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# AL FALAH MASJID, 96 HEYWOOD STREET, CHEETHAM HILL, MANCHESTER,

## NOISE IMPACT ASSESSMENT

Report **17578-NIA-01 RevA**

Prepared on 16 September 2022

Issued For:

**Anwar Nyer**

**94 - 96 Heywood Street**

**Manchester**

**M8 0TD**



## Executive Summary

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This noise impact assessment has been undertaken in order to assess proposed first floor school spaces at Al Falah Masjid, 96 Heywood Street, Cheetham Hill, Manchester.

The proposed school spaces will consist of two classrooms, a library space, a meeting room and an office.

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 British Standard 4142:2014.

Calculations were undertaken for the nearest identified receiver, identified as an adjacent house on Wordsworth Avenue and an opposite house on Heywood 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, dependant on the following material considerations:

- The school could be in use between 17:00 and 19:00 on weekdays only, which has been confirmed with the Client
- The noise emissions data for the proposed activities do not exceed the levels assumed in this assessment
- Source and receiver locations are as established in this report and marked on the attached site plan

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.

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| Appendix A | Glossary of Acoustic Terminology |
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| Document Revision | Date of Revision | Reasons for Revision                                   | Revision By        |
|-------------------|------------------|--------------------------------------------------------|--------------------|
| 0                 | 04/07/2022       | First Issue                                            | Jamie Newton AMIOA |
| RevA              | 16/09/2022       | Added extra explanation around calculations undertaken | Duncan Martin MIOA |

## 1.0 INTRODUCTION

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Clement Acoustics has been commissioned by Anwar Nyer to measure existing background noise levels at Al Falah Masjid, 96 Heywood Street, Cheetham Hill, Manchester. Measured noise levels have been used to determine noise emissions criteria for a school 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

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Proposals are to extend an existing temple premise at first floor level include a school space consisting of two classrooms, a library space, a meeting room and an office. It is understood that taught lessons will take place in the classrooms, while independent learning will happen in the library, and small meetings and office work will occur in the meeting room and office

The site is bound by Heywood Street to the west, Kelvin Grove to the north, Wordsworth Avenue to the south and residential premises to the east. The surrounding area is predominantly residential in nature.

As the school will be providing after-school classes, it is understood that the school will operate between the hours of 17:00 and 19:00 on weekdays only.

The nearest residential window (Receiver 1) has been identified as a first floor south facing window at 18 Wordsworth Avenue, approximately 6 m east of the site.

A second receiver (Receiver 2) has been identified as the front façade of housing on Heywood Street, approximately 25 m from the site.

The locations of the identified receivers are shown in indicative site plan 17578-SP1.

These nearest noise sensitive receiver were identified through observations on-site. If there are any receivers closer to 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.

### 3.0 ENVIRONMENTAL NOISE SURVEY

#### 3.1 Unattended Noise Survey Procedure

Measurements were undertaken at one position as shown on indicative site drawing 17578-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 1 <sup>st</sup> storey flat roof at the south of the building. The microphone was positioned 2 m in front of the wall. <sup>[1]</sup> |

**Table 3.1: Description of unattended monitoring locations**

**Note [1]:** The position was not considered to be free-field according to guidance found in BS 4142: 2014, and a correction for reflections has therefore been applied. Based on the presence of the reflective surface and the nature of surrounding noise sources, a correction for reflections of 3 dB has been applied, in line with the recommendations of the standard.

Continuous automated monitoring was undertaken for the duration of the survey between 15:30 on 6 June 2022 and 15:00 on 8 June 2022.

The measurement procedure generally complied with BS 7445: 1991: '*Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use*'.

#### 3.2 Weather Conditions

At the time of set-up and collection of the monitoring equipment, the weather conditions were dry with light winds. It is understood that the weather conditions during the unattended survey remained generally dry with light showers during the evening of 7 June to 8 June, and wind speeds below 5 m/s.

Due to anomalous measurements observed during periods of rain, data measured between 22:30 on 7 June and 04:30 on 8 June have been excluded from calculations. This can be seen in the attached time history 17578-TH1.

