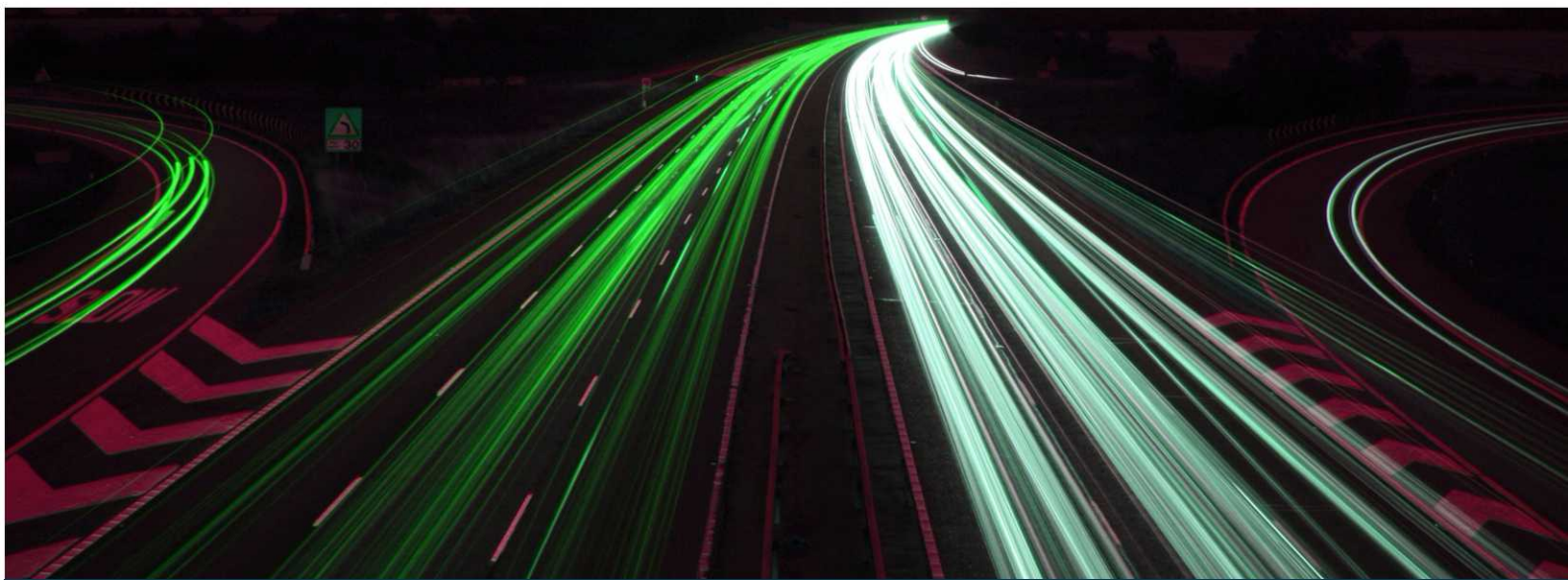




Post Noise Impact Assessment

Report: 4813-1-R1 – Rutherford House TE, 34 George Street, Manchester, M1 4HA.

Client: AIRSYS (UK) Ltd

Northern Office: The Old Vicarage,
Barcroft Lane, Haywood DN6 0DS

t: 01302 707 199

e: info@cloveracoustics.co.uk

www.cloveracoustics.co.uk

Table of Contents

1. Introduction	3
2. Scope	3
3. Site Description	4
4. Survey Information.....	6
5. Survey Results	8
6. Noise Assessment.....	10
7. Conclusion	12
8. Appendix	14

Report Revisions	Date		
4813-1-R1	01/12/2023	Initial Report	
	Produced by:	Checked by:	Authorised by:
Name:	Steve McKeever AMIOA	Steve Clow MIOA	Steve Clow MIOA

Steve Clow MIOA, is a member of The Institute of Acoustics and has achieved the IOA Diploma in Acoustics and Noise Control. Steve Clow has over 20 years experience in an acoustic consultant capacity working on many assessments involving planning and regulatory services.

