2 Hardman Street
Manchester

Plant Sound
Assessment Report
0821/PSA1

21 May 2021

For:

JLL
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1.0 Introduction

Lighthouse Acoustics has been appointed by JLL to undertake an environmental sound survey at 2 Hardman Street, Manchester and to assess atmospheric sound emissions from the proposed 12No. condenser units to serve the office building.

The survey methodology, results and assessment are presented in this report.

2.0 Objectives

To establish the Local Authority's plant sound emission requirements for the proposed plant items.

To visit site to undertake a detailed environmental sound survey in order to establish existing environmental sound levels at the site.

To review atmospheric sound emissions from the proposed 12No. condenser units to the nearest receptor and propose mitigation measures if required in order to achieve the requirements of the Local Authority.

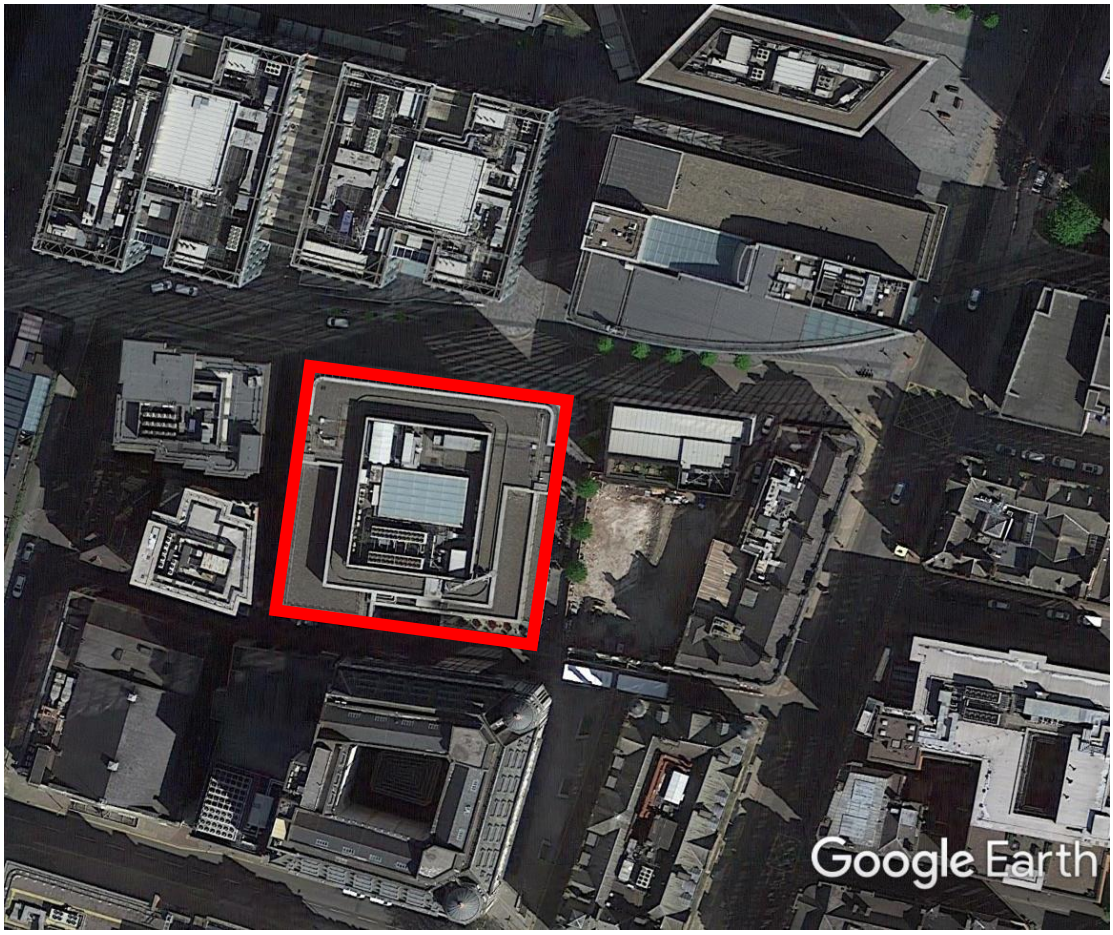
3.0 Site Description

The proposed 12No. condenser units are proposed at roof level of 2 Hardman Street towards the north west corner of the roof.

2 Hardman Street is bound by Hardman Street to the north, Scott Place to the east, Atkinson Street to the south and Jodrell Street to the west. The surrounding buildings are commercial.

