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20706-NIA-01-AB-R1

Noise Impact Assessment

Project Number
20706

Issued For
DTS Development

EXECUTIVE SUMMARY

This noise impact assessment has been undertaken in order to assess a proposed plant installation for commercial use at 44 King Street, Manchester.

The proposed plant installation comprises the following plant units:

- 2 No. Daikin Air source heat pump Units.
- 1 No. Samsung Heat Recovery Unit.

A background noise survey has been undertaken as detailed in the report, in order to determine an appropriate noise emission criterion, in accordance with the requirements of Manchester City Council.

Calculations were undertaken for the nearest receiver, identified as 33 South King Street. 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.

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
- Mitigation is applied as recommended in this report, as follows:
 - Air source heat pumps are restricted to a 'low noise' mode,
 - Manufacturer-supplied acoustic enclosures installed around the air source heat pumps,
 - In-duct attenuators on the heat recovery unit.

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.

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20706-SP1	Indicative Site Plan
20706-TH1	Environmental Noise Time History
Appendix A	Glossary of Acoustic Terminology
Appendix B	Acoustic Calculations

REVISION HISTORY

Issue	Date of Issue	Author	Reviewed	Authorised
R1	12/02/2025			
		Jamie Newton Senior Consultant BEng (Hons) MIOA	Duncan Martin Director BSc (Hons) MIOA	Duncan Martin Director BSc (Hons) MIOA

Issue	Comment
R0	First Issue
R1	Revision due to change in proposed plant installation and mitigation strategy

1.0 INTRODUCTION

Clement Acoustics has been commissioned by DTS Development to measure existing background noise levels at 44 King Street, Manchester. Measured noise levels have been used to determine noise emissions criteria for a proposed plant installation 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 consists of the basement, ground floor and first floor of 44 King Street, a residential unit bound by King Street to the north, further retail units to the west, an alley and further commercial units to the west and residential building 33 South King Street to the south. The surrounding area is predominantly commercial in nature.

Current proposals are to install two air source heat pump units at first floor level on the south façade of the site, and one heat recovery unit located within the building with ducting to the southern façade of the site. The units will service a commercial unit.

A residential unit at 33 South King Street has been identified as the nearest affected receiver. This nearest noise sensitive receivers was identified through observations on-site. If there are any receivers closer than that identified within this report then a further assessment will need to be carried out. Therefore, the closest noise sensitive receiver should be confirmed by the client before the plant is installed or any noise mitigation measures are implemented.

Locations are shown in attached site plan 20706-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Unattended Noise Survey Procedure

Measurements were undertaken at one position as shown on indicative site drawing 20706-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
UN1	The microphone was mounted on a 1st storey window flat roof at the back of the building. The microphone was positioned >3.5 m in front of any vertical reflective surface. ^[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 ‘*Methods for rating and assessing industrial and commercial sound*’ (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 17:00 on 15 December 2025 and 16:00 on 17 December 2025.

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 had light winds and occasional precipitation. It is understood that the weather conditions during the unattended survey remained dry with light winds until 08:00 on 17 December when rain began, and so noise data measured between 08:00 – 16:00 on 17 December have been excluded from this assessment.

Outside of data excluded from this assessment, it is considered that the weather conditions did not significantly 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 summarised in Table 3.2.

Position	Instrument	Manufacturer	Type
UN1	Class 1 sound level meter ^[1]	01dB	Solo
-	Class 1 sound level meter calibrator ^[1]	Norsonic	1251

Table 3.2 Instrumentation used during the survey

Note [1]: Calibration certificates available upon request

4.0 ENVIRONMENTAL NOISE SURVEY 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 20706-SP1. Measured noise levels are shown as a time history in Attachment 20706-TH1, with average ambient and typical background noise levels summarised in Table 4.1.

	Time Period	Average ambient noise level $L_{Aeq}: T, dB$	Typical background noise level $L_{A90}: 5min, dB$
UN1	Daytime (07:00 - 23:00)	56	55
	Night-time (23:00 - 07:00)	49	43

Table 4.1 Average ambient and typical background noise levels

5.0 NOISE CRITERIA

5.1 Local Authority Criteria

Based on previous projects within the Manchester area, it is understood that the Manchester City Council general plant noise emissions criteria are as follows:

“Any externally mounted ancillary plant or fan/ducting equipment 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”

It is understood that the proposed plant units will be for commercial use, but could be in use at any time during a 24 hour period.

