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ACOUSTIC CONSULTANTS

Ambient Noise and Building Envelope Assessment

Proposed Residential Development
St Margaret's Chambers, Newton Street, Manchester, M1 1HL

REPORT REFERENCE NO. J004193-5990-02-CW

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	Name	Position
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This document has been prepared for the client only and solely for the purposes expressly defined herein. We owe no duty of care to any third parties in respect of its content. Therefore, unless expressly agreed by us in signed writing, we hereby exclude all liability to third parties, including liability for negligence, save only for liabilities that cannot be so excluded by operation of applicable law.

This report has been prepared based upon a scope of works and associated resources agreed between the client and Philip Dunbavin Acoustics Ltd (PDA). This report has been prepared with all reasonable skill, care and diligence and has been based upon the interpretation of data collected. This has been accepted in good faith as being accurate and valid at the time of the collection. This report has been based solely on the specific design assumptions and criteria stated herein.

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1.0 SUMMARY

PDA Ltd have been commissioned to carry out an ambient noise and building envelope assessment for the proposed residential development at St Margaret's Chambers, Newton Street, Manchester, M1 1HL. The proposal involves the conversion of the former office building to form residential apartments with existing retail and A3 uses retained at ground level.

A noise survey was undertaken in the vicinity of the site to determine the existing ambient noise levels in the vicinity of the site. The noise climate in the vicinity of the site is dominated by road traffic noise on Newton Street and Piccadilly.

Based upon the measured noise levels, calculations have been undertaken for the bedrooms and living spaces to evaluate the internal noise levels. Recommendations are given for glazing, ventilation and building facade elements to meet the internal noise level requirements in Section 5.3 of this report.

In addition, measurements were undertaken to determine the sound insulation performance of the separating floor between the 1st floor and ground floor retail units. The results indicate that the floor has a performance of 44 dB $D_{nT,w}$ + C_{tr} and therefore, achieves the criteria of the Building Regulations Approved Document E which stipulates that separating floors should have a minimum airborne sound insulation performance of 43 dB $D_{nT,w}$ + C_{tr}.

On this basis assuming reasonable noise limits for non-noise intensive ground floor retail uses (79 dBA during day and 74 dBA at night) our calculations suggest that the criteria of BS822 and the WHO guidelines is likely to be achieved within the proposed apartments and therefore it is considered that the ground floor uses are unlikely to have an adverse impact on the occupants.

Our calculations suggest that the noise criteria of BS8233:2014, WHO Guidelines and the can be achieved within the dwellings and therefore, in accordance with the requirements of the National Planning Policy Framework we see no reason why the application should be refused on the grounds of noise. Further, our assessment suggests that in accordance with The Building Regulations Approved Document O, open windows are unlikely to be suitable as a means to mitigate against overheating and therefore an alternative strategy will be required.

2.0 SITE DESCRIPTION

The site is located on the corner of Newton Street and Piccadilly in Manchester City Centre. It is understood that the proposal is to convert the former office block to form residential apartments whilst retaining the existing retail and A3 uses on the ground floor.

The site is bound by Back Piccadilly to the north, Newton Street to the east and Piccadilly to the south with the wider surrounding area comprising a mixture of existing commercial, office and residential uses typical of a city centre environment.

The site location can be seen in Figure 1 below:

Figure 1 – Site location and measurement location

3.0 ASSESSMENT CRITERIA

3.1 National Planning Policy Framework

National Planning Policy is guided by the National Planning Policy Framework (NPPF) updated in July 2021. With regard to Noise the Framework states the following;

Planning policies and decisions should contribute to and enhance the natural and local environment by:

- *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.*

Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

The terms '*significant adverse impact*' and '*adverse impact*' are defined in the explanatory notes of the 'Noise Policy Statement for England (NPSE) which states;

There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

> *<u>NOEL – No Observed Effect Level</u>*
>
> *This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*
>
> *<u>LOAEL – Lowest Observed Adverse Effect Level</u>*
>
> *This is the level above which adverse effects on health and quality of life can be detected.*
>
> *Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.*
>
> *<u>SOAEL – Significant Observed Adverse Effect Level</u>*
>
> *This is the level above which significant adverse effects on health and quality of life occur.*

The notes also offer an explanation of the term 'other adverse impacts' as follows;

> *… refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.*

Although no specific noise limits for LOAEL and SOAEL have been defined, in 2014 the UK Government published a planning practice guidance document for noise which indicates where these limits fall with relation to the perception of noise. A summary is reproduced in Section 3.2 below; the full document is published at https://www.gov.uk/guidance/noise--2.

3.1.1 Planning Practice Guidance – Noise

The UK Planning Practice Guidance on noise offers further guidance on the typical levels which constitute the NOEL, LOAEL and SOAEL and is reproduced in the table below;

Table 1: Planning Practice Noise Level Guidance

Perception	***Examples of Outcomes***	***Increasing Effect Level***	***Action***
Not present	No Effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Present and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Present and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

3.2 BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

British Standard 8233:2014, *Guidance on Sound Insulation and noise reduction for buildings*, gives guidance on internal noise levels within dwellings, flats and rooms in residential use when unoccupied. The following criteria are for Living and Dining Rooms for daytime use and Bedrooms for night time.

Table 2: BS8233 Recommended Indoor Ambient Noise Levels

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 $L_{Aeq,16hour}$	–
Dining	Dining room/area	40 $L_{Aeq,16hour}$	–
Sleeping (daytime resting)	Bedrooms	35 $L_{Aeq,16hour}$	30 $L_{Aeq,8hour}$

It should however be stressed that the above criterion relates to steady noise, in this case from road traffic etc., excluding unusual noise events departing from the typical noise character of the area.

In addition, BS 8233 suggests, '*regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values'.*

With regard to gardens and external areas, BS 8233:2014 (Section 7.7.3.2) gives the following advice:

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 50dB $L_{Aeq,T}$, with an upper guideline value of 55dB $L_{Aeq,T}$ 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.

3.3 WHO Guidelines for Community Noise

In 1999, the WHO (World Health Organisation) published Guidelines for Community Noise, stating the following noise levels are applicable to residential dwellings.

Table 3: WHO Guidelines for Community Noise Criteria

Specific Environment	Critical Health Effect(s)	L_{Aeq} dB	Time Base (hours) *	L_{AFMAX} dB
Dwelling, indoors	Speech intelligibility & moderate annoyance, daytime & evening	35	16	-
Inside bedrooms	Sleep disturbance, night-time	30	8	45

* Typically taken to be daytime/evening - 07:00 – 23:00 hours and night time 23:00 – 07:00 hours.

The WHO guidelines state that, *"it is recommended that $L_{Aeq,T}$ be used to evaluate more-or-less continuous environmental noises. Where the noise is principally composed of a small number of discrete events, the additional use of L_{Amax} or SEL is recommended."* The guidelines recommend that for a good sleep, the indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10 – 15 times.

3.4 Approved Document O (ADO)

Approved Document O (APO) 2021, provides guidance on meeting the requirements of the Building Regulations 2010, part 'O1 Overheating mitigation'. The aim of the Building Regulations part O1 is to protect the health and welfare of occupants of the building by reducing the occurrence of high indoor temperatures.

Building Regulations part O1 requires that dwellings, institutions or any other buildings containing one or more rooms for residential purposes (other than a room in a hotel) to:

(a) Limit unwanted solar gains in summer:

(b) Provide an adequate means to remove heat from the indoor environment

However in meeting the obligations of ADO the buildings overheating mitigation strategy for use by occupants must consider 'Noise at night' in addition to other non-noise related considerations.

In regards to 'Noise at night', ADO stipulates the following.

In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

(a) 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).

(b) 55dB L_{AFmax}, more than 10 times a night (between 11pm and 7am)

It should be noted that the above noise limits are with reference to internal noise levels within a bedroom. BS 8233 advises that based on a partially opened window noise at the external façade of the building will reduced by approximately 15 dB. Therefore ADO infers that windows will be required to remain closed when the external noise climate exceeds the following external noise limits.

55dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am)

70dB L_{AFmax}, more than 10 times a night (between 11pm and 7am)

Subsequently, where windows are required to be closed at night (due to the above noise limits being exceeded), the overheating mitigation strategy as required by ADO must provide an alternative method to removing heat other than relying on windows remaining open.

4.0 SURVEY DETAILS & RESULTS

4.1 Measurement Time & Location

In order to determine the existing ambient noise climate in the vicinity of the proposed development a noise survey was undertaken by PDA Ltd. Measurements were undertaken at 2 positions as summarised below:

- Position 1 – Approximately 6m above ground level from a 2nd storey window on the eastern facade overlooking both Newton Street and Piccadilly.
- Position 2 – Approximately 6m fixed to external fire escape stair well with a clear line of sight to Back Piccadilly.

The measurement positions are illustrated in Figure 2 below:

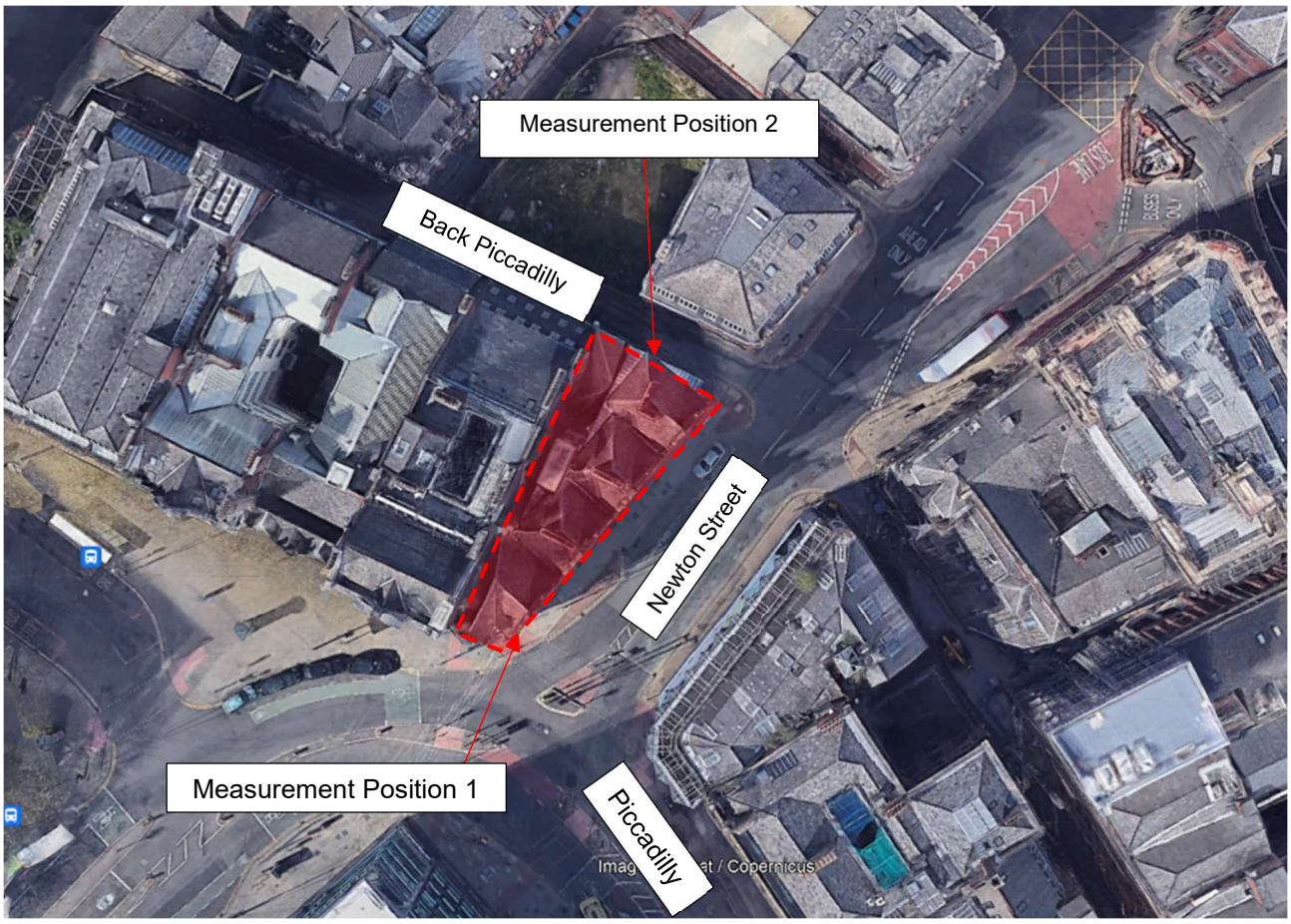

Figure 2 – Noise Survey Measurement Positions and Indicative Site Location

The measurements at both locations were made continuously over a period of approximately 16 hours periods between 16:02 hours on Thursday 26th and 10:30 hours on Friday 27th January 2023. The measurement period was chosen such that both the morning and evening rush-hour periods were captured in addition to a full night-time.

4.2 Measurement Equipment and Personnel

The noise survey was conducted using 2 NTI XL2 sound level meters. In accordance with IEC 61672-1:2002 the NTi XL2 has a class 1 frequency response and can operate as an integrating sound level meter with frequency analysis and statistical functions. The meters were set to measure 'A' weighted, broadband and octave band sound pressure levels and various statistical parameters. The meters were field calibrated to 1kHz at 94dB both before and after the measurement during which time no significant deviation was observed. In addition, a valid calibration certificate is held for both the meters and the calibrator. All measurements were made and partially attended by Mr C Wright BSc (Hons) MIOA of PDA Ltd.

A summary of the weather conditions during the survey period is given in Table 4 below:

Table 4: Weather Conditions

Measurement Date	Temperature	Windspeed	Events
Thursday 26th January 2023	5 - 8°c	1 - 5 m/s	Dry
Friday 27th January 2023	4 - 6°c	1 - 3 m/s	Dry

4.3 Measured Noise Results

Full details of the measured results can be seen in the appendix included at the end of this report. A summary of the results is given in Table 5 below, all values have been rounded to the nearest dB.

Table 5: Summary of noise measurements

Measurement Location	Period	Average dB $L_{Aeq,T}$	Night-time L_{AFMax}[1]
Position 1 (Piccadilly/Newton Street)	Daytime	67	n/a
	Night-time	63	84
Position 2 (Back Piccadilly)	Daytime	65	n/a
	Night-time	61	82

Notes:

1 The WHO Guidelines for Community Noise state that sleep disturbance may occur where the specified 45dB L_{Amax} is exceeded internally 10 to 15 times over the 8-hour night-time period. The L_{Amax} recorded for these positions is the LAmax exceeded no more than 10 times over the full night-time-period or equivalent.

4.4 Description of Noise Sources

The noise climate in the vicinity of the site is dominated by road traffic noise on Newton Street and Piccadilly. The road traffic included cars, motorbikes, buses and HGV's as well as occasional sirens due to passing emergency vehicles.

It was observed that vehicle movements on Back Piccadilly are relatively infrequent and traffic from Newton Street was the dominant at this location. In addition, plant noise was audible during lulls in road traffic however, was not considered to have a significant contribution to the ambient noise climate.

5.0 NOISE IMPACT ASSESSMENT AND MITIGATION

In our experience, sites with noise levels similar to those measured are suitable for residential development provided that adequate acoustic attenuation is provided to habitable areas. The acoustic weak points of a building façade are typically the glazing and ventilation elements, calculations have been undertaken to determine building fabric specifications to ensure that suitable internal noise levels can be achieved within the dwellings.

5.1 Calculations

Based upon the measured noise levels, calculations have been undertaken to determine acoustic specification requirements for the proposed residential dwelling. Calculations have been undertaken in octave bands from 63 Hz to 8kHz inclusive, for the night-time L_{eq}, day-time L_{eq} and night-time L_{max} levels. The calculated internal noise levels are dependent on the size of room, location and relative glazing area. Note that as our noise survey measurements were taken from the 2nd floor we have applied a distance correction to account for the increased noise level at 1st floor level. Room and glazing dimensions are taken from drawings provided to us by the client.

The sound insulation provided by the building envelope is a combination of the sound reduction indices of the individual façade elements and the area of the façade they cover. The result is a composite sound insulation value for the whole façade.

