



Azymuth Acoustics UK

Professional Acoustic Services

Acoustic Testing Report

Ref: Z49572.3

**Crossley Street
Gorton**

On behalf of

Mears Limited

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1.0 Introduction

Azymuth Acoustics UK (henceforth AAUK) were appointed by Mears Limited to undertake acoustic testing on the new build development site located on Crossley Street, Gorton. The site consists of 45no. new build houses.

Additional testing has been instructed in order to fulfil a planning condition in relation to internal noise levels. The planning application refers to the noise impact assessment that was carried out on site by PDA Ltd. in February 2019. 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 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 window in Plot 1 Bedroom 3 as well as ~1m from the first-floor window in Plot 36 Bedroom 2. 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 Plot 1 were undertaken over a continuous period between 09:53hrs on Tuesday 3rd and 08:23hrs on Wednesday 4th January 2023.

Measurements in the bedroom of Plot 36 were undertaken over a continuous period between 09:34hrs on Wednesday 4th and 11:04hrs on Thursday 5th 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, Condition 16

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 Condition 19 (Application number: 131962/JO/2021)

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

'The premises shall be acoustically insulated and treated in accordance with the noise mitigation advice given in section 7.0 of the PDA Ltd report, Ref. J002322/3532/WSC/1 dated 6th February 2019.



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.

Reason - To secure a reduction in noise from traffic or other sources in order to protect future residents from noise disturbance, pursuant to policies SP1, H1 and DM1 of the Manchester Core Strategy (2012)'

2.3.1 PDA Ltd. Recommendations and Requirements

The following table details the recommendations and requirements that were set out in the initial noise impact assessment issued by PDA Ltd (Section 7.3, Table 5).

Room	Minimum Glazing Rating R_w dB	Minimum combined Ventilator Rating D_{new}	Internal Noise level Target $L_{Aeq,T}$ dB Day/Night	Calculated Internal Noise Level $L_{Aeq,T}$ dB Day/Night	Internal Noise Level Target L_{Amax} dB Night	Calculated Internal Noise Level L_{Amax} dB Night
Bedroom	29	29 (any non-acoustic trickle vent)	35/30	27/22	45	37
Living Room	29	29 (any non-acoustic trickle vent)	35/-	27/-	-	-

Table 2 – Glazing and ventilation recommendations, PDA Ltd.

Based on the guidance above the following criteria has been identified with the aim of minimizing the impact of the environmental noise on the proposed new residential accommodation:

- Daytime noise levels not to exceed 35dB L_{Aeq} , 16hr bedrooms
- 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 Plot 1 Bedroom 3

The following table summarises the noise measurement data for the bedroom of Plot 1 over the measurement period.

Location	Period	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Plot 1 Bedroom 3	Day	48.4	30.9	34.1	24.9	19.6
Plot 1 Bedroom 3	Night	44.7	24.6	22.5	15.8	12.6

Table 3 – Summary of daytime and night-time noise levels Plot 1 Bedroom 3

- 15th highest night-time L_{Amax} value = 35.7dB inside Bedroom 3 Plot 1

3.2 Plot 36 Bedroom 2

The following table summarises the noise measurement data for the bedroom of Plot 36 over the measurement period.

Some instances of data during this measurement period have been discarded due to the intrusion of construction noise.

Location	Period	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Plot 36 Bedroom 2	Day	44.1	26.9	28.7	25.0	23.0
Plot 36 Bedroom 2	Night	39.4	23.0	23.6	20.6	19.1

Table 4 – Summary of daytime and night-time noise levels Plot 36 Bedroom 2

- 15th highest night-time L_{Amax} value = 33.6dB inside Bedroom 2 Plot 36

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



4.0 Summary

Azymuth were appointed by Mears Limited to undertake acoustic testing at the Crossley Street, Gorton site.

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

The daytime noise levels in Bedroom 3 of Plot 1 were measured to be 30.9dB $L_{Aeq, 16hr}$, the night-time noise levels in the bedroom were measured to be 24.6dB $L_{Aeq, 8hr}$. The 15th highest night-time L_{Amax} value was measured to be 35.7dB.

The daytime noise levels in Bedroom 2 of Plot 36 were measured to be 26.9dB $L_{Aeq, 16hr}$, the night-time noise levels in the bedroom were measured to be 23.0dB $L_{Aeq, 8hr}$. The 15th highest night-time L_{Amax} value was measured to be 33.6dB.

