flat 8 BD	00:30:00	50.4	31	34.9	27.7	17.1
23:46	Flat 8 BD	00:30:00	51.8	30.5	34.1	25.5	12.6
Sunday 29 th January 2023							
00:16	Flat 8 BD	00:30:00	57.3	31.5	34.2	24.3	8
00:46	Flat 8 BD	00:30:00	56.4	29.8	33.8	23.2	9.1
01:16	Flat 8 BD	00:30:00	42.7	27.7	32.7	18.6	7.4
01:46	Flat 8 BD	00:30:00	40.6	27	31.8	18.9	7.8
02:16	Flat 8 BD	00:30:00	42.5	27.3	32.2	16.4	7.3
02:46	Flat 8 BD	00:30:00	42.8	25.2	30	14.6	7.2
03:16	Flat 8 BD	00:30:00	43.6	25.5	30.4	8.7	7.2
03:46	Flat 8 BD	00:30:00	43.6	24.9	29.2	7.8	7.1
04:16	Flat 8 BD	00:30:00	41.6	24.3	28.3	7.8	7.1
04:46	Flat 8 BD	00:30:00	41.7	22.8	25.4	7.7	7.1
05:16	Flat 8 BD	00:30:00	43.8	25	29.1	7.9	7.1
05:46	Flat 8 BD	00:30:00	50.3	27.3	32	13.8	7.2
06:16	Flat 8 BD	00:30:00	42.6	26.4	31	12.6	7.2
06:46	Flat 8 BD	00:30:00	52.4	29.8	33.1	17.5	7.3
07:16	Flat 8 BD	00:30:00	42.9	27.5	32.6	15.9	7.2
07:46	Flat 8 BD	00:30:00	46.4	28.8	33.5	20.6	7.5
08:16	Flat 8 BD	00:30:00	46	29.7	34.4	22.8	7.9
08:46	Flat 8 BD	00:30:00	44.4	31	35.3	26.7	12.7
09:16	Flat 8 BD	00:30:00	42.8	31.6	35.7	28.8	17
09:46	Flat 8 BD	00:30:00	45.3	32.8	36.5	30.8	20.6
10:16	Flat 8 BD	00:30:00	43.4	33.9	37	32.9	24.6
10:46	Flat 8 BD	00:30:00	65.1	37.3	37.5	33.7	25.6
11:16	Flat 8 BD	00:30:00	55.4	35.2	37.4	33.8	26.8



Start	Plot	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
11:46	Flat 8 BD	00:30:00	48	34.6	37.2	33.9	28.3
12:16	Flat 8 BD	00:30:00	49.6	34.9	37.4	34.3	29.9
12:46	Flat 8 BD	00:30:00	51.1	35.1	37.5	34.6	29.8
13:16	Flat 8 BD	00:30:00	55.4	35.3	37.4	34.2	29
13:46	Flat 8 BD	00:30:00	52.4	34.9	37.2	33.7	28.6
14:16	Flat 8 BD	00:30:00	51.4	35.1	37.6	34.3	29.3
14:46	Flat 8 BD	00:30:00	55.9	35.3	37.5	34.2	28.8
15:16	Flat 8 BD	00:30:00	45.4	34.7	37.4	34	28.6
15:46	Flat 8 BD	00:30:00	45.3	34.3	37.1	33.6	28
16:16	Flat 8 BD	00:30:00	48.2	34.2	36.9	33.5	27.3
16:46	Flat 8 BD	00:30:00	45.4	33.8	36.8	33.1	25.2
17:16	Flat 8 BD	00:30:00	51.7	33.2	36.5	32	23.4
17:46	Flat 8 BD	00:30:00	52	32.8	35.9	31.5	22.4
18:16	Flat 8 BD	00:30:00	41.8	32.5	35.7	31.6	23.2
18:46	Flat 8 BD	00:30:00	54.2	33.6	36.1	32.1	24.8
19:16	Flat 8 BD	00:30:00	44.9	32.8	36.2	31.4	23.1
19:46	Flat 8 BD	00:30:00	42.8	32.2	35.8	30.6	21.5
20:16	Flat 8 BD	00:30:00	53.8	32.7	35.6	29.8	20.1
20:46	Flat 8 BD	00:30:00	69.6	37.8	35.1	28.1	18.6
21:16	Flat 8 BD	00:30:00	45.3	30.6	34.6	27.9	17.8
21:46	Flat 8 BD	00:30:00	47.1	30.9	34.8	27.7	18.5
22:16	Flat 8 BD	00:30:00	42.8	29.9	34.1	26.4	17.8
22:46	Flat 8 BD	00:30:00	42.3	29.2	34	23.7	14.7
23:16	Flat 8 BD	00:30:00	46	28.8	33.3	22.1	11.4
23:46	Flat 8 BD	00:30:00	41.2	26.1	30.7	16.4	7.6
Monday 30 th January 2023							
00:16	Flat 8 BD	00:30:00	47.2	27.3	31.7	20.1	8.6
00:46	Flat 8 BD	00:30:00	49	26.3	30.2	18	7.7
01:16	Flat 8 BD	00:30:00	41.9	25.8	29.6	16	7.4
01:46	Flat 8 BD	00:30:00	42.1	24.1	27.3	12.9	7.3
02:16	Flat 8 BD	00:30:00	46.1	23.6	25.7	10.5	7.2
02:46	Flat 8 BD	00:30:00	40.4	20.2	21.8	9.2	7.2
03:16	Flat 8 BD	00:30:00	43	22.1	23.6	9.6	7.2
03:46	Flat 8 BD	00:30:00	43.1	24.4	26.7	11.7	7.2
04:16	Flat 8 BD	00:30:00	42.1	24.1	27.8	14.8	7.4
04:46	Flat 8 BD	00:30:00	43.2	24	27.5	13.1	7.3
05:16	Flat 8 BD	00:30:00	44.5	27	31.5	14.2	7.2
05:46	Flat 8 BD	00:30:00	47.1	31.8	36.1	26.8	12.5
06:16	Flat 8 BD	00:30:00	49.3	31.5	35.7	26.5	13.3
06:46	Flat 8 BD	00:30:00	45.8	33.4	37	31.8	19.2
07:16	Flat 8 BD	00:30:00	47	34.1	37.4	33	24.3
07:46	Flat 8 BD	00:30:00	44.5	35	37.8	34.3	27.8

