

Noise impact assessment of proposed fitness studio

Davidson House, Forbury Square, Reading, RG1 3EB



Client: Featherstone Commercial Interiors Limited

Report Reference: 190606-R001

Date: 5th July 2019

Revision:	Date:	Author:	Checked:
-	05/07/2019	Rob Cant MIOA	Tommy Burn BSc (Hons) MIOA

This report has been prepared by ACA Acoustics Limited (ACA) with all reasonable skill, care, and diligence in accordance with generally accepted acoustic consultancy principles and taking account of the services and terms agreed between ACA and our client. Any information provided by third-parties and referred to herein may not have been checked or verified by ACA unless expressly stated otherwise. Certain statements made in the report may constitute estimates or projections and even though these are based on reasonable assumptions and good industry practice, such forward-looking statements by their nature involve risks and uncertainties which could cause actual results to differ materially from the results predicted. ACA does not guarantee or warrant any estimate or projection contained in this report.

This report is confidential to the client and ACA accepts no responsibility whatsoever to third parties unless formally agreed by ACA. Any such party relies upon the report at their own risk. © 2019 ACA Acoustics Limited.

CONTENTS

0. SUMMARY	2
1. INTRODUCTION	3
2. ACOUSTIC CRITERIA	4
2.1 BS 8233:2014	4
2.2 Institute of Acoustics – Good Practice Guide on the Control of Noise from Pubs and Clubs.....	5
2.3 Structure-borne Impact Sound Transmission	6
3. REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS	7
4. BACKGROUND SOUND LEVEL SURVEY	8
5. AIRBORNE SOUND INSULATION TESTS OF THE EXISTING STRUCTURE.....	9
6. ASSESSMENT OF OPERATIONAL ACTIVITY/MUSIC NOISE EMISSIONS TO OUTSIDE RESIDENTIAL DWELLINGS	11
6.1 Façade Sound Insulation	11
6.2 Proposed Yoga Studio	11
6.3 Potential Intensification of Use in the Gym	11
7. ASSESSMENT OF AIRBORNE SOUND TRANSMISSION TO ADJOINING COMMERCIAL OFFICES	13
8. STRUCTURE-BORNE SOUND TRANSMISSION TO ADJOINING COMMERCIAL OFFICES	14
APPENDIX A.....	A1
APPENDIX B.....	B1

0. SUMMARY

- 0.1. Planning consent has been granted for the change of use of part of the basement at Davidson House, Forbury Square, Reading, to Class D2 fitness gym. ACA Acoustics Limited have been commissioned to assess the impact of the proposed fitness studio to nearby properties.
- 0.2. A background sound level survey has been undertaken to the front of the site, outside windows to the closest noise-sensitive properties in St Lawrence House Apartments. Current background sound levels comprise of distant traffic activity and pedestrians in the local area. Lowest background sound levels measured during the evening were LA90 44dB.
- 0.3. Sound transmission through the façade has been calculated. Resultant sound levels from potential high-volume music inside the proposed fitness studio to outside nearby residential windows will be below LAeq 29dB. This is at least 15dBA below the existing background sound level. Allowing a reduction of 10-15dBA through a partially open window equates to a level of LAeq 14-19dB to inside rooms of nearby dwellings. This is at least 11dBA below the guideline level set out in BS 8233:2014 to inside bedrooms overnight of LAeq 30dB and at least 16dBA below guideline level to living rooms during the daytime. Noise from the proposed gym will not be disturbing or detrimental to the amenity of any nearby residential occupants.
- 0.4. Sound insulation tests have been undertaken on the separating floors to determine the level of sound transmission between the proposed fitness studio and commercial offices above. The proposed operator of the new gym is to develop it as a yoga studio. This will produce low internal sound levels and no further mitigation is required to the structure. Should a future operator desire to play high-volume music within the gym then sound transmission would still remain below the current ambient sound level in the offices and below BS 8233:2014 guideline levels to offices.
- 0.5. Structure-borne sound transmission due to the impact of weights being dropped on the floor has been measured to offices above. Use of the fitness gym as a yoga studio will limit potential impact sound transmission and standard gym flooring would be suitable. Should use of heavier weights be proposed by a future operator of the premises then it has been demonstrated that with an appropriate resilient flooring configuration, impact sound transmission to the offices above is subjectively inaudible above the existing background sound level inside the offices and achieves guideline levels to inside offices set out in BS 8233:2014.
- 0.6. In conclusion, allowing for the implementation of the noise mitigation scheme set out in this report, the proposed development should not have an adverse impact on the amenity of existing residential or commercial occupants in the vicinity and condition 6 of Decision Notice 172092 may be discharged.