The calculation of noise break-in to the residential rooms has been undertaken in accordance with the calculation methods of BS EN 12354-3:2000 *Building Acoustics – Estimation of acoustic performance of buildings from the performance of elements. Part 3: Airborne sound insulation against outdoor sound*, in octave bands. Reverberation time is 0.5 seconds as per the BS EN 12354-3 reference time for dwellings.

Information on the sound insulation properties for specific element details has been sourced from either manufacturer's literature or Insul® Sound insulation prediction software.

5.2 Design Assumptions

5.2.1 Walls

The drawings provided to us indicate that external wall construction comprises circa 400mm solid masonry. Our predictions suggest that this build up has an acoustic performance of at least 65 dB R_W.

Please note that the external façade should have no unsealed penetrations, and any openings for ventilation should meet the specifications for ventilators as discussed below.

5.3 Glazing and Ventilation Specification

The dominant paths for noise transfer to the interior of buildings are generally the glazing and ventilation elements of the façade constructions. It is understood that alterations to the facade are likely to be limited as the existing building is Grade 2 listed and therefore, it is assumed that secondary glazing and mechanical ventilation will be utilised throughout the development. Based on this premise, to achieve the required internal noise levels as discussed in Section 3 the development would require the following glazing and ventilation specifications. Note that the following specification apply to habitable rooms only.

Table 6: Glazing and Ventilation Schedule

Facade	Room Type	Minimum Glazing Rating R_w dB	Minimum combined Ventilator Rating $D_{n,e,w}$ dB	Calculated Highest Internal Noise Level dBA (Day/Night/Max)
All	Bedrooms	51	Mechanical[1]	33/30/42
	Living Rooms	51		35/-/-

Notes:

1 It should be ensured that self-generated noise from the mechanical system does not give rise to exceedances of the internal noise criteria detailed in Section 3.

Our calculations indicate that with the façade treatments specified above the internal noise criterion of given in Section 3 can be achieved within the habitable rooms of the proposed development.

5.4 Glazing Specification and Installation

For the glazing specification in Table 6 (above), all sound insulation values quoted above must be achieved by the overall combination of frame and glazing, and not just by the glazing alone. The frame should not reduce the performance of the system overall.

Glazing framing systems must be fully sealed with any gaps around the perimeter to be stuffed with dense mineral wool to full frame depth and sealed both sides with acoustic non-setting mastic. No gaps should be left unsealed.

The minimum performance requirements for the combination of glazing and framing recommended in the above tables are as follows:

Table 7: Required Minimum Sound Insulation of Combined Glazing and Framing

Typical Product	***Minimum Sound Reduction Index R (dB) at Octave Band Centre Frequency (Hz)***							***R_w***
	63	***125***	***250***	***500***	***1000***	***2000***	***4000***	
4mm pane/150mm cavity/6mm secondary pane	25	35	44	49	54	50	50	51

Figures stated in the table above unless otherwise stated are based on manufacturer quoted data. Acoustic ratings should be checked with the manufacturer and supported by laboratory test reports where necessary.

5.5 Ventilator Requirements

It is understood that the development is to be mechanically ventilated, in terms of noise ingress from external sources we would consider this to be acceptable however, it will need to be ensured that self-generated noise from the mechanical system just not give rise to exceedances of the internal noise criteria detailed in Section 3.

It should be noted that inclusion of ventilators alone does not ensure compliance with Building Regulations or other regulatory requirements for ventilation. The ventilation strategy should be checked by others.

5.6 Approved Document O (ADO), Method of Removing Heat

With reference to the noise survey results our assessment indicates that the facade noise level of the proposed development is will exceed the following criteria.

55dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am)

70dB L_{AFmax}, more than 10 times a night (between 11pm and 7am)

Consequently based on a 15 dB reduction for a partially open window, noise within bedrooms is predicted to exceed the following ADO limits above which windows are expected to remain closed to control the ingress of external noise.

40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).

55dB L_{AFmax}, more than 10 times a night (between 11pm and 7am)

Therefore, in accordance with the requirements of ADO an alternative method to remove heat other than relying on open windows will be required.

6.0 SOUND INSULATION BETWEEN GROUND FLOOR RETAIL UNITS AND 1ST FLOOR

There are a number of existing retail and A3 uses on the ground floor of the development, it is understood that these uses are to be retained and as such, we have considered the likely noise impact to the proposed residential use at 1st floor level.

The separating floor construction is understood to be as follows:

- *Existing timber floor with lath and plaster ceiling to the underside of the joists with retrofitted independent ceiling comprising 2 layers of fireboard.*

In order to determine the sound insulation performance of the floor in-situ testing was undertaken during our site visit. The test was undertaken in accordance with the methods of ISO 140-4:1998 *Part 4: Field measurements of airborne sound insulation between rooms.* The results of our test indicate that the separating floor has a performance of 44 dB $D_{nT,w}$ + C_{tr} and therefore, achieves the criteria of the Building Regulations Approved Document E which stipulates that separating floors should have a minimum airborne sound insulation performance of 43 dB $D_{nT,w}$ + C_{tr}.

We have calculated the likely noise transfer between ground floor commercial units and the bedrooms above. Our assessment assumes the following:

- The separating floors will have a minimum airborne sound insulation of 43 dB $D_{nT,w}$ + C_{tr} as required by the Building Regulations Approved Document E 2003 (ADE).
- Flanking transmission is adequately controlled throughout.
- Noise levels within the retail units will not exceed 79 dBA during the daytime and 74 dBA during the night-time. It seems unlikely that the noise level would exceed 79 dBA within the retail units and allows for music to be played at a reasonable level i.e. similar to what might be expected in a typical domestic setting.

On this basis, the noise level within 1st floor apartments is predicted to achieve 35 dB $L_{Aeq\ daytime}$ / 30 dB $L_{Aeq\ night\text{-}time}$ as recommended in BS822 and the WHO guidelines and is therefore unlikely to have an adverse impact on the occupants.

If noise levels above 79 dBA are expected within the ground floor uses then the performance of the separating floor will likely need to be increased. This could be achieved using an independent mass barrier ceiling which we would expect to increase the sound insulation of the floor by at least 10 dB. On this basis, source levels of between 84 - 89 dBA are likely to be acceptable within the units.

7.0 CONCLUSION

PDA Ltd have been commissioned to carry out an ambient noise and building envelope assessment for the proposed residential development at St Margaret's Chambers, Newton Street, Manchester, M1 1HL.

A noise survey was undertaken in the vicinity of the site to determine the existing ambient noise levels in the vicinity of the site. In addition, measurements were undertaken to determine the sound insulation performance of the separating floor between the 1st floor and ground floor retail units. Based upon the measured noise levels, calculations have been undertaken for the bedrooms and living spaces to evaluate the internal noise levels.

Our calculations suggest that the noise criteria of BS8233:2014, WHO Guidelines and the can be achieved within the dwellings and therefore, in accordance with the requirements of the National Planning Policy Framework we see no reason why the application should be refused on the grounds of noise. Further, our assessment suggests that in accordance with The Building Regulations Approved Document O, open windows are unlikely to be suitable as a means to mitigate against overheating therefore an alternative strategy will be required.

APPENDIX A – DEFINITION OF ACOUSTIC TERMS

The decibel

This is the basic unit of noise, denoted dB.

A Weighting

This is a weighting process which simulates the human ear's different sensitivity at different frequencies. A weighting can be shown two typical ways, 50 dB(A) L_{eq} or 50 dB $L_{Aeq.}$ Both mean the same thing. (See below for a definition of L_{eq}). The dB(A) level can be regarded as the overall level perceived by human beings.

L_{eq} and $L_{eq(s)}$

This is the equivalent continuous noise level which contains the same acoustic energy as the actual time-varying sound. In other words it is a kind of average noise level. It is denoted dB L_{eq} or, for A-weighted figures dB(A) L_{eq} or dB L_{Aeq}. It can also be expressed in terms of frequency analysis (see later). $L_{eq(s)}$ is the sample L_{eq} level.

