

369 Moston Lane Manchester

Acoustic Planning Report
0704/APR1

29 July 2020

For:

P4B Architecture Limited
15 Memorial Way
Worsley
M28 3QA



2nd Floor 3 Hardman Square
Spinningfields Manchester M3 3EB

☎ 0161 457 0515 ■ 07415 151 901
✉ Enquiry@LighthouseAcoustics.co.uk
🌐 www.LighthouseAcoustics.co.uk

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Time History Graph 0704/THG1

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Registered Office: 2nd Floor 3 Hardman Square Spinningfields Manchester M3 3EB
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1.0 Introduction

Lighthouse Acoustics has been appointed by P4B Architecture Limited to undertake a detailed sound survey at the proposed restaurant situated at 369 Moston Lane, Manchester and to assess atmospheric plant sound emissions from the proposed 1No. kitchen extract fan.

In addition, to undertake an assessment of typical operational sound from the proposed restaurant to the nearest noise sensitive receptors.

The survey methodology, results and assessments are presented in this report.

2.0 Objectives

To establish the Local Authority's acoustic requirements for the proposed restaurant.

To undertake a detailed environmental sound survey in order to establish existing environmental sound levels at the site.

To undertake an assessment of atmospheric sound emissions from the proposed 1No. kitchen extract fan to the nearest noise sensitive receptor and propose mitigation measures where required in order to achieve the requirements of the Local Authority.

To undertake an assessment of restaurant operational sound transfer through the separating wall construction to the existing adjoining residential flat based on typical source noise levels.

To undertake an assessment of restaurant operational sound breakout through the façade of the proposed restaurant to the windows of the nearest noise sensitive receptor based on typical source noise levels.

To propose mitigation measures where required in order to achieve the requirements of the Local Authority.

3.0 Site Description

The proposed restaurant is situated at 396 Moston Lane, Manchester and comprises an end terrace building. The building is a former bank and is single storey at the front and 2 storey at the rear. The restaurant, kitchen and toilets are proposed at ground floor level whilst an office is proposed at 1st floor level.

The site is bound by adjoining building to the north east (commercial at ground floor with residential flat above), Moston Lane to the south east/south west and Simpson Memorial Hall/Simpson Medical Practice to the west.

The site plan overleaf indicates the site boundary and the surrounding environment.



Site plan indicating the site boundary and the surrounding environment

4.0 Local Authority Requirements

4.1 Building Services

With regard to noise and vibration from fixed plant/equipment, Section 3.6.1.5.1 of the Planning & Noise Technical Guidance document (dated December 2015) produced by Manchester City Council states the following:

"The noise assessment should be based on BS 4142: 2014 and any application for fixed plant, equipment or machinery must demonstrate that:

Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location."

4.2 Operational Noise

Whilst the Planning & Noise Technical Guidance document (dated December 2015) produced by Manchester City Council states requirements for entertainment venues, they are applicable to venues where music is the dominant sound source of operational activities.

We are unaware of any requirements that Manchester City Council have for venues where conversation is the dominant sound source of operational activities with background music only.

As such, for sound breakout it is proposed that L_{Aeq} bar operational sound levels are designed to achieve the representative L_{A90} background sound levels at the window of the nearest noise sensitive receptors.

For sound transfer, it is proposed that L_{Aeq} bar operational sound levels are designed to achieve $L_{Aeq,15min} \leq 30dB$ daytime and $L_{Aeq,15min} \leq 25dB$ night-time within structurally connected noise sensitive receptors.

5.0 Environmental Sound Survey

5.1 Measurements

Automated environmental sound measurements were undertaken from 10:00 hours on Thursday 16 July 2020 to 10:00 hours on Friday 17 July 2020. During this period the L_{Amax} , L_{Aeq} and L_{A90} sound pressure levels were measured continuously over 15 minute periods.

5.2 Weather Conditions

At the start of the survey period there was a gentle westerly breeze (<5m/s) and the sky was overcast. There was no rainfall and road surfaces were dry. The temperature was approximately 15°C.

