

Able Acoustics

C.B. WRIGHT & ASSOCIATES LTD

2-3 BERKLEY ROAD, GRAVESEND

SOUND INSULATION ASSESSMENT

SEPTEMBER 2024

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P1603/01	September 2024	Position	Signature
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1. INTRODUCTION

1.1 Introduction

- 1.1.1 Permission is sought for residential development of the site at: *2-3 Berkley Road, Gravesend, Kent, DA12 2EU.*
- 1.1.2 The site was previously a commercial (office use) space and it is proposed to provide two flats and one house of multiple occupation (HMO) Able Acoustics Ltd has been instructed to carry out an acoustic assessment for the site.
- 1.1.3 This report presents the monitoring undertaken, the results of the assessment and suitable suggestions for mitigation where applicable.



2. NOISE UNITS AND STANDARDS

2.1 General

- 2.1.1 The range of audible sound is from 0 dB to 140 dB and a range of typical levels is presented in Table 2.1 below. Noise is a subjective term and can be defined as unwanted sound.

Table 2.1 Typical Sound Levels

Sound Pressure Level dB(A)	Source	Subjective Level
130 - 140	Jet (at 10m)	Threshold of pain
120 - 130	Pneumatic Drill (at 1m)	Extremely Loud
110 - 120	Loud Car Horn (at 1m)	Very Loud/Very High
100 - 110	Alarm Bell (at 1m)	Very Loud/Very High
80 - 90	Inside General Factory	Loud/High
70 - 80	Average Traffic (on street corner)	Loud/High
60 - 70	Conversational Speech	Moderate/Typical
50 - 60	Typical Business Offices	Moderate/Typical
40 - 50	Living-room Urban Area	Quiet/Low
30 - 40	Library	Quiet/Low
20 - 30	Bedroom (at night)	Very Quiet/Very Low
10 - 20	Broadcasting Studio	Very Quiet/Very Low

- 2.1.2 For variable sound sources a difference of 3 dB(A) is just distinguishable. For road traffic or railway sound sources, a doubling of traffic flow will increase the overall noise by 3 dB(A). The "loudness" of a sound is a purely subjective parameter, but it is generally accepted that an increase/decrease of 10 dB(A) corresponds to a doubling/halving in perceived loudness.
- 2.1.3 The frequency response of the ear is usually taken to be about 20 Hz (number of oscillations per second) to 20 kHz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the measuring instrument. The weighting which is most widely used and which correlates best with subjective response to sound is the dB(A) weighting. This is an internationally accepted standard for environmental sound measurements.
- 2.1.4 External sound levels are rarely steady, but rise and fall according to activities within an area at any given time. In an attempt to produce a figure that relates this variable sound level to subjective response, a number of indices have been developed. These include:

- i) *The $D_{nT,w}$ Weighted Standardized Level Difference.*

This is a value of airborne sound transmission between rooms obtained by field measurements which is then corrected for a standard 0.5 second reverberation time to generate a single figure value, because sound in the receiving room consists of both direct transmitted sound and reverberant sound.

- ii) *The C_{tr} Spectrum Adaptation Term*

This is a Spectrum Adaptation Term derived from an urban traffic noise spectrum (one that is influenced by lower frequencies) which is added to the Weighted Standardised Level Difference to give an overall level of airborne sound insulation. This is applied to account for how much less insulation would be offered if the source was dominated by low frequency components.

iii) R_w

This is a single number quantity used to define the laboratory measured airborne sound insulation of a partition.

2.2 Local Authority Requirements

- 2.2.1 The local planning authority: Gravesham Borough Council (GBC) has raised concerns in respect of noise stating:

“The noise assessment should be based on a sound insulation test to assess the performance of the internal partitions (both floor/ceiling and also vertical wall) in terms of noise transmission. This should include both airborne sound and also impact sound. In this type of situation, we would expect the sound insulation of the internal partitions to meet the requirements of Building Regulations Approved Document E (ADE) ‘Resistance to the passage of sound’ of the Building Regulations (and ideally with additional improvement of at least 5dB above Building Regulation standard).”

- 2.2.2 Following telephone discussion with Julie Oates (Environmental Health Officer at GBC) it is understood that an improvement of at least 5dB above building regulations would be required for between habitable rooms while a value of at least 10dB above building regulations would be required for domestic spaces separated from commercial units or any kitchen/breakfast/living/dining areas.

2.3 Standards and Guidance

- 2.3.1 The requirements for buildings, relating to the resistance to the passage of sound, are outlined in Approved Document E of the Building Regulations along with subsequent amendments [1]. The criteria for airborne sound insulation, for dwelling houses and flats formed by a material change of use is stipulated in Table 1a of Approved Document E and is reproduced below:

Table 2.4 Minimum Airborne Sound Insulation Criteria

Dwelling houses and flats formed by material change of use	Airborne sound insulation $D_{nT,W} + C_{tr}$ dB (Minimum values)
Walls	43
Floors and stairs	43

- 2.3.2 Approved Document E stops short of providing a performance value for partitions separating spaces used for normal domestic purposes and non-domestic purposes and states:

“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.”

- 2.3.3 It is considered that where speech is the primary source of sound as might be expected in residential environments a value equal to the value for dwelling houses and flats formed by material change of use would be appropriate as the absolute minimum.

3. SITE LAYOUT

3.1 Overview

- 3.1.1 The application site is located at: 2-3 Berkley Road, Gravesend, Kent, DA12 2EU and is located on the east side of Berkley Road and shown in Figure 01.
- 3.1.2 The existing and proposed layouts are shown in Figures 02 to Figure 08.
- 3.1.3 The site currently comprises a disused commercial premises split over two levels.
- 3.1.4 The site is bounded by Number 04 Berkley Road to the north, Berkley Road to the east, a post office premises to the south and associated gardens and Dolphin yard to the west.



4. MEASUREMENTS

4.1 Sound Insulation Testing

- 4.1.1 Sound insulation tests were also carried out on the 23rd of August 2024 between the basement, ground and first floors additional tests were conducted at ground floor level of the partition (wall) that spans the ground and first floor. Both the source and receiving rooms were unfurnished.
- 4.1.2 The local authority requires a value at least 5dB (between habitable rooms) and 10dB for communal/non domestic use spaces) above the building regulations requirements for dwelling houses and flats formed by a material change of use, accordingly the standards referenced by the Building Regulations have been used to inform this exercise.
- 4.1.3 The full construction of the existing separating partitions is not known and viewer access was limited. The partitions are believed to comprise:

Basement to ground floor level

Measured as 22cm floor with 175mm joists and no ceiling layer below joists.

Ground to first floor level

Measured as 19cm at the stair well, circa 30mm floor below underlay and carpet with circa 150mm joists and plaster below.

Party wall spanning ground and first floor level

Measured as circa 200mm and assumed masonry.

- 4.1.4 The tests were carried out between two pairs of vertically separated rooms sharing a common partition; as detailed below.

Table 4.3: Summary of Partitions Tested

Partition ID	Source Room	Receiver Room	Partition	Area of Common Partition (m ²)	Volume of Receiver Room (m ³)
A	Ground Floor Office Space	1 st Floor Office Space	Ceiling	13.5	36.3
	1 st Floor Office Space	Ground Floor Office Space	Floor	13.5	66.3
B	Ground Floor Office Space	Basement Storage Area	Floor	12.5	26.1
C	Ground Floor Meeting Space	Ground Floor Office Space/Reception	Wall	56.8	15.3

4.1.5 The instrumentation used for the testing is also detailed below.

Table 4.4: Instrumentation

Equipment Description	Type Number	Serial Number	Date of Last Calibration	Conformance / Calibration Certificate Number
Sound Level Meter	Rion NA-28	30431903	18/06/2024	TCRT24/1448
Pre-amplifier	Rion NH-23	21966	18/06/2024	TCRT24/1448
Microphone	Rion UC-59	04966	18/06/2024	TCRT24/1448
Sound Level Calibrator	Rion NC-74	34936366	09/08/2023	UCRT23/2056
Pink Noise Generator	ANV	FTL500-01-006	N/a	N/a
Dodecahedron Speaker	ANV	DS200405	N/a	N/a
Tapping Machine	EOS	NG E05 252	16/05/2024	UCRT24/1748

- 4.1.6 The measurement system had been calibrated to traceable standards within the last two years, while the reference sound calibrator had been calibrated within the last 12 months. All instrumentation used was within acceptable validity periods of calibration at the time of testing and calibration certificates are provided in Appendix A.
- 4.1.7 The instrumentation was calibrated before and after the testing period using the sound level calibrator to a reference level of 94.0dB and no calibration drift was recorded.
- 4.1.8 All measurements used an averaging period of 10 seconds. To minimise the number of times that the equipment was moved, the tests were carried out in the following order.
- 4.1.9 The microphone was placed in the source room and at least five measurements were taken. The adjacent 1/3 Octave band levels were then checked to ensure none of the adjacent bands differed by more than 6dB. Where measurements contained differences of more than 6dB in adjacent frequency bands, the graphic equaliser was used to correct this and the measurements were repeated.
- 4.1.10 Background noise level measurements in the receiver room were then undertaken. At least five separate measurement locations were used. The background sound was considered to be primarily attributable to infrequent local vehicle sound and also pedestrian activity from outside the building.
- 4.1.11 The noise generator, power amplifier and speaker were used to generate pink noise in the source room while measurements were carried out in the receiver room. At least five microphone positions were used.
- 4.1.12 The microphone was moved back into the source room and the height and location of the source was changed. At least five further measurements were taken in the source room and the adjacent 1/3 Octave band levels were then checked to ensure none of the adjacent bands differed by more than 6dB.
- 4.1.13 Finally the microphone was then moved back to the receiver room, and at least five further measurements were taken in the receiver room. In accordance with BS EN ISO 140-4 [2], this procedure yielded at least ten measurements in both source and

receiver rooms and a combination of at least five microphone positions and two source positions.

