Lyf Hotel
Manchester
M1 4PH

Plant Noise Impact

On behalf of

AVISON YOUNG

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For and on behalf of Noise Solutions Ltd				

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01	27/03/2026	Updated Plant Locations	AJ	NAC

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Executive Summary

Noise Solutions Ltd (NSL) has been commissioned to provide a noise impact assessment for new plant to be installed on the rooftop of the Lyf Hotel in Manchester.

The proposed plant will be installed in two locations on the hotel rooftop. The plant consists of 21 VRF air conditioning units. The plant will typically operate 24 hours daily.

The noise level predictions demonstrate that cumulative noise emissions from the proposed plant will comply with the proposed limits at the nearest noise sensitive properties.

Noise from fixed plant should not be grounds for refusal of planning permission.

1.0 Introduction

1.1. Noise Solutions Ltd (NSL) has been commissioned to provide a noise impact assessment for new plant to be installed on the rooftop of the Lyf Hotel in Manchester.

1.2. An environmental sound survey has been undertaken to establish the prevailing background sound pressure levels at a location representative of the sound levels outside the nearest noise sensitive receptors to the site.

1.3. Plant noise levels have been predicted at the nearest noise-sensitive premises and assessed against the local authority's usual requirements.

1.4. To assist with the understanding of this report, a glossary of acoustic terms can be found in **Appendix A**. An in-depth glossary of acoustic terms can be viewed online at www.acoustic-glossary.co.uk.

2.0 Details of development proposals

2.1. Lyf Hotel is located at Piccadilly Plaza, Portland Street in Manchester.

2.2. The proposed plant will be installed in two locations on the hotel rooftop. The plant consists of 21 VRF air conditioning units. The plant will typically operate 24 hours daily.

2.3. A site plan showing the site, the surrounding area and the noise monitoring location used in this assessment is presented in **Appendix B**.

2.4. A drawing showing the plant layout on the roof can be seen in **Appendix F**.

3.0 Nearest noise sensitive receptors

3.1. The area surrounding the site is mainly commercial.

3.2. The nearest residential receptors will be the hotel rooms directly below the plant on the top floor of the hotel (receptor R1). These rooms are approximately 5m from the plant but screened by the roof edge.

3.3. The closest offices with direct line of sight are the upper floors of City Tower approximately 50m to the northwest of the closest plant (receptor R2).

3.4. All other nearby receptors benefit from increased distance and screening from the plant.

3.5. The receptors are shown in **Appendix B**.

4.0 Existing noise climate

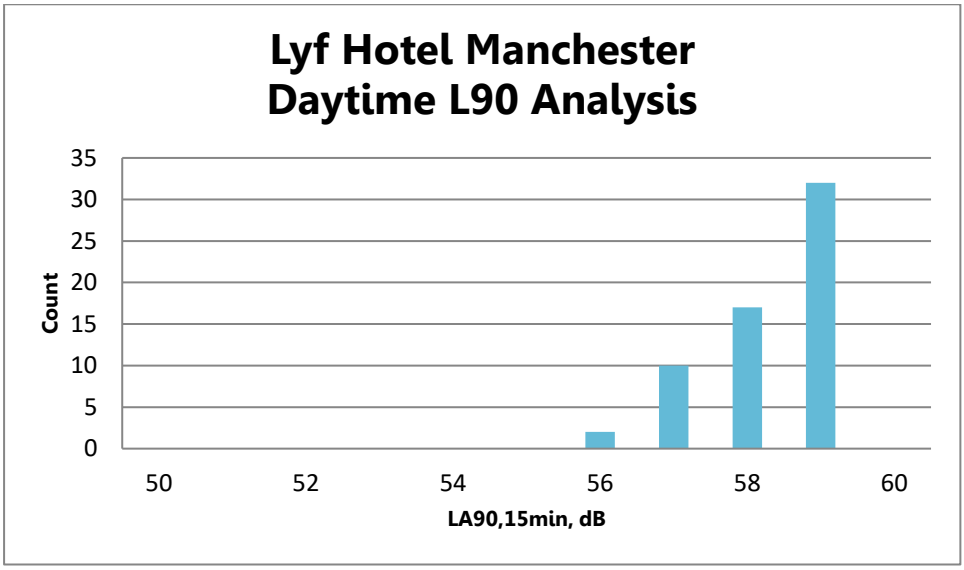
4.1. An environmental noise survey was undertaken to establish the typical background sound levels at a location representative of the noise climate outside the façades of the nearest noise sensitive receptors to the proposed plant area, during the quietest times at which the plant will operate.

