

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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Al Furqan Centre, 42 Great Southern St, Manchester

Noise report for discharging planning conditions

London, Manchester, Edinburgh, Birmingham, Belfast, Leeds

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Summary

Sandy Brown has been commissioned Al Furqan Islamic Centre Manchester to provide acoustic advice in relation to the proposed development at Al Furqan Islamic Centre Manchester. This report has been prepared with respect to the discharge of two planning conditions related to acoustics.

An environmental noise survey has been carried out to determine the existing sound levels in the area. The noise survey was carried out between 12:00 on 27 February 2024 and 08:30 on 6 March 2024.

The representative typical background sound levels measured during the survey were $L_{A90,15min}$ 46 dB during the day and $L_{A90,15min}$ 41 dB at night.

Based on the requirements of Manchester City Council and on the results of the noise survey, all plant must be designed such that the cumulative noise level at 1 m from the worst affected windows of the nearby noise sensitive premises does not exceed $L_{Aeq,15min}$ 40 dB during the day, and $L_{Aeq,15min}$ 31 dB during the night. These limits are cumulative and apply with all plant operating under normal conditions, and accounting for any penalties for attention catching features (eg, sound emissions as a rating level).

An assessment has been carried out of noise egress from the proposed building services plant associated with the development. The proposed items are expected to comply with the above noise egress limits.

Operational noise egress from activity within the Level 2 extension has also been assessed, with internal amplified sound limits set based on the proposed sealed constructions of the extension, in the region of L_{Aeq} 87 dB. Octave band limits are presented within the report. These limits are not expected to restrict the use of the proposed classroom, library, canteen and office uses.

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1 Introduction

Sandy Brown has been commissioned Al Furqan Islamic Centre Manchester to provide acoustic advice in relation to the proposed development at Al Furqan Islamic Centre Manchester.

As part of this, an environmental noise survey is required, the purpose of which is to establish the existing sound levels on and around the site and to set plant and operational noise egress limits.

This report presents the survey method and results, as well as assessments of plant and operational noise egress with respect to Manchester City Council requirements to discharge the two planning conditions associated with the scheme.

2 Site description

2.1 The site and its surroundings

The site location in relation to its surroundings is shown in Figure 1. The site is bounded by Great Southern Street to the north, Crofton Street west of the site, Santiago Street east of the site and Rutherford Avenue south of the site.

Measurement location 'L' shows the measurement position of the unattended measurements of the site. Pins 1 and 2 show the attended measurement locations, chosen to provide a representative sample of background noise levels surrounding the site.

