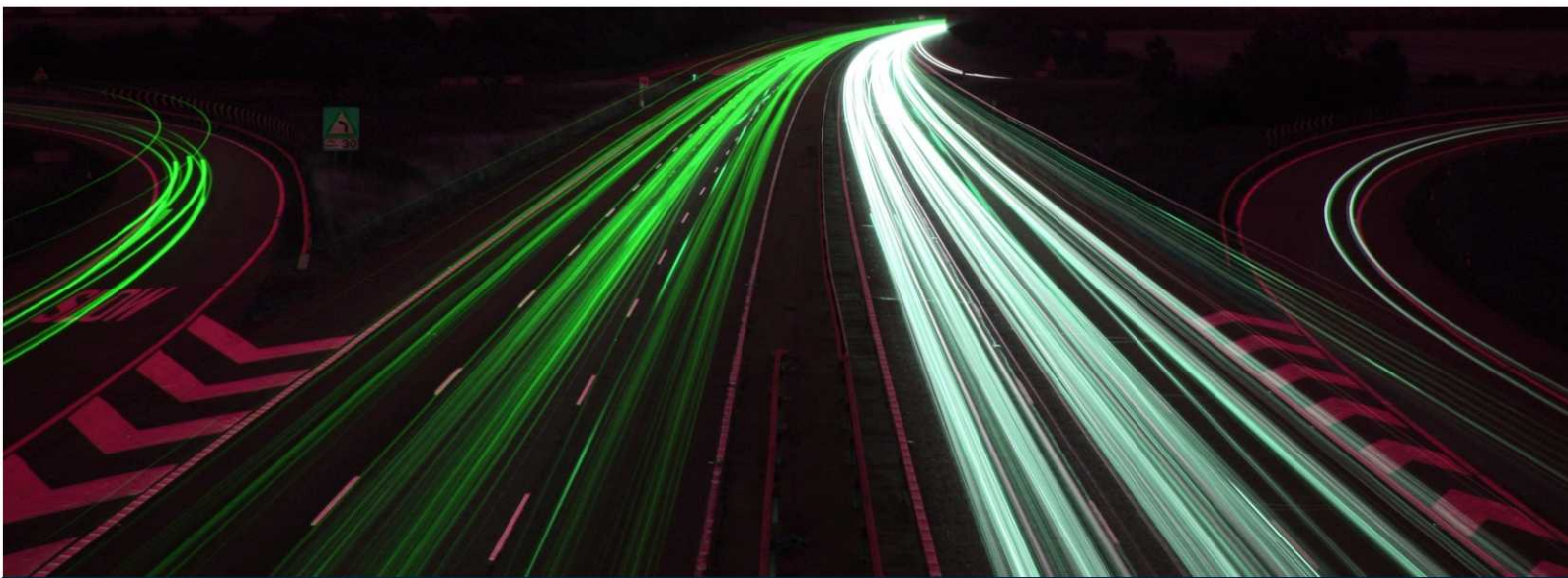




Noise Impact Assessment

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

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1. Introduction

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

A background noise survey has been carried out during a representative night 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 advise on noise limits required for the installation in the context of minimising any noise impact from the operation of the proposed units at neighbouring sensitive dwellings.

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 new air handling equipment to be installed 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 proposed equipment. Subjectively the existing background sound was moderate with road traffic and pedestrian traffic from the city centre, there is also a general hum apparent from the neighbouring commercial cooling equipment.

- The receivers to the proposed 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 location; Figure 2 shows the proposed floor layout plan.

