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19-21 George Street, Manchester

5 August 2025

19373-NIA-02-AA-R0

Noise Impact Assessment

Project Number
19373

Issued For
Mr Jason Zeng

Company registered in England & Wales no. 07958744
UKAS accreditation is only applicable to pre-completion sound insulation testing services for building regulations and is not linked to the endorsements and certifications shown above

EXECUTIVE SUMMARY

This noise impact assessment has been undertaken in order to assess the site at 19-21 George Street, Manchester for use as a mini-market at basement level and restaurant premises with kitchen and dining areas at ground floor level. The site is currently in use as a storage and refrigeration area.

Planning drawings indicate that the restaurant could seat approximately 70 diners at one time and will be accessed by steps up from a ground level entrance at the front of the site.

A background noise survey has been undertaken as detailed in the report, in order to determine an appropriate noise emission criterion, in accordance with identified Local Authority requirements.

Calculations were undertaken for the nearest identified receivers, identified as residential apartments at 46 George Street to the west of the front façade of the site and Faulkner Court directly south of the site. It should be noted that if there are closer receivers that Clement Acoustics is not aware of, a reassessment will be necessary, and this should therefore be confirmed by the Client.

The proposed plant installation comprises the following plant units:

- 1 No. Solerpalau TCBTx2/4-500 Restaurant Kitchen Supply Fan
- 1 No. Solerpalau CVAT/4-12000/560N Restaurant Kitchen Extract Fan
- 1 No. Solerpalau CVAT/4-9000/560N Mini-Market Extract Fan
- 2 No. GREE KF-120TW Condenser Units

A background noise survey has been undertaken as detailed in the report, in order to determine an appropriate noise emission criterion, in accordance with identified Local Authority requirements.

It has been demonstrated that compliance with the established criterion is feasible, dependent on the following material considerations:

- The plant could be in use at any time over a 24 hour period
- The noise emissions data for the proposed units, as obtained from available manufacturer information
- Plant and receiver locations are as established in this report and marked on the attached site plan
- Attenuators are installed on the atmospheric side of the ground floor supply, ground floor extract and basement extract fans, as specified in this report
- Any building element replacement works to follow the general advice in this assessment.
- The site will be in use between, 17:00 and 04:00, after which time the site will be vacated and non-operational.
- Noise limiters to be installed and set to appropriate levels (anticipated limiting levels are discussed in this report).

If there is any deviation from the above, Clement Acoustics must be informed, in order to establish whether a reassessment is necessary.

Clement Acoustics has used all reasonable skill and professional judgement when preparing this report. The report relies on the information as provided to us at the time of writing and the assumptions as made in our assessment.

This report is designed to be suitable to discharge typical plant noise planning conditions, as per our original scope of work. The report should not be relied upon for further reasons, such as the detailed design of mitigation measures.

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19373-TH1	Environmental Noise Time History
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Appendix B1 to B2	Acoustic Calculations

REVISION HISTORY

Issue	Date of Issue	Author	Reviewed	Authorised
R0	05/08/2025	[redacted] **Jamie Newton** Senior Consultant BEng (Hons) MIOA	[redacted] **Duncan Martin** Director BSc (Hons) MIOA	[redacted] **Duncan Martin** Director BSc (Hons) MIOA

Issue	Comment
R0	First Issue

1.0 INTRODUCTION

Clement Acoustics has been commissioned by Mr Jason Zeng to measure existing background noise levels to inform an assessment of proposed restaurant and mini-market use at 19-21 George Street, Manchester. Measured noise levels have been used to determine noise emissions criteria for a proposed plant installation and operation of a restaurant in agreement with the planning requirements of the Manchester City Council.

This report presents the results of the environmental survey followed by noise impact calculations and outlines any necessary mitigation measures.

An acoustic terminology glossary is provided in Appendix A.

2.0 SITE DESCRIPTION

The site is an existing basement storage area and retail unit at 19-21 George Street, Manchester. The building is bound by an existing commercial building to the north, a car park to the east and south, and George Street, housing a mix of restaurants, offices and apartments, to the west.

The surrounding area is predominantly commercial in nature, although the presence of residential apartments is noted.

Current proposals are for restaurant at ground floor level of the site with a kitchen space, dining area and storage refrigeration areas proposed, and a mini-market with on-site bakery at ground floor level.

