



Quadrant Developments UK Ltd

APARTMENT No.1, 9 THE QUADRANT, BUXTON

**NOISE MEASUREMENTS TO DISCHARGE PLANNING
CONDITION 3**

08 February 2023

AEC REPORT: P4726/R1a/DMT

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1.0 INTRODUCTION

- 1.1 Acoustic & Engineering Consultants Limited (AEC) has been instructed by Quadrant Developments UK Ltd to undertake noise measurements in relation to discharging Planning Condition 3 associated with Apartment No.1, located on the 1st floor at 9 The Quadrant, Buxton.
- 1.2 The building is located on the end of The Quadrant terrace and is a Grade II listed building. Apartment No.1 includes a lounge and two bedrooms and has been converted from former offices.
- 1.3 Condition 3 requires that specific indoor noise level criteria are not exceeded, and states the following:

“3. Prior to occupation of the development hereby approved a noise control scheme shall be submitted to and approved by the Local Planning Authority. The scheme shall include the carrying out of an acoustic survey of ambient noise taking into account predicted noise from the ground floor ventilation and extraction units associated with the ground floor development already approved. The scheme shall specify acoustic treatment as required to the building envelope to prevent the following noise criteria being exceeded:

Bedrooms – LAeq (8hrs) not to exceed 30dB(A) and LAmx not to exceed 45dB
Living Rooms – LAeq (16hrs) not to exceed 35dB(A)

The approved noise control scheme shall be installed prior to the first occupation of the development hereby approved and shall subsequently maintained during the life of the development.”

- 1.4 This report presents the results of daytime and night-time noise level measurements undertaken inside the Apartment No.1 living room and two bedrooms, respectively. The findings are compared against the required limits in Condition 3, stated above.
- 1.5 Acoustic terminology used in this report is described in brief in Appendix A.

2.0 SITE DESCRIPTION

2.1 Apartment 1 of 9 The Quadrant has three different elevations:

- The southern elevation, overlooking the road traffic on The Quadrant
- The western elevation, overlooking the road traffic on the roundabout junction, and
- The northern elevation, looking over the quieter rear yard, where the ground floor external plant is located, and out towards Station Road which is partially screened.

The building location is identified on Figure 1.

2.2 The noise climate on all elevations is dominated by road traffic noise, generated by vehicles on The Quadrant, Station Road and the roundabout. The route from Station Road, through the roundabout and on to St Johns Road opposite is the A53, which is a main route through Buxton. There are buses regularly running along The Quadrant and regular HGVs using the A53, primarily during the daytime. Based on AEC's experience of working in this area, external traffic noise levels were considered 'typical' during the full 24-hour survey period. In addition, the ground floor external building services plant is just audible at the northern elevation.

2.3 The noise measurements were taken in the three rooms specified in the planning condition, namely, the living room during the daytime (0700-2300h) and the two bedrooms (2300-0700h) during the night-time.

2.4 The living room has several windows on the southern and western elevations. All the original sash windows have been fitted with openable secondary glazing on the inside with seals to the perimeter of all the openings.

2.5 The bedroom on the western elevation has one large primary sash window, fitted with openable secondary glazing on the inside with seals to the perimeter of all the openings. The bedroom on the northern elevation, overlooking the ground floor building services plant, has one sash window which has been upgraded with heritage double glazing.

3.0 NOISE MEASUREMENTS

- 3.1 Daytime and night-time noise levels were measured by AEC from 1100h Tuesday 17th January 2023 to 1100h Wednesday 18th January 2023.
- 3.2 Noise monitoring stations were set up in the living room and bedrooms, and noise levels were continuously monitored during the relevant day and night periods.
- 3.3 The noise monitoring stations were left unattended for long periods, however, several inspections were undertaken throughout the day and night-time periods, to make notes/observations regarding the dominant noise sources etc.
- 3.4 In all rooms, road traffic noise was dominant the dominant sound source, with the ground floor plant also contributing to noise levels in the bedroom on the northern elevation. In each room it was perceived that practically all sound in the room was breaking in to the building via the windows.
- 3.5 Daytime noise levels in the living room were monitored over two separate periods to form the full 16-hour day period (see the time history in Figure B1).
- 3.6 There were several noisy events observed from sources within the apartment and some of these events (where observed) have been extracted from the time history i.e. user noise when changing the batteries, creaking floors, or moving the microphone etc.

