Unit 11, Brunel Court, Gadbrook Park, CW9 7LP
01565 632535
info@solacoustics.co.uk
www.solacoustics.co.uk

NHSBT Manchester Blood Donation Centre

Plant Noise Verification Assessment

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05 October 2026

PROJECT	NHSBT Manchester Blood Donation Centre Plant Noise Verification Assessment
CLIENT	Perfect Circle c/o Pick Everard Halford House Charles Street Leicester United Kingdom LE1 1HA
DOCUMENT REFERENCE	P2864-SOL-XX-XX-RG-AC-0002
SIGNED	[redacted] Victoria Abrahams
CHECKED	[redacted] Thomas Leach MIOA
DATE	05 / 10 / 2026

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Name of Organisation	Sol Acoustics Limited
Company Registration Number	4218702

Contents

1 Introduction 4

2 Location & Description of Development 5

3 Baseline Environmental Noise Survey 6

4 Acoustic Guidance and Criteria 9

5 M&E Noise Impact Assessment 11

6 Conclusion 13

APPENDIX A Glossary of Acoustic Terms 14

APPENDIX B Noise Survey Details 15

1 Introduction

1.1 Sol Acoustics Ltd (Sol) has been commissioned by Pick Everard to undertake a Plant Noise Compliance Assessment of a new NHS Blood and Transplant Services at Manchester Donation Centre.

1.2 The purpose of this acoustic assessment is as follows:

- Undertake post-installation acoustic testing of all relevant external plant and equipment.
- Assess the measured noise levels against the maximum permissible Rating Level limits, in accordance with the planning condition that pertains to mechanical plant and equipment
- Undertake calculations in accordance with BS 4142:2014+A1:2019 to ensure compliance with the planning condition set out by the Local Planning Authority.

1.3 This report has been produced by suitably qualified and competent professionals with relevant experience as detailed in the **Table 1** below.

Name	Position	Qualifications	Members of professional bodies	Experience
Victoria Abrahams	Senior Acoustic Consultant	MPhys Physics with Astronomy	Technician Member of the Institute of Acoustics	2 years relevant acoustic consultancy experience.
Thomas Leach	Associate Director	MSc Sound & Vibration Studies, BSc(Hons) Sound Technology	Member of the Institute of Acoustics, Association of Noise Consultants registered pre-completion tester	16 years relevant experience including the assessment and design of fixed plant and equipment and developments

Table 1

2 Location & Description of Development

2.1 Description of Development

2.1.1 The new Manchester Blood Donation Centre at One St James Square, Manchester has installed new mechanical plant and equipment as part of the scheme.

2.1.2 One MVHR unit has been installed on the rooftop of the building, and three additional condenser units have been installed internally within the basement which terminate through a louvre discharging at basement level via an external plant well below local ground level.

