

INTERNAL AMBIENT NOISE REPORT

**WALDORF HOUSE, 5 COOPER STREET,
MANCHESTER, M2 2FW**

REPORT REFERENCE NO. J003264-5210-LK-01

OCTOBER 2021

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Document Control Sheet

Details of Assessment	
Client	Acelux Ltd
Document Title	Internal Ambient Noise Report, Waldorf House, 5 Cooper St, Manchester, M2 2FW
Report Reference	J003264-5210-LK-01

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Issue	Date	Author	Remark	Status
01	22/10/2022	LK	Initial Issue	Draft
02				

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This report has been prepared based upon a scope of works and associated resources agreed between the client and Philip Dunbavin Acoustics Ltd (PDA). This report has been prepared with all reasonable skill, care and diligence and has been based upon the interpretation of data collected. This has been accepted in good faith as being accurate and valid at the time of the collection. This report has been based solely on the specific design assumptions and criteria stated herein.



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APPENDIX A – DEFINITION OF ACOUSTIC TERMS

1.0 SUMMARY

PDA has been commissioned by Acelux Ltd to carry out an acoustic assessment of the internal ambient noise at the residential refurbishment development at Waldorf House, 5 Cooper St in Manchester, M2 2FW.

The development consisted of the renovation of the existing building and converting it into 14 no. residential dwellings over a number of floors.

The results of the survey were used to evaluate the internal ambient noise level and to assess compliance with Planning Condition 5.

The assessment has demonstrated that for both the daytime and the night-time measurements the internal noise environment meets the requirements of the planning condition.

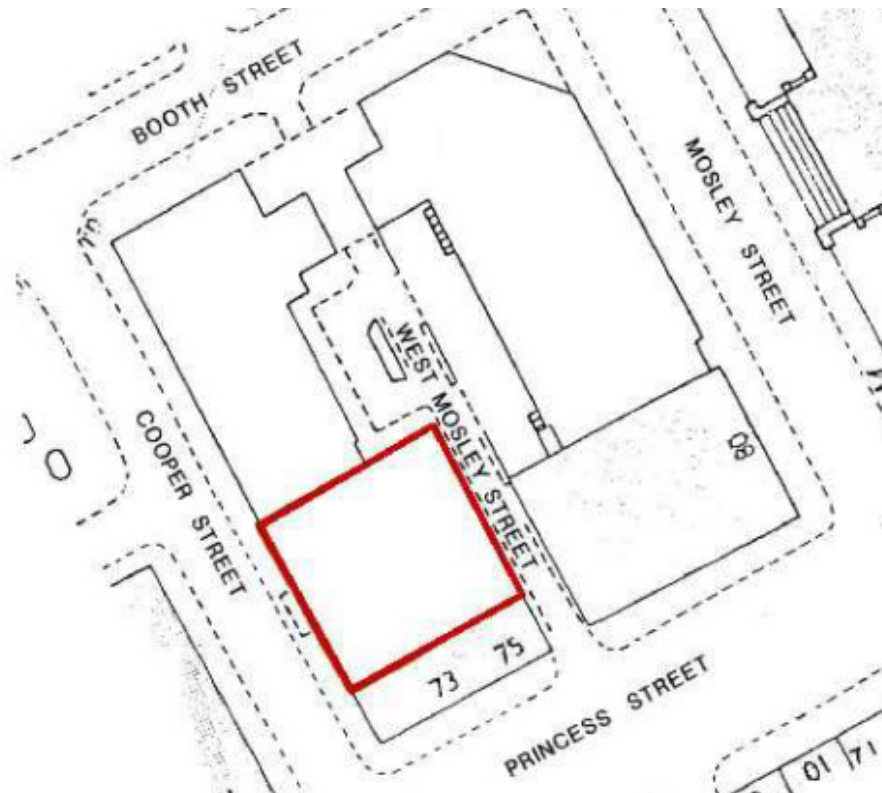
2.0 SITE DESCRIPTION

The development consisted of the renovation of the existing building and converting it into 14 no. residential dwellings over a number of floors.

The proposed site is located within Manchester city centre. The surrounding local area is predominantly commercial, retail and office buildings. The front façade of the building faces onto Cooper Street with the back façade facing onto West Mosley Street. Princess Street runs approximately 15m to the southwest of the building.

A site plan showing the location of the site and surrounding local area is shown in Figure 1 below.

Figure 1. Site Location in red



3.0 NOISE ASSESSMENT CRITERIA

3.1 Planning Condition 33

The project has Planning Permission ref. 111932/FO/2016, dated 8 August 2016. Planning Condition 5 states:

5) Before the development commences a scheme for acoustically insulating the proposed residential accommodation against noise from Cooper Street and Princess Street shall be submitted to and approved in writing by the City Council as local planning authority. There may be other actual or potential sources of noise which require consideration on or near the site, including any local commercial/industrial premises. The approved noise insulation scheme shall be completed before any of the dwelling units are occupied.