Measurement Results

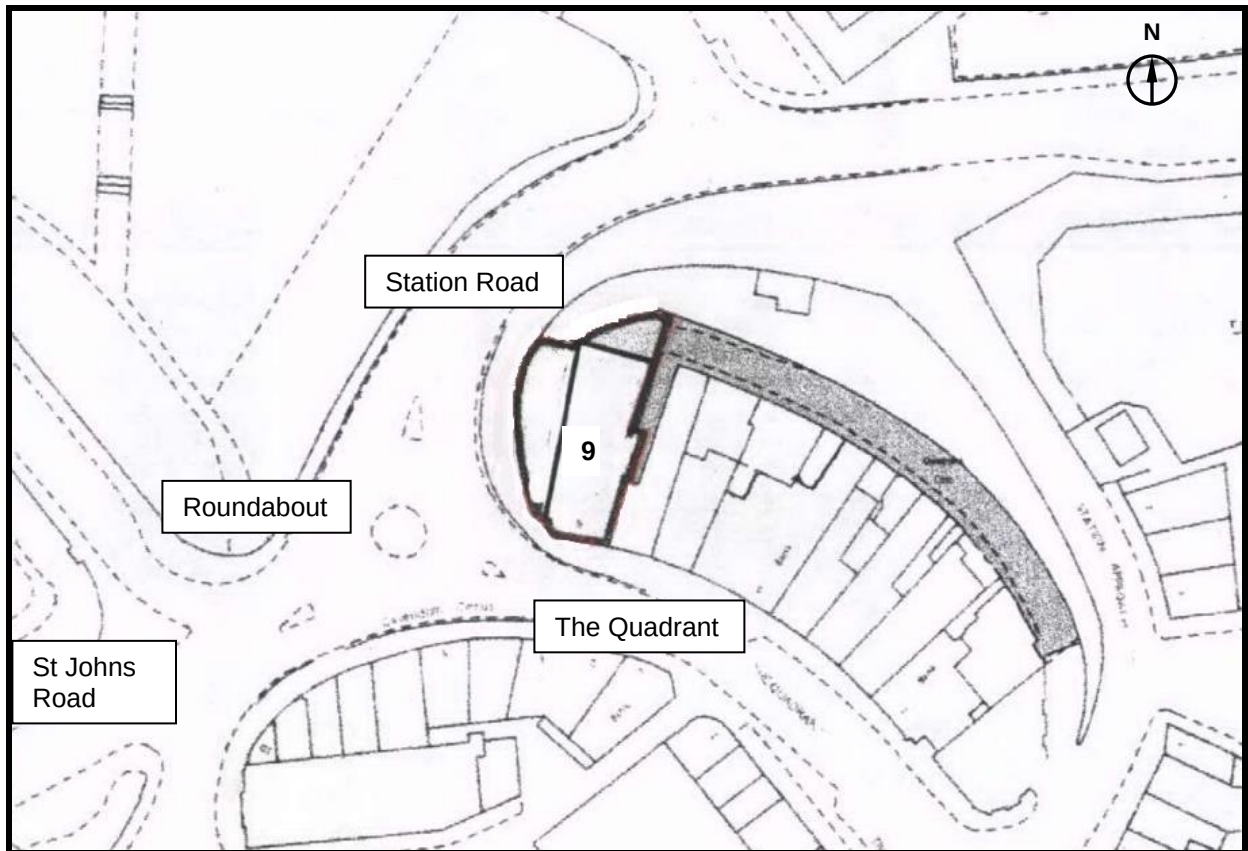
- 3.7 The measured noise monitoring data has been processed and the results can be summarised as follows:
- 1st Floor Living Room: 32dBL_{Aeq,16hrs} (0700-2300h)
 - 1st Floor bedroom on western elevation: 24dBL_{Aeq,8hrs} (2300-0700h)
45L_{Amax,F} – not typically exceeded¹
 - 1st Floor bedroom on northern elevation 22dBL_{Aeq,8hrs} (2300-0700h)
45L_{Amax,F} – not typically exceeded¹
- 3.8 These measured results meet the internal noise limits stated in Condition 3 and reproduced in Paragraph 1.4 above.
- 3.9 Full details of the noise survey are presented in Appendix B with measured noise data presented in Figure B1.

¹ 45L_{Amax,F} is not exceeded by typical cars, busses and HGVs. AEC also took multiple sample measurements to confirm this. Occasional exceedances shown on Figures B2&B3 are spurious i.e. thermal shrinkage within building, other internal noise, or irregular external noise such as horns, loud exhaust, etc. This approach is in-line with industry standards whereby the top 10-15 highest maximum noise events are discounted.