4.2. The results of the environmental sound survey are summarised in Table 1 below. The full set of measurement results and details of the survey methodology are presented in **Appendix C**.

Table 1 Summary of survey results

Measurement period	Range of recorded sound pressure levels (dB)			
	$L_{Aeq(15mins)}$	$L_{AFmax(15mins)}$	$L_{A10(15mins)}$	$L_{A90(15mins)}$
Daytime (07.00 – 23.00 hours)	58-73	66-94	60-66	56-59
Night-time (23.00 – 07.00 hours)	55-63	63-86	56-63	53-58

Figure 1 Histogram of daytime L_{A90} background sound pressure levels



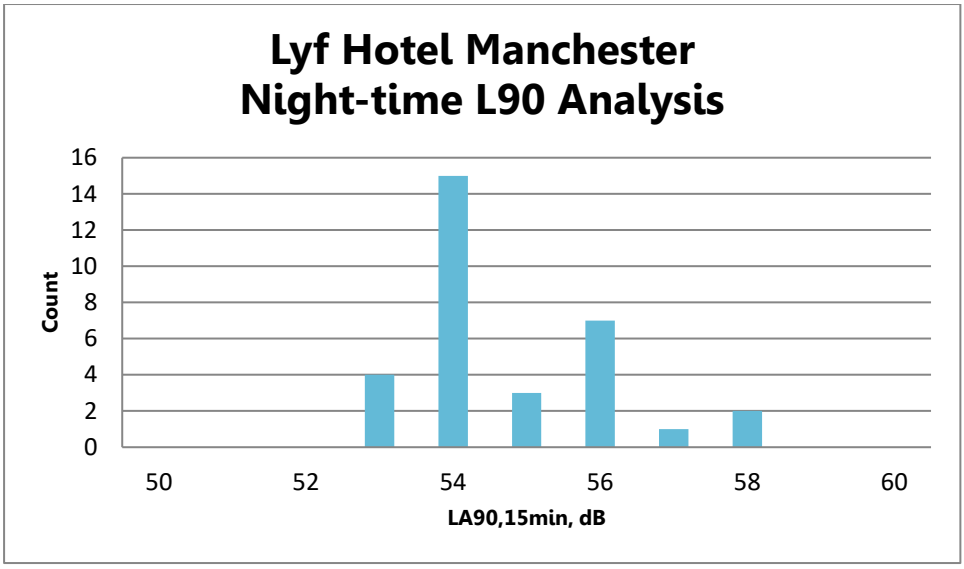
4.3. Further statistical analysis has been carried out on the data, and the mean, modal and median values are shown in Table 2 below.

Table 2 Statistical analysis of $L_{A90,15min}$ levels during the daytime period

dB, L_{A90} daytime period	
mean	58
modal	59
median	59

4.4. From the histogram analysis, and in view of the high daytime background sound levels, 56dB has been selected to be a robust representation of the background noise level during the daytime period.

Figure 2 Histogram of night-time L_{A90} background sound pressure levels



4.5. Further statistical analysis has been carried out on the data and the mean, modal and median values are shown in Table 3 below.

Table 3 Statistical analysis of $L_{A90,15min}$ levels during the night-time period

dB, L_{A90} night-time period	
mean	55
modal	54
median	54

4.6. From the histogram analysis, 53dB has been selected to be a robust representation of the background noise level during the night-time period.

4.7. Therefore, the following values are considered representative of the existing background sound pressure levels at nearby noise sensitive premises:

- 56dB L_{A90} during the daytime period; and
- 53dB L_{A90} during the night-time period.

5.0 Plant noise design criteria

Manchester City Council

5.1. The Planning and Noise Technical Guidance document for Manchester City Council[1] provides the following guidance with regards to noise and vibration from fixed plant/equipment.

> *The noise assessment should be based on BS 4142, 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 (LAeq) below the typical background (LA90) level at the nearest noise sensitive location'.*

BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

5.2. BS 4142:2014+A1:2019 is intended to be used to assess the likely effects of sound on people residing in nearby dwellings. The scope of BS 4142:2014 includes "sound from fixed plant installations which comprise mechanical and electrical plant and equipment".

5.3. The procedure contained in BS 4142:2014+A1:2019 is to quantify the "specific sound level", which is the measured or predicted level of sound from the source in question over a one hour period for the daytime and a 15 minute period for the night-time. Daytime is defined in the standard as 07:00 to 23:00 hours, and night-time as 23:00 to 07:00 hours.

