104 Belsize Lane

London

NW3 5BB

Sound Insulation Assessment Report

On behalf of

EANDO Ltd

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Document Information

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Appendices

1.0 Introduction

1.1. Noise Solutions Ltd (NSL) has been commissioned by EANDO Ltd to undertake an assessment of the sound insulation of the separating floor between ground floor office space and a proposed residential dwelling at 104 Belsize Lane.

1.2. An assessment has been made of the suitability of the proposed floor construction and determine what improvements, if any, are required to provide sufficient sound insulation for the proposed uses.

1.3. A glossary of acoustic terminology is given in **Appendix A**.

2.0 Details of development proposals

2.1. The two-storey property at 104 Belsize Lane sits on the west side of Belsize Lane, between the junctions with Daleham Gardens to the south and Daleham Mews to the north.

2.2. The property is currently in Class E office use on both floors. It is proposed to change the use of the first floor to residential, while leaving the ground floor as Class E use.

2.3. One residential flat will be created at first floor level. The property will have bedrooms at either end, with a kitchen / living room in the centre. The first floor will be accessed via stairs at the south end of the building, with a new-build party wall between the ground floor hallway and the office space.

2.4. Plans and sections showing the proposed layouts are included in **Appendix B**.

3.0 Assessment criteria

Building Regulations Approved Document E – Resistance to the passage of sound

3.1. Approved Document E of the building regulations gives performance requirements for:

- Minimum airborne sound insulation of floors and walls between new dwellings and between dwellings and non-residential spaces in the building
- Minimum impact sound insulation of floors between new dwellings
- Permissible impact sound insulation of floors between new dwellings

- Airborne sound insulation of walls and floors between certain combinations of room types within new dwellings

- Acoustic absorption required within internal common spaces accessed from new dwellings.

3.2. The last two of these requirements are outside the scope of this review, while the requirement relating to impact sound transmission only applies where a dwelling is below another space.

Airborne sound insulation – Building Regulations

3.3. Separating walls and floors between dwellings formed by a material change of use must provide an airborne sound insulation of at least 43dB $D_{nT,w}$ + C_{tr} (higher values are better). This is an on-site test value. Compliance is demonstrated by pre-completion acoustic testing of a sample of walls and floors.

3.4. Internal walls and floors not separating dwellings must have an airborne sound insulation of 40dB R_w. This is a laboratory performance, there is no test requirement.

Impact sound insulation – Building Regulations

3.5. Separating floors between dwellings formed by material change of use must provide an impact sound insulation value of no more than 64dB $L'_{nT,w}$ (lower values are better). This is an on-site test value. Compliance is demonstrated by pre-completion acoustic testing of a sample of walls and floors.

3.6. Impact sound insulation requirements apply only where residential rooms are below another demise. There are no such instances within this development and as such only airborne sound insulation requirements apply.

BS 8233:2014

3.7. The minimum standards in the Building Regulations may not be sufficient to control noise, if the noise levels in the non-residential premises may be higher than would usually be expected for a dwelling. Guidance is therefore sought from BS 8233:2014 – *'Guidance on sound insulation and noise reduction for buildings'*.

3.8. Section 7.5 '*Internal Sound Insulation*' of BS 8233, states the following:

> *"... sound from adjacent spaces can affect the intended use, depending on the noise activity, noise sensitivity and privacy requirement. A matrix may be used to determine the sound insulation requirement of separating partitions once the noise activity, noise sensitivity and privacy requirements for each room and space. An example matrix, which can be adapted according to the specific building use, is given in Table 3. Each room may be both a source*

and a receiving room. Where adjacent rooms have different uses, the worst case sound insulation should be specified.'