4.0 SUMMARY & CONCLUSIONS

- 4.1 The indoor ambient noise levels inside Apartment No.1, at 9 The Quadrant, have been monitored by AEC over a period of around 24 hours from 1100h Tuesday 17th January 2023 until 1100h Wednesday 18th January 2023.
- 4.2 Noise levels were monitored over consecutive periods in the living room during the daytime period (0700-2300h), and in the bedrooms to western and northern elevations during the night-time period (2300-0700h).
- 4.3 The noise level results, presented in Paragraph 3.7 above, demonstrate that the indoor noise level criteria stipulated in Planning Condition 3 have been achieved in all rooms.
- 4.4 Based on all the above, it is suggested that the requirements of Planning Condition 3 have been satisfied and therefore Condition 3 can be discharged subject to Local Authority approval.

FIGURE 1 – Site Location Plan



APPENDIX A – Acoustic Terminology in Brief

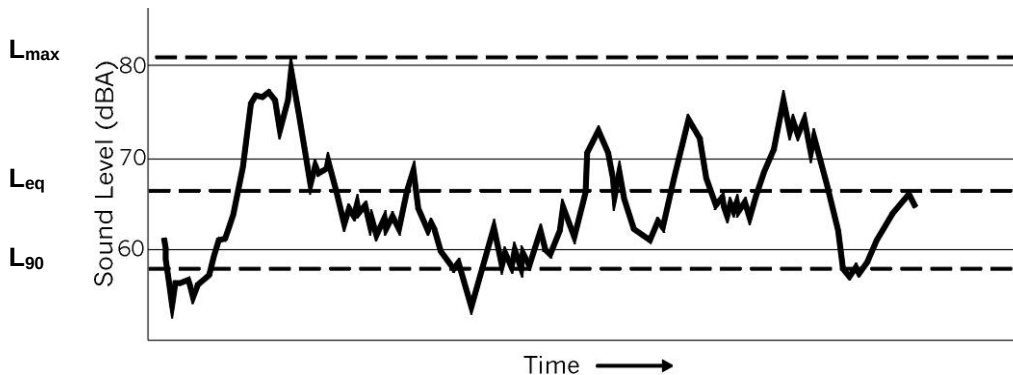
Sound is produced by mechanical vibration of a surface, which sets up rapid pressure fluctuations in the surrounding air. The rate at which the pressure fluctuations occur determines the pitch or *frequency* of the sound. The frequency is expressed in Hertz (*Hz*), that is, cycles per second. The human ear is sensitive to sounds from about 20 Hertz to 20,000 Hertz. Although sound can be of one discrete frequency - a 'pure tone' - most noise is made up of many different frequencies.

The human ear is more sensitive to some frequencies than others, and modern instruments can measure sound in the same subjective way. This is the basis of the A-weighted sound pressure level *dBA*, normally used to assess the effect of noise on people. The *dBA* weighting emphasises or reduces the importance of certain frequencies within the audible range.

Noise Units

In order to assess environmental noise, measurements are carried out by sampling over specific periods of time, such as fifteen minutes or one hour, the statistically determined results being used to quantify various aspects of the noise.

The figure below shows an example of sound level varying with time. Because of this time variation the same period of noise can be described by several different levels. The most common of these are described below.



Example of Sound Level Varying With Time

$L_{Aeq,T}$	The equivalent continuous (A-weighted) sound level may be considered as the “average” sound level over a given time, <i>T</i> . It is used for assessing noise from various sources including transportation, industrial and construction sources and can be considered as the “ambient” noise level.
L_{A90}	The (A-weighted) sound level exceeded for 90% of a measurement period. It is the value used to describe the “background” noise.
L_{Amax}	The maximum (A-weighted) sound level during a measurement period.
Free-field Level	This refers to the sound level measured outside, away from reflecting surfaces.
Facade Level	This refers to the sound level measured outside, at around 1 metre from a building façade or other solid, sound reflecting, structure.

APPENDIX B – Measurement Procedure

Dates & Times of Survey: Approximately 24hours from 1100h on Tuesday 17th January 2023 to 1100h on Wednesday 18th January 2023.

Personnel Present: David Terry (AEC)

Equipment Used: B&K 2260 Real Time Analysers (AEC Kit 2)
Cirrus Real Time Analysers (AEC Kit 3)

Weather Conditions: No precipitation, mostly clear skies, frost in morning. Negligible wind speeds and direction. Approximately 3 to 6°C.

Measurement Procedure: Ambient noise levels were measured in three rooms, as described below.