5.4. The specific sound level is converted to a rating level by adding penalties on a sliding scale to account for either potentially tonal or impulsive elements. The standard sets out objective methods for determining the presence of tones or impulsive elements, but notes that it is acceptable to subjectively determine these effects.

5.5. The penalty for tonal elements is between 0dB and 6dB, and the standard notes: "Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible."

5.6. The penalty for impulsive elements is between 0dB and 9dB, and the standard notes: "Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."

[1] Planning and Noise, Technical Guidance, Manchester City Council, October 2022

5.7. The assessment outcome results from a comparison of the rating level with the background sound level. The standard states:

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

5.8. The standard does state that "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."

5.9. The standard goes on to note that: "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."

5.10. In addition to the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, the 2014 edition places emphasis upon an appreciation of the context, as follows:

> *"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."*

5.11. BS 4142:2014+A1:2019 requires uncertainties in the assessment to be considered, and where the uncertainty is likely to affect the outcome of the assessment, steps should be taken to reduce the uncertainty.

Criterion at commercial property

5.12. Typically, local authorities do not consider office premises to be as sensitive to noise as residential properties and, therefore, emissions criteria are generally relaxed at these locations.

5.13. However, it is considered appropriate to control plant noise levels within offices to meet the recommended internal noise levels provided in BS 8233:2014 *'Guidance on sound insulation and noise reduction for buildings'*. The standard states a range of noise levels for various spaces used for 'study and work requiring concentration' between 35 and 50dB L_{Aeq}.

5.14. In addition, BS 8233 provides general guidance on the expected sound insulation performance of a given building façade, with details of how various elements can affect the overall performance. Concerning windows, it states that:

> *If partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15dB.*

5.15. This implies that should windows on a noise affected façade be openable, a sound insulation value of 15dB should be applied to the whole façade to an internal room being assessed. It should be noted that a sound insulation performance of much greater than 15dB is expected for non-openable standard double-glazed windows. However, in order to assess the worst-case scenario, this report assumes that windows may be opened if desired.

5.16. Based on the above and assuming a worst-case internal criterion of 35dB L_{Aeq}, cumulative plant noise levels at the façade of the nearest office premises should not exceed 50dB L_{Aeq}.

Proposed criteria

5.17. Plant noise should not exceed a rating level higher than 5dB below the representative L_{A90} background level for the hotel rooms and should not exceed 50dB L_{Aeq} at the façade of the nearest office premises.

5.18. Noise levels from the proposed plant should not exceed the limits in Table 4 to demonstrate compliance with the criteria detailed above:

Table 4 Proposed plant noise emissions level limits at the noise sensitive receptors

Period	Cumulative plant rating noise level, dB $L_{Ar,Tr}$
Daytime (07.00 – 23.00 hours)	51
Night-time (23.00 – 07.00 hours)	48
Commercial	50*

**Specific level*

6.0 Plant noise impact assessment

6.1. The cumulative plant noise levels at the nearest noise sensitive receptors have been predicted. The assessment has considered directivity, distance and screening between the sources and receivers where appropriate.

6.2. The predictions have been based on the proposed plant operating at full capacity during both the daytime and night-time periods.

6.3. It should be noted that the proposed plant is not anticipated to exhibit any tonal or impulsive characteristics provided it is well maintained. All proposed plant will be inverter driven and, therefore, will gently ramp up and down depending on the demands on the various systems. The plant is also not expected to contain any significant low frequency tones, as stated in BS 4142:2014:2014. However, were appropriate (at residential dwellings) a penalty of 3dB as described in BS 4142:2014 has been applied for the possible presence of "*...characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment...".*

6.4. Table 5 summarises the results of the assessment at the nearest noise sensitive receptors. All other nearby receptors benefit from increased distance/screening to the plant such that resulting noise levels will be lower than at the receptors considered. The full set of calculations can be found in **Appendix E**. Manufacturer plant noise data can be found in **Appendix D**.

Table 5 Assessment of predicted noise levels at the nearest noise sensitive receptors

Receptor	Period	Predicted noise rating level at receptor, $L_{Ar,Tr}$ (dB)	Criterion (dB)	Difference
R1 Top Floor Hotel Rooms	Daytime (07.00 - 23.00 hours)	44	51	-7
	Night-time (23.00 - 07.00 hours)	44	48	-4
R2 Offices in City Tower	Daytime (07.00 - 23.00 hours)	47	50*	-3
	Night-time (23.00 - 07.00 hours)	47*	50*	-3

**Specific level*

6.5. The noise level predictions demonstrate that cumulative noise emissions from the proposed plant will comply with the proposed limits at the nearest noise sensitive properties.

