



Darus Salam Mosque

Noise Impact Assessment

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Client: Darus Salam Mosque
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REVISION HISTORY

Revision	Date	Revision Details	Author	Checked
R01	07/10/2022	Original Issue	Luke Hine Bsc AMIOA	<i>Ben Tomlin</i> Ben Tomlin Bsc MIOA

1 INTRODUCTION

- 1.1 dBx Acoustics has been appointed by Darus Salam Mosque to discharge planning conditions associated with planning application reference 130538/FO/2021 for *'Change of use of offices to be used in conjunction with existing place of worship with ancillary accommodation (Class F1) following related reconfiguration of existing internal space'* at 43 Slade Lane, M13 0QJ.
- 1.2 Afternoon prayer sessions occur 5 times a week, and last no longer than 15 minutes. No more than 15-20 people were in attendance, which is understood to be typical.
- 1.3 A glossary of acoustic terminology is presented in Appendix A.

2 BASIS OF NOISE ASSESSMENT

- 2.1 All noise related planning conditions associated with planning application reference 130538/FO/2021 are reproduced below:

'4) Before the commencement of the use of 43 Slade Lane for the purposes shown on drawings referenced: Proposed Ground Floor Plan SK 002 and Proposed First Floor Plan SK 003, a scheme shall be submitted and approved in writing by the City Council as local planning authority relating to measures to secure appropriate measures to secure an appropriate acoustic insulation to reduce the risk of noise outbreak and transmission from the property'.
- 2.2 It is understood from discussions with the client that the principal concern relates to noise transfer into the adjacent office via the separating wall. Assessment of the above planning condition is therefore contained within this report.

'5a) Before its installation, any externally mounted ancillary plant, equipment and servicing required in support of any of the accommodation comprising the authorised development, shall be selected and / or acoustically treated in accordance with a scheme designed so as to achieve a satisfactory noise rating level at the nearest noise sensitive location. Prior to commencement of the use hereby approved the scheme shall be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the site.'
- 2.3 It is understood that there will be no external plant serving the property, and hence this is not assessed.

'6) There shall be no external transmission of music or operation and / or use of loudspeakers, bells, tannoy, public address systems or any other form of amplified external sound equipment in association with the authorised Class F1 use, including the operation of such equipment as part of religious observance.'
- 2.4 It is understood that there will be no external transmission of music, and hence this is not assessed.
- 2.5 Manchester City Council (MCC) does not offer definitive guidance relating to internal ambient noise levels (IANL) of office spaces and therefore BS8233 guidance has been referred to when determining the permissible noise transmission level into the adjacent office space.
- 2.6 Additionally, potential noise transfer has been compared to the existing background noise levels within the adjacent office.

BS 8233:2014: 'Guidance on sound insulation and noise reduction for buildings'

- 2.7 BS:8233 states that indoor ambient noise levels within an executive office should not exceed 35-40dB_{L_{Aeq,T}}.

3 NOISE SURVEY

- 3.1 dBx Acoustics observed and measured a prayer session at 14:00h on Tuesday 4th of October 2022. Table 1 below displays the measured levels in the prayer room, and background noise levels within the adjacent office.