L_n

This is the level exceeded for n% of the time. It is denoted dB L_n or, for A-weighted figures dB(A) L_n or dB $L_{An.}$ It can be expressed in terms of frequency analysis (see later). L_{90} is the level exceeded for 90% of the time and is a measure of the lowest level typically reached. L_{10} is the level exceeded for 10% of the time and is the highest level typically reached. L_{50} is the level exceeded for 50% of the time and, mathematically, it is the median.

L_{max}

This is the maximum level reached during a measurement period. The "time constant", or the ability of the equipment to respond to impulses is usually expressed along with it, e.g. "Fast", "Slow", etc. It is denoted dB L_{max} or, for A-weighted figures dB(A) $L_{max,}$ dB $L_{Amax,}$ etc. It can also be expressed in terms of frequency analysis.

Frequency Analysis

Whereas dB(A) gives a very useful overall figure, it has its limitations in that it cannot be used to model or predict the effect of noise control and mitigation as this nearly always has radically different performance at different frequencies.

Frequency analysis expresses an overall noise level at each frequency or band of frequencies in the audible range. Octave band analysis divides the audible range into 10 bands from 31.5 Hz to 16 kHz and the noise level in each band can be expressed in any form e.g. L_{eq}, L_{90}, L_{max} etc. One third octave band analysis uses 30 bands.

Narrow band analysis takes the process to resolutions of less than 1 Hz. This is useful for identifying the existence of tones (whines, hums, etc.) and in pin-pointing the sources.

APPENDIX B – MEASURED NOISE LEVELS

Our Ref: J004193
Client: Charlotte Street Estates Ltd
Project: St Margarets Chambers
Results: Ambient Noise Measurements Position 1 (Piccadilly / Newton Street)

					Octave Band Centre Frequencies (Hz), dB L_{eq}							
Date	**Time**	**dB, L_{Aeq}**	**dB, L_{Amax}**	**dB, L_{A90}**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
26/01/2023	16:03	67	78	61	69	66	64	63	63	60	54	45
26/01/2023	16:05	64	72	62	70	63	62	61	60	57	52	49
26/01/2023	16:10	66	80	60	69	65	64	61	62	58	53	51
26/01/2023	16:15	66	84	62	70	66	64	62	61	58	56	46
26/01/2023	16:20	65	83	62	70	64	62	61	61	57	55	48
26/01/2023	16:25	67	75	64	72	66	66	63	63	59	53	49
26/01/2023	16:30	66	77	62	70	64	64	62	62	57	52	46
26/01/2023	16:35	66	87	62	71	63	63	62	62	58	53	49
26/01/2023	16:40	65	76	61	70	64	64	61	61	57	52	45
26/01/2023	16:45	66	77	63	72	65	64	63	62	59	54	54
26/01/2023	16:50	66	87	61	72	65	64	62	61	59	53	46
26/01/2023	16:55	66	77	62	71	65	64	62	62	58	53	54
26/01/2023	17:00	64	74	60	71	63	63	61	61	56	51	45
26/01/2023	17:05	65	78	62	72	64	62	61	61	57	51	43
26/01/2023	17:10	65	79	61	72	64	63	62	61	57	53	46
26/01/2023	17:15	65	71	61	70	63	62	62	60	57	51	43
26/01/2023	17:20	66	76	61	71	64	63	62	61	58	53	46
26/01/2023	17:25	67	81	61	71	65	64	65	63	59	53	47
26/01/2023	17:30	67	81	61	71	65	65	63	62	59	54	51
26/01/2023	17:35	66	83	61	72	64	64	62	61	58	55	49
26/01/2023	17:40	65	81	61	73	65	63	62	61	57	54	48
26/01/2023	17:45	63	81	59	70	63	62	60	59	55	53	44
26/01/2023	17:50	66	75	63	72	65	65	63	62	58	52	54
26/01/2023	17:55	84	107	63	71	65	65	63	75	82	68	52
26/01/2023	18:00	66	84	61	70	65	64	62	62	58	53	44
26/01/2023	18:05	66	81	60	74	66	65	64	61	58	53	48
26/01/2023	18:10	65	79	62	69	62	62	62	61	58	52	45
26/01/2023	18:15	64	76	60	69	62	62	61	60	56	50	44
26/01/2023	18:20	66	76	62	72	65	64	62	61	58	53	53
26/01/2023	18:25	66	78	62	72	65	64	62	62	58	52	46
26/01/2023	18:30	63	73	59	68	61	61	60	59	55	48	40
26/01/2023	18:35	68	79	62	72	66	66	64	63	60	55	50
26/01/2023	18:40	66	84	62	72	64	63	63	62	59	52	46
26/01/2023	18:45	64	82	60	69	63	62	60	61	57	53	43
26/01/2023	18:50	66	82	61	69	63	63	62	62	59	53	44
26/01/2023	18:55	64	74	60	70	62	62	61	60	56	51	44
26/01/2023	19:00	65	77	61	69	63	61	61	61	58	52	44
26/01/2023	19:05	66	82	60	69	64	64	63	61	57	57	46
26/01/2023	19:10	65	84	60	70	63	64	62	60	56	57	46
26/01/2023	19:15	66	87	60	69	64	64	63	62	57	52	45
26/01/2023	19:20	65	82	60	69	63	61	62	62	57	52	43
26/01/2023	19:25	65	84	58	70	63	62	60	61	57	52	48
26/01/2023	19:30	65	81	58	70	64	63	61	59	58	50	42
26/01/2023	19:35	64	78	59	69	63	62	60	59	56	50	54
26/01/2023	19:40	64	77	59	70	65	62	60	60	57	51	45
26/01/2023	19:45	62	77	58	68	61	60	60	58	53	47	39
26/01/2023	19:50	65	76	60	71	64	64	61	61	56	50	46
26/01/2023	19:55	63	76	57	69	61	63	60	58	54	49	42
26/01/2023	20:00	63	76	57	68	60	60	59	59	55	49	41
26/01/2023	20:05	66	75	56	69	73	70	59	58	56	52	51
26/01/2023	20:10	61	73	58	66	58	59	59	58	53	47	39
26/01/2023	20:15	64	81	58	69	61	60	60	60	56	50	44
26/01/2023	20:20	65	75	59	69	63	63	62	60	56	51	44
26/01/2023	20:25	63	80	58	67	60	60	60	59	54	52	39
26/01/2023	20:30	63	79	58	69	61	60	60	60	56	50	42
26/01/2023	20:35	65	74	60	73	64	63	62	61	57	51	45
26/01/2023	20:40	64	76	59	71	63	63	61	60	57	52	51
26/01/2023	20:45	62	71	58	68	60	60	58	58	54	47	40
26/01/2023	20:50	64	74	61	70	65	63	61	60	57	50	42
26/01/2023	20:55	64	77	60	69	62	61	61	60	57	50	43
26/01/2023	21:00	63	72	59	69	61	62	60	59	56	49	41
26/01/2023	21:05	62	72	57	69	62	60	58	58	55	47	40
26/01/2023	21:10	65	75	58	71	64	62	61	61	58	51	44
26/01/2023	21:15	64	86	57	66	60	60	59	61	56	48	39
26/01/2023	21:20	65	78	59	69	63	63	62	60	57	51	43
26/01/2023	21:25	64	79	57	72	66	62	61	61	57	51	42
26/01/2023	21:30	63	74	58	67	61	60	59	58	56	49	41
26/01/2023	21:35	65	78	59	70	64	63	61	60	56	54	54
26/01/2023	21:40	62	73	57	69	61	61	59	58	54	48	42
26/01/2023	21:45	64	79	58	69	61	59	60	60	57	50	41
26/01/2023	21:50	67	78	63	69	63	63	63	63	60	54	44
26/01/2023	21:55	65	80	59	70	61	61	62	61	59	50	41
26/01/2023	22:00	63	82	57	68	61	62	59	59	55	49	41

Our Ref: J004193
Client: Charlotte Street Estates Ltd
Project: St Margarets Chambers
Results: Ambient Noise Measurements Position 1 (Piccadilly / Newton Street)

