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WESTMINSTER HOUSE, 11 PORTLAND STREET, MANCHESTER

ACOUSTIC COMMISSIONING REPORT

Report **14552-AC-01**

Prepared on 11 March 2021

Issued For:

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Contents

1.0	INTRODUCTION	2
2.0	SITE DESCRIPTION	2
3.0	NOISE EMISSIONS CRITERIA	2
3.1	Procedure	2
4.0	DISCUSSION	3
4.1	Measurement Procedure	3
5.0	CONCLUSION	4

List of Attachments

14552-AC-01-SP1	Indicative Site Plans
Appendix A	Glossary of Acoustic Terminology

1.0 INTRODUCTION

Clement Acoustics has been commissioned by Wates to undertake an assessment of installed external plant units at Westminster House, 11 Portland Street, Manchester. A previously undertaken background noise survey was used to set noise emissions criteria in agreement with the planning requirements of the City of Manchester.

This report presents the noise impact measurements and outlines any necessary additional mitigation measures.

2.0 SITE DESCRIPTION

As part of recent development works, an air handling unit and extract fan to service 4th floor office currently undergoing refurbishment have been installed. The atmospheric terminations are on the building façade at 4th floor level.

A receiver at the corner of Bloom Street and Minshull Street was identified as the closest receiver with direct line of sight to the plant installation. This receiver was also shown to be the receiver most affected by the installation, though plant noise levels were expected to be 5 dB below the criteria set out by Manchester City Council, as detailed in Clement Acoustics report 14552-NIA-02.

3.0 NOISE EMISSIONS CRITERIA

3.1 Procedure

An environmental noise survey has previously been undertaken on site. The survey was undertaken in October 2020. The survey methodology is detailed in Clement Acoustics Ltd report 14552-NIA-02. Based on the measured noise levels and local authority requirements, noise emissions criteria were set as follows:

- Daytime plant operation: Criterion 38 dB(A),
- Night-time plant operation: Criterion 35 dB(A).

It is understood that the proposed plant units will be for commercial use, operational during typical office operating hours. However, criteria will be based on night-time noise levels, to present a particularly robust assessment.

4.0 DISCUSSION

4.1 Measurement Procedure

A site visit was undertaken to take manual measurements of the installed plant unit, such that noise emissions could be measured and assessed.

Measurements were taken in single octave bands between 63Hz and 8kHz and lasted between 1 minute and 2 minutes, depending on the fluctuation of background noise levels.

Measurements were undertaken at three locations:

- Position 1: The location of the October 2020 survey, at roof level overlooking the central courtyard
- Position 2: At ground level, within the central courtyard
- Position 3: Five meters from the façade of the nearest receiver with line of site to the proposed plant

Measurement locations are shown in attached site plan 14552-AC-01-SP1.

Table 4.1 shows the measured ambient noise levels at each location with the installed air handling unit both on and off.

Measurement Location	Plant Operation	Comments on Plant Installation	Measured Ambient Noise Level, $L_{Aeq,5mins}$
Position 1: Roof Level	On	Plant noise indistinguishable from existing background noise	55 dB(A)
	Off	No audible change in noise landscape with plant not operating	56 dB(A)
Position 2: Courtyard	On	Plant noise indistinguishable from existing background noise	55 dB(A)
	Off	No audible change in noise landscape with plant not operating	55 dB(A)
Position 3: Receiver	On	Plant noise indistinguishable from existing background noise	58 dB(A)
	Off	No audible change in noise landscape with plant not operating	60 dB(A)

Table 4.1: Measured ambient and specific noise levels

Due to the location of the louvred plant duct terminations, and surrounding noise sources including the adjacent tramline, it was not possible to get a meaningful reading lower than those shown in Table 4. However, the ambient noise levels in the area were the limiting factor. Subjectively, noise from the recently installed air handling unit was completely inaudible even during lulls in traffic noise. To be inaudible when residual noise levels are 55 dB(A), the specific noise must be at least 10 dB lower than this residual level even close to the plant location at measurement Positions 1 & 2.

The predicted cumulative noise emission level at the worst affected receiver in report 14552-NIA-02 was 30 dB(A). This correlates with a noise level of no more than 45 dB(A) at measurement Positions 1 & 2, when the additional distance separation to the receiver is taken into account.

We are therefore satisfied that all plant and associated mitigation has been correctly installed and noise emission levels are not expected to be audible at surrounding windows.

5.0 CONCLUSION

A noise impact assessment has been undertaken for an installed air handling unit at Westminster House, Manchester. A previously undertaken noise survey was used to set criteria for noise emissions in accordance with the requirements of the City of Manchester.

Manual measurements were then undertaken of the installed plant units to calculate noise levels at a nearby receiver due to the plant installation.

Measurements and calculations show that noise emissions from the plant installation are expected to be equal to or less than the predicted noise emission levels and as such, meet the requirements of the Local Authority.

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GLOSSARY OF ACOUSTIC TERMINOLOGY

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq} . The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for not more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise

L_{90}

This is the level exceeded for not more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 10 such octave bands whose centre frequencies are defined in accordance with international standards.

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than one alone and 10 sources produce a 10 dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.