1. INTRODUCTION

Planning consent, reference 172092, has been granted for the change of use to Class D2 gym of part of the basement car park at Davidson House, Forbury Square, Reading, RG1 3EB.

ACA Acoustics Limited has been commissioned to assess the impact of the proposed use on the existing noise climate in the vicinity and, where necessary, provide a scheme for noise mitigation measures to ensure that the amenity of nearby noise-sensitive properties is not compromised.

This report presents results of the sound level surveys and assessment.

Note that the development is at an early stage and design of new mechanical services equipment is yet to be finalised. Assessment of noise from any new mechanical equipment, required under condition 4 of the Decision Notice, will be considered in a separate application.

2. ACOUSTIC CRITERIA

Reading Borough Council has granted consent for the development, subject to various conditions. Condition 6 of Decision Notice 172092 states:

Prior to commencement of works for the basement floor gymnasium, a scheme for insulating the premises to control the transmission of noise emanating from the gymnasium and to prevent audible noise nuisance shall be submitted to and approved in writing by the Local Planning Authority. The scheme shall be designed, specified and constructed in accordance with BS 8233:2014 Guidance on sound insulation and noise reduction for buildings. The scheme shall be implemented as approved prior to commencement of the use and retained at all times thereafter.

The planning condition refers to BS 8233:2014, however no numerical levels or assessment methodology is included. Discussion of relevant Standards and other guidance documents is provided below.

2.1 BS 8233:2014

BS 8233:2014 provides guideline values for acceptable indoor ambient sound levels to a variety of room types. The introduction to the Standard advises that;

“noise control in and around buildings is discussed in this British Standard guide on an objective and quantifiable basis as far as is currently possible. For many common situations, this guide suggests criteria, such as suitable sleeping/resting conditions, and proposes noise levels that normally satisfy these criteria for most people.”

It also notes that; *“the standard is intended to be used routinely where noise sources are brought to existing noise-sensitive buildings.”*

Section 7.3 of the Standard advises that *“guidance on indoor ambient noise levels is given in Table 2, Table 3, Table 4, Table 5 and Table 6 for various types of rooms”*. Table 4 advises that suitable design range for residential properties is LAeq 35dB to living rooms and bedrooms during daytime hours. However, it is noted that Paragraph 7.7.1 advises that;

“only noise without character is considered in Table 4 ... noise has a specific character if it contains features such as a distinguishable discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate.”

Amplified music is often irregular and may contain a strong low-frequency content. As such the author considers that while the above criteria provide an initial baseline for assessment, these alone may not be sufficient to protect the amenity of nearby residents. Notwithstanding this,

where existing background sound levels exceed the BS 8233:2014 criteria, the BS 8233 levels will be used as being the lower of the two values.

For commercial offices adjoining the new fitness gym, Table 2 of BS 8233:2014 recommends indoor ambient noise levels in open plan offices should not exceed LAeq 45dB to 50dB.

2.2 Institute of Acoustics – Good Practice Guide on the Control of Noise from Pubs and Clubs

Whilst the proposed development is a fitness gym, rather than a pub or club, the author considers that the primary noise source from a fitness gym is usually amplified music, and as such the recommendations for the assessment of noise emissions from bars may be applied similarly to the assessment of noise emission from the gym.