2.1.3 Figure 1 shows the site, the surrounding noise sensitive receptors, and the location of the plant and equipment:

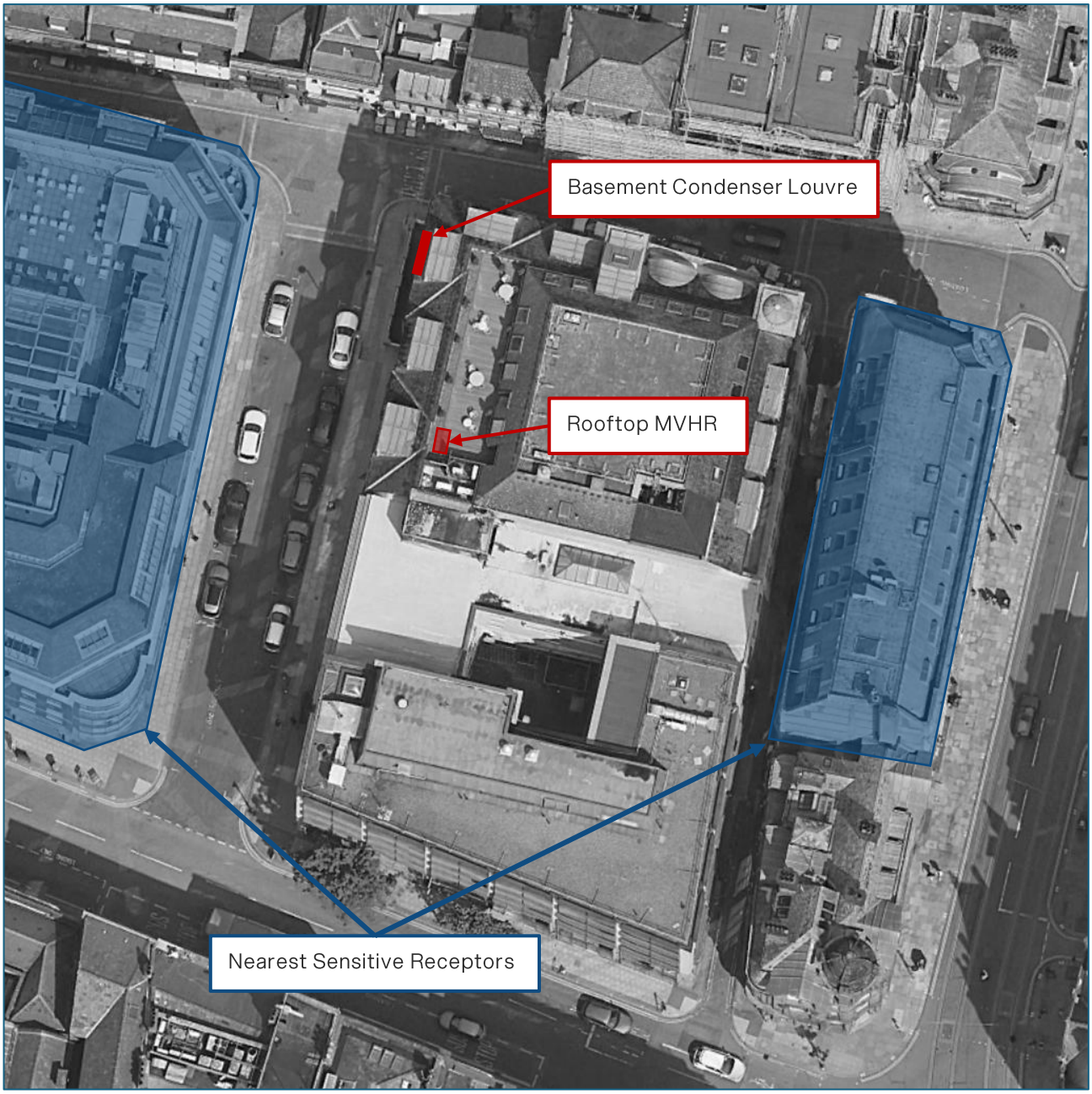


Figure 1: Site location and nearest noise sensitive receptors

3 Baseline Environmental Noise Survey

3.1 Noise Survey Details

3.1.1 A baseline noise survey was conducted by Sol between Friday 19th December and 23rd Tuesday December 2025. The survey was undertaken in line with the requirements of BS 7445 'Description and measurement of environmental noise' Part 1-3.

3.1.2 The baseline noise survey consisted of a single long-term unattended measurement position described in Table 2:

Measurement position	Description
MP1	Sound level meter microphone mounted on a mast, out of a window, approx. 7m AGL and considered to be representative of the closest noise sensitive receptor. The microphone was positioned c.1 metre from the façade.

Table 2: Measurement position location

3.1.3 MP1 was a secure unattended measurement positions intended to quantify the prevailing background sound level at the closest noise sensitive receptor to the proposed location of the rooftop fixed plant and equipment to serve the Facility.