Lounge – Microphone located centrally in room. The microphone was moved slightly around the central areas of the room during the measurement to obtain a spatial average.

Bedrooms on western and northern elevation – Microphone located centrally in room.

Noise levels were measured in terms of $L_{Aeq,1hr}$ during the daytime and $L_{Aeq,5mins}$ during the night-time.

All the measurements were taken at a height of 1.2 to 1.5m above floor and with the microphone at least 2 metres away from any wall/window.

The sound level analyser, which conformed to BS EN 61672-12003 '*Electro acoustics – sound level meters - Part 1 Specifications*' for Class 1 Type Z meters, was in calibration and both check calibrated before and after the measurement periods using a Brüel & Kjær type 4231 (94dB) calibrator. There was no significant drift in calibration. Calibration certificates are available on request.

Measured Data The measured data is presented in Figures B1 to B3 below.

FIGURE B1 – Living Room - Measured Noise Levels (in Daytime)

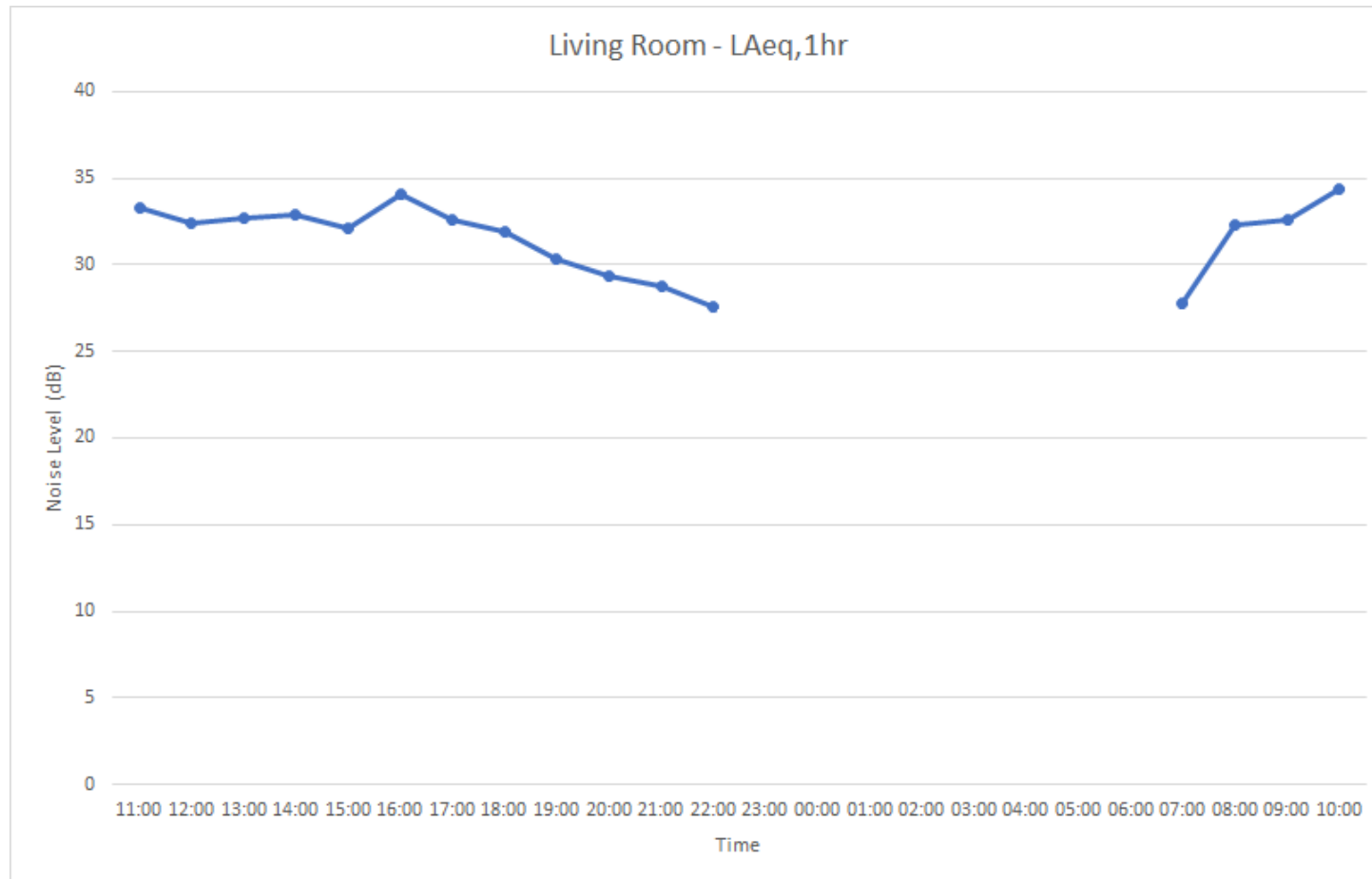


FIGURE B2 – Bedroom on North Elevation - Measured Noise Levels (in Night-time)