In March 2003, the Institute of Acoustics (IOA) published a *Good Practice Guide on the Control of Noise from Pubs and Clubs*. The initial guidance document provides recommended criteria as set out below;

“For premises where entertainment takes place on a regular basis, music and associated sources should not be audible inside noise-sensitive property at any time ... for the purposes of this document, noise may be considered not audible or inaudible when it is at a low enough level such that it is not recognisable as emanating from the source in question and does not alter the perception of the ambient noise environment.”

Whilst this guidance provides a useful basis for design, it does not provide objective noise criteria as defining a sound as “audible” or “inaudible” is difficult and requires a subjective opinion of the listener which may differ from person to person. What is inaudible to one person may be clearly audible to another. Therefore, a more technical assessment methodology is recommended.

To address this, a working group of the IOA has produced a draft annex on criteria and measurement guidelines. This was published in the Institute of Acoustics Bulletin (Volume 28 No 6 Nov/Dec 2003) and includes suggested numerical limits for music emissions such that the noise will be generally inaudible inside residential properties and will not cause nuisance, and thus may be defined as being below the LOAEL, following terminology of the NPPF.

For premises where music might occur more than once a week the draft annex proposes criteria as follows:

- a) The LAeq of the entertainment noise should not exceed the representative background noise level LA90 (without entertainment noise), and
- b) The LA10 of the entertainment noise should not exceed the representative background noise level L90 (without entertainment noise) in any 1/3rd octave band between 40Hz and 160Hz.

It is considered that these criteria are suitable for music noise emissions from the new development to nearby residential properties. At this level music noise breakout from the gym will be low and should not be detrimental to the amenity of any nearby residents.

2.3 Structure-borne Impact Sound Transmission

Whilst there are numerous studies on sleep disturbance or awakening due to individual short-term noise events at night to residential dwellings, the author is unaware of any reputable studies into the effect of short-term noise events regarding disturbance or loss of amenity during the daytime to commercial offices.

Based on similar previous projects, including peer-review from other acoustic consultants, to protect occupants of the adjoining commercial offices from disturbance for regular noise events associated with the fitness gym the author considers suitable criteria for impact noise due to weights being dropped on the floor is LA1 40dB.

Note that this criterion is appropriate for normal/reasonable events within the fitness gym. A reasonable activity is proposed to include dropping a 20kg weight from around shin/knee height. Dropping heavier weights or from a greater height would constitute unreasonable behaviour and most gym operators would have policies in place to restrict this accordingly.

3. REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS

The development site is at Davidson House, Reading. A new fitness gym is to be developed in part of the basement car park. Upper floors are to commercial offices and a Carluccio's restaurant.

There are residential flats at St Lawrence House Apartments To the front of the building, approximately 17m diagonally across from the new gym. Other apartments are to the side of Davidson House, but set back such that they have no direct line of site to the façade of the new gym.

Proposed site layout is shown in Figure 1.

