25 Old Gloucester Street London

Environmental Noise Survey and Noise Impact Assessment Report

24421/NIA1 PL01 Rev1

11 September 2023

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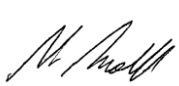
Document Control

Rev	Date	Comment	Prepared by	Authorised by
1	11/09/2023	Revised Planning Scheme 1		
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Hann Tucker Associates

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Attachments

1.0 Introduction

25 Old Gloucester Street is to be refurbished as follows:

“Extension of Basement to accommodate additional cultural centre accommodation (use class F1 and F2) and conversion of front part of building at second and third floor levels to create two studio dwellings”.

Hann Tucker have been commissioned to undertake an environmental noise survey in order to provide acoustic advice regarding the project.

This report presents the methodology and findings of our noise survey and assessment in the context of the National Planning Policy Framework (NPPF) and the requirements of the Local Authority.

2.0 Objectives

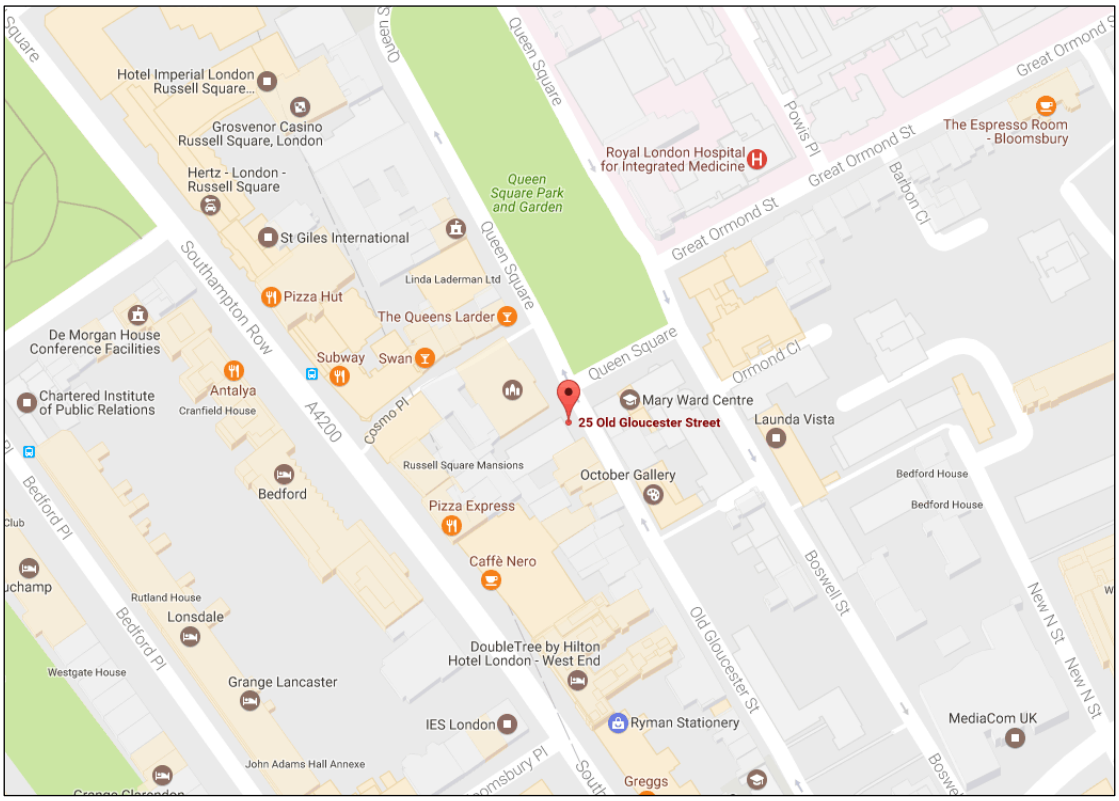
To assess the suitability of the site for the creation of residential properties based on noise data from our environmental noise survey.

To assess any likely transfer of noise from the commercial areas to the residential dwellings within the development.

To assess any likely transfer of noise from the commercial areas to the residential dwellings neighbouring the development.