- 4.1.14 The noise generator, speaker and microphone were then all moved to the receiver room, and the reverberation time in the receiver room was measured. In accordance with BS EN ISO 140-7 [3], at least three microphone locations and two source locations were used, with two measurements at each microphone location (giving a total of at least six measurements). The method used for taking these measurements was the “interrupted noise” method as required by ISO 140-4, whereby the noise generator is started and the sound level meter is set to measure the decay of the reverberant sound once the noise generator is stopped.
- 4.1.15 The tests detailed in this report have been carried out in accordance with BS EN ISO 140-4, BS EN ISO 140-7 and BS EN ISO 717-1 [4].
- 4.1.16 A summary of the sound insulation test measurement results is reproduced below while full test measurement results are presented in Appendix C.

Table 4.5: Summary of Sound Insulation Test Results

Partition	Source room		Receiver room		Measured Value	
	Description	Volume (m ³)	Description	Volume (m ³)	DnT,w + Ctr	L'nT,w
A	Ground Floor Office Space	66.3	1 st Floor Office Space	36.3	49, -8 (41)	-
	1 st Floor Office Space	36.3	Ground Floor Office Space	66.3	-	59
B	Ground Floor Office Space	66.3	Basement Storage Area	26.1	30, -3 (27)	72
C	Ground Floor Meeting Space	215.9	Ground Floor Office Space/Reception	15.3	50, -3 (47)*	-

*There may be uncertainty present due to the adjacency of the rooms and potential indirect sound transmission via the two intervening doorways and corridor indicating a poorer level of performance than may actually be present. NB at Partition A the partition was the same but tested in different directions due to the respective room sizes.

5. ASSESSMENT

5.1 Sound Insulation

- 5.1.2 The test measurements indicate the level of sound insulation failed to meet the requirements of the local authority for all partitions.
- 5.1.3 Calculations have also been undertaken using the industry standard Insul™ to estimate the performance of the external wall facing the post office garage area on the basis access was not provided, which was observed to be two separate adjoining walls. The calculations indicate a performance level of circa 54dB DnT,w +Ctr which exceeds the requirement of the local planning authority. The calculations are reproduced in Figure 09.
- 5.1.4 Calculations were undertaken using the industry standard Insul™ to estimate the minimum requirements to augment the party wall partitions between habitable rooms to meet a value of 5dB above the Building Regulations criteria for a material change of use.
- 5.1.5 The calculations indicate the masonry party wall partition separating Flats 1 and 2 from the proposed HMO will provide circa 53dB DnT,w +Ctr which exceeds the local authority's minimum performance criteria.
- 5.1.6 No details have been provided for the proposed party floor/ceiling separating Flats 1 and 2 or the partition separating the ground and first floors and the 1st and second floors and calculations have been undertaken based on a timber ceiling/floor type (Floor Treatment 1) from Approved Document E that would meet the local planning authority's requirements. The calculations are reproduced in Figure 10 and Figure 11 indicate a likely airborne sound insulation value of 48dB DnT,w +Ctr and an impact sound insulation value of 48dB LnTw.
- 5.1.7 The partitions should comprise:
- 18mm floor board to existing floor with at least 145mm joists and two layers of plasterboard (Gyproc SoundBloc 12.5mm) to the underside. Separate joists should be fitted to provide an independent ceiling these should provide a void of at least 125mm with a 25mm clearance between the underside of the ceiling above and the top of the independent joists. The joists should be fixed to the surrounding walls, additional support may be provided by resilient hangers attached directly to the existing floor base. The void should be filled with rockwool minimum density 10kg/m³ preferably 33kg/m³ and with two layers of plasterboard to the underside recommended Gyproc fireline 12.5mm or similar to a minimum mass per unit area of 20kg/m².
- Care must also be taken not to create a rigid or direct connection between the independent ceiling and the floor base. Care must also be taken not to compress the absorbent material to avoid bridging the cavity.
- 5.1.8 The local planning authority requires a minimum airborne sound insulation value of 53dB DnT,w +Ctr and a maximum impact sound value of 54dB LnTw for the partition separating the proposed kitchen, living, breakfast and dining areas at lower ground level. Based on the current ceiling height it is unlikely this will be possible without

altering the floor above and providing a similar construction to Floor treatment 1 outlined above with separate joists and a resilient rail to mount the ceiling to the underside of the floor above the separate joists.

- 5.1.9 The calculations are reproduced in Figure 12 and Figure 13 indicate a likely airborne sound insulation value of 54dB DnT,w +Ctr and an impact sound insulation value of 46dB LnTw.
- 5.1.10 In the event it is not possible to install such a system it is recommended an individual view be formed on the acceptability of communal habitable rooms located below bedrooms in the HMO or a relaxation of sound insulation criteria for this particular partition.

6. CONCLUSIONS

6.1 Summary of Conclusions

- 6.1.1 It is considered, that development of the site may be acceptable in terms of sound insulation, provided suitable consideration is given to the augmentation of the relevant separating partitions as outlined in Section 5 above.
- 6.1.2 Additional consideration will be required for the partition separating the proposed kitchen, living, breakfast and dining areas at lower ground level. In the event it is not possible to increase the partition due to limited ceiling height it is recommended an individual view be formed on the acceptability of communal habitable rooms located below bedrooms in the HMO or a relaxation of sound insulation criteria for that particular partition.

6.2 Supplementary Note - Informative

6.2.1 Sound transmission in buildings occurs through direct and indirect (flanking) paths and is a function of the acoustic performance of building elements and quality of workmanship¹. The degree of flanking sound transmission depends on the overall design of a building as well as the level and frequency of the sound in question.

6.2.2 There is no recognised method or standardised procedure for the measurement & assessment of indirect sound transmission. However, indirect sound transmission can be reduced by measures such as the following:

- Increasing the mass of the flanking walls.
- Increasing the mass of the partition.
- Introducing discontinuities in the indirect paths.
- Installing flush fitting doors fitted with automatic door closing devices.
- Erecting independent wall linings adjacent to the flanking walls to prevent energy entering the flanking construction.
- Sealing any air gaps and paths through ducts
- Installing an IsoEdge (or similar) flanking strip installed for all room perimeters
- Ensuring the flanking strip overlaps any rubber resilient floor surface layer
- Ensuring any skirting boards are isolated from the floor screed by the IsoEdge (or similar) flanking strip where appropriate.
- Ensuring all ceiling board joints are sealed with tape or caulked with sealant where appropriate.
- Ensuring all service pipes are wrapped in quilt and boxed in with two layers of nominal 8 kg/m² gypsum-based board where appropriate.
- All other holes and gaps should be filled. Where access penetrations are provided for building services, collars should be fitted around the service penetrations.

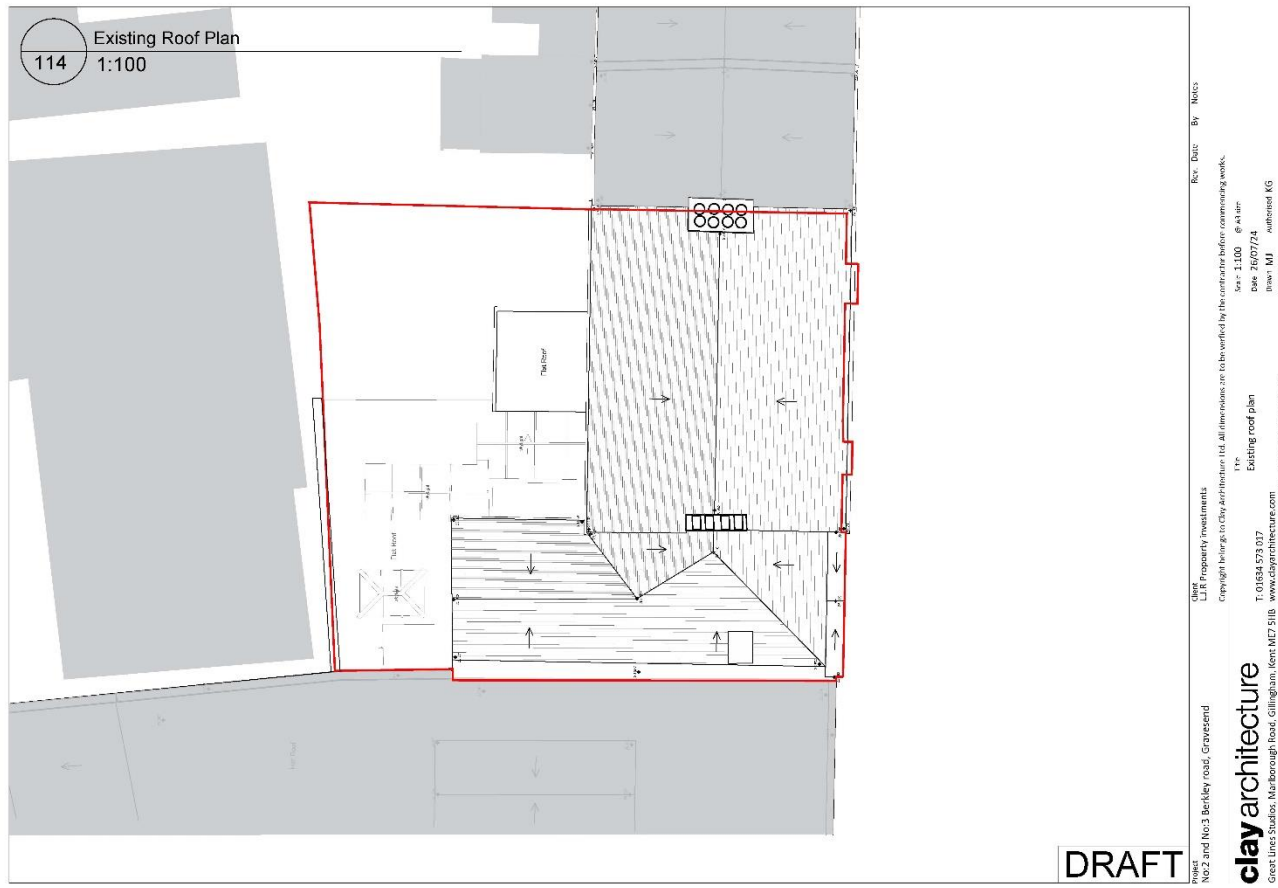
¹ Able Acoustics Ltd makes no representations or guarantees in respect of 3rd party products or workmanship.