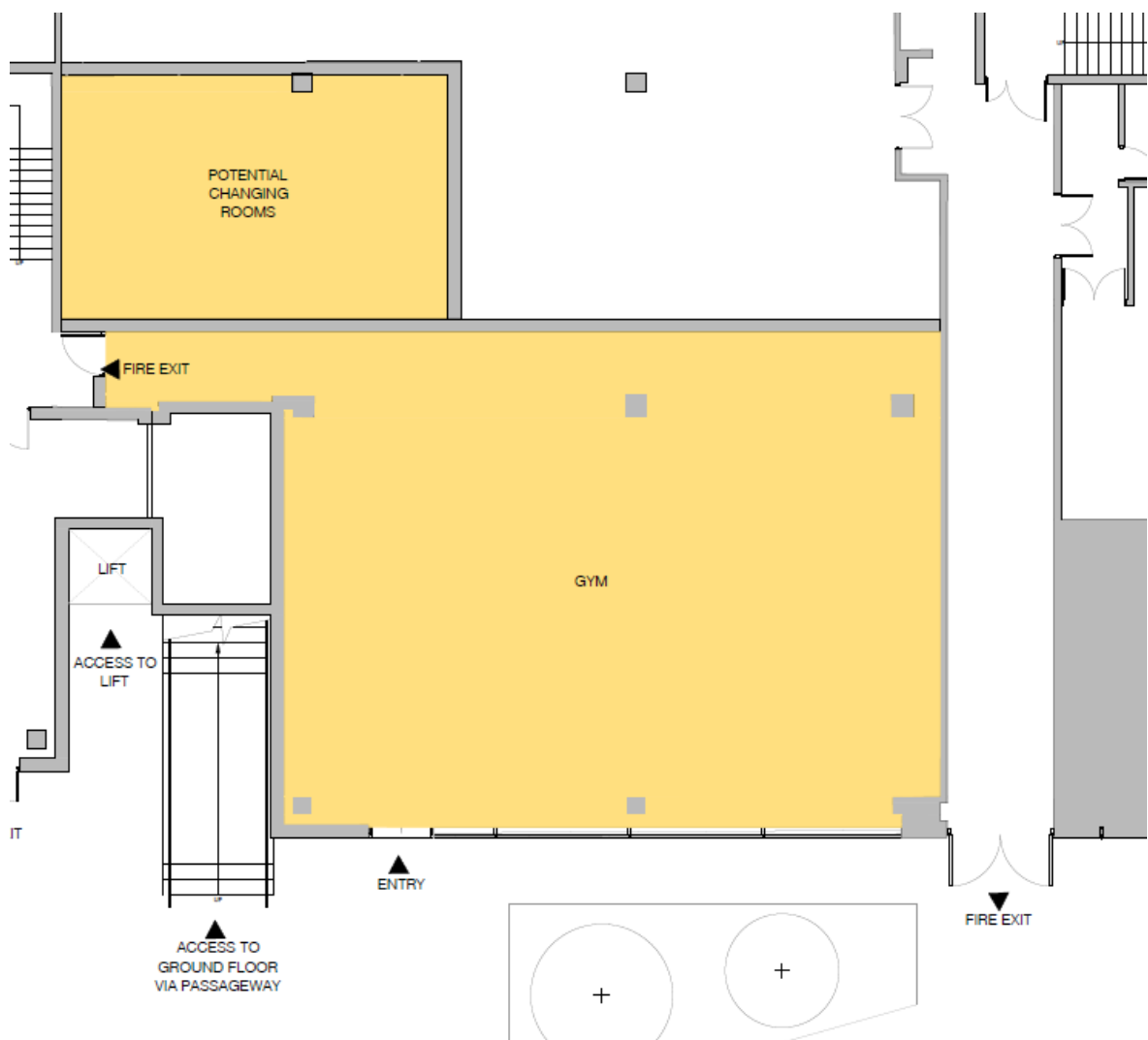


Figure 1: Site Layout Plan

4. BACKGROUND SOUND LEVEL SURVEY

To assess operational sound levels from the proposed fitness gym it is necessary to establish existing sound levels in the vicinity. Details of the sound level survey carried out by ACA Acoustics are provided below.

Background sound levels were measured externally outside the closest façade of St Lawrence House Apartments.

The following equipment was used during the survey; the sound level meter was calibrated before and checked after with no deviation noted.

Equipment	Serial Number
NTi Audio sound level meter type XL2-TA Class 1	A2A-12174-E0
Castle calibrator type 4226. Compliant to IEC 60942-1:2003 (Calibrated to a reference traceable to NIST)	1551589

Table 1: Equipment used

The following weather conditions were recorded at the start of the surveys.

Time	Temperature	Wind Speed m/s	Wind Direction	Comments
27 th June 2019 19:00	19 °C	6	East	Warm, humid, clear skies and moderate breeze

Table 2: Recorded meteorological conditions at start of survey

Summary results are shown in Table 4 below.

Description	LAeq over Survey Duration	Lowest Measured LAeq	Lowest Measured LA90
Outside St Lawrence House Apartments	52dBA	49dB	44dB

Table 3: Summary sound level survey results

Subjectively the author considered the acoustic climate to primarily comprise of distant traffic on local routes and pedestrian activity in the area.