Steve McKeever AMIOA, is an associate member of The Institute of Acoustics and has achieved the IOA Diploma in Acoustics and Noise Control. Steve McKeever has 15 years experience working in acoustics and 10 years in an acoustic consultant capacity.

This report is for the exclusive use of the client named on page 1 and may not be reproduced without the authors' permission. The information reported had been prepared with all reasonable care and diligence. Clover Acoustics Ltd disclaims any responsibility to the client and others in respect of matters outside the scope of works agreed. We accept no responsibility to any third party to whom this report or any part of is made available. Any such parties rely upon this report at their own risk.

Aerial images contained in this document are reproduced under license from our Global Imaging System operator. License details are available upon request.

Clover Acoustics Ltd - The Old Vicarage - Barcroft Lane - Askern - Doncaster - DN6 0DS
Tel: 01302 707 199 - Web: www.cloveracoustics.co.uk - Email: info@cloveracoustics.co.uk

1. Introduction

Clover Acoustics Ltd has been appointed by AIRSYS (UK) Ltd to carry out a noise assessment of air handling equipment installed at Rutherford House TE, 34 George Street, Manchester, Lancashire, M1 4HA.

Measurements of the installed equipment were carried out during a representative night-time period commencing on Wednesday 29th November 2023. A background noise assessment was carried out during a representative night-time period commencing on Thursday 2nd March 2023 in order to establish the existing background levels prior to the installation of the equipment.

The purpose of this report is to demonstrate that due consideration for noise affecting neighbouring residential properties has been made and to assess the significance of any noise impact from the operation of the units.

2. Scope

BS4142:2014 Methods for rating and assessing industrial and commercial sound.

BS4142 gives a method for rating sound from industrial and commercial sources affecting people inside or outside dwellings or premises used for residential purposes. An initial estimate of the significance of the sound from the industrial/commercial nature can be assessed by subtracting the measured background noise level from the rating level (this is the specific sound level of the source with any corrections or penalties for distinctive acoustic characteristics). Typically, the greater the 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 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.

3. Site Description

Rutherford House TE is a small sized telephone exchange building situated in a mixed commercial and residential area in Manchester city centre. The current drawings identify newly installed air handling equipment on the ground floor level of the exchange building including:

- 3 x FCA Air handling units (AHU) on the south-east elevation.
- 3 x Extract units to a covered yard area on the north-western aspect which have been considered as likely low impact.

Background sound measurements of the existing noise climate were taken prior to the installation of the equipment. Subjectively the existing background sound was influenced by road noise from the surrounding area, there was a general hum apparent in the close vicinity of the exchange building.

- The receivers to the AHU installations on the south-east elevation of the exchange are identified as 'Manhattan Apartments' approximately 28 meters south-west from the nearest unit.

Figure 1 shows the site location and background monitoring locations; Figure 2 shows the floor layout plan.