Proposals are for the restaurant to be operational between 17:00 and 04:00 as a worst case.

Residential apartments have been identified at 46 George Street and Faulkner Court. These receivers were identified through onsite observations and an online Council Tax search. If there are any receivers closer than those identified within this report then a further assessment will need to be carried out.

Locations are shown in attached site plan 19373-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Unattended Noise Survey Procedure

An environmental noise survey was undertaken over a weekend period when the restaurant is expected to be busiest.

Measurements were undertaken at one position as shown on indicative site drawing 19373-SP1. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the nearest affected receiver.

The surroundings and position used for the monitoring location are described in Table 3.1.

Position No.	Description
1	The microphone was mounted on a tripod on the main roof of 19-21 George Street, facing the identified receivers. The microphone was positioned away from reflective surfaces. [1]

Table 3.1 Description of unattended monitoring locations

Note [1]: The position was considered to be free-field according to guidance found in BS 4142: 2014, and a correction for reflections has therefore not been applied.

Continuous automated monitoring was undertaken for the duration of the survey between 16:00 on 19 September 2024 and 04:00 on 22 September 2024.

The measurement procedure generally complied with ISO 1996-2: 2017: '*Description, measurement and assessment of environmental noise'*.

3.2 Weather Conditions

At the time of set-up and collection of the monitoring, the weather conditions dry with light winds. It is understood that the weather conditions during the unattended survey were generally dry with wind speeds below 5 m/s.

It is considered that the weather conditions did not adversely affect the measurements and are therefore considered suitable for the measurement of environmental noise.

3.3 Equipment

The equipment calibration was verified, by means of a field verification check, before and after use and no abnormalities were observed.

The equipment used was as follows.

- 1 No. Svantek Type 958 Class 1 Sound Level Meter
- Norsonic Type 1251 Class 1 Calibrator

4.0 RESULTS

4.1 Unattended Noise Survey Results

The $L_{Aeq:\ 5min}$, $L_{Amax:\ 5min}$, $L_{A10:\ 5min}$ and $L_{A90:\ 5min}$ acoustic parameters were measured at the location shown in site drawing 19373-SP1. Measured noise levels are shown as a time history in Figure 19373-TH1.

Average ambient and typical background noise levels are summarised in Table 4.1. In order to set representative noise emissions criteria for the proposed hours of operation, the typical background noise level has been assessed for the period between 03:00 and 04:00. This is expected to present a suitably robust assessment criterion, avoiding undue influence from daytime use of plant serving nearby existing restaurants.

Position	Time Period	Average ambient noise level $L_{Aeq:\ T}$, dB	Typical background noise level $L_{A90:\ 5min}$, dB
1	Daytime (07:00 - 23:00)	58	51
	Night-time (23:00 - 07:00)	57	48
	Typical Operating Hours (20:30 - 22:30)	59	48

Table 4.1 Average ambient and typical background noise levels

5.0 NOISE CRITERIA

5.1 Plant Noise

The stated requirements of Manchester City Council with regards to plant noise emissions are as follows:

> *"… any 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 (LAeq) below the typical background (LA90) level at the nearest noise sensitive location."*

Based on the above stated requirements and the existing noise levels summarised in Table 4.1, any external plant should therefore be designed to not exceed a noise level of **$L_{Aeq,T}$ 43 dB** at the identified sensitive receptors.

5.2 Restaurant Operations

The stated requirements of Manchester City Council with regards to breakout of entertainment noise are as follows:

> *"In terms of the proposed use, the study should identify the acoustic treatment and measures that will limit the breakout of noise in accordance with a noise study of the premises. The scheme proposed shall include measures such as acoustic lobbies at access and egress points to the premises, acoustic treatment of the building structure, sound limiters linked to sound amplification equipment, and specified maximum internal noise levels."*

In order to determine a suitable limit for breakout noise emissions, guidance has been sought in Manchester City Council document '*Planning and Noise – Technical Guidance*', October 2022.

For a new entertainment venue that is structurally detached from sensitive building uses (as is the case here) the following is stated:

> *"Entertainment noise ($L_{Aeq,5min}$) should be controlled to 5dB below the typical background noise level (L_{A90}) in each octave band at the nearest noise sensitive location."*

Based on the above requirements and the measured spectral background sound levels, Table 5.1 shows the noise limits to be achieved at the identified receivers.