Based on the measured sound levels and appropriate assessment methodology discussed in Section 2 above, music and operational noise emissions from the gym to outside nearby residential dwellings should not exceed a level of LAeq 44dB. Allowing a reduction through partially open windows of 15dBA as recommended in BS 8233:2014, this will ensure sound levels inside dwelling are lower than 29dBA and comply with BS 8233:2014 guideline criteria to living rooms and bedrooms.

5. AIRBORNE SOUND INSULATION TESTS OF THE EXISTING STRUCTURE

To calculate noise emissions from the proposed fitness studio to adjoining commercial offices, a sound insulation test of the existing structure has been carried out.

Sound insulation tests were conducted on 27th June 2019 by Tommy Burn and Rob Cant of ACA Acoustics Limited.

The following equipment was used for the survey. The meter was calibrated before and checked after the survey with no change noted.

Equipment	Serial Number
NTi Audio sound level meter type XL2-TA Class 1	A2A-12174-E0
Castle calibrator type 4226. Compliant to IEC 60942-1:2003 (Calibrated to a reference traceable to NIST)	1551589
Yamaha DSR 112 Loudspeaker	BFYJ01026
NTi Audio pink noise generator type Minirator MR-PRO	G2P-RAEVK-G0

Table 4: Equipment used

Airborne sound insulation tests were carried out in accordance with BS EN ISO 16283-1:2014 *Acoustics – Field measurements of sound insulation in buildings and of building elements – Part 1: Airborne Sound Insulation*. Rating of airborne test results has been carried out in accordance with BS EN ISO 717-1:1997 *Acoustics – Rating of sound insulation in buildings and of building elements. Part 1. Airborne sound insulation*.

High volume 'pink' noise was generated by the loudspeaker in the source room, positioned to obtain a diffuse sound field in the room. The spatial energy average of the one-third octave band noise levels was obtained within the source room from measurements at five fixed microphone positions evenly distributed within the room. Measurements were recorded over an equal period of at least six seconds at each position. This measurement procedure was then repeated in the receiving room.

These procedures were then repeated for a second loudspeaker position within the source room.

Ambient sound levels were measured inside each receiving room to correct the measured airborne sound level measurements for the influence of the prevailing acoustic climate.

The weighted level difference (D,w), was then determined in accordance with BS EN ISO 717-1. Results of the sound insulation tests are shown in [Table 5](#) below. Detailed test result graphs are included in Appendix A.

Test Reference	Source Room	Receiving Room	Measured D,w	ISO 717-1 Correction Terms (C; C'tr)
AF01	Basement Car Park	Ground Floor Office	51dB	(-2; -7)

Table 5: Airborne sound insulation test results

6. ASSESSMENT OF OPERATIONAL ACTIVITY/MUSIC NOISE EMISSIONS TO OUTSIDE RESIDENTIAL DWELLINGS

6.1 Façade Sound Insulation

A computer model has been developed for the proposed new shopfront façade to the gym. The model is based on the calculation method of BS EN 12354-4:2000 and takes into account existing concrete structure and new glazing providing minimum performance of R_w 34dB ($R_w + C'_{tr}$ 30dB), equating to a configuration of 4mm glass, 16mm cavity, 6mm glass or similar. This is a very conservative glazing selection for a commercial shopfront and it is likely thicker layers of glass would be utilised. Thicker layers of glass, or those with laminated or toughened panes will provide higher acoustic performance and would be acceptable.

Transmission of sound from the façade to outside nearest residential properties has been calculated using a computer model based on the methodology of ISO 9613-2:1996.

6.2 Proposed Yoga Studio

The client has advised ACA Acoustics that the new gym is to be operated as a yoga studio. Sound levels inside a yoga studio will be low and transmission to outside nearest residential properties will be $LA_{eq} < 25$ dB.

This is at least 19dBA below the lowest measured LA_{90} background sound level in the vicinity. Allowing a reduction through partially open windows of 15dBA as discussed in BS 8233:2014, resultant sound levels from the yoga studio to inside nearest noise-sensitive dwellings will be around LA_{eq} 10dB. This is at least 20dBA below guideline levels for sleeping in bedrooms and 25dBA below levels for resting in bedrooms or living rooms, as proposed in BS 8233:2014.