It is considered that the weather conditions outside of these times did not significantly adversely affect the measurements outside of 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 957 Class 1 Sound Level Meter
- Norsonic Type 1251 Class 1 Calibrator

## 4.0 RESULTS

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### 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 17578-SP1.

Measured noise levels are shown as a time history in Figure 17578-TH1, with average ambient and typical background noise levels summarised in Table 4.1.

It should be noted that the guidance of the latest revision of British Standard 4142: 2014 +A1 2019 '*Methods for rating and assessing industrial and commercial sound*', as detailed in Section 8.1 of the standard is as follows:

*'The objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.'*

Therefore, the typical background noise level will be used for the purpose of this assessment.

| Time Period                                 | Average ambient noise level<br>Leq: T | Minimum/Typical background<br>noise level L <sub>90</sub> : 5min |
|---------------------------------------------|---------------------------------------|------------------------------------------------------------------|
| Daytime<br>(07:00 - 23:00)                  | 53 dB(A)                              | 40 dB(A)                                                         |
| Night-time<br>(23:00 – 07:00)               | 46 dB(A)                              | 28 dB(A)                                                         |
| Proposed Operating Hours<br>(17:00 – 19:00) | 53 dB(A)                              | 39 dB(A)                                                         |

**Table 4.1: Average ambient and minimum background noise levels**

## 5.0 NOISE CRITERIA

### 5.1 External Noise Emissions

In order to assess the likely impact of the proposed activities on nearby residential windows, we would suggest the comparison of anticipated noise emission levels to the minimum measured background noise levels ( $L_{A90}$ ) and provide a rating of impact according to BS 4142: 2014: *Methods for rating and assessing industrial and commercial sound* (BS 4142).

BS 4142 can be seen as a good guide for assessing the suitability of noise emissions to residential receivers from commercial sounds. In a BS 4142 assessment, corrections are applied to measured noise levels in order to calculate a noise rating level for the effects of the source on nearby noise sensitive receivers.

This assessment will compare noise emissions to the operational hours minimum measured background noise level of 39 dB(A) during proposed operating hours.

BS 4142 states that a noise rating of around 5 dB above the background noise level is likely to be an indication of an adverse impact. If the difference is around 10 dB or more, then this is stated as likely to be an indication of a significant adverse impact. Where the rating level does not exceed the background noise level, this is stated as an indication of the sound source having a low impact.

It is understood the Local Authority planning criterion is to achieve a noise emission level that is 5 dB below the measured background noise level.

## 6.0 NOISE IMPACT ASSESSMENT

### 6.1 Proposed Activity

The proposed school spaces will consist of two classrooms, a library space, a meeting room and an office. It has been confirmed by the Client that there will be no amplified music within the new spaces.

In order to present a worst-case scenario, previous measurements of children playing in a playground on a school site have been used in order to predict noise emissions from classroom and library spaces. The measurements used were the loudest 5 minute period in a half hour playtime for a similar number of children (30).

Measurements taken during a meeting of a mixed in-person and remote staff members has been used in order to predict noise emissions from meeting room and office spaces. The measurements used were the loudest 5 minute period in a 15 minute meeting of 8 people.

These source noise levels are shown in Table 6.1.

| Source           | Sound Pressure Level (dB) in each Frequency Band, at source |       |       |       |      |      |      |      | dB(A) |
|------------------|-------------------------------------------------------------|-------|-------|-------|------|------|------|------|-------|
|                  | 63Hz                                                        | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz |       |
| Children Playing | 63                                                          | 57    | 56    | 61    | 64   | 68   | 62   | 51   | 71    |
| Meeting          | 45                                                          | 57    | 63    | 66    | 59   | 58   | 53   | 44   | 66    |

**Table 6.1: Measured Playground Noise Levels**

These levels have been assumed as the source noise for the following spaces:

- Proposed Classroom: Children Playing
- Proposed Library: Children Playing
- Proposed Office: Meeting

## 6.2 Proposed External Building Fabric

It is understood that no mechanical heating / cooling is proposed, therefore it will be assumed that ventilation will be provided by opening windows.