Context and uncertainties

6.6. As BS 4142:2014 advises, the impact must be considered within the context of the site and the surrounding acoustic environment. The following must, therefore, also be taken into consideration when determining the potential impact that may be experienced:

- The assessment is undertaken at the nearest residential windows. The impact on all other nearby residential windows will be lower due to screening and distance attenuation.
- The noise level predictions are based on the proposed equipment running at maximum duty. The plant will not run in this manner at all times (for example, when demands for heating/cooling are lower) and, therefore, this is a robust assessment.

6.7. Where possible uncertainty in the above assessments has been minimised by taking the following steps:

- The meter and calibrator used have a traceable laboratory calibration and the meter was field calibrated before and after the measurements.
- Uncertainty in the calculated impacts has been reduced by the use of a well-established calculation method.

7.0 Summary

7.1. Noise Solutions Ltd (NSL) has been commissioned to provide a noise impact assessment for new plant to be installed on the rooftop of the Lyf Hotel in Manchester.

7.2. An environmental sound survey has been undertaken to establish the prevailing background sound pressure levels at a location representative of the sound levels outside the nearest noise sensitive receptors to the site.

7.3. Cumulative plant noise emission levels for the proposed plant have been predicted at the most affected noise sensitive receptors and assessed against the local authority's usual requirements.

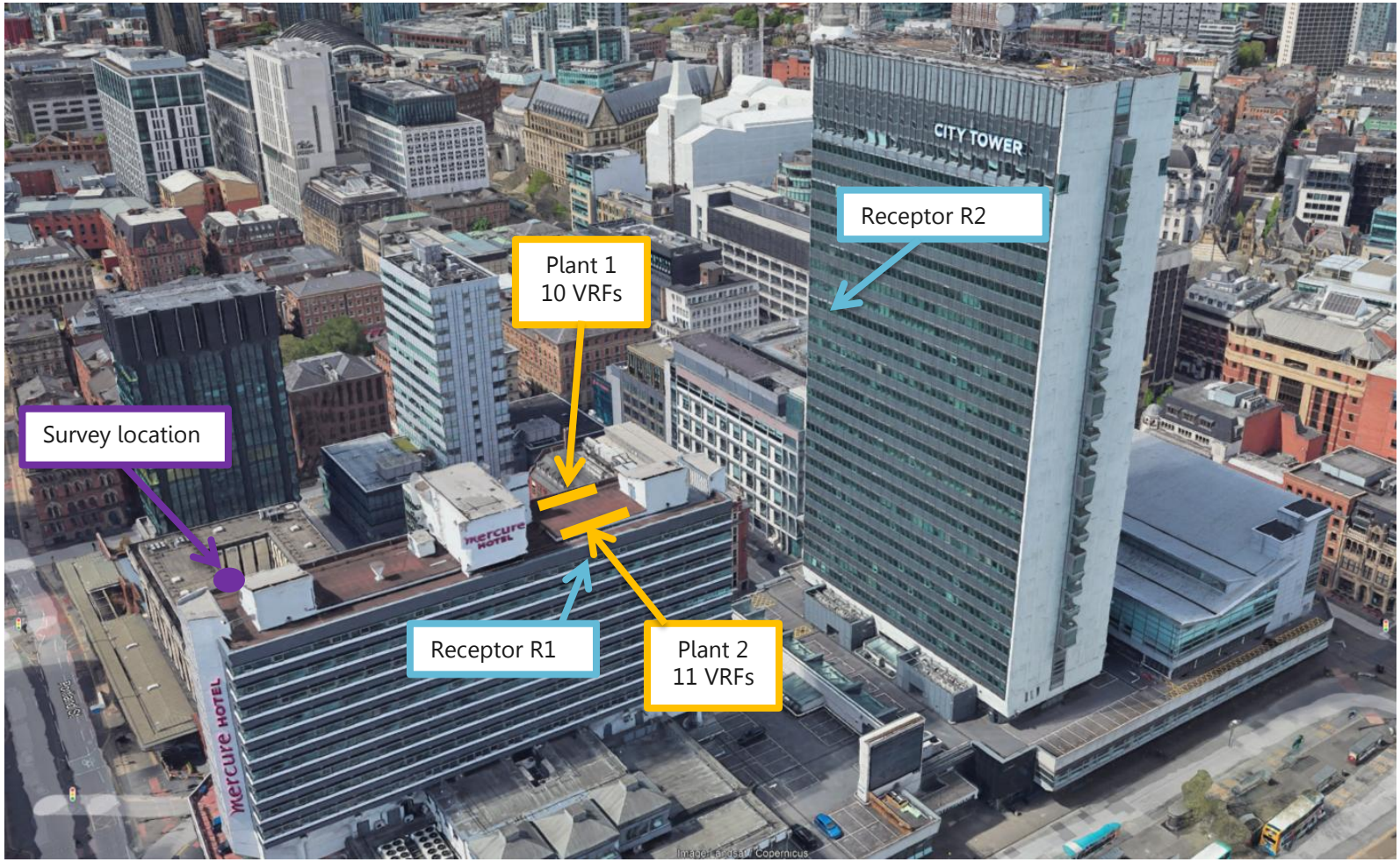
7.4. The noise level predictions demonstrate that the proposed plant will comply with the proposed limits at the nearest noise sensitive properties.