At the end of the survey period there was a gentle southerly breeze (<5m/s) and the sky was scattered overcast. There was no rainfall and road surfaces were dry. The temperature was approximately 17°C.

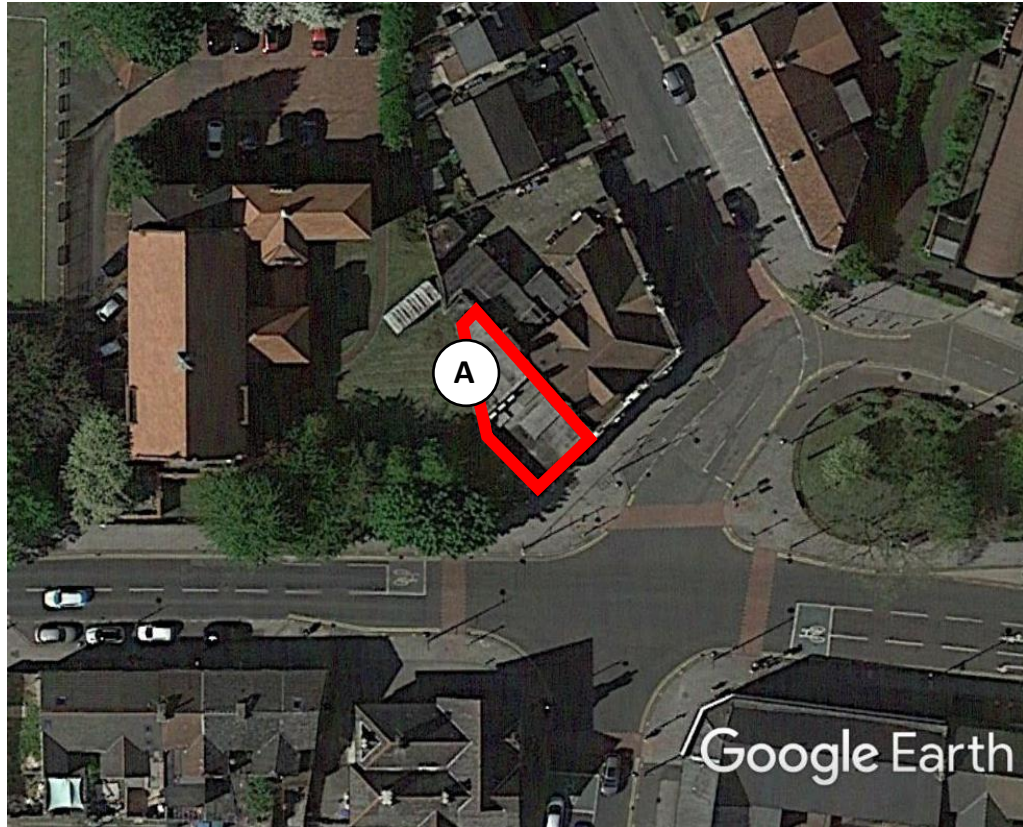
Based on publicly available weather data for the survey period it is understood that weather conditions remained similar for the duration of the survey with no significant periods of rainfall or strong breezes. The weather conditions during the survey period are therefore considered to be suitable for undertaking measurements of sound levels.

5.3 Measurement Position

Environmental sound levels were measured at a single position on-site as described in the table below.

Position	Description
A	Microphone at 1 st floor level at 1.0m from the west façade of the building overlooking Simpson Memorial Hall/Simpson Medical Practice.

The measurement position and site boundary are shown on the site plan below.



Site plan showing measurement position and site boundary

Measurement Position A was selected in order to assess typical environmental sound levels representative of those at the facade of Simpson Memorial Hall/Simpson Medical Practice to the west.

5.4 Equipment

The following equipment was used to undertake the environmental sound survey.