According to BS 8233:2014 '*Guidance on sound insulation and noise reduction for buildings*' (BS 8233), a typical building façade with a partially opened window is expected to offer a minimum sound reduction of 15 dB.

This has been applied as the total reduction offered by the external building fabric.

## 6.3 3D Noise Model

In order to assess the noise impact of proposed activities, noise emissions have been assessed by developing a noise map.

The noise model was constructed using the proprietary noise modelling software package CadnaA. The noise model was constructed utilising the following assumptions and parameters:

- Noise sources are as described in Section 6.1
- Presence of reflecting surfaces
- Hardness of the ground between the sources and receivers
- Attenuation due to atmospheric absorption
- Calculations are performed in spectral frequency bands between 63 Hz and 8 kHz.

The noise map allows the cumulative impact of all proposed spaces operating simultaneously to be assessed at all surrounding receptors.

It should be noted that all calculations in the CadnaA model, including those for distance and screening of intermediate building envelopes are undertaken according to International Standard ISO 9613-2:1996 '*Acoustics – Attenuation of sound during propagation outdoors. Part 2: General method of calculation*'. This standard is the preferred method stated in Bs 4142 to minimise uncertainty.

Figure 6.1 visually represents the modelled development and noise propagation from the identified noise sources.



Figure 6.1: Plan view of noise propagation in 3D noise model

#### 6.4 Noise Impact Assessment

BS 4142 recommends that a 4 dB tonality penalty should be used when an activity is considered tonal and clearly perceptible at the receiver's location. As this could be applicable to the typical noise profile of children playing and a meeting, this has been used in our calculations.

The closest receivers have been identified as a window on the southern facade of 18 Wordsworth Avenue, which is a minimum of 6 m from the proposed site, and a window on the eastern facade of a bungalow on Heywood Street opposite the site, which is a minimum of 25 m from the proposed site.

Taking into account all necessary acoustic corrections, the specific noise level is shown in Table 6.2. The effect of adding the 4 dB tonality penalty is also shown.

| Receiver   | Operation Hours Criterion | Specific Noise Level at Receiver | Penalties | Rating Noise Level at Receiver |
|------------|---------------------------|----------------------------------|-----------|--------------------------------|
| Receiver 1 | 39 dB(A)                  | 32 dB(A)                         | +4 dB     | 36 dB(A)                       |
| Receiver 2 |                           | 32 dB(A)                         | +4 dB     | 36 dB(A)                       |

**Table 6.2: Noise levels and project criterion at noise sensitive receivers**

As presented in Table 6.2 and Appendix B, the specific noise level of proposed school activity would be expected to meet the requirements of the Local Authority.

When the tonality penalty is applied, the noise rating level also demonstrates a level that is indicative of a 'low impact' as defined in BS 4142.

## 6.5 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 dB(A) as being acceptable internal resting conditions during daytime.

With loudest external rating levels of 36 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 6.3.

| Receiver                  | Recommended Target – For resting conditions in a bedroom, in BS 8233: 2014 | Noise Level at Receiver (due to plant installation) |
|---------------------------|----------------------------------------------------------------------------|-----------------------------------------------------|
| Inside Residential Window | 35 dB(A)                                                                   | 21 dB(A)                                            |

**Table 6.3: Noise levels and BS 8233: 2014 criteria inside nearest residential space**

## 7.0 CONCLUSION

An environmental noise survey has been undertaken at Al Falah Masjid, 96 Heywood Street, Cheetham Hill, Manchester. The results of the survey have enabled criteria to be set for noise emissions from the proposed activities in accordance with the requirements of the British Standard 4142:2014.

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

Calculations show that noise emissions from the proposed activities should meet the requirements of the Local Authority and British Standard 4142:2014.