Period	Limiting Noise Level, dB in each Frequency Band, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Typical Operating Hours (03:00 - 04:00)	48	47	45	40	38	32	25	19	43

Table 5.1 Typical background noise level by frequency

6.0 PLANT NOISE IMPACT ASSESSMENT

6.1 Proposed Installation

The proposed plant installation comprises the following:

- 1 No. Solerpalau TCBTx2/4-500 Restaurant Kitchen Supply Fan
- 1 No. Solerpalau CVAT/4-12000/560N Restaurant Kitchen Extract Fan
- 1 No. Solerpalau CVAT/4-9000/560N Mini-Market Extract Fan
- 2 No. GREE KF-120TW Condenser Units

Noise emissions for the proposed plant units, as provided by the manufacturer, are shown in Table 6.1. Loudest modes of operation have been used in order to present a robust worst-case assessment.

Unit	Sound power Level (dB) in each Frequency Band, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Ground Floor Kitchen Supply Fan (TCBTx2/4-500)	65	76	87	88	90	84	77	70	93
Ground Floor Kitchen Extract Fan (CVAT/4-12000/560N)	63	78	78	81	81	78	71	60	85
Basement Market Extract Fan (CVAT/4-9000/560N)	58	73	74	7	77	75	67	57	80
	Sound pressure Level (at 1 m, dB) in each Frequency Band, Hz								
GREE KF-120TW	84	71	63	59	52	46	39	33	63[1]

Table 6.1 Manufacturer provided noise emissions levels

Note [1]: Manufacturer data simply states "> 63 dB(A)", so frequency data from a similar unit has been used to inform source noise levels

Extract fans are to be ducted to roof level, where supply fan is to duct to James Street at basement level, adjacent to proposed condenser locations. This is shown on indicative site plan 19373-SP1.

6.2 Proposed Mitigation Measures

In order to meet the proposed criteria stated in Section 5.1, it is recommended that attenuators be placed in both extract and supply ductwork. Attenuators should be fitted as close to the fan in the duct run as possible.

Based on the information provided, attenuators meeting the performances as stated in Table 6.2 should be suitable.

Mitigation	Required Attenuation (dB) in each Frequency Band, Hz							
	63	125	250	500	1k	2k	4k	8k
Ground Floor Restaurant Supply Fan Attenuator	4	6	10	18	26	29	25	19
Ground Floor Kitchen Extract Fan	1	2	5	9	13	10	7	5
Basement Market Extract Fan								

Table 6.2 Required attenuation from mitigation

N.B. All mechanical plant and associated pipe and ductwork should be suitably isolated from the building structure. Therefore, appropriate specifications for anti-vibration mounts should be sought from the manufacturer/supplier.

6.3 Noise Impact Assessment

The closest receivers have been identified as 46 George Street to the west of the front façade of the site and Faulkner Court directly south of the site.

Screening of the supply fan duct end and condensers to 46 George Street is provided by the building envelope.

Taking into account all necessary acoustic corrections, the resulting noise level at the identified residential windows would be as shown in Table 6.3. Detailed calculations are shown in Appendix B.

Receiver	Design Criterion	Noise Level at Receiver (due to proposed plant)
1: 46 George Street	43 dB(A)	42 dB(A)
2: Faulkner Court		40 dB(A)

Table 6.3 Noise levels and project criterion at noise sensitive receivers

As presented in Table 6.3 and Appendix B, the proposed plant installation with proposed attenuators would be expected to meet the requirements of the proposed criteria.

6.4 British Standard Requirements

Further calculations have been undertaken to assess whether the noise emissions from the proposed plant unit would be expected to meet recognised British Standard recommendations, in order to further ensure the amenity of nearby noise sensitive receivers.

British Standard 8233: 2014 '*Guidance on sound insulation and noise reduction for buildings*' gives recommendations for acceptable internal noise levels in residential properties. Assuming worst case conditions, of the closest window being for a bedroom, BS 8233: 2014 recommends 35/30 dB(A) as being acceptable internal sleeping conditions during night-time.

With loudest external levels of 42 dB(A), acceptable internal conditions would be met by taking the attenuation of the window itself into consideration. According to BS 8233: 2014, a typical building facade with a partially open window offers 15 dB attenuation.