Equipment	Manufacturer	Model	Serial No.	Calibration Date
Class 1 Sound Level Meter	Casella	633C	2811231	07/06/2019
Preamplifier	Casella	495	001239	07/06/2019
Microphone	Casella	251	1841	07/06/2019
Class 1 Sound Calibrator	Casella	120/1	3864878	15/11/2019
Environmental Noise Kit	Casella	6847	-	-
Microphone Extension Cable	Casella	C6717/5	-	-
Weather Protection System	Casella	6737	-	-

Field calibration checks were performed on the sound level meter prior to and on completion of the survey and were found to be within acceptable tolerance limits.

5.5 Results

5.5.1 Time History Graph

The results of the environmental sound survey are presented on Time History Graph 0704/THG1 enclosed at the rear of the report. The presented results for Position A have been corrected for reflections from the façade by subtracting 3dB from the measured sound levels in order to obtain free field sound levels.

5.5.2 $L_{A90,T}$ Background Sound Level

The lowest representative daytime $L_{A90,15min}$ background sound level measured at Position A during the proposed opening hours (12:00 to 23:00 hours) is detailed in the table below.

Position	Lowest Representative $L_{A90,15min}$ Background Sound Level (dB)
	Daytime (12:00–23:00)
A	49

The presented results for Position A have been corrected for reflections from the façade by subtracting 3dB from the measured sound levels in order to obtain free field sound levels.

5.6 Discussion of Sound Climate

At the start and end of the survey period the dominant sound sources at Position A were noted to be road traffic along Moston Lane and passing pedestrians.

Whilst we are unable to comment on dominant sound sources or individual sound events during the survey period, based on the surrounding environment it is likely that road traffic remained the dominant sound source.

6.0 Atmospheric Plant Sound Emission Limit

Based on the lowest representative daytime $L_{A90,15min}$ background sound level measured during the environmental sound survey and the requirements of the Local Authority, cumulative atmospheric plant sound emissions should not exceed the following limit at the nearest existing noise sensitive receptor.

Receptor	L_{Aeq} Cumulative Atmospheric Plant Sound Emission Limit (dB) at Nearest Noise Sensitive Receptors
	Daytime (12:00–23:00)
West	44

The above limit is subject to final approval by Manchester City Council.

7.0 Plant Sound Emission Assessment

7.1 Plant Sound Data

Atmospheric building services sound levels have been assessed based on the manufacturers sound data received for the proposed 1No. kitchen extract fan which indicates octave band sound data as detailed in the tables below.

Helios Gigabox GBW 400/4 at 0.74m³/s at 305Pa

Outlet Sound Power Level (dB) at Octave Band Centre Frequency (Hz)								dBA
63	125	250	500	1k	2k	4k	8k	
74	74	76	72	65	62	59	54	73

Helios Gigabox GBW 400/4 at 0.74m³/s at 305Pa

Breakout Sound Power Level (dB) at Octave Band Centre Frequency (Hz)								dBA
63	125	250	500	1k	2k	4k	8k	
70	70	63	52	45	41	36	30	58

Whilst it is not possible to assess plant irregularity or impulsiveness based on manufacturer's sound data, BS 4142: 2014 provides an objective method for assessing the audibility of tones in sound. The one-third octave method states that if the level of a one third octave band exceeds the level of both adjacent one third octave bands by the following amounts, then a tonal component may be identified as present:

- 15dB in the low-frequency one-third-octave bands (25Hz to 125Hz);
- 8dB in the mid-frequency one-third-octave bands (160Hz to 400Hz);
- 5dB in the high-frequency one-third-octave bands (500Hz to 10kHz).

However, one third octave band sound data is rarely available from manufacturers as is the case in this instance.

By applying the same principal to the octave band sound data in the tables above, a review indicates that these items are unlikely to exhibit a tonal component. As such, no character correction has been applied to the specific sound level for these items.

Should one third octave band sound data become available a revised assessment should be undertaken.

7.2 Operating Hours

It is understood that the proposed 1No. kitchen extract fan has the potential to operate between 12:00 to 23:00 hours Monday to Sunday.

In order to undertake a worst case assessment, it is assumed that the proposed 1No. kitchen extract fan will operate for the full 1 hour daytime assessment period.