7. REFERENCES

1. Ministry of Housing, Communities & Local Government The Building Regulations Statutory guidance Resistance to sound: Approved Document E, March 2015.
2. British Standards Institution. BS EN ISO 140-4. Acoustics – Measurement of sound insulation in buildings and of building elements. Part 4: Field measurements of airborne sound insulation between rooms, 1998.
3. British Standards Institution. BS EN ISO 140-7. Acoustics – Measurement of sound insulation in buildings and of building elements. Part 4: Field measurements of impact sound insulation of floors, 1998.
4. British Standards Institution. BS EN ISO 717-1: Acoustics – Rating of sound insulation in buildings and of building elements, 2013.

FIGURES



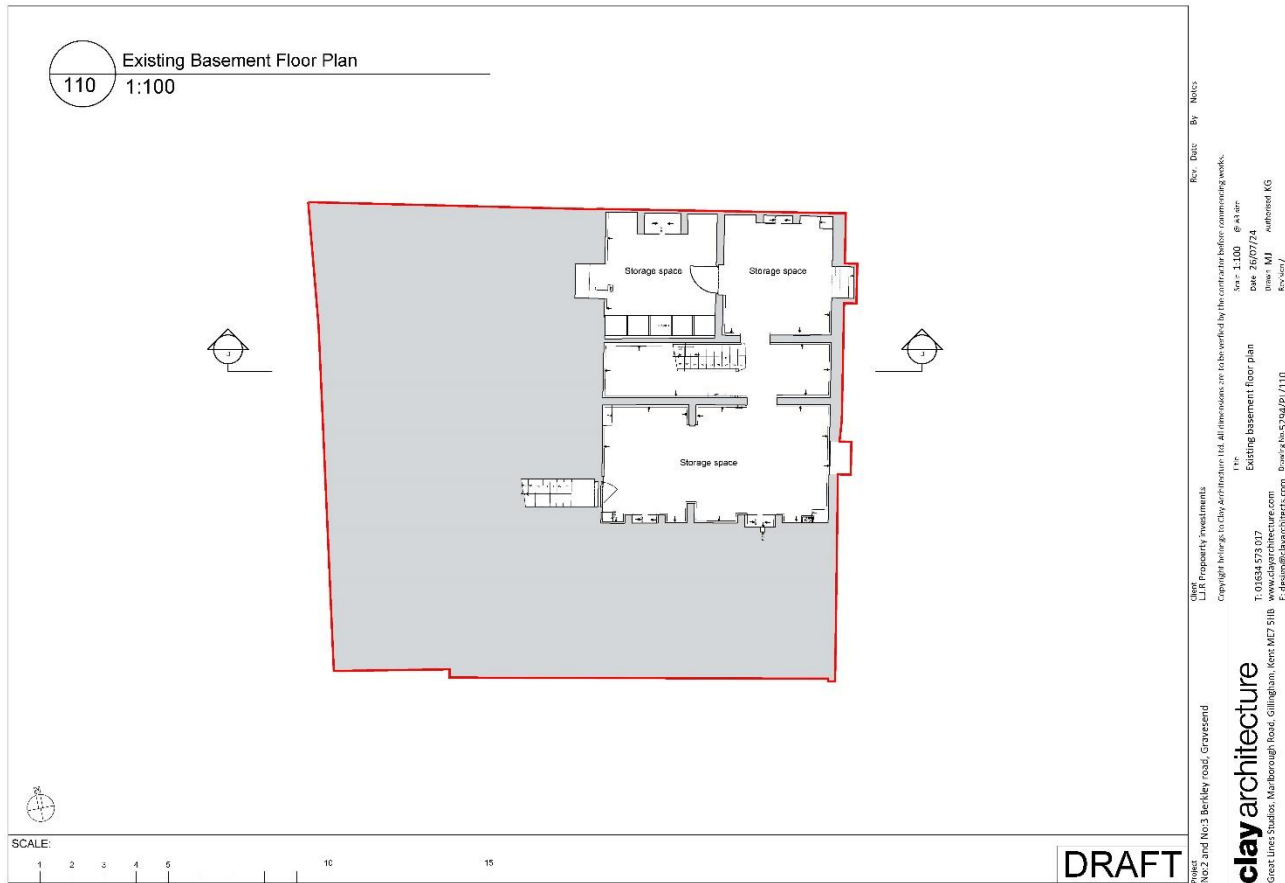


Project: No2 and No3 Berkley road, Gravesend
 Client: Liff Property Investments
 Copyright: Inking to City Architecture Ltd. All dimensions are to be verified by the contractor before commencing work.
 Scale: 1:100 @ A4 size
 Date: 20/07/24
 Drawn by: MJ
 Checked by: KG
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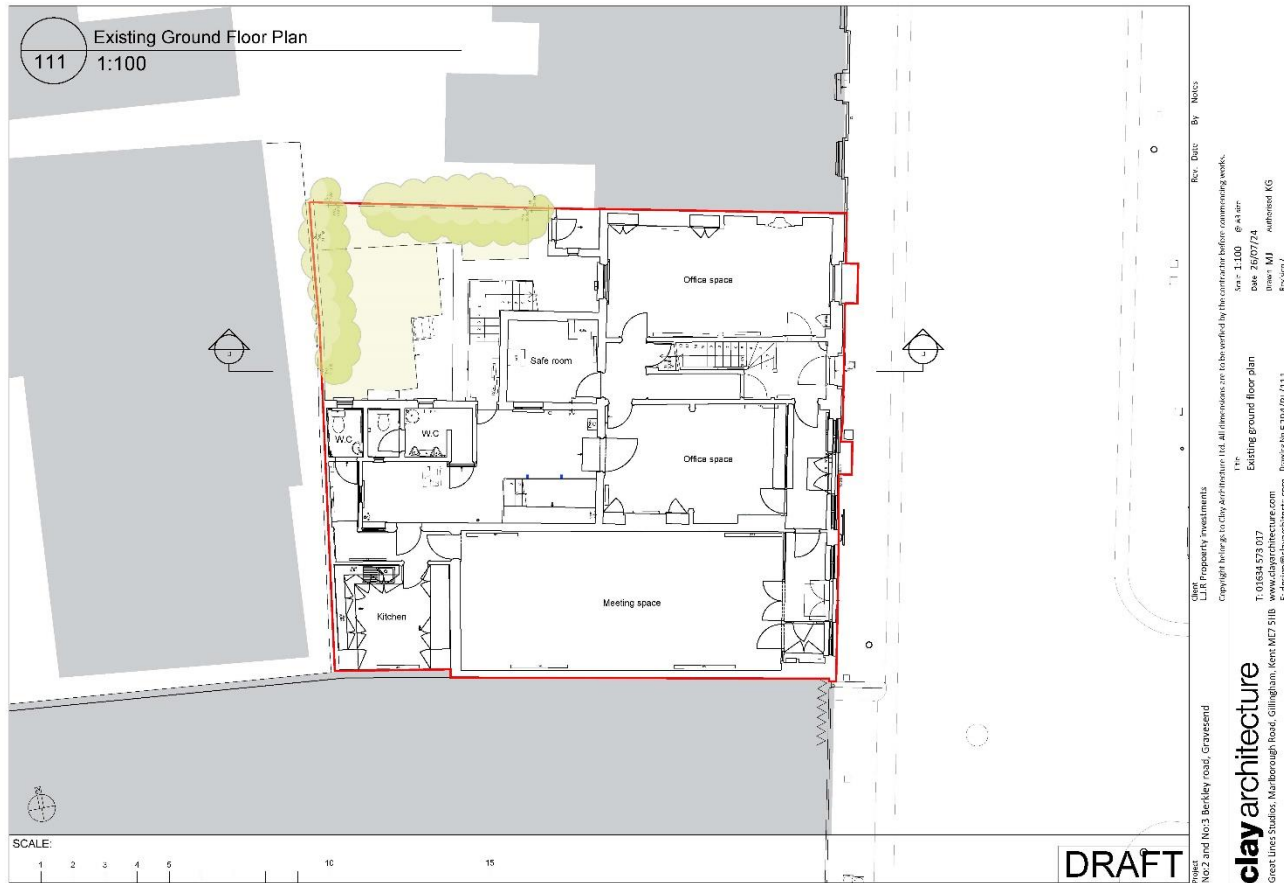
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2-3 Berkley Road	P1603	Site Location	Figure 01	P1603/Figures.ppt	02/09/2024