3.1.4 The noise survey was carried out using Type 1 Precision Grade noise monitoring equipment, and the complete measuring system was field calibrated immediately prior to and following the noise survey period. Full details of the noise monitoring systems are retained on file by Sol, including traceable calibration records; these are available for review if needed.

3.1.5 Weather conditions were deemed favourable for the noise survey, with average wind speeds remaining under 5m/s and dry ground conditions for the majority of the noise survey.

3.1.6 Notwithstanding, the microphone system was entirely weatherproofed and fitted with all-weather environmental windshields, and with a bird spike.

3.2 Noise Survey Results Summary

3.2.1 Appendix B provides detailed time-histories for the environmental noise levels recorded for the duration of the survey.

3.2.2 Table 3 provides a basic summary of the typical overall, A-weighted noise levels as measured at MP1:

Monitoring Position	Daytime		Nighttime	
	Residual Sound Level dB $L_{Aeq,\ 16\ Hour}$	Background Sound Level dB $L_{A90,\ 15\ min}$	Residual Sound Level dB $L_{Aeq,\ 8\ Hour}$	Background Sound Level dB $L_{A90,\ 15\ min}$
MP1	62 - 64	47 - 60	60 - 64	46 - 58

Table 3: Typical overall A-weighted noise levels

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3.2.3 Figure 2 presents the distribution of $L_{A90,15mins}$ noise levels measured during the Sol Acoustics surveys undertaken at the development site during daytime hours (07:00 – 23:00 hours) and night time hours (23:00 – 07:00) at MP1:

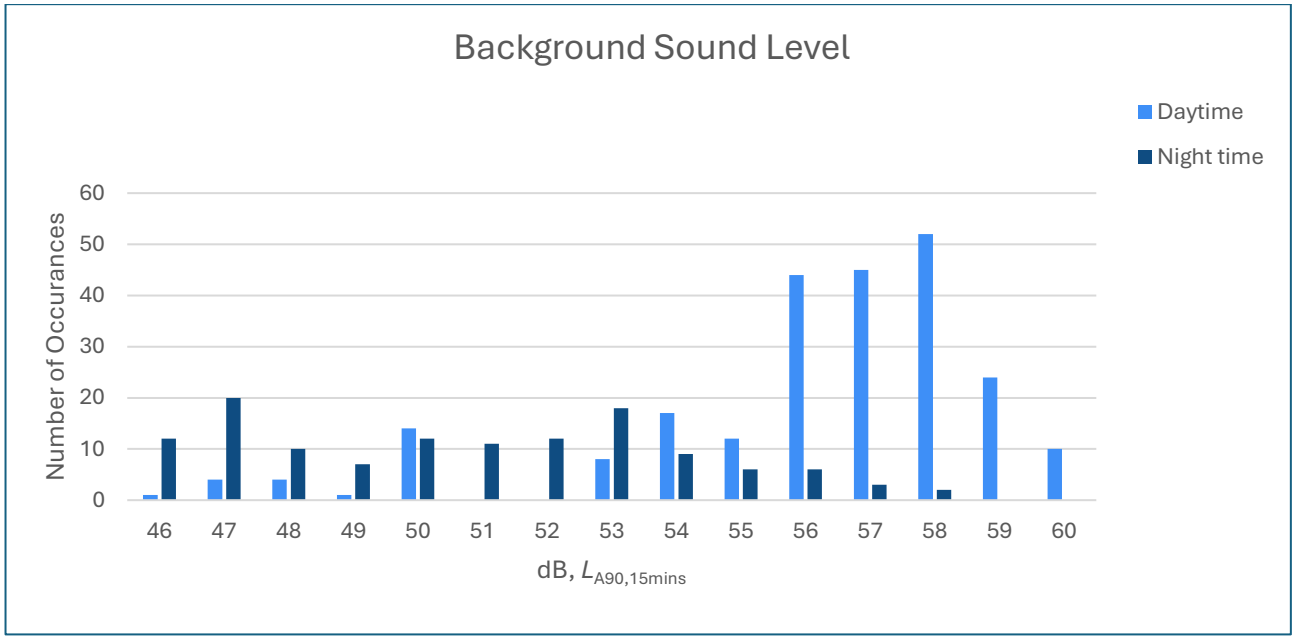


Figure 2: Graph summarising the background sound level at MP1 in dB, $L_{A90,15mins}$. terms