2.1 Location

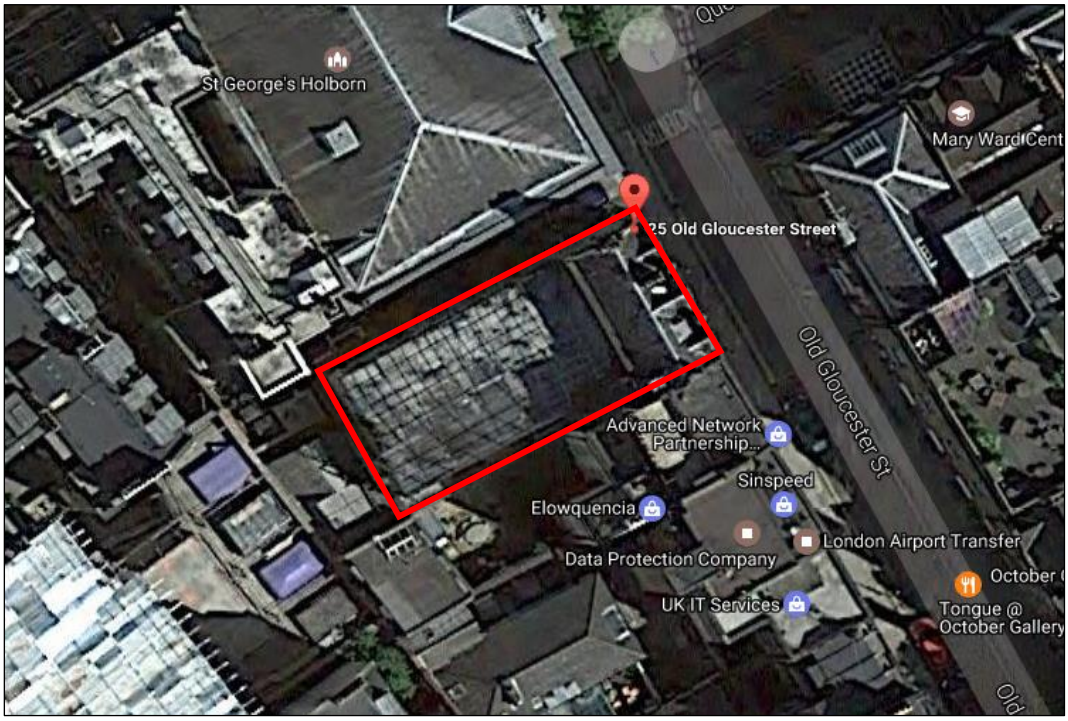
The site is located at 25 Old Gloucester Street, WC1N 3AF and falls within the jurisdiction of Camden London Borough Council. See Location Map below.



Location Map (Map Data ©2023 Google)

2.2 Description

The existing site is located at the south corner of Queen Square Park and Garden and is approximately 200m from Russell Square. There are a number of commercial properties surrounding the site and there are residential properties to the southeast. See Site Plan below.



Site Plan (Map Data ©2017 Google Imagery ©2023 The GeoInformation Group)

3.0 Acoustic Terminology

For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.

4.0 Methodology

The survey was undertaken by Nick Russell MIOA and assisted by Luke Brough.

4.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 13:15 hours on Thursday 25 May to 14:30 hours on Tuesday 30 May 2017.

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately comment on the weather conditions throughout the entire survey period. However, at the beginning and end of the survey period the wind conditions were calm and the sky was generally clear with some occasional rain. We understand that generally throughout the survey period the weather conditions were very similar to this description and can therefore be considered as suitable for establishing typical background noise levels.

Measurements were taken continuously of the A-weighted (dBA) L_{90}, L_{eq} and L_{max} sound pressure levels over 15 minute periods.

4.2 Measurement Positions

The noise level measurements were undertaken at two positions on the development site. The measurement position**s** are described in the table below.

Position No	Description
1	The microphone was attached to a pole and mounted out of a window on the front of the site. It was installed at a height of approximately 10m from ground level.
2	The microphone was mounted out of a window overlooking the disused play area at the rear of the site. It was installed at a height of approximately 1.5m from the play area roof.