It can therefore be predicted that, in addition to meeting the requirements of the set criteria, the emissions from the proposed plant would be expected to meet the most stringent recommendations of the relevant British Standard, with neighbouring windows partially open. Predicted levels are shown in Table 6.4.

Receiver	Recommended Target – For sleeping conditions in a bedroom, in BS 8233: 2014	Noise Level at Receiver (due to plant installation)
Inside Residential Window	30 dB(A)	27 dB(A)

Table 6.4 Noise levels and BS 8233: 2014 criteria inside nearest residential space

7.0 RESTAURANT OPERATION NOISE IMPACT ASSESSMENT

7.1 Proposed Internal Operations

As the building is not currently in use as a restaurant, attended measurements were taken of similar sized venue, with patrons present and music played back at a level considered to be an entertainment level. In this way, an assessment will be provided for the worst-case scenario of loudest noise levels.

The measured noise levels that will be used in calculations are as shown in in Table 7.1

Source	Sound Pressure Level (at 1 m, dB) in each Frequency Band, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Busy bar with music at entertainment level	91	92	90	90	85	77	69	64	90

Table 7.1 Measured noise emissions levels

7.2 External Building Fabric

Based on available drawings, the noise breakout path from the restaurant will be via the front door and windows at the front of the site. We have been informed that a door will also be placed at the foot of the stairwell into the dining area, thereby creating a lobby area across the stairwell area.

For the proposed main entrance and lobby doors, we would recommend selecting doors with a stated sound reduction performance of at least R_w 35 dB. It should be ensured that the doors are well sealed with high performing acoustic seals around the entire perimeter including the threshold.

7.3 Noise Impact Calculations

In order to calculate the predicted level of noise at residential receivers, the equation shown in Equation 7.1 was used to calculate the breakout of internal noise.

$$SPL_{outdoor} = SPL_{indoor} - SRI_{Composite} + 10\log_{10} S - 20\log_{10} r - 14$$

Equation 7.1 Noise Breakout Calculations

The source noise discussed in Section 7.1 is assumed to be constant across the entire basement area. Calculations assume that only one entrance door could be closed.

All dimensions and distances have been taken from available drawings.

7.4 Proposed Mitigation

To control noise emissions, it is recommended a noise limiter is fitted and set such that the music from the proposed operations meets the recommended limits described in Section 5.2. This is expected to be achievable with the noise limits shown below in Table 7.2, in addition to the recommended facade upgrade works discussed in Section 7.2.

Period / Scenario	Low Frequency Limits		Overall Limit
	63 Hz	125 Hz	
Night-time Operations (Finished by 04:00)	83 dB	80 dB	86 dB(A)

Table 7.2 Proposed noise limits

Note: It must be noted that these noise limits are a prediction only, based on the expected performance of the external façades, and acoustic formulae. A final commissioning exercise should be undertaken to determine the appropriate limits in practice, which could be lower.

7.5 Noise Impact Assessment

The closest receiver has been identified as the window on the southern facade of a residential property across the access road which is a minimum of 11 m from the closet façade of the site.

Taking into account all necessary acoustic corrections, including the proposed mitigation in Section 7.4, the resulting noise level at the identified residential windows would be as shown in Table 6.3. Detailed calculations are shown in Appendix B2.

Receiver	Scenario	Criteria, dB			Noise Level due to Site Operations, dB(A)		
		63 Hz	125 Hz	dB(A)	63 Hz	125 Hz	dB(A)
Apartments at 46 George St	Night-time Operations	48	47	**43**	48	47	**43**

Table 7.3 Noise levels and project criterion at noise sensitive receivers

As presented in Table 6.3 and Appendix B2, the proposed operations with the proposed mitigation in place would be expected to meet the criteria.

7.6 Proposed Noise Management Plan

In addition to limiting music noise, the following additional measures are proposed to limit the noise impact of the site:

- During evening and night-time hours, it should be ensured that entrance doors are closed when not in use.
    - The lobby area should be used to ensure that at least one door is closed at all times.
- Patrons should also be reminded of the nature of surrounding premises and behaviour outside the premises should be monitored accordingly.
- No deliveries or waste collection should be undertaken outside daytime hours.
- It is understood that there will be no onsite parking for guests. If proposals in this regard change, additional assessment of noise should be considered.
- Arrival and dispersal of guests should be carefully managed, to ensure noise due to outdoor sources is minimised.