Noise from the yoga studio will be low and no further mitigation measures would be required.

6.3 Potential Intensification of Use in the Gym

Although the proposed occupant of the gym proposes to use this as a yoga studio, it is acknowledged that a future tenant may choose to operate a different style of gym; for example this relatively small space could be readily used to host modern group classes such as spinning, or high intensity interval training. These will produce significantly higher internal sound levels within the gym.

ACA Acoustics has worked on various projects for two national chains operating this type of group classes. Based on measurements within a number of different gyms it is anticipated sound levels inside the gym with this type of class operating would be $LA_{eq} \leq 88$ dB.

Based on the façade sound insulation performance and anticipated music volume inside the gym, calculated sound levels to outside the closest noise-sensitive properties are shown in Table 6 below.

Description	Calculated Sound Level	Criteria
Music noise emissions to outside St Lawrence House Apartments	L _{Aeq} 29dB	L _{Aeq} ≤44dB

Table 6: Calculated music noise emissions to outside closest noise-sensitive properties

Even if the gym were operated with higher volume music, as typical for group-based classes, noise emissions to outside nearby residential properties would still be low and significantly below existing background sound levels. No further noise mitigation measures would be required.

7. ASSESSMENT OF AIRBORNE SOUND TRANSMISSION TO ADJOINING COMMERCIAL OFFICES

Based on the measured sound insulation performance of the separating floor/ceiling structure and anticipated source sound levels within the studio, as discussed in Sections 5 and 6 above, sound levels to inside adjoining commercial offices have been calculated.

Description	Calculated Sound Level of Offices Above
Gym used as yoga studio	L _{Aeq} 31dB
Gym used for fitness classes with high volume music	L _{Aeq} 35dB

Table 7: Calculated music sound transmission to adjoining commercial offices

Allowing for the existing structure, sound emissions from the gym are below L_{Aeq} 35dB to inside adjoining commercial offices, even allowing for high volume music in the gym. This is significantly below the guideline sound level to open plan offices in BS 8233:2014 of L_{Aeq} 45dB to 50dB. Therefore, even allowing for irregular noise to be more disturbing than an equivalent steady sound, noise from use of the gym is substantially below the BS 8233:2014 guidance levels and should therefore not be disturbing to occupants of the commercial offices and no further mitigation measures would be required.

8. STRUCTURE-BORNE SOUND TRANSMISSION TO ADJOINING COMMERCIAL OFFICES

The proposed yoga studio would have limited sources of significant impact on the structure and it is anticipated that any gym-type rubber flooring would be acceptable.

Should a future operator propose to incorporate uses which may result in greater impacts on the structure, for example treadmills or using free weights above 15kg then there is the potential for structure borne sound transmission to become disturbing to occupants of the offices above.

There is no formal methodology to test structure-borne noise transmission due to dropping weights within a fitness studio. Based on previous similar projects, ACA Acoustics propose an in-house methodology as providing indication of potential transmission during 'normal' operation of a fitness gym; a 20kg kettlebell was dropped onto the floor from a height of around 0.5m, being equivalent of around knee-height, with a minimum of five repetitions. Previous testing by ACA Acoustics has demonstrated that the impact sound transmission of a 20kg kettlebell is roughly equivalent to the levels achieved with up to a 50kg dumbbell.

Sound levels are recorded within the receiving rooms as short-term (0.1 second) instantaneous sound pressure levels over the duration of the weight-drops, to allow the rate of change and peak sound level achieved to be determined.

Note that there is often a variation in the range of levels measured, as sound levels can be influenced by slight changes in the height the weight is dropped, but also more importantly the angle the weight hits the floor. By having a minimum of five repetitions for each test should ensure most variables are accounted for and resultant levels from the studio in-use are likely to be within the range of values recorded.

The tests were carried out on typical 'final finish' fitness studio flooring. Tests were then repeated using various sample resilient flooring composite arrangements. The trial build-ups all use material previously supplied to ACA Acoustics Limited by Total Vibration Solutions. Similar products will be available from alternative suppliers.

