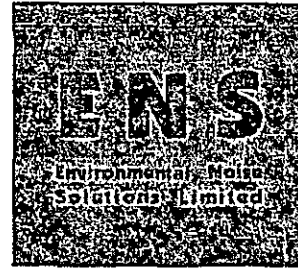


Our ref: NIA/3065/10/2511

18th May 2010

Mr Steve Camps
SDC Projects
Northern House
51 Claret Street
Penistone
Sheffield
S36 6AU



Sent by e-mail only: stevecampspenistone@yahoo.co.uk

Dear Sirs

NOISE IMPACT ASSESSMENT PROPOSED CHANGE OF USE OF A RESIDENTIAL FLAT TO DANCE SCHOOL AT 23 SHREWSBURY ROAD, PENISTONE

Please find herewith the noise impact assessment for the proposed change of use of a residential flat (Class C3 – Dwelling Houses) to a dance school (Class D2 – Assembly and Leisure) at 23 Shrewsbury Road, Penistone.

1.0 INTRODUCTION

- 1.1 The proposed dance school is to be formed at the ground floor area of a three storey building, with the upper two storeys remaining in residential use. The proposed opening hours of the dance school are understood to be between 9am and 9pm, Monday to Sunday.
- 1.2 A noise impact assessment has been requested by Barnsley Metropolitan Borough Council (BMBC) in order to protect the amenity of the first floor dwelling flat use. Further to our discussions with Ms Sarah Newman, Senior Environmental Health Officer, BMBC, the agreed methodology for the noise impact assessment includes the following scope of works:
- Measure the noise levels within an operation dance school;
 - Measure the noise levels within the existing first floor dwelling flat at the application site;
 - Measure the airborne sound insulation of the existing separating floor between the ground and first floor first flats at the application site; and
 - Specify a scheme of sound insulation works (primarily to improve the airborne sound insulation of the existing separating floor) to protect the amenity of the first floor dwelling flat.
- 1.3 *A glossary of acoustic terms is contained within Appendix 1 for reference.*

2.0 NOISE LEVELS WITHIN AN OPERATIONAL DANCE SCHOOL

- 2.1 Noise measurements were undertaken within the Betty Chappelle School of Theatre Dancing, 36 Smyth Street, Wakefield (for reference estimated to be around one-third larger than the proposed dance school) on the evening of Tuesday 4th May 2010. Noise measurements were undertaken using a Bruel & Kjaer 2260 sound level meter and consisted of 5-second consecutive logging over a period of at least 5-minutes. The measurement system calibration was verified immediately before the commencement of the measurement sessions and again at the end, with no drift in calibration level noted.
- 2.2 The noise measurements covered two distinct dance activities (plymsole dancing followed by tap dancing, each with amplified music provided by a 'ghetto blaster') by a group of approximately 20 to 30 dancers.
- 2.3 A summary of the noise measurement data, rounded to the nearest decibel, is contained within the following table. For reference, the reverberation time within the dance school was approximately 0.75 seconds.

Table 2.1 – Noise Levels Within An Operational Dance School

Activity	Time	L _{Aeq} (dB)	L _{Ceq} (dB)	L _{A90} (dB)	L _{A10} (dB)	L _{A1} (dB)	Comments
Plymsole Dancing	17:42–17:47	78	83	69	81	86	Class of 20 to 30 persons, over half dancing at any time
Tap Dancing	17:47–17:57	82	88	69	86	89	Class of 20 to 30 persons, over half dancing at any time

2.4 The noise level measured during tap dancing activity was 82 dB L_{Aeq,T}, which is considered representative of a dance studio setting. It should be noted that noise levels of 85 dB L_{Aeq,T} and above represents the upper exposure limit under the Control of Noise at Work Regulations 2005 and, as a consequence, significantly higher noise levels would not be expected, nor necessarily tolerated by patrons (particularly young children).

3.0 NOISE LEVELS WITHIN EXISTING FIRST FLOOR DWELLING FLAT

3.1 Noise measurements were undertaken within the existing first floor dwelling flat at the application site on the evening of Wednesday 12th May 2010.

3.2 Noise measurements were undertaken using a Bruel & Kjaer 2260 sound level meter and consisted of 15-second consecutive logging over a period of at least 15-minutes. The measurement system calibration was verified immediately before the commencement of the measurement sessions and again at the end, with no drift in calibration level noted.

3.3 A summary of the noise measurement data, rounded to the nearest decibel, is contained within the following table. For reference, the reverberation time within the bedroom of the first floor dwelling flat was approximately 0.40 seconds.

Table 2 – Noise Levels Within Existing First Floor Dwelling Flat

Location	Time	L _{Aeq} (dB)	L _{Ceq} (dB)	L _{A90} (dB)	L _{A10} (dB)	L _{A1} (dB)	Comments
First Floor Flat Bedroom	20:28–20:43	32	48	20	36	44	Intermittent traffic on Shrewsbury Road

3.4 The ambient noise level within the existing first floor dwelling flat was 32 dB L_{Aeq,T}. In accordance with British Standard 8233:1999 'Sound Insulation and Noise Reduction for Buildings – Code of Practice' (BS 8233), such an ambient noise levels is considered to represent good resting and sleeping conditions. The background noise level within the existing first floor dwelling flat (i.e. the noise level in the absence of passing traffic) was relatively low at 20 dB L_{A90,T}.

