
**New Apartment Building
Swinbourne Grove, Manchester**

Noise Verification Report

Project: Swinbourne Grove, Manchester – Noise Verification Report

Client: Truman Design and Build Ltd

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Document History

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1. Introduction

- 1.1 RS Acoustic Engineering Ltd has been appointed by Truman Design and Build Ltd to undertake an internal noise survey and assessment with regard to the new apartment building off Swinbourne Grove, Manchester, M20.
- 1.2 The new apartment building is four storeys high and contains thirteen dwellings in total. At the time of the survey, the construction works were near completion.
- 1.3 The development was granted full planning permission subject to a number of conditions. With regard to environmental noise ingress, condition No.18 is relevant in this instance (further details are given overleaf).
- 1.4 This assessment is based on the results of a noise survey undertaken at the site by RS Acoustic Engineering Ltd. The most notable source of noise at the site is road traffic on Wilmslow Road to the north west and road traffic on Swinbourne Grove to the east.
- 1.5 Continuous sound level monitoring was conducted within two apartments in order to establish the internal sound levels during the daytime and night-time period.
- 1.6 This assessment has been undertaken with reference to the guidance and recommendations contained within BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings*.
- 1.7 The survey was conducted by Mr Ryan Swales (BSc(Hons), MIOA), Principal Acoustic Consultant and Member of the Institute of Acoustics.
- 1.8 The results of the noise survey have been presented, along with the assessment criteria and a discussion of the results with respect to the appropriate targets.

2. Assessment Guidance & Criteria

Manchester City Council Planning Conditions

- 2.1 The following noise related planning condition has been attached to the permission:

Condition No.18:

The acoustic insulation measures identified within the approved Noise Assessment Report (reference RSA285/2019 version 2) prepared by RS Acoustic Engineering shall be completed before any of the dwelling units are occupied.

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.

British Standard 8233:2014: Guidance on sound insulation and noise reduction for buildings

- 2.2 BS 8233 provides guidance regarding acoustic criteria and noise levels appropriate for various types of space that have different functions.
- 2.3 With regard to dwellings, appropriate internal ambient sound levels are given in Table 2.1 for bedrooms, living rooms and dining rooms. The guidelines take into consideration the effect of internal noise on sleep and also the effect of noise on resting, listening and communicating.

Table 2.1 – Indoor ambient noise levels for dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB L _{Aeq,16hour}	---
Dining	Dining room/area	40 dB L _{Aeq,16hour}	---
Sleeping (daytime resting)	Bedroom	35 dB L _{Aeq,16hour}	30 dB L _{Aeq,8hour}

- 2.4 BS 8233 (Note 7) also suggests that in some circumstances, it is appropriate to relax the indoor ambient noise level targets by up to 5 dB:

Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

World Health Organisation: Guidelines for community noise (1999)

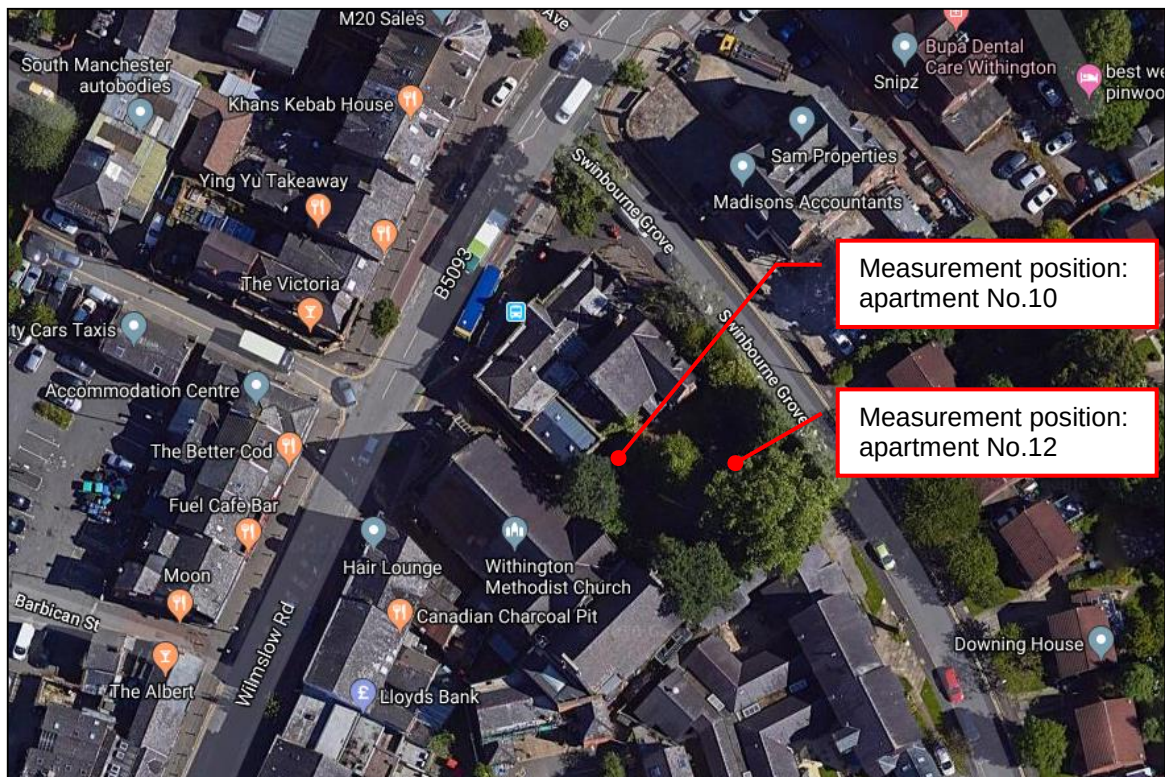
- 2.5 The guidelines and corresponding sound level targets within this superseded document corroborate those given within BS 8233. The guideline values are to help avoid speech interference, annoyance and sleep disturbance within dwellings.
- 2.6 The study undertaken by Vallet & Vernet suggests that for good sleep, indoor 'maximum' sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10 to 15 times per night.