Based on test results achieved, example suitable resilient build-up would comprise of 10mm TVS Sportec Color over 15mm TVS Sportec Team Cup X. This increased the existing sound level within the unoccupied offices by less than 2dBA from LAeq 41dB to LAeq 43dB. This demonstrates that impact sound transmission itself would be around LAeq 39dB; below the current ambient sound level, significantly below BS 8233:2014 guideline levels, and achieves the criteria proposed in Section 2.3

Although not required for the yoga studio, it has been demonstrated that should a future tenant wish to operate the gym with heavier weights then an appropriate resilient flooring configuration will ensure that impact sound transmission should not be disturbing to occupants of the commercial offices above.

APPENDIX A

Sound Insulation Test Result Graphs for Separating Floor

Level Difference Measured in Accordance with ISO 16283-1

Field measurements of airborne sound insulation between rooms

Project Name Davidson House, Reading

Client Featherstone Commercial Interiors Ltd

Project Reference 190606

Test Date 27/06/2019

190606-SI-GR-AF01

Test on Floor between Basement Car Park and Ground Floor Open Plan Office

Description and identification of the building construction:

Existing separating floor. Exact make-up unknown.

Source Room Volume (m³)

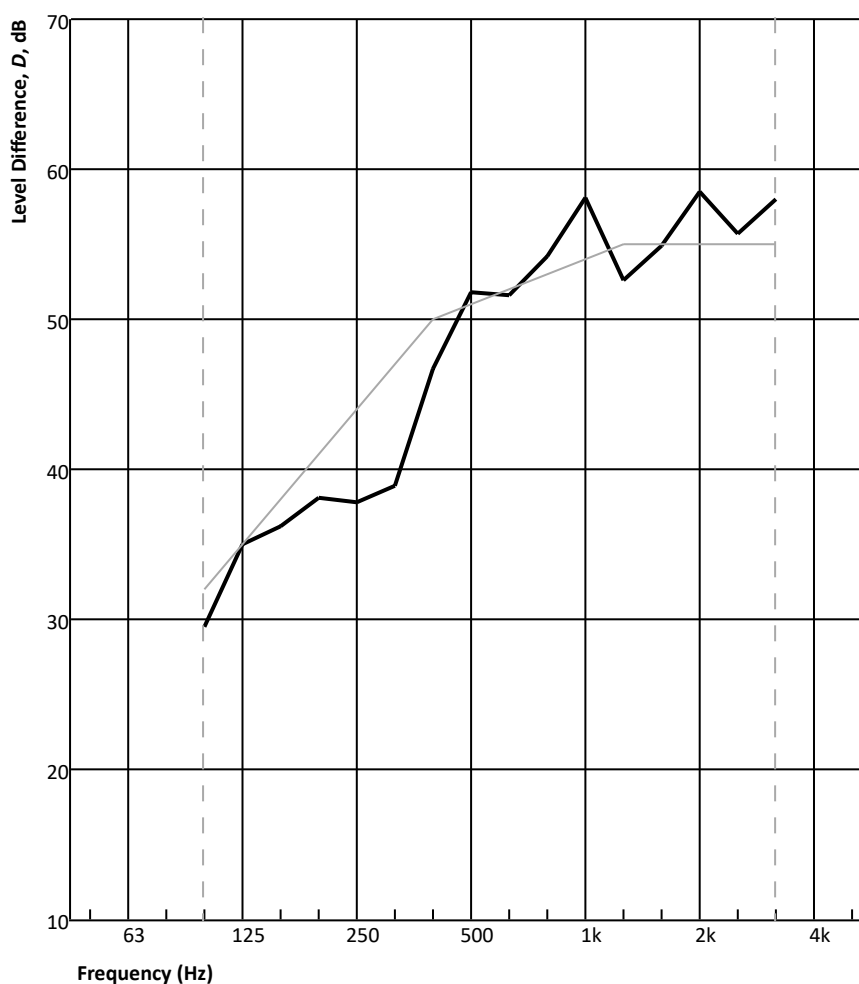
-

Receive Room Volume (m³)