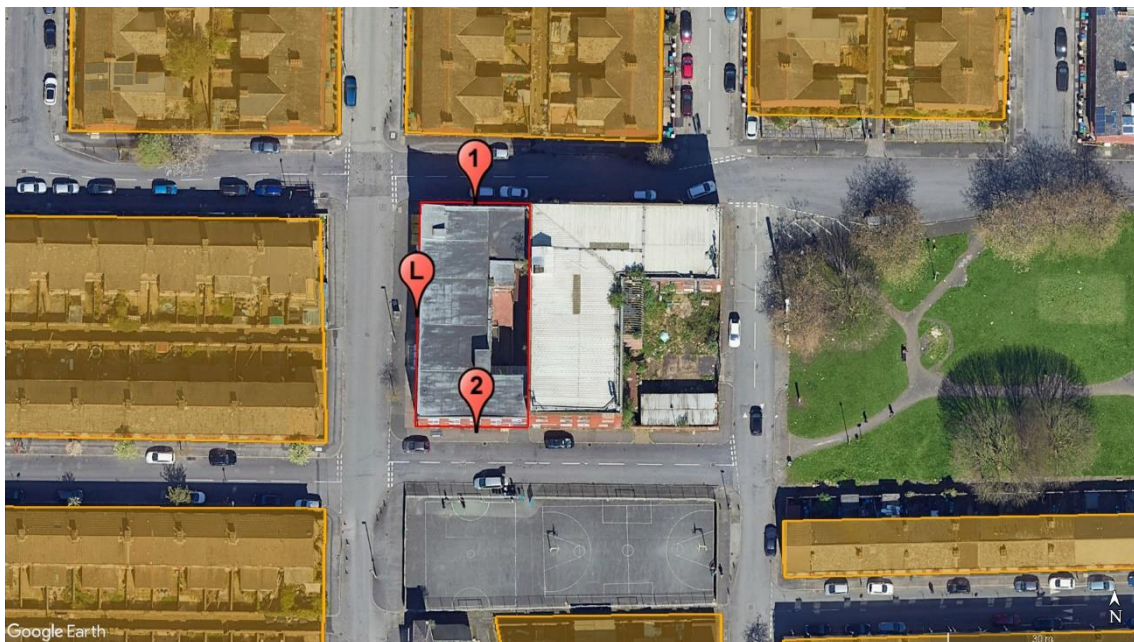


Figure 1 Aerial view of site (courtesy of Google Earth Pro)

2.2 Adjacent premises

The nearest noise sensitive premises are residential dwellings north and west of the site marked up in orange in Figure 1.

3 Local authority criteria

3.1 Planning conditions

The development is subject to the following two planning conditions:

- *No development that is hereby approved shall commence unless and until the extensions hereby approved are acoustically insulated and treated to limit the break out of noise in accordance with a noise study of the premises and a scheme of acoustic treatment that has been submitted to and approved in writing by the City Council as local planning authority. The scheme shall be implemented in full before the use commences or as otherwise agreed in writing by the City Council as local planning authority.*
- *Before first occupation of the development the building, together with any externally mounted ancillary equipment, shall be acoustically insulated in accordance with a scheme submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the equipment.*

3.2 Typical Manchester City Council criteria

Manchester City Council (MCC) stipulates the following in regard to plant noise egress:

‘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’.

They also state that amplified sound egress is to be 5 dB below the typical background noise level in octave bands outside the nearby noise sensitive premises.

4 Noise survey method

The survey included unattended and attended noise measurements.

4.1 Unattended measurements

Unattended noise monitoring was undertaken at the site over 7 days.

Details of the equipment used and the noise indices measured are provided in Appendix A.

The unattended measurements were taken over 15 minute periods between 12:00 on 27 February 2024 and 08:30 on 6 March 2024.

The measurement position used during the survey is indicated Figure 1, denoted by the letter 'L'. A photograph showing the measurement location is provided in Figure 2.

Measurements were carried out under facade conditions.



Figure 2 Photograph of unattended logger location 'L'

This location was chosen to be reasonably representative of noise levels at the site and outside the nearest noise sensitive premises. It is understood that the condenser units shown at the bottom of Figure 2 were not operational during the survey and operate only during warmer months.

4.2 Attended measurements

Attended sample measurements were taken at two locations. These are indicated in Figure 1 as Positions 1 and 2. The measurements were carried out on 28 February 2024, over 15 minute periods.

At each position the microphone was mounted on a tripod approximately 1.2 m above the ground level and at least 3 m from any other reflective surface. Details of the equipment used and the noise indices measured are provided in Appendix A.

Dominant noise sources occurring during the measurements were noted to be traffic noise and pedestrians passing by.

4.3 Weather conditions

Weather conditions during the survey are described in Appendix A.

5 Noise survey results

5.1 Observations

Dominant noise sources occurring during the measurements were noted to be vehicular road traffic and pedestrians passing by the measurement positions.

Less significant noise sources included aircraft overflights and occasional voice egress from inside the site due to amplified speech.

5.2 Noise measurement results

5.2.1 Unattended measurement results

A graph showing the results of the unattended measurements is provided in Appendix B.

Ambient noise levels measured during the unattended survey are presented in Table 1. Measured minimum background sound levels are given in **Error! Reference source not found..**

Table 1 Ambient noise levels measured during the unattended survey

Date	Day (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Tuesday 27 February 2024	57 ^[1]	49
Wednesday 28 February 2024	57	50
Thursday 29 February 2024	56	48
Friday 1 March 2024	57	49
Saturday 2 March 2024	57	49
Sunday 3 March 2024	56	48
Monday 4 March 2024	56	47
Tuesday 5 March 2024	56 ^[1]	-
Average	57	49

^[1] Measurement not made over full period due to monitoring start and end time (the measurement on 27 February 2024 was over 11 hours, and on 5 March 2024 over 1.5 hours); not included in the average.

In line with BS 4142:2014+A1:2019, representative typical background sound levels have been determined using statistical analysis of the continuous measurements.