3. Environmental Noise Survey

Survey methodology

- 3.1 Continuous sound level monitoring was conducted over a 28.5-hour period within apartment No.10 on the third floor. The monitoring equipment was installed within the bedroom on the north facing elevation (facing Wilmslow Road).
- 3.2 Measurements were performed from approximately 16:00 hours on Friday 28th through to 20:30 hours on Saturday 29th May 2021.
- 3.3 Continuous sound level monitoring was also conducted over a 48-hour period within apartment No.12 on the third floor. The monitoring equipment was installed within the bedroom on the east facing elevation (facing Swinbourne Grove).
- 3.4 Measurements were performed from approximately 16:15 hours on Friday 28th through to 16:15 hours on Sunday 30th May 2021.
- 3.5 The bedroom windows were closed at the time of the survey. There are no trickle ventilator units fitted to the window frame (i.e. the building is mechanically ventilated).
- 3.6 A measurement interval of 5 minutes was used during the survey. The microphone was tripod mounted at a height of approximately 1.4 metres from the ground. One-third octave band and A-weighted broadband sound pressure levels were recorded during the survey.
- 3.7 The site location and survey measurement positions are shown in Figure 3.1.

Figure 3.1 – Site location and survey measurement positions (source: Google Maps)



- 3.8 The internal measurement positions are shown on the third floor plan overleaf and also within the photographs in Figure 3.3 and 3.4.