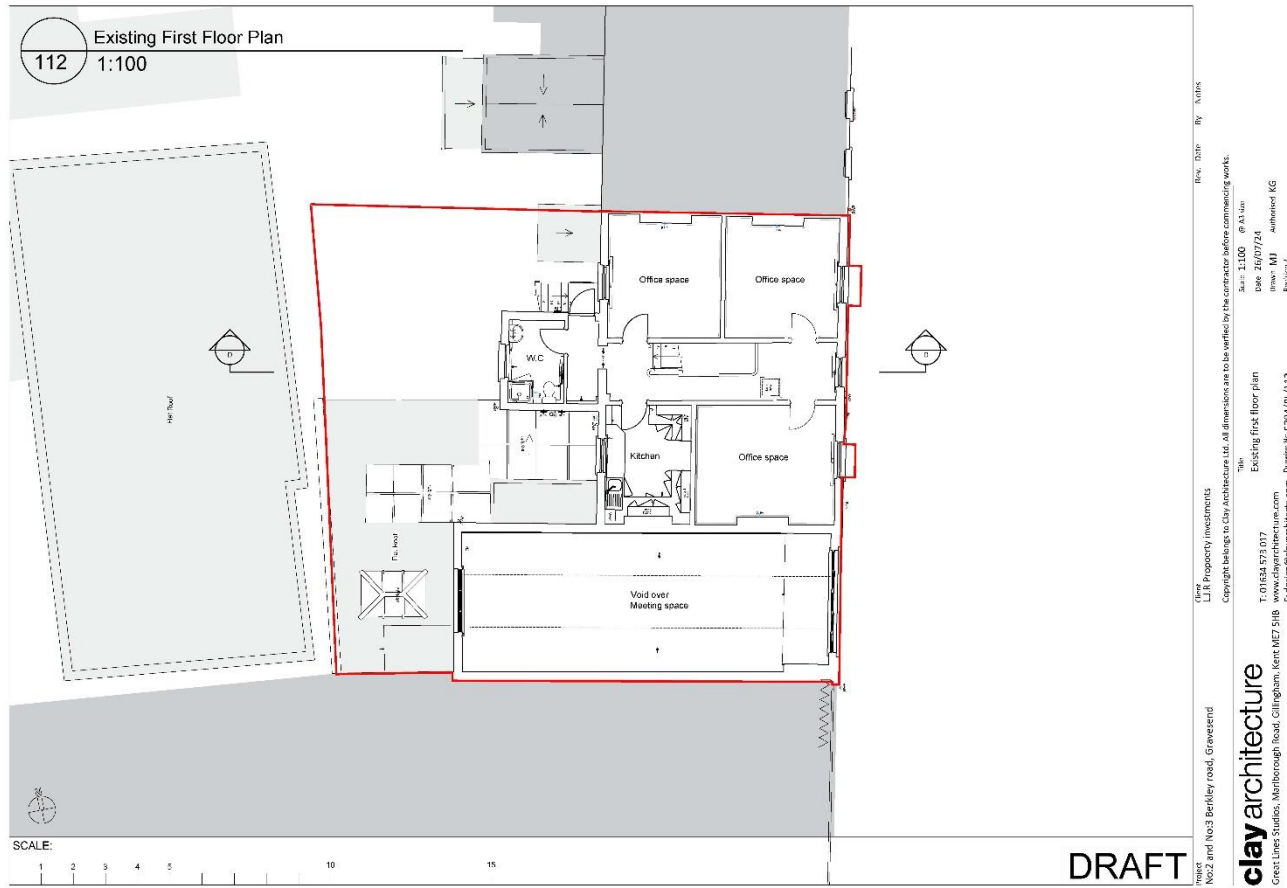
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2-3 Berkley Road	P1603	Existing Layout Basement	Figure 02	P1603/Figures.ppt	02/09/2024



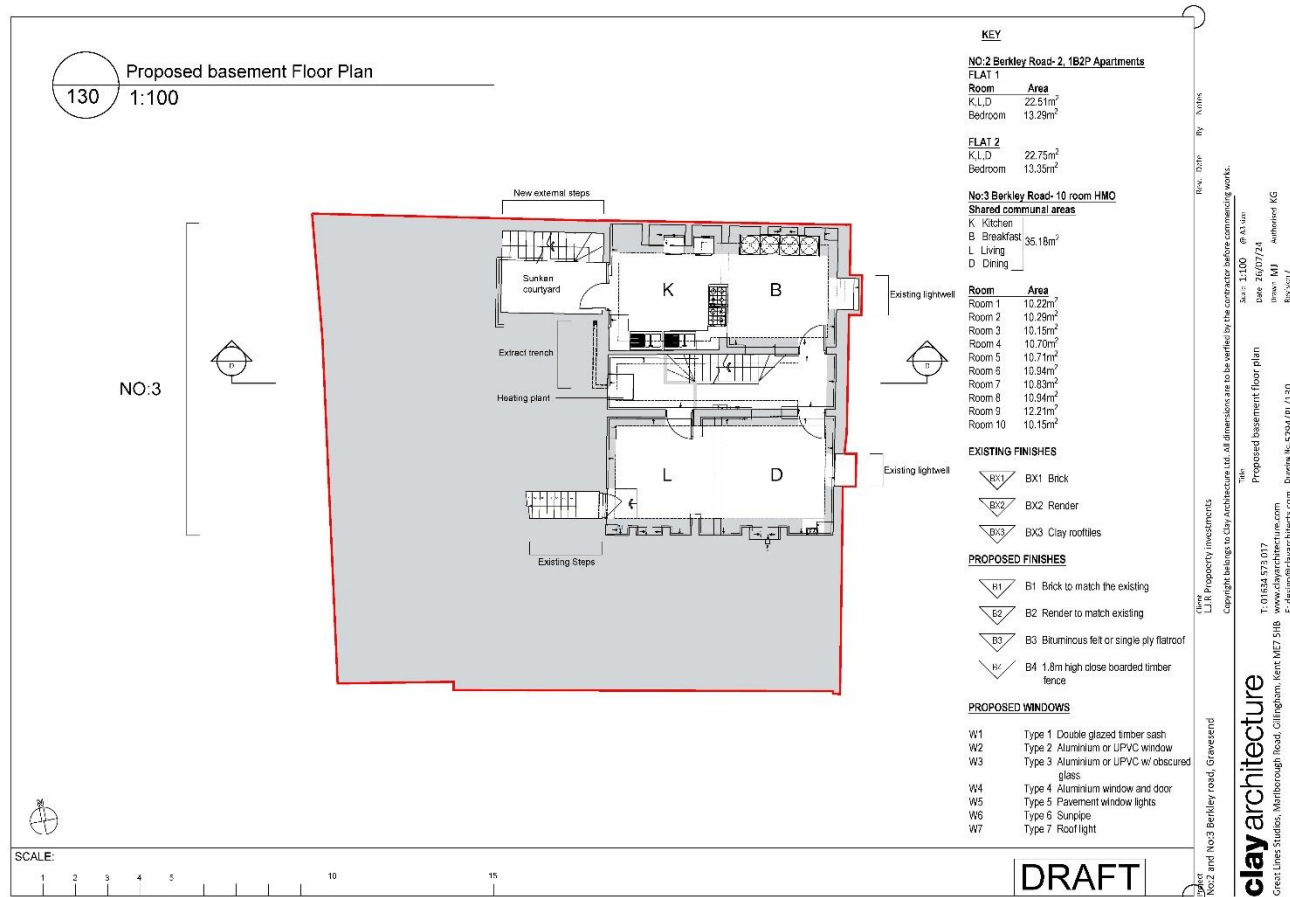
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2-3 Berkley Road	P1603	Existing Layout Ground Floor	Figure 03	P1603/Figures.ppt	02/09/2024



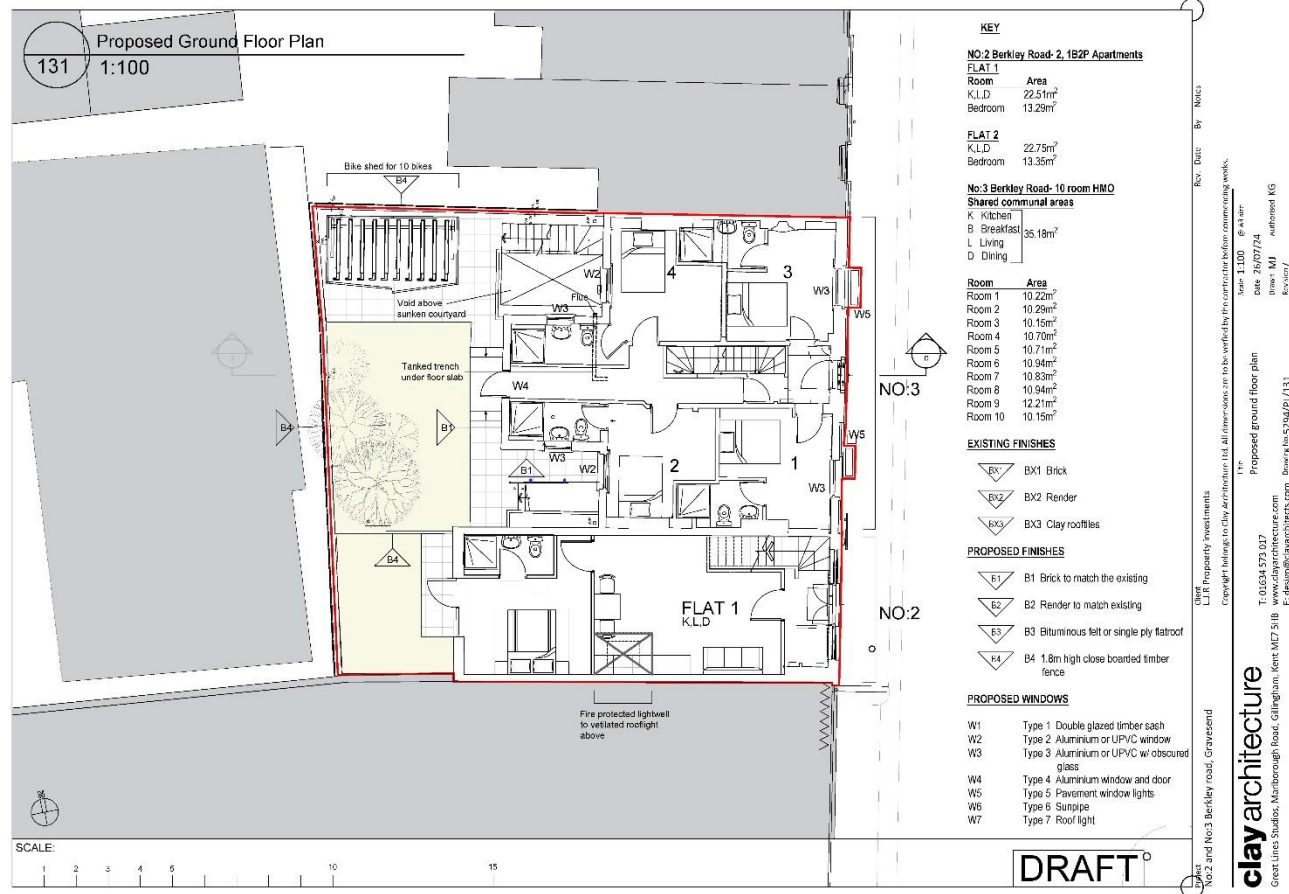
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2-3 Berkley Road	P1603	Existing Layout 1st Floor	Figure 04	P1603/Figures.ppt	02/09/2024



