

Post Completion Noise Testing and Verification Report – Plots 9 and 10

Site: Bennett Street, Manchester

Reference: 50-636-R2-1

Date: November 24





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EXECUTIVE SUMMARY

Site Address	Bennett Street, Manchester M12 5NE
National Grid Reference	E 386210, N 397025.
Background	Post completion acoustic testing is required in order to discharge a planning condition in relation to the residential development at the above address.
Surveys Completed	E3P have undertaken unattended measurements inside a worst-case living room and bedroom of selected plots during a typical weekday period. As mechanical ventilation was installed with no trickle vents, windows were not required to be opened for this and, as such, a 24-hour survey was conducted with windows closed. Verification of any mitigation measures, including barriers, was also undertaken.
Assessments Completed	Measured internal noise levels have been corrected to allow for unfurnished rooms and then compared to BS 8233 and WHO guidelines for internal habitable rooms. The surveys determined compliance with the applicable criteria in both rooms of Plot 10. Verification of installed glazing at Plot 9 has also been undertaken.
Remedial Mitigation Measures	Due to the outcome of the survey and verification, no remedial measures are required. All currently installed fencing and glazing are as recommended in the original Noise Assessment.



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1. INTRODUCTION

1.1. BACKGROUND

E3P were commissioned by Kellen Homes to undertake Post Completion Noise Testing for Plot 10 with verification of Plot 9 also undertaken at the development site on Bennett Street in Manchester, to be referred to hereafter as 'the Site'.

Following submission of the Noise Impact Assessment (50-636-R1-6) by E3P, planning permission was granted with the following condition applied:

18b) Prior to first occupation of the residential units which have been acoustically insulated, a verification report shall 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 have been met. Any instance 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.

1.2. REPORT OBJECTIVES

The objectives of this report are as follows.

- ✚ Establish and measure the existing sound levels within affected rooms during typical weekday periods.
- ✚ Assess internal noise levels in accordance with criteria given in BS 8233.
- ✚ Verify any mitigation measures, where required.

1.3. DEVELOPMENT

A snapshot of the development layout is indicated in Figure 1 which is zoomed in to Plots 9 and 10.



Figure 1 **Snapshot of Development**





2. ASSESSMENT METHODOLOGY

2.1. BRITISH STANDARD BS 8233:2014+A1:2019 – GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS

The scope of this standard is the provision of recommendations for the control of noise in and around buildings including residential dwellings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new buildings or refurbished buildings undergoing a change of use, rather than to assess the effect of changes in the external noise climate.

The standard suggests suitable internal noise levels within different types of buildings, including residential dwellings, as shown in Table 1.

Table 1 BS 8233:2014 Recommended Internal Noise Levels

Criterion	Typical situation	Design criterion, $L_{Aeq,t}$ (dB)
Suitable resting and sleeping conditions	Living Room	35
	Bedroom	30

BS 8233 goes on to recommend noise levels for gardens:

It is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors might be warranted.

BS 8233 goes on to say:

In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.



3. SURVEY RESULTS – PLOT 10

Plot 10 was chosen given its proximity to Bennett Street to the south. Access to Plot 9 was not available for the testing but verification of the installed glazing, ventilation and barriers have been undertaken.

It was noted at installation that mechanical ventilation was installed and, as such, no vents/windows were required to be opened for ventilation. However, the system was deactivated to allow for the measurement of external to internal noise break-in.

The rooms were unfurnished and so a correction to the measured values may be required.

3.1. LIVING ROOM – INTERNAL SOUND MEASUREMENT

E3P has conducted an internal sound survey within the living room with all windows and doors closed. The survey was conducted during the following periods:

 13:00 Friday 15th November to 09:00 Tuesday 18th November 2024.

It is noted that snow was reported on Monday night. As such, the night-time period of Friday 15th November will be used to inform the assessment, but all data is given for completeness. The following noise measurement position was chosen for the Noise Survey:

 Noise Measurement Position 1 (NMP1): Located in the centre of the living room at a height of 1.5 m above floor level. Noise sources were noted to be distant traffic and on-site construction works, intermittently.

A summary of the hourly measured sound pressure levels inside the living room are presented in Table 2.