Figure 3.2 – Third floor plan showing survey measurement positions

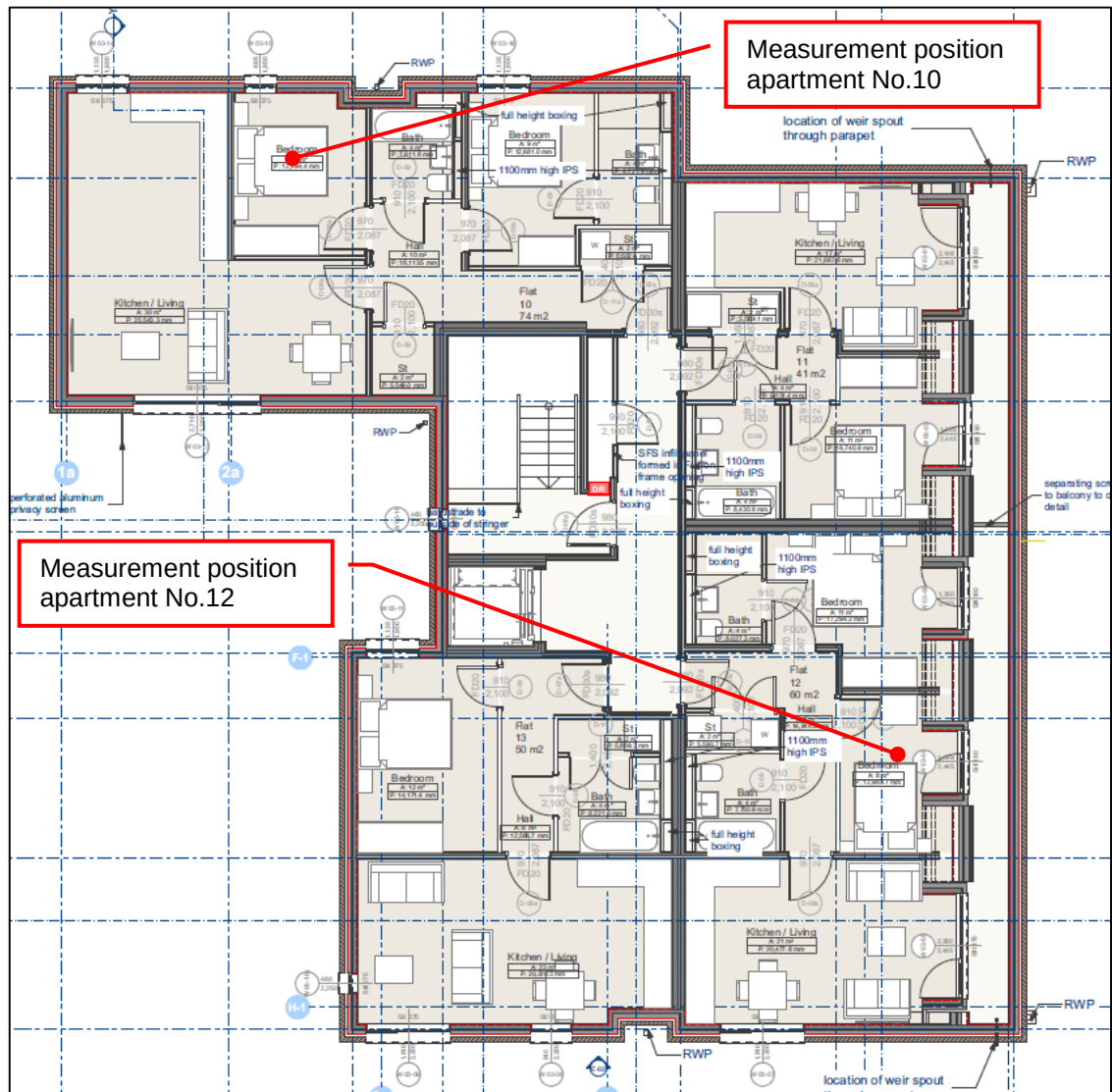


Figure 3.3 – Photographs showing internal measurement position, apartment No.10



Figure 3.4 – Photographs showing internal measurement position, apartment No.12



Survey equipment

- 3.9 The survey was conducted using the following Class 1 specification equipment:
- Brüel & Kjaer 2250-Light sound level meter, microphone type 4189 and pre-amplifier type ZC0032.
 - Casella CEL-633A sound level meter, microphone type CEL-251 and pre-amplifier type CEL-495.
 - CEL-120/1 Acoustic calibrator.
- 3.10 Calibration of the sound level meter and microphone used for the measurements are traceable to UKAS accredited laboratories (calibration certificates are available upon request).
- 3.11 The calibration of both sound level meter and microphone was checked using a 1 kHz tone at 94 dB prior to and following the measurements performed. The drift in calibration was less than 0.1 dB.

Measured indices

- 3.12 Although a wide range of statistical sound level data was recorded during the survey, the L_{Aeq} and L_{AFmax} indices are of most interest for this assessment:
- $L_{Aeq,T}$ - The A-weighted equivalent continuous sound pressure level over a period of time, T. Representative of the 'average' sound pressure level over a given period (used to describe the ambient sound level).
 - $L_{AFmax,T}$ - The A-weighted 'maximum' sound pressure level that occurred during a given period, T (used for the assessment of intermittent loud noises).
- 3.13 Sound pressure level measurements are taken with an A-weighting (denoted by a subscript 'A', e.g. L_{Aeq}) to approximate the frequency response of the human ear.

Results summary

- 3.14 Table 3.1 presents a summary of results for the measurement position within apartment No.10 (bedroom). Measured values have been rounded to the nearest whole number.

Table 3.1 – Summary of continuously measured sound pressure levels, apartment No.10

Date	Period	Duration, T (hours)	$L_{Aeq,T}$ dB	Highest $L_{AFmax,T}$ dB	10 th highest ¹ $L_{AFmax,T}$ dB
Friday 28/05/2021 to Saturday 29/05/2021	Daytime (07:00-23:00)	16	22	---	---
	Night-time (23:00-07:00)	8	19	42	34
Saturday 29/05/2021	Daytime (07:00-23:00)	4.5	21	---	---
¹ The 10 th highest value from 96 measurement periods					

- 3.15 Table 3.2 presents a summary of results for the measurement position within apartment No.12 (bedroom). Measured values have been rounded to the nearest whole number.