Table 3 **Example on-site sound insulation matrix (dB $D_{nT,w}$)**

Privacy requirement	Activity noise of source room	Noise sensitivity of receiving rooms		
		Low sensitivity	Medium sensitivity	Sensitive
Confidential	Very high	47	52	57 A)
	High	47	47	52
	Typical	47	47	47
	Low	42	42	47
Moderate	Very high	47	52	57 A)
	High	37	42	47
	Typical	37	37	42
	Low	No rating	No rating	37
Not private	Very high	47	52	57 A)
	High	37	42	47
	Typical	No rating	37	42
	Low	No rating	No rating	37

*NOTE Background noise can also influence privacy. See also **7.7.6.3**.*

A) $D_{nT,w}$ 55 dB or greater is difficult to obtain on site and room adjacencies requiring these levels should be avoided wherever practical.

3.9. There is an element of professional judgement required with regard to the acoustic categorisation of each space.

3.10. As a worst case, the ground floor office could be considered as a space which is confidential and with a typical activity noise level. The residential properties above can be considered as spaces with a high level of sensitivity.

3.11. Based on these considerations, the sound insulation of the partition separating these spaces should not be lower than 47dB $D_{nT,w}$ based on the matrix table in BS8233. This requirement is in addition to the criterion in Building Regulations.

3.12. In practice, where the Building Regulations requirement described above is achieved, the minimum performance resulting from the BS 8233:2014 recommendations would normally be achieved "by default" for the floor above the office.

4.0 Sound insulation assessment

Floor construction

4.1. The existing separating floor construction between the ground and first floors consists of (from top down):

- 15mm engineered oak flooring, on
- 20mm original solid timber floor, on
- 250mm x 75mm timber joists

- Plasterboard, with skim coat finish.

4.2. There is no mineral wool or other insulation within the cavity.

4.3. The above construction should, subject to flanking and workmanship, be capable of providing an airborne sound insulation of around 40 dB $D_{nT,w} + C_{tr}$ and 45 dB $D_{nT,w}$. This will not be sufficient to comply with the requirements set out in Section 3.0.

5.0 Recommendations

5.1. In order to increase airborne sound insulation performance of the separating floor, the following options are recommended:

Option 1 – Additional ceiling layer

5.2. This option consists of an additional ceiling layer, with no additional treatment above the floor.

- Existing ceiling layer upgraded to 20kg/m^2, plus
- Additional independent joists (minimum 25mm clear of underside of ceiling) with minimum cavity depth of 125mm including 100mm mineral wool, supporting
- At least two layers of plasterboard, joints staggered, minimum mass 20kg/m^2.

Option 2 – Upgraded platform floor

5.3. This option consists of an additional floating floor layer.

- Existing ceiling layer upgraded to 20kg/m^2, plus
- 100mm mineral wool installed in floor cavity
- 15mm oak flooring either removed or retained
- Additional resilient layer of mineral wool, minimum thickness 25mm, density 60-100kg/m^3
- Platform floor consisting of minimum two layers of board bonded or screwed, joints staggered, minimum total mass 25kg/m^2, each layer at least 8mm thick.

5.4. Alternatively, in addition to the upgraded ceiling layer, a proprietary platform floor system such as Cellecta Screedboard 28 could be laid above the existing floor layer. This may require the ceiling layers to be isolated from the joists on resilient bars or hangers.

5.5. In all cases, the platform floor should be isolated from perimeter walls (and internal walls, if these are built off the base floor rather than the floating layer) using suitable resilient flanking strips.

6.0 Summary

6.1. Noise Solutions Ltd (NSL) has been commissioned by EANDO Ltd to undertake an assessment of the sound insulation of the separating floor between ground floor office space and a proposed residential dwelling at 104 Belsize Lane.

6.2. Recommendations have been made such that the separating floor should meet the minimum performance levels recommended under the guidance given in BS 8233:2014 – *'Guidance on sound insulation and noise reduction for buildings'* and Building Regulations requirements for 'residential properties'.

Appendix A Acoustic terminology

Parameter	Description
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$D_{nT,w}$	Weighted standardized level difference. Single-number quantity that characterizes the airborne sound insulation between rooms.
C_{tr}	Spectrum adaption term applied to $D_{nT,w}$ (and similar) parameters to mimic the frequency content of traffic noise sources. Also used in England and Wales Building Regulations to control low frequency noise between dwellings.

Appendix B Proposed layouts