-

--- Frequency range according to the
— Curve of reference values (ISO 717-1)

	D (one-third octave) dB
50	-
63	-
80	-
100	29.5
125	35.0
160	36.2
200	38.1
250	37.8
315	38.9
400	46.7
500	≥ 51.8
630	51.6
800	54.2
1k	≥ 58.1
1,25k	≥ 52.6
1,6k	≥ 54.9
2k	≥ 58.5
2,5k	≥ 55.7
3,15k	≥ 58.0
4k	-
5k	-



Rating according to ISO 717-1

$D_w (C; C_{tr}) = 51 (-2; -7) \text{ dB};$

$C_{50-3150} = -2 \text{ dB}; C_{50-5000} = -1 \text{ dB}; C_{100-5000} = -1 \text{ dB}$

Evaluation based on field measurement results obtained by an engineering method

$C_{tr, 50-3150} = -8 \text{ dB}; C_{tr, 50-5000} = -8 \text{ dB}; C_{tr, 100-5000} = -7 \text{ dB}$

Date: 05/07/2019

Name of Test Institute: ACA Acoustics Limited

Report Reference: 190606 R1

Signature: Rob Cant

APPENDIX B

Acoustic Calculations

Calculation Sheet

Gym to St Lawrence House Apartments

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Internal Receiver Noise									
Internal Receiver Noise - Gym									
Total Sound Pressure Level (dB)		64.0	69.0	75.0	78.0	72.0	67.0	62.0	57.0
Diffusivity - Cd									
Levels after Correction		59.0	64.0	70.0	73.0	67.0	62.0	57.0	52.0 Row A
Composite R' of structural elements									
Facade Wall - Blockwork									
Element Area (m2)	10.0								
Facade Area	38.0								
Door - Door									
Element Area (m2)	3.0								
Glazing - Glazed Facade									
Element Area (m2)	25.0								
Radiating Lw		35.3	39.6	46.6	42.3	22.5	18.3	11.3	-
10 log (S)		15.8	15.8	15.8	15.8	15.8	15.8	15.8	-
Directivity Correction - Dc									
		0.5	0.5	0.5	0.5	0.5	0.5	0.5	-
Adiv - Geometrical Divergence									
		-35.6	-35.6	-35.6	-35.6	-35.6	-35.6	-35.6	-
Aatm - Atmospheric Absorption									
		0.0	0.0	0.0	0.0	-0.1	-0.2	-0.6	-
Agr - Ground Attenuation									
		3.0	3.0	3.0	3.0	3.0	3.0	3.0	-
Abar - Barrier Attenuation									
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
External Receiver									
External Receiver - St Lawrence House Apartments									
Sound Pressure, Lp:		18.9	23.3	30.2	25.9	6.1	1.8	-5.6	-

Calculation Sheet

Yoga Studio to Office

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - Yoga Studio								
Sound Power Levels	64.0	69.0	75.0	78.0	72.0	67.0	62.0	57.0
Existing Separating Floor								
Separating Element - Separating Floor								
	-33.0	-33.0	-38.0	-49.0	-54.0	-56.0	-60.0	-69.0
Proposed Mitigation								
Separating Element - None								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Internal Receiver Noise								
Internal Receiver Noise - Office								
Reverberant Field, L_{Prev}	31.0	36.0	37.0	29.0	18.0	11.0	2.0	-12.0

Calculation Sheet

Typical gym to Office

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Noise Source								
Noise Source - Typical gym								
Sound Pressure Levels @ m	69.0	75.0	73.0	83.0	82.0	77.0	74.0	71.0
Existing Separating Floor								
Separating Element - Separating Floor								
	-33.0	-33.0	-38.0	-49.0	-54.0	-56.0	-60.0	-69.0
Proposed Mitigation								
Separating Element - None								
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Internal Receiver Noise								
Internal Receiver Noise - Office								
Reverberant Field, LPrev	36.0	42.0	35.0	34.0	28.0	21.0	14.0	2.0