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Cheetham Hill, Manchester

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18554-NIA-01 RevA

Noise Impact Assessment

Project Number
18554

Issued For
UKiYO Republic Trading Ltd

EXECUTIVE SUMMARY

This noise impact assessment has been undertaken in order to assess a proposed plant installation for commercial use at 20 Red Bank.

The proposed plant installation comprises the following plant units:

- 1 No. Marstair CKC 80 Outdoor Chiller Unit
- 1 No. FusionHot Ltd Kitchen Recirculation Extract System

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 of noise emissions from the chiller were undertaken for the nearest identified receiver, identified as Masson Place. 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, dependent on the following material considerations:

- The chiller plant could be in use at any time over a 24-hour period, and the extract plant between 10:00 and 00:00 only.
- Current drawings indicate that a recirculated air extraction system will be used, rather than a traditional externally ducted system.
- The noise emissions data for the proposed units is as obtained from available manufacturer information.
- Plant and receiver locations are as established in this report and marked on the attached site plan.
- Mitigation is applied as recommended in this report, in the form of a louvred enclosure.

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.

CONTENTS

1.0	INTRODUCTION	1
2.0	SITE DESCRIPTION	1
3.0	ENVIRONMENTAL NOISE SURVEY	1
3.1	UNATTENDED NOISE SURVEY PROCEDURE	1
3.2	WEATHER CONDITIONS	2
3.3	EQUIPMENT	2
4.0	RESULTS.....	2
4.1	UNATTENDED NOISE SURVEY RESULTS	2
5.0	NOISE CRITERIA	3
5.1	LOCAL AUTHORITY CRITERIA.....	3
6.0	PLANT NOISE IMPACT ASSESSMENT	3
6.1	PROPOSED INSTALLATION	3
6.2	PROPOSED MITIGATION MEASURES.....	5
6.3	NOISE IMPACT ASSESSMENT.....	5
6.4	BRITISH STANDARD REQUIREMENTS.....	5
7.0	CONCLUSION	6

LIST OF ATTACHMENTS

18554-SP1	Indicative Site Plan
18554-TH1	Environmental Noise Time History
Appendix A	Glossary of Acoustic Terminology
Appendix B	Acoustic Calculations

Issue	Date of Issue	Author	Reviewed	Authorised
RevA	31/01/2025			
		Jamie Newton Senior Consultant BEng (Hons) MIOA	Duncan Martin Director BSc (Hons) MIOA	

Issue	Comment
0	First Issue
RevA	Updated to include comments on proposed kitchen extract system

1.0 INTRODUCTION

Clement Acoustics has been commissioned by UKiYO Republic Trading Ltd to measure existing background noise levels at 20 Red Bank, Cheetham Hill. Measured noise levels have been used to determine noise emissions criteria for a proposed plant installation in agreement with the planning requirements of the 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 located within a rail bridge archway bound by Red Bank to the west, Back Red Bank and Red Bank Car Park to the east. The surrounding area is mixed commercial and residential in nature. Current proposals are to install 1 no. chiller unit and 1 no. extract fan unit.

Residential flats within Masson Place have been identified as the nearest affected receivers. This nearest noise sensitive receivers were 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 18554-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Unattended Noise Survey Procedure

Measurements were undertaken at one position as shown on indicative site drawing 18554-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 fence to the east of the building. The microphone was positioned > 3.5 m in front of the window. [1]

Table 3.1 Description of unattended monitoring locations

Note [1]: The position was considered to be free-field according to guidance found in BS 4142: 2014, and a correction for reflections has therefore not been applied.

Continuous automated monitoring was undertaken for the duration of the survey between 17:00 on 3 August 2023 and 01:30 on 5 August 2023.

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 weather conditions were dry with light winds. It is understood that the weather conditions during the unattended survey remained generally dry with occasional light showers and 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 958 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 18554-SP1.

Measured noise levels are shown as a time history in Attachment 18554-TH1, with average ambient and typical background noise levels summarised in Table 4.1.

Position	Time Period	Average ambient noise level	Typical background noise level
		$L_{Aeq: T}$, dB	$L_{A90: 5min}$, dB
1	Daytime (07:00 - 23:00)	56	45
	Night-time (23:00 - 07:00)	49	41

Table 4.1 Average ambient and minimum/typical background noise levels

5.0 NOISE CRITERIA

5.1 Local Authority Criteria

Based on previous projects within the Manchester area, it is understood that the Manchester City Council general plant noise emissions criteria are as follows:

“Any externally mounted ancillary plant or fan/ducting equipment 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 chiller unit may be operational at all hours, but the extract plant will operate between 10:00 and 00:00 only.

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 the nearest noise sensitive receiver.