Table 3.2 – Summary of continuously measured sound pressure levels, apartment No.12

Date	Period	Duration, T (hours)	$L_{Aeq,T}$ dB	Highest $L_{AFmax,T}$ dB	10 th highest ¹ $L_{AFmax,T}$ dB
Friday 28/05/2021 to Saturday 29/05/2021	Daytime (07:00-23:00)	16	25	---	---
	Night-time (23:00-07:00)	8	22	42	38
Saturday 29/05/2021 to Sunday 30/05/2021	Daytime (07:00-23:00)	16	24	---	---
	Night-time (23:00-07:00)	8	23	50	38
¹ The 10 th highest value from 96 measurement periods					

- 3.16 The results of the continuous monitoring are presented graphically in Figure 3.5 and 3.6 overleaf.

Figure 3.5 – Graph showing results of continuous sound level monitoring, apartment No.10

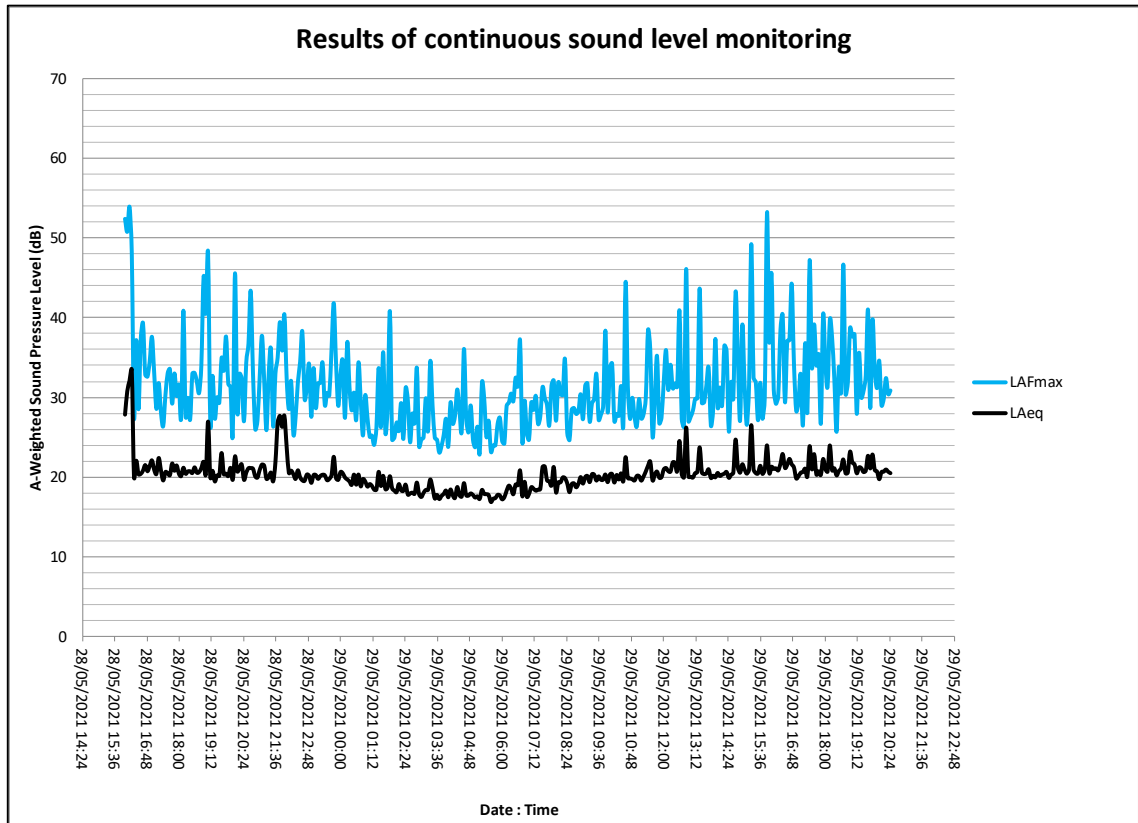
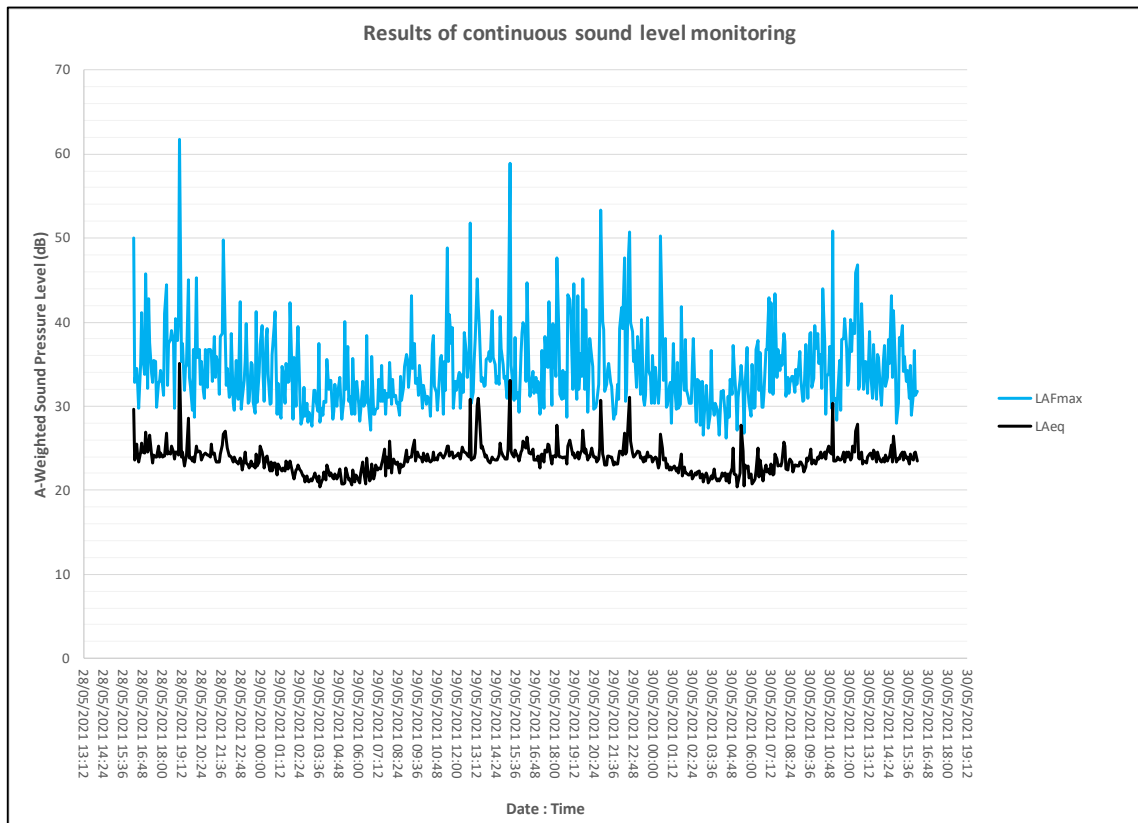