These positions were chosen in order to establish typical noise levels at both the front and rear of the site.

Plan Showing Unmanned Measurement Positions

4.3 Instrumentation

The instrumentation used during the survey is presented in the table below:

Description	Manufacturer	Type	Serial Number	Calibration
Type 1 Data Logging Sound Level Meter	Larson Davis	824	3444	Calibration on 11/07/2016
Type 1 ½" Condenser Microphone	PCB	377B02	122885	Calibration on 11/07/2016
Type 1 Data Logging Sound Level Meter	Larson Davis	824	3443	Calibration on 10/03/2017
Type 1 ½" Condenser Microphone	PCB	377A02	107842	Calibration on 10/03/2017

5.0 Results

The results have been plotted on Time History Graphs 24421/TH1 to 24421/TH2 enclosed presenting the 15-minute A-weighted (dBA) L_{90}, L_{eq} and L_{max} levels at each measurement position throughout the duration of the survey.

5.1 L_{A90} Noise Levels

The following table presents the lowest modal L_{A90} background noise levels during the survey:

Position	Lowest Modal L_{A90} Background Noise Level (dB re 2 x 10^{-5} Pa)		
	Daytime (07:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours	24 Hours
1	48	45	45
2	46	44	44

5.2 L_{eq} Noise Levels

In order to compare the results of our survey with suitable guidelines it is necessary to convert the measured $L_{Aeq(15\ minute)}$ noise levels into single figure daytime $L_{Aeq(16\text{-}hour)}$ (07:00-23:00 hours) and night-time $L_{Aeq(8\text{-}hour)}$ (23:00-07:00 hours) levels.

The daytime $L_{Aeq(16\text{-}hour)}$ and night-time $L_{Aeq(8\text{-}hour)}$ noise levels for each position are presented in the tables below.

Position	Daytime $L_{Aeq(16\text{-}hour)}$	Night-Time $L_{Aeq(8\text{-}hour)}$
1	59dB	52dB
2	52dB	47dB

5.3 Night-time L_{max} Results

The following table presents the number of L_{max} events which exceeded 80dBA during the night-time periods.

Date	No of Events	
	Position 1	Position 2
25/05/2017 to 26/05/2017	1	0
26/05/2017 to 27/05/2017	2	0
27/05/2017 to 28/05/2017	1	0
28/05/2017 to 29/05/2017	2	1
29/05/2017 to 30/05/2017	1	0

6.0 Discussion Of Noise Climate

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However, at the beginning and end of the survey period the dominant noise source was noted to be road traffic noise from the surrounding area.

7.0 Planning Policy/Guidance

7.1 National Planning Policy Framework (NPPF)

The following paragraph is from the NPPF:

“123.Planning policies and decisions should aim to:

- avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and

- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."

7.2 Local Authority Criteria

We understand Camden Council have previously imposed the following Condition (11) for external noise intrusion on the site in a planning application issued in November 2021:

"The design and structure of the Theobalds Building shall be of such a standard that it will protect residents within it from existing external noise so that they are not exposed to levels indoors of more than 35 dB LAeq 16 hrs daytime and of more than 30 dB LAeq 8hrs in bedrooms at night".

Various reference documents including BS 8233: 2014 edition and WHO Community Noise Guidelines present acoustic criteria for residential premises, as outlined below. These guidelines are entirely discretional.

7.3 BS8233

British Standard 8233: 2014 "Guidance on sound insulation and noise reduction for buildings" provides guidance for the control of noise in and around buildings.

Section 7.7.2 "Internal ambient noise levels for dwellings" states:

In general for steady external noise sources, it is desirable that internal ambient noise levels do not exceed the following guideline values:

Activity	***Location***	***Desirable Internal Ambient Criteria***	
		07:00 – 23:00	***23:00 to 07:00***
Resting	*Living Rooms*	*35 dB $L_{Aeq,16hour}$*	*-*
Dining	*Dining Room/Area*	*40 dB $L_{Aeq,16hour}$*	*-*
Sleeping (Daytime Resting)	*Bedroom*	*35 dB $L_{Aeq,16hour}$*	*30 dB $L_{Aeq,8hour}$*

Note 7 states:

"Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved".