3.2.4 As shown in the table above, the typical minimum background sound level measured at MP1 was **50dB $L_{A90,15mins}$** and **46dB $L_{A90,15mins}$** during the daytime and night time period respectively.

3.3 Plant Noise Measurements

3.3.1 One MVHR unit has been installed on the rooftop and three MVHR units have been installed in the basement with an external louvre at basement level, which egress into a plant well below the local street level. A summary of the plant can be found in the table below:

Plant Item	Location	Quantity	Make/Model
MVHR	Rooftop	1	Mitsubishi PURY-EM350YXM-A
Condenser Unit	Basement	3	Mitsubishi PUZ-ZM35VKA2

Table 4: Plant Items

3.3.2 Sol Acoustics undertook post commissioning plant noise measurements on 17th September 2026. Measurements were undertaken in the following locations:

- **A -** Within basement, 1 metre from the condenser units
- **B -** In basement external plant well, 0.5 metres from louvre
- **C -** Rooftop, 1 metre from front face of MVHR
- **D -** Rooftop, 0.5 metres from side face of MVHR
- **E -** Rooftop, 0.5 metres from back face of MVHR
- **F –** Rooftop, 1 metre from top face of MVHR, 45 degrees off axis

3.3.3 The table below outlines the average on-site octave band sound pressure level measurements at each location:

Measurement Position	Sound pressure level (dB) per octave-band centre frequency (Hz)								A-Weighted Sound Pressure Level (dB $L_{Aeq,T}$)
	63	125	250	500	1k	2k	4k	8k	
A	64	55	48	51	48	45	43	40	53
B	60	63	56	55	50	46	39	32	56
C	71	66	60	59	55	53	50	45	62
D	74	66	64	62	58	55	52	47	64
E	76	67	65	63	60	56	52	46	65
F	76	71	68	66	62	58	54	48	68

Table 5: On-site plant noise measurements

4 Acoustic Guidance and Criteria

4.1 Manchester City Council Decision Notice

4.1.1 The scheme gained planning approval for the installation of ground floor louvres and rooftop plant to form the blood donation centre. Conditions were attached to the decision notice; condition 3 pertains to acoustic criteria and states:

> *3) a) Prior to any above ground external works, either a scheme that demonstrates that any plant equipment will achieve a rating level of 5dB (LAeq) below the typical background (LA90) level in each octave band at the nearest noise sensitive location, or a scheme showing a method to acoustically treat/insulate any plant equipment so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level in each octave band at the nearest noise sensitive location, shall be submitted to and approved in writing by the Local Planning Authority. The development shall then be carried out in accordance with the approved details.*
>
> *b) Prior to the first use of the ground floor commercial unit, a verification report, which will include post-completion testing, shall be submitted to and approved in writing by the Local Planning Authority to validate that the plant equipment achieves a rating level of 5dB (LAeq) below the typical background (LA90) level in each octave band at the nearest noise sensitive location.*
>
> *c) In the event of non-conformity with a rating level of 5dB (LAeq) below the typical background (LA90) level in each octave band, then any measures/changes required to achieve conformity shall be carried out. Any required measures/changes and verification shall continue until conformity has been achieved and agreed in writing by the Local Planning Authority, before the use can commence.*
>
> *Reason - To minimise the impact of the development and to prevent a general increase in pre-existing background noise levels around the site. Pursuant to policies SP1 and DM1 of the Core Strategy and saved policy DC26 of the UDP.*

4.1.2 Based on correspondence with Manchester City Council, the wording of the condition is contrary to the British Standard as there is no methodology to assess A-weighted octave band noise levels to the background noise level. Therefore, the plant has been assessed in accordance with BS 4142:2014+A1:2019, with a rating level of 5dB L_{Aeq} below the typical broadband background sound level.