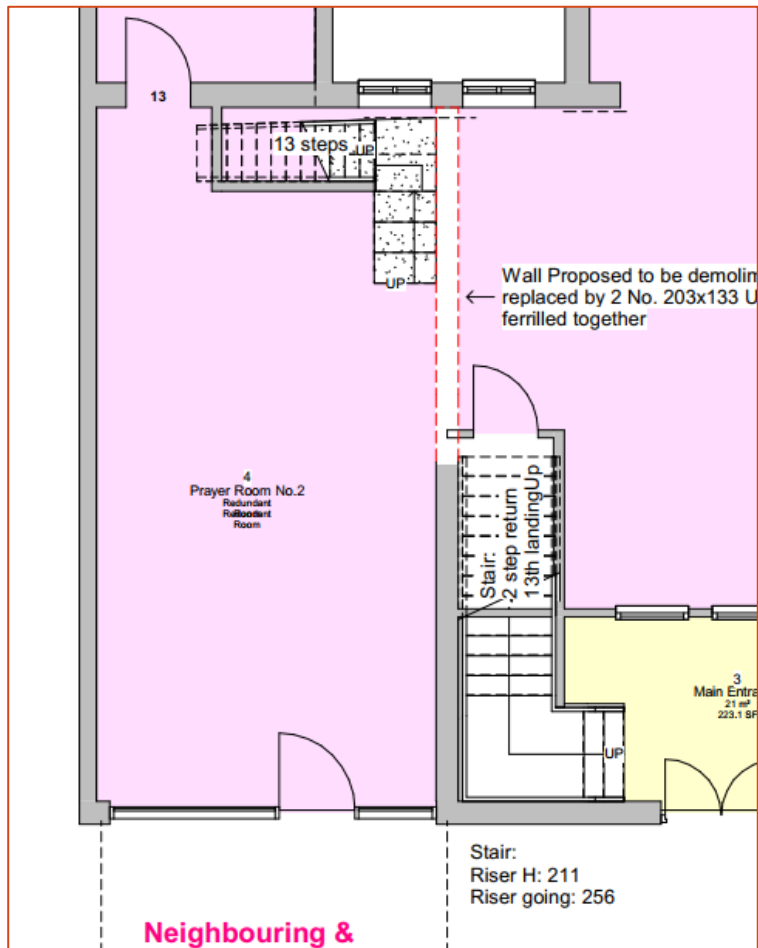
Table 1: Measured Noise Levels

	Noise level, dB _{L_{Aeq,T}}								
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dBA
Prayer Session Ambient Noise Level	41	36	35	44	43	30	31	22	53
Office Background Noise Levels	46	31	25	21	21	20	19	14	36

4 SOUND INSULATION MEASUREMENTS

- 4.1 Following measurements of the prayer session on 4th of October, dBx Acoustics carried out testing of the partition separating Darus Salam Mosque prayer space at 43-47 Slade Lane and Zia Accountants at 41 Slade Lane.
- 4.2 The testing was carried out generally in accordance with BS EN ISO 140-4.

Figure 1: Prayer room used for testing



- 4.3 The level difference was measured on site, and subsequently corrected for background noise. The transmission of noise from the mosque via the partition was then calculated using the corrected level difference between the rooms and the ambient noise levels of the prayer session, as shown in Table 3 below.

Table 3: Noise transmission via the partition.

	Noise Level/Level Difference in Octave Band Centre Frequency, dB								
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dBA
Prayer Session, $dBL_{Aeq,T}$	41	36	35	44	43	30	31	22	52
Level Difference, D, dB	41	42	47	46	49	56	63	72	-
Noise Level in Office, $dBL_{Aeq,T}$	0	-6	-12	-2	-5	-26	-32	-50	5
Office Background Noise Level, $dBL_{Aeq,T}$	51	39	31	26	25	25	33	20	36
Transmitted	-50	-43	-34	-19	-25	-46	-53	-64	-

- 4.4 As can be seen, the transmitted noise level is significantly lower than the existing background noise level, meaning that the prayer session would generally be inaudible, or barely perceptible, and hence of no adverse impact on the neighboring property.
- 4.5 The predicted worst case noise level is also significantly (at least) 30dB lower than the BS8233 recommended indoor ambient noise levels in executive offices.
- 4.6 The noise levels measured and used in this assessment used a PA system that would not typically be used for prayer's during the day which made the assessment an absolute worst case.

5 SUMMARY AND CONCLUSION

- 5.1 dBx Acoustics has been appointed by Darus Salam Mosque to discharge planning conditions associated with planning application reference 130538/FO/2021 for '*Change of use of offices to be used in conjunction with existing place of worship with ancillary accommodation (Class F1) following related reconfiguration of existing internal space*' at 43 Slade Lane, M13 0QJ.
- 5.2 Noise levels of a typical prayer session were measured, along with the sound insulation performance of the separating wall. These were used to determine the likely noise transfer into the adjacent office.
- 5.3 It was calculated that noise transfer would be significantly lower than the background noise levels in the adjacent office, and would therefore be inaudible, or barely perceptible.
- 5.4 The predicted worst case noise level is also significantly (at least) 30dB lower than the BS8233 recommended indoor ambient noise levels in executive offices.
- 5.5 On this basis, no further acoustic treatment is necessary to prevent the ambient noise levels within the neighboring office exceeding the guidance outlined within BS:8233 referenced within the report.
- 5.6 On this basis, it would appear that planning condition 4 can be discharged.
- 5.7 As there will be no external plant installed planning condition 5a was not required to be assessed.
- 5.8 As there will be no external transmission of music planning condition 6 was not required to be assessed.
- 5.9 All planning conditions associated with noise can therefore be discharged.