Section 7.7.3.2 “Design criteria for external noise” states:

“For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$[1], with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited”.

7.4 Proposed Criteria

On the basis of the above guidance we would propose the following internal noise levels be adopted as minimum design targets in the worst affected dwellings.

Activity	Location	Desirable Internal Ambient Criteria	
		07:00 – 23:00	23:00 to 07:00
Resting	Living Rooms	35 dB $L_{Aeq,16hour}$	-
Dining	Dining Rooms	35 dB $L_{Aeq,16hour}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

8.0 Achievable Internal Noise Levels

We have predicted the levels that would be achievable in the worst-case dwellings from external noise ingress. A simple assessment based on a typical outside to inside sound reduction of 33dB(A) indicates the following noise levels may be expected within the proposed worst-case dwellings with typical thermal double or suitably designed secondary glazing.

Façade	Daytime $L_{Aeq(16\text{-}hour)}$	Night-time $L_{Aeq(8\text{-}hour)}$
East	26dBA	19dBA
North	26dBA	19dBA

These predicted worst case internal noise levels meet the proposed criteria. It is thus demonstrated that acceptable internal noise levels are achievable.

9.0 Separating Floor Assessment (First Floor Office to Second Floor Residential)

There are offices proposed on the first floor at the east section of the building below the second-floor studio apartment. These offices are part of the community centre.

We understand that the intermediate floor slab is 250mm thick solid concrete and that a mass barrier ceiling will be installed in the offices. This ceiling shall have an air gap of 150mm with 50mm of mineral wool in the cavity. The lower ceiling will be constructed from two layers of 12.5mm Soundbloc plasterboard installed on acoustic hangers. Our assessment of this construction is that it should provide the following airborne sound reduction:

Description	Sound Reduction Indices, (dB) at Octave Band Frequencies (Hz)							
	63	125	250	500	1K	2K	4K	8K
250mm thick concrete slab with mass barrier ceiling detailed above	46	55	59	66	73	75	78	78

In order to achieve a low impact noise from the ground floor in the residential dwellings above we would recommend that a noise criterion of NR15 should be adopted.

In order to calculate the limiting noise levels permissible within the first floor in order to achieve a noise level of NR15 within the residential dwellings above, the following equation was used:

$$L_{pLIM} = L_{p2} + R - 10\log(Sp) + 10\log(A)$$

Where:

L_{P2} = Required noise level in residence.

L_{PLIM} = Limiting sound pressure level in Office

R = Approximate composite SRI of floor.

Sp = Approximate surface area of partition wall (m^2) (bedroom).

A = Total absorption in receive room (m^2).

The total absorption (A) was calculated by multiplying the absorption co-efficient (α) by the surface area of the room. Typical values for a bedroom were used in the calculation.

The table below shows the details of our calculation:

Description	Octave Band Centre Frequencies (Hz)							
	63	125	250	500	1k	2k	4k	8k
LP2 (NR15)	47	35	26	19	15	12	9	7
R	46	55	59	66	73	75	78	78
10logSp	9	9	9	9	9	9	9	9
α	0.1	0.18	0.25	0.27	0.31	0.32	0.32	0.35
Room Surface Area	45	45	45	45	45	45	45	45
10logA	7	9	11	11	12	12	12	12
LPLIM	91	90	87	87	91	90	90	88

