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25 KING STREET MANCHESTER

NOISE IMPACT ASSESSMENT

Report **17071-NIA-01**

Prepared on 28 January 2022

Issued For:
Sixteen Real Estate (Offices) Ltd
2nd Floor, Byron House
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Executive Summary

This noise impact assessment has been undertaken in order to assess a proposed plant installation for commercial use at 25 King Street, Manchester.

The proposed plant installation comprises 2 No. Flakt Woods fans to provide ventilation for an existing commercial premise.

A background noise survey has been undertaken as detailed in the report, in order to determine an appropriate noise emission criterion, in accordance with the requirements of Manchester City Council.

Calculations were undertaken for the nearest identified receiver, identified as 33 South King Street. It should be noted that if there are closer receivers that Clement Acoustics is not aware of, a reassessment will be necessary, and this should therefore be confirmed by the Client.

It has been demonstrated that compliance with the established criterion is feasible, dependant on the following material considerations:

- The plant could be in use at any time over a 24-hour period
- The noise emissions data for the proposed units as obtained from available manufacturer information
- Plant and receiver locations are as established in this report and marked on the attached site plan

If there is any deviation from the above, Clement Acoustics must be informed, in order to establish whether a reassessment is necessary.

Clement Acoustics has used all reasonable skill and professional judgement when preparing this report. The report relies on the information as provided to us at the time of writing and the assumptions as made in our assessment.

This report is designed to be suitable to discharge typical plant noise planning conditions, as per our original scope of work.

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17071-SP1	Indicative Site Plan
17071-TH1	Environmental Noise Time History
Appendix A	Glossary of Acoustic Terminology
Appendix B	Acoustic Calculations

Document Revision	Date of Revision	Reasons for Revision	Revision By
0	26/01/2022	First Issue	Jamie Newton AMIOA

1.0 INTRODUCTION

Clement Acoustics has been commissioned by Sixteen Real Estate Ltd to measure existing background noise levels at 25 King Street, Manchester. Measured noise levels have been used to determine noise emissions criteria for a proposed plant installation in agreement with the planning requirements of Manchester City Council.

This report presents the results of the environmental survey followed by noise impact calculations and outlines any necessary mitigation measures.

An acoustic terminology glossary is provided in Appendix A.

2.0 SITE DESCRIPTION

The site is bound mixed commercial and retail buildings to the east and west, King Street to the south and Mayo Street to the north. The surrounding area is predominantly commercial in nature.

The existing site consists of a retail unit at the ground basement levels with office space above. Current proposals are to install kitchen extract and intake fan plant on a first-floor flat roof to the north of the site as part of a refurbishment of the site.

Residential premises at 33 South King Street have been identified as the nearest affected receiver. This nearest noise sensitive receiver was identified through observations on-site. If there are any receivers closer to that identified within this report then a further assessment will need to be carried out. Therefore, the closest noise sensitive receiver should be confirmed by the client before the plant is installed or any noise mitigation measures are implemented.

Locations are shown in attached site plan 17071-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Unattended Noise Survey Procedure

Measurements were undertaken at one position as shown on indicative site drawing 17071-SP1. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the nearest affected receiver.

The surroundings and position used for the monitoring location are described in Table 3.1.

Position No.	Description
1	The microphone was mounted on a 3 rd storey window at the back of the building. The microphone was positioned >1 m in front of the window. ^[1]

Table 3.1: Description of unattended monitoring locations

Note [1]: The position was not considered to be free field according to guidance found in BS 4142: 2014, and a correction for reflections has therefore been applied. Based on the presence of the reflective surface and the nature of surrounding noise sources, a correction for reflections of 3 dB has been applied, in line with the recommendations of the standard.

Continuous automated monitoring was undertaken for the duration of the survey between 15:00 on 19 January 2022 and 13:30 on 23 January 2022.

The measurement procedure generally complied with BS 7445: 1991: '*Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use*'.

3.2 Weather Conditions

At the time of set-up and collection of the monitoring equipment, the weather conditions were dry with low wind speeds. It is understood that the weather conditions during the unattended survey remained dry with wind speeds below 5 m/s.

It is considered that the weather conditions did not significantly adversely affect the measurements and are therefore considered suitable for the measurement of environmental noise.

3.3 Equipment

The equipment calibration was verified, by means of a field verification check, before and after use and no abnormalities were observed.

The equipment used was as follows.