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}
Tuesday 3 rd January 2023							
09:53:00	1	00:30:00	48.9	30.3	33.7	26.2	23.3
10:23:00	1	00:30:00	54.8	31	33.7	23.5	19
10:53:00	1	00:30:00	49	29.7	32.6	24.4	18.6
11:23:00	1	00:30:00	46.1	31	34.9	26.6	20.3
11:53:00	1	00:30:00	48.7	31.7	35.1	26.5	20.8
12:23:00	1	00:30:00	56.5	32.4	35.2	26.7	21.3
12:53:00	1	00:30:00	50.9	32.2	36.4	26.4	20.2
13:23:00	1	00:30:00	49.7	31.5	35.6	27.4	22.1
13:53:00	1	00:30:00	45.6	30.8	34.7	25.8	19.4
14:23:00	1	00:30:00	46.6	30.6	35.3	24.4	18.3
14:53:00	1	00:30:00	49.3	30.4	34.7	23.4	18.7
15:23:00	1	00:30:00	46.7	30.8	35.4	23.1	18.5
15:53:00	1	00:30:00	50.5	31.6	36.2	24	18.5
16:23:00	1	00:30:00	53.2	31.9	36.3	25.1	18.8
16:53:00	1	00:30:00	45.7	31.2	36	24	18.9
17:23:00	1	00:30:00	46.6	31	35.4	24.7	19.9
17:53:00	1	00:30:00	46.3	31.4	35.8	25.8	20.3
18:23:00	1	00:30:00	46.8	30.8	34.4	25.1	20.1
18:53:00	1	00:30:00	47.2	31.5	35.3	26.9	19.6
19:23:00	1	00:30:00	49.9	30.3	34.1	24.3	19
19:53:00	1	00:30:00	48.5	31.3	35	25.6	19.8
20:23:00	1	00:30:00	47	31.4	33.9	28.3	24.2
20:53:00	1	00:30:00	46	30.9	33.7	27.7	22.4
21:23:00	1	00:30:00	43.6	28.5	30.5	24.9	18.8
21:53:00	1	00:30:00	43.3	28.2	30.6	24.4	18
22:23:00	1	00:30:00	45.1	27.2	29.4	21.2	16.8
22:53:00	1	00:30:00	46.4	26.7	28.1	20.5	16.2
23:23:00	1	00:30:00	52	26.5	26.3	18	15.4
23:53:00	1	00:30:00	46.2	31.2	34.8	26.1	17.7
Wednesday 4 th January 2023							
00:23:00	1	00:30:00	45.6	28.9	31	26.1	16.7
00:53:00	1	00:30:00	38.4	21.2	25.5	15.5	12.1
01:23:00	1	00:30:00	45.5	21.7	23.1	13.9	11.2
01:53:00	1	00:30:00	52.5	21.8	20.8	12.8	10.7
02:23:00	1	00:30:00	45.8	21.7	20.2	12.5	10
02:53:00	1	00:30:00	43.2	19.5	18	11.8	9.5
03:23:00	1	00:30:00	35.7	15	15.7	11.8	9.6
03:53:00	1	00:30:00	44.3	20.2	18.9	12.6	10.1
04:23:00	1	00:30:00	44.2	18.6	17.9	13.2	11
04:53:00	1	00:30:00	35.7	14.6	15.6	12.7	10.7
05:23:00	1	00:30:00	44	19.7	17.7	13.7	11.3
05:53:00	1	00:30:00	49.8	26.4	26.3	16.2	13.4
06:23:00	1	00:30:00	43.6	24.5	23.1	17.6	15.1
06:53:00	1	00:30:00	48.3	25.8	24.9	18.8	17.1
07:23:00	1	00:30:00	48.2	28.8	32.2	20.7	17.8



Start	Plot	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
07:53:00	1	00:30:00	44.8	28.9	33.1	20.9	18.1
08:23:00	1	00:30:00	58.6	34.3	36.6	28	20.5

Table B1 – Fully tabulated internal noise measurement results for Plot 1 Bedroom 3



