

Noise Breakthrough Assessment

Site Address:	83 Haywood Street, Leek, Staffordshire, ST13 5JN
Project Reference:	NP-012304
Client:	Sammons Architectural Ltd.
Reported By:	M. Caley, MSc, MIOA
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Introduction

NOVA Acoustics Ltd has been commissioned to predict and assess the level of noise transmission between a proposed first floor bar/function room and the adjacent residential flat.

A conditionally approved planning application for the development (ref. SMD/2024/0511) has been submitted to the Local Planning Authority ('LPA') Staffordshire Moorlands District Council. The application is titled as follows:

"Change of use of former bank to public house and function room (sui generis use) including external & internal alterations".

An acoustic report for the development was produced by Peak Acoustics in October 2024 (ref. 1309244NR). A noise breakthrough assessment was undertaken in section 10 of the report, and it was concluded that the existing partition wall between the properties should provide a suitable level of sound insulation. Further assessment has now been requested by the LPA to validate the outcome of the assessment. The scope of this is detailed below:

"A sound test should be undertaken to determine the specific noise reduction specification of the wall to assess the likely impacts of the development inside the neighbouring property. It should consider airborne, structure borne, low frequency music noise and flanking transmission. This sound test would provide site specific information on the suitability of the site for the proposed use and provide detail to address sound insulation requirements if appropriate ."

The figure overleaf shows the location of the partition under assessment.

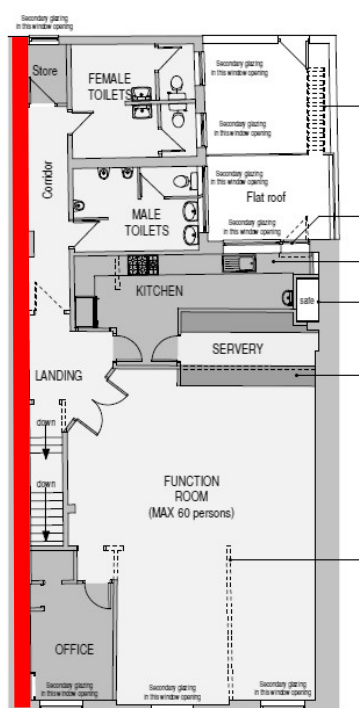


Figure 1 – Wall Partition Under Assessment

Noise Breakthrough Assessment

It is stated in BS8233:2014 that the internal noise criteria within residential properties should be achieved considering the cumulative noise environment. This includes both noise ingress through the external building envelope, and noise transference within the building itself.

Guidance on sound insulation between adjoining domestic and non-domestic dwellings is discussed in Approved Document E ('ADE') of the Building Regulations. The following is stated in section 0.8 of Part E:

"The performance standards set out in Tables 1a and 1b are appropriate for walls, floors and stairs that separate spaces used for normal domestic purposes. A higher standard of sound insulation may be required between spaces used for normal domestic purposes and communal or non-domestic purposes. In these situations, the appropriate level of sound insulation will depend on the noise generated in the communal or non-domestic space. Specialist advice may be needed to establish if a higher standard of sound insulation is required and, if so, to determine the appropriate level."

NOVA Acoustics has been informed that live music will not be played in the function room, however, it is likely that recorded music will be played through an amplified speaker system at a background level to provide ambience. The music is expected to be set at a level at which patrons will not have to raise their voices to be heard. The opening hours are intended to extend into the night-time period (12:00 – 01:00) and as such the sensitivity of the adjoining residents requires additional consideration during the later period.

To achieve an appropriate acoustic environment within the dwelling, the NR20 frequency curve is used as the criteria for the breakthrough calculations. This is 5dB below the standard BS8233 criteria, which

should ensure that noise from the function room does not cause adverse impact. Further to this, the criteria in the 63Hz and 125Hz are specified using the Moorhouse Curve, which should ensure that any adverse impact from low-frequency noise is fully considered.

The predicted internal noise levels which are used in the assessment are taken from a previous report completed by NOVA Acoustics for similar development (report ref: 6690CM). The measurement was taken in the centre of a lively bar, with background music being played through ceiling-mounted Bose 802 speakers and ground-mounted Bose subwoofers. The measured levels are thought to be representative of a typical medium sized 'bar/restaurant'. The minimum levels of airborne sound insulation required to achieve the criteria are presented in the table below.