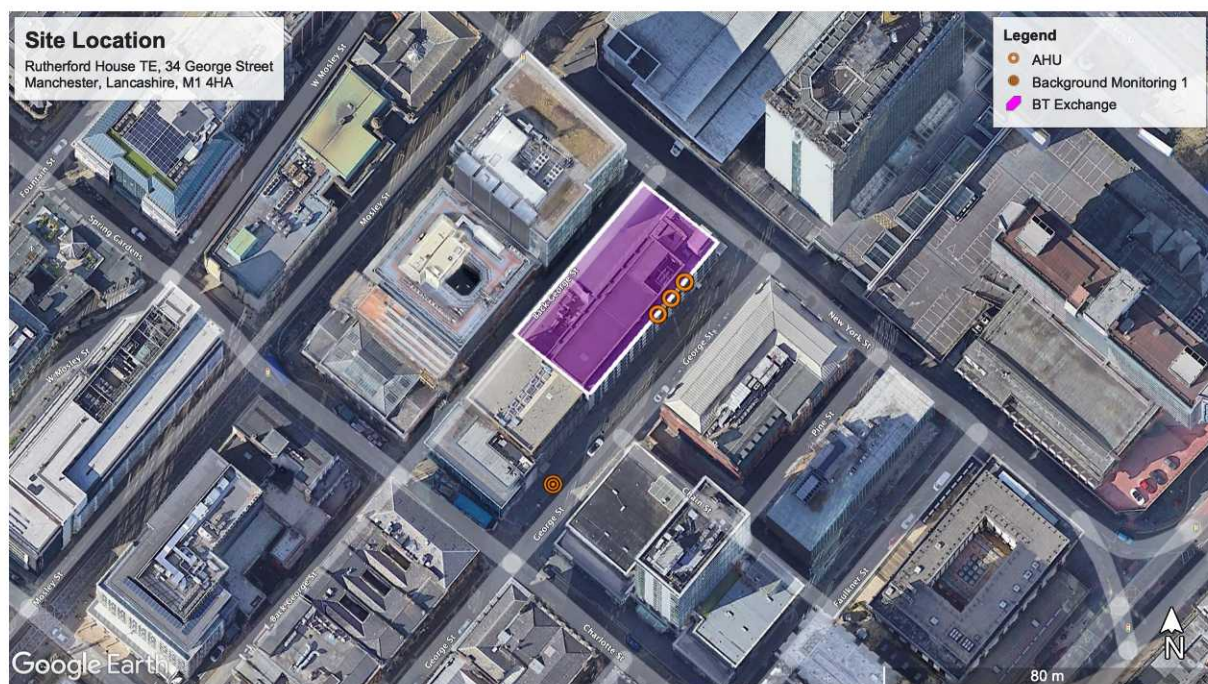


Figure 1 – Site location with background monitoring locations

4. Survey Information

Measurement Instrumentation

The measurement instrumentation used on the survey was as follows:

Equipment	Manufacturer & Type	Serial Number	Calibration Certificate
Sound Level Meter	Norsonic 139	1392705	23/1185
Acoustic Calibrator	Norsonic 1251	32856	23/1319

The equipment was calibrated to comply with section 4.2 of BS7445:1-2003 before and after the surveys. The calibration was as follows:

Meter	Serial	Before		After	
Norsonic 139	1392705	114.1	-27.6	114.1	-27.5

Measurements & Timescales

Specific levels of the air handling equipment were taken on Wednesday 29th November 2023 with the air handling equipment on maximum commissioned. During the background survey 5-minute measurements were made during a typical night period commencing on Thursday 2nd March 2023 at a location representative of the nearest sensitive receivers to the exchange building.

The following measurements are reported: $L_{Aeq,T}$, $L_{A90,T}$, $L_{Amax,T}$

The measurements and their interpretation shall be in accordance with BS 7445: Parts 1 and 2. All sound pressure levels are in dB (re 20 μ Pa).

Meteorology

Wind speed measurements were recorded during the specific survey close to the noise monitoring location. Throughout the measurement period; average wind speed measurements were below 5m/s.

Temperature was recorded at 5-6°C during the initial background survey and recorded at 1°C during the post survey. No precipitation occurred during the monitoring period.

Position of Monitoring Equipment

The equipment was mounted free field. Figure 3 shows the site location plan with the location of the installations.