4.0 AIRBORNE SOUND INSULATION OF THE EXISTING SEPARATING FLOOR

4.1 An airborne sound insulation test of the existing separating floor between ground and first floors at the application site was undertaken on the evening of Wednesday 12th May 2010.

4.2 The airborne sound insulation testing was undertaken using a Bruel & Kjaer 2260 sound level meter and the Building Acoustic Kit. All the procedures in Annex B of the Approved Document E 'Resistance to the Passage of Sound', 2003 (ADE 2003) of the Building Regulations were followed.

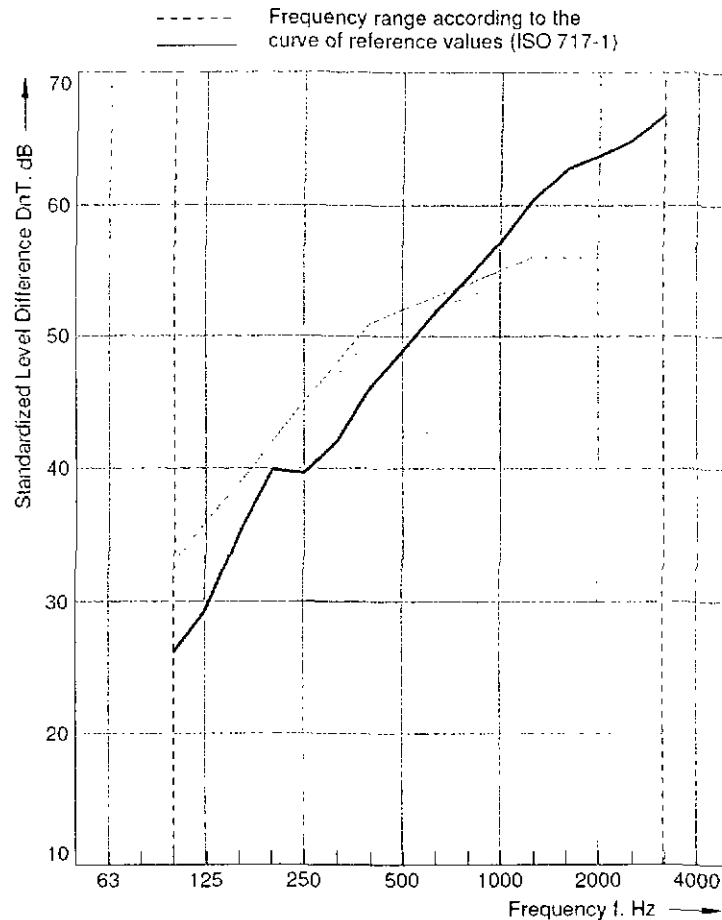
4.3 Airborne testing was undertaken for all third octave frequency bands between 100–3150 Hertz. Two source positions were used. The spatial average sound pressure level was obtained for each source position in both source and receiving rooms using a swept microphone technique (continuously moving). An averaging time of 30 seconds was used for each microphone sweep. Reverberation time measurements were undertaken using one loudspeaker position and an interrupted source. The average of six decay measurements for each frequency band was determined from three fixed microphone positions with two readings in each case. The measurement system calibration was verified immediately before the commencement of the measurement sessions and again at the end, with no drift in calibration level noted.

- 4.4 The airborne sound insulation of the existing separating floor between the ground and first floors at the application site was measured at 51 dB $D_{nT,w}$ (where $D_{nT,w}$ is a single-number quantity which characterizes the airborne sound insulation between rooms as defined in BS EN ISO 717-1), as shown in the following figure.

Figure 4.1 – Airborne Sound Insulation of the Existing Separating Floor

Source room volume: m^3
Receiving room volume: $33.00 m^3$

Frequency f Hz	D_{nT} 1/3 Octave dB
50 63 80	
100 125 160	26.2 29.3 35.4
200 250 315	39.9 39.6 42.0
400 500 630	46.2 48.9 51.8
800 1000 1250	54.5 57.2 60.3
1600 2000 2500	62.7 63.7 64.8
3150 4000 5000	66.8



Rating according to ISO 717-1

$$D_{nT,w}(C;C_{tr}) = 51 (-2; -8) \text{ dB}$$

Evaluation based on field measurement results obtained in one-third-octave bands by an engineering method

- 4.5 For reference, the airborne sound insulation of the existing separating floor between the ground and first floors at the application site was measured at 43 dB $D_{nT,w} + C_{tr}$ (where $D_{nT,w} + C_{tr}$ is a single-number quantity which characterizes the airborne sound insulation between rooms using noise spectrum No.2 as defined in BS EN ISO 717-1; for reference this is the parameter currently used by ADE 2003 to assess airborne sound insulation). This level of airborne sound insulation (43 dB $D_{nT,w} + C_{tr}$) is the same as the minimum standard for separating floors between dwelling flats formed by a material change of use.
- 4.6 Whilst a higher level of airborne sound insulation is appropriate at the application site (as the underlying use is assembly and leisure rather than residential), the results of the sound insulation test demonstrate that the existing separating floor is of a reasonable standard (compliant with ADE 2003). Furthermore, the sound insulation test also demonstrates that there was no evidence of any flanking sound transmission via supporting walls (which is to be expected as the external walls of the existing buildings are understood to be a substantial solid masonry construction).