4.2 BS 4142:2014+A1:2019: 'Methods for Rating and Assessing Industrial and Commercial Sound'

4.2.1 BS 4142:2014+A1:2019 'Method for rating and assessing industrial and commercial sound' (BS 4142) is intended to be used to assess noise of an industrial and commercial nature, which includes sound from fixed installations comprising mechanical and electrical plant and equipment.

4.2.2 The procedure contained in BS 4142 for assessing environmental noise impact is to compare the measured or predicted noise level from the source in question, the Specific Sound Level immediately outside the noise sensitive premises, with the corresponding Background Sound Level. Where the noise contains attention attracting characteristics such as tonal, impulsive, and/or intermittent elements, it may be appropriate to apply a correction to the Specific Sound Level to obtain the Rating Level.

4.2.3 BS 4142 states that the significance of sound arising from 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 also the context in which the sound occurs:

- Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- 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.

4.2.4 For the daytime, the assessment is carried out over a one-hour period, and over a 15-minute period at night. The daytime and nighttime periods are defined as occurring between 07:00 hours to 23:00 hours, and 23:00 hours to 07:00 hours, respectively.

5 M&E Noise Impact Assessment

5.1 Environmental Plant Noise Limits

5.1.1 Based upon the results of the background noise survey and the requirements of the Local Planning Authority, Table 6 provides the maximum permissible cumulative Rating Level to be achieved by any M&E plant associated with the development, as assessed 1 metre from the nearest noise sensitive window.

Maximum Permissible Free-field Rating Level Limit 1m from nearest residential façade dB $L_{Aeq,T}$	
Daytime (07:00 – 23:00 hours)	Nighttime (23:00 – 07:00 hours)
45	41

Table 6: Plant Noise Rating Limit criteria

5.1.2 The above maximum permissible noise level limits are specified in terms of the BS 4142:2014+A1:2019 defined Rating Level. The acoustic character of the sound generated from the plant must therefore be considered and where appropriate, an acoustic character correction (penalty) must be applied to the predicted Specific Sound Level when assessing compliance with the above specified receptor noise level limits.

5.2 Plant Noise Assessment

5.2.1 The table below presents the assessment of the rooftop MVHR unit and basement level louvre to the nearest sensitive receptor. Details of the plant noise calculation can be found in Appendix B:

Plant Item	Assessment Period	Calculated Rating Level dB $L_{Ar,Tr}$	Rating Penalty dB	Planning Condition Criteria, dB L_{A90}	Rating level sub. Criteria ±dB
Rooftop MVHR	Daytime (07:00 – 23:00 hours)	45	0	45	+0
	Nighttime (23:00 – 07:00 hours)			41	+4
Basement Louvre	Daytime (07:00 – 23:00 hours)	36	0	45	-9
	Nighttime (23:00 – 07:00 hours)			41	-5

Key
Green: low impact (less than or equal to 0dB)
Amber: sub-adverse impact to adverse impact (i.e. +1dB to +5dB)
Red: adverse to significant adverse impact (+6dB or higher)

Table 7: BS 4142 preliminary assessment

5.3 Rating Penalty

5.3.1 In accordance with BS 4142, a Rating Penalty can be applied for sounds with features that are readily distinctive against the residual acoustic environment, such as tonal, impulsive, and/or intermittent elements.

5.3.2 The operation of the proposed plant is continuous and from on-site observation, noise from the plant is broadband in nature with no tonal character and the units feature inverter driven controls such that there are no impulsive start/stop events.

5.3.3 During the both the daytime and the night-time the specific sound level will be significantly below the residual sound level, and therefore, noise from the proposed plant will be masked by the existing environment. It is considered that in line with BS 4142, no rating penalty is applicable.