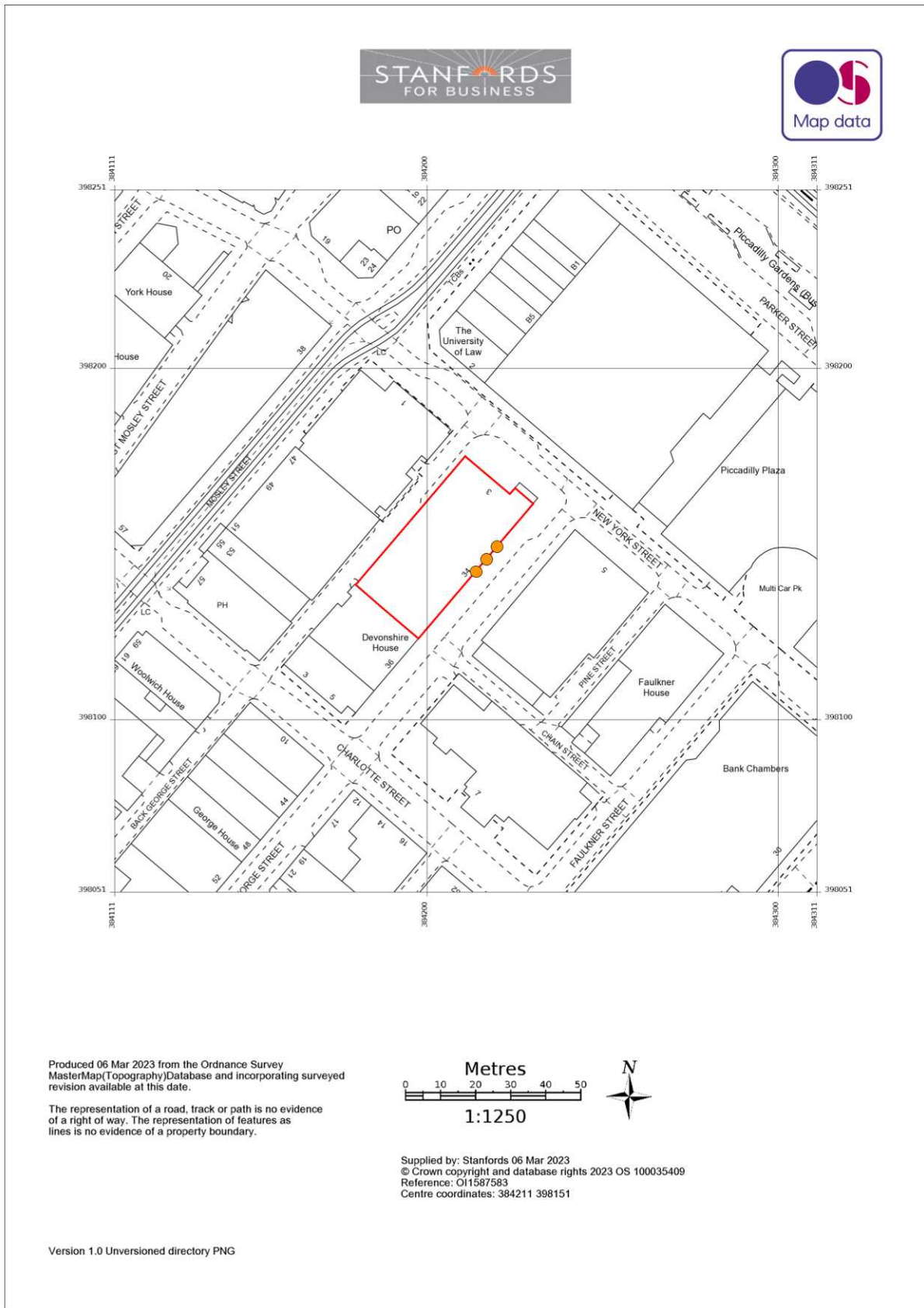


Figure 3 – Site Location Plan



5. Survey Results

Background Noise Summary

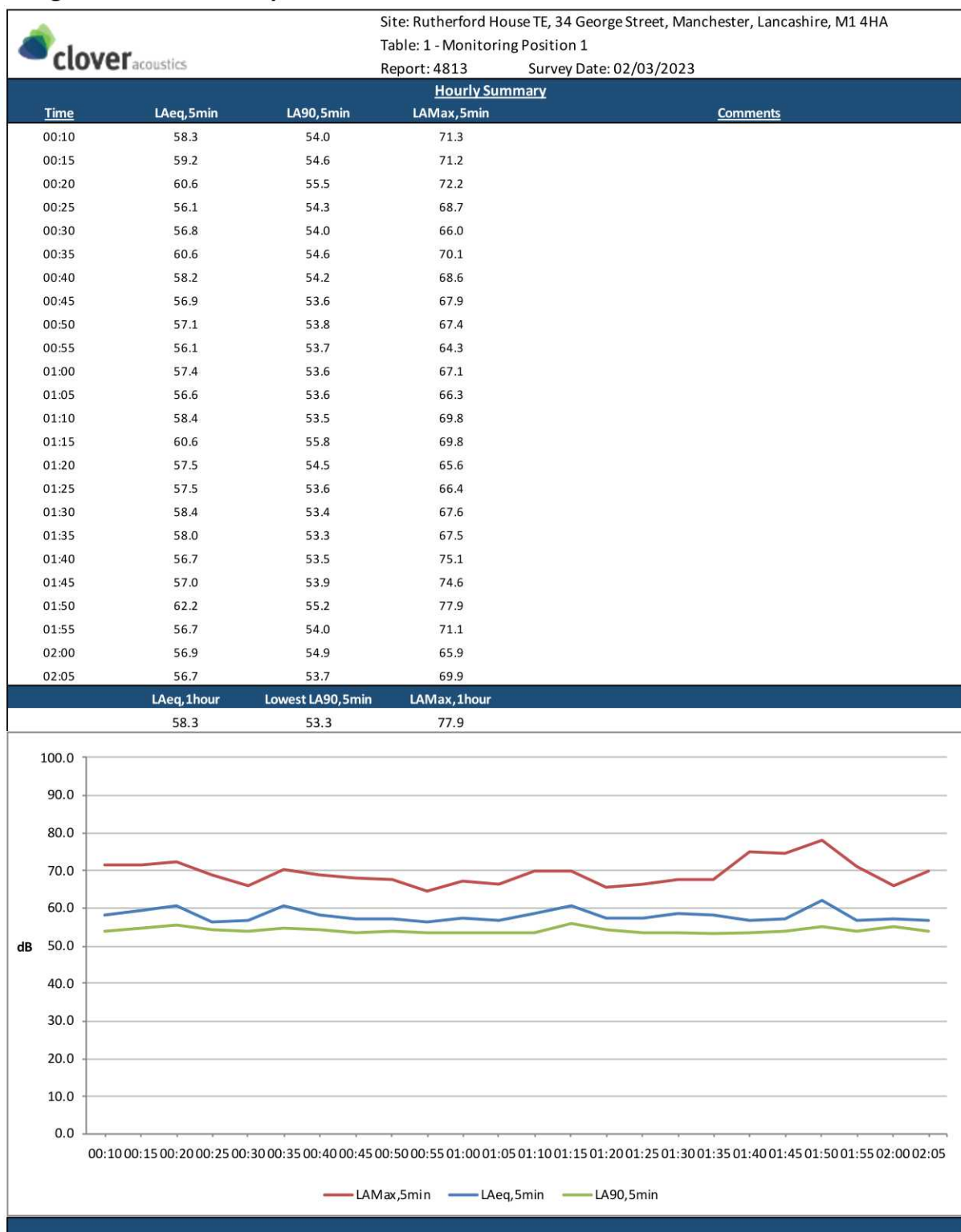


Table 1 – Monitoring Position 1 – South-East Elevation Receiver

Measured Source Level Summary

<i>Ambient Sound Levels – Maximum Commissioned Speed</i>				
Source	Elevation	Operating Speed	Distance, m	dB L _{Aeq}
AHU 1	South-East	Max	1.5	58.8*
AHU 2	South-East	Max	1.5	59.9*
AHU 3	South-East	Max	1.5	59.1*
<i>Residual Sound Levels</i>				
Source	Elevation	Operating Speed	Distance, m	dB L _{Aeq}
AHU Residual Level	South-East	Off	-	61.4

**Residual Sound Correction*

The specific source level for the air handling units could not be clearly distinguished above the existing residual sound level due to existing road traffic, pedestrian and city centre noise. The specific source levels presented have been derived from short-term L_{Aeq} measurements where breaks occurred between traffic. An additional residual sound correction will not be applied for the assessments.

6. Noise Assessment

BS4142:2014 – Methods for rating and assessing industrial and commercial sound

Noise Source Description

Specific measurements of the installed equipment were taken with the equipment on maximum commissioned speeds.