Description	Octave Frequency Band (Hz, dB)							Overall (dB)
	63	125	250	500	1k	2k	4k	
Predicted Internal Noise Level in Function Room (L_{eq})	83	79	73	77	77	74	66	81 (A)
NR20 Curve + Moorhouse (L_{eq})	47	35	31	24	20	17	14	25 (A)
Min. Required Sound Reduction (D_{nT})	36	44	42	53	57	57	52	56 ($D_{nT,w} + C_{tr}$) ^[1]

Notes:

[1] It should be noted that this level of sound insulation is 13dB above the standard criterion provided in Approved Document E for residential developments undergoing a material change of use.

Table 1 – Minimum Required Airborne Sound Insulation Performance

Sound insulation testing was carried out on the wall partition on 24/02/2025. The sound insulation measurements were undertaken in accordance with BS EN ISO 140-4:1998. Full procedural details and the test certificate can be found in Appendix A.

It is noted that the function room will be separated from the dwelling by a corridor and office (as seen in figure 1). In order to provide a worst-case scenario, sound insulation testing was carried out from the function room stairwell landing directly through the partition.

During the testing it was found that the core of the existing wall is approximately 450mm solid masonry, however, a section which adjoins the lounge/kitchen of 79 Haywood Street has been filled in with light density blockwork, 25mm timber battens and a layer of plasterboard. This section was noted to provide a lower level of sound reduction.

The results of the sound insulation testing are compared with the recommended criteria in the table below.

Source Room	Receiving Room	1/1 Octave Frequency Band (D_{nT} , Hz, dB)							Overall ($D_{nT,w} + C_{tr}$, dB)
		63	125	250	500	1k	2k	4k	
83 Haywood Street – Function Room	79 Haywood Street – Lounge/Kitchen	34	47	53	52	59	66	69	56
Min. Required Sound Reduction (D_{nT})		36	44	42	53	57	57	52	56
Further Attenuation Required		+2	0	0	+1	0	0	0	0

Table 2 – Noise Breakthrough Assessment

As can be seen, the criteria are marginally exceeded in the 63Hz and 500Hz octave bands. As such, it is recommended that mitigation is implemented to reduce the possibility of adverse impact.

Recommendations and Mitigation

To ensure the criteria are achieved, it is recommended that the following mitigation is implemented:

- Install automatic door closers on the entrance/exit doors to the function room.
- Ensure no live music is played within the function room.
- Install a noise limiter capable of controlling noise in separate octave band frequencies. The limiter should be installed between the music source and the amplifier and should restrict noise output when the proposed limit levels are reached. An example product that could be installed is the 'MRC Audio EQ Limit, Data Logging Automatic Volume Sound Limiter', however, other systems are available.

The proposed limit levels are shown in the table below.

Description	Octave Frequency Band (Hz, dB)							Overall (dBA)
	63	125	250	500	1k	2k	4k	
Proposed Internal Noise Limits (L_{eq}) [1]	81	79	73	76	77	74	66	81
Notes: [1] It should be noted that the proposed limit levels are expected to be readily achievable considering the capacity of the room and the nature of the events (no live music, etc.).								

Table 3 – Proposed Internal Noise Limits

Conclusion

A noise breakthrough assessment has been undertaken to assess the sound insulation performance of the wall separating the proposed function room and the adjacent residential flat. In order to avoid adverse impact, mitigation measures have been recommended. These include the installation of automatic door closers on the function room entrance/exit doors, and the installation of a music noise limiter.

Considering that the function room will be separated from the dwelling by a corridor, and a closed door should provide a sound reduction in excess of 20dB R_w , noise levels within the residential property are generally expected to be significantly below the criteria. However, to provide a worst-case scenario, the noise limit levels have been defined to ensure low impact is still achieved when the doors are open.

Document End

Appendix A – Sound Insulation Testing Certificate and Procedure

Airborne sound insulation measurements are undertaken in accordance with BS EN ISO 140-4:1998. A summary of the test procedure is provided below:

- 1) A dodecahedral loudspeaker and sub speaker are used to generate pink noise at a steady and continuous level across the required frequency bands.
- 2) The sound levels are measured in 1/3 octave frequency bands from 50Hz to 5kHz in the source and receiver room using fixed or moving microphone positions to establish a representative average sound pressure level for each room.
- 3) The reverberation time is measured in the receiving room in accordance with BS EN ISO 354:2003.
- 4) Background sound levels are measured in the receiving room.
- 5) The difference in source and receiver noise levels is calculated for each partition in accordance with BS EN 140-4:1998 and Annex B of ADE. The resulting frequency dependent level differences are converted into “a single number characterising the acoustical performance” using the method given in BS EN ISO 717-1:1997, namely the weighted standardised level difference ($D_{nT,w}$).