5.4 Uncertainty

5.4.1 Section 10 of BS 4142:2014+A1:2019 states the following with regards to uncertainty:

> *'... Consider the level of uncertainty in the data and associated calculations. Where the level of uncertainty could affect the conclusion, take reasonably practicable steps to reduce the level of uncertainty. Report the level and potential effects of uncertainty...'*

5.4.2 In accordance with the requirements of BS 4142, Sol have untaken numerous and significant steps to limit the level of uncertainty in the assessment. Specifically, the following measures have been undertaken:

- Measurement positions have been selected to be as representative of the nearest noise sensitive receptors as possible;
- The sound level meters were calibrated immediately before and after each survey. No noticeable drift in calibration was recorded;
- All practicable measures were taken to minimise the effect of any prevailing meteorological conditions during the survey periods;

5.4.3 Surveys were undertaken for an appropriate duration to ensure a robust data set.

5.5 Compliance

5.5.1 Table 7 shows that the calculated rating level from the measurements is not expected to exceed 5dB below the background sound level during the daytime and is an indication of a *'low impact, depending on the context'*, in BS 4142 terms.

5.5.2 The calculated rating level for the rooftop MVHR unit during the night time is expected to exceed the nighttime background sound level by 4dB, which is an indication of an *'adverse impact, depending on the context'* in BS 4142 terms.

5.5.3 Therefore it is recommended that the rooftop MVHR unit is only operational during daytime hours. Where night-time operation is required, either a night time set back reduced duty or mitigation will be required to provide a minimum reduction of 4dB.

6 Conclusion

6.1 Sol Acoustics Ltd (Sol) has been commissioned by Pick Everard to undertake a Plant Noise Compliance Assessment of a new NHS Blood and Transplant Services at Manchester Donation Centre, in accordance with the planning condition set out by the Local Planning Authority.

6.2 An assessment of the measured plant noise levels at the nearest noise sensitive receptor was undertaken in accordance with BS 4142:2014+A1:2019 and the Local Planning Authority.

6.3 The results of the plant noise assessment in accordance with the planning condition concludes that the basement condenser units terminating through the louvre are in compliance. The rooftop MVHR is in compliance during the daytime; however, the rooftop MVHR unit exceeds the nighttime noise level limits.

6.4 It is recommended that, without mitigation, the rooftop MVHR is operational only during daytime hours.

APPENDIX A
Glossary of Acoustic Terms

Term	Abbreviation	Description
Decibel	dB	A scale for comparing the ratios of two quantities, including sound pressure and sound power.
A-weighting	dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the change in sensitivity of the human ear at varying frequencies.
Sound Pressure Level	L_{pA}	A measure of the sound pressure at a particular location. Typically expressed in dB(A) referenced to $2x10^{-5}$ Pascals.
Equivalent Continuous Sound Level	$L_{Aeq,T}$	The steady level of sound over a prescribed period of time which would contain the same total sound energy as the actual fluctuating noise under consideration in the same period of time.
Statistical Sound Levels	L_{A10} and L_{A90}	The level of noise exceeded for a percentage of the time period being sampled, namely 10% or 90% respectively.
Background Sound Level	$L_{A90,T}$	The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of the time period being sampled.
Maximum Sound Level	L_{Amax}	The maximum sound or noise level determined with instrumentation set to either a fast time weighting, L_{AFmax}, or a slow time weighting, L_{Asmax}, as occurring during the time period being sampled.
Sound Power Level	L_{wA}	A measure of the total sound energy radiated from a source. Like sound pressure levels, this is also expressed in dB(A) terms, but it is referenced to 1×10^{-12} W.
Broadband		Sound sampled over a wide range of frequencies.
Narrow band		Sound sampled over a specific, restricted frequency range. Used to ascertain the amplitude and significant of individual, audible tones, and to assist in identifying particular sources of noise within a complex, multi-source soundscape environment.
Ambient Sound	$L_{eq,T}$	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, both near and far.
Specific Sound Level	$L_{eq,T}$	The Equivalent Continuous A-Weighted Sound Level at an assessment position produced by a specific sound over a given reference time interval, *Tr*
Rating Level	$L_{Ar,Tr}$	The Specific Sound Level plus any adjustment for the acoustic characteristic features of the noise (e.g. intermittency, tones etc.).
Residual Noise	$L_{Aeq,T}$	The ambient sound remaining at given position in a given situation, when the specific sound source is suppressed to such an extent that it no longer contributes to the ambient sound.
Sound Reduction Index	*SRI*	The reduction in sound energy when transmitted through a panel or similar planar element, typically used in relation to single octave or one-third octave frequency band values.
Weighted Sound Reduction Index	R_w	The Sound Reduction Index expressed as a single figure, as expressed against a reference curve.
Dynamic Insertion Loss	*DIL*	Reduction in acoustic energy resulting from the insertion of a noise control element (e.g. an attenuator, acoustic enclosure etc.).
Free Field		Noise measuring location that is free from the presence of sound reflecting objects (except the ground), usually taken to mean being at least 3.5 metres distance from reflective surface(s) or greater.