Figure 3.6 – Graph showing results of continuous sound level monitoring, apartment No.12



4. Discussion

Building envelope construction and acoustic performance

- 4.1 The external wall construction at ground floor level consists of a brickwork outer leaf, insulated cavity, blockwork inner leaf and plasterboard lining.
- 4.2 The external wall construction at upper floor level consists of a brickwork outer leaf, insulated cavity, steel frame with infill insulation batts and two layers of Fireline plasterboard.
- 4.3 The sound insulation performance of the external wall is expected to be at least 45 dB R_w+C_{tr} .
- 4.4 The approved noise report associated with the planning application states that standard thermal double glazing will provide sufficient sound insulation against external noise. There was a further recommendation for a 6 mm thick pane of glass on the elevation facing Wilmslow Road.
- 4.5 It is understood that aluminium frames and standard double glazing consisting of 6 mm glass / 16 mm cavity / 6 mm glass has been installed throughout the building. On the ground floor, the outer pane is a 6.8 mm thick laminate.
- 4.6 Such units typically provide a sound insulation performance in the region of 27 to 29 dB R_w+C_{tr} .
- 4.7 The installed glazing specification is in line with the recommendations given within the noise assessment report dated June 2019 (ref: RSA285/2019-V2).
- 4.8 There are no ventilator units fitted to the window frames. Rapid cooling and purge ventilation can be achieved by opening the windows and there is a mechanical ventilation system to provide heating and cooling (air source heat pump and outdoor compressor units).
- 4.9 The ventilation strategy is considered to be appropriate and is in line with the recommendations given within the noise assessment report dated June 2019 (ref: RSA285/2019-V2).
- 4.10 It is recommended that sample noise measurements are conducted within the apartments once the mechanical ventilation system is fully operational in order to check that the noise emitted from the system is acceptable.

Environmental noise ingress

- 4.11 Within apartment No.10, the daytime sound pressure level was 22 dB $L_{Aeq,16hour}$ and the night-time sound pressure level was 19 dB $L_{Aeq,8hour}$.
- 4.12 The daytime sound level target of 35 dB $L_{Aeq,16hour}$ and the night-time target of 30 dB $L_{Aeq,8hour}$ are therefore being achieved.
- 4.13 Within apartment No.12, the daytime sound pressure level was 24 to 25 dB $L_{Aeq,16hour}$ and the night-time sound pressure level was 22 to 23 dB $L_{Aeq,8hour}$.
- 4.14 The daytime and night-time sound level targets are therefore being achieved.
- 4.15 With regard to the 'maximum' internal sound level, for the majority of the night-time period the recommended target of 45 dB L_{AFmax} is also being achieved within the apartments.