The nearest noise sensitive receptor to the proposed 12No. condenser units is understood to be the office windows of the adjacent office building (3 Hardman Street) to the north of the site which overlook the plant area.

The site plan below indicates the extent of the site and the surrounding environment.



Site plan indicating the extent of the site and the surrounding environment

4.0 Local Authority Requirements

With regard to noise and vibration from fixed plant/equipment, Section 3.6.1.5.1 of the Planning & Noise Technical Guidance document (dated December 2015) produced by Manchester City Council states the following:

> *"The noise assessment should be based on BS 4142: 2014 and any application for fixed plant, equipment or machinery must demonstrate that:*
>
> ***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 (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location."***

5.0 Environmental Sound Survey

5.1 Measurements

Automated environmental sound measurements were undertaken from 11:00 hours on Wednesday 5 May 2021 to 11:00 hours on Thursday 6 May 2021. During this period the L_{Amax}, L_{Aeq} and L_{A90} sound pressure levels were measured continuously over 15 minute periods.

5.2 Weather Conditions

At the start of the survey period there was a gentle westerly breeze (<5.0m/s) and the sky was overcast. There was no rainfall and road surfaces were dry. The temperature was approximately 8°C.

At the end of the survey period there was a gentle westerly breeze (<5.0m/s) and the sky was broken cloud. There was no rainfall and road surfaces were dry. The temperature was approximately 7°C.

Based on publicly available weather data for the survey period it is understood that weather conditions remained similar for the duration of the survey with no periods of significant rainfall or strong breezes. The weather conditions during the survey period are therefore considered to be suitable for undertaking measurements of sound levels.

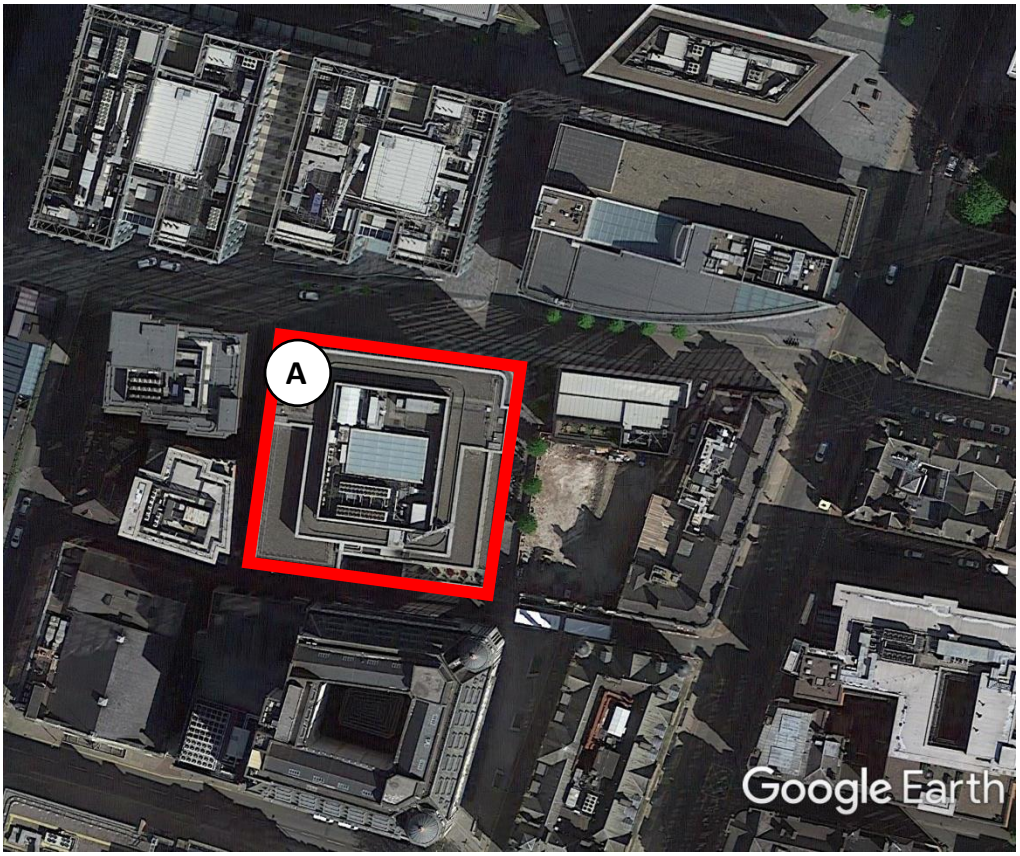
5.3 Measurement Position

Environmental sound levels were measured at 1No. position on-site as described in the table below.