APPENDIX B
Noise Survey Details

LOCATION

One St James Square, Manchester, M2 6DN

DATES AND TIMES

14:00 hours on Friday 19th December 2025 to 09:00 hours on Tuesday 23rd December 2025

11:00 hours to 12:00 hours on Thursday 17th September 2026

WEATHER CONDITIONS

Weather conditions were understood to be typically dry with light winds and considered to be suitable for environmental noise measurements.

PERSONNEL

Mike Hartley AMIOA – Sol Acoustics Ltd

INSTRUMENTATION

01dB Cube Sound Level Meter (serial no. 11348)

Cirrus CR:515 Sound Calibrator (serial no.105286)

Norsonic 118 Sound Level Meter (serial no. 28260)

Norsonic 1251 Acoustic Calibrator (serial no.29917)

METHODOLOGY

Before and after the measurements the noise monitoring equipment was calibrated to an accuracy of ±0.4dB using the Cirrus CR:515 Sound Calibrator. The calibrator produces a sound pressure level of 94 dB re $2x10^{-5}$ Pa @ 1kHz.

MEASUREMENT RESULTS

Graph B1 summarises the broadband A-weighted results obtained during the environmental noise survey.

Figure B2 and Figure B3 display the detailed calculations of the rooftop MVHR and basement louvre respectively.