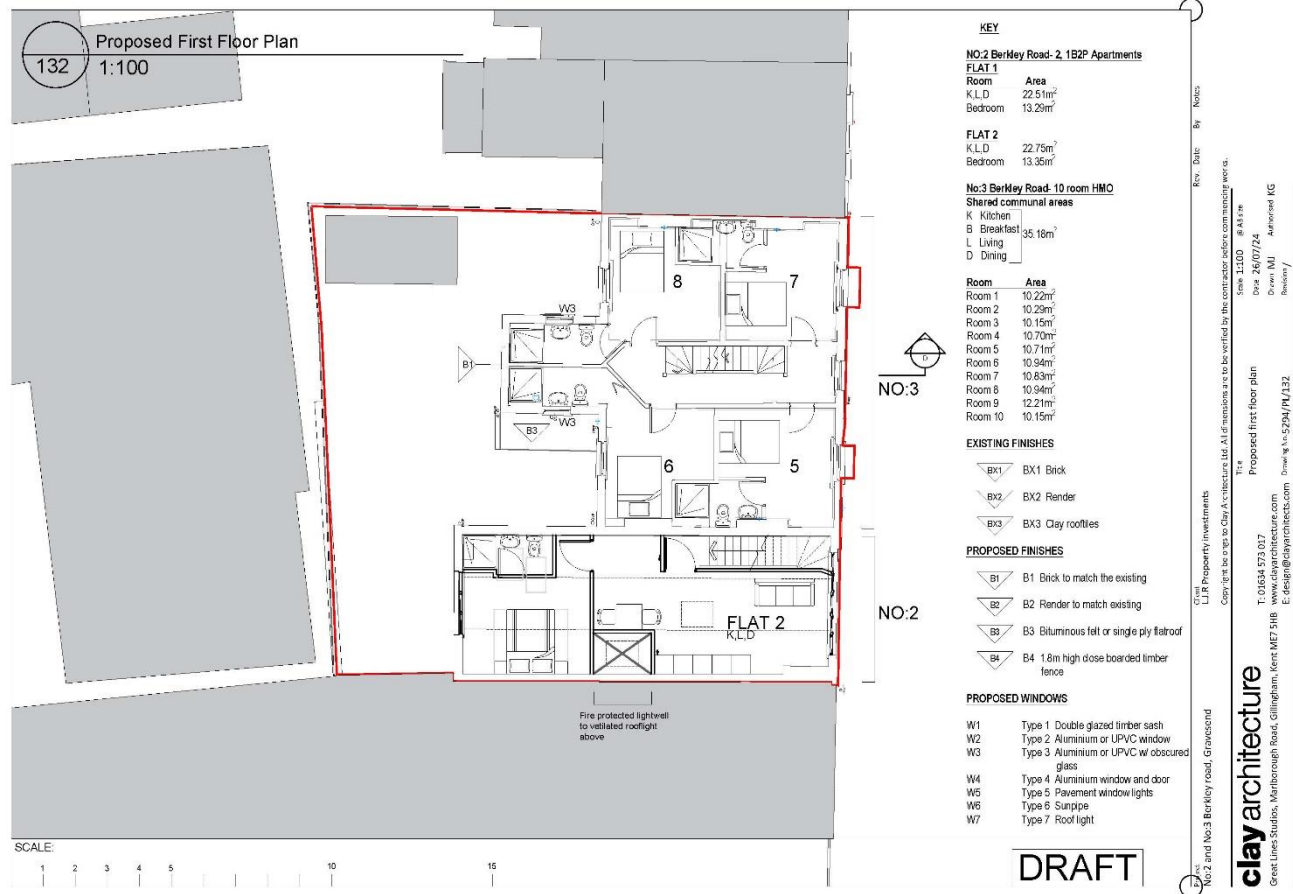
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Project	No.	Drawing	No.	File	Date
2-3 Berkley Road	P1603	Proposed Layout Lower Ground Floor	Figure 05	P1603/Figures.ppt	02/09/2024



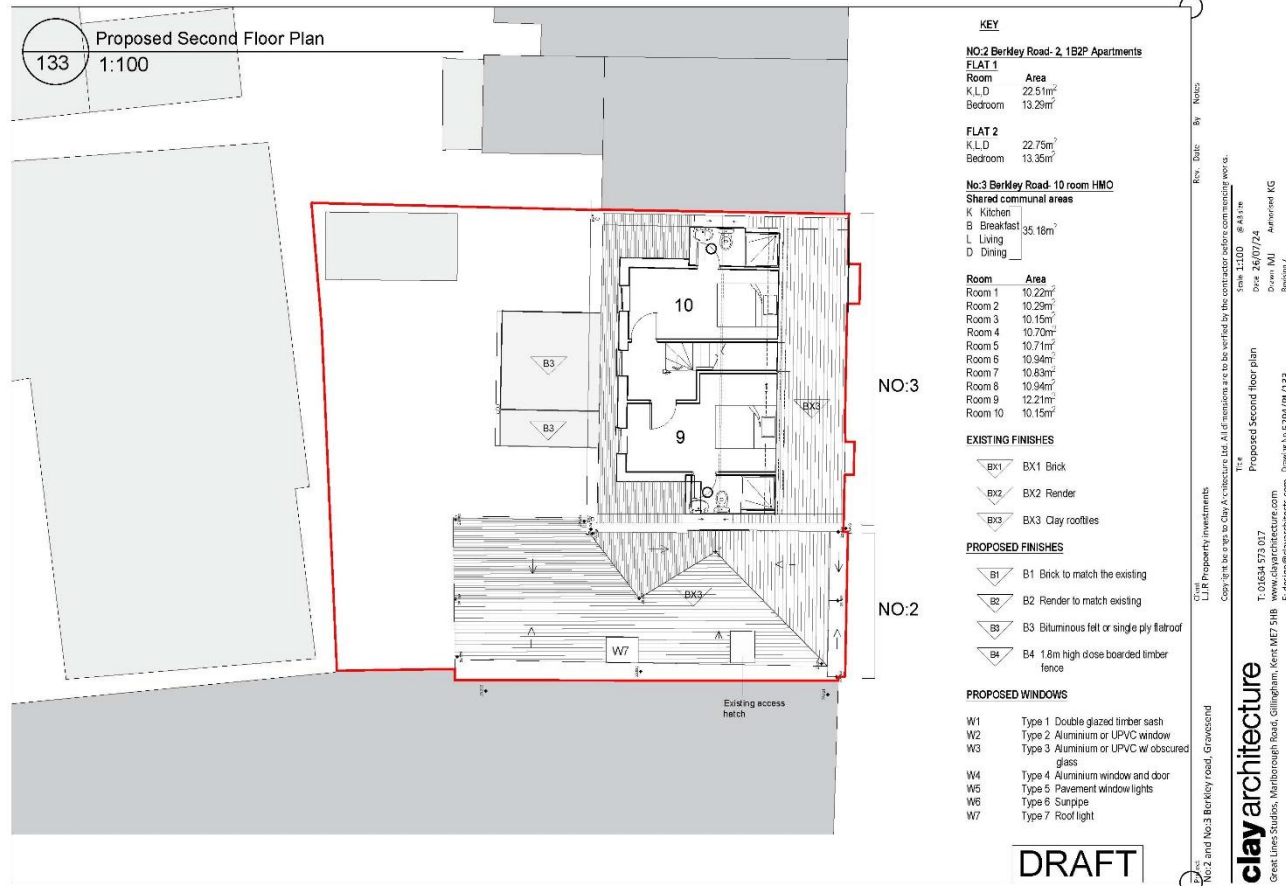
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Project	No.	Drawing	No.	File	Date
2-3 Berkley Road	P1603	Proposed Layout Ground Floor	Figure 06	P1603/Figures.ppt	02/09/2024



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Project	No.	Drawing	No.	File	Date
2-3 Berkley Road	P1603	Proposed Layout 1st Floor	Figure 07	P1603/Figures.ppt	02/09/2024



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Project	No.	Drawing	No.	File	Date
2-3 Berkley Road	P1603	Proposed Layout 2nd Floor	Figure 08	P1603/Figures.ppt	02/09/2024

Sound Insulation Prediction (v8.0.12)

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Able Acoustics Ltd - Key No. 2530

Margin of error is generally within $R_w \pm 3$ dB

Job Name: Berkley Road

Job No.: P1603

Date: 8 Sep 24

File Name: Estimated Performance External Walls.lxl

Page No.:

Initials: E



300.0 mm

System description

Panel 1: 1 x 230.0 mm Brick (ρ 1600 kg/m³, E 8.9 GPa, η 0.04, μ 388 kg/m², f_c 120 Hz)

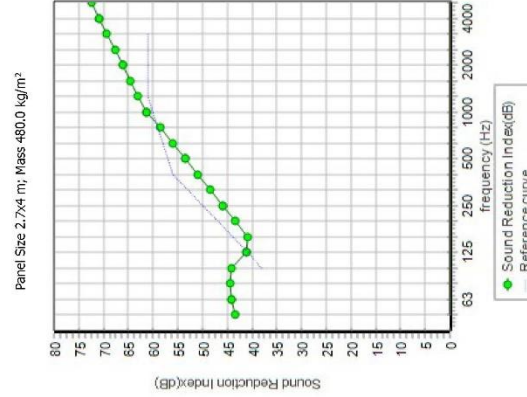
+ 1 x 70.0 mm Brick (ρ 1800 kg/m³, E 8.9 GPa, η 0.01, μ 112 kg/m², f_c 383 Hz)

Notes:

Assumed minimum 230mm brick with a minimum of 110mm brick to far side.