7.3 Plant Location

The location of the proposed 1No. kitchen extract fan has been taken from the following drawings.

Author	Drawing No.	Revision	Date
P4B Architecture Limited	07	B	-
	08	B	-

This indicates that the proposed 1No. kitchen extract fan is to be situated externally at ground floor level on the west façade of 369 Moston Lane with exhaust ductwork penetrating the west façade and terminating vertically at roof level.

7.4 Nearest Receptor

It is understood that the nearest noise sensitive receptor is Simpson Memorial Hall/Simpson Medical Practice situated approximately 15m to the west of the proposed 1No. kitchen extract fan.

7.5 Vibration Isolation

It is understood that the proposed 1No. kitchen extract fan is proposed to be fitted with Christie & Grey's Type 19.101.R rubber turret vibration isolation mounts in order to minimise structure borne noise transfer.

7.6 Attenuation Proposals

It is understood that the proposed 1No. kitchen extract fan is proposed to be fitted with an atmospheric silencer as specified in the table below.

Flakt Woods Type B Silencer 400mm Diameter

Length (mm)	Breakout Sound Power Level (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
400	70	70	63	52	45	41	36	30

7.7 Assessment

The table below details the calculated cumulative L_{Aeq} atmospheric plant sound emission levels at the nearest receptors along with the proposed cumulative atmospheric plant sound emission limits and the differences between them.

Receptor	Descriptor	Period
		Daytime
West	Calculated Cumulative Atmospheric Plant Sound Emission Level L_{Aeq} (dB)	33
	Cumulative Atmospheric Plant Sound Emission Limit L_{Aeq} (dB)	44
	Difference (dB)	-11

The calculated cumulative L_{Aeq} atmospheric plant sound emission level at the nearest receptor is 11dB below the proposed cumulative atmospheric plant sound emission limit.

The assessment therefore indicates that the building services proposals are likely to achieve the proposed cumulative atmospheric plant sound emission limit at the nearest receptor with the incorporation of the specified attenuation proposals.

8.0 Separating Wall Assessment

8.1 Introduction

The proposed restaurant is situated at ground floor level whilst the existing adjoining residential flat is situated at 1st floor level.

Typical restaurant L_{Aeq} operational sound levels for similar size premises to that proposed are therefore assessed to the existing adjoining residential flat via the existing separating wall construction.

8.2 Operating Hours

It is understood that the proposed opening hours of the restaurant are 12:00 to 23:00 hours Monday to Sunday.

8.3 $L_{Aeq,T}$ Operational Sound Levels

Typical restaurant L_{Aeq} operational sound levels for similar size premises to that proposed are detailed in the table below along with the corresponding L_{eq} octave band sound pressure levels.

Source Description	Leq Sound Pressure Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Restaurant with background music (no subwoofers)	69	69	69	74	73	69	63	56	77

The above includes background music (no subwoofers) and customer/staff conversations.

8.4 Existing Construction

It was not possible to undertake a sound insulation test of the existing separating wall between the proposed restaurant and existing adjoining residential flat since access was not available to the existing residential flat. As such, the sound reduction indices for the separating wall have been estimated based on the construction.

Due to the age of the building and the former use as a bank the separating wall is understood to comprise solid masonry at least 2 leaves thick (206mm). The following typical sound reduction indices have been assumed for the separating wall construction.

Element	Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Separating Wall 206mm Brick	34	41	44	48	55	55	55	55

8.5 Receive Room Assumptions

The following typical dimensions and finishes/furnishings for the rooms of the existing adjoining residential flat have been assumed for the purpose of the assessment.