Table 2 Living Room – Unfurnished

Date	Measurement period	Measured ambient noise level, $L_{Aeq,T}$ (dB)	10th highest measured maximum noise level, $L_{Amax,fast}$ (dB)
Friday 15th November	Daytime	32.6	-
	Night	22.4	41.6
Saturday 16th November	Daytime	27.8	-
	Night	21.4	41.2
Sunday 17th November	Daytime	26.1	-
	Night	22.2	41.2
Monday 18th November	Daytime	32.7	-
	Night	22.7	41.8

The resultant worst-case 16-hour noise level is noted to be 33 dB applicable to the unfurnished room. If furnishing corrections were applied, the noise level would be lower by at least 3 dB.

This falls below the 35 dB internal criterion by 2 dB. As such, the installed glazing and façade insulation are acceptable.

3.2. BEDROOM – INTERNAL SOUND MEASUREMENT

E3P has conducted a full 24-hour survey within Bedroom 1 with all windows and doors closed. The survey was conducted during the following periods:

- 🕒 13:00 Wednesday 9th October to 14:00 Thursday 10th October 2024.

It is noted that snow was reported on Monday night. As such, the night-time period of Friday 15th November will be used to inform the assessment, but all data is given for completeness. The following noise measurement position was chosen for the Noise Survey:

- 🕒 Noise Measurement Position 2 (NMP2): Located in the centre of the bedroom at a height of 1.5 m above floor level. Noise sources were noted to be distant traffic and on-site construction works, intermittently.

A summary of the hourly measured sound pressure levels inside the living room are presented in Table 3.



Table 3 Bedroom 1 – Unfurnished

Date	Measurement period	Measured ambient noise level, $L_{Aeq,T}$ (dB)	10th highest measured maximum noise level, $L_{Amax,fast}$ (dB)
Friday 15th November	Daytime	27.5	-
	Night	18.2	34.3
Saturday 16th November	Daytime	29.4	-
	Night	17.2	33.8
Sunday 17th November	Daytime	25.8	-
	Night	18.0	34.0
Monday 18th November	Daytime	27.6	-
	Night	18.4	34.9

The resultant 16-hour noise level is noted to be 28 dB and the 8 hour night-time noise level is 19 dB. The 10th highest maximum noise level during the night-time period was also measured and noted to be 35 dB. All applicable to the unfurnished room. With the correction applied to allow for furnishings, such as carpet, furniture, curtains, etc, the resultant noise levels would be lower.

These fall below the 35 dB, 30 dB and 45 dB internal criterion respectively. As such, the installed glazing and façade insulation are acceptable.

Weather conditions during the survey were calm and dry, except for snowfall on Monday evening and night but these have seemingly increased noise levels with roads likely wet and road traffic sound higher.

The equipment outlined in 4 was used for the noise survey.



Table 4 Noise Measurement Equipment and Calibration Dates

Measurement position	Equipment description	Manufacturer & type number	Serial number	Calibration due date
Bedroom	Sound Level Meter	01dB Fusion	14226	7th December 2025
	Pre-amplifier	01dB Pre22	2135072	
	Microphone	GRAS 40CD	470570	
	Calibrator	Cirrus CR 515	99204	8th August 2025
Living Room	Sound Level Meter	01dB Fusion	14616	10th July 2026
	Pre-amplifier	01dB Pre22	20951	
	Microphone	GRAS 40CD	494264	
	Calibrator	Cirrus CR 515	99206	9th July 2025

The sound level meters were field calibrated before and after measurements with no significant drift witnessed.



4. PLOT 9 VERIFICATION AND MITIGATION MEASURES.

It has been shown that the required internal criteria is achieved in all rooms of Plot 10 which is attached to Plot 9. Plot 9 was subject to acoustic mitigation which was as follows:

- ✿ Glazing – 35 dB R_w (27 dB R_w + $C_{t,r}$).
- ✿ Barriers – 2.1 m high close boarded fence.

Below each mitigation measures is verified from on-site verification and desk top review of installed measures.

4.1. GLAZING TO LIVING ROOM AND BEDROOMS

The client has confirmed that the following glazing is installed, the specification sheet is appended to the rear of the report:

- ✿ 6.8 mm / 16 mm / 6 mm argon filled to Dining Room/Living Room.
- ✿ 6.8 mm / 16 mm / 6 mm argon filled to Bedroom 2.
- ✿ 6.8 mm / 16 mm / 6 mm argon filled to Bedroom 3.
- ✿ 6.8 mm / 16 mm / 6 mm argon filled to Bedroom 1.