Noise survey data must include measurements taken during a rush-hour period and night time to determine the appropriate sound insulation measures necessary. The internal noise criteria are as follows:

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

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

Gardens and terraces (daytime) 55 dB 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) 47dB and 41dB, 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 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 policy DM1 of the Core Strategy.

3.2 BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

Section 7 of British Standard 8233:2014, *Guidance on Sound Insulation and noise reduction for buildings*, gives guidance on internal noise levels within dwellings, flats and rooms in residential use when unoccupied. The following criteria are for Living and Dining Rooms for daytime use and Bedrooms for night time.

Table 1. BS8233 recommended indoor ambient noise levels

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 $L_{Aeq,16hour}$	—
Dining	Dining room/area	40 $L_{Aeq,16hour}$	—
Sleeping (daytime resting)	Bedrooms	35 $L_{Aeq,16hour}$	30 $L_{Aeq,8hour}$

It should however be stressed that the above criterion relates to steady noise, in this case from road traffic etc, excluding unusual noise events departing from the typical noise character of the area.

4.0 NOISE SURVEY DETAILS

4.1 Survey Times and Dates

Measurements were conducted between 16:10 hours on 12 October 2021 and 09:06 hours on 13 October 2021 encompassing a full night time period. It should be noted that measurements from the surveys have been grouped into “day” and “night” categories in accordance with the following times:-

Daytime: Between 0700 and 2300 hours

Night-time: Between 2300 and 0700 hours

5 minute sample durations were taken over the daytime and night time measurement periods, with all measurements being made by Mr Liam Kavaney of PDA Ltd.

It should be noted during the daytime period, ongoing construction works from site both internally and externally were in operation and therefore noise measurements where construction activity dominated the internal noise environment have been omitted from the survey results. Subsequently during the daytime site construction hours sample measurements were only possible during lulls in construction activity.

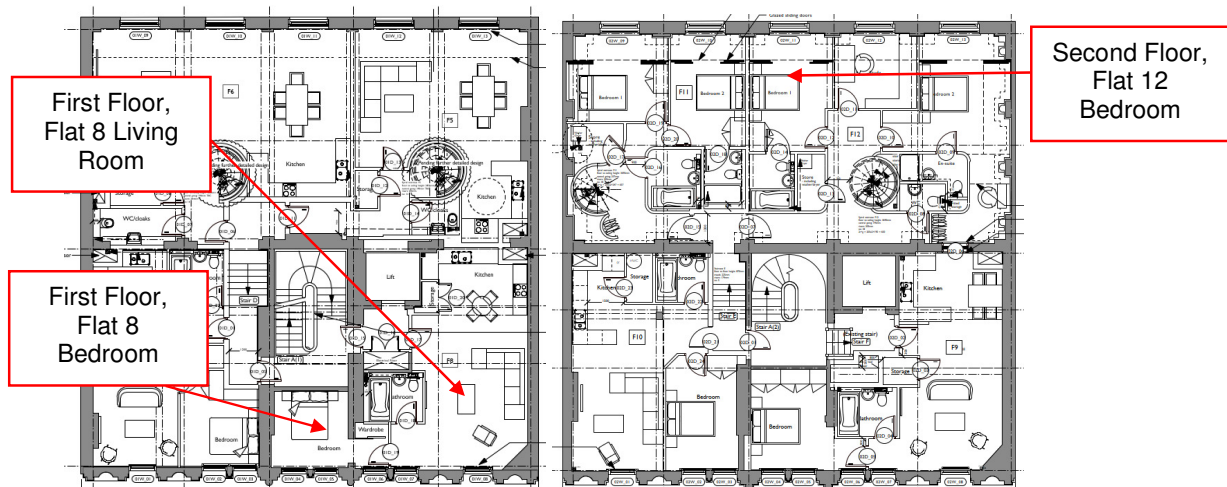
4.2 Equipment Used

Throughout the survey measurements were undertaken with a NTi XL2 sound level meter, a Rion NL-52 sound level meter and a Rion NA28 sound level meter. The meters are precision grade Class 1 sound level meters (as per BS EN 61672-1: 2002) for which current calibration certificates are held. The meters were set to A-Weighted and fast response. The meters were calibrated directly before any measurement took place and immediately afterwards and no significant drift was observed.

4.3 Measurement Locations

Daytime and overnight measurements were undertaken in two bedrooms located in what were deemed the most noise sensitive bedrooms on each façade within Flat 8 on the first floor and Flat 12 on the second floor of the development facing Cooper Street and West Moseley Street respectively as detailed in Figure 2 below. In addition short term sample measurements were made during the daytime within the Living Area of Flat 8 on the first floor facing the worst case façade Cooper Street. All measurements were undertaken with sound level meters mounted on a tripod at 1.2m height and centrally located within each room. The measurements were undertaken within the following rooms:

Figure 2. Floor Plan Highlighting the Rooms Selected for Noise Monitoring



4.4 Description of Noise Sources

Traffic on Cooper Street and surrounding local roads was the main noise source during the survey period. Ongoing construction works contributed the acoustic climate when in operation.

