

**Iklhass Masjid Mosque
Halliwell Lane
Manchester**

Acoustic Planning Report
1414/APR1

6 May 2025

For:

Abdul Hadi Sabawan



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Acoustic Planning Report

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1.0 Introduction

Lighthouse Acoustics has been appointed by Abdul Hadi Sabawan to undertake a detailed sound survey at Ikhass Masjid Mosque, Halliwell Lane, Manchester and to assess atmospheric plant sound emissions from the 6No. condenser units.

In addition, to undertake an assessment of amplified speech from the building 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 6No. condenser units and amplified speech.

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 6No. condenser units to the nearest noise sensitive receptors and to propose mitigation measures where required in order to achieve the requirements of the Local Authority.

To undertake an assessment of amplified speech from the building to the nearest noise sensitive receptor based on measured source noise levels.

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

3.0 Site Description

The Ikhass Masjid Mosque is situated on Halliwell Lane, Manchester and comprises a new build detached 2 storey building with car park.

The site is bound by Greenland Street to the north and east and Halliwell Lane to the south west.

Existing residential properties are situated to the north and east opposite Greenland Street whilst Cheetham C of E Community Academy is situated to the south opposite Halliwell Lane.

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

Condition 5 of planning application number 117640/FO/2017 states the following:

"5) Prior to the first occupation of the development hereby approved, details of any externally mounted ancillary plant, equipment and servicing shall be submitted for approval. The approved scheme shall be implemented prior to the first occupation of the development and thereafter retained and maintained in situ."

With regard to noise and vibration from fixed plant/equipment, Section 3.7.1.5 of the Planning & Noise Technical Guidance document (dated October 2022) 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

Condition 6 of planning application number 117640/FO/2017 states the following:

“6) (a) Prior to the first use of the place of worship hereby approved, the building shall be insulated in accordance with a scheme submitted for approval in writing by the City Council, as Local Planning Authority. (b) The approved scheme shall be implemented and prior to the first use of the building a post construction survey (including appropriate mitigation measures and timescales for implementation if necessary) shall be submitted for approval in writing by the City Council, as Local Planning Authority. The measures agreed thereafter retained and maintained in situ.”

Whilst the Planning & Noise Technical Guidance document (dated October 2022) 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 amplified speech is the dominant sound source of operational activities.

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

5.0 Environmental Sound Survey

5.1 Measurements

Automated environmental sound measurements were undertaken from 11:00 hours on Tuesday 8 April 2025 to 11:00 hours on Wednesday 9 April 2025. 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 the wind conditions were calm (<1m/s) and the sky was scattered cloud. There was no rainfall and road surfaces were dry. The temperature was approximately 13°C.

At the end of the survey period there was a light north easterly breeze (<3m/s) and the sky was scattered cloud. There was no rainfall and road surfaces were dry. The temperature was approximately 11°C.

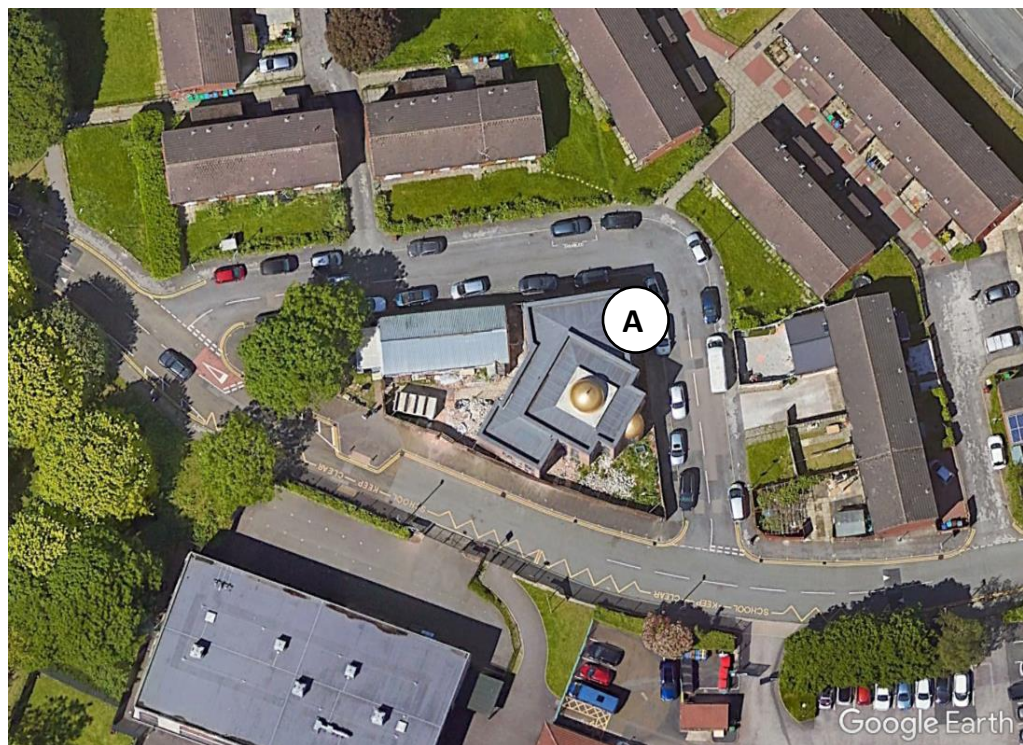
Based on publicly available weather data for the survey period it is understood that weather conditions remained similar for the duration of the survey with no significant periods of rainfall or strong breezes. The weather conditions during the survey period are therefore considered to be suitable for 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 situated at the north east corner of the building at 1.5m above ground level overlooking Greenland Street.