Based on the results of the environmental noise survey and requirements of Manchester City Council, Table 5.1 presents the proposed plant noise emission criteria.

Period	Plant Noise Emission Limit $L_{Aeq,T}$, dB
Daytime (07:00 - 23:00)	50
Night-time (23:00 - 07:00)	38

Table 5.1 Plant noise emission limits

6.0 PLANT NOISE IMPACT ASSESSMENT

6.1 Proposed Installation

The proposed plant installation comprises the following:

- 2 No. Daikin RZAG125N Air Source Heat Pump units*
- 1 No. Samsung AN080JSKL heat recovery unit

** Restricted to Low-Noise operations, and located in a manufacturer provided acoustic enclosure*

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.

It should be noted that in-duct sound power levels were not available from the manufacturer, and so in-duct levels have been taken from a similar unit with the same stated noise breakout levels (Daikin ALB03LBS).

Unit		Sound pressure Level at 1 m in each Frequency Band, Hz								
		63	125	250	500	1k	2k	4k	8k	dB(A)
Daikin RZAG125N Air Source Heat Pump Low Noise and with Enclosure		45	50	37	30	15	6	3	7	35
Sound power Level in each Frequency Band, Hz										
Samsung AN080JSKL heat recovery unit	Fresh Air Inlet	62	64	62	53	51	46	32	20	58
	Exhaust Outlet	67	72	76	74	65	64	56	48	74

Table 6.1 Manufacturer provided noise emissions levels

6.2 Consideration of Penalties

BS 4142 provides guideline penalties that can be applied to noise emissions to account for tonality, impulsivity and intermittency. Where a sound source is neither tonal nor impulsive, but is still distinctive against the residual acoustic environment, a penalty may still be applied.

The available penalties for different characteristics are summarised in **Error! Reference source not found..**

Characteristic	Comments	Maximum Penalty
Tonality	Can be converted to 2 dB for a tone which is just perceptible, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible	+6 dB
Impulsivity	Can be converted to 3 dB for impulsivity which is just perceptible, 6 dB where it is clearly perceptible and 9 dB where it is highly perceptible	+9 dB
Intermittency	When the sound has identifiable on/off conditions	+3 dB
Distinctiveness	Intended for sources that are neither tonal nor impulsive, but distinctive against background noise sources	+3 dB

Table 6.2 Available penalties according to BS 4142

6.2.1 Consideration of Tonality

Air source heat pumps and heat recovery units would not be considered a tonal source of noise.

6.2.2 Consideration of Impulsivity

The proposed plant would not be considered an impulsive source of noise, provided the units are maintained in good working order.

6.2.3 Consideration of Intermittency

In terms of the potential intermittency, the following guidance taken from Section 9.2 of BS 4142 is noted:

“Intermittency

When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.”

For the assessed worst-case periods, the plant is assumed to be in constant operation, in line with the above guidance. It can therefore be determined that there will be no intermittency within that period.

6.2.4 Consideration of Distinctiveness

It is noted that the design target is to achieve a plant noise level that is 5 dB below the background noise level, as described in Section 5.1. As such, plant noise emissions are not expected to be distinctive against the residual noise environment, and no penalty has therefore been applied.

6.3 Proposed Mitigation Measures

In order to meet the proposed criteria stated in Section 5.0, it is recommended that in-duct attenuators are installed to the atmospheric ducts of the heat recovery unit, in addition to proposed measures being applied to the heat pumps.

Based on the information provided, attenuators meeting the sound reduction indices as stated in Table 6.3 installed on both the fresh air inlet duct and exhaust outlet duct should be suitable.