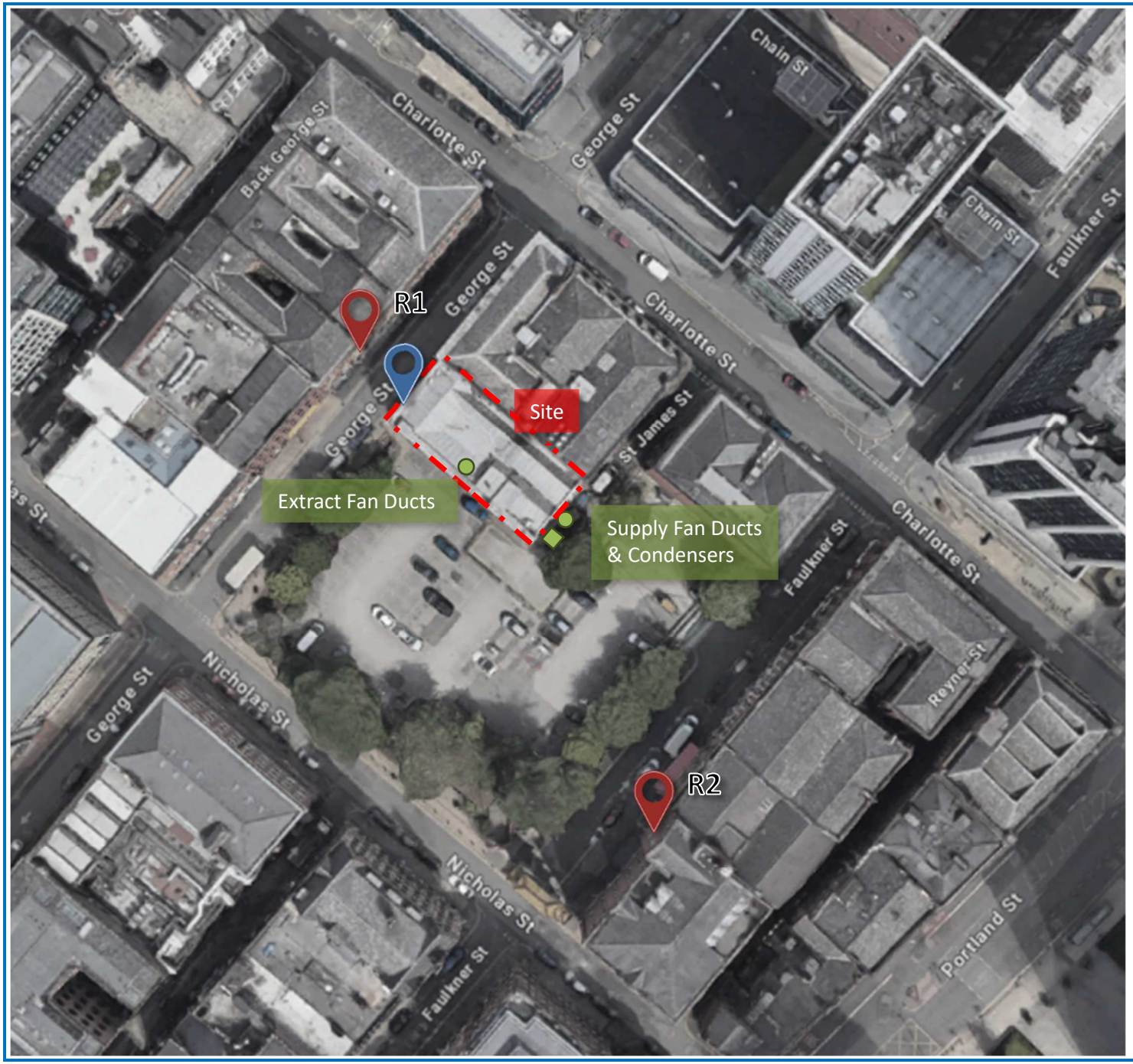
8.0 CONCLUSION

An environmental noise survey has been undertaken at 19-21 George Street, Manchester. The results of the survey have enabled criteria to be set for noise emissions from the proposed plant and operation of the restaurant in accordance with the requirements of the Manchester City Council, including stricter criteria set out to specifically limit low frequency entertainment noise.