Day and night statistical analysis of background sound levels for the site are given in Figure 3.

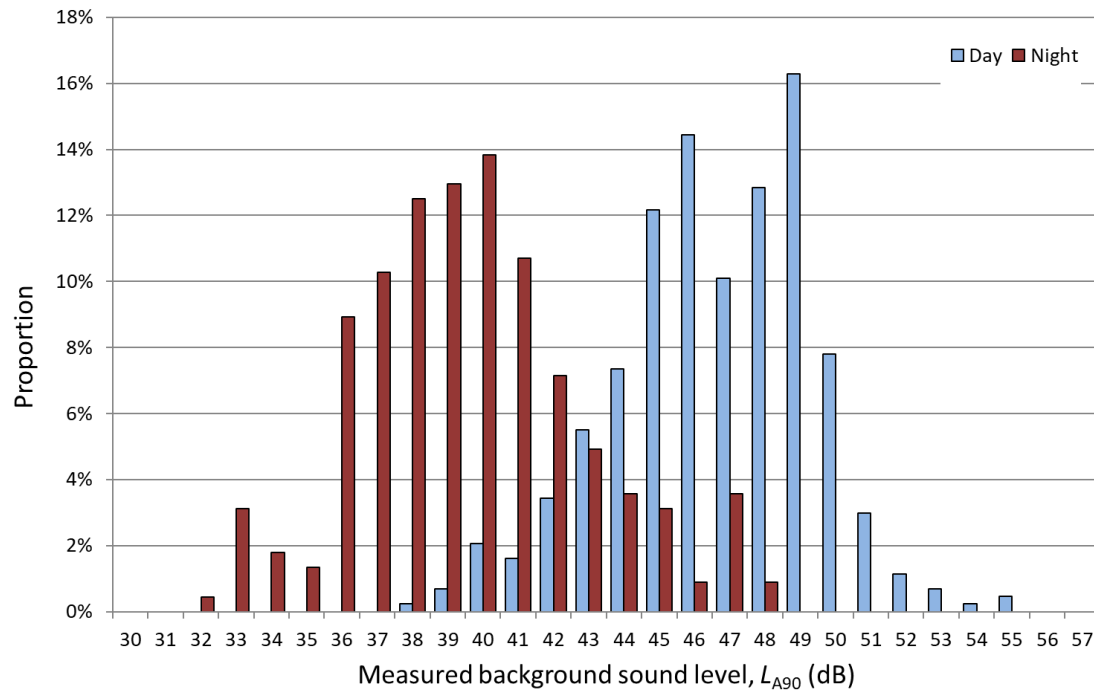


Figure 3 Statistical analysis of background sound levels

From this analysis, the representative typical background sound levels measured during the survey were $L_{A90,15min}$ 45 dB during the day and $L_{A90,15min}$ 36 dB at night.

5.2.2 Attended measurement results

Noise levels and key sources recorded during the attended measurements are summarised in Table 2. These measurements were taken in the free field.

Table 2 Noise levels and key noise sources from attended measurements

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,15min}$	$L_{AFmax,15min}$	$L_{A90,15min}$	
1	11:45	53	75	45	Measurements at this position were dominated by occasional vehicular road traffic. Less significant sources included aircraft overflights and idling vehicles near the measurement position.
	12:00	55	74	48	
2	12:15	58	81	48	Measurements at this position were dominated by pedestrians walking past measurement position and voice egress from the site due to amplified speech.
	12:30	56	78	49	

5.3 Basic limits

5.3.1 Plant noise egress

Based on the above criteria and the measurement results, the cumulative rated noise level from the operation of all new plant should not exceed the limits set out in Table 3.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels. In this case these limits would apply at the residential dwellings opposite the site along Crofton Street and Great Southern Street, highlighted in orange in Figure 1.

Table 3 Plant noise limits at 1 m from the nearest noise sensitive premises

Time of day	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)
Day (07:00-23:00)	40
Night (23:00-07:00)	31

^[1] The limits set out in Table 3 include any corrections for attention catching features. This is required to rate the specific sound level. Penalty corrections for attention catching features may be significant and will need to be considered as part of the building services design assessment. This is discussed in Appendix C.

5.3.2 Amplified noise egress

As part of the Level 2 extension, amplified noise egress will need to be suitably controlled in line with MCC typical guidance of 5 dB below background noise levels in each octave band.