5.0 PROPOSED SCHEME OF SOUND INSULATION WORKS

5.1 In accordance with BS 8233, the ambient noise level within the existing first floor dwelling flat at the application site represents good resting and sleeping conditions. Furthermore, the background noise level (i.e. in the absence of passing traffic) was relatively low at 20 dB $L_{A90,T}$.

5.2 For the noise associated with the proposed dance studio not to exceed the background noise level in the first floor flat, the required airborne sound insulation of the separating floor is calculated by the following equation:

$$\begin{aligned} \text{Sound Insulation} &= \text{Specific Noise Level Dance Studio} - \text{Background Noise Level} \\ (D_{nT,w}) &= 82 \text{ dB } L_{Aeq,T} - 20 \text{ dB } L_{A90,T} \\ &= 62 \text{ dB } D_{nT,w} \end{aligned}$$

5.3 This is consistent with the advice provided by a number of local planning authorities which require that the airborne sound insulation of separating elements between residential dwellings and adjacent places of entertainment with "non-discotheque" music should be a minimum of 60 dB $D_{nT,w}$.

5.4 Notwithstanding this, in order to provide a margin for safety, it is recommended that the airborne sound insulation of the separating floor between the proposed ground floor dance studio and the overlying residential dwelling flat should be a minimum of 67 dB $D_{nT,w}$ (i.e. the noise level of the proposed dance studio is at least 5 decibels below the background noise level in the existing first floor dwelling flat). In order to achieve this level of airborne sound insulation (c. 67 dB $D_{nT,w}$), it is necessary to under draw the existing ceiling with an independent ceiling as per the following specification:

- The independent ceiling should be supported by independent joists fixed only to the surrounding walls and the independent ceiling joists should not be in contact with the existing ceiling (or any steelwork to support load bearing walls above)
- A clearance of at least 300 mm should be left between the top of the independent ceiling board and the underside of the existing ceiling (note: although a greater void may be formed due to the need to keep the independent joists clear of any steelwork to support load bearing walls above)
- The independent ceiling should consist of 3 x 15 mm sound bloc plasterboard (staggered joints) with 200 mm mineral wool quilt (density 45 kg/m³) laid above
- Any steelwork to support load bearing walls above should be boxed out with 2 x 15 mm fire line plasterboard and mineral wool packed between the web of the down stand beams

5.6 The following sound insulation works are also recommended to the proposed ground floor dance studio:

- In order to provide mitigation against any structure borne sound re-radiating through the building, a resilient impact mat should be installed beneath the floor finish (presumably a laminate-type floor is proposed to support tap dancing etc); the specification for the resilient impact mat is a weighted impact sound reduction (ΔL_w) of at least 17 dB, such as Profloor Impact Mat, Interfloor Boardwalk/Silentfloor/SilentfloorGold, etc.
- In order to provide mitigation against excessive reverberation it is recommended that the sound insulating ceiling be under drawn with a Class C absorber or better, such as Ecophon Advantage (Class A absorber with 110 mm overall depth system (ods), Class C absorber with 50 mm ods) or Echosorba Stick-On Acoustic Tiles (Class B absorber).

I trust that the above is sufficient for your requirements, however, should you have any queries please do not hesitate to contact me.

Yours sincerely

Jonathan Rigg
For Environmental Noise Solutions Limited

cc Ms Shani Mitchell

Appendix 1 Glossary of Acoustic Terms

Sound Pressure Level (L_p)

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 μ Pa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$$L_p = 20 \log_{10}(p/p_0)$$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_0 = reference sound pressure (20 μ Pa).

A-weighting Network

A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$

The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T , has the same mean-square sound pressure as a sound that varies with time. $L_{Aeq, 16h}$ (07:00 to 23:00 hours) and $L_{Aeq, 8h}$ (23:00 to 07:00 hours) are used to qualify daytime and night time noise levels.

$L_{A10, T}$

The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T . $L_{A10, 18h}$ is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

$L_{A90, T}$

The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T . L_{A90} is typically taken as representative of background noise.

$L_{AF \max}$

The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

Sound Exposure Level (SEL or L_{AE})

The energy produced by a discrete noise event averaged over one second, no matter how long the event actually took. This allows for comparison between different noise events which occur over different lengths of time.

Weighted Sound Reduction Index (R_w)

Single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies (R_w is used to characterise the insulation of a material or product that has been measured in a laboratory).

Weighted Airborne Sound Insulation ($D_{nT,w}$)

Single number quantity which characterises the airborne sound insulation between rooms.