A noise impact assessment has then been undertaken using manufacturer noise data to predict the noise levels, due to the proposed plant, at the nearby noise sensitive receivers.

Calculations show that noise emissions from the proposed units should meet the requirements of the Manchester City Council with the recommended mitigation installed as stated herein.

A further assessment of noise breakout due to internal activities has been undertaken, with suitable noise limits predicted to ensure no adverse effects on the amenity of nearby residents.



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N

Not to scale

Description:
Indicative site plan showing noise monitoring position and nearest sensitive receiver

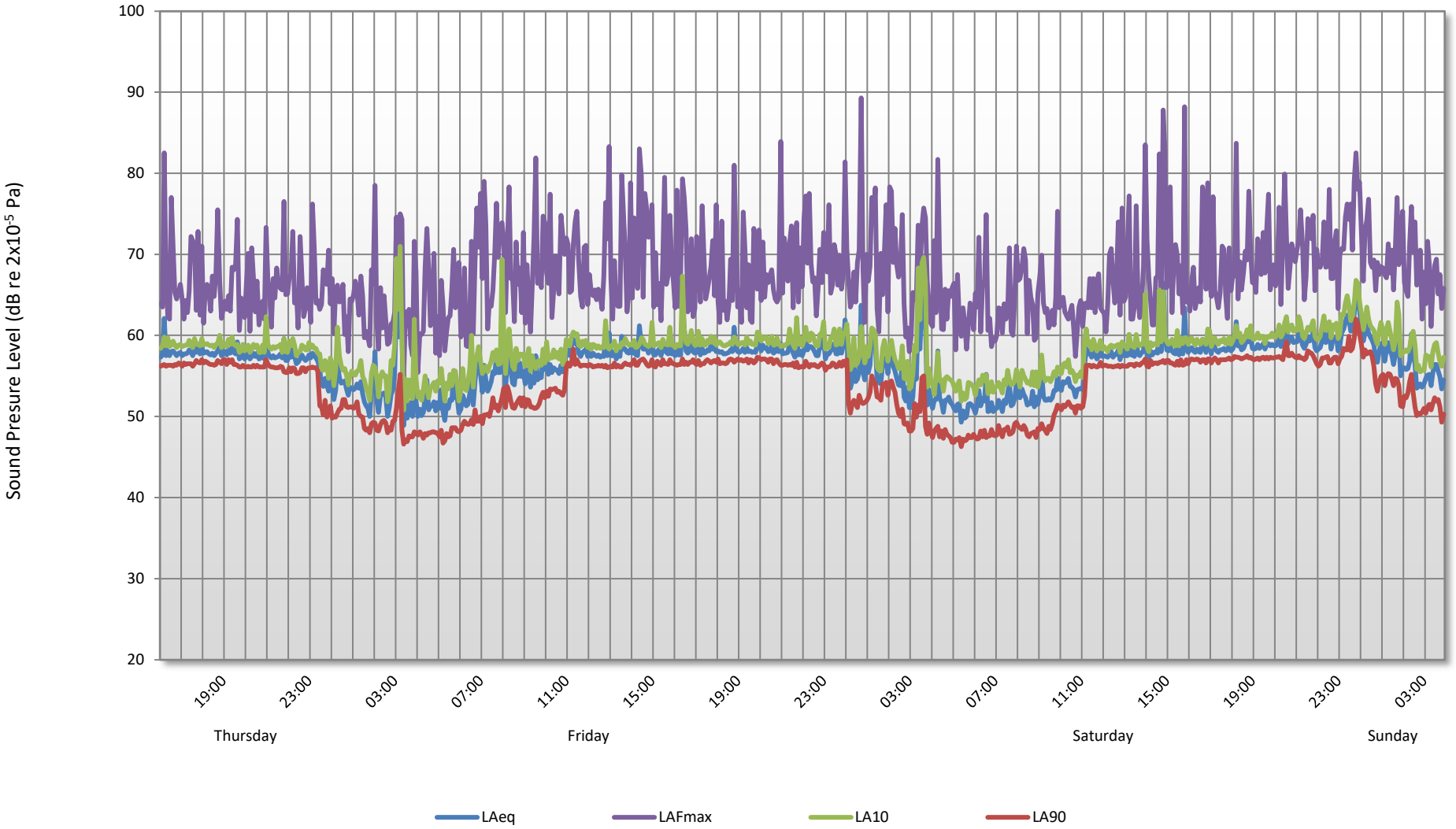
Date	05 August 2025
Reference	19373-SP1
Project Name	Basement, 19-21 George Street
Image ©	Google Earth