R_w	57 dB
C	-1 dB
C_{tr}	-5 dB
D_{nTw}	59 dB
	[N=200] [A=100]

frequency (Hz)	R (dB)	R (dB)
50	43	
63	44	44
80	44	
100	44	
125	41	42
160	41	
200	43	
250	46	45
315	48	
400	51	
500	54	53
630	56	
800	59	
1000	61	61
1250	63	
1600	65	
2000	66	66
2500	68	
3150	69	
4000	71	71
5000	73	



Panel Size 2.7x4 m, Mass 480.0 kg/m²

Not To Scale Resized From Original Image

Project	No.	Drawing	No.	File	Date
2-3 Berkley Road	P1603		Figure 09	P1603/Figures.ppt	02/09/2024

Impact Sound Prediction (v8.0.12)

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Able Acoustics Ltd - Key No. 2530

Margin of error is generally within $R_w \pm 3$ dB

Job Name: Berkley Road

Job No.: P1603

Date: 8 Sep 24

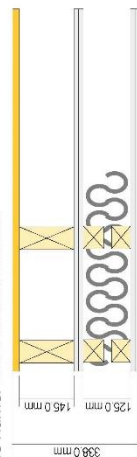
File Name: Floor Treatment 1 Airborne.lxd

Page No.:

Initials: info

Notes:

Augmentation based on Floor Treatment 1
from Approved Document E



R_w	62 dB
C	-5 dB
C_{tr}	-13 dB
D	61 dB
$D_{1/1w}$	61 dB

System description

Panel 1 : 1 x 18.0 mm Particle Board ($\rho=80 \text{ kg/m}^3$, $E=2.7 \text{ GPa}$, $\eta=0.03$, $\rho_s=11.9 \text{ kg/m}^2$, $f_c=1768 \text{ Hz}$)

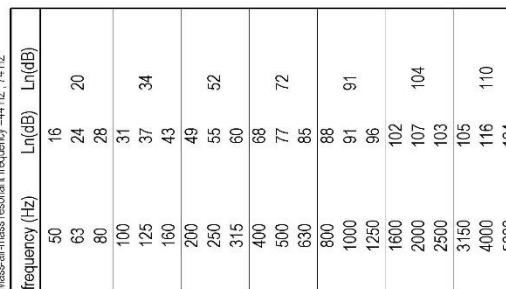
Cavity: Solid (timber or Tiling) Stud spacing 300 mm

Panel 2 : 2 x 12.5 mm Gyproc SoundBloc 12.5mm ($\rho=848 \text{ kg/m}^3$, $E=3.6 \text{ GPa}$, $\eta=0.01$, $\rho_s=10.6 \text{ kg/m}^2$, $f_c=2482 \text{ Hz}$)

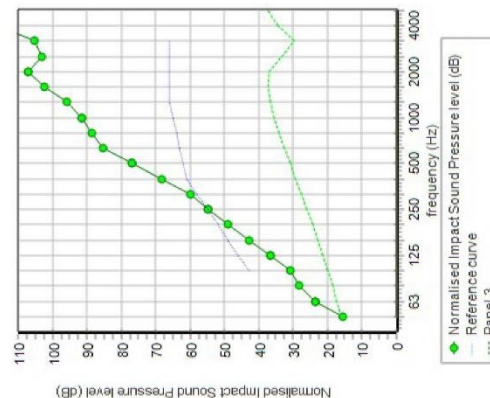
Cavity: Separate Joists Stud spacing 600 mm, in-fill Rockwool (33 kg/m^3) Thickness 100 mm ($\rho=33 \text{ kg/m}^3$, $R_f=13400 \text{ Pa.s/m}^2$)

Panel 3 : 2 x 12.5 mm Gyproc Fireline 12.5mm ($\rho=784 \text{ kg/m}^3$, $E=2.4 \text{ GPa}$, $\eta=0.01$, $\rho_s=9.8 \text{ kg/m}^2$, $f_c=2309 \text{ Hz}$)

Mass-air-mass resonant frequency = 44 Hz, 74 Hz



Panel Size 3.7x3.7 m, Mass 56.0 kg/m²



Not To Scale Resized From Original Image

Project	No.	Drawing	No.	File	Date
2-3 Berkley Road	P1603	Augmentation based on Floor Treatment 1 (Airborne)	Figure 10	P1603/Figures.ppt	02/09/2024

Impact Sound Prediction (v8.0.12)

Program copyright: Marshall Day Acoustics 2015

Able Acoustics Ltd - Key No. 2530

Margin of error for Impact Sound Prediction is generally within $L_{n,w} \pm 5$ dB

Job Name: Berkley Road

Job No.: P1603

Date: 8 Sep 24

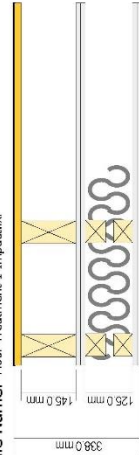
File Name: Floor Treatment 1 Impact.rpt

Page No.:

Initials: info

Notes:

Augmentation based on Floor Treatment 1
from Approved Document E



$L_{n,w}$ 48 dB
 C_1 2 dB

System description

Floor Cover: None (Measured)

Panel 1: 1 x 18.0 mm Particle Board ($\rho=80$ kg/m³, $E=2.7$ GPa, $\eta=0.03$, $\rho_s=11.9$ kg/m², $f_c=1768$ Hz)

Cavity: Solid (Solid Timber or Tiling) (Solid) Stud spacing 300 mm

Panel 2: 2 x 12.5 mm Gyproc SoundBloc 12.5mm ($\rho=848$ kg/m³, $E=3.6$ GPa, $\eta=0.01$, $\rho_s=10.6$ kg/m², $f_c=2482$ Hz)

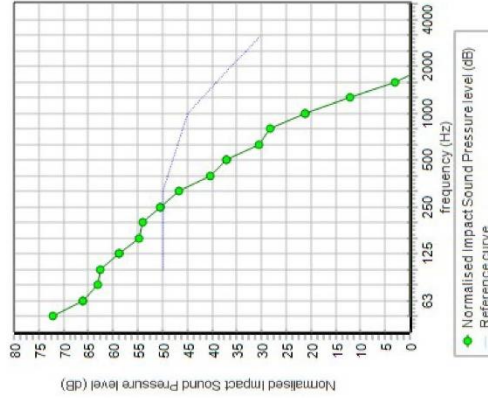
Cavity: Separate (Solid Stud spacing 600 mm, Infill Rockwool (33 kg/m³) Thickness 100 mm ($\rho=33$ kg/m³, $R_f=13400$ Pa.s/m²)

Panel 3: 2 x 12.5 mm Gyproc Fireline 12.5mm ($\rho=784$ kg/m³, $E=2.4$ GPa, $\eta=0.01$, $\rho_s=9.8$ kg/m², $f_c=2308$ Hz)

Mass-air-mass resonant frequency = 44 Hz, 74 Hz

frequency (Hz)	L_n (dB)	L_n (dB)
50	72	
63	66	74
80	63	
100	63	
125	59	65
160	55	
200	54	
250	51	56
315	47	
400	40	
500	37	42
630	30	
800	28	
1000	21	29
1250	12	
1600	3	
2000	-4	4
2500	-4	
3150	-14	
4000	-21	-13
5000	-23	

Panel Size 3.7x3.7 m; Mass 56.0 kg/m²



Not To Scale Resized From Original Image

Project	No.	Drawing	No.	File	Date
2-3 Berkley Road	P1603	Augmentation based on Floor Treatment 1 (Impact)	Figure 11	P1603/Figures.ppt	02/09/2024

Impact Sound Prediction (v8.0.12)

Program copyright: Marshall Day Acoustics 2015

Able Acoustics Ltd - Key No. 2530

Margin of error is generally within $R_w \pm 3$ dB

Job Name: Berkley Road

Job No.: P1603

Date: 8 Sep 24

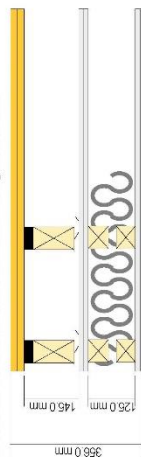
File Name: Floor Treatment Variation Airborne ground floor.xd

Page No.:

Initials: info

Notes:

Augmentation based on a variation of Floor Treatment 1 from Approved Document E



R_w 68 dB

C -5 dB

C_{tr} -13 dB

D 67 dB

System description

Panel 1 : 2 x 18.0 mm Particle Board ($\rho=60 \text{ kg/m}^3$, E=2.7 GPa, $\eta=0.03$, $\rho_s=11.9 \text{ kg/m}^2$, $f_c=1768 \text{ Hz}$)

Cavity: Resilient battens and steel rail. Stud spacing 300 mm

Panel 2 : 2 x 12.5 mm Gyproc SoundBloc 12.5mm ($\rho=848 \text{ kg/m}^3$, E=3.6 GPa, $\eta=0.01$, $\rho_s=10.6 \text{ kg/m}^2$, $f_c=2482 \text{ Hz}$)

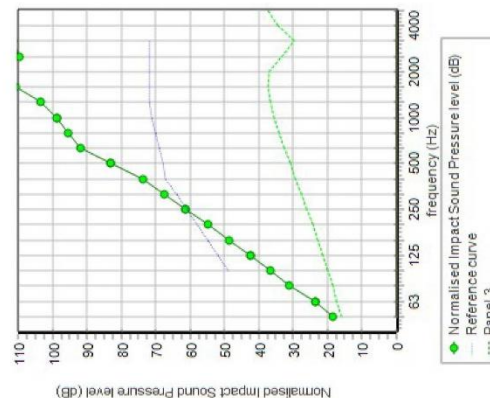
Cavity: Separate joists. Stud spacing 600 mm. Infill: Rockwool (33 kg/m³). Thickness: 100 mm ($\rho=33 \text{ kg/m}^3$, Rf=13400 Pa.s/m²)

Panel 3 : 2 x 12.5 mm Gyproc Fireline 12.5mm ($\rho=784 \text{ kg/m}^3$, E=2.4 GPa, $\eta=0.01$, $\rho_s=9.8 \text{ kg/m}^2$, $f_c=2309 \text{ Hz}$)

Mass-air-mass resonant frequency = 38 Hz, 67 Hz

frequency (Hz)	Ln(dB)	Ln(dB)
50	18	
63	24	22
80	31	
100	37	
125	43	40
160	49	
200	55	
250	61	59
315	68	
400	74	
500	83	78
630	92	
800	95	
1000	99	98
1250	103	
1600	111	
2000	114	111
2500	109	
3150	112	
4000	122	116
5000	131	

Panel Size 3.7x3.7 m, Mass 67.9 kg/m²



Not To Scale Resized From Original Image

Project	No.	Drawing	No.	File	Date
2-3 Berkley Road	P1603	Floor Treatment 1 Variation (Airborne)	Figure 12	P1603/Figures.ppt	02/09/2024

