# 25 Old Gloucester Street London

## Environmental Noise Survey and Noise Impact Assessment Report

24421/NIA1 PL02 Rev1

11 September 2023

For:
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Hann Tucker Associates

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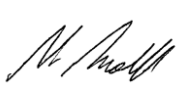
# 24421/NIA1 PL02 Rev1

## Document Control

| Rev | Date | Comment | Prepared by | Authorised by |
|---|---|---|---|---|
| 1 | 11/09/2023 | Revised Planning Scheme 2 |  |  |
| | | | Nick Russell<br>Principal Consultant<br>MIOA | Robin Honey<br>Director<br>BA(Hons), MIOA |
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## 24421/NIA1 PL02 Rev1

## Contents



## Attachments

# 1.0 Introduction

25 Old Gloucester Street is to be refurbished as per the following description:

“Extension of basement to accommodate additional cultural centre accommodation (use class F1 and F2), replacement of second floor at rear to accommodate offices (class E1) and conversion of front part of building at second and third floor levels to create two new studio dwellings”.

to create two studio apartments on the second and third floors of the building, office space and a Cultural Centre. The apartments are to have a party wall and floor with the offices within the site and will overlook the front of the building.

It is also proposed to install some building services plant on the roof of the building.

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.

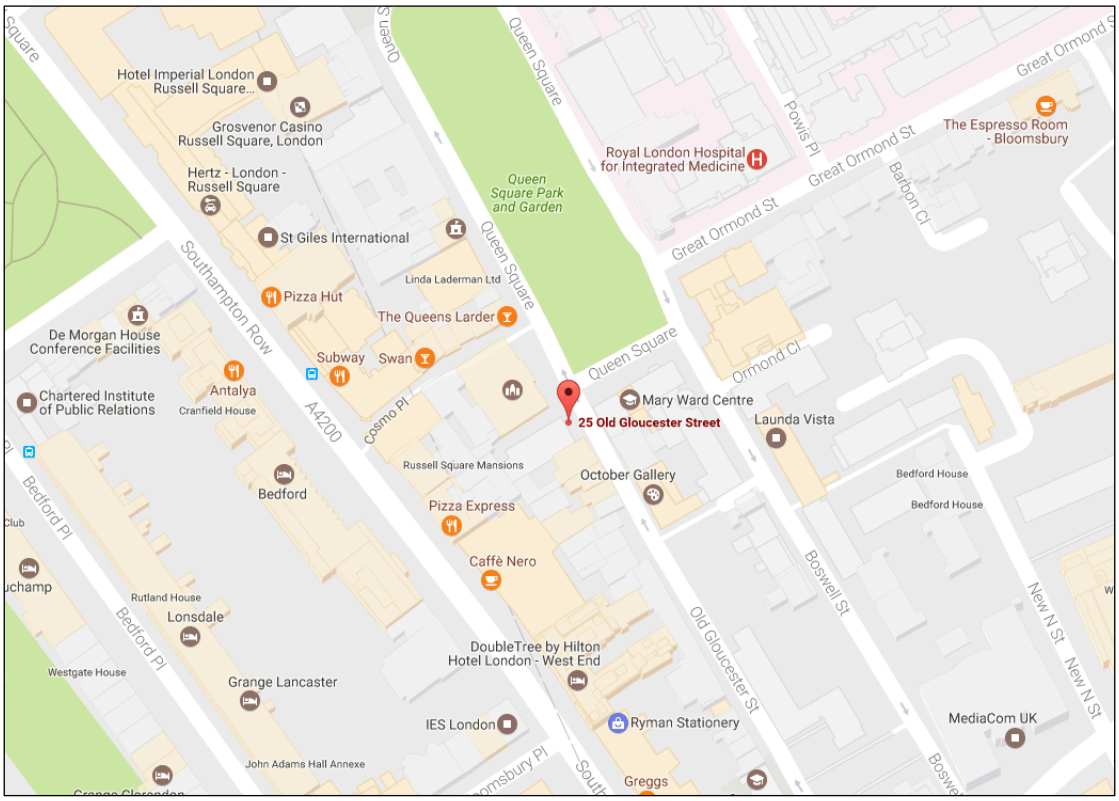
To assess any likely transfer of noise from the commercial areas to the residential dwellings within the development.