Key:	
	Unattended Noise Survey Position
	Noise Sensitive Receiver
	Plant Locations

Basement 19-21 George Street Manchester

Position 1

Environmental Noise Time History
19 September 2024 to 22 September 2024



APPENDIX A

GLOSSARY OF ACOUSTIC TERMINOLOGY

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for not more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise

L_{90}

This is the level exceeded for not more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 10 such octave bands whose centre frequencies are defined in accordance with international standards.

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than one alone and 10 sources produce a 10 dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3 dB for each doubling of distance.

APPENDIX A

Subjective impression of noise

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.

Appendix B1

Plant Noise Acoustic Calculations

19373

Basement 19-21 George Street Manchester

Receiver 1: 46 George Street

External Plant Noise Emissions Calculation

Description	Frequency, Hz 63	125	250	500	1k	2k	4k	8k	dB(A)
Manufacturer provided sound power level									
Ground Floor Kitchen Supply Fan (TCBTx2/4-500)	65	76	87	88	90	84	77	70	93
Proposed Attenuator	-4	-6	-10	-18	-26	-29	-25	-19	
System Effects	0	3	4	5	5	3	2	0	
Radiating correction, dB	-5	-5	-5	-5	-5	-5	-5	-5	
Distance correction to receiver, dB (41 m) [1]	-32	-32	-32	-32	-32	-32	-32	-32	
Barrier Attenuation	-19	-24	-25	-25	-25	-25	-25	-25	
Sound pressure level at receiver	**24**	**35**	**43**	**37**	**31**	**20**	**16**	**13**	**39**
Manufacturer provided sound power level									
Ground Floor Kitchen Extract Fan (CVAT/4-12000/560N)	63	78	78	81	81	78	71	60	85
Proposed Attenuator	-1	-2	-5	-9	-13	-10	-7	-5	
System Effects	-20	-15	-7	-1	1	-2	-3	-5	
Radiating correction, dB	-8	-8	-8	-8	-8	-8	-8	-8	
Distance correction to receiver, dB (30 m) [1]	-30	-30	-30	-30	-30	-30	-30	-30	
Sound pressure level at receiver	**5**	**23**	**29**	**33**	**32**	**29**	**24**	**13**	**36**
Manufacturer provided sound power level									
Basement Market Extract Fan (CVAT/4-9000/560N)	58	73	74	7	77	75	67	57	80
Proposed Attenuator	-1	-2	-5	-9	-13	-10	-7	-5	
System Effects	-18	-13	-5	-1	0	-4	-5	-7	
Radiating correction, dB	-8	-8	-8	-8	-8	-8	-8	-8	
Distance correction to receiver, dB (30 m) [1]	-30	-30	-30	-30	-30	-30	-30	-30	
Sound pressure level at receiver	**2**	**21**	**27**	**-40**	**26**	**23**	**17**	**7**	**29**
Indicative sound pressure level									
GREE KF-120TW	84	71	63	59	52	46	39	33	63
Correction for Multiple Units (2 Units)	3	3	3	3	3	3	3	3	
Correction for Reflections	3	3	3	3	3	3	3	3	
Distance correction to receiver, dB (41 m) [1]	-32	-32	-32	-32	-32	-32	-32	-32	
Barrier Attenuation	-19	-24	-25	-25	-25	-25	-25	-25	
Sound pressure level at receiver	**58**	**45**	**37**	**33**	**26**	**20**	**13**	**7**	**36**
Combined Sound Pressure Level at Reciever	**58**	**45**	**44**	**40**	**36**	**31**	**25**	**17**	**42**

[1] Distance loss calculated assuming Point Source attenuation (*typically used where distance is more than 3x the largest source dimension*)

Design Criterion	**43**

BS 8233 Assessment Calculation

Description	Frequency, Hz 63	125	250	500	1k	2k	4k	8k	dB(A)
Sound pressure level outside window	58	45	44	40	36	31	25	17	42
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	**43**	**30**	**29**	**25**	**21**	**16**	**10**	**2**	**27**