Start	Plot	Time	L _{Amax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
Wednesday 4 th January 2023							
09:34:00	36	00:30:00	41.1	28.1	30.5	26.8	24.6
10:04:00	36	00:30:00	42.8	26.7	28.7	25.7	24
10:34:00	36	00:30:00	47	26.6	28.6	25.5	23.8
12:04:00	36	00:30:00	43.2	26.8	28.9	25.8	24
13:34:00	36	00:30:00	41.7	27.8	29.9	26.6	24.5
15:04:00	36	00:30:00	53.9	29.1	31.2	27.5	24.8
16:04:00	36	00:30:00	40.5	28.6	30.8	27.7	25.7
16:34:00	36	00:30:00	40	28.5	30.6	27.5	25.3
17:04:00	36	00:30:00	42.1	27.6	29.8	26.6	24.7
17:34:00	36	00:30:00	45.5	27.6	29.8	26.3	24.4
18:04:00	36	00:30:00	47.1	27.7	29.9	26.2	24.2
18:34:00	36	00:30:00	51.6	27.4	28.8	25.2	23.4
19:04:00	36	00:30:00	44.8	26.9	29	25.6	23.6
19:34:00	36	00:30:00	39.8	25.9	28	24.8	23
20:04:00	36	00:30:00	46.4	25.2	27.5	23.6	21.6
20:34:00	36	00:30:00	35.3	24.9	27.4	23.5	21.8
21:04:00	36	00:30:00	47.1	25.8	27.6	23.6	22
21:34:00	36	00:30:00	43.9	24.3	26.4	22.7	20.7
22:04:00	36	00:30:00	43.9	23.1	25.2	21.6	20.1
22:34:00	36	00:30:00	33	22.6	24.4	21.6	20.2
23:04:00	36	00:30:00	43.7	22.8	23.9	21.6	20.2
23:34:00	36	00:30:00	43.8	23.8	25.2	21.7	20.2
Thursday 5 th January 2023							
00:04:00	36	00:30:00	40.6	23.6	25.5	21.7	20.1
00:34:00	36	00:30:00	39.5	23.1	24.8	21.6	20
01:04:00	36	00:30:00	36.4	21.4	22.8	20.4	19
01:34:00	36	00:30:00	41.7	22.1	23.2	20.2	18.8
02:04:00	36	00:30:00	38.9	22.3	23.8	20.3	18.8
02:34:00	36	00:30:00	50.3	28.5	28.3	20.2	18.3
03:04:00	36	00:30:00	35.9	21.7	23.1	19.8	18.2
03:34:00	36	00:30:00	34.4	20.8	22.3	19.6	18.2
04:04:00	36	00:30:00	30.9	19.8	21.1	19.3	18
04:34:00	36	00:30:00	33.6	19.3	20.5	18.9	17.8
05:04:00	36	00:30:00	40	20.1	20.7	19.2	18
05:34:00	36	00:30:00	37	21.3	22.3	20.3	19
06:04:00	36	00:30:00	43.7	23.3	24.4	21.6	20.1
06:34:00	36	00:30:00	39.4	23.6	25.2	22.7	21.2
07:04:00	36	00:30:00	38.2	25.1	27.4	23.9	22
07:34:00	36	00:30:00	39.1	24.6	26.9	23.6	21.9
08:04:00	36	00:30:00	47.1	25.7	27.7	23.8	22
08:34:00	36	00:30:00	46.4	28.3	31	25.2	22.4
09:04:00	36	00:30:00	47.3	27.6	29.9	25.6	22.5
09:34:00	36	00:30:00	48.1	28.7	30.3	25.3	22.5
10:04:00	36	00:30:00	52.8	28.3	28.6	24	21.7
10:34:00	36	00:30:00	42.1	25.7	27.8	24.3	22.4
11:04:00	36	00:30:00	48	27.7	30.4	26	23.6

Table B2 – Fully tabulated internal noise measurement results for Plot 36 Bedroom 2