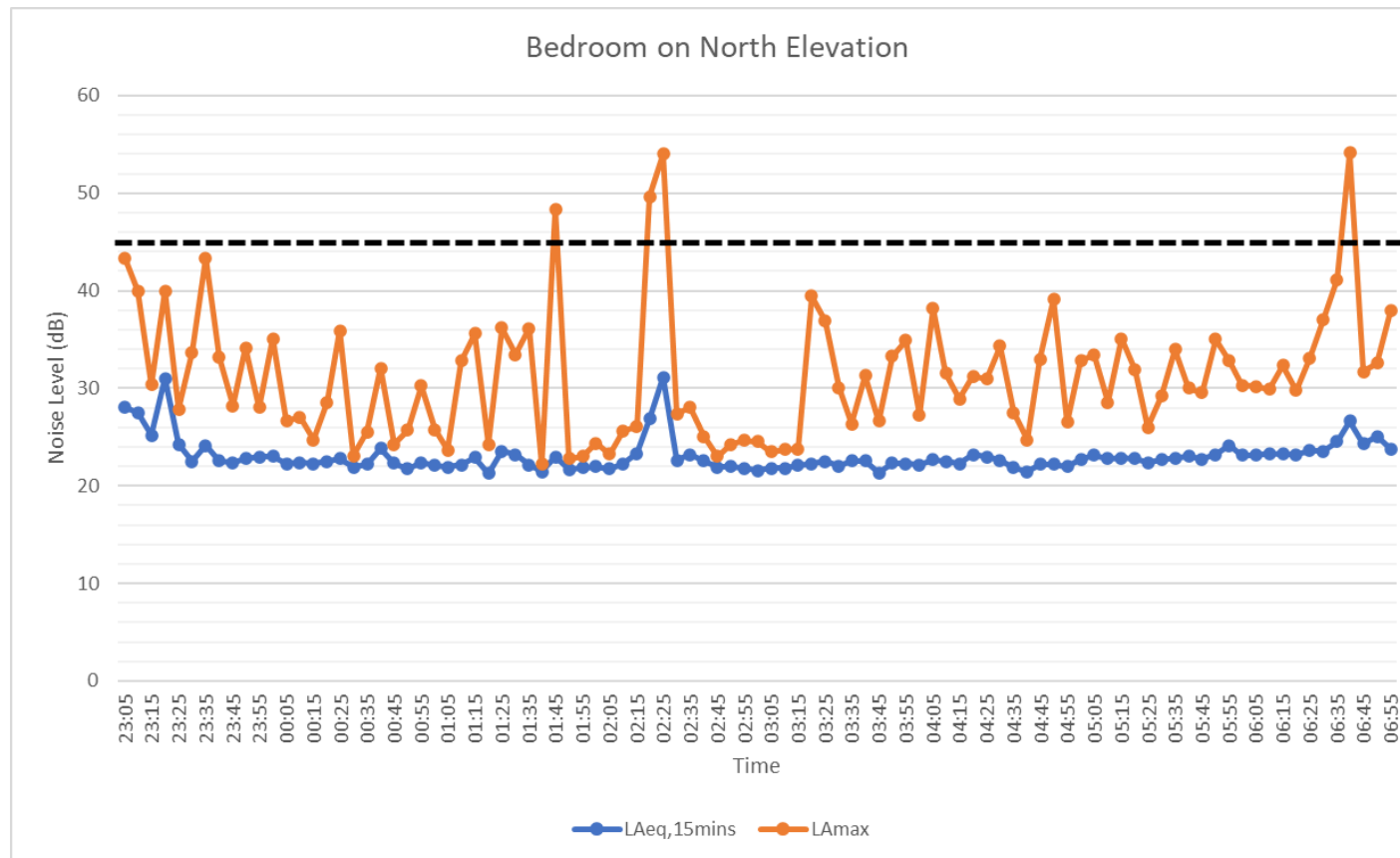


FIGURE B3 – Bedroom on West Elevation - Measured Noise Levels (in Night-time)