7.5. Noise from fixed plant should not be grounds for refusal of planning permission.

Appendix A Acoustic terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 $\log_{10}$ (s1/s2). 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 20μPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	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 recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	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. $L_{A10,18h}$ is the A –weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level that is exceeded for 90% of the measurement time interval, T. It gives an indication of the lower levels of fluctuating noise. It is often used to describe the background noise level and can be considered to be the "average minimum" noise level and is a term used to describe the level to which non-specific noise falls during quiet spells, when there is lull in passing traffic for example.

Appendix B Aerial photograph site showing areas of interest



Appendix C Environmental sound survey

Details of sound surveys

C.1 Measurements of the existing background sound levels were undertaken between 11.15 hours on Monday the 19th January and 10.30 hours on Tuesday 20th January 2026.

C.2 The sound level meter was programmed to record the A-weighted L_{eq}, L_{90}, L_{10} and L_{max} noise indices for consecutive 15-minute sample periods for the duration of the noise survey.

Measurement position

C.3 The representative measurement position was located on the roof top of Lyf Hotel (location indicated on the site plan in **Appendix B**). The location was chosen as environmental noise levels were considered to be similar to those at the nearest receptor.

C.4 In accordance with BS 7445-2:1991 'Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use', the measurements were undertaken under free-field conditions.

Equipment

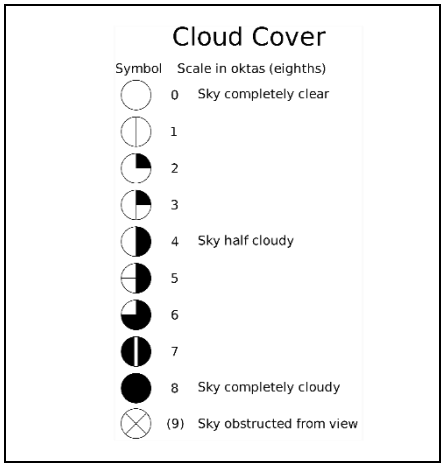
C.5 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (+/-0.2 dB) in the calibration level was noted.

Environmental noise survey

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Svantek 977D / 99472	07/02/2024	Factory conformation certificate
Condenser microphone	Microtech MK255 / 26247		
Preamplifier	Svantek SV12L / 144643		
Calibrator	Svantek SV33B / 148015	10/03/2025	1511553-1