- 1 No. Svantek Type 977 Class 1 Sound Level Meter
- Norsonic Type 1251 Class 1 Calibrator

4.0 RESULTS

4.1 Unattended Noise Survey Results

The $L_{Aeq}: 5min$, $L_{Amax}: 5min$, $L_{A10}: 5min$ and $L_{A90}: 5min$ acoustic parameters were measured at the location shown in site drawing 17071-SP1.

Measured noise levels are shown as a time history in Figure 17071-TH1, with average ambient and typical background noise levels summarised in Table 4.1.

It should be noted that the guidance of the latest revision of British Standard 4142: 2014 +A1 2019 'Methods for rating and assessing industrial and commercial sound', as detailed in Section 8.1 of the standard is as follows:

'The objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.'

Time Period	Average ambient noise level	Typical background noise level
	$L_{eq}: T$	$L_{90}: 5min$
Daytime (07:00 - 23:00)	53 dB(A)	44 dB(A)
Night-time (23:00 - 07:00)	48 dB(A)	43 dB(A)

Table 4.1: Average ambient and minimum background noise levels

5.0 NOISE CRITERIA

5.1 Local Authority Criteria

The Local Authority general criteria for noise emissions are as follows:

‘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’.

It is understood that the proposed plant units will be for commercial use and may be operational at any time.

Based on the results of the environmental noise survey and requirements of the Manchester City Council, Table 5.1 presents the proposed plant noise emission criteria to be achieved at 1 m from the nearest noise sensitive receiver:

Period	Plant Noise Emission Limit $L_{eq,T}$
Daytime (07:00 - 23:00)	39 dB(A)
Night-time (23:00 - 07:00)	38 dB(A)

Table 5.1: Plant noise emission limits

6.0 PLANT NOISE IMPACT ASSESSMENT

6.1 Proposed Installation

The proposed plant installation comprises the following:

- 2 No. Flakt Woods Estoc Targe (Powerbox) 80-560-30

Noise emissions for the proposed plant units, as provided by the manufacturer, are shown in Table 6.1. The stated modes of operation have been used in order to present a suitably robust assessment.

Source	Sound Power Levels in each Frequency Band								dB(A)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
Inlet	26	85	87	78	74	72	69	63	82
Outlet	26	92	86	82	79	76	71	65	85
Breakout	26	79	73	65	62	61	57	53	70

Table 6.1: Manufacturer provided noise emissions levels

British Standard 4142: 2014 +A1 2019 '*Methods for rating and assessing industrial and commercial sound*' provides guideline penalties that can be applied to noise emissions to account for tonality, impulsivity and intermittency. Where a sound source is neither tonal nor impulsive, but is still distinctive against the residual acoustic environment, a penalty may still be applied.

The available penalties for different characteristics are summarised in Table 6.2.

Characteristic	Comments	Maximum Penalty
Tonality	Can be converted to 2 dB for a tone which is just perceptible, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible	+6 dB
Impulsivity	Can be converted to 3 dB for impulsivity which is just perceptible, 6 dB where it is clearly perceptible and 9 dB where it is highly perceptible	+9 dB
Intermittency	When the sound has identifiable on/off conditions	+3 dB
Distinctiveness	Intended for sources that are neither tonal nor impulsive, but distinctive against background noise sources	+3 dB

Table 6.2: Available penalties according to BS 4142: 2014

With reference to Table 6.2, a +3 dB acoustic feature correction for distinctiveness has been applied, as per BS 4142: 2014 guidance. The proposed plant units will be generally broadband and continuous in nature and therefore no penalty for tonality or intermittency has been applied.

The proposed plant location is on a first-floor flat roof at the north of the site which is shown on indicative site plan 17071-SP1.

6.2 Noise Impact Assessment

The closest receiver has been identified as the window on the northern facade of a residential property opposite which is a minimum of 20 m from the proposed plant location.

Screening of the nearest noise sensitive receptor is provided by the upper floors of 25 king street.

Taking into account all necessary acoustic corrections, the resulting noise level at the identified residential windows would be as shown in Table 6.3. Detailed calculations are shown in Appendix B.

Receiver	Night-time Hours Criterion	Rating noise Level at Receiver (due to proposed plant)
Nearest Residential Property	38 dB(A)	38 dB(A)

Table 6.3: Noise levels and project criterion at noise sensitive receivers

As presented in Table 6.3 and Appendix B, the proposed plant installation would be expected to meet the requirements of the proposed criteria.

6.3 British Standard Requirements

Further calculations have been undertaken to assess whether the noise emissions from the proposed plant unit would be expected to meet recognised British Standard recommendations, in order to further ensure the amenity of nearby noise sensitive receivers.