Mitigation	Required Attenuation (dB) in each Frequency Band, Hz							
	63	125	250	500	1k	2k	4k	8k
Fresh Air Attenuator ^[1]	2	4	6	10	27	3	7	7
Exhaust Attenuator ^[2]	3	7	11	20	39	23	8	7

Table 6.3 Required attenuation from proposed attenuator

[1] Performance based on client provided Blouberg Ventilatoren attenuator data – Product SD200/600

[2] Performance based on client provided Blouberg Ventilatoren attenuator data – Product SD200/1200

6.4 Noise Impact Assessment

The closest receiver has been identified as the window on the southern façade of a 33 South King Street, a residential property 7 m south of the site, on the opposite side of a light-well.

Taking into account all necessary acoustic corrections, the resulting noise level at the identified residential windows would be as shown in Table 6.4. Detailed calculations are shown in Appendix B.

Receiver	Design Criterion	Noise Level at Receiver (due to proposed plant)
Nearest Residential Property	38 dB(A)	37 dB(A)

Table 6.4 Noise levels and project criterion at noise sensitive receivers

As presented in Table 6.4 and Appendix B, the proposed plant installation with suitable operation restrictions, an acoustic enclosure and in-duct attenuators would be expected to meet the requirements of the proposed criteria.

6.5 British Standard 8233: 2014 Guidelines

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'* (BS 8233: 2014) 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 30 dB(A) as being acceptable internal sleeping conditions during night-time.

With loudest external levels of 38 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 6.5.

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)	22 dB(A)

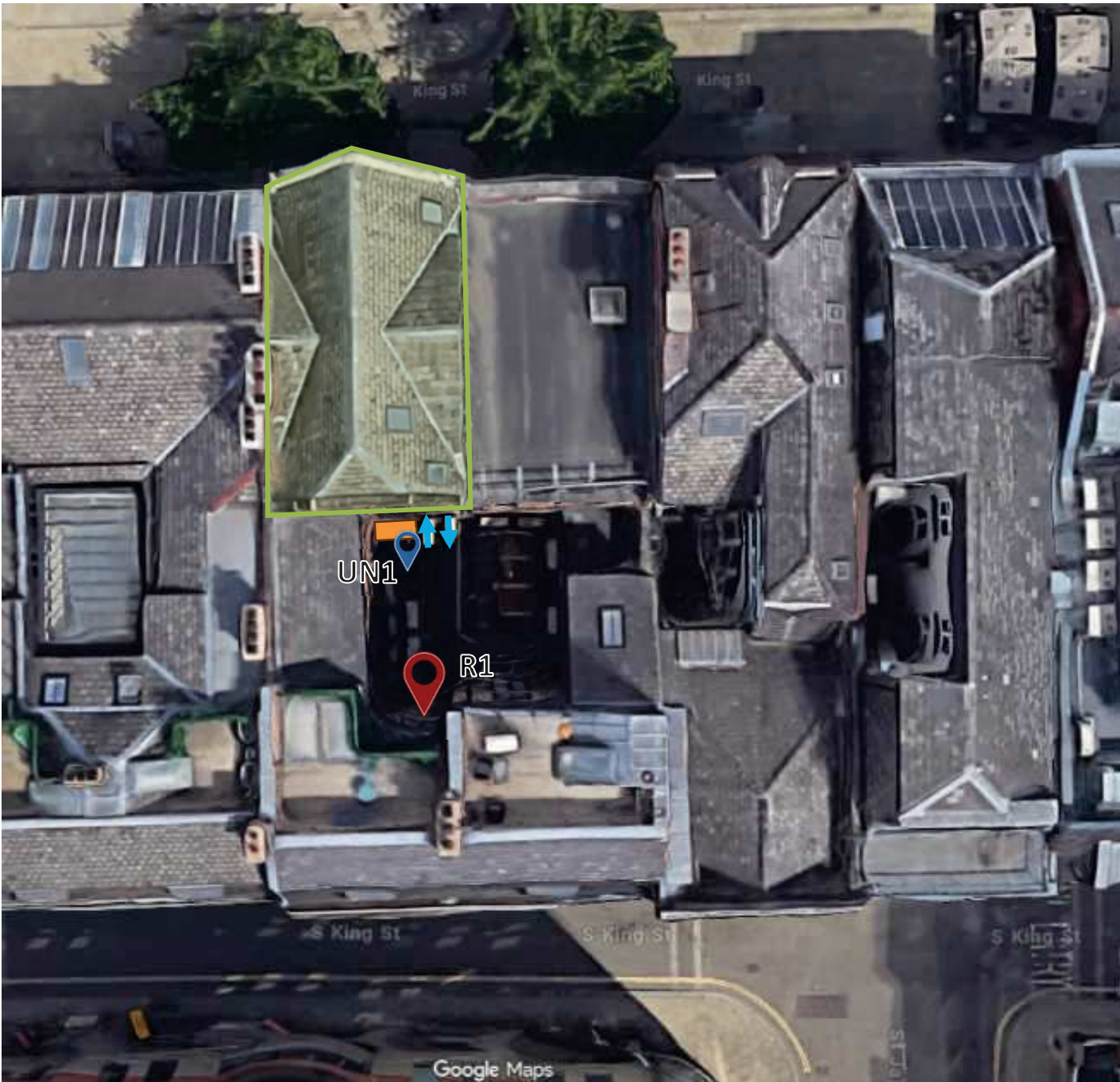
Table 6.5 Noise levels and BS 8233: 2014 criteria inside nearest residential space

