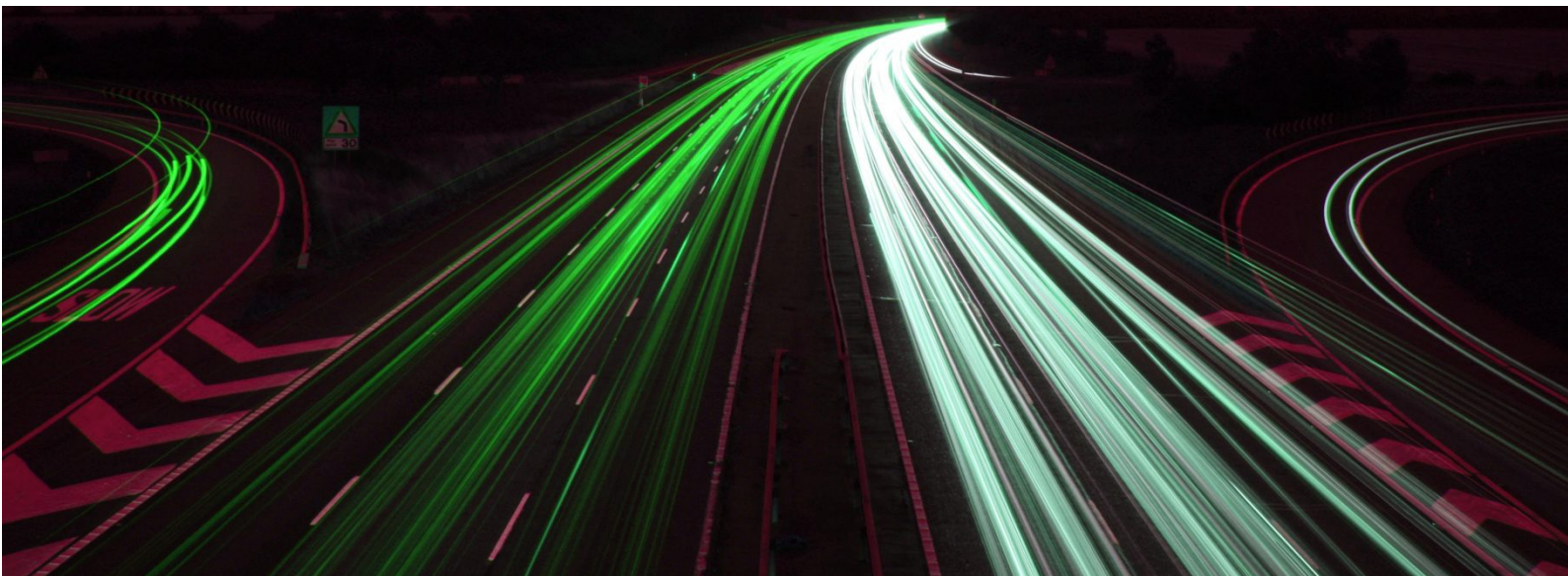




Noise Impact Assessment

Report: 5003-R1 – Reading Central TE, 41 Minster Street, Reading, Berkshire, RG1 2JB.

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1. Introduction

Clover Acoustics Ltd has been appointed by M.J. Quinn Integrated Services Ltd to carry out a noise assessment in preparation for air handling equipment to be installed at Reading Central TE, 41 Minster Street, Reading, Berkshire, RG1 2JB.

A background noise survey has been carried out during a representative night period commencing on Thursday 19th December 2024 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+A1:2019 – 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

Reading Central TE is a large sized telephone exchange building situated in a predominately commercial area in Reading City centre. The current drawings identify new air handling equipment to be installed on the second-floor level of the exchange building including:

- 2 x Air handling units (AHU) on the west elevation (2.0m³ FAU Type).
- 1 x Double exhaust unit on the west elevation.

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 passing road traffic events from Minster Road and the surrounding area and commercial noise from the city centre location.

In addition, there was plant/equipment noise from the neighbouring 'Minster Court' building opposite from a car parking area. This source was likely as a fan or motor system which sounded in poor condition. The unit was intermittent with periods where it appeared to have stalled. When the motor was active it was considered the dominant source on Earley Place. Subjectively, the motor contained tonal characteristics.

- The receivers to the proposed AHU and exhaust installations on the west elevation of the exchange are identified as 'Minster Court, 32-34, Minster Street' approximately 11 meters west from the nearest unit.