British Standard 8233: 2014 '*Guidance on sound insulation and noise reduction for buildings*' gives recommendations for acceptable internal noise levels in residential properties. Assuming worst case conditions, of the closest window being for a bedroom, BS 8233: 2014 recommends 30 dB(A) as being acceptable internal sleeping conditions during night-time.

With loudest external levels of 36 dB(A), acceptable internal conditions would be met by taking the attenuation of the window itself into consideration. According to BS 8233: 2014, a typical building facade with a partially open window offers 15 dB attenuation.

It can therefore be predicted that, in addition to meeting the requirements of the set criteria, the emissions from the proposed plant would be expected to meet the most stringent recommendations of the relevant British Standard, with neighbouring windows partially open. Predicted levels are shown in Table 6.4.

Receiver	Recommended Target – For resting/sleeping conditions in a bedroom, in BS 8233: 2014	Noise Level at Receiver (due to plant installation)
Inside Residential Window	30 dB(A)	23 dB(A)

Table 6.4: Noise levels and BS 8233: 2014 criteria inside nearest residential space

7.0 CONCLUSION

An environmental noise survey has been undertaken at 25 King Street, Manchester. The results of the survey have enabled criteria to be set for noise emissions from the proposed plant in accordance with the requirements of the Manchester City Council.

A noise impact assessment has then been undertaken using manufacturer noise data to predict the noise levels, due to the proposed plant, at the nearby noise sensitive receivers.

Calculations show that noise emissions from the proposed units should meet the requirements of the Manchester City Council.

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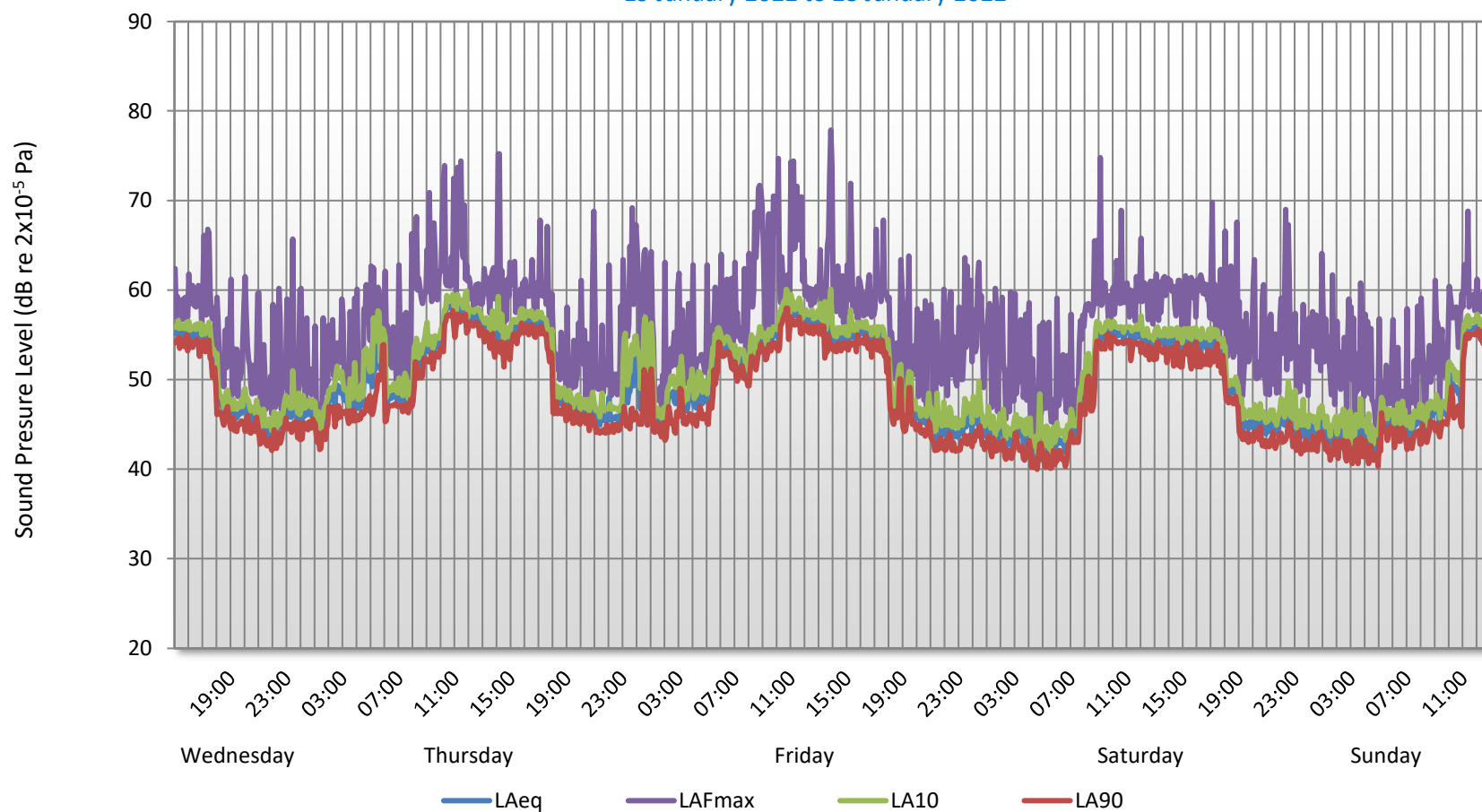