Weather conditions

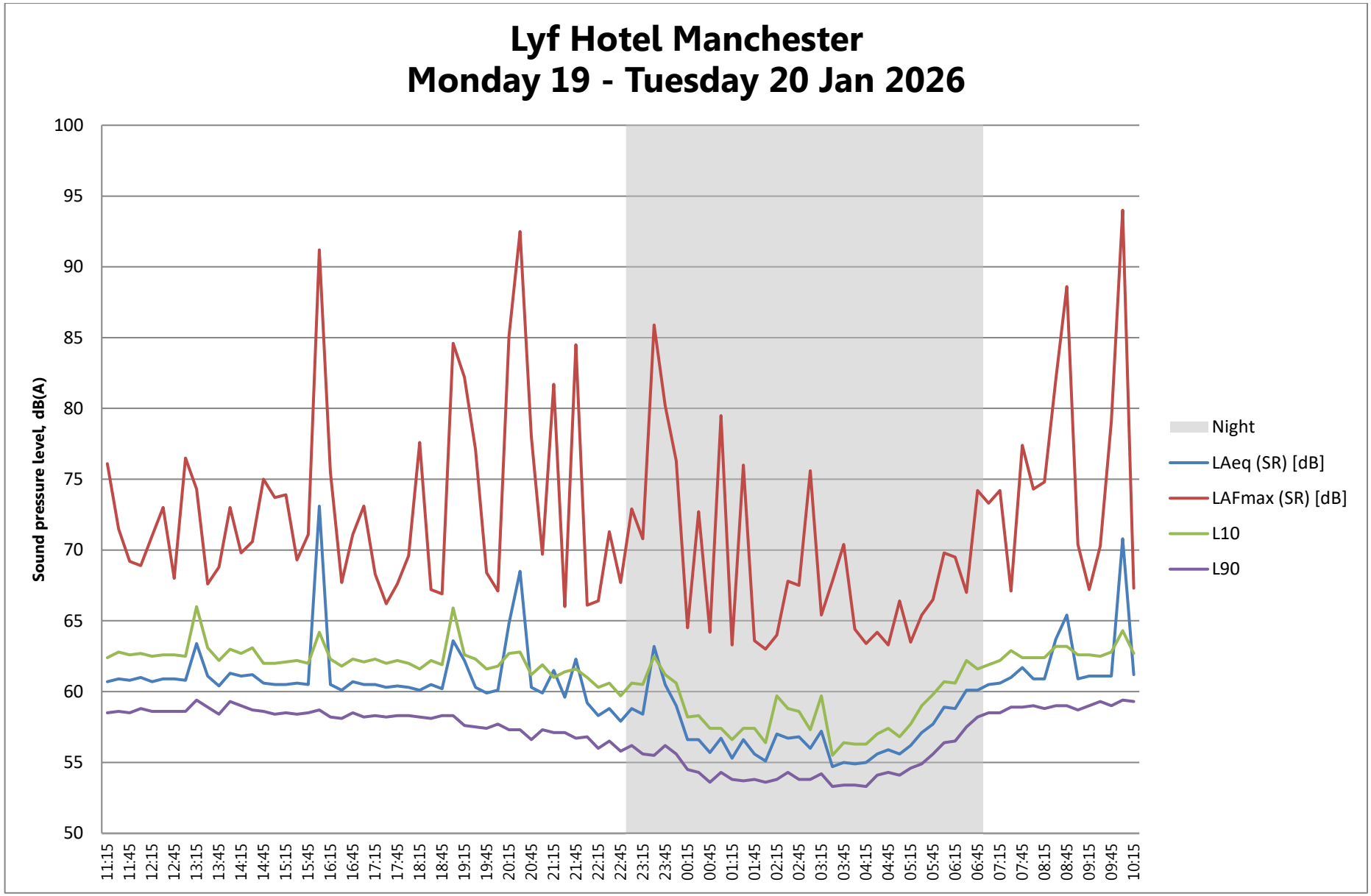
C.6 Weather conditions were determined both at the start and on completion of the survey. It is considered that the meteorological conditions were generally appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site at the beginning and end of the survey.

Weather Conditions				
Measurement Location	**Date/Time**	**Description**	**Beginning of Survey**	**End of Survey**
As indicated on Appendix B	11.15 19th January -10.30 20th January 2026	Temperature (°C)	9	9
		Precipitation:	No	No
		Cloud cover (oktas – see guide)	9	4
		Presence of fog/snow/ice	Fog	No
		Presence of damp roads/wet ground	Yes (damp)	Yes (damp)
		Wind Speed (m/s)	0.5	2
		Wind Direction (from)	N	S
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Results

C.7 The results of the environmental survey are considered to be representative of the background sound pressure levels at the façades of the nearest noise sensitive receptors during the quietest times at which the plant will operate. The noise climate upon set up and collection of the sound level meter was dominated by local traffic, distant traffic and plant from the surrounding buildings.

C.8 The results of the survey are presented in a time history graph overleaf.