Limits at 1 m from the nearest noise sensitive receptors are set out below.

Table 4 Octave-band amplified noise limits at 1 m from the nearest noise sensitive premises

Time period	Octave-band centre frequency (Hz)								L_{Aeq}
	63	125	250	500	1000	2000	4000	8000	
Day (07:00-23:00)	44	41	39	37	36	28	19	11	40
Night (23:00-07:00)	35	32	30	28	27	19	10	0	31

6 Plant noise egress assessment

The proposed plant items comprise the following:

- 5 no. external Toshiba MHP0406HT-E condensers located in the centre of the roof (L_{wA} 73 dB per unit). Spectral data from the manufacturer is provided in Appendix D.
- Mechanical Ventilation and Heat Recover (MVHR) units terminating at the facades of each classroom in the extension (Level 2), and the prayer rooms on upper ground floor.

Terminations are predominantly on the western facades, but some terminations are also on the east and south facades. There are a total of 8 no. atmospheric terminations per floor on the most onerous western facade, including intake and exhaust per MVHR.

Each atmospheric termination is to be limited to L_{wA} 46 dB during the day and L_{wA} 37 dB during the night.

Accounting for distance attenuation to the nearest noise sensitive receptors, 15 m to the west from the boundary of the building and 25 m away from the proposed rooftop plant location, and screening of the rooftop plant by the parapet of the extension, the predicted noise level at the receptor is L_{Aeq} 37 dB. Due to the proposed condensers not expected to exhibit tonal or intermittent characteristics as perceived at the receptor, no corrections for attention catching features have been applied.

While the rooftop plant is the dominant source of noise egress, the MVHR terminations are designed to result in noise egress levels 10 dB below that the noise egress limits, and as such result in no significant increase to the overall rating level. The predicted level is suitable for meeting the daytime noise egress limits.

A summary of the corrections used is set out below in Table 5.

Table 5 Summary of calculations for noise egress from rooftop plant

Description	Level/Correction (dB)
Rooftop condenser sound power level per unit L_{WA}	73
Correction to 5 units running simultaneously	+7
Distance correction to 25 m, hemispherical spreading ($Q=2$)	-36
Screening from rooftop parapet	-10
Facade reflection at receiver to 1 m	+3
Corrections for attention-catching features	0
Rating level at 1 m from the facade of the nearest noise sensitive receptor ($L_{A(Tr)}$)	37
Criteria	40 Day/ 31 Night
Difference	-3 Day / 6 Night

For night-time operation between 23:00 and 07:00, a minimum 6 dB setback in operation will occur to allow the limits to be met.

7 Operational noise egress assessment

7.1 Proposed facade sound insulation

Standard thermal double glazing in stick curtain walling is proposed to the Level 2 extension, providing a sound insulation of $R_w + C_{tr}$ 28 dB.

The minimum sound reduction performance requirement for the roof is $R_w + C_{tr}$ 33 dB.

The proposed roof construction to achieve this performance comprises from top to bottom:

- PV panels to the full extent of the roof
- “Fibreglass” roof finish
- Plywood backing board (minimum 22 mm thickness) on timber firrings to provide a fall for drainage
- Insulation (minimum 200 mm depth)
- Timber joists within steel beams (minimum 200 mm depth)
- 2 x 12.5 mm dense plasterboard on MF grid, with 25 mm mineral fibre insulation in the ceiling void.

7.2 Internal amplified noise limits

Based on the proposed sound insulation performance of the facade, operational noise limits in each room of the extension are set out below in Table 6 for the sealed facade using the MVHR system to provide background ventilation.

Table 6 Octave-band internal amplified sound limits within the Level 2 extension

	Octave-band centre frequency (Hz)								L_{Aeq}
	63	125	250	500	1000	2000	4000	8000	
Daytime amplified noise limits in extension spaces, L_{Aeq} (dB)	71	74	70	75	85	80	67	60	87

The expected noise levels from the proposed classroom, library, canteen and office uses would be significantly quieter than this with typical use. The use of amplified sound is expected to be limited where used at all.

No use of amplified sound will be carried out in the extension during the night-time, and as such the limits will be achieved by default.

As such, the proposed constructions are expected to be suitable, and comply with the operational noise egress requirements.