E3P have inputted this unit into the Guardian Glass Analytics Acoustic Assistant and have provided a report detailing the reductions which are as follows:

- ✿ 37 dB R_w (32 dB R_w + $C_{t,r}$).

The above reduction exceeds the requirements of the NIA and should result in internal noise levels being at least 2 dB lower than WHO maximum noise levels and 5 dB lower than BS 8233 criteria.

4.2. BARRIERS

E3P have verified the barrier at Plot 9 with pictures shown below of its construction and finished height.



Figure 2 **Installed barrier at Plot 9**





Figure 3 Installed barrier at Plot 9 - height



As can be seen, the barrier is of close boarded nature, it is sealed at the base and the height of 2.1 m above ground level.



As such, the installed barrier is sufficient and meets the requirements of the NIA.

Accordingly, all requirements of the NIA in relation to plots 9 and 10 and those adjacent have been installed correctly and appropriately with acceptable internal noise levels achieved in the worst-case habitable rooms and sufficient protection given to garden areas against road traffic sound.

END OF REPORT

APPENDIX I

LIMITATIONS





GENERAL

1. This report and any associated works (together comprising the "Services") were compiled and carried out by E3P for the client (as present in Section 1) under the E3P "Terms of Business" or with those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.
2. Unless explicitly agreed otherwise, in writing, this report has been prepared under E3P Standard Terms and Business as included within our proposal to the Client.
3. Project-specific appointment documents may be agreed upon at our discretion and a charge may be levied for both the time to review and finalise appointment documents and also for associated changes to the appointment terms. E3P reserves the right to amend the fee should any changes to the appointment terms create an increased risk to E3P.
4. The report needs to be considered in light of the proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

NOISE AND VIBRATION IMPACT ASSESSMENTS

5. Where a noise or vibration survey is required to inform an assessment, E3P will endeavour to ensure that all noise and vibration measurements taken are robust, representative and reliable in order to inform an accurate assessment.
6. Where mitigation measures are specified in this report, it should be noted that these measures are relative to a specific sound or vibration source, both in terms of the measured sound pressure and vibration level and the character of the sound source. Where either the sound pressure level or the character of the sound varies following completion of the sound survey, E3P cannot be held responsible for any subsequent variations in the proposed mitigation performance.
7. The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walkover inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. E3P cannot be held responsible for any disclosures that are provided post-production of our report and will not automatically update our report.
8. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, E3P reserves the right to review such information and, if warranted, to modify the opinions accordingly.
9. E3P does not warrant work/data undertaken/provided by others.

APPENDIX II

GLOSSARY





NOISE

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source. 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 LAeq, LA90 etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective but, as a general guide, a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions. An indication of the range of sound levels commonly found in the environment is given in the following table.

Table 5 **Typical Sound Pressure Levels**

SOUND PRESSURE LEVEL	LOCATION/EXAMPLE
0	Threshold of hearing
20-30	Quiet bedroom at night
30-40	Living room during the day
40-50	Typical office
50-60	Inside a car
60-70	Typical high street
70-90	Inside a factory
100-110	Burglar alarm at 1 m away
110-130	Jet aircraft on take off
140	Threshold of pain



ACOUSTIC TERMINOLOGY

Table 6 Terminology

DESCRIPTOR	EXPLANATION
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 (2E-05 Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. "A" weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
LAeq, T	LAeq is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.
LAmx	LAmx is the maximum A-weighted sound pressure level recorded over the period stated. LAmx is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the "fast" sound level meter response.
L10 and L90	If a non-steady noise is to be described, it is necessary to know both its level and the degree of fluctuation. The Ln indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L10 is the level exceeded for 10% of the time and as such can be regarded as the "average maximum level". Similarly, L90 is the "average minimum level" and is often used to describe the background noise. It is common practice to use the L10 index to describe traffic noise.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally, as measured outside and away from buildings.
Fast	A time weighting used in the root-mean-square section of a sound level meter with a 125-millisecond time constant.
Slow	A time weighting used in the root-mean-square section of a sound level meter with a 1000-millisecond time constant.
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 (2E-05 Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. "A" weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.