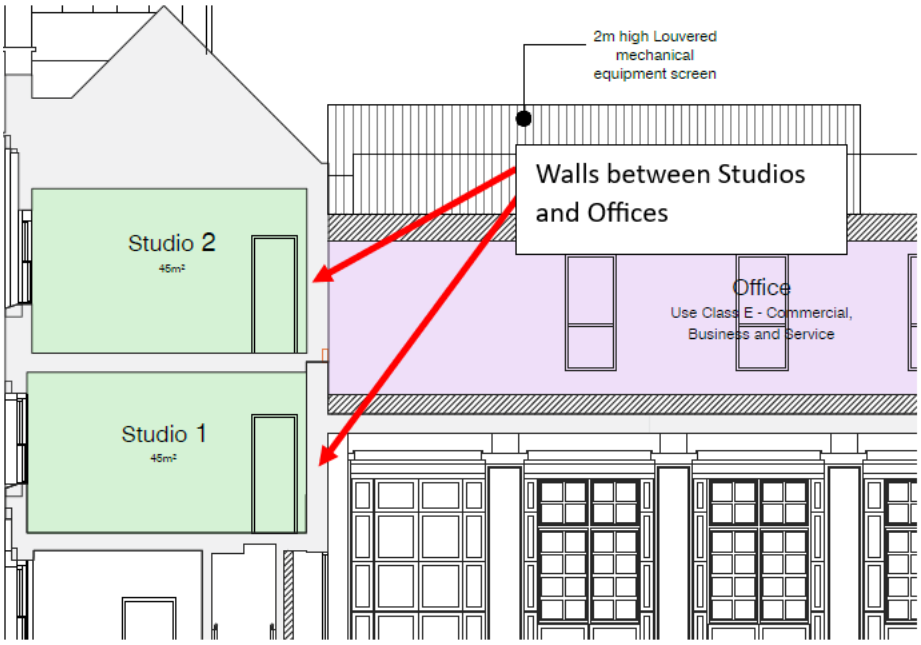
Therefore, in order to achieve an internal level of NR15 in the residential dwellings above the ground floor, the maximum noise levels should be limited to the following:

First Floor Limiting Sound Pressure Levels (dB Lmax) at Octave Band Centre Frequency (Hz)								
63	125	250	500	1k	2k	4k	8k	dBA
91	90	87	87	91	90	90	88	97

The above limiting maximum sound pressure levels are approximately significantly higher than those we have in our company database for typical office usage and hence we can see no reason why these offices should be a source of noise complaint from residents in the dwellings above. Suitable resilient layers within the residential floor will be installed to limit impact noise to the offices below from residents.

10.0 Separating Wall Assessment

The proposed studio apartments have an adjoining party wall to the first-floor lecture hall and the second-floor offices, which may be used for community uses, as detailed in the following sketch:



The existing construction of the party walls is brickwork and as follows:

Studio 1- 350mm thick wall, 328mm brick and 25mm plaster.

Studio 2- 240mm thick wall, 215mm brick and 25mm plaster.

As part of the work on site these walls will be taken back to the brickwork and a new stud wall will be added for fire compartmentation and increasing U-values. This will comprise a new metal independent stud with 110mm insulation, a 25mm service zone and 12.5mm plasterboard with a 10mm parge coat.

10.1 Studio Walls

Our assessment of the proposed construction of the studio walls is that they should provide the following airborne sound reduction:

Description	Airborne Sound Reduction (dB) at Octave Band Frequencies (Hz)							
	63	125	250	500	1K	2K	4K	8K
Studio 1 350mm thick brickwork, independent 135mm stud wall with 110mm insulation, 12.5mm plasterboard and 10mm parge coat	38	55	72	85	96	103	102	100
Studio 2 240 mm thick brickwork, independent 135mm stud wall with 110mm insulation, 12.5mm plasterboard and 10mm parge coat	35	49	68	79	91	98	97	95

In order to achieve a low impact noise from the ground floor in the residential dwellings above we would recommend that a noise criterion of NR15 should be adopted.

In order to calculate the limiting noise levels permissible within the first floor in order to achieve a noise level of NR15 within the residential dwellings above, the following equation was used:

$$L_{pLIM} = L_{p2} + R - 10\log(Sp) + 10\log(A)$$

Where:

L_{P2} = Required noise level in residence.

L_{PLIM} = Limiting sound pressure level in Office

R = Approximate composite SRI of floor.

Sp = Approximate surface area of partition floor (m^2) (bedroom).

A = Total absorption in receive room (m^2).

The total absorption (A) was calculated by multiplying the absorption co-efficient (α) by the surface area of the room. Typical values for a bedroom were used in the calculation.