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16 September 2022

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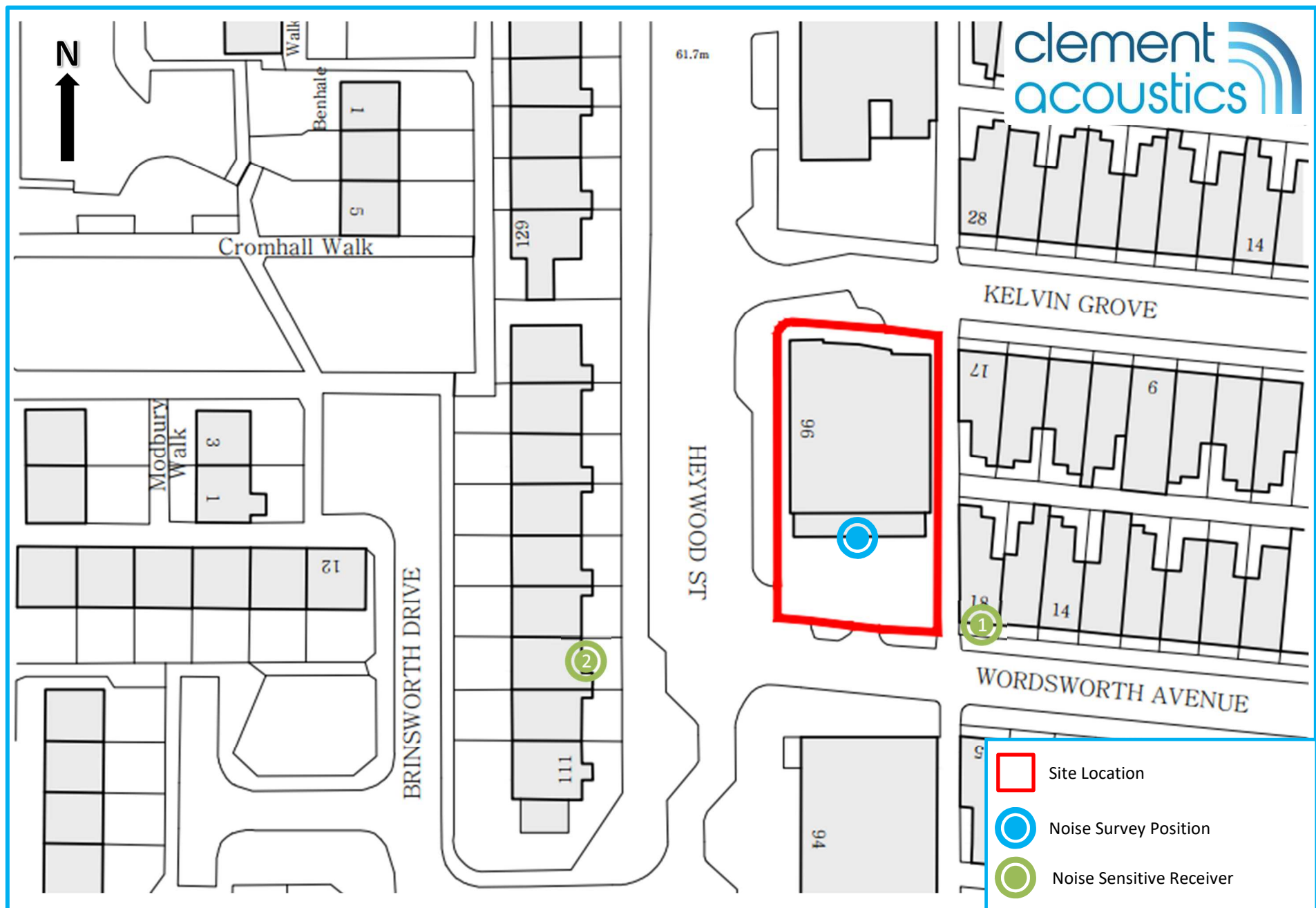


