

A.K.S Air Conditioning Limited

THE SHARP PROJECT, M40 5BJ

Acoustic Verification Report



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REPORT LIMITATIONS

1. Introduction

1.1. Purpose of the Report

Peninsular Acoustics Limited has been commissioned by A.K.S Air Conditioning Limited [the Client], to provide an Acoustic Verification Report to consider noise impact of the installed air conditioning plant at The Sharp Project, M40 5BJ [the Site].

The purpose of this verification report is to confirm, based on measured noise levels, whether the installed plant achieves the noise criteria required by the relevant planning condition.

This report is necessarily technical in nature and to assist the reader, an acoustic glossary is provided in Appendix A.

1.2. Planning Context

The Site forms part of The Sharp Project, Thorp Road, Manchester, M40 5BJ and is subject to planning application reference 143112/FO/2025.

As set out in correspondence issued by Manchester City Council dated 30 June 2025, the Local Planning Authority (LA) has imposed conditions relating to externally mounted plant and equipment to control potential noise impact on nearby noise-sensitive receptors.

The relevant condition requires that externally mounted ancillary plant and equipment be selected and/or acoustically treated to achieve a rating level of at least 5 dB below the typical background sound level (L_{A90}) at the nearest noise-sensitive location. The condition further requires the submission of a post-completion verification report to confirm that the installed plant complies with the approved acoustic scheme and that the agreed noise criteria have been achieved.

This report has therefore been prepared to satisfy the above requirement and to verify, based on site measurements, the operational noise impact of the air conditioning plant as installed.

1.3. Scope of Works

The following scope of works has been undertaken:

- The nearest noise-sensitive receptors (NSRs) have been identified using satellite images, and on-site observations;
- Post-installation acoustic verification survey of the installed air conditioning plant, including close-proximity noise measurements under worst-case operating conditions and assessment in accordance with BS 4142¹ to verify compliance with the applicable planning noise criterion; and
- Concise report suitable for submission to Local Authority.

¹ BS4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*.

2. Site Description

2.1. Existing Site

The Site is a large mixed-use commercial complex and is situated within an established urban area including a combination of commercial and industrial uses, with local road and rail networks forming the primary sources of existing environmental noise.

2.2. Installed Air Conditioning Plant

The installed plant comprises two air conditioning units located externally at ground level on the western elevation of the building. The units installed are identified below and were observed to be securely mounted and operational at the time of the survey. It was noted that one of the air conditioning units installed at the Site differs from the equipment described in the previously approved acoustic assessment conducted by Peninsular Acoustics ref: PA1180-R01-P01.

- **Daikin RZASG125M7V1B** (right) [approved acoustic assessment detailed 'Daikin RZASG100M']
- **Daikin RZA200D7Y1B** (left)