APPENDIX A – GLOSSARY OF ACOUSTIC TERMINOLOGY

Decibel, dB	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. For sound pressure level (L_p) the reference quantity is $2 \times 10^{-5} \text{ N/m}^2$. The sound pressure level existing when microphone measured pressure is $2 \times 10^{-5} \text{ N/m}^2$ is 0 dB, the threshold of hearing.
L	Instantaneous value of Sound Pressure Level (L_p) or Sound Power Level (L_w).
Frequency	Number of cycles per second, measured in hertz (Hz), related to sound pitch.
A-weighting	Arithmetic corrections applied to values of L_p according to frequency. When logarithmically summed for all frequencies, the resulting single "A weighted value" becomes comparable with other such values from which a comparative loudness judgement can be made, then, without knowledge of frequency content of the source.
$L_{eq,T}$	Equivalent continuous level of sound pressure which, if it actually existed for the integration time period T of the measurement, would possess the same energy as the constantly varying values of L_p actually measured.
$L_{Aeq,T}$	Equivalent continuous level of A weighted sound pressure which, if it actually existed for the integration time period, T, of the measurement would possess the same energy as the constantly varying values of L_p actually measured.
$L_{n,T}$	L_p which was exceeded for n% of time, T.
$L_{An,T}$	Level in dBA which was exceeded for n% of time, T.
$L_{max,T}$	The instantaneous maximum sound pressure level which occurred during time, T.
$L_{Amax,T}$	The instantaneous maximum A weighted sound pressure level which occurred during time, T.
$L_{Ar,Tr}$	The equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise.
Reverberation Time, T	The time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped. The descriptor T often includes other nomenclature to describe the type of reverberation time measurement or if the reverberation time is an average taken for specific frequencies. For example, a T_{mf} is the mid-frequency reverberation time.
Absorption Coefficient, α	The fraction of reverberant sound energy absorbed by a material. It is expressed as a value between 1.0 which equates to perfect absorption and 0 which equates to zero absorption.
Acoustic Class, A - E	Classification of sound absorbers into Sound Absorption Classes A-E, according to BS EN ISO 11654, including frequencies 200-5000 Hz
NRC	A single-number rating system used to compare the sound-absorbing characteristics of building materials. A measurement of the acoustical absorption performance of a material, calculated by averaging its Sound Absorption Coefficients at 250, 500, 1000 and 2000 Hz
STI	Speech Transmission Index , Metric ranging between 0 and 1 representing the transmission quality of speech with respect to intelligibility by a speech transmission channel
R	Sound Reduction Index , the laboratory measured sound insulation properties of a material or building element in octave or third octave bands.
R_w	Weighted Sound Reduction Index , a single number which represents the sound reduction of a material. It is derived by plotting the sound reduction index against a set of reference curves. The curves are shifted until a best-fit is established and the curve which best fits the sound reduction spectrum is used to represent the single figure value.
D_w	Weighted Level Difference , the weighted level difference between a pair of rooms, stated as a single figure.
D_{nT}	Standardised Level Difference , a frequency-dependent measurement of airborne sound insulation, calculated using the following formula: $D_{nT} = L_1 - L_2 + 10 \log(T/T_0)$ dB Where: L_1 is the energy-averaged sound pressure level due to the pink noise source measured in the source room using a sweep technique.

L_2 is the energy-averaged sound pressure level measured in the receiving room using a sweep technique.

T is the mean receiving room reverberation time (derived from T_{30} measured in seconds).

T_0 is the reference reverberation time (= 0.5s for dwellings).

$D_{nT,w}$	Weighted Standardised Level Difference , a single-figure value of airborne sound insulation performance, derived according to procedures in BS EN ISO 717-1, based on the D_{nT} values at different frequencies (100-3150 Hz third octave bands).
$D_{nF,w}$	Weighted, Normalised Flanking Level Difference , the normalised, weighted difference in sound level between a pair of rooms via a flanking element, such as mullion or ceiling detail. The level difference in octave bands is first normalized to a reference amount of absorption and then plotted against a set of reference curves to establish a single figure value.
D_{ne}	Normalised Element Level Difference , The normalised difference in sound level between a pair of rooms via a small element such as a trickle ventilator. The level difference in octave bands is normalized to a reference amount of absorption.
$D_{n,e,w}$	Weighted, Normalised Element Level Difference , The normalised, weighted difference in sound level between a pair of rooms via a small element such as a trickle ventilator, stated as a single figure. The level difference in octave bands is normalized to a reference amount of absorption and then plotted against a set of reference curves to establish a single figure value.
C_{tr}	Spectrum Adaptation Term , a correction term applied to the sound insulation single-number values (R_w , D_w , and $D_{nT,w}$) in accordance with BS EN ISO 717-1. Applying the C_{tr} penalises a construction's performance if its low frequency performance is poor in relation its performance at higher frequencies.
Impact Sound	The noise generated by an impact on a structure. This is normally used to describe the noise created by people walking or moving furniture on a floor structure.
L_{nT}	Standardised Impact Sound Pressure Level , a frequency dependent measurement of impact sound insulation, calculated using the following formula: $L_{nT} = L_1 + 10\log(T/T_0)$ dB Where: L_1 is the mean sound pressure level due to the tapping machine measured in the receiving room using a sweep technique. T is the mean receiving room reverberation time (derived from T_{30} measured in seconds). T_0 is the reference reverberation time (0.5s for dwellings)
$L'_{nT,w}$	Weighted Standardised Impact Sound Pressure Level , a single-figure value (@ 500 Hz) of impact sound insulation, performance, derived according to BS EN ISO 717-2, based on the L_{nT} values at different frequencies (100Hz- 3150 Hz third octave bands).
Insertion Loss, IL	The reduction of noise level due to the presence of a noise control device such as an attenuator, excluding any regeneration noise created by its presence.
NR	The Noise Rating level . This is a single figure value derived by plotting a noise spectrum against a set of curves. The curve under which the spectrum fits is the resulting NR level.