16 September 2022

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16 September 2022

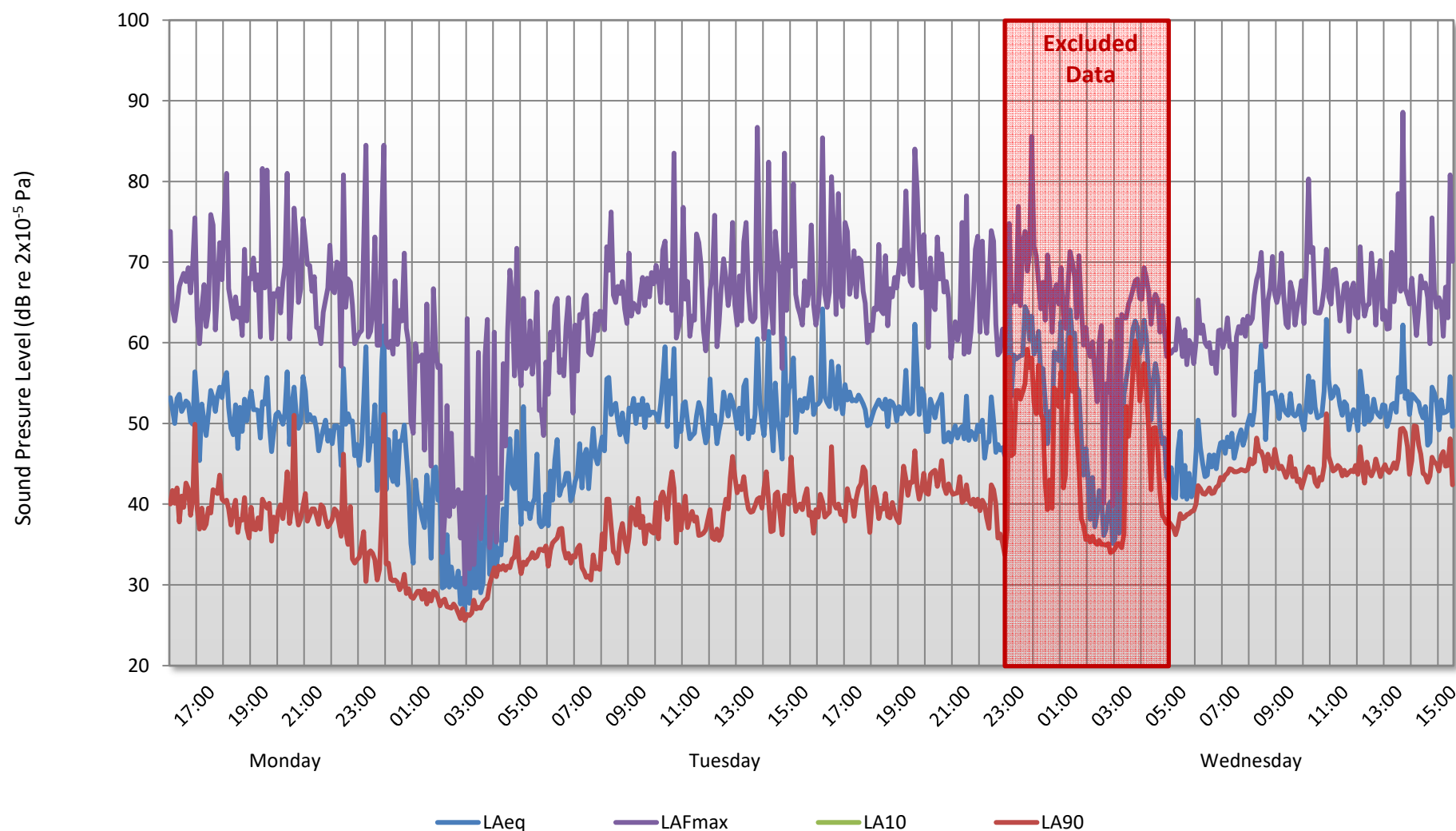


**17578-SP1** Indicative site plan indicating noise monitoring position and nearest noise sensitive receiver

**Date:** 16 September  
2022

# Al Falah Masjid, Cheetham Hill, Manchester

Environmental Noise Time History  
06 June 2022 to 08 June 2022



## 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.