Impact Sound Prediction (v8.0.12)

Program copyright: Marshall Day Acoustics 2015

Able Acoustics Ltd - Key No. 2530

Margin of error for Impact Sound Prediction is generally within $L_{n,w} \pm 5$ dB

Job Name: Berkley Road

Job No.: P1603

Date: 8 Sep 24

File Name: Floor Treatment Variation Impact ground floor.rtd

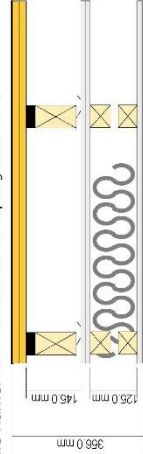
Page No.:

Initials: info

Notes:

Augmentation based on a variation of Floor Treatment 1

from Approved Document E



$L_{n,w}$ 46 dB
 C_1 3 dB

System description

Floor Cover: None (Measured)

Panel 1: 2 x 18.0 mm Particle Board ($\rho=80 \text{ kg/m}^3$, $E=2.7 \text{ GPa}$, $\eta=0.03$, $\rho_s=11.9 \text{ kg/m}^2$, $f_c=1768 \text{ Hz}$)

Cavity: Resilient battens and steel rail. Stud spacing 300 mm

Panel 2: 2 x 12.5 mm Gyproc SoundBloc 12.5mm ($\rho=848 \text{ kg/m}^3$, $E=3.65 \text{ GPa}$, $\eta=0.01$, $\rho_s=10.6 \text{ kg/m}^2$, $f_c=2482 \text{ Hz}$)

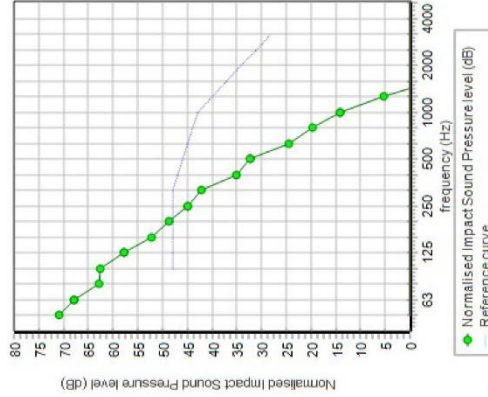
Cavity: Separate joists. Stud spacing 600 mm. Infill: Rockwool (33 kg/m^3) Thickness: 100 mm ($\rho=33 \text{ kg/m}^3$, $R_f=13400 \text{ Pa.s/m}^2$)

Panel 3: 2 x 12.5 mm Gyproc Fireline 12.5mm ($\rho=784 \text{ kg/m}^3$, $E=2.46 \text{ GPa}$, $\eta=0.01$, $\rho_s=9.8 \text{ kg/m}^2$, $f_c=2308 \text{ Hz}$)

Mass-air-mass resonant frequency = 38 Hz, 67 Hz

frequency (Hz)	L_n (dB)	$L_{n,w}$ (dB)
50	71	
63	68	73
80	63	
100	63	
125	58	64
160	52	
200	49	
250	45	51
315	42	
400	35	
500	32	37
630	24	
800	20	
1000	14	21
1250	5	
1600	-5	
2000	-11	-3
2500	-10	
3150	-20	
4000	-27	-19
5000	-29	

Panel Size 3.7x3.7 m; Mass 67.9 kg/m²



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Project	No.	Drawing	No.	File	Date
2-3 Berkley Road	P1603	Floor Treatment 1 Variation (Impact)	Figure 13	P1603/Figures.ppt	02/09/2024

APPENDIX A
Calibration Certificates





CERTIFICATE OF CALIBRATION

Date of Issue: 18 June 2024

Certificate Number: TCRT24/1448

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages
Approved Signatory

K. Mistry

Customer Able Acoustics Ltd
Unit 20
Connect 10 Business Park
Ashford
TN24 0FE

Order No. P1000

Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification	Manufacturer	Instrument	Type	Serial No. / Version
	Rion	Sound Level Meter	NA-28	30431903
	Rion	Firmware		2.0
	Rion	Pre Amplifier	NH-23	21966
	Rion	Microphone	UC-59	04966
	Brüel & Kjær	Calibrator	4231	2263404
		Calibrator adaptor type if applicable		UC 0210

Performance Class 1

Test Procedure TP 2.SLM 61672-3 TPS-49

Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002 Yes Approval Number 21.21/07.01

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2002

Date Received 17 June 2024

ANV Job No. TRAC24/06252

Date Calibrated 18 June 2024

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2002, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	14 June 2022	TCRT22/1373	ANV Measurement Systems

This certificate provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.



CERTIFICATE OF CALIBRATION

Date of Issue: 18 June 2024

Certificate Number: TCRT24/1445

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

K. Mistry

A handwritten signature in blue ink, appearing to read 'K. Mistry', is written over a horizontal line.

Customer
Able Acoustics Ltd
Unit 20
Connect 10 Business Park
Ashford
TN24 0FE

Order No. P1000

Test Procedure Procedure TP 1 Calibration of Sound Calibrators

Description Acoustic Calibrator

Identification	Manufacturer	Instrument	Model	Serial No.
	Brüel & Kjær	Calibrator	4231	2263404

The calibrator has been tested as specified in Annex B of IEC 60942:2003. As public evidence was available from a testing organisation (PTB) responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2003.

ANV Job No. TRAC24/06252

Date Received 17 June 2024

Date Calibrated 18 June 2024

Previous Certificate	<i>Dated</i>	13 June 2022
	<i>Certificate No.</i>	UCRT22/1767
	<i>Laboratory</i>	0653

This certificate provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.



CERTIFICATE OF CALIBRATION



0653

Date of Issue: 16 May 2024

Certificate Number: UCRT24/1748

Calibrated at & Certificate issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 4 Pages

Approved Signatory

K. Mistry

CUSTOMER ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes
MK5 8HL

ORDER No ANV MS HIRE

Job No UKAS24/05356

DATE OF RECEIPT 08 May 2024

PROCEDURE Calibration Engineer's Handbook section 31

IDENTIFICATION Tapping Machine SOURCESLINE type EOS serial no. NG E05 252

CALIBRATED ON 16 May 2024

PREVIOUS CALIBRATION Calibrated on 07-08 Feb 2024 Certificate No. UCRT24/1215 issued by this laboratory.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

APPENDIX B
Sound Insulation Test Results



Standardized level difference according to ISO 16283-1

Field measurements of airborne sound insulation between rooms

Client: C. B. Wright & Associates Ltd

Date of test: 23/08/2024

Project: Berkley Road

Description and identification of the building construction and test arrangement, direction of measurement:

Current ground floor office area, to current 1st floor office area.

Measured as 19cm at the stair well, circa 30mm floor below underlay and carpet with circa 150mm joists and plaster below.

Common partition area (m²): 13.5

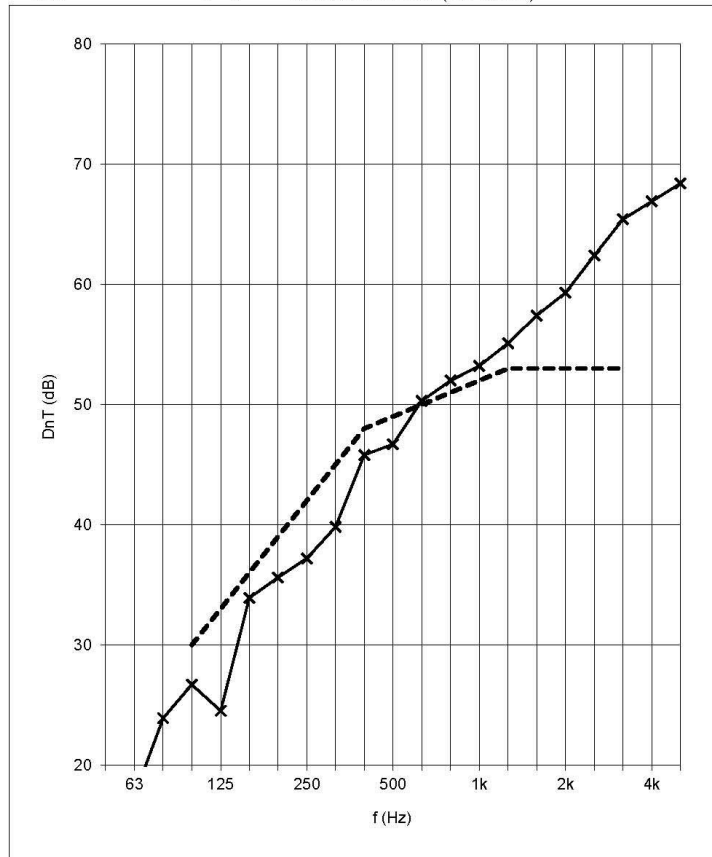
Source room volume (m³): 66.3

Receiving room volume (m³): 36.3

----- Shifted reference curve.

---X---X--- Measurement results (DnT values).

Frequency f Hz	DnT (1/3 octave) dB
50	14.7
63	17.4
80	23.9
100	26.7
125	24.5
160	33.9
200	35.6
250	37.2
315	39.8
400	45.8
500	46.7
630	50.3
800	52.0
1000	53.2
1250	55.1
1600	57.4
2000	59.3
2500	62.4
3150	>= 65.4
4000	>= 66.9
5000	>= 68.4



Rating according to ISO 717-1

$D_{nT,w} (C; C_{tr}) = 49 (-3; -8) \text{ dB}$

No background noise influence on $D_{nT,w}$

Background noise influence on C and C_{tr}

Evaluation based on field measurement using results obtained by an engineering method

Standardized impact sound pressure levels according to ISO 16283-2 Field measurements of impact sound insulation of floors

Client: C.B. Wright & Associates Ltd

Date of test: 23/08/2024

Project: Berkley Road

Description and identification of the building construction and test arrangement:

Current 1st floor office area, to current ground floor office area.

Measured as 19cm at the stair well, circa 30mm floor below underlay and carpet with circa 150mm joists and plaster below.