Lyf Hotel Manchester
Monday 19 - Tuesday 20 Jan 2026
Sound pressure level, dB(A)
100
95
90
85
80
75
70
65
60
55
50
11:15
11:45
12:15
12:45
13:15
13:45
14:15
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16:15
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02:15
02:45
03:15
03:45
04:15
04:45
05:15
05:45
06:15
06:45
07:15
07:45
08:15
08:45
09:15
09:45
10:15
Night
LAeq (SR) [dB]
LAFmax (SR) [dB]
L10
L90

Appendix D External plant noise data

Plant Ref	Number of Units	Operating Hours	Sound power level	Sound Pressure level dBA @ 1m
Toshiba VRF SMMs R410a MMY – MUP1001HT8P-E	21	Day	77 dBA	58
		Night	77 dBA	58

Appendix E Noise Level Predictions

Receptor R1. Top floor hotel rooms

Plant item	Source Sound Pressure (dBA)	Distance		Directivity Correction (dB)	Screening (dB)	BS4142 Feature Correction (dB)	Plant sound level at receptor L_{Aeq} (dB)
		Distance to Receptor (m)	Correction (dB)				
VRF 1	58 @1m	4	-12	0	-15*	3	34
VRF 2	58 @1m	4	-12	0	-15*	3	34
VRF 3	58 @1m	4	-12	0	-15*	3	34
VRF 4	58 @1m	4	-12	0	-15*	3	34
VRF 5	58 @1m	4	-12	0	-15*	3	34
VRF 6	58 @1m	4	-12	0	-15*	3	34
VRF 7	58 @1m	4	-12	0	-15*	3	34
VRF 8	58 @1m	4	-12	0	-15*	3	34
VRF 9	58 @1m	4	-12	0	-15*	3	34
VRF 10	58 @1m	4	-12	0	-15*	3	34
VRF 11	58 @1m	4	-12	0	-15*	3	34
VRF 12	58 @1m	14	-23	0	-20**	3	18
VRF 13	58 @1m	14	-23	0	-20**	3	18
VRF 14	58 @1m	14	-23	0	-20**	3	18
VRF 15	58 @1m	14	-23	0	-20**	3	18
VRF 16	58 @1m	14	-23	0	-20**	3	18
VRF 17	58 @1m	14	-23	0	-20**	3	18
VRF 18	58 @1m	14	-23	0	-20**	3	18
VRF 19	58 @1m	14	-23	0	-20**	3	18
VRF 20	58 @1m	14	-23	0	-20**	3	18
VRF 21	58 @1m	14	-23	0	-20**	3	18
Total plant sound pressure level, day & night							**44**

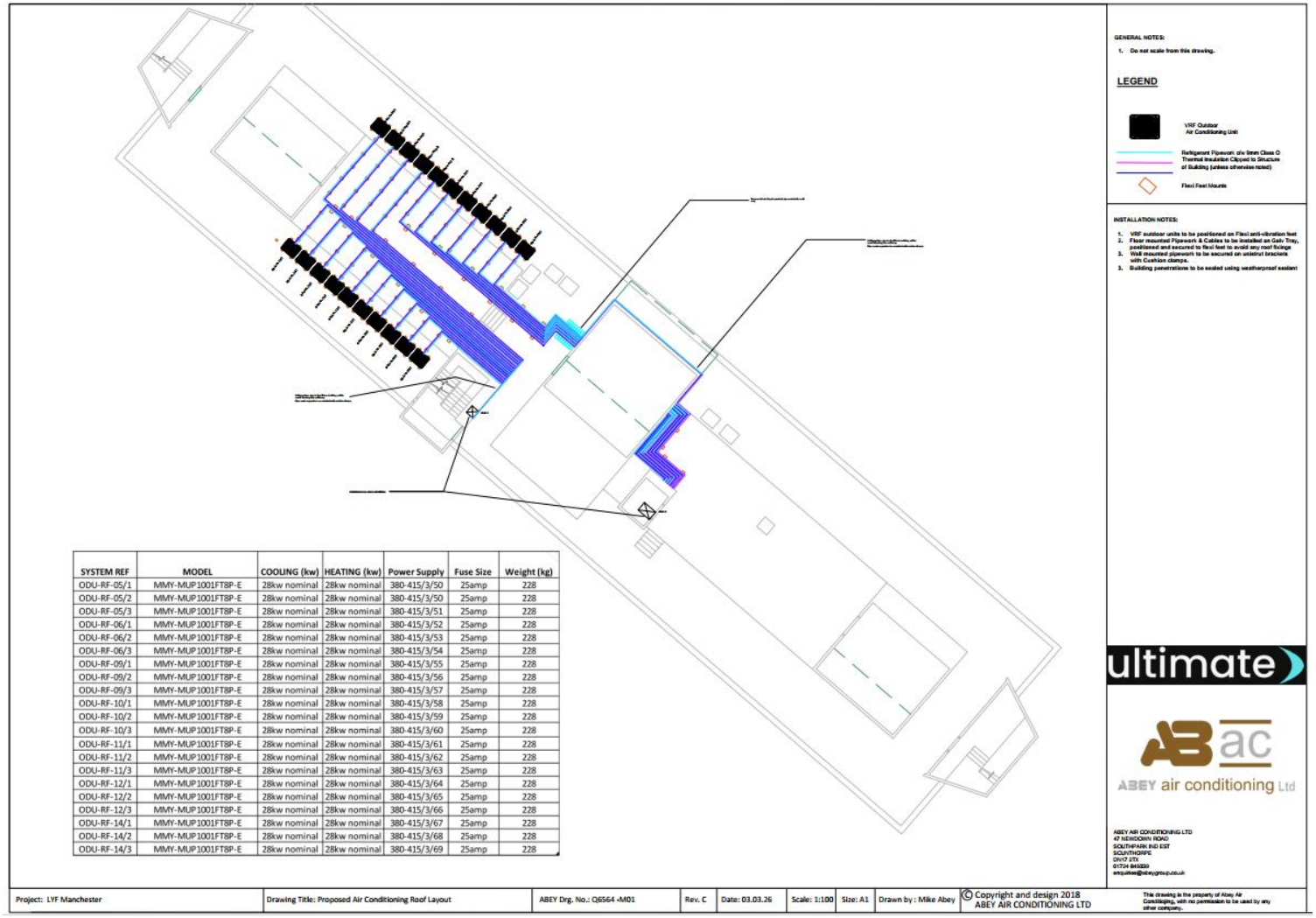
**Screening from parapet around the roof.*
***Screening provided by existing rooftop facades*