28 January 2022



25 King Street, Manchester

Environmental Noise Time History
19 January 2022 to 23 January 2022



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 3 dB 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.

APPENDIX B

17071

25 King Street, Manchester

EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Receiver: Nearest Residential Receiver		Frequency, Hz							
Source: Inlet Grille		63	125	250	500	1k	2k	4k	8k
Manufacturer provided Inlet sound power levels, dB		26	85	87	78	74	72	69	63
System Losses, dB		-0.7	-0.7	-0.4	-0.3	-0.2	-0.2	-0.2	-0.2
End Reflection, dB		-18	-14	-9	-5	-2	0	0	0
Sound power at grille, dB		7	70	78	73	72	72	69	63
Radiating correction, dB		-2	-2	-2	-2	-2	-2	-2	-2
Directivity Correction, dB		1	2	3	4	5	6	6	6
Distance loss, dB (20m)		-26	-26	-26	-26	-26	-26	-26	-26
Attenuation due to building envelope		-11	-14	-17	-20	-22	-22	-22	-22
Sound pressure level at receiver		31	31	36	29	27	28	25	19

Source: Inlet Breakout		63	125	250	500	1k	2k	4k	8k
Manufacturer provided breakout sound power levels, dB		26.0	79.0	73.0	65.0	62.0	61.0	57.0	53.0
Radiating correction, dB		-2	-2	-2	-2	-2	-2	-2	-2
Distance loss, dB (21m)		-26	-26	-26	-26	-26	-26	-26	-26
Attenuation due to building envelope		-11	-13	-16	-19	-22	-22	-22	-22
Sound pressure level at receiver		18	38	29	18	12	11	7	3

Source: Outlet Grille		63	125	250	500	1k	2k	4k	8k
Manufacturer provided outlet sound power levels, dB		26	92	86	82	79	76	71	65
System Losses, dB		-0.2	-0.3	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1
End Reflection, dB		-18	-14	-9	-5	-2	0	0	0
Sound power at grille, dB		8	78	77	77	77	76	71	65
Radiating correction, dB		-5	-5	-5	-5	-5	-5	-5	-5
Directivity Correction, dB		-1	-2	-3	-7	-9	-8	-8	-8
Distance loss, dB (27 m)		-29	-29	-29	-29	-29	-29	-29	-29
Attenuation due to building envelope		-8	-11	-13	-16	-19	-22	-22	-22
Sound pressure level at receiver		24	32	27	20	16	12	7	1

Source: Outlet Breakout		63	125	250	500	1k	2k	4k	8k
Manufacturer provided breakout sound power levels, dB		26	79	73	65	62	61	57	53
Radiating correction, dB		-5	-5	-5	-5	-5	-5	-5	-5
Distance loss, dB (26 m)		-28	-28	-28	-28	-28	-28	-28	-28
Attenuation due to building envelope		-9	-11	-14	-17	-20	-22	-22	-22
Sound pressure level at receiver		22	35	26	15	9	6	2	-2

Combined sound pressure level at receiver		35	41	38	30	27	28	25	19
Distinctiveness Penalty		3	3	3	3	3	3	3	3
Sound Rating Level at receiver		38	44	41	33	30	31	28	22

[1] Distance loss calculated assuming Point Source attenuation (typically used where distance is more than 3x the largest source dimension)

Design Criterion	38
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BS 8233 ASSESSMENT CALCULATION

Receiver: Inside Nearest Residential Window		Frequency, Hz							
Source: Proposed plant installation		63	125	250	500	1k	2k	4k	8k
Sound pressure level outside window		38	44	41	33	30	31	28	22
Minimum attenuation from partially open window, dB		-15	-15	-15	-15	-15	-15	-15	-15
Sound pressure level inside nearest noise sensitive premises		23	29	26	18	15	16	13	7

Design Criterion	30
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