- The assessment location for the AHU installations on the south-east elevation of the exchange is approximately 28 meters from the nearest proposed unit.
 - The lowest background noise level monitored during the night-time monitoring period was 53dB $L_{A90,5min}$ at the south-east elevation receivers.

Acoustic Feature Correction

BS4142:2014 allows a character correction to be applied to the specific sound level where acoustic features are present at the assessment location. BS4142 considers that certain acoustic features can increase impact of a new noise source over that expected from a straight comparison between the specific noise level and the background noise level.

These features and the penalties applied to calculate a rating level when assessing subjectively as defined by BS4142 are as follows:

Tonality: For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 and +6dB for tonality.

- 2dB for a tone that is just perceptible
- 4dB where it is clearly perceptible
- 6dB where it is highly perceptible

Impulsivity: A correction of up to 9dB can be applied for sound that is highly impulsive, considering both the rapidity of change in sound level and the overall change in sound level.

- 3dB just perceptible impulsivity
- 6dB clearly perceptible impulsivity
- 9db highly perceptible impulsivity

Distinctive: Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive from the residual acoustic environment a 3dB penalty can be applied.

Intermittency: Where the specific sound has identifiable on/off conditions the specific sound level should be representative of the time period of length equal to the reference time period which contain the greatest amount of 'on' time. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied.

Corrections Applied: Subjectively, the units were not considered to be unlikely to be tonal at the receiver locations. Comparing the specific measurements against the objective method for assessing the audibility of tones in sound: One-third octave method from BS4142:2014 Annex C would consider the units were not tonal. Typically air handling equipment would not be considered impulsive. In normal operation the equipment would not switch on/off several times within the reference time period and as such would not be considered intermittent.

Site Context

The dominant noise source is road traffic, pedestrian and commercial noise from the surrounding area. A general background hum is apparent in the close vicinity of the exchange. The equipment is typical for this type of installation.

Screening Attenuation

Screening of the installation to prevent line of sight to the source would reduce noise levels at the receiver. Screening attenuation will vary depending on the individual source and receiver combinations. The receivers do not have direct line of sight though for the assessment purposes no attenuation from screening is accounted for to represent a worst-case scenario.

Distance Attenuation

The nearest sensitive receivers identified to the south-east are approximately 28m from the nearest AHU installation. Distance attenuation has been calculated using the following formula:

$$L_{p2} = L_{p1} + 20 \log \left(\frac{r_1}{r_2} \right) + 3$$

BS4142 Assessment 1 – Manhattan Apartments – 3 x Air Handling Units

Measurements of the AHU equipment at *maximum commissioned speed* and applying the factors discussed above calculates a noise rating level of 39dB(A) at the receiver. This would give an assessment level -16dB below the measured existing background noise level.

BS4142 Assessment 1 – South-East Receivers				
Unit Description	Specific Sound Level dB(A)	Distance m	Distance Attenuation dB	Specific Level Receiver dB(A)
AHU 1	58.8*	28	-22	36
AHU 2	59.9*	33	-24	36
AHU 2	59.1*	38	-25	34
Total Specific Level dB(A)				40
Acoustic Feature Correction				0
Rating Level dB(A)				40
Night-time Background Level dB L _{A90}				56
Rating Below Night-time Background				-16

Assessment Context

BS4142 advises, *“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 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”*.

During the daytime period external ambient temperatures are higher and usage load on the exchange is also increased for which the cooling capacity of the air handling equipment is designed to meet. The efficiency of the installed equipment should have been selected to provide enough cooling capacity to meet increased daytime requirements. With the cooling requirements lower at night-time it can reasonably be assumed the equipment would not regularly be required to operate at maximum speed during night-time periods.

The BS4142 ratings advise *“depending on the context”*, with the above context consideration should be given to the likeliness of the cooling equipment operating at maximum speed during night-time periods and lower speed/noise output would be more appropriate for night-time periods.