					Octave Band Centre Frequencies (Hz), dB L_{eq}							
Date	**Time**	**dB, L_{Aeq}**	**dB, L_{Amax}**	**dB, L_{A90}**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
26/01/2023	22:05	62	74	56	68	62	59	60	58	54	47	40
26/01/2023	22:10	64	80	59	68	62	64	61	59	55	48	40
26/01/2023	22:15	65	80	62	68	63	64	62	61	56	48	38
26/01/2023	22:20	63	76	58	69	63	62	60	60	54	47	39
26/01/2023	22:25	69	81	58	69	64	68	68	63	60	59	58
26/01/2023	22:30	73	85	60	71	68	73	72	67	62	60	60
26/01/2023	22:35	66	83	60	71	62	63	63	62	58	53	44
26/01/2023	22:40	68	78	58	68	64	67	66	63	60	58	57
26/01/2023	22:45	66	76	59	70	62	66	64	61	56	52	49
26/01/2023	22:50	62	72	58	67	60	60	60	59	54	47	40
26/01/2023	22:55	64	77	56	68	61	61	59	60	56	50	43
26/01/2023	23:00	61	72	56	69	60	58	57	57	53	47	41
26/01/2023	23:05	63	76	59	70	60	61	59	59	55	52	52
26/01/2023	23:10	71	89	57	71	73	78	67	67	58	48	41
26/01/2023	23:15	61	77	56	67	59	58	57	57	55	46	38
26/01/2023	23:20	65	79	57	71	64	63	60	61	58	53	46
26/01/2023	23:25	60	81	54	67	58	57	57	57	53	44	40
26/01/2023	23:30	63	78	56	68	61	62	61	59	55	48	39
26/01/2023	23:35	63	76	58	68	62	61	59	59	55	48	42
26/01/2023	23:40	69	81	58	68	64	70	67	64	60	59	59
26/01/2023	23:45	60	70	55	69	60	58	56	56	52	46	37
26/01/2023	23:50	61	75	54	67	60	59	57	57	54	47	39
26/01/2023	23:55	60	70	54	68	58	58	57	56	53	47	39
27/01/2023	00:00	60	74	54	68	58	59	57	56	53	46	38
27/01/2023	00:05	60	74	54	68	58	58	56	56	53	45	36
27/01/2023	00:10	61	75	54	67	60	59	58	57	53	48	42
27/01/2023	00:15	63	77	55	67	61	61	62	59	55	49	43
27/01/2023	00:20	61	74	54	69	60	59	57	58	54	48	40
27/01/2023	00:25	57	66	51	65	55	54	54	53	48	40	31
27/01/2023	00:30	60	71	54	67	58	56	55	56	53	46	40
27/01/2023	00:35	60	69	54	66	58	57	57	56	52	45	37
27/01/2023	00:40	61	76	54	64	57	57	60	57	53	46	39
27/01/2023	00:45	59	77	53	63	56	56	56	55	52	45	36
27/01/2023	00:50	71	83	61	68	65	69	70	65	61	60	59
27/01/2023	00:55	60	71	53	66	62	57	56	56	52	46	38
27/01/2023	01:00	60	75	54	68	58	55	55	58	52	44	36
27/01/2023	01:05	56	65	52	64	55	53	52	53	48	40	33
27/01/2023	01:10	57	69	51	62	55	53	52	54	48	39	34
27/01/2023	01:15	62	73	51	67	59	57	56	58	55	48	45
27/01/2023	01:20	62	75	54	67	57	57	60	59	54	47	43
27/01/2023	01:25	58	73	51	62	56	54	54	55	51	44	35
27/01/2023	01:30	58	71	51	64	55	54	53	54	51	44	36
27/01/2023	01:35	61	84	50	60	54	56	60	56	54	47	33
27/01/2023	01:40	59	84	49	60	53	54	58	54	51	45	31
27/01/2023	01:45	62	85	51	65	58	58	59	57	54	49	41
27/01/2023	01:50	62	81	52	68	62	57	58	58	55	49	40
27/01/2023	01:55	66	84	54	67	61	57	64	63	56	48	38
27/01/2023	02:00	63	80	52	65	55	57	60	60	54	44	34
27/01/2023	02:05	59	74	52	64	56	55	55	56	52	45	40
27/01/2023	02:10	63	86	51	64	61	62	62	59	54	48	41
27/01/2023	02:15	56	69	51	64	56	53	53	53	49	40	31
27/01/2023	02:20	58	77	51	62	55	54	55	54	50	43	48
27/01/2023	02:25	73	86	60	70	68	74	72	67	61	59	58
27/01/2023	02:30	60	73	55	67	58	58	56	56	53	48	42
27/01/2023	02:35	58	71	50	59	53	55	53	52	52	51	45
27/01/2023	02:40	67	80	55	67	63	67	65	61	57	56	54
27/01/2023	02:45	54	64	51	66	53	51	50	51	47	38	28
27/01/2023	02:50	60	72	51	66	57	57	55	57	52	44	40
27/01/2023	02:55	55	64	51	61	54	53	52	51	47	39	30
27/01/2023	03:00	59	79	51	65	56	55	55	55	52	49	45
27/01/2023	03:05	59	79	51	61	56	54	56	54	52	43	36
27/01/2023	03:10	58	70	52	66	56	56	55	55	50	43	35
27/01/2023	03:15	62	84	52	62	56	56	58	58	55	44	35
27/01/2023	03:20	56	69	49	62	53	52	52	52	49	41	32
27/01/2023	03:25	55	65	49	62	53	52	51	51	47	39	37
27/01/2023	03:30	55	64	49	64	56	53	51	52	47	41	33
27/01/2023	03:35	58	68	51	65	56	56	55	54	49	41	33
27/01/2023	03:40	54	65	49	60	52	52	52	51	46	40	30
27/01/2023	03:45	62	76	48	62	55	55	57	58	55	51	40
27/01/2023	03:50	58	83	49	59	55	54	54	53	51	49	36
27/01/2023	03:55	59	73	50	69	59	56	56	54	52	46	39
27/01/2023	04:00	60	82	51	65	55	55	56	56	53	47	37
27/01/2023	04:05	58	75	50	66	56	54	54	54	50	43	38

Our Ref: J004193
Client: Charlotte Street Estates Ltd
Project: St Margarets Chambers
Results: Ambient Noise Measurements Position 1 (Piccadilly / Newton Street)