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

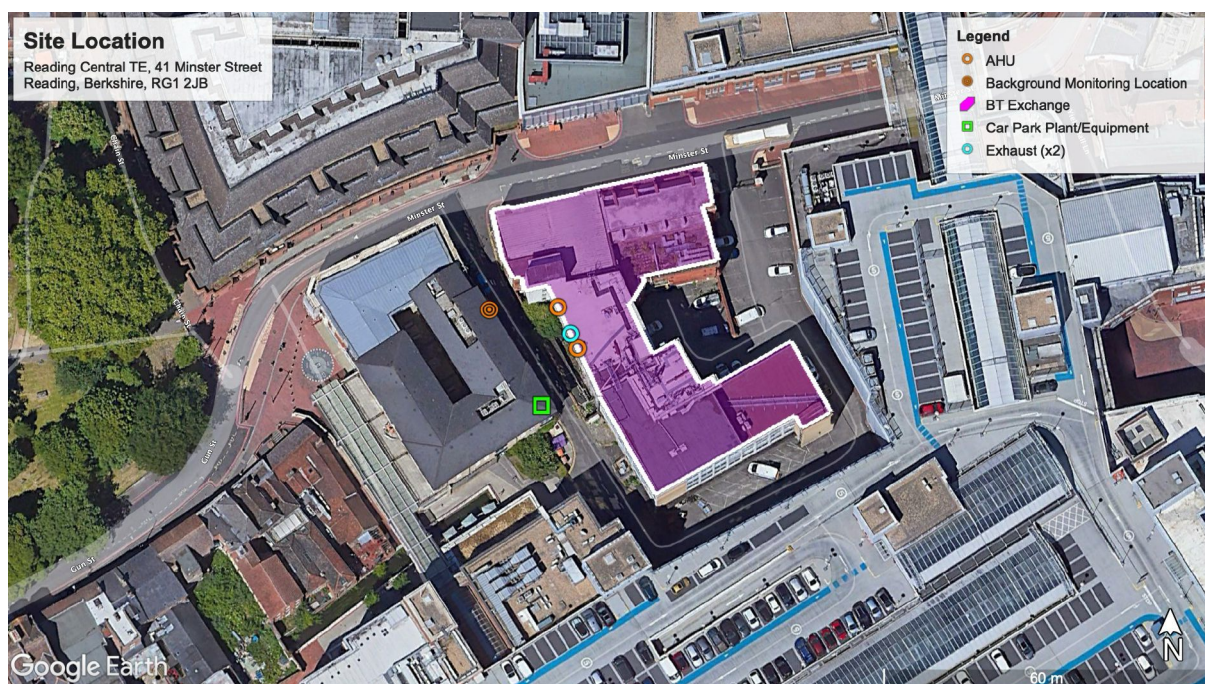


Figure 1 – Site location with background monitoring locations

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	1392706	24/1719
Acoustic Calibrator	Norsonic 1251	32856	24/1333

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	-28.7	114.1	-28.7

Measurements & Timescales

During the background survey 5-minute measurements were made during a typical night period commencing on Thursday 19th December 2024 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 background survey close to the noise monitoring location. Throughout the measurement period average wind speed measurements were below 5m/s. Temperature was recorded at 4°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.