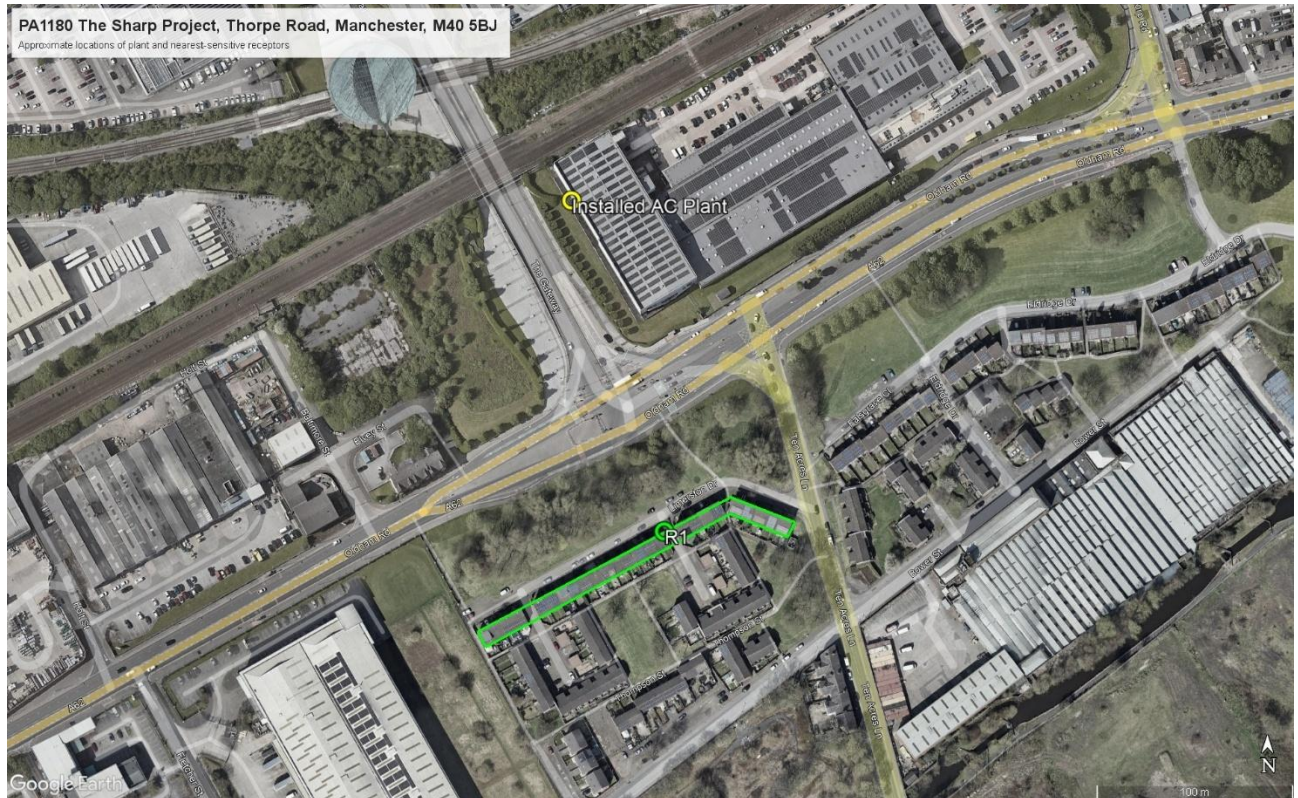
Figure 2.1: AC plant as installed



2.3. Noise-sensitive Receptors

The nearest receptors are the residential properties located approximately 170 metres from the installed air conditioning plant. These receptors were previously identified within the approved acoustic assessment and are considered representative of the nearest and most sensitive residential location.

Figure 2.2: Site plan



3. Approved Noise Assessment

3.1. Overview

An acoustic assessment (PA1180-R01-P01) was previously undertaken to consider the potential noise impact associated with the proposed installation of external air conditioning plant at the Site. The approved assessment was carried out in accordance with BS 4142 and considered the operational noise impact of two proposed air conditioning units based on manufacturer-provided sound power data.

3.2. Proposed Plant (As Assessed for Planning)

The plant assessed within the approved planning report comprised the following:

- 1 no. Daikin RZA200D air conditioning unit, with a manufacturer-stated sound power level of L_w 76 dB(A); and
- 1 no. Daikin RZASG100M air conditioning unit, with a manufacturer-stated sound power level of L_w 70 dB(A).

Both units were assumed to be installed externally at ground level on the western elevation of the building.

3.3. Summary of Assessment Findings

The assessment predicted that noise from the proposed air conditioning plant would be significantly below background sound levels at NSR1 during both daytime and night-time periods. When assessed individually and in combination, the plant was predicted to achieve at least 5 dB below the background sound level (L_{A90}), representing a low impact in accordance with BS 4142 and compliance with the relevant planning noise condition without the need for mitigation.

4. Sound Surveys

4.1. Methodology and Equipment

The air conditioning units were measured individually at a distance of 0.5m under worst-case operating conditions. Each unit was set to heating mode with the control set to 30°C to encourage continuous high-load operation. Measurements were selected for assessment only where steady-state operation was achieved and where intermittent extraneous noise did not significantly influence the measured L_{Aeq} and L_{A90} values. Measurements affected by start-up behaviour, ramping, or transient pressure relief events were excluded from the assessment, as these were not considered representative of typical operational conditions.