					Octave Band Centre Frequencies (Hz), dB L_{eq}							
Date	**Time**	**dB, L_{Aeq}**	**dB, L_{Amax}**	**dB, L_{A90}**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
27/01/2023	04:10	55	66	49	60	52	55	52	51	47	38	28
27/01/2023	04:15	55	67	49	63	57	53	51	51	48	44	37
27/01/2023	04:20	67	82	49	63	62	67	67	62	57	54	54
27/01/2023	04:25	65	76	54	63	62	65	64	60	56	54	52
27/01/2023	04:30	58	74	49	63	55	54	53	54	51	44	36
27/01/2023	04:35	58	69	49	66	55	55	53	55	50	42	33
27/01/2023	04:40	53	65	48	59	52	51	49	50	45	37	27
27/01/2023	04:45	59	77	48	61	58	56	55	55	51	45	41
27/01/2023	04:50	57	75	48	62	53	53	52	54	49	39	31
27/01/2023	04:55	58	70	52	63	56	55	53	55	51	46	38
27/01/2023	05:00	59	75	50	63	60	58	55	55	52	47	38
27/01/2023	05:05	60	73	50	62	59	56	55	56	53	47	38
27/01/2023	05:10	59	69	50	67	60	59	54	55	52	47	39
27/01/2023	05:15	56	68	52	64	58	55	53	52	49	43	34
27/01/2023	05:20	60	71	53	67	60	58	56	56	53	48	40
27/01/2023	05:25	61	75	57	67	61	60	57	57	54	47	37
27/01/2023	05:30	59	71	53	68	58	57	54	55	53	47	39
27/01/2023	05:35	64	82	52	65	62	65	61	59	56	51	41
27/01/2023	05:40	59	70	54	66	58	59	55	54	51	46	38
27/01/2023	05:45	65	81	55	69	63	62	58	59	61	52	46
27/01/2023	05:50	62	80	53	67	60	59	59	57	54	50	43
27/01/2023	05:55	67	89	56	67	62	63	64	61	61	57	51
27/01/2023	06:00	59	67	55	66	59	57	55	55	52	48	42
27/01/2023	06:05	61	74	53	65	60	58	56	57	53	49	42
27/01/2023	06:10	60	75	53	65	60	58	56	55	52	48	44
27/01/2023	06:15	66	78	56	69	62	66	61	61	58	53	44
27/01/2023	06:20	65	84	55	69	64	66	62	60	57	53	47
27/01/2023	06:25	69	92	56	68	63	64	65	63	63	57	49
27/01/2023	06:30	63	74	58	68	62	61	59	58	56	51	44
27/01/2023	06:35	66	76	57	71	65	67	62	61	58	53	47
27/01/2023	06:40	62	72	57	67	60	59	59	58	54	51	43
27/01/2023	06:45	65	77	59	71	62	62	60	63	56	51	44
27/01/2023	06:50	61	71	58	67	61	60	57	57	54	48	44
27/01/2023	06:55	61	71	56	68	61	59	57	56	54	49	42
27/01/2023	07:00	63	76	57	69	62	61	58	59	56	51	44
27/01/2023	07:05	65	76	59	70	67	62	60	60	58	53	48
27/01/2023	07:10	65	80	58	71	64	64	60	60	57	53	47
27/01/2023	07:15	64	73	58	71	63	61	59	59	57	52	47
27/01/2023	07:20	62	71	57	69	62	61	58	58	55	49	42
27/01/2023	07:25	65	76	61	70	65	65	61	60	58	53	51
27/01/2023	07:30	63	71	60	69	62	60	58	59	56	51	44
27/01/2023	07:35	69	90	59	70	64	64	63	64	63	58	50
27/01/2023	07:40	63	78	57	70	62	63	60	59	56	51	43
27/01/2023	07:45	62	76	58	68	61	60	58	58	55	49	49
27/01/2023	07:50	64	78	58	70	62	61	59	60	56	51	46
27/01/2023	07:55	68	80	62	73	69	71	64	63	61	56	49
27/01/2023	08:00	63	74	58	70	62	61	60	59	55	51	46
27/01/2023	08:05	67	79	60	72	65	65	63	62	60	55	49
27/01/2023	08:10	65	82	60	70	64	64	61	61	58	53	46
27/01/2023	08:15	71	79	62	71	65	67	63	64	64	65	65
27/01/2023	08:20	66	77	61	73	66	65	62	62	59	54	48
27/01/2023	08:25	65	79	61	71	65	64	61	61	58	54	47
27/01/2023	08:30	66	87	61	72	65	65	62	62	59	53	48
27/01/2023	08:35	65	78	59	71	64	65	61	60	57	51	45
27/01/2023	08:40	67	82	61	71	65	66	63	62	58	55	54
27/01/2023	08:45	64	77	61	71	64	63	61	59	56	54	46
27/01/2023	08:50	69	83	64	74	67	65	63	63	64	56	50
27/01/2023	08:55	67	85	63	73	65	65	64	62	60	56	49
27/01/2023	09:00	67	79	63	73	65	65	63	62	60	55	49
27/01/2023	09:05	65	80	59	71	64	63	61	61	58	54	48
27/01/2023	09:10	66	80	61	71	65	64	62	61	58	54	48
27/01/2023	09:15	65	81	61	71	64	64	61	61	58	54	51
27/01/2023	09:20	66	80	61	70	64	64	62	61	59	55	48
27/01/2023	09:25	65	75	60	72	65	65	62	60	57	53	47
27/01/2023	09:30	65	79	60	73	65	64	61	61	58	54	50
27/01/2023	09:35	65	78	62	69	63	63	63	60	58	51	49
27/01/2023	09:40	66	77	61	72	65	65	62	61	59	55	51
27/01/2023	09:45	65	77	61	71	65	64	62	61	58	55	47
27/01/2023	09:50	66	80	60	72	65	64	61	61	60	55	47
27/01/2023	09:55	65	74	62	70	65	64	61	61	58	54	47
27/01/2023	10:00	67	83	62	72	65	64	62	62	60	55	51
27/01/2023	10:05	67	81	61	71	63	63	62	60	63	53	45
27/01/2023	10:10	67	84	62	71	64	64	63	62	60	56	48

Our Ref:	J004193
Client:	Charlotte Street Estates Ltd
Project:	St Margarets Chambers
Results:	Ambient Noise Measurements Position 1 (Piccadilly / Newton Street)

					Octave Band Centre Frequencies (Hz), dB L_{eq}							
Date	**Time**	**dB, L_{Aeq}**	**dB, L_{Amax}**	**dB, L_{A90}**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
27/01/2023	10:15	68	86	62	72	66	65	63	63	61	57	52
27/01/2023	10:20	66	80	61	70	64	64	63	62	59	54	47
27/01/2023	10:25	71	83	61	71	66	67	64	63	64	64	64
27/01/2023	10:30	67	78	64	73	66	65	63	63	60	58	50

Our Ref: J004193
Client: Charlotte Street Estates Ltd
Project: St Margarets Chambers
Results: Ambient Noise Measurements Position 2 (Back Piccadilly)

					Octave Band Centre Frequencies (Hz), dB L_{eq}							
Date	**Time**	**dB, L_{Aeq}**	**dB, L_{Amax}**	**dB, L_{A90}**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
26/01/2023	16:02	64	92	57	67	64	63	61	59	58	46	36
26/01/2023	16:05	61	76	58	64	61	60	59	57	54	47	38
26/01/2023	16:10	62	71	58	65	61	62	58	58	54	48	39
26/01/2023	16:15	60	71	57	65	61	60	57	56	51	45	36
26/01/2023	16:20	59	66	57	64	60	60	56	55	50	43	35
26/01/2023	16:25	62	73	57	65	62	63	59	58	53	46	41
26/01/2023	16:30	61	74	57	64	61	61	59	57	54	47	43
26/01/2023	16:35	59	79	56	64	60	60	57	55	51	43	34
26/01/2023	16:40	62	73	58	65	66	63	58	58	54	49	46
26/01/2023	16:45	62	70	60	66	67	63	58	58	53	46	44
26/01/2023	16:50	62	73	59	67	69	63	59	57	53	46	38
26/01/2023	16:55	62	73	59	67	68	63	59	57	53	47	41
26/01/2023	17:00	61	72	58	69	64	61	57	57	53	47	41
26/01/2023	17:05	65	82	57	66	66	61	61	62	57	48	34
26/01/2023	17:10	60	74	57	65	61	60	57	55	51	46	38
26/01/2023	17:15	60	72	57	63	60	60	57	56	52	46	37
26/01/2023	17:20	61	75	57	65	61	60	57	56	53	47	36
26/01/2023	17:25	61	72	57	64	61	61	58	57	52	45	37
26/01/2023	17:30	60	66	57	65	60	61	57	56	51	42	36
26/01/2023	17:35	60	73	57	65	61	61	57	56	51	46	42
26/01/2023	17:40	61	82	57	66	61	61	57	56	53	53	40
26/01/2023	17:45	59	80	56	64	60	60	57	55	50	46	35
26/01/2023	17:50	62	74	58	65	62	62	59	57	53	48	46
26/01/2023	17:55	80	102	58	65	61	61	58	71	78	61	42
26/01/2023	18:00	62	81	56	65	64	62	59	58	54	46	37
26/01/2023	18:05	61	71	59	66	68	62	58	56	51	44	32
26/01/2023	18:10	60	70	59	63	65	62	57	56	51	43	32
26/01/2023	18:15	61	74	58	64	66	62	58	57	51	42	35
26/01/2023	18:20	65	90	59	65	67	64	60	59	58	58	48
26/01/2023	18:25	61	68	59	65	69	62	58	57	53	46	38
26/01/2023	18:30	60	71	58	64	67	62	57	56	51	41	30
26/01/2023	18:35	62	71	57	66	62	63	59	58	53	45	37
26/01/2023	18:40	61	70	58	65	61	61	58	56	52	44	34
26/01/2023	18:45	61	81	57	64	61	60	57	57	53	46	36
26/01/2023	18:50	61	83	57	64	60	61	59	57	52	44	33
26/01/2023	18:55	59	69	56	64	60	61	57	55	51	43	34
26/01/2023	19:00	63	75	59	67	66	62	60	59	56	48	43
26/01/2023	19:05	59	67	57	63	62	61	57	55	50	42	31
26/01/2023	19:10	61	85	57	67	60	61	58	57	54	47	38
26/01/2023	19:15	61	79	57	65	62	61	59	56	52	43	35
26/01/2023	19:20	58	70	56	63	59	59	56	55	49	41	31
26/01/2023	19:25	60	77	56	65	61	60	57	56	52	44	39
26/01/2023	19:30	63	83	56	66	61	59	58	56	60	44	34
26/01/2023	19:35	61	82	55	63	58	58	56	57	54	49	41
26/01/2023	19:40	60	76	55	64	62	60	56	56	52	49	48
26/01/2023	19:45	58	76	55	63	58	59	57	54	49	40	30
26/01/2023	19:50	63	79	56	64	60	61	59	60	53	46	44
26/01/2023	19:55	59	74	55	63	58	61	57	55	49	41	30
26/01/2023	20:00	64	81	56	64	60	60	61	60	57	51	41
26/01/2023	20:05	59	73	55	63	64	65	55	54	49	41	32
26/01/2023	20:10	60	73	56	61	57	59	57	56	51	43	33
26/01/2023	20:15	59	72	56	65	58	58	56	55	51	44	35
26/01/2023	20:20	58	69	55	62	57	57	56	53	49	39	29
26/01/2023	20:25	58	76	54	62	57	56	55	53	50	42	31
26/01/2023	20:30	58	68	55	64	58	59	55	54	50	43	34
26/01/2023	20:35	61	81	56	64	60	60	57	56	54	49	35
26/01/2023	20:40	59	72	56	65	59	59	56	55	52	45	39
26/01/2023	20:45	58	67	54	62	57	57	55	54	49	41	29
26/01/2023	20:50	58	70	56	63	58	59	55	54	49	40	30
26/01/2023	20:55	58	72	55	62	57	58	56	55	49	39	29
26/01/2023	21:00	58	68	55	62	57	59	55	54	49	39	28
26/01/2023	21:05	57	67	55	62	58	58	54	54	49	38	28
26/01/2023	21:10	61	81	56	64	60	60	57	57	53	45	37
26/01/2023	21:15	58	78	54	61	56	56	54	54	49	39	30
26/01/2023	21:20	61	77	54	63	59	58	59	58	53	44	36
26/01/2023	21:25	59	72	54	65	60	58	56	56	51	43	35
26/01/2023	21:30	59	84	54	63	58	59	55	55	51	44	43
26/01/2023	21:35	59	76	54	63	59	59	55	55	51	49	40
26/01/2023	21:40	56	67	53	63	57	57	53	53	48	39	29
26/01/2023	21:45	59	69	54	67	59	57	56	55	52	46	38
26/01/2023	21:50	60	79	55	64	58	57	58	56	52	44	33
26/01/2023	21:55	60	75	55	62	57	58	58	56	52	41	29
26/01/2023	22:00	58	71	53	66	59	58	55	54	50	42	32