Room Type	Typical Room Dimensions	Typical Room Finishes / Furnishings
Lounge	4m x 3m x 2.4m	Hard floor finish, plastered walls, plasterboard ceiling, sofa, cupboards, table, chairs, curtains
Bedroom	3m x 2.5m x 2.4m	Carpeted floor finish, plastered walls, plasterboard ceiling, bed, curtains

8.6 Calculation

The reverberant L_{Aeq} sound pressure level within the rooms of the existing adjoining residential flat due to restaurant operational sound levels has been calculated using the following formula:

$$L_{pr2} = L_{pr1} - SRI + 10 \log (S/A)$$

Where:

L_{pr2} is the reverberant sound pressure level in the receiving room, dB;

L_{pr1} is the reverberant sound pressure level in the source room, dB;

SRI is the sound reduction indices of the separating element, dB;

S is the surface area of the separating element, m²;

A is the total absorption area in the receiving room, m².

8.7 Results

The reverberant L_{Aeq} sound pressure level within the rooms of the existing adjoining residential flat due to restaurant operational sound levels are presented in the table below.

Receptor	Calculated L_{Aeq} (dB)
Lounge of existing adjoining residential flat	27
Bedroom of existing adjoining residential flat	25

The assessment indicates that the reverberant L_{Aeq} sound pressure levels within the lounge and bedroom of the existing adjoining residential flat due to restaurant operational sound levels will be 27dB and 25dB respectively during the daytime period with no impact during the night-time period.

The assessment therefore indicates that the proposed requirement to achieve $L_{Aeq,15min} \leq 30dB$ daytime and $L_{Aeq,15min} \leq 25dB$ night-time within structurally connected noise sensitive receptors is likely to be achieved.

8.8 Music Level Limits

For the restaurant in-house loudspeaker system, amplified music levels should be limited by means of an electronic noise limiter/compressor. The device should be capable of limiting individual octave bands over the frequency range 20Hz to 20kHz and controlling the number of speakers/zones required.

In order to set the device to achieve the proposed requirements a commissioning visit will be required in conjunction with an acoustic consultant upon completion of the fit-out works and prior to the operation of the bar. The devices should be lockable once set to prevent tampering. Upon completion, a commissioning report should be issued to the Local Authority specifying details of the devices installed and the limits that they have been set to.

9.0 Facade Assessment

9.1 Introduction

The proposed restaurant is situated at ground floor level whilst the nearest noise sensitive receptor is the existing adjoining residential flat situated at 1st floor level.

Typical restaurant L_{Aeq} operational sound levels for similar size premises to that proposed are therefore assessed to the windows of the existing adjoining residential flat against the lowest representative $L_{A90,15min}$ background sound level measured at Position A during the proposed opening hours.

9.2 Operating Hours

It is understood that the proposed opening hours of the restaurant are 12:00 to 23:00 hours Monday to Sunday.

9.3 $L_{Aeq,T}$ Operational Sound Levels

Typical restaurant L_{Aeq} operational sound levels for similar size premises to that proposed are detailed in the table below along with the corresponding L_{eq} octave band sound pressure levels.

Source Description	Leq Sound Pressure Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Restaurant with background music (no subwoofers)	69	69	69	74	73	69	63	56	77

The above includes background music (no subwoofers) and customer/staff conversations.

9.4 $L_{A90,T}$ Background Sound Level

The lowest representative daytime $L_{A90,15min}$ background sound level measured at Position A during the proposed opening hours (12:00 to 23:00 hours) is detailed in the table below.

Position	Lowest Representative $L_{A90,15min}$ Background Sound Level (dB)	
	Daytime (12:00–23:00)	
A	49	

The presented results for Position A have been corrected for reflections from the façade by subtracting 3dB from the measured sound levels in order to obtain free field sound levels.

9.5 Existing Construction

It is understood that the existing ground floor front façade of the proposed restaurant comprises the following constructions.

Element	Typical Construction
Facade	Solid masonry wall
Openings	Single glazed windows with single glazed door

The following Sound Reduction Indices have been allowed for the existing ground floor front façade constructions.

Element	Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Facade	34	41	44	48	55	55	55	55
Openings	16	22	25	28	31	26	31	33

The area of the front facade is understood to be approximately 24m².