5. Conclusion

- 5.1 The internal noise level criteria have been easily satisfied within both apartments during the daytime and night-time period.
- 5.2 The survey results indicate that sufficient sound insulation is being provided by the building envelope and associated elements and the ventilation strategy is considered appropriate for the new building.
- 5.3 This report verifies that the recommendations and requirements outlined within the approved acoustic consultant's report have been implemented and therefore planning condition No.18 has been satisfied.

Appendix A

Floor plans and elevations

Figure A.2 – First floor plan

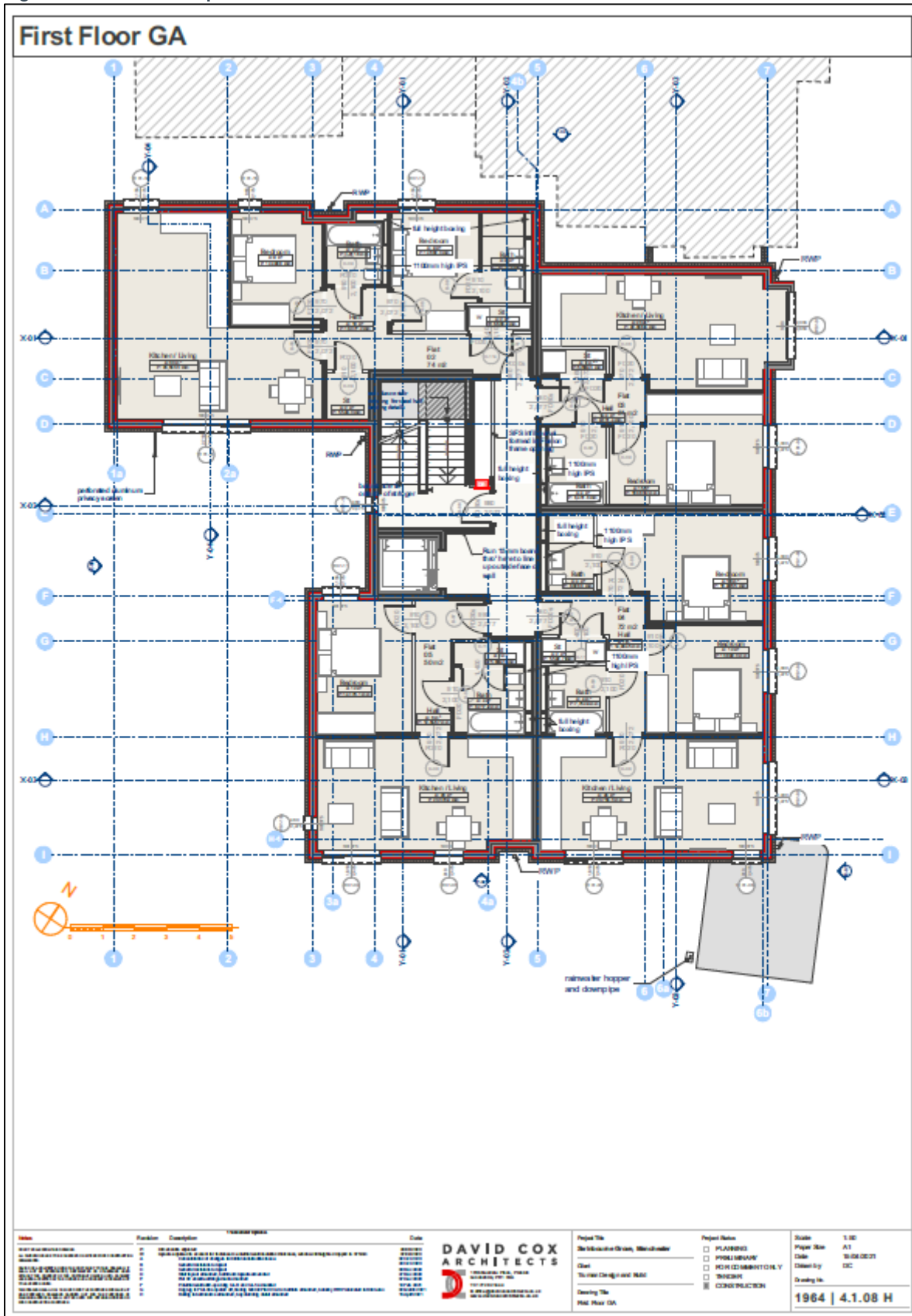


Figure A.3 – Second floor plan

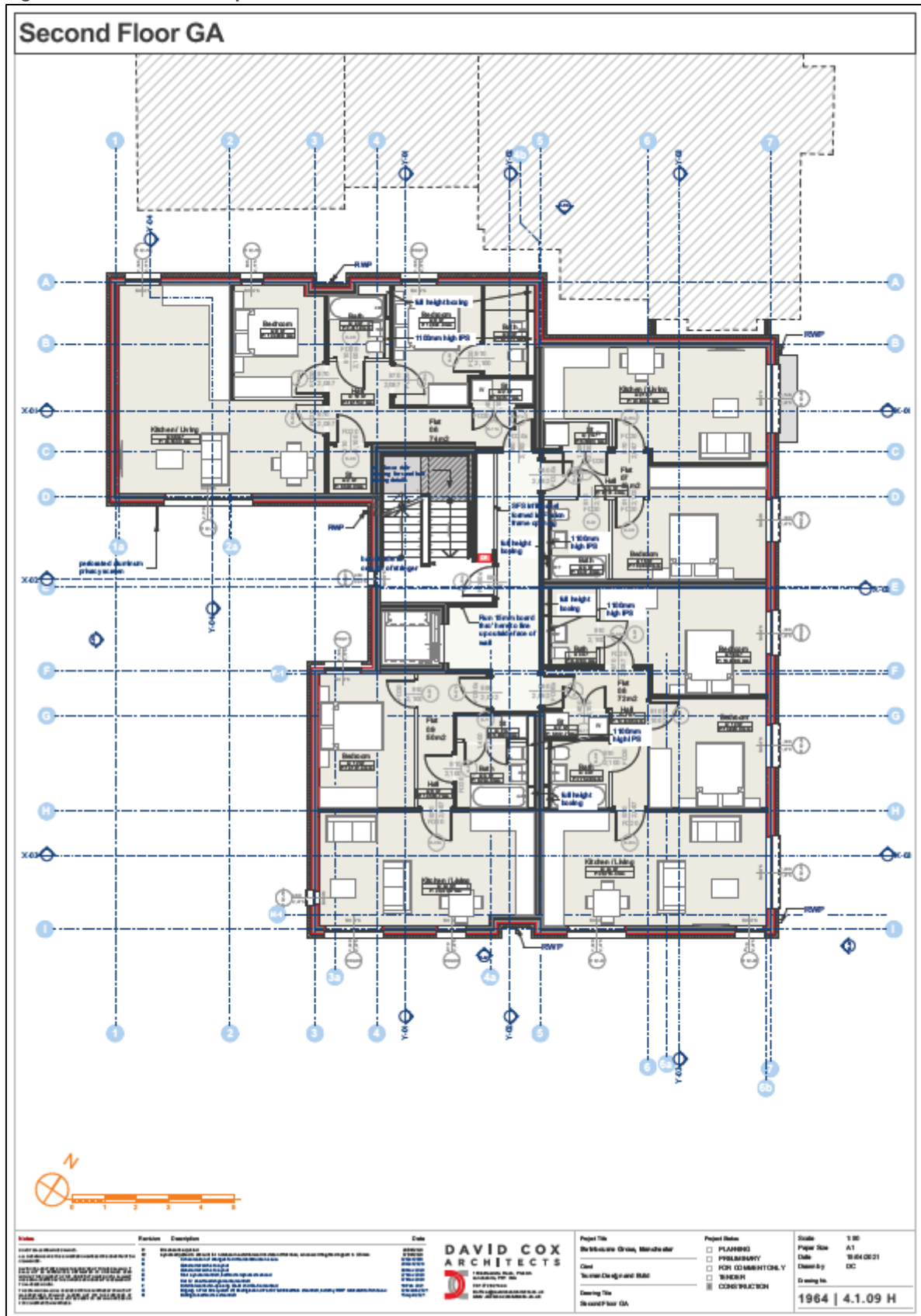
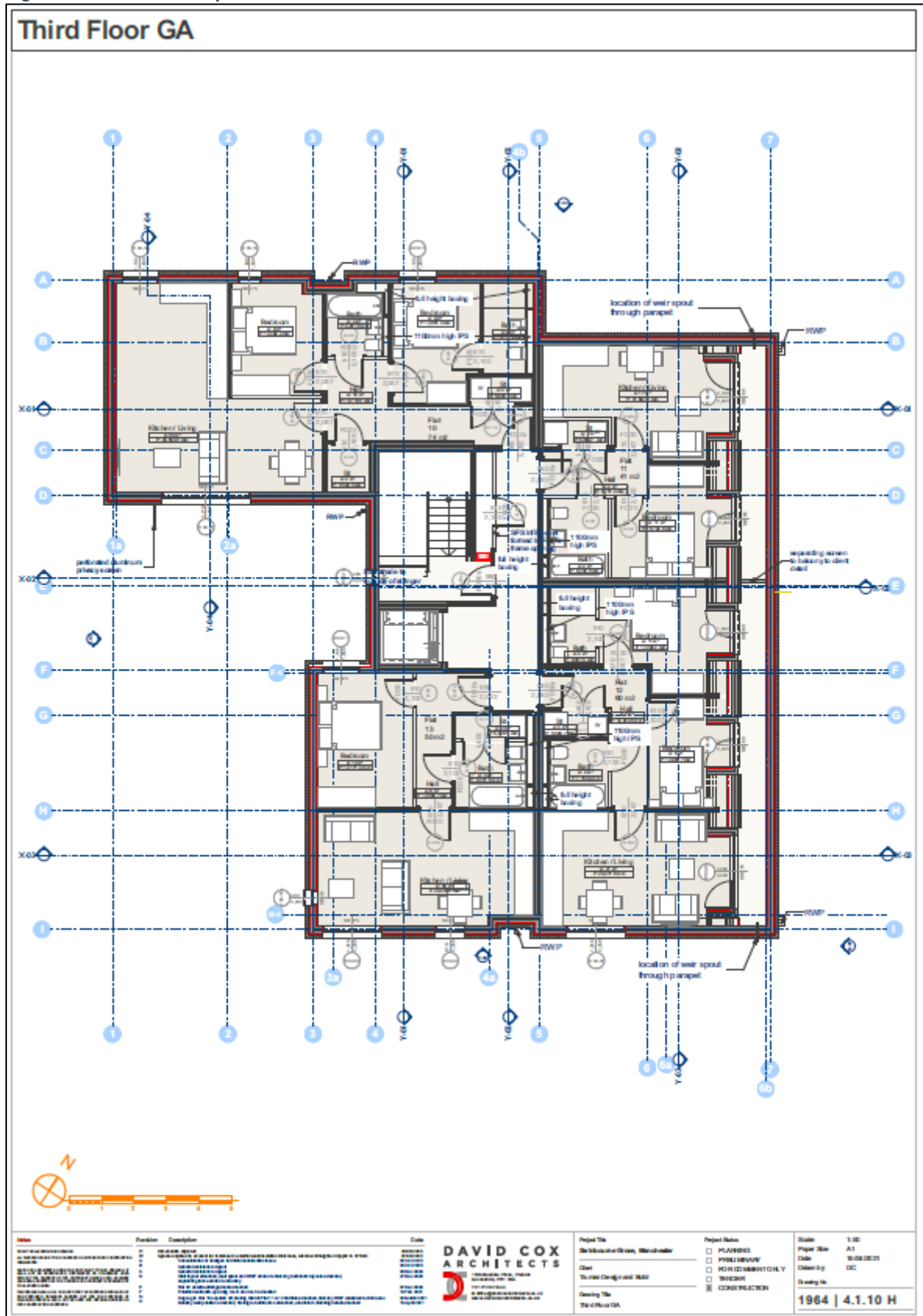