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

To assess the likely plant noise emissions from proposed building services equipment.

## 2.1 Location

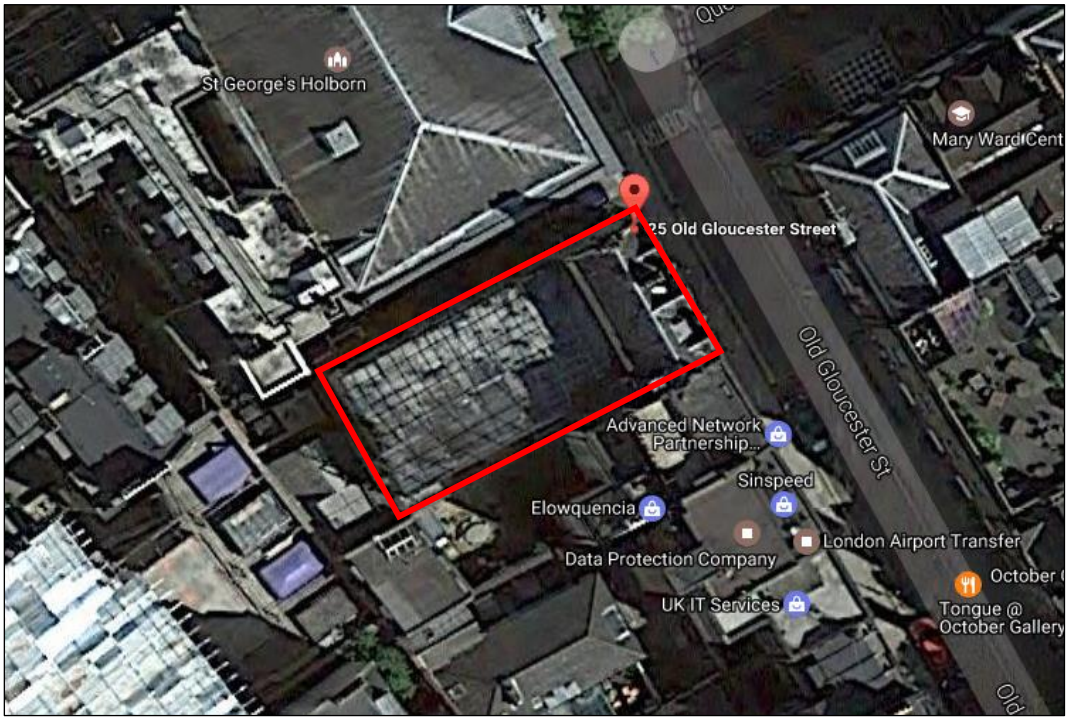
The site is located at 25 Old Gloucester Street, WC1N 3AF and falls within the jurisdiction of Camden London Borough Council. See Location Map below.



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 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 studio apartments 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 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 independent 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 |