Appendix C – Graphed Results

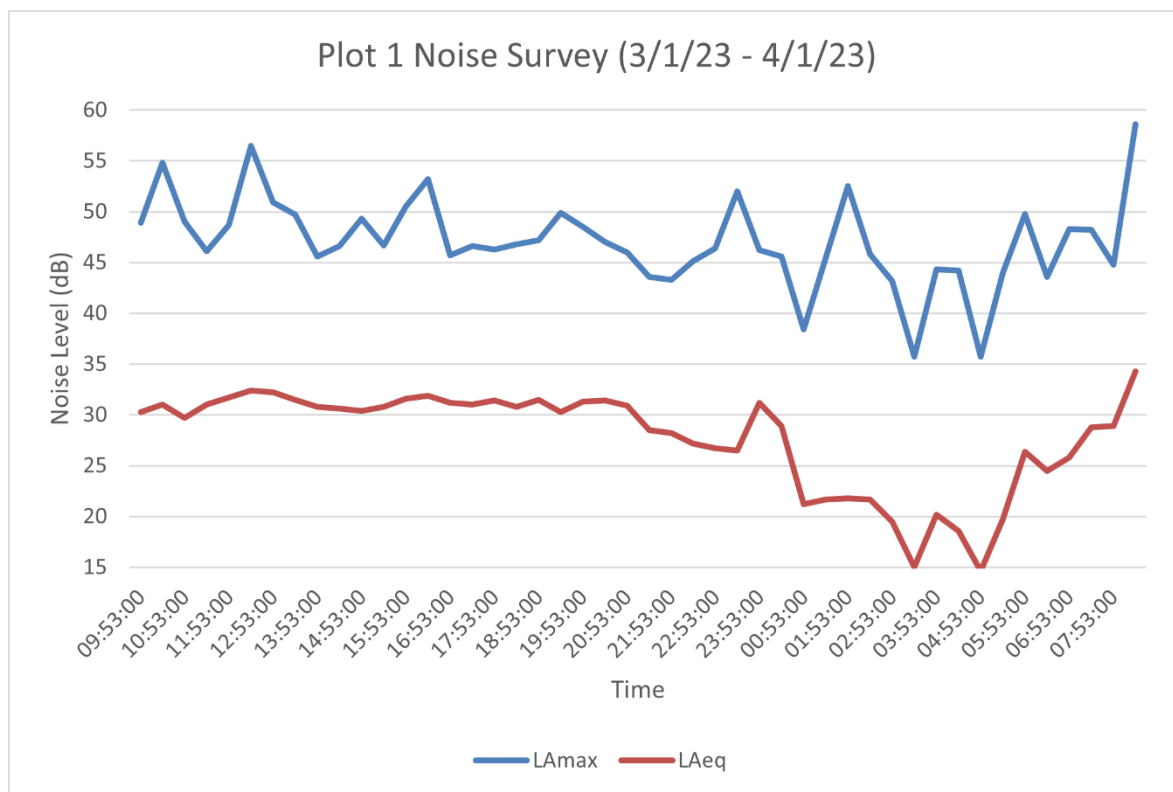


Figure C1 – Plot 1 Bedroom 3 graphed measurement data

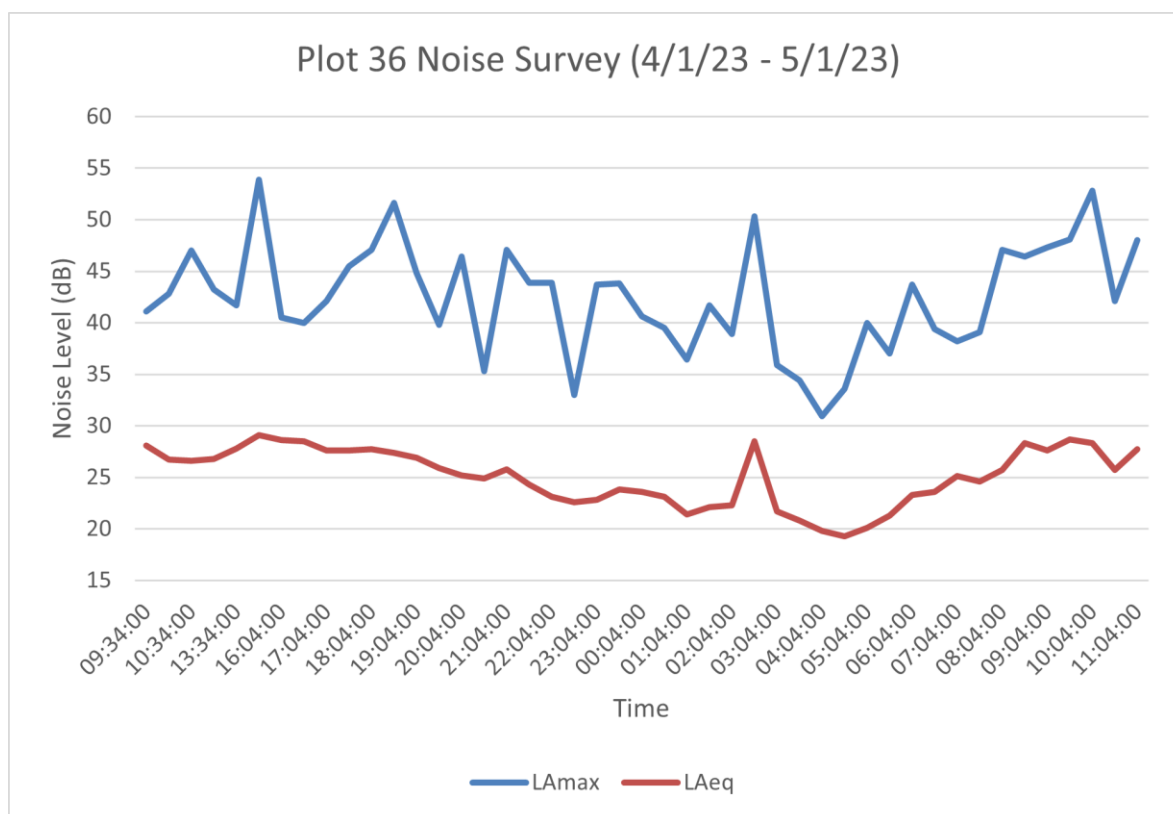


Figure C2 – Plot 36 Bedroom 2 graphed measurement data