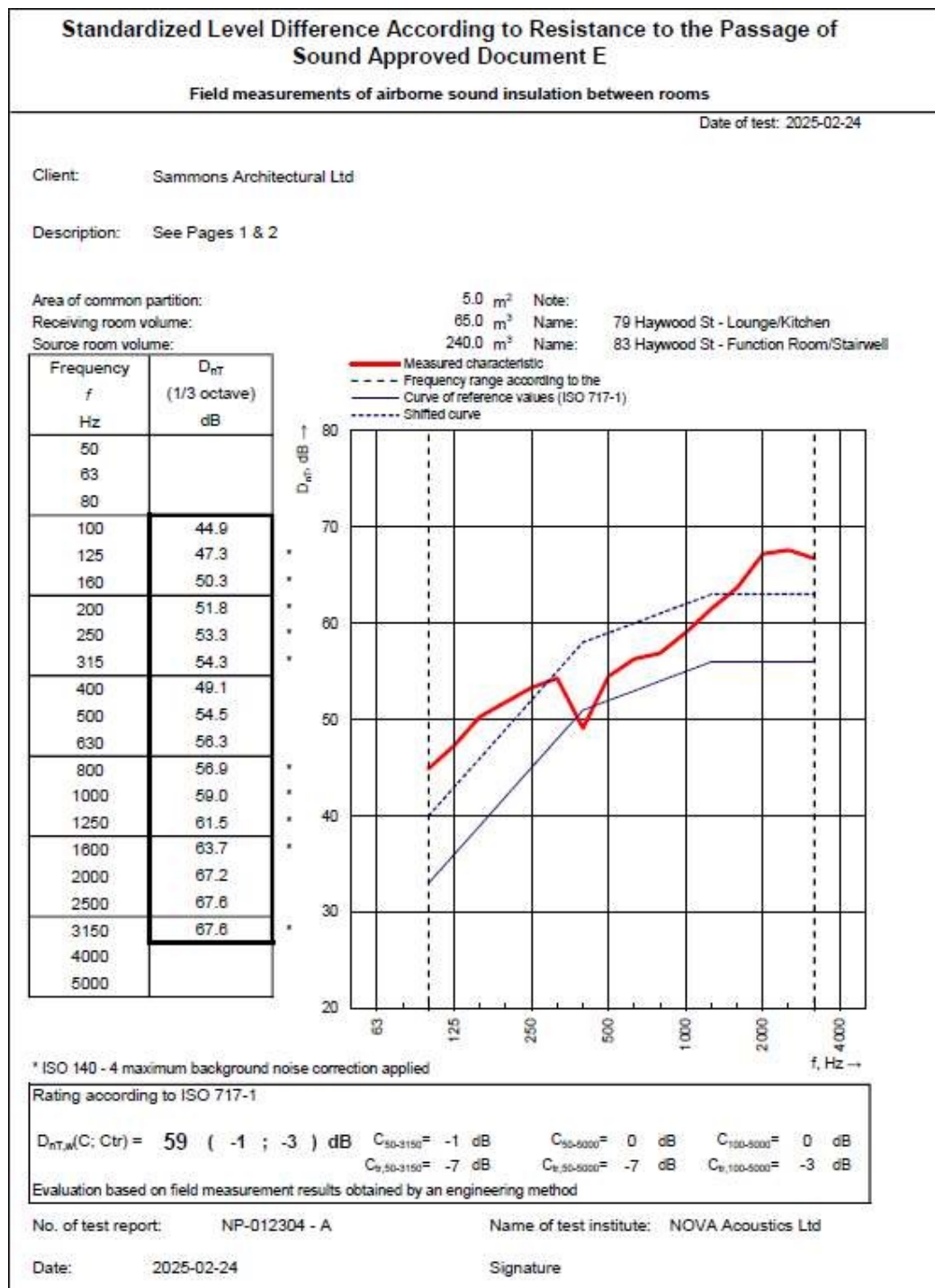


Figure 2 – Sound Insulation Testing Certificate

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