Our Ref: J004193
Client: Charlotte Street Estates Ltd
Project: St Margarets Chambers
Results: Ambient Noise Measurements Position 2 (Back Piccadilly)

					Octave Band Centre Frequencies (Hz), dB L_{eq}							
Date	**Time**	**dB, L_{Aeq}**	**dB, L_{Amax}**	**dB, L_{A90}**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
26/01/2023	22:05	56	72	52	62	56	54	54	53	48	38	27
26/01/2023	22:10	60	70	55	63	63	62	58	55	49	40	32
26/01/2023	22:15	59	71	55	64	61	61	57	55	50	42	31
26/01/2023	22:20	59	67	55	63	58	58	56	55	51	43	36
26/01/2023	22:25	63	78	53	62	58	61	62	58	55	50	45
26/01/2023	22:30	68	80	58	67	62	67	67	62	59	55	51
26/01/2023	22:35	72	93	58	65	63	64	66	65	64	67	58
26/01/2023	22:40	63	75	55	65	59	63	62	59	54	49	44
26/01/2023	22:45	58	74	52	62	56	56	56	54	50	43	32
26/01/2023	22:50	58	77	53	62	55	54	55	54	50	41	30
26/01/2023	22:55	59	74	52	62	57	56	55	56	52	44	34
26/01/2023	23:00	56	71	53	63	56	56	53	53	48	40	41
26/01/2023	23:05	58	72	53	63	57	56	55	55	51	44	40
26/01/2023	23:10	65	83	51	65	68	70	63	59	51	42	31
26/01/2023	23:15	55	66	50	60	53	52	51	52	48	37	26
26/01/2023	23:20	59	75	53	64	59	58	55	55	51	43	35
26/01/2023	23:25	55	70	50	61	53	53	52	52	48	39	30
26/01/2023	23:30	57	70	52	63	57	58	55	53	48	40	29
26/01/2023	23:35	57	71	52	63	56	55	53	53	50	42	32
26/01/2023	23:40	59	69	54	63	57	58	57	55	51	45	37
26/01/2023	23:45	58	79	50	61	54	54	52	52	53	50	36
26/01/2023	23:50	55	65	50	61	54	52	51	51	47	37	26
26/01/2023	23:55	54	64	49	60	54	52	51	51	47	38	28
27/01/2023	00:00	55	66	49	61	53	52	51	52	47	37	25
27/01/2023	00:05	55	66	51	60	55	53	51	52	47	36	26
27/01/2023	00:10	56	63	52	61	57	56	52	52	47	38	27
27/01/2023	00:15	76	88	54	69	69	76	75	69	65	62	59
27/01/2023	00:20	55	68	51	62	56	53	52	52	47	39	27
27/01/2023	00:25	54	63	50	60	54	53	53	50	45	36	26
27/01/2023	00:30	54	63	51	61	55	52	51	51	47	38	29
27/01/2023	00:35	56	72	50	61	56	54	53	53	48	38	27
27/01/2023	00:40	53	62	50	60	54	51	50	50	45	35	24
27/01/2023	00:45	54	65	49	58	53	51	50	50	46	35	25
27/01/2023	00:50	58	73	53	59	57	57	58	53	49	44	34
27/01/2023	00:55	55	68	49	59	55	51	51	51	47	39	28
27/01/2023	01:00	54	64	50	60	54	51	51	51	46	37	25
27/01/2023	01:05	55	71	49	63	55	51	52	52	47	38	31
27/01/2023	01:10	53	65	49	56	53	50	50	50	45	35	27
27/01/2023	01:15	56	70	49	58	56	52	52	53	48	40	32
27/01/2023	01:20	56	70	50	60	54	52	53	53	48	38	31
27/01/2023	01:25	53	66	49	57	52	50	50	50	45	39	26
27/01/2023	01:30	52	64	48	57	52	50	49	49	44	34	26
27/01/2023	01:35	54	73	48	56	52	50	51	50	46	35	24
27/01/2023	01:40	52	73	48	57	52	50	50	49	44	34	23
27/01/2023	01:45	55	73	49	58	54	52	52	51	47	38	28
27/01/2023	01:50	54	66	49	60	56	51	51	51	47	38	26
27/01/2023	01:55	57	71	50	61	56	51	54	54	49	39	27
27/01/2023	02:00	60	79	49	59	52	54	57	58	51	41	28
27/01/2023	02:05	53	66	49	58	52	50	51	50	45	34	24
27/01/2023	02:10	57	76	49	57	55	56	56	53	47	37	26
27/01/2023	02:15	53	64	49	58	53	50	49	50	46	36	25
27/01/2023	02:20	57	82	49	57	53	53	55	54	48	39	30
27/01/2023	02:25	66	83	52	65	62	66	66	60	56	52	48
27/01/2023	02:30	56	66	50	60	56	53	52	52	48	39	28
27/01/2023	02:35	55	67	48	57	53	54	54	50	45	38	29
27/01/2023	02:40	57	67	50	58	55	55	56	52	48	41	34
27/01/2023	02:45	50	64	48	56	52	48	47	47	42	32	23
27/01/2023	02:50	56	74	49	57	53	52	51	54	49	39	29
27/01/2023	02:55	51	62	48	56	52	50	48	48	43	34	23
27/01/2023	03:00	57	74	49	59	53	53	53	54	50	44	39
27/01/2023	03:05	53	70	48	57	53	49	51	49	43	34	25
27/01/2023	03:10	54	65	48	59	51	52	52	50	45	37	27
27/01/2023	03:15	57	76	50	57	53	54	54	54	49	39	29
27/01/2023	03:20	53	68	47	58	49	49	49	49	46	36	25
27/01/2023	03:25	52	63	48	56	50	49	49	49	44	34	24
27/01/2023	03:30	52	63	47	57	51	50	48	48	46	35	25
27/01/2023	03:35	54	67	48	59	51	51	50	49	48	37	24
27/01/2023	03:40	51	63	47	58	48	49	49	47	41	33	24
27/01/2023	03:45	57	70	47	54	51	51	52	51	51	48	31
27/01/2023	03:50	50	69	47	55	49	49	48	47	43	34	23
27/01/2023	03:55	54	72	47	61	54	51	53	50	46	38	28
27/01/2023	04:00	53	68	48	59	51	50	50	49	45	39	32
27/01/2023	04:05	52	64	47	57	50	49	48	49	44	33	25