9.6 Calculation

The sound pressure level radiated from the front façade due to restaurant operational sound levels has been calculated using the following formula:

$$L_p = L_{prev} + 10 \log S - 6 - SRI + 10 \log Q - 20 \log R - 11 - D$$

Where:

L_p is the sound pressure level at the receiver, dB;

L_{prev} is the reverberant sound pressure level in the source room, dB;

S is the surface area of the separating element, m²;

SRI is the sound reduction indices of the separating element, dB;

Q is the directivity factor for the separating element, dB;

R is the distance in meters between the separating element and the receiver, m;

D is the directivity correction for the separating element, dB.

9.7 Results

The calculated restaurant L_{Aeq} operational sound levels incident upon the windows of the windows of the existing adjoining residential flat due to breakout through the front façade are presented in the table below.

Nearest Noise Sensitive Receptor	Calculated L_{Aeq} (dB)
Adjoining residential flat	35

The assessment indicates that restaurant L_{Aeq} operational sound levels incident upon the windows of the existing adjoining residential flat due to breakout through the front façade will be 35dB with no impact during the night-time period.

This is therefore likely to achieve the proposed requirement to achieve the representative daytime L_{A90} background sound levels of 49dB at the window of the nearest noise sensitive receptors.

9.8 Music Level Limits

For the restaurant in-house loudspeaker system, amplified music levels should be limited by means of an electronic noise limiter/compressor. The device should be capable of limiting individual octave bands over the frequency range 20Hz to 20kHz and controlling the number of speakers/zones required.

In order to set the device to achieve the proposed requirements a commissioning visit will be required in conjunction with an acoustic consultant upon completion of the fit-out works and prior to the operation of the bar. The devices should be lockable once set to prevent tampering. Upon completion, a commissioning report should

be issued to the Local Authority specifying details of the devices installed and the limits that they have been set to.

10.0 Additional Guidance

In order to minimise sound emissions from the premises the following guidance should be incorporated.

- All staff should be trained on the noise management measures employed by the venue to minimise operational sound emissions from the premises.
- All external entrance/escape doors should be fitted with self-closing devices and good fitting seals. Staff should ensure that the entrance/escape doors are not kept open unnecessarily in order to minimise sound emissions from the premises.
- Internal loudspeakers should face away from external doors and windows and the use of subwoofers should be prohibited.
- Staff should regularly monitor and manage external areas to ensure that customers are not causing a disturbance to local residents. Rowdy behaviour from customers should not be tolerated and anyone behaving in an anti-social way should be asked to leave the premises.
- Deliveries, refuse collections and storage/disposal of waste/recyclables in external areas should be restricted to normal working hours between 08:00 and 18:00 hours Monday to Saturday with none on Sundays/Bank holidays.
- A contact telephone number should be made available to local residents/businesses which they can use to report noise disturbances to the venue as and when they occur.

11.0 Conclusions

The Local Authority's acoustic requirements for the proposed restaurant have been established.

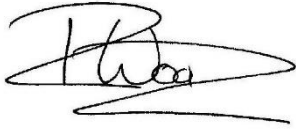
A detailed environmental sound survey has been undertaken in order to establish existing environmental sound levels at the site.

An assessment of atmospheric sound emissions from the proposed 1No. kitchen extract fan to the nearest noise sensitive receptor has been undertaken and mitigation measures have been proposed where required in order to achieve the requirements of the Local Authority.

An assessment of restaurant operational sound transfer through the separating wall construction has been undertaken to the existing adjoining residential flat.

An assessment of restaurant operational sound breakout through the façade of the proposed restaurant has been undertaken to the windows of the nearest noise sensitive receptor.

Mitigation measures have been proposed where required in order to achieve the requirements of the Local Authority.

A handwritten signature in black ink, appearing to read 'Robin Wood', with a large, sweeping horizontal stroke underneath.

Robin Wood
LIGHTHOUSE ACOUSTICS

369 Moston Lane, Manchester
Time History Graph - Thursday 16 July 2020 to Friday 17 July 2020
 $L_{Amax,15min}$, $L_{Aeq,15min}$ & $L_{A90,15min}$ Noise Levels at Position A