Sound levels were measured using a Class 1 Sound Level Meter (SLM) housed in environmental protection apparatus. The SLM was field calibrated before and after the survey using a Class 1 calibrator, with no significant drift in calibration levels recorded ($> \pm 0.5\text{dB}$).

4.2. Survey Observations

4.2.1. Meteorological Conditions

During the survey, weather conditions were monitored using a handheld Kestrel 1000 anemometer, which confirmed steady wind speeds of less than 5 m/s. No precipitation occurred during the survey period and, as such, the measured results are considered suitable for assessment purposes.

4.2.2. On-site Observations

Background noise during the survey was primarily influenced by road traffic on nearby roads, with occasional aircraft and train noise. These sources were intermittent and did not significantly affect the selected steady-state plant measurements.

A faint high-frequency component was subjectively noted at close proximity to the units during operation; however, this was low in level, not dominant at distance, and therefore not considered to warrant a tonal character correction in accordance with BS 4142 when assessing at the receptor.

4.3. Results

The measured noise levels for each unit are summarised in Table 4.1. Due to the influence of environmental noise, the L_{A90} readings are considered representative of the continuous steady operational noise of the plant.

Table 4.1: Plant sound measurement results

Unit	Operating Mode	Measurement Distance	$L_{Aeq,T}$ (dB)	$L_{A90,T}$ (dB)
Daikin RZA200D7Y1B (left)	Heating (30°C)	0.5 m	73.8 dB $L_{Aeq,24s}$	73.3 dB $L_{A90,24s}$
Daikin RZASG125M7V1B (Right)	Heating (30°C)	0.5 m	69.4 dB $L_{Aeq,30s}$	68.9 dB $L_{A90,30s}$

5. BS 4142 Assessment

5.1. Background Sound

The background sound levels previously established as part of the approved planning acoustic assessment are summarised in Table 5.1. These background sound levels are considered representative of typical conditions at the nearest noise-sensitive receptor and have been retained for the purposes of this verification assessment.

Table 5.1: Background sound levels at NSR1 (from previous assessment)

Period	Background Sound Level $L_{A90,15min}$ (dB)
Daytime	50
Night-time	44

5.2. Specific Sound Level

The specific sound level has been derived from the combined LA90 measurements obtained during the verification survey, with distance attenuation applied to predict levels at the nearest noise-sensitive receptor (NSR1).

Table 5.2: Predicted specific sound level at NSR1

Step	Instruction	Daikin RZA200D7Y1B (left)	Daikin RZASG125M7V1B (Right)	Combined	Comments
1	Measured Level at 0.5 m ($L_{A90,T}$)	73 dB	69 dB	75 dB	Worst-case heating operation
2	Distance to NSR1	170 m	170 m	170 m	As per approved assessment
3	Distance attenuation from 0.5 m to 170 m	-51dB	-51 dB	-51 dB	$20 \cdot \log(170/0.5)$
4	Barrier / screening correction	0 dB	0 dB	0 dB	No screening assumed
5	Predicted specific sound level at NSR1 ($L_{Aeq,T}$)	23 dB	18 dB	24 dB	Step 1 + Step 3 + Step 4

5.3. Initial Numerical Impact Assessment

An assessment in accordance with BS 4142 for both units combined is presented in Table 5.3.

No acoustic feature corrections are considered necessary, based on the site observations outlined in Section 4.2.2.

Table 5.3: BS 4142 INIA

Assessment Step	Results	
	Daytime	Night-time
Specific Sound Level [A]	24 dB $L_{Aeq,T}$	24 dB $L_{Aeq,T}$
Acoustic Corrections [B]	0 dB	0 dB
Rating Level [A + B = C]	24 dB $L_{Ar,Tr}$	24 dB $L_{Ar,Tr}$
Background Sound Level [D]	50 dB $L_{A90,15min}$	44 dB $L_{A90,15min}$
Excess over Background [E = C – D]	-26 dB	-20 dB
Initial Estimate of Impact	Low Impact	Low Impact

5.3.1. Discussion of Results

The BS 4142 assessment indicates that the rating level associated with the operation of the installed air conditioning plant is significantly below the prevailing background sound levels at the nearest noise-sensitive receptor during both daytime and night-time periods. The rating level of 24 dB $L_{Ar,Tr}$ is 26 dB below the daytime background level and 20 dB below the night-time background level, which corresponds to a low impact in accordance with BS 4142. On this basis, the operational noise from the installed plant is not considered likely to result in an adverse noise impact.