Figure A.4 – Third floor plan



Appendix B

Assessment terminology

Assessment terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2 \times 10^{-5} \text{Pa}$).
dB(A)	The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq} , L_{A90} etc, according to the parameter being measured.
Acoustic environment	Sound from all sources as modified by the environment.
Ambient sound level	The totally encompassing sound in a given situation at a given time; it is usually composed of sound from many sources, near and far.
Equivalent continuous sound level - $L_{Aeq,T}$	The A-weighted equivalent continuous sound pressure level over a period of time, T. Representative of the 'average' sound pressure level over a given period (commonly used to describe the 'ambient' sound level).
Maximum sound level - $L_{AFmax,T}$	The A-weighted 'maximum' sound pressure level that occurred during a given period, T (commonly used for the assessment of intermittent loud noises).
Habitable room	Any room used or intended to be used for sleeping, cooking, living or eating purposes (enclosed spaces such as bath or toilet facilities, service rooms, corridors, laundries, hallways, utility rooms or similar spaces are excluded from this definition).
R_w	The weighted sound reduction index expressed in dB. A single number quantity for airborne sound insulation rating.
$R_w + C_{tr}$	The ' C_{tr} ' term is added to the single number rating R_w to take account of the characteristics of particular sound spectra (e.g. road traffic).