Our Ref: J004193
Client: Charlotte Street Estates Ltd
Project: St Margarets Chambers
Results: Ambient Noise Measurements Position 2 (Back Piccadilly)

					Octave Band Centre Frequencies (Hz), dB L_{eq}							
Date	**Time**	**dB, L_{Aeq}**	**dB, L_{Amax}**	**dB, L_{A90}**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
27/01/2023	04:10	56	72	48	61	55	55	52	52	49	43	33
27/01/2023	04:15	51	66	45	55	50	48	47	47	44	37	27
27/01/2023	04:20	55	69	46	59	52	54	54	51	47	38	30
27/01/2023	04:25	55	65	49	56	53	55	54	51	46	38	30
27/01/2023	04:30	53	67	48	58	51	50	49	49	46	37	27
27/01/2023	04:35	54	69	48	61	52	52	50	51	47	38	27
27/01/2023	04:40	53	64	49	55	52	51	49	49	46	38	31
27/01/2023	04:45	54	73	47	56	54	52	51	50	46	40	31
27/01/2023	04:50	53	72	47	55	50	50	48	50	45	35	25
27/01/2023	04:55	53	62	48	57	52	51	49	49	46	38	29
27/01/2023	05:00	53	64	48	56	53	52	51	49	45	37	28
27/01/2023	05:05	55	68	48	57	56	52	51	51	48	40	29
27/01/2023	05:10	64	80	50	63	58	57	54	53	61	54	34
27/01/2023	05:15	53	62	49	59	54	52	51	49	44	36	26
27/01/2023	05:20	66	83	55	68	63	63	62	62	58	49	39
27/01/2023	05:25	66	83	56	70	63	63	62	62	59	50	41
27/01/2023	05:30	63	76	57	63	60	60	59	59	55	49	39
27/01/2023	05:35	63	83	52	59	56	63	60	59	54	47	35
27/01/2023	05:40	56	65	52	60	55	55	53	51	48	40	30
27/01/2023	05:45	59	73	53	62	59	56	55	54	54	44	35
27/01/2023	05:50	56	70	51	61	57	54	53	52	49	43	31
27/01/2023	05:55	60	78	53	61	57	57	56	55	54	48	35
27/01/2023	06:00	63	77	53	65	66	60	59	58	57	51	39
27/01/2023	06:05	58	73	52	61	58	57	55	54	51	44	34
27/01/2023	06:10	57	79	52	61	57	55	54	52	49	43	35
27/01/2023	06:15	58	69	53	63	59	57	54	54	50	42	32
27/01/2023	06:20	60	71	55	66	61	60	57	56	53	47	37
27/01/2023	06:25	68	81	56	67	67	62	61	64	62	53	43
27/01/2023	06:30	63	80	57	64	62	64	59	58	55	50	41
27/01/2023	06:35	65	82	57	65	64	64	61	61	58	52	45
27/01/2023	06:40	67	81	56	65	64	66	61	64	58	53	43
27/01/2023	06:45	72	91	56	69	61	61	60	72	57	51	43
27/01/2023	06:50	61	85	56	63	59	60	57	57	55	49	36
27/01/2023	06:55	60	77	56	69	60	58	56	56	53	47	38
27/01/2023	07:00	60	76	54	65	62	59	56	56	54	47	37
27/01/2023	07:05	61	76	56	64	64	59	58	57	55	49	44
27/01/2023	07:10	62	75	55	66	63	62	58	57	54	48	38
27/01/2023	07:15	60	70	56	64	61	60	56	56	53	46	36
27/01/2023	07:20	60	76	56	64	60	59	57	56	52	45	36
27/01/2023	07:25	60	72	57	64	61	60	57	56	53	46	38
27/01/2023	07:30	59	68	56	64	59	58	55	55	54	45	38
27/01/2023	07:35	72	95	57	69	64	66	67	67	67	61	50
27/01/2023	07:40	61	75	55	64	60	60	57	56	53	47	41
27/01/2023	07:45	60	74	56	63	59	58	56	55	53	47	39
27/01/2023	07:50	61	70	56	65	61	60	57	56	54	48	44
27/01/2023	07:55	64	76	60	67	65	65	59	59	58	51	41
27/01/2023	08:00	63	77	56	66	62	62	59	57	55	54	51
27/01/2023	08:05	68	82	56	66	64	64	62	61	61	60	58
27/01/2023	08:10	61	75	57	66	61	60	57	57	54	48	40
27/01/2023	08:15	66	78	61	65	63	63	61	60	60	57	53
27/01/2023	08:20	62	80	58	66	62	61	58	58	55	46	40
27/01/2023	08:25	64	87	57	65	61	61	61	60	55	48	38
27/01/2023	08:30	64	84	57	67	63	62	61	60	56	49	41
27/01/2023	08:35	64	82	58	66	63	63	62	59	55	46	38
27/01/2023	08:40	64	79	58	66	62	63	61	60	56	48	42
27/01/2023	08:45	63	79	59	68	63	61	59	58	55	53	43
27/01/2023	08:50	65	79	61	68	64	62	60	59	60	50	44
27/01/2023	08:55	66	83	62	68	63	63	62	62	59	53	45
27/01/2023	09:00	66	88	60	65	63	62	62	62	60	52	41
27/01/2023	09:05	60	75	56	66	61	59	56	56	52	45	36
27/01/2023	09:10	66	89	59	66	62	62	62	63	59	52	44
27/01/2023	09:15	67	91	59	66	63	62	62	63	60	55	48
27/01/2023	09:20	65	85	59	64	64	62	61	61	59	54	45
27/01/2023	09:25	67	83	59	67	65	64	63	63	60	54	43
27/01/2023	09:30	64	81	58	68	63	62	60	60	57	51	43
27/01/2023	09:35	66	91	61	65	62	63	63	63	57	49	38
27/01/2023	09:40	64	82	60	68	65	64	61	59	56	51	41
27/01/2023	09:45	64	80	59	65	63	61	61	61	56	53	43
27/01/2023	09:50	61	72	58	66	62	62	58	57	55	47	36
27/01/2023	09:55	62	74	57	65	61	61	57	57	55	51	40
27/01/2023	10:00	63	89	57	66	61	61	59	59	56	50	41
27/01/2023	10:05	74	93	58	64	62	61	59	59	73	52	41
27/01/2023	10:10	70	95	59	66	66	68	66	65	63	58	49

Our Ref:	J004193
Client:	Charlotte Street Estates Ltd
Project:	St Margarets Chambers
Results:	Ambient Noise Measurements Position 2 (Back Piccadilly)

					Octave Band Centre Frequencies (Hz), dB L_{eq}							
Date	**Time**	**dB, L_{Aeq}**	**dB, L_{Amax}**	**dB, L_{A90}**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
27/01/2023	10:15	66	90	62	66	64	63	64	61	58	54	48
27/01/2023	10:20	66	89	58	74	64	63	65	62	57	49	42