6. Conclusions

Peninsular Acoustics Limited has undertaken an acoustic verification survey of the installed air conditioning plant at The Sharp Project, Thorp Road, Manchester, in accordance with the requirements of the relevant planning condition.

The assessment demonstrates that the rating level from the installed plant is significantly below the representative background sound levels at the nearest noise-sensitive receptor during both daytime and night-time periods corresponding to a low impact in accordance with BS 4142.

It is therefore concluded that the operational noise from the installed air conditioning plant complies with the relevant planning noise condition and is not expected to result in an adverse noise impact at nearby noise-sensitive receptors.

Limitations applicable to this report are contained in Appendix B.

Appendix A

TECHNICAL TERMINOLOGY

Parameter	Description
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20 μ Pa (20x10 ⁻⁶ Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s ₁ and s ₂ is given by 20 log ₁₀ (s ₁ / s ₂). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20 μ Pa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
L_{eq,T}	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
L_{Max,T}	A noise level index defined as the maximum noise level during the period T. L _{Max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L _{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{90,T}	A noise level index. The noise level exceeded for 90% of the time over the period T. L ₉₀ can be considered to be the "average minimum" noise level and is often used to describe the background noise.
L_{10,T}	A noise level index. The noise level exceeded for 10% of the time over the period T. L ₁₀ can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
L_{Aeq,Tr}	Specific noise level. The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.
L_{Ar,Tr}	Rating noise level. The specific noise level plus any adjustments for characteristic features of the noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m.

Parameter	Description
Facade	At a distance of 1m in front of a large sound reflecting object such as a building facade.
Fast/Slow Time Weighting	Averaging times used in sound level meters.
Octave Band	A range of frequencies whose upper limit is twice the frequency of the lower limit
Airborne Sound Insulation	Sound insulation that reduces transmission of airborne sound between buildings or parts of buildings
R_w	The single number quantity, which characterises the airborne sound insulating properties of a material or building element over a range of frequencies.
D_{nT,w}	The single number quantity, which characterises the airborne sound insulation between rooms over a range of frequencies, using noise spectrum 2 as defined in BS EN ISO 717-1:1997
C_{tr}	Correction term applied against the sound insulation single-number values (R _w , D _w and D _{NT,W}) to provide a weighting against low frequency performance.
Frequency (Hz)	The number of pressure variations (or cycles) per second that gives a sound its distinctive tone. The unit of frequency is the Hertz (Hz).
One-third octave band	A frequency band in which the upper limit is 2 ^{1/3} times the frequency of the lower limit.
Reverberation Time	The time, in seconds, taken for a sound in a room to decay by 60dB after a source has been stopped.
Reverberation Time	The time, in seconds, taken for a sound in a room to decay by 60 dB after a source has been stopped.
Sound Level	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure. The sound level is the sound pressure relative to a standard reference pressure of 20x10 ⁻⁶ Pascals on a decibel scale.



Appendix B

REPORT LIMITATIONS

This report has been prepared for the titled project or named part thereof and should not be used in whole or part and relied upon for any other project without the written authorisation of Peninsular Acoustics Limited. Peninsular Acoustics Limited accept no responsibility or liability for the consequences of this document if it is used for a purpose other than that for which it was commissioned. Persons wishing to use or rely upon this report for other purposes must seek written authority to do so from the owner of this report and/ or Peninsular Acoustics Limited and agree to indemnify Peninsular Acoustics Limited for any and all loss or damage resulting therefrom. Peninsular Acoustics Limited accepts no responsibility or liability for this document to any other party other than the person by whom it was commissioned.

The findings and opinions expressed are relevant to the dates of the site works and design drawings/specifications and should not be relied upon to represent conditions at substantially later dates. Opinions included therein are based on information gathered during the study and from our experience. If additional information becomes available which may affect our comments, conclusions or recommendations Peninsular Acoustics Limited reserve the right to review the information, reassess any new potential concerns and modify our opinions accordingly.



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