8 Conclusion

A noise survey has been carried out at Al Furqan Centre. Dominant noise sources occurring during the measurements were noted to be road traffic and pedestrians passing by the measurement position.

Measured ambient noise levels were in the range $L_{Aeq,15min}$ 56 to 57 dB during the day, and $L_{Aeq,15min}$ 47 to 50 dB during the night. The representative typical background sound levels measured during the survey were $L_{A90,15min}$ 45 dB during the day and $L_{A90,15min}$ 36 dB at night.

The cumulative noise rating level from the operation of all new plant should not exceed $L_{Aeq,15min}$ 40 dB in the day and $L_{Aeq,15min}$ 31 dB at the nearest noise sensitive receptors.

These limits are cumulative, and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features, a penalty based on the type and impact of those features will be applied.

An assessment of noise egress from the proposed plant items has been carried out. The proposed plant is expected to comply with the limits set out above, relying on a setback in duty to meet the limits during the night-time.

An assessment of amplified noise egress from the extension has also been carried out, and limits on internal amplified sound levels set in accordance with the proposed sound insulation performance of the facade. The internal limits are expected to be commensurate with the proposed uses of the space.

Appendix A

Survey details

Equipment

The unattended and attended noise measurements were taken using a Rion NL-52 sound level meter.

Calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Sound level meter	NL-52/00932326	Rion	7 Nov 25	TCRT23/1806
Microphone	UC-59/24147	Rion	7 Nov 25	TCRT23/1806
Pre-amp	NH-25/32354	Rion	7 Nov 25	TCRT23/1806
Calibrator	NC-74/34125432	Rion	9 Aug 25	TCRT23/1576
Sound level meter	NL-52/01010788	Rion	20 Sep 25	TCRT23/1666
Microphone	UC-59/20416	Rion	20 Sep 25	TCRT23/1666
Pre-amp	NH-25/11436	Rion	20 Sep 25	TCRT23/1666
Calibrator	SV30A/10559	Svantek	20 Sep 25	TCRT23/1665

Calibration of the meters used for the measurements is traceable to national standards. Calibration certificates for the sound level meter(s) used in this survey are available upon request.

Calibration checks were carried out on the meters and their measurement chains at the beginning and end of the survey. No significant calibration deviation occurred.

Noise indices

Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period, T, with a fast time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg, L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS 7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures*.

Weather conditions

During the attended noise measurements, the weather was generally clear and dry and no rain occurred. Wind speeds were measured at each position and varied between 1 m/s and 4 m/s.