Receptor R2. Offices at City Tower

Plant item	Source Sound Power (dBA)	Distance		Directivity Correction (dB)	Screening (dB)	Plant sound level at receptor L_{Aeq} (dB)
		Distance to Receptor (m)	Correction (dB)			
VRV 1	77	56	-43	0	0	34
VRV 2	77	56	-43	0	0	34
VRV 3	77	56	-43	0	0	34
VRV 4	77	56	-43	0	0	34
VRV 5	77	56	-43	0	0	34
VRV 6	77	56	-43	0	0	34
VRV 7	77	56	-43	0	0	34
VRV 8	77	56	-43	0	0	34
VRV 9	77	56	-43	0	0	34
VRV 10	77	56	-43	0	0	34
VRV 11	77	56	-43	0	0	34
VRV 12	77	56	-43	0	0	34
VRV 13	77	56	-43	0	0	34
VRV 14	77	56	-43	0	0	34
VRV 15	77	56	-43	0	0	34
VRV 16	77	56	-43	0	0	34
VRV 17	77	56	-43	0	0	34
VRV 18	77	56	-43	0	0	34
VRV 19	77	56	-43	0	0	34
VRV 20	77	56	-43	0	0	34
VRV 21	77	56	-43	0	0	34
Total plant sound pressure level, day & night						**47**

The receptor is above the plant; the sound power more accurately represents the plant noise in this case as most of the sound radiates from the top of the VRF unit.

Appendix F *Roof top plant layout



SYSTEM REF	MODEL	COOLING (kw)	HEATING (kw)	Power Supply	Fuse Size	Weight (kg)
ODU-RF-05/1	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/50	25amp	228
ODU-RF-05/2	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/50	25amp	228
ODU-RF-05/3	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/51	25amp	228
ODU-RF-06/1	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/52	25amp	228
ODU-RF-06/2	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/53	25amp	228
ODU-RF-06/3	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/54	25amp	228
ODU-RF-09/1	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/55	25amp	228
ODU-RF-09/2	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/56	25amp	228
ODU-RF-09/3	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/57	25amp	228
ODU-RF-10/1	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/58	25amp	228
ODU-RF-10/2	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/59	25amp	228
ODU-RF-10/3	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/60	25amp	228
ODU-RF-11/1	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/61	25amp	228
ODU-RF-11/2	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/62	25amp	228
ODU-RF-11/3	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/63	25amp	228
ODU-RF-12/1	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/64	25amp	228
ODU-RF-12/2	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/65	25amp	228
ODU-RF-12/3	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/66	25amp	228
ODU-RF-14/1	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/67	25amp	228
ODU-RF-14/2	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/68	25amp	228
ODU-RF-14/3	MMY-MUP1001FT8P-E	28kw nominal	28kw nominal	380-415/3/69	25amp	228