The measurement position is shown on the site plan below.



Site plan showing measurement position

Measurement Position A was selected in order to assess typical environmental sound levels representative of those at the facades of the surrounding noise sensitive receptors.

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	5262813	25/07/2023
Preamplifier	Casella	495	003391	25/07/2023
Microphone	Casella	251	1031	25/07/2023
Class 1 Sound Calibrator	Casella	120/1	3864878	31/10/2024
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 1414/THG1 enclosed at the rear of the report.

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

The lowest representative $L_{A90,15min}$ background sound level measured at Position A during the proposed operating hours (06:00 to 20:00 hours) are detailed in the table below.

Position	Lowest Representative $L_{A90,15min}$ Background Sound Level (dB)
	(06:00–20:00)
A	38

5.6 Discussion of Sound Climate

At the start and end of the survey period the dominant sound source at Position A was noted to be road traffic along Halliwell Lane. During lulls of passing road traffic, road traffic from the surrounding road network contributed towards the measured sound climate.

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 BS 4142: 2014

BS 4142: 2014 "Methods for rating and assessing industrial and commercial sound", describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

- sound from industrial and manufacturing processes;
- sound from fixed installations which comprise mechanical and electrical plant and equipment;
- sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

Sound of an industrial and/or commercial nature does not include sound from the passage of vehicles on public roads and railway systems.

It should be noted that the determination of noise amounting to a nuisance is beyond the scope of BS 4142.

The likely impact is indicated by subtracting the existing background sound level from the rating level of the industrial and/or commercial sound. The standard states that:

- "a) Typically, the greater this difference, the greater the magnitude of the impact.*
- b) A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- c) A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.*
- d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*

Note 2 Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."

The industrial and/or commercial sound is expressed as the specific sound level and given as a $L_{Aeq,Tr}$ sound level. Should the specific sound level exhibit any acoustic features (i.e. tonality, irregularity or impulsiveness) a character correction is applied. The rating level is the specific sound level with character correction applied (if applicable) and is given as a $L_{Ar,Tr}$ sound level.

The existing background sound level is given as a L_{A90} , T sound level.

The reference time interval, T_r , is 1 hour during the daytime period (07:00 to 23:00 hours) and 15 minutes during the night-time period (23:00 to 07:00 hours).

7.0 Atmospheric 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 6No. condenser units which indicates octave band sound data as detailed in the tables below.

2No. Fujitsu AOYG36KATA

Sound Pressure Level at 1m (dB) at Octave Band Centre Frequency (Hz)								dBA
63	125	250	500	1k	2k	4k	8k	
69	63	53	53	50	45	44	42	56

4No. Fujitsu AOYG54KATA

Sound Pressure Level at 1m (dB) at Octave Band Centre Frequency (Hz)								dBA
63	125	250	500	1k	2k	4k	8k	
73	68	63	57	55	52	47	43	61

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 6No. condenser units have the potential to operate between 06:00 and 20:00 7 days a week.

In order to undertake a worst case assessment, it is assumed that the 6No. condenser units will operate for the full 1 hour daytime/15 minute night-time assessment period.

7.3 Plant Location

The 6No. condenser units are situated externally on the northern end of the eastern façade of the building.