Table B1 – Fully tabulated internal noise measurement results for Flat 8 Bedroom

Appendix C – Graphed Results

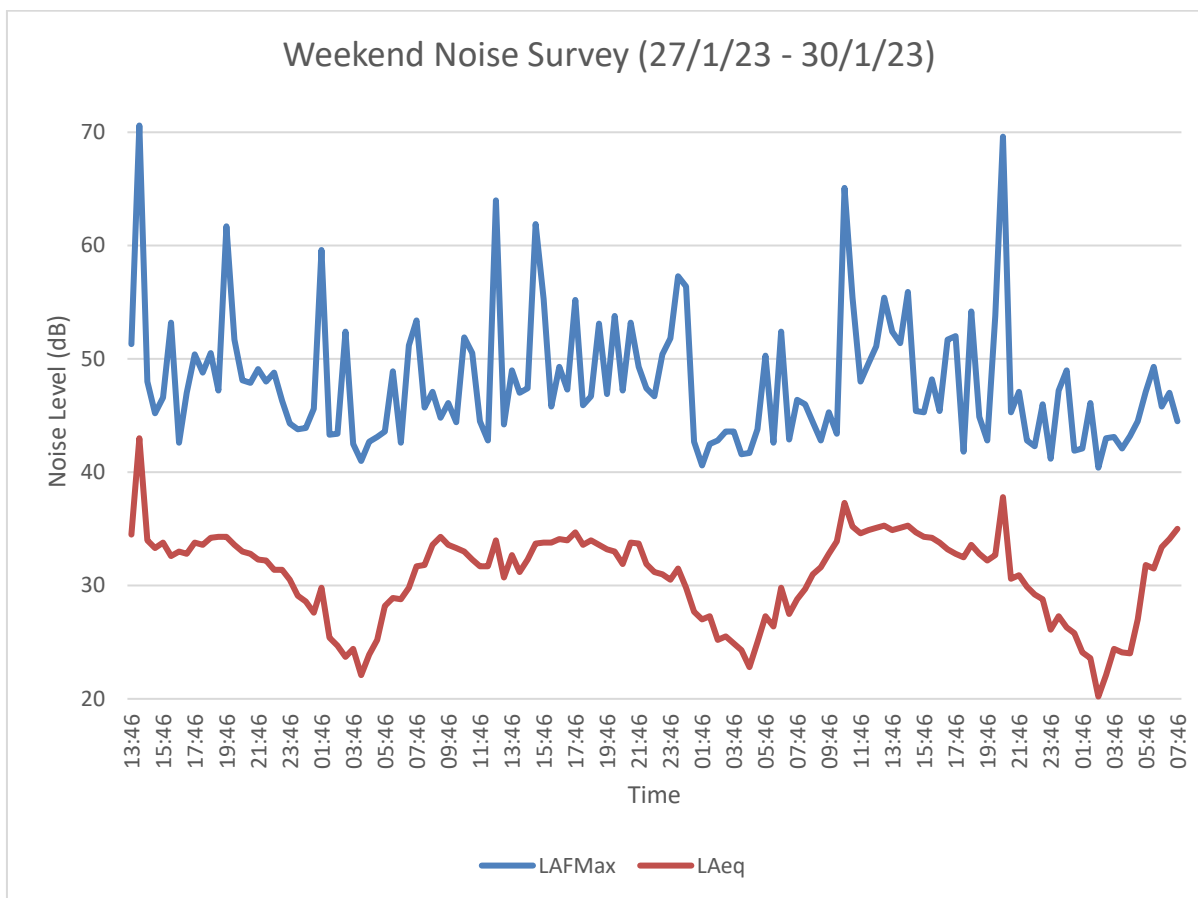


Figure C1 – Flat 8 Bedroom graphed measurement data