Period	Plant Noise Emission Limit $L_{Aeq,Tp}$ dB
Daytime (07:00 - 23:00)	40
Night-time (23:00 - 07:00)	36
Proposed Extract Fan Operating Hours (10:00 – 00:00)	40

Table 5.1 Plant noise emission limits

6.0 PLANT NOISE IMPACT ASSESSMENT

6.1 Proposed Installation

The proposed plant installation comprises the following:

- 1 No. Marstair CKC 80 Outdoor Chiller Unit
- 1 No. FusionHot Ltd Kitchen Recirculation Extract System

Noise emissions for the proposed chiller unit, as provided by the manufacturer, are shown in Table 6.1. Loudest modes of operation have been used in order to present a robust worst-case assessment.

Unit	Sound Power Level in each Frequency Band, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Marstair CKC 80	73 ^[1]	71	69	68	65	60	54	56 ^[1]	70

Table 6.1 Manufacturer provided noise emissions levels

[1] 63 Hz and 8 KHz data not provided, meaning worst case levels have been predicted, based on the available data.

The proposed chiller location is at the front, western façade of the unit which is shown on indicative site plan 18554-SP1.

For the kitchen extract system, current proposals are to use a purified recirculated air extraction system, which relies on circulation of indoor air only. This means there will be no external ducts or terminations, and noise from ventilation plant therefore does not require assessment.

Should proposals change to include external plant (including external ducts or terminations) noise due to noise emissions of the kitchen extract should be reconsidered to establish if a detailed assessment is necessary.

6.2 Determination of Penalties

British Standard 4142: 2014 +A1 2019 '*Methods for rating and assessing industrial and commercial sound*' [BS 4142] provides guideline penalties that can be applied to noise emissions to account for tonality, impulsivity, and intermittency to provide a Noise Rating Level. 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

Noise emissions from a chiller would not be considered tonal, and the assessment assumes constant operation of the plant unit in a reference period.

With reference to Table 6.2, a +3 dB acoustic feature correction for distinctiveness has been applied to chiller noise emissions, as per BS 4142 guidance.

6.3 Proposed Mitigation Measures

In order to meet the proposed criteria stated in Section 5.1, it is recommended that an enclosure is installed around the proposed chiller unit. The enclosure should provide sufficient attenuation to achieve a maximum sound pressure level of 51 dB(A) when measured at 1 m in all directions.

Based on the information provided, an enclosure meeting the sound reduction indices as stated in Table 6.3 should be suitable to achieve this.

Mitigation	Required Attenuation (dB) in each Frequency Band, Hz							
	63	125	250	500	1k	2k	4k	8k
Louvred Enclosure for Chiller Unit	5	4	5	6	9	13	14	13

Table 6.3 Required attenuation from mitigation

6.4 Noise Impact Assessment

The closest receiver has been identified as the window on the eastern facade of a residential property opposite which is a minimum of 18 m from the proposed plant location.

Taking into account all necessary acoustic corrections, the resulting noise level at the identified residential windows would be as shown in Table 6.4. Detailed calculations are shown in Appendix B.

Receiver	Design Criterion – Night-time	Noise Level at Receiver (due to proposed plant)
Nearest Residential Property	36 dB(A)	35 dB(A)

Table 6.4 Noise levels and project criterion at noise sensitive receivers

As presented in Table 6.4 and Appendix B, the proposed plant installation with acoustic enclosure would be expected to meet the requirements of the proposed criteria.

6.5 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 façade 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 6.5.

Receiver	Recommended Target – For sleeping conditions in a bedroom, in BS 8233: 2014	Noise Level at Receiver (due to plant installation)
Inside Residential Window	30 dB(A)	21 dB(A)

Table 6.5 Noise levels and BS 8233: 2014 criteria inside nearest residential space

7.0 CONCLUSION

An environmental noise survey has been undertaken at 20 Red Bank, Cheetham Hill. 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 for a proposed chiller unit 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 chiller unit should meet the requirements of the Manchester City Council with the recommended mitigation installed as stated herein.

Current proposals are to use a purified recirculated air extraction system, which relies on circulation of indoor air only. This means there will be no external ducts or terminations, and noise from ventilation plant therefore does not require assessment.



Not to scale

Description:

Indicative site plan showing noise monitoring position, proposed chiller location and nearest sensitive receiver