7.4 Nearest Noise Sensitive Receptors

It is understood that the nearest noise sensitive receptors are the existing residential properties situated to the east opposite Greenland Street. The residential properties have windows in the west façades which look towards the 6No. condenser units. The distance between the 6No. condenser units and the nearest residential window is estimated to be approximately 17m.

7.5 Calculation

The assessment has been undertaken in accordance with generally accepted acoustic principles for building services plant items.

7.6 Assessment

The results of the assessment are summarised in the following table.

Nearest Noise Sensitive Receptor	Rating Level $L_{r,T}$ at Receptor (dB)	Lowest Representative Background Sound Level $L_{A90,15min}$ at Receptor (dB)	Difference (dB)	BS 4142: 2014 Likely Impact
Residential window to the east	46	38	+8	Significant Adverse Impact

The assessment indicates that atmospheric plant sound emissions from the 6No. condenser units are likely to have a significant adverse impact at the nearest noise sensitive receptor whilst the requirements of the Local Authority are exceeded by 13dB.

7.7 Mitigation Measures

In order to achieve the Local Authority's requirement of not to exceed 5dB below the lowest background noise level the 6No. condenser units require attenuation measures which can provide a reduction of at least 13dB.

In order to achieve these reductions, an acoustic louvred enclosure should be considered around the 6No. condenser units. Acoustic louvres with a depth of 150mm would typically be expected to provide ~14dB attenuation, as specified in the Acoustic Specification for Acoustic Louvred Enclosure which is enclosed at the rear of the report.

7.8 Repeat Assessment with Mitigation Measures

The results of the repeat assessment with mitigation measures are summarised in the following table.

Nearest Noise Sensitive Receptor	Rating Level $L_{r,T}$ at Receptor (dB)	Lowest Representative Background Sound Level $L_{A90,15min}$ at Receptor (dB)	Difference (dB)	BS 4142: 2014 Likely Impact
Residential window to the east	32	38	-6	Low Impact

The assessment indicates that atmospheric plant sound emissions from the 6No. condenser units are likely to have a low impact at the nearest noise sensitive receptor whilst the requirements of the Local Authority are achieved by 1dB.

8.0 Context

BS 4142: 2014 states the following with regard to the context of the industrial/commercial sound:

"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."

In addition, BS 4142: 2014 states the following:

"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following."

1) The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.

Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.

2) The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it.

3) The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:

- i) facade insulation treatment;*
- ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and*
- iii) acoustic screening."*

"The standard is not intended to be applied to the assessment of indoor sound levels."

In order to place the industrial sound in context the following points have therefore been considered:

- Attenuation measures have been proposed where required in order to reduce the sound emissions from the 6No. condenser units;
- The rating levels at the nearest receptors with the incorporation of the attenuation measures will be 5dB below the lowest representative background sound levels;

- BS 4142:2014 only uses outdoor sound levels to assess the likely effects of sound and does not consider indoor sound levels within nearest receptors which may be significantly lower due to the sound insulation offered by the façade;
- Sound emissions from the 6No. condenser units are broadband and steady and are therefore unlikely to be distinguishable from the environmental sound climate.

Based on the above, it is considered that the 6No. condenser units are likely to have a low impact during the daytime and night-time periods at the nearest noise sensitive receptors with the incorporation of the proposed mitigation measures. This conclusion is reached by professional judgement, taking context into consideration.

9.0 Uncertainty

Weather conditions during the survey period are considered to be suitable for undertaking measurements of sound levels. The measurement position was selected that was representative of the nearest noise sensitive receptor. Measurements were undertaken over a 24-hour period to establish the lowest representative environmental sound levels. Whilst environmental sound levels have the potential to be lower than those measured on some occasions, they are likely to be similar to those measured for the vast majority of the time. As such, uncertainty in the survey methodology is considered to be of marginal significance.

The survey was undertaken using Class 1 equipment which had been calibrated within the required intervals. In addition, field calibration checks were performed on the sound level meters prior to and on completion of the survey and were found to be within acceptable tolerance limits. As such, uncertainty in the survey equipment is considered to be of negligible significance.

Assessment data including sound data and operating hours has been based on manufacturers sound data, measured sound data and information received from others. A character correction has been applied as deemed appropriate. As such, uncertainty in the assessment data is considered to be of marginal significance.

Calculations have been undertaken in accordance with recognised procedures and have been performed in a spreadsheet. As such, uncertainty in the assessment is considered to be of negligible significance.

Based on the above, overall uncertainty in the assessment is considered to be of marginal significance.