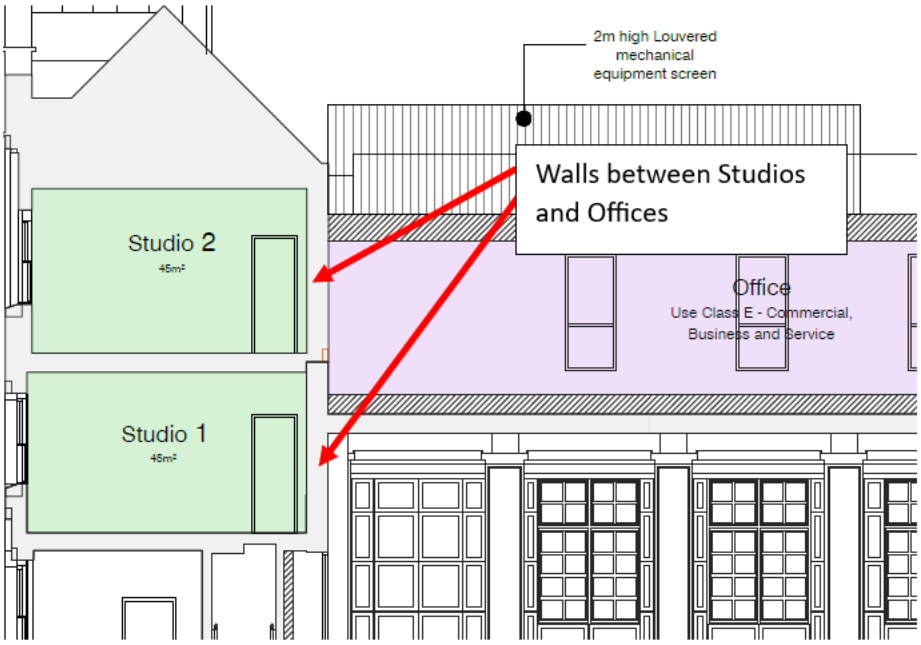
Therefore, in order to achieve an internal level of NR15 in the residential dwellings above the ground floor, the maximum noise levels should be limited to the following:

| 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 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 Apartment Walls

Our assessment of the proposed construction of the studio apartment 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<br>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<br>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 and hence we can 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 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 45dB$L_{max}$ 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 Plant Noise Emission Criteria

The site lies within London Borough of Camden's jurisdiction. Their advice regarding criteria for atmospheric noise emissions from building services plant is contained within their Local Plan,

version June 2017 as follows:

**Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)**

| Existing Noise sensitive receptor | Assessment Location | Design Period | LOAEL (Green) | LOAEL to SOAEL (Amber) | SOAL (Red) |
|---|---|---|---|---|---|
| Dwellings** | Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade) | Day | 'Rating level' 10dB* below background | 'Rating level' between 9dB below and 5dB above background | 'Rating level' greater than 5dB above background |
| Dwellings** | Outside bedroom window (façade) | Night | 'Rating level' 10dB* below background and no events exceeding 57dB $L_{Amax}$ | 'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB $L_{Amax}$ | 'Rating level' greater than 5dB above background and/or events exceeding 88dB $L_{Amax}$ |

## Industrial and Commercial Noise Sources

A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion).

*10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.

**levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.

The periods in Table C correspond to 0700 hours to 2300 hours for the day and 2300 hours to 0700 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration.

There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS:4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specification of NR35 or below, dependant on the room (based upon measured or predicted Leq,5mins noise levels in octave bands) 1 metre from the façade of affected premises, where the noise sensitive premise is located in a quiet background area.

Based on the above and the measured noise levels summarised in Section 6.0, we therefore propose the following plant noise emission criteria to be met at 1m outside the nearest neighbouring residential property.

Based on the above and the measured noise levels summarised in Section 5.1, we therefore propose the following plant noise emission criteria to be met at 1m outside the nearest neighbouring residential property.