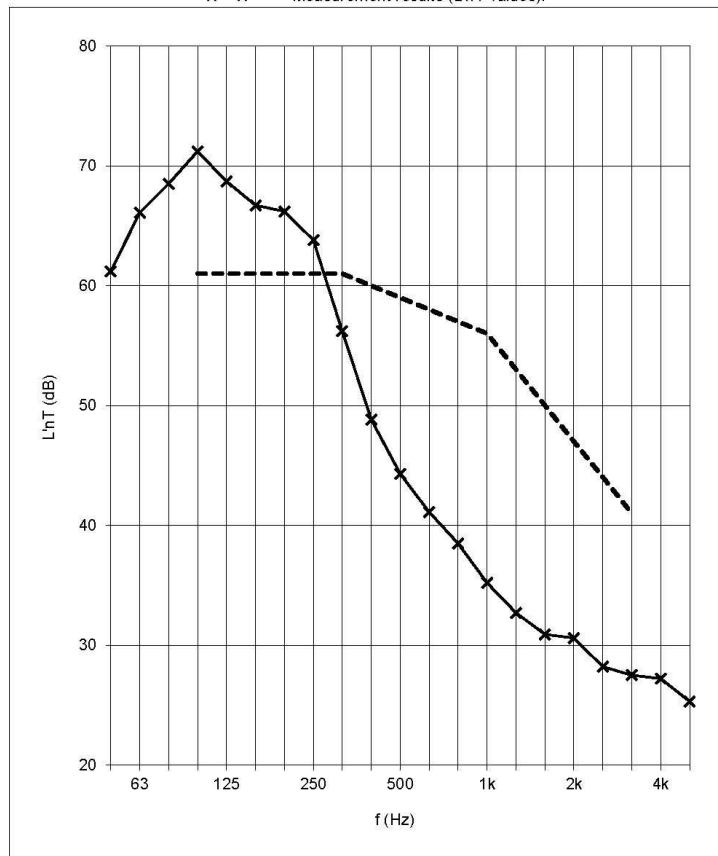
Receiving room volume (m³):

36.3

----- Shifted reference curve.

---X---X--- Measurement results (L'nT values).

Frequency f Hz	L'nT (1/3 octave) dB
50	61.2
63	66.1
80	68.5
100	71.2
125	68.7
160	66.7
200	66.2
250	63.8
315	56.2
400	48.8
500	44.3
630	41.1
800	38.5
1000	35.2
1250	32.7
1600	30.9
2000	30.6
2500	28.2
3150	27.5
4000	27.2
5000	25.3



Rating according to ISO 717-2

L'nT,w (CI) = 59 (1) dB

No background noise influence on L'nT,w

No background noise influence on CI

Evaluation based on field measurement
results obtained by an engineering method

Standardized level difference according to ISO 16283-1

Field measurements of airborne sound insulation between rooms

Client: C. B. Wright & Associates Ltd

Date of test: 23/08/2024

Project: Berkley Road

Description and identification of the building construction and test arrangement, direction of measurement:
Current ground floor office area, to current basement storage area.
Measured as 22cm floor with 175mm joists and no ceiling below joists.

Common partition area (m²): 12.5

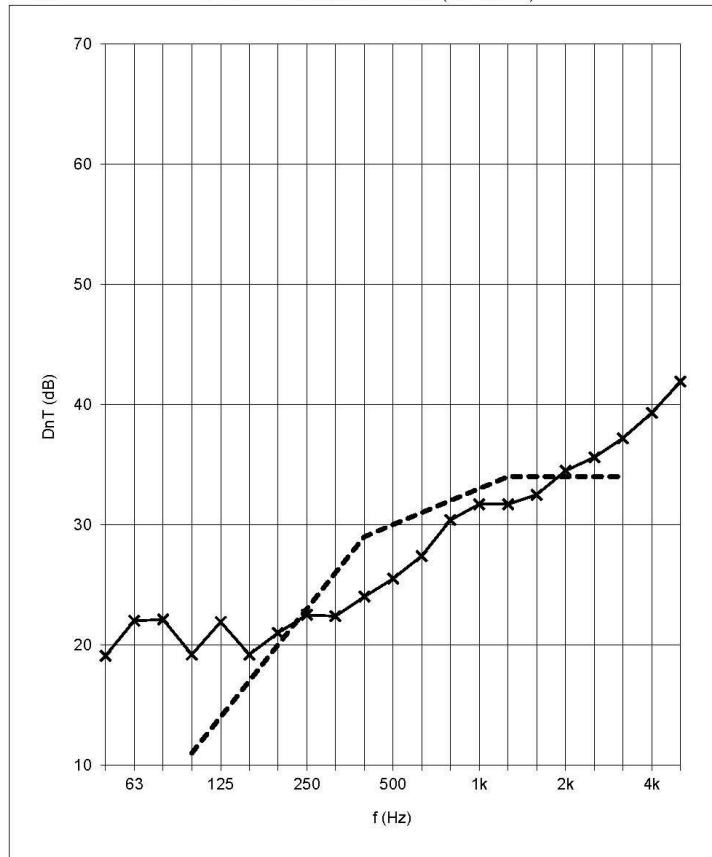
Source room volume (m³): 66.3

Receiving room volume (m³): 26.1

----- Shifted reference curve.

---X---X--- Measurement results (DnT values).

Frequency f Hz	DnT (1/3 octave) dB
50	19.1
63	22.0
80	22.1
100	19.2
125	21.9
160	19.2
200	21.0
250	22.5
315	22.4
400	24.0
500	25.5
630	27.4
800	30.4
1000	31.7
1250	31.7
1600	32.5
2000	34.5
2500	35.6
3150	37.2
4000	39.3
5000	41.9



Rating according to ISO 717-1

$D_{nT,w} (C; C_{tr}) = 30 (0; -3) \text{ dB}$

No background noise influence on $D_{nT,w}$

No background noise influence on C and C_{tr}

Evaluation based on field measurement using
results obtained by an engineering method

Standardized impact sound pressure levels according to ISO 16283-2 Field measurements of impact sound insulation of floors

Client: C.B. Wright & Associates Ltd

Date of test: 23/08/2024

Project: Berkley Road

Description and identification of the building construction and test arrangement:
Current ground floor office area, to current basement storage area.
Measured as 22cm floor with 175mm joists and no ceiling below joists.

Receiving room volume (m³):

26.1

----- Shifted reference curve.

---X---X--- Measurement results (L'nT values).

Frequency f Hz	L'nT (1/3 octave) dB
50	75.6
63	73.7
80	79.2
100	78.0
125	76.5
160	82.3
200	80.8
250	80.0
315	74.8
400	74.4
500	71.5
630	70.0
800	66.5
1000	63.2
1250	62.3
1600	60.0
2000	56.7
2500	54.7
3150	52.2
4000	48.5
5000	42.6



Rating according to ISO 717-2

L'nT,w (CI) = 72 (1) dB

No background noise influence on L'nT,w

No background noise influence on CI

Evaluation based on field measurement
results obtained by an engineering method

Standardized level difference according to ISO 16283-1 **Field measurements of airborne sound insulation between rooms**

Client: C.B. Wright & Associates Ltd

Date of test: 23/08/2024

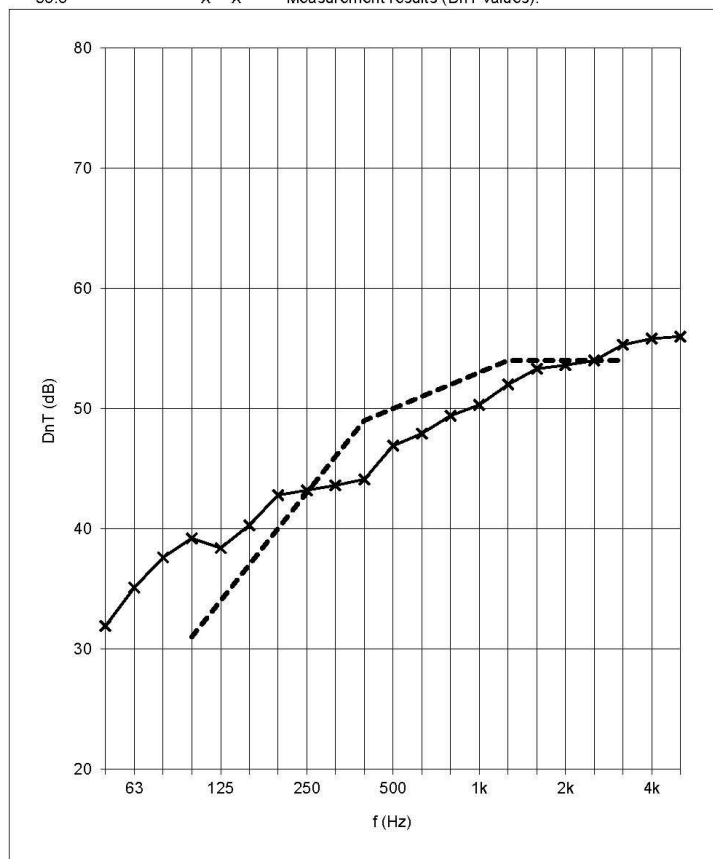
Project: Berkley Road

Description and identification of the building construction and test arrangement, direction of measurement:
 Current ground floor meeting space, current ground floor office/reception area.
 Measured as circa 200mm and assumed masonry.

Common partition area (m²): 15.31
 Source room volume (m³): 215.9
 Receiving room volume (m³): 56.8

----- Shifted reference curve.
 ---X---X--- Measurement results (DnT values).

Frequency f Hz	DnT (1/3 octave) dB
50	31.9
63	35.1
80	37.6
100	39.2
125	38.4
160	40.3
200	42.8
250	43.2
315	43.6
400	44.1
500	46.9
630	47.9
800	49.4
1000	50.3
1250	52.0
1600	53.3
2000	53.6
2500	54.0
3150	55.3
4000	55.8
5000	56.0



Rating according to ISO 717-1

DnT,w (C; Ctr) = 50 (0; -3) dB

No background noise influence on DnT,w

No background noise influence on C and Ctr

Evaluation based on field measurement using
 results obtained by an engineering method