5. Survey Results

Background Noise Summary

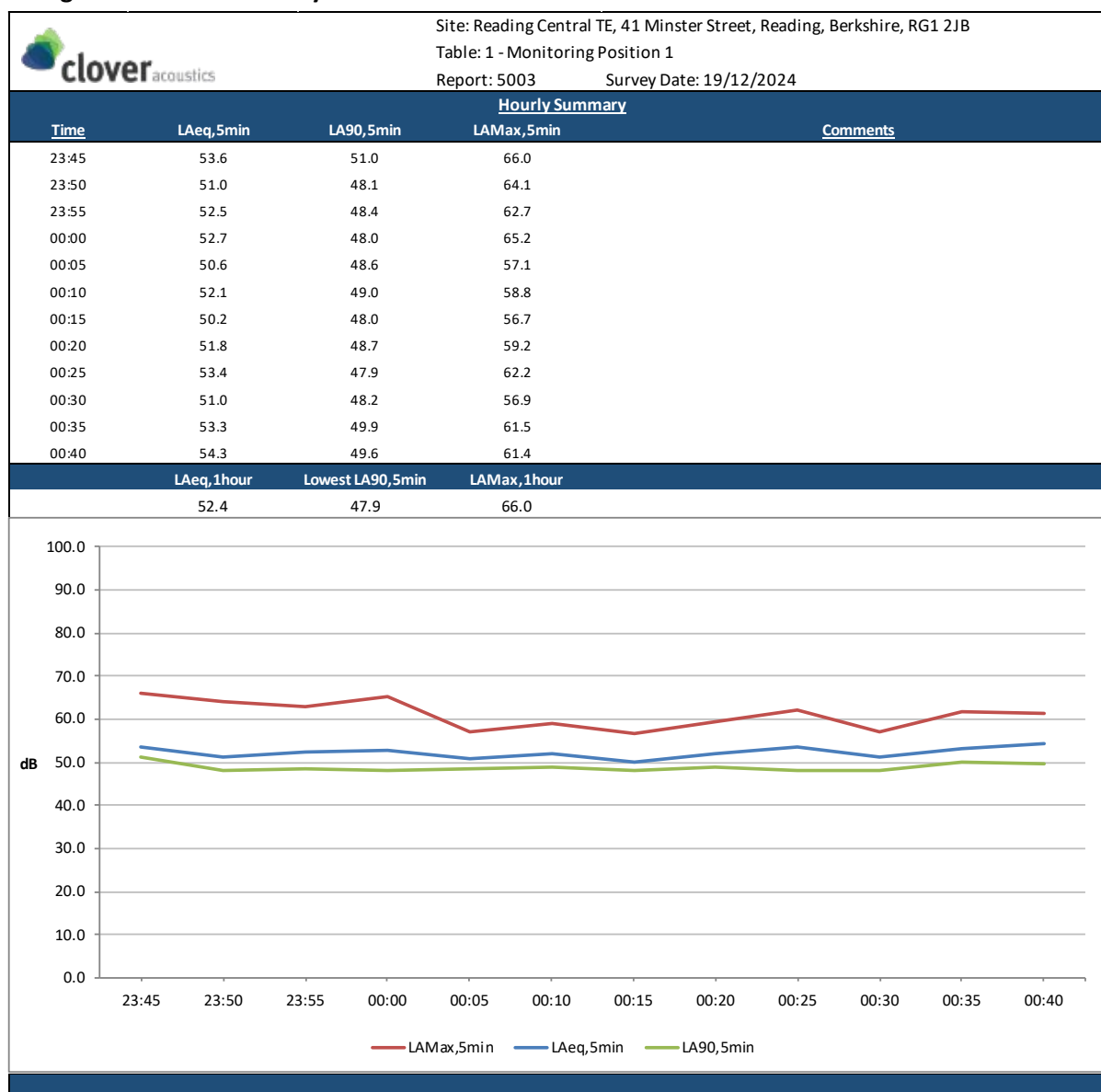


Table 1 – Monitoring Position 1 – West Elevation Receivers

The lowest background noise level monitored during the night-time monitoring period was 48dB LA90,5min at the east elevation receivers. During this period the motor unit from the neighbouring premises what not in use which would represent a worst-case scenario.

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 west elevations 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 and exhaust installations on the east elevation of the exchange is approximately 11 meters from the nearest proposed unit. The lowest background noise level monitored during the night-time monitoring period was 48dB $L_{A90,5min}$ at the 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 occasional an irregular fan/motor unit from the neighbouring premises. Whilst the motor was not in use the dominant noise source was road traffic and commercial noise from the surrounding area. The proposed air handling system is direct replacement for existing units within the exchange and typical of equipment used within telephone exchanges.

Distance Attenuation

The nearest sensitive receivers identified to the west will be approximately 11m from the nearest proposed AHU and exhaust installations. 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 – Minster Court, 32-34, Minster Street – 2 x AHU, 1 x Double Exhaust Unit

The individual air handling and exhaust units should be limited to a noise output of 56dB(A) at 1m from each of the external louvers. Applying the factors discussed above would predict a noise rating level of 47dB(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 – East Receivers	dB(A)
Single Unit (SPL at 1m)	56
Multiple Units x 3	4.8
Acoustic Feature Correction	4
Distance Attenuation	-18
Screening Attenuation	0
Rating Level at Receiver	47
Background Level L_{A90}	48
Rating Below Background	-1

Assessment Context

The background sound level was assessed with the existing unit not operating which would represent a worst-case scenario. The previous installation has been in operation for over 20 years and could reasonably be considered to form part of the existing background sound level in this area.

We would consider a target rating level of -1dB as reasonable under these conditions. It is also acknowledged that during the summer months, the background sound level in this area is likely to increase. Furthermore, the assessment takes into account the likelihood of the proposed system operating at maximum cooling capacity during the late-night period, which is expected to be infrequent.

The neighboring plant and equipment are observed to operate intermittently above the existing background sound level, exhibiting tonal characteristics. Given that this neighboring equipment has likely been operating in this manner for a significant period without causing notable impacts, it is considered unlikely that the proposed replacement equipment, with a rating level of -1dB below the *lowest* measured background, would similarly not cause a significant impact.

7. Conclusion

A noise assessment has been carried out at the Reading Central TE, 41 Minster Street, Reading, Berkshire, RG1 2JB to assess the impact of proposed air handling equipment to be installed on the second floor of the building. A background noise survey was conducted commencing on Thursday 19th December 2024 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.