Design Criterion	**30**

Appendix B1

Receiver 2: Faulkner Court

External Plant Noise Emissions Calculation

Description	Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Manufacturer provided sound power level									
Ground Floor Kitchen Supply Fan (CVAT/4-12000/560N)	65	76	87	88	90	84	77	70	93
Proposed Attenuator	-4	-6	-10	-18	-26	-29	-25	-19	
System Effects	0	3	4	5	5	3	2	0	
Radiating correction, dB	-5	-5	-5	-5	-5	-5	-5	-5	
Distance correction to receiver, dB (41 m) [1]	-33	-33	-33	-33	-33	-33	-33	-33	
Sound pressure level at receiver	**23**	**35**	**43**	**37**	**31**	**20**	**16**	**13**	**38**
Manufacturer provided sound power level									
Ground Floor Kitchen Extract Fan (CVAT/4-12000/560N)	63	78	78	81	81	78	71	60	85
Proposed Attenuator	-1	-2	-5	-9	-13	-10	-7	-5	
System Effects	-20	-15	-7	-1	1	-2	-3	-5	
Radiating correction, dB	-8	-8	-8	-8	-8	-8	-8	-8	
Distance correction to receiver, dB (53 m) [1]	-35	-35	-35	-35	-35	-35	-35	-35	
Sound pressure level at receiver	**0**	**18**	**24**	**28**	**26**	**23**	**18**	**7**	**30**
Manufacturer provided sound power level									
Basement Market Extract Fan (CVAT/4-9000/560N)	58	73	74	7	77	75	67	57	80
Proposed Attenuator	-1	-2	-5	-9	-13	-10	-7	-5	
System Effects	-18	-13	-5	-1	0	-4	-5	-7	
Radiating correction, dB	-8	-8	-8	-8	-8	-8	-8	-8	
Distance correction to receiver, dB (56 m) [1]	-35	-35	-35	-35	-35	-35	-35	-35	
Sound pressure level at receiver	**-4**	**15**	**21**	**-46**	**21**	**18**	**12**	**2**	**24**
Indicative sound pressure level									
GREE KF-120TW	84	71	63	59	52	46	39	33	63
Correction for Multiple Units (2 Units)	3	3	3	3	3	3	3	3	
Correction for Reflections	3	3	3	3	3	3	3	3	
Distance correction to receiver, dB (45 m) [1]	-33	-33	-33	-33	-33	-33	-33	-33	
Sound pressure level at receiver	**57**	**44**	**36**	**32**	**25**	**19**	**12**	**6**	**36**
Combined Sound Pressure Level at Reciever	**57**	**44**	**44**	**38**	**33**	**26**	**21**	**15**	**40**

[1] Distance loss calculated assuming Point Source attenuation (*typically used where distance is more than 3x the largest source dimension*)

Design Criterion	**43**

BS 8233 Assessment Calculation

Description	Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Sound pressure level outside window	57	44	44	38	33	26	21	15	40
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	**42**	**29**	**29**	**23**	**18**	**11**	**6**	**0**	**25**

Design Criterion	**30**

Appendix B2

Restaurant Operations Acoustic Calculations

19373

19-21 George Street, Manchester

$$SPL_{outdoor} = SPL_{indoor} - SRI_{composite} + 10log_{10}S - 20log_{10}r - 14$$

Night-time Operation

Basement Noise Emissions Calculation

Description	Frequency, Hz								dB(A)
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	
Measured operation sound levels									
Internal Noise Level	83	80	86	86	81	73	65	60	86
SRI Composite - Front Façade	-29	-27	-31	-39	-43	-42	-42	-42	
Correction for Surface Area of Breakout Point (27 m^2)	29	29	29	29	29	29	29	29	
Distance correction to receiver, dB (11 m)	-21	-21	-21	-21	-21	-21	-21	-21	
Correction for indoor to outdoor conditions	-14	-14	-14	-14	-14	-14	-14	-14	
Sound pressure level at receiver	**48**	**47**	**49**	**41**	**32**	**25**	**16**	**11**	**43**
Design Criterion	**48**	**47**	**45**	**40**	**38**	**32**	**25**	**19**	**43**