The table below shows the details of our calculation for the Studio 2 wall, which has the worst acoustic performance:

Description	Octave Band Centre Frequencies (Hz)							
	63	125	250	500	1k	2k	4k	8k
LP2 (NR15)	47	35	26	19	15	12	9	7
R	35	49	68	79	91	98	97	95
10logSp	9	9	9	9	9	9	9	9
α	0.1	0.18	0.25	0.27	0.31	0.32	0.32	0.35
Room Surface Area	45	45	45	45	45	45	45	45
10logA	7	9	11	11	12	12	12	12
LPLIM	80	84	96	90	109	113	109	105

Therefore, in order to achieve an internal noise level of NR15 in the residential dwellings above the ground floor, the maximum noise levels should be limited to the following:

Indicative First Floor Limiting Sound Pressure Levels (dB Lmax) at Octave Band Centre Frequency (Hz)								
63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
80	84	96	90	109	113	109	105	117

The above limiting maximum airborne sound pressure levels, for the worst-case wall acoustically, are significantly higher than those we have in our company database for typical office usage, or activities associated with a cultural centre such as moderate levels of reproduced music. We can, therefore, see no reason why these offices should be a source of noise complaint from residents in the dwellings above. The above calculation of the likely sound insulation should be checked by carrying out pre completion sound insulation testing.

It is understood that the Lecture Hall may be used as a meeting/lecture room with some religious ceremonies or lectures. It is understood that reproduced music could be played but will be limited to reasonable levels. Our database for religious ceremonies with some music indicates that the above limiting levels are unlikely to be exceeded. (It should be noted that the limiting levels above are for the Studio 2 wall; the Studio 1 wall levels are around 5dB higher in each octave).

Suitable resilient layers within the residential floors will be installed to limit impact noise to the offices below from residents.

11.0 Noise Breakout to Neighbouring Properties

We have also considered the potential noise breakout to other adjacent properties through the building fabric from typical internal noise levels associated with religious ceremonies containing reasonable levels of reproduced music. The adjacent properties comprise a number of residential dwellings at the rear of the building and a church to the north.

Our calculations indicate that with suitably designed thermal double or secondary glazing, to the proposed ground floor lounge and the first-floor lecture hall, the external noise levels at one metre to the nearest neighbouring property should be around 45dBL_{max} and 35dB $L_{Aeq.}$ The latter is approximately 17dB below the single figure daytime $L_{Aeq(16\text{-}hour)}$ (07:00-23:00 hours) at Position 2 of 52dBA. In accordance with the National Planning Practice Guidance based upon the Noise Policy Statement for England this is not noticeable and hence no specific actions should be required.

12.0 Conclusions

A detailed environmental noise survey has been undertaken in order to establish the currently prevailing environmental noise climate around the site.

Appropriate internal noise criteria have been proposed. These are achievable using conventional glazing constructions.

The environmental noise impact upon the proposed dwellings has been assessed in the context of the NPPF and the requirements of the Local Authority. Mitigation advice to reduce to a minimum the adverse impact on health and quality life arising from environmental noise have been recommended.

Based upon the results of our survey and subsequent assessment the proposed development is considered compliant with the local policy of the London Borough of Camden.

An assessment of the noise impact from the first to second floor of the building has been undertaken, with regards to the internal second floor dwelling, and our calculations indicate that the intermediate structure proposed should provide suitable acoustic isolation.

An assessment of the noise impact from likely activities in the ground and first floors of the building to external neighbouring properties has been undertaken and our calculations indicate that with suitably designed glazing no specific actions are likely to be required acoustically.

Appendix A

The acoustic terms used in this report are defined as follows:

dB — Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. 30dB + 30dB = 33dB, not 60dB).

dBA — The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The $_A$ subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted

It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.

$L_{90,T}$ — L_{90} is the noise level exceeded for 90% of the period *T* (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.

$L_{eq,T}$ — $L_{eq,T}$ is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, *T*.

L_{max} — L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.

L_p — Sound Pressure Level (SPL) is the sound pressure relative to a standard reference pressure of 2×10^{-5} Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).

L_w — Sound Power Level (SWL) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).