7. Conclusion

A noise assessment has been carried out at the Rutherford House TE, 34 George Street, Manchester, Lancashire, M1 4HA to assess the impact of air handling equipment installed on the ground floor of the building. A specific noise survey of the installed equipment was conducted commencing on Wednesday 29th November 2023.

An assessment has been made in accordance with BS4142:2014 which has shown that the AHU installations on the south-east results in a rating level -16dB below the night-time background sound levels with the air handling equipment on *maximum commissioned speed*.

According to BS4142:2014;

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

Considerations for the context of the assessment have been provided.



Steve McKeever AMIOA
Acoustic Consultant

8. Appendix

Glossary of Terms

Specific Noise Source

The noise source under investigation for assessing the likelihood of complaints.

Specific Noise Level, $L_{Aeq,T}$

The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.

Rating Level, $L_{A,T}$

The specific noise level plus any adjustment for the characteristic features of the noise.

Background Noise Level, $L_{A90,T}$

The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 % of a given time interval, T.

Residual Noise

The ambient noise remaining at a given position in a given situation when the specific noise source is suppressed to a degree such that it does not contribute to the ambient noise.

Ambient Noise

Totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far.

Reference Time Interval, T

The specified interval over which an equivalent continuous A-weighted sound pressure level is determined.

$L_{Aeq,T}$

The A-weighted equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as the fluctuating sound over a specified measurement period, T.

$L_{A10,T}$

The A-weighted sound level exceeded for 10% of the specified measurement period, T.

L_{Amax}

The highest short duration A-weighted sound level recorded during a noise event.

A-Weighting

The 'A' weighting is a correction term applied to the frequency range in order to approximate to the sensitivity of the human ear to noise. It is generally used to obtain an overall noise level from octave or third octave band frequencies.

Octave Band

A frequency band in which the upper limit of the band is twice the frequency of the lower limit.

One-third-octave Band

A frequency band in which the upper limit of the band is 1/3 times the frequency of the lower limit.

Tonal Objective Method

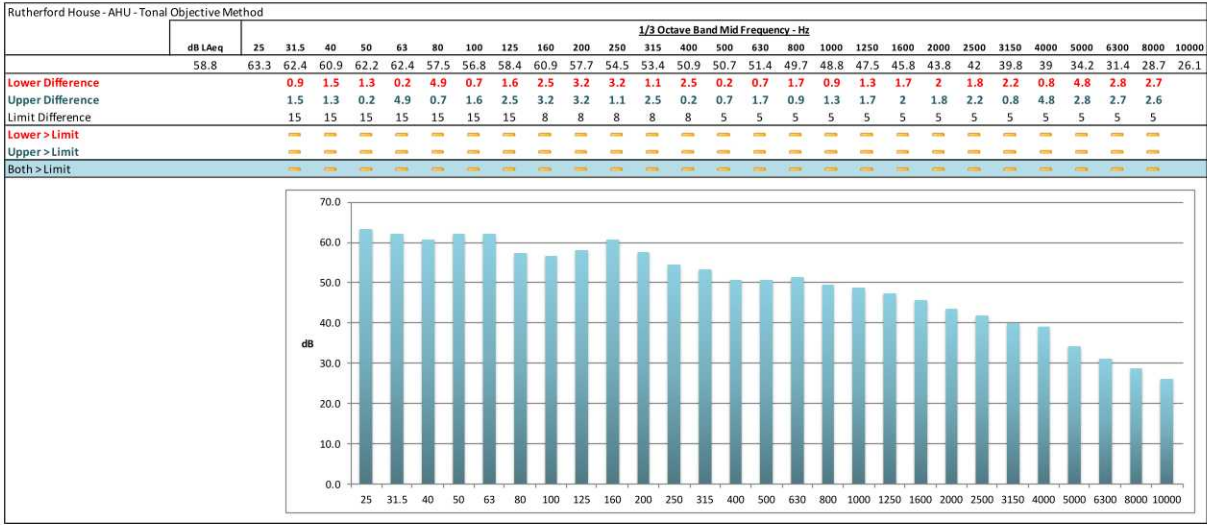


Table 2 – Tonal Objective Method – AHU