4.5 Reverberation Time Within Spaces

It should be noted that these measurements were undertaken within unoccupied rooms that were generally unfurnished and did not include soft furnishings such as bedding, curtains, etc.

Acoustic theory would indicate that noise levels are directly related to the amount of absorption within the space, with a greater amount of absorption reducing the noise level. As the rooms were not fully furnished we have applied a correction to account for a typically furnished 'lived in' room i.e. with a reverberation time of 0.5 seconds.

5.0 MEASURED RESULTS

A summary of the noise level measurements is given below. The levels presented in the tables have been rounded to the nearest decibel. The L_{Aeq} levels are the logarithmic average of all the measured noise levels. It should be noted that during the daytime period, ongoing construction works from site both internally and externally were in operation therefore noise measurements were taken at periods where there were lulls in construction activity on site and where possible before and after construction work had started and finished. The noise measurements from the survey are summarised in the tables below:

Table 2. Summary of Daytime Noise Levels

Room	Date	Time Period (hh:mm)	Criteria $L_{Aeq,T}$ (dB)	Measured $L_{Aeq,T}$ (dB)
Flat 8 Bedroom	12 th to 13 th October 2021	16:10 – 23:00 07:00 – 08:00	35	31
Flat 8 Living Room	13 th October 2021	08:49 – 09:06	35	22
Flat 12 Bedroom	12 th to 13 th October 2021	16:20 – 23:00 07:00 – 07:55	35	21

Table 3. Summary of Night-time Noise Levels

Room	Date	Time Period (hh:mm)	Criteria $L_{Aeq,T}$ (dB)	Measured $L_{Aeq,T}$ (dB)	No. of Times 45dB $L_{Amax,T}$ Exceeded*
Flat 8 Bedroom	12 th to 13 th October 2021	23:00 – 07:00	30	26	10
Flat 12 Bedroom	12 th to 13 th October 2021	23:00 – 07:00	30	19	0

* WHO guidelines state that for a good sleep, the indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10 – 15 times a night.

5.1 Discussion of Results

The tables above indicate that the measured internal noise levels meet the requirements of BS8233:2014 and WHO Guidelines for Community Noise and therefore it is considered that the measurements demonstrate compliance of the building façade attenuation to allow discharge of Planning Condition 5 as detailed in Section 3.1.

APPENDIX A – DEFINITION OF ACOUSTIC TERMS

The decibel

This is the basic unit of noise, denoted dB.

A Weighting

This is a weighting process which simulates the human ear's different sensitivity at different frequencies. A weighting can be shown two typical ways, 50 dB(A) L_{eq} or 50 dB L_{Aeq} . Both mean the same thing. (See below for a definition of L_{eq}). The dB(A) level can be regarded as the overall level perceived by human beings.

L_{eq} and $L_{eq(s)}$

This is the equivalent continuous noise level which contains the same acoustic energy as the actual time-varying sound. In other words it is a kind of average noise level. It is denoted dB L_{eq} or, for A-weighted figures dB(A) L_{eq} or dB L_{Aeq} . It can also be expressed in terms of frequency analysis (see later). $L_{eq(s)}$ is the sample L_{eq} level.

L_n

This is the level exceeded for n% of the time. It is denoted dB L_n or, for A-weighted figures dB(A) L_n or dB L_{An} . It can be expressed in terms of frequency analysis (see later). L_{90} is the level exceeded for 90% of the time and is a measure of the lowest level typically reached. L_{10} is the level exceeded for 10% of the time and is the highest level typically reached. L_{50} is the level exceeded for 50% of the time and, mathematically, it is the median.

L_{max}

This is the maximum level reached during a measurement period. The "time constant", or the ability of the equipment to respond to impulses is usually expressed along with it, e.g. "Fast", "Slow", etc. It is denoted dB L_{max} or, for A-weighted figures dB(A) L_{max} , dB L_{Amax} , etc. It can also be expressed in terms of frequency analysis.

Frequency Analysis

Whereas dB(A) gives a very useful overall figure, it has its limitations in that it cannot be used to model or predict the effect of noise control and mitigation as this nearly always has radically different performance at different frequencies.

Frequency analysis expresses an overall noise level at each frequency or band of frequencies in the audible range. Octave band analysis divides the audible range into 10 bands from 31.5 Hz to 16 kHz and the noise level in each band can be expressed in any form e.g. L_{eq} , L_{90} , L_{max} etc. One third octave band analysis uses 30 bands.

Narrow band analysis takes the process to resolutions of less than 1 Hz. This is useful for identifying the existence of tones (whines, hums, etc.) and in pin-pointing the sources.