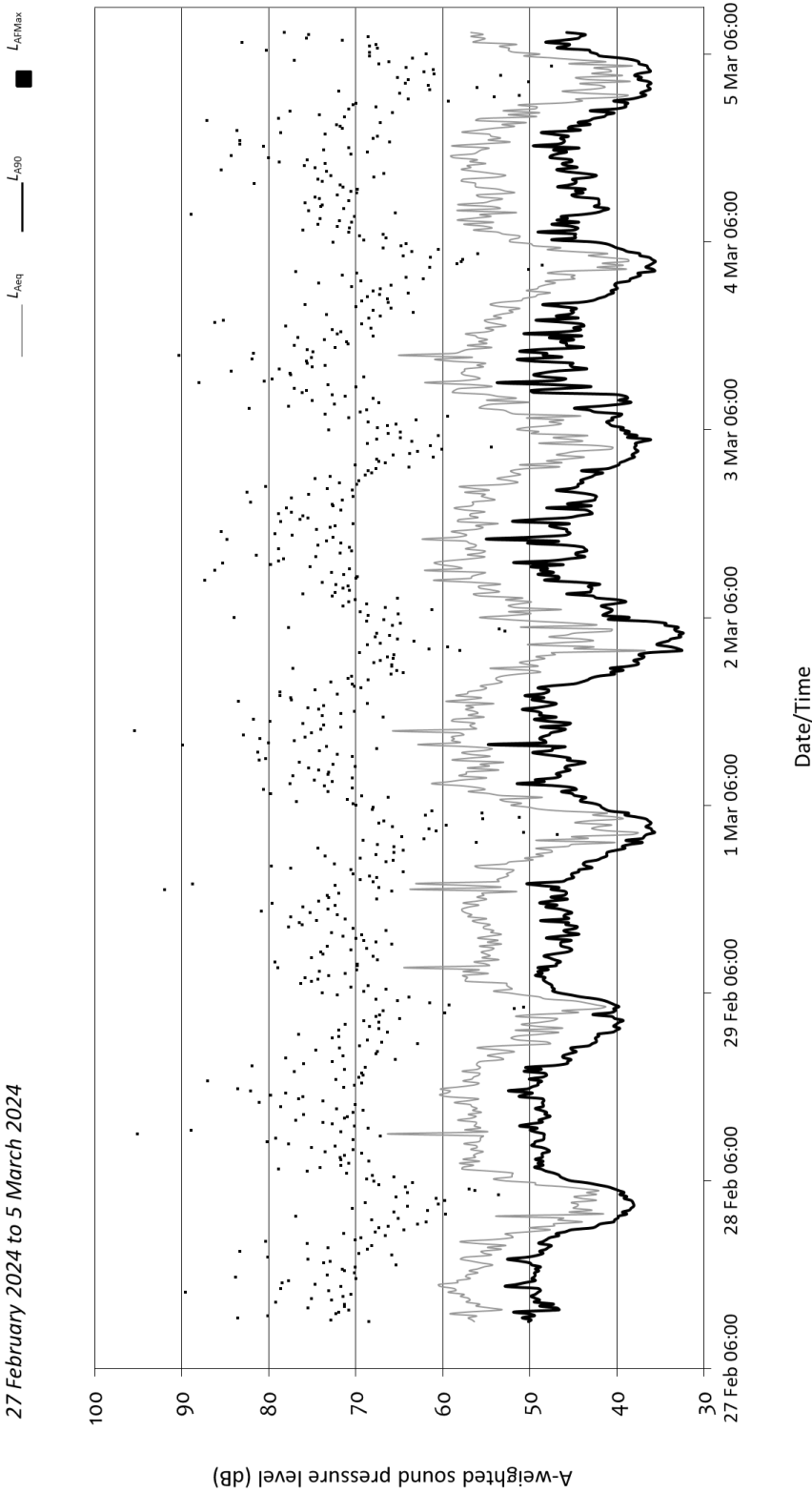
During the unattended noise measurements, weather reports for the area indicated that temperatures varied between 1°C at night and 10°C during the day, and the wind speed was less than 6 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements at Location 'L'

Al Furqan Centre
Results of noise logging survey at 'L'
27 February 2024 to 5 March 2024



Appendix C

BS 4142 corrections for attention catching features

The following applies where plant noise is assessed in accordance with BS 4142:2014+A1:2019.

If the proposed plant noise contains attention catching features (such as tonal elements, whines, whistles, bangs etc), penalty corrections should be applied based on the type and impact of the features.

If appropriate, a subjective assessment of the plant features can be adopted. Where the plant noise contains tonal elements, the following corrections can be made depending on how perceptible the tone is at the noise receptor:

- 0 dB where the tone is not perceptible
- 2 dB where the tone is just perceptible
- 4 dB where the tone is clearly perceptible
- 6 dB where the tone is highly perceptible.

Where the plant noise is impulsive, the following corrections can be made depending on how perceptible the impulsivity is at the noise receptor:

- 0 dB where the impulse is not perceptible
- 3 dB where the impulse is just perceptible
- 6 dB where the impulse is clearly perceptible
- 9 dB where the impulse is highly perceptible.

For noise which is equally both impulsive and tonal, then both features can be accounted for by linearly summing the corrections for both characteristics.

If the plant has other distinctive characteristics, such as intermittency, then a 3 dB correction can be made.

If a subjective assessment of tonality is not appropriate, an objective assessment can be made by analysis of time-averaged, third-octave band sound pressure levels. A noise source is deemed to be tonal if the level in a third-octave band exceeds the level in adjacent third-octave bands by the level differences given below:

- 15 dB in the low frequency third-octave bands (25 Hz to 125 Hz)
- 8 dB in the mid frequency third-octave bands (160 Hz to 400 Hz)
- 5 dB in the high frequency third-octave bands (500 Hz to 10000 Hz).

If an objective assessment identifies the plant noise to be tonal then a 6 dB correction must be made.

Appendix D

Manufacturer noise spectra

MCY-MHP0406HT-E

Sound pressure level (dB(A))	Cooling	Heating
	54	57