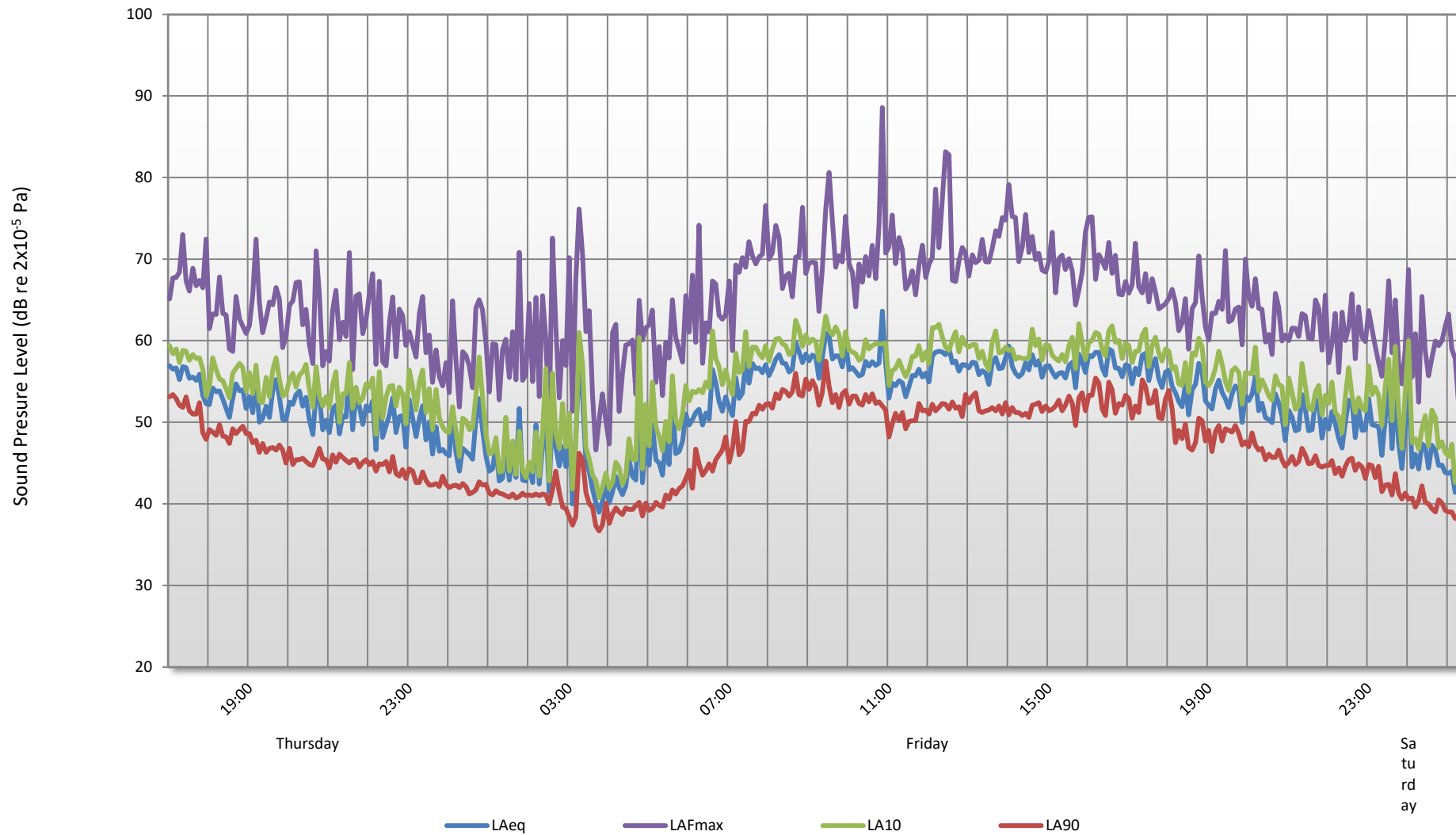
Date	31 January 2025
Reference	18554-SP1
Project Name	20 Red Bank
Image ©	Google Earth

Key:

	Unattended Noise Survey Position
	Noise Sensitive Receiver
	Proposed Chiller Location

20 Red Bank, Cheetham Hill, Manchester

Environmental Noise Time History
03 August 2023 to 05 August 2023



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.

Acoustic Calculations

18554

20 Red Bank, Cheetham Hill, Manchester

Night-Time Operation

External Plant Noise Emissions Calculation

Description	Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Manufacturer provided sound power level									
Marstair CKC 80 Chiller Unit	73	71	69	68	65	60	54	56	70
Correction for Sound Power to Sound Pressure	-11	-11	-11	-11	-11	-11	-11	-11	
Rating Penalty for Distinctiveness	3	3	3	3	3	3	3	3	
Proposed Enclosure	-5	-4	-5	-6	-9	-13	-14	-13	
Correction for reflections, dB	6	6	6	6	6	6	6	6	
Distance correction to receiver, dB (18 m) ^[1]	-25	-25	-25	-25	-25	-25	-25	-25	
Sound pressure level at receiver	41	40	37	35	29	20	13	16	35

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

Design Criterion	36
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BS 8233 Assessment Calculation

Description	Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Sound pressure level outside window	41	40	37	35	29	20	13	16	35
Minimum attenuation from partially open window, dB	-15	-15	-15	-15	-15	-15	-15	-15	
Sound pressure level inside nearest noise sensitive premises	26	25	22	20	14	5	-2	1	20

Design Criterion	30
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