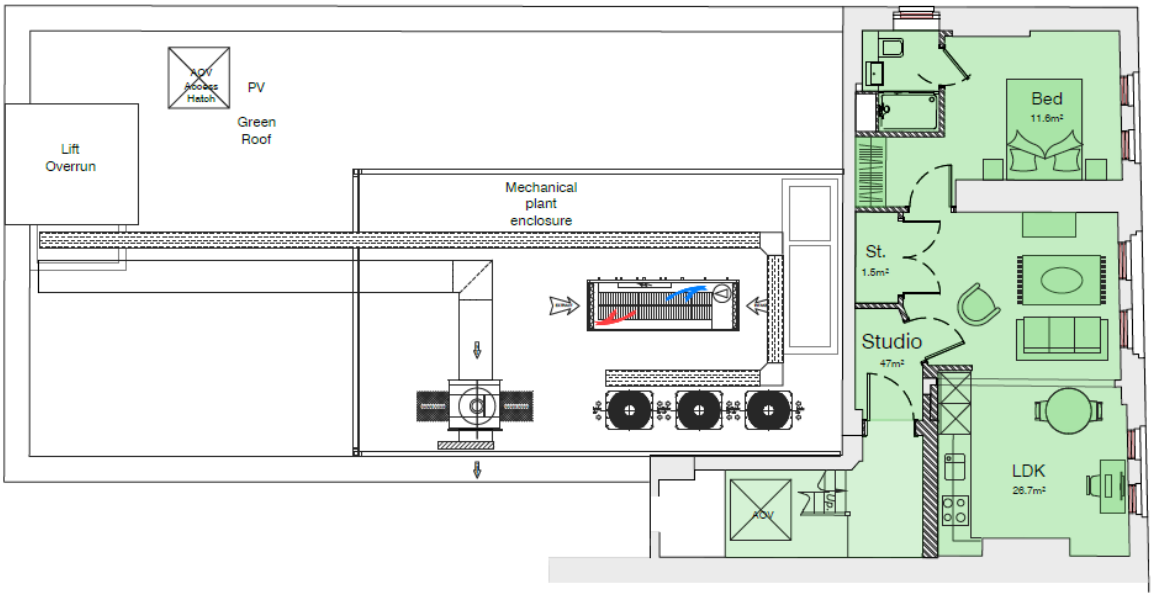
| Position | Limiting Plant Noise Rating Level (dBA re 2x10-5 Pa) | |
|---|---|---|
| | Daytime (07:00–23:00 hours) | Night-time (23:00–07:00 hours) |
| 1 | 38 | 35 |
| 2 | 36 | 34 |

It should be noted that the above criteria are subject to final approval by the London Borough of Camden.

# 13.0 Plant Noise Assessment

## 13.1 Plant Location

Building services plant has not yet been designed for the project but is currently assumed to comprise of a kitchen extract fan, an air handling unit and some external condensers. It is understood that the plant is proposed to be installed on the roof as detailed in the ATP drawing below.




The above drawing shows that the plant is to be installed within a compound that has provision for acoustic louvres or solid screens around the plant. In addition, the extract fan and air handling unit will be installed with atmospheric attenuators to limit noise transmitted to atmosphere.

The nearest noise sensitive residential window to the plant area is at the rear of 26 Old Gloucester Street. These windows are at the same height as the plant and approximately 7 metres away.

## 13.2 Limiting Noise Levels

Based on the location of the plant and the nearest noise sensitive window above the relevant noise criteria is based on our Position 2 survey position. We have carried out a preliminary assessment based on noise reduction due to distance loss and the barrier effect of the screen around the compound. Based on this we can see no reason why the Local Authority plant noise emission criteria should be exceeded providing the cumulative Noise Rating Level of all plant

does not exceed the following limiting levels.

| Limiting Plant Noise Rating Level in Enclosure (dBA re 2x10-5 Pa) | |
|---|---|
| **Daytime (07:00–23:00 hours)** | **Night-time (23:00–07:00 hours)** |
| 60 | 58 |

In addition to the above assessment for emission of plant noise to neighbouring properties, the plant will be installed with mitigation measures, if required, to achieve a noise level of NR15 within the studio flats.

### 13.3 Anti Vibration Measures

Camden Council have previously imposed the following Condition (10) for the provision of anti-vibration isolators in a planning application issued in November 2021:

*"Prior to use, plant at the development shall be mounted with proprietary anti-vibration isolators and fan motors shall be vibration isolated from the casing and adequately silenced and maintained as such".*

All plant proposed for installation at the site will be installed on anti-vibration mounts that provide a minimum isolation efficiency of 95%. This should render any reradiated noise from the plant inaudible within the demise of the site and also in any adjoining properties. Plant will be maintained to ensure that vibration levels will constantly achieve the above isolation efficiency.

## 14.0 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 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.

Plant noise emission criteria have been proposed based on the requirements of the London Borough of Camden and a preliminary assessment indicates that these levels should be achievable. These will be confirmed once plant selections are made.

# 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 $2 \times 10^{-5}$ 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).