7.0 CONCLUSION

An environmental noise survey has been undertaken at 44 King Street, Manchester. The results of the survey have enabled criteria to be set for noise emissions from the proposed plant in accordance with the requirements of the Manchester City Council.

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 receiver.

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.



Description:

Indicative site plan showing noise monitoring position, proposed plant location and nearest sensitive receiver

Not to scale

Date	22 December 2025
Reference	20706-SP1
Project Name	44 King Street, Manchester
Image ©	Google Earth

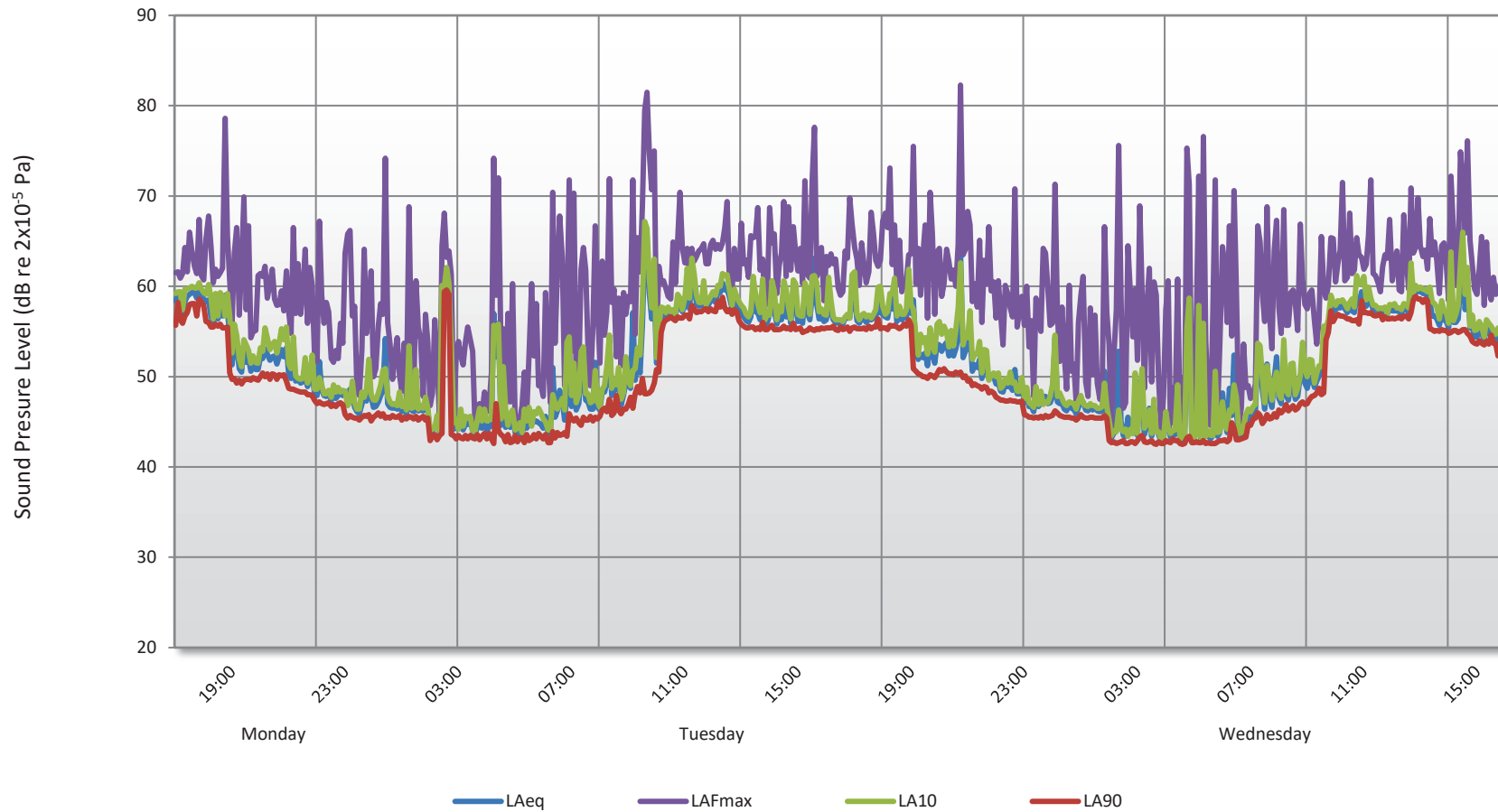
Key:

	Unattended Noise Survey Position
	Noise Sensitive Receiver
	Site Location
	Proposed Condenser Location
	Proposed Duct Termination Location

44 King Street, Manchester

Position UN1

Environmental Noise Time History
15 December 2025 to 17 December 2025



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.

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.

Acoustic Calculations

20706

44 King Street, Manchester

Receiver 1: 33 South King Street

External Plant Noise Emissions Calculation

Description	63	125	250	Frequency, Hz				8k	dB(A)
	500	1k	2k	4k					
Manufacturer provided sound pressure level									
Daikin RZAG12SNV1 Air Source Heat Pump - Low Noise, With Enclosure	45	50	37	30	15	6	3	7	36
Correction for Multiple Units (2 units)	3	3	3	3	3	3	3	3	
Correction for reflections (Quarter-Spherical)	6	6	6	6	6	6	6	6	
Distance correction to receiver, dB (7 m) ^[1]	-17	-17	-17	-17	-17	-17	-17	-17	
Condenser Sound pressure level at receiver	37	42	29	22	7	-2	-5	-1	28
	2	4	6	10	27	3	7	7	
Samsung AN080JSKL Supply Inlet	62	64	62	53	51	46	32	20	58
Correction for end reflections	-7	-3	-1	0	0	0	0	0	
Proposed Attenuator (SD200/600)	-2	-4	-6	-10	-27	-3	-7	-7	
Correction for Hemi-spherical radiation	-5	-5	-5	-5	-5	-5	-5	-5	
Distance correction to receiver, dB (7 m) ^[1]	-17	-17	-17	-17	-17	-17	-17	-17	
Supply Inlet Sound Pressure at Reciever	31	35	33	21	2	21	3	-9	28
	3	7	11	20	39	23	8	7	
Samsung AN080JSKL Return Outlet	67	72	76	74	65	64	56	48	74
Correction for end reflections	-7	-3	-1	0	0	0	0	0	
Proposed Attenuator (SD200/1200)	-3	-7	-11	-20	-39	-23	-8	-7	
Correction for quarter-spherical radiation	-5	-5	-5	-5	-5	-5	-5	-5	
Distance correction to receiver, dB (7 m) ^[1]	-17	-17	-17	-17	-17	-17	-17	-17	
Supply Inlet Sound Pressure at Reciever	35	40	42	32	4	19	26	19	36
Combined Sound Pressure Level at Reciever	40	45	43	33	10	23	26	19	37

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

Design Criterion

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BS 8233 Assessment Calculation

Description	63	125	250	Frequency, Hz				8k	dB(A)
	500	1k	2k	4k					
Sound pressure level outside window	40	45	43	33	10	23	26	19	37
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	25	30	28	18	-5	8	11	4	22

Design Criterion

30