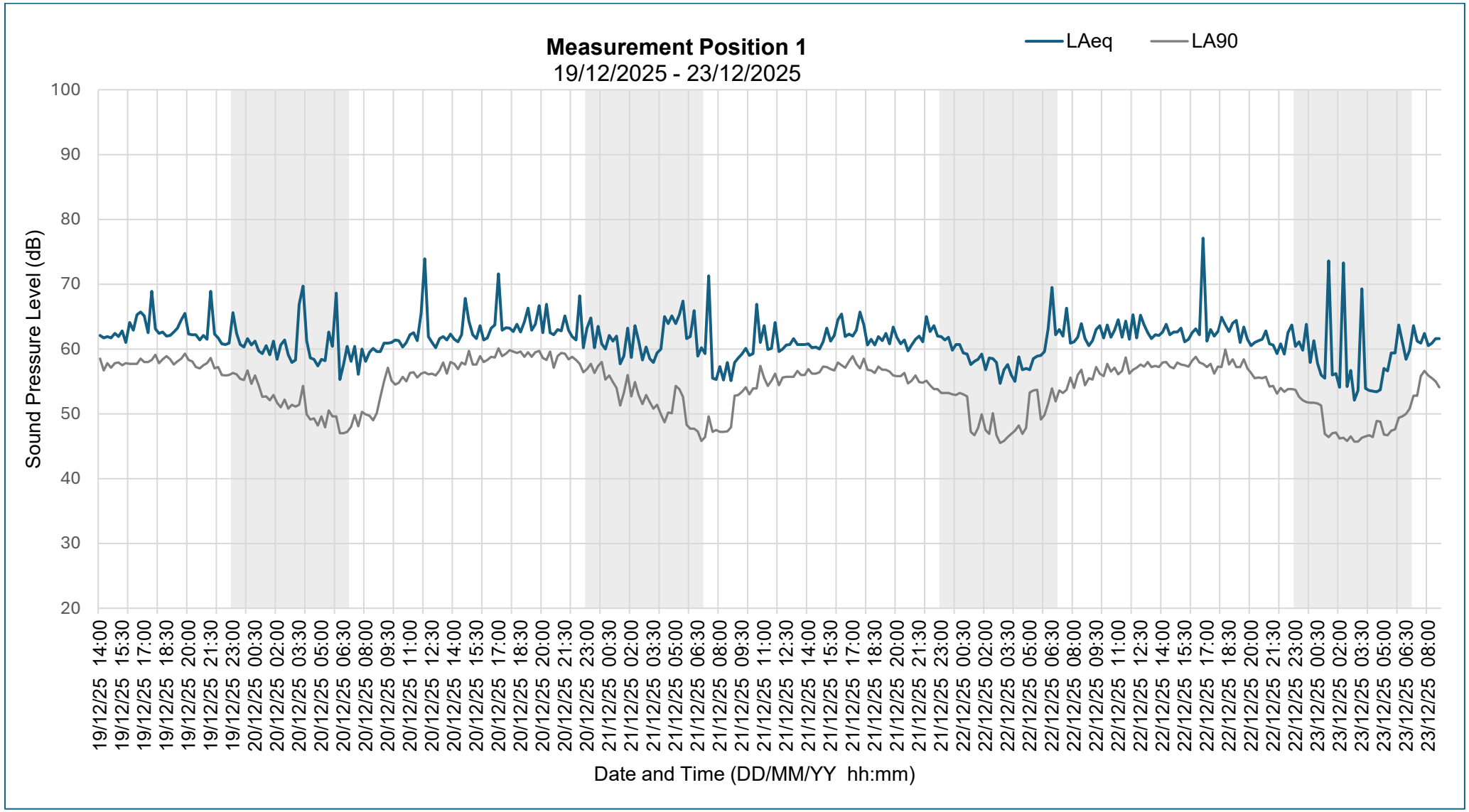


Figure B1: Sound pressure levels at Measurement Position 1 (MP1)

Item	Sound Power Level ($dB\ L_{wA}$)	Distance to Receptor (m)	Hemi-spherical Distance Attenuation (dB)	Screening Attenuation (dB)	Reflective surfaces (dB)	Specific Sound Level at Receptor ($dB\ L_{Aeq,Tr}$)	Rating Penalty	Rating Level at Receptor ($dB\ L_{Ar,Tr}$)
MVHR	79	18	-33	0	0	46	0	46
		Cumulative Sound Level at Nearest Receptor ($dB\ L_{Aeq,Tr}$)				**46**		**46**

Figure B2: MVHR noise limit calculation

Item	Sound Power Level ($dB\ L_{wA}$)	Distance to Receptor (m)	Hemi-spherical Distance Attenuation (dB)	Screening Attenuation (dB)	Reflective surfaces (dB)	Specific Sound Level at Receptor ($dB\ L_{Aeq,Tr}$)	Rating Penalty	Rating Level at Receptor ($dB\ L_{Ar,Tr}$)
From Louvre (external)	66	13	-30	0	0	36	0	36
		Cumulative Sound Level at Nearest Receptor ($dB\ L_{Aeq,Tr}$)				**36**		**36**

Figure B3: Louvre noise limit calculation

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