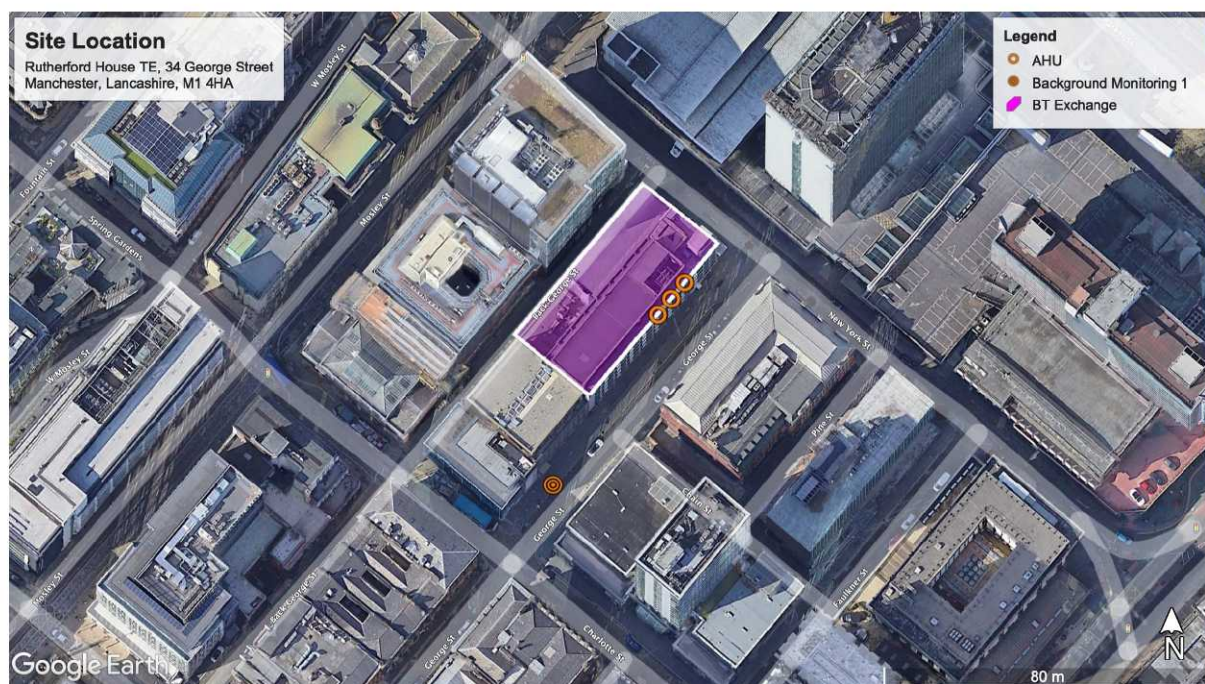


Figure 1 – Site location with background monitoring location

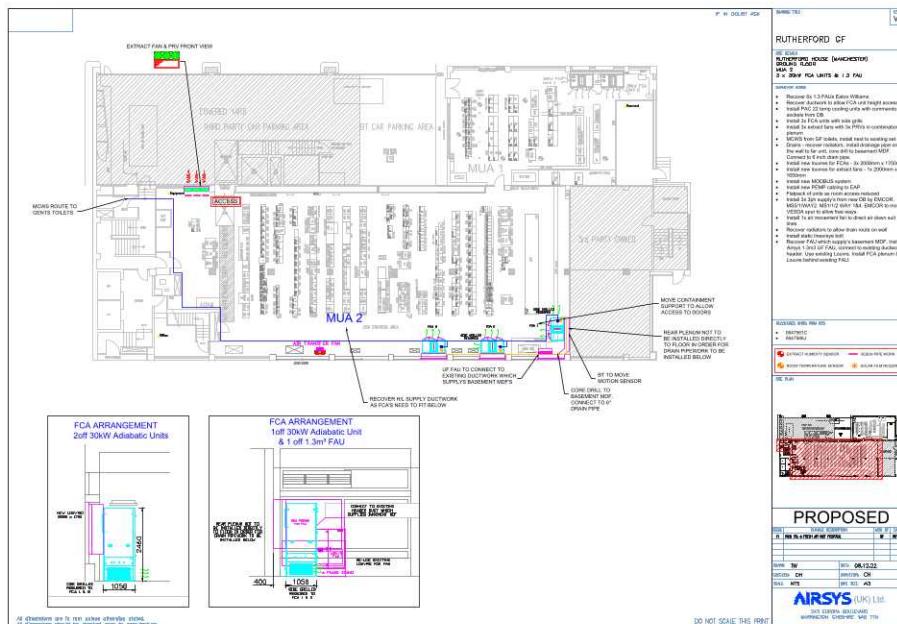


Figure 2 – Proposed Ground Floor Layout Plan

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	1392706	22/1652
Acoustic Calibrator	Norsonic 1251	32856	22/1230

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	1392706	114.1	-27.2	114.1	-27.2

Measurements & Timescales

During the background survey 5-minute measurements were made during a typical night period commencing on Thursday 2nd March 2023 at locations 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 background 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 with no precipitation during the measurement period.