10.0 Amplified Speech Assessment

10.1 Introduction

Measured amplified speech L_{Aeq} sound levels are assessed to the windows of the nearest noise sensitive receptors against the lowest representative $L_{A90,15min}$ background sound level measured at Position A during the proposed operating hours.

10.2 Operating Hours

It is understood that the amplified speech system is used on Fridays only for congregational prayer and that the sound level is kept to a minimum acceptable level for clear internal communication.

10.3 $L_{Aeq,T}$ Operational Sound Levels

Lighthouse Acoustics visited site between 10:30 and 11:00 hours on Tuesday 8 April 2025 to undertake measurements of the amplified speech levels within the building.

The following equipment was used to undertake the sound level measurements.

Equipment	Manufacturer	Model	Serial No.	Calibration Date
Class 1 Sound Level Meter	Bruel & Kjaer	2250	2626230	01/11/2024
Preamplifier	Bruel & Kjaer	ZC-0032	21309	01/11/2024
Microphone	Bruel & Kjaer	4189	2621208	04/11/2024
Class 1 Sound Calibrator	Casella	120/1	3864878	31/10/2024

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.

Amplified speech L_{Aeq} sound levels were measured within the building as 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	
Amplified speech	52	55	49	49	42	36	28	22	49

10.4 $L_{A90,T}$ Background Sound Level

The lowest representative $L_{A90,15min}$ background sound level measured at Position A during the proposed operating hours (06:00 to 20:00 hours) is detailed in the table below.

Position	Lowest Representative $L_{A90,15min}$ Background Sound Level (dB)
	(06:00–20:00)
A	38

10.5 Existing Construction

The existing building façade comprises the following constructions.

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

The following Sound Reduction Indices have been allowed for the existing 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	20	24	20	25	34	37	35	39

The area of the façade facing the nearest noise sensitive receptors to the east is approximately 12m². Windows and doors must remain closed during operational periods.

10.6 Nearest Noise Sensitive Receptors

It is understood that the nearest noise sensitive receptors are the existing residential properties situated to the east opposite Greenland Street. The residential properties have windows in the west façades which look towards the building. The distance between the building facade and the nearest residential window is estimated to be approximately 22m.

10.7 Calculation

The sound pressure level radiated from the façade due to amplified speech 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.

10.8 Results

The calculated amplified speech L_{Aeq} operational sound levels incident upon the windows of the nearest noise sensitive receptors due to breakout through the façade are presented in the table below.

Nearest Noise Sensitive Receptor	Calculated L_{Aeq} (dB)
Residential Properties to the east	<10

The assessment indicates that amplified speech L_{Aeq} operational sound levels incident upon the windows of the nearest noise sensitive receptors due to breakout through the front façade will be <10dB.

The proposed requirement to achieve the representative L_{A90} background sound level of 38dB at the windows of the nearest noise sensitive receptors should therefore be achieved.

11.0 Conclusions

The Local Authority's acoustic requirements for the 6No. condenser units and amplified speech have been established.

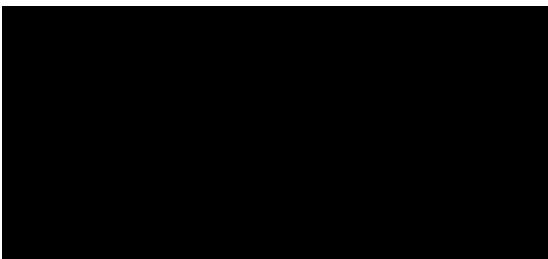
A detailed environmental sound survey has been undertaken in order to establish existing environmental sound levels at the site.

An assessment of atmospheric sound emissions from the 6No. condenser units to the nearest noise sensitive receptors has been undertaken.

Taking context into consideration, the proposed 6No. air source heat pump units are likely to have a low impact during the daytime and night-time periods at the nearest noise sensitive receptors and achieve the Local Authority's acoustic requirements with the incorporation of the proposed mitigation measures.

An assessment of amplified speech from the building to the nearest noise sensitive receptors has been undertaken.

The amplified speech is likely to achieve the proposed requirement to achieve the representative L_{A90} background sound level at the windows of the nearest noise sensitive receptors.



Ikhass Masjid, Halliwell Lane, Manchester
Time History Graph - Tuesday 8 April 2025 to Wednesday 9 April 2025
 $L_{Amax,15min}$, $L_{Aeq,15min}$ & $L_{A90,15min}$ Noise Levels at Position A