Position of Monitoring Equipment

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

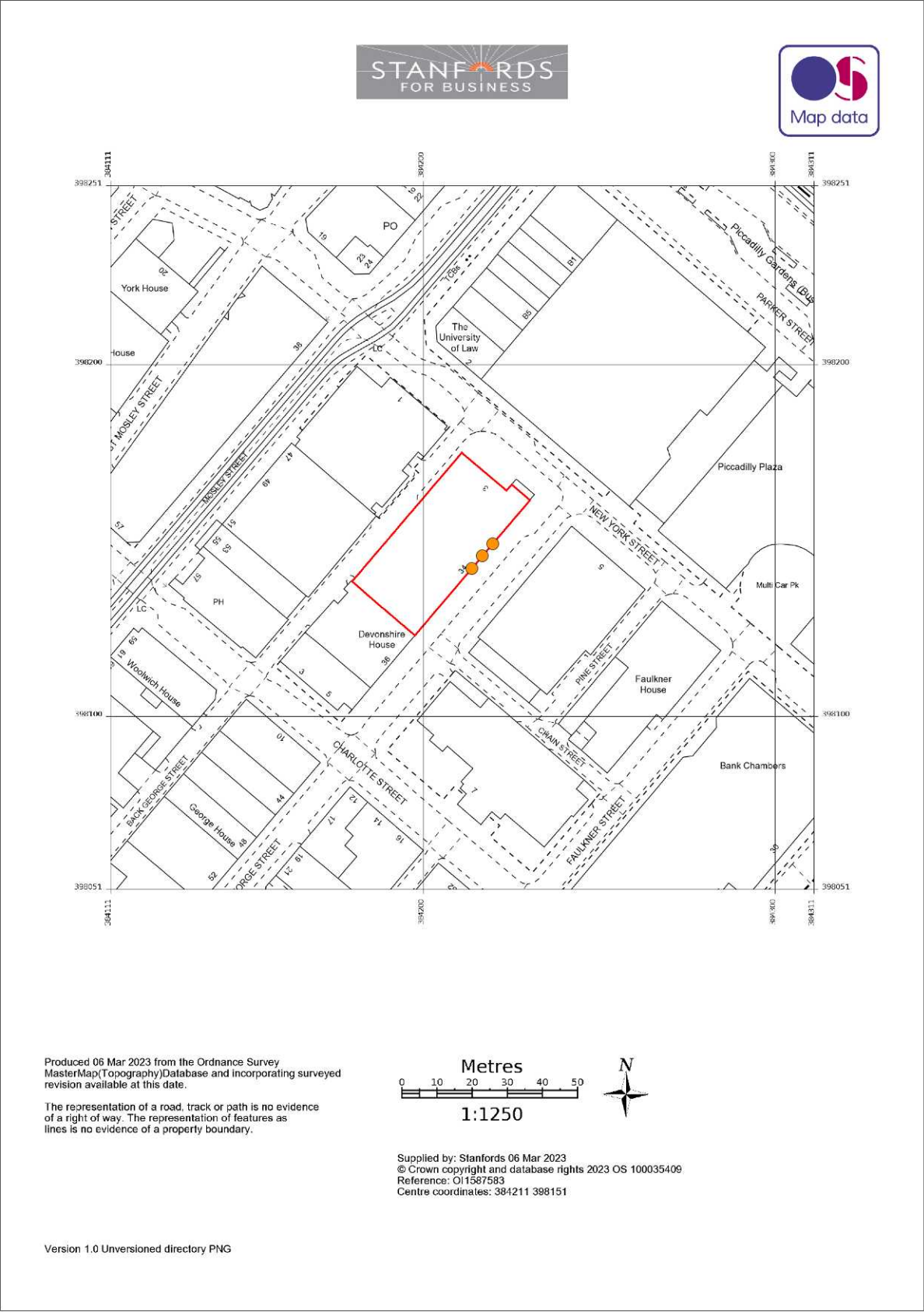


Figure 3 – Site Location Plan



AHU Installation

5. Survey Results

Background Noise Summary

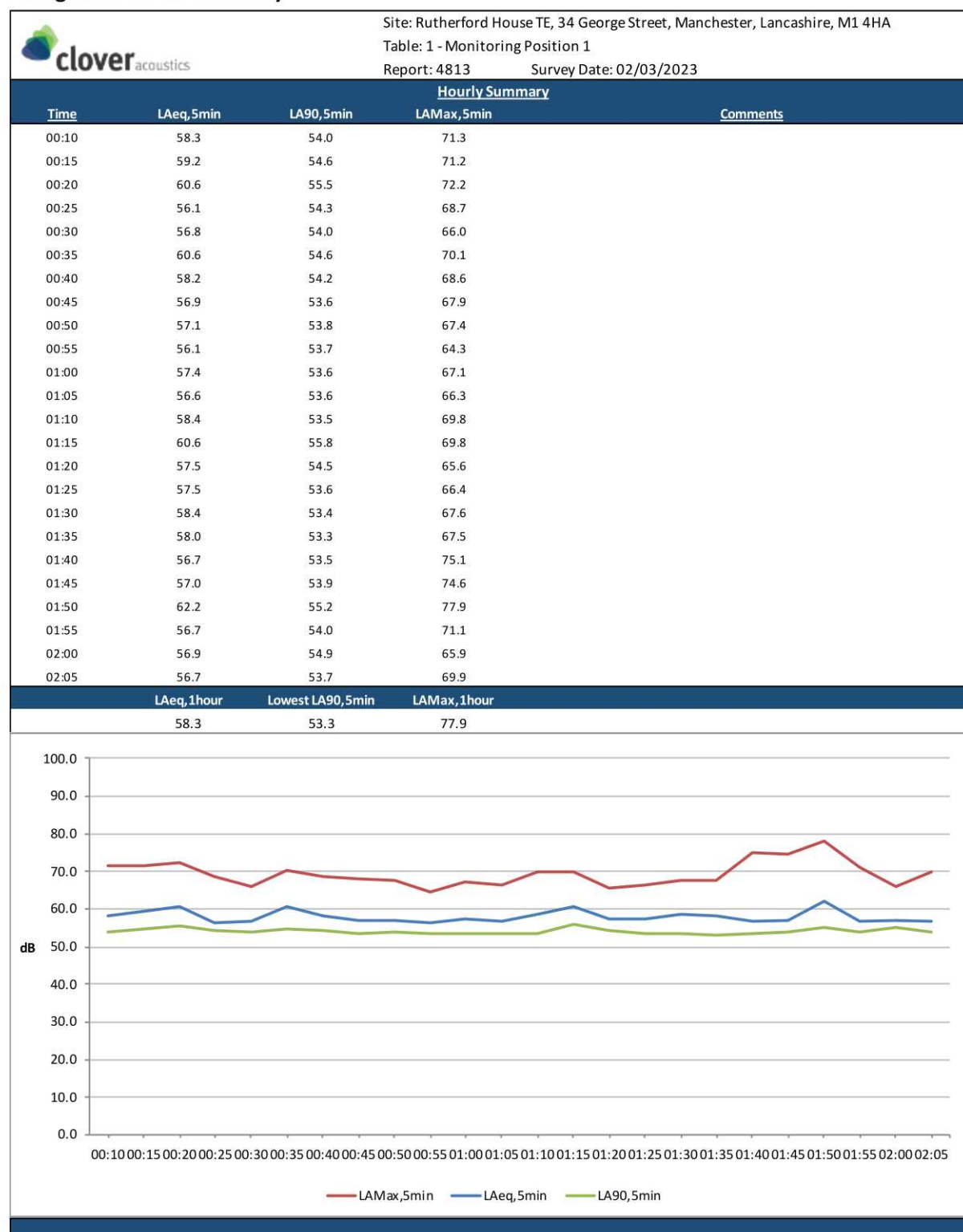


Table 1 – Monitoring Position 1 – South-East Elevation Receivers

6. Noise Assessment

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

Noise Source Description

The proposal is to install air handling equipment to the south-east elevation of the exchange building. As the proposed equipment is a bespoke installation the noise output specification is not available therefore this report seeks to establish a noise emissions limit to ensure that there is no significant impact at the nearest receivers.

- 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 are used 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: No frequency data is available to assess potential tonality of the specific unit, therefore it would in our view be prudent to apply a 4dB penalty for a clearly perceptible tone at the receivers. 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 and commercial noise from the surrounding area. A general background hum is apparent in the close vicinity of the exchange building. The proposed air handling system is a typical of equipment used within telephone exchanges.

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. 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 will be approximately 28m from the nearest proposed 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 AHU

The individual air handling units should be limited to a noise output of 69dB(A) at 1m from the external louvers. Applying the factors discussed above would predict a noise rating level of 52dB(A) at the receiver. This would give an assessment level -1dB below the lowest measured existing background noise level. 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”*.

BS4142 Assessment 1 – South-East Receivers	dB(A)
Single Unit (SPL at 1m)	69
Multiple Units x 3	4.8
Acoustic Feature Correction	4
Distance Attenuation	-26
Screening Attenuation	0
Rating Level at Receiver	52
Background Level L_{A90}	53
Rating Below Background	-1

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 proposed air handling equipment to be installed on the ground floor of the building. A background noise survey was conducted commencing on Thursday 2nd March 2023 at a location representative of the nearest sensitive receivers.

A prediction assessment has been made in accordance with BS4142:2014 which has shown a rating level for the proposed installation of -1dB below the existing background noise level monitored can be achieved through limiting new installation noise as prescribed in section 6 of this report.

According to BS4142, *"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"*.



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.