Position	Description
A	Microphone situated at 1.2m above roof level to the north west corner of the roof looking towards the office windows of the adjacent building to the north.

The measurement position is shown on the site plan overleaf.

It should be noted that all existing plant items situated towards the north west corner of the roof had been decommissioned in preparation for the installation of the proposed 12No. Condenser units. As such, plant noise from the roof of 2 Hardman Street was minimal at the measurement position.



Site plan showing measurement position

Measurement Position A was selected in order to assess typical environmental sound levels incident upon the office windows of the adjacent office building to the north of the site which overlook the plant area.

5.4 Equipment

The following equipment was used to undertake the environmental sound survey.

Equipment	Manufacturer	Model	Serial No.	Calibration Date
Class 1 Sound Level Meter	Casella	633C	0721319	08/09/2017
Preamplifier	Casella	495	001446	08/09/2017
Microphone	Casella	251	1996	08/09/2017
Class 1 Sound Calibrator	Casella	120/1	3864878	13/11/2018
Environmental Noise Kit	Casella	6847	-	-
Microphone Extension Cable	Casella	C6717/5	-	-
Weather Protection System	Casella	6737	-	-

Field calibration checks were performed on the sound level meter prior to and on completion of the survey and were found to be within acceptable tolerance limits.

5.5 Results

5.5.1 Time History Graph

The results of the environmental sound survey are presented on Time History Graph 0821/THG1 enclosed at the rear of the report.

5.5.2 L_{A90} Background Sound Levels

The lowest representative daytime and night-time $L_{A90,15min}$ background sound levels measured during the survey period are detailed in the table below.

Position	Lowest Representative $L_{A90,15min}$ Background Sound Levels (dB)	
	Daytime (07:00–23:00)	Night-time (23:00–07:00)
A	54	50

5.5.3 Discussion of Sound Climate

At the start and end of the survey period the dominant sound sources were noted to be existing rooftop building services plant from the surrounding buildings and road traffic from the surrounding road network.

Whilst we are unable to comment on dominant sound sources or individual sound events during the survey period, based on the surrounding environment it is likely building services plant remained the dominant sound source.

6.0 Atmospheric Plant Sound Emission Limits

Based on the lowest representative daytime and night-time $L_{A90,15min}$ background sound levels measured during the environmental sound survey and the requirements of the Local Authority, cumulative atmospheric plant sound emissions should not exceed the following limits at the nearest existing noise sensitive receptor (i.e. residential).

Receptor	L_{Aeq} Cumulative Atmospheric Plant Sound Emission Limits (dB) at Nearest Noise Sensitive Receptor	
	Daytime (07:00–23:00)	Night-time (23:00–07:00)
Residential	49	45

For non-noise sensitive receptors (i.e. commercial), it is proposed that cumulative atmospheric plant sound emissions should not exceed the following limits (equal to the lowest representative daytime and night-time $L_{A90,15min}$ background sound levels).

Receptor	L_{Aeq} Cumulative Atmospheric Plant Sound Emission Limits (dB) at Nearest Non-Noise Sensitive Receptors	
	Daytime (07:00–23:00)	Night-time (23:00–07:00)
Commercial	54	50

The above limits are based on the understanding that the commercial buildings do not require openable windows for ventilation to occupied spaces.

The above limits are subject to final approval by Manchester City Council.

7.0 Plant Sound Emission Assessment

7.1 Plant Sound Data

Atmospheric building services sound levels have been assessed based on the manufacturers sound data received for the proposed 12No. condenser units which indicates octave band sound data as detailed in the tables below.

2No. Mitsubishi PURY-EP250YNW-A

Condenser Sound Pressure Level (dB) at 1m at Octave Band Centre Frequency (Hz)								dBA
63	125	250	500	1k	2k	4k	8k	
78	63	62	60	54	50	51	44	61

4No. Mitsubishi PURY-EP350YNW-A

Condenser Sound Pressure Level (dB) at 1m at Octave Band Centre Frequency (Hz)								dBA
63	125	250	500	1k	2k	4k	8k	
72	71	64	62	57	54	52	48	64

4No. Mitsubishi PURY-EP400YNW-A

Condenser Sound Pressure Level (dB) at 1m at Octave Band Centre Frequency (Hz)								dBA
63	125	250	500	1k	2k	4k	8k	
81	70	70	68	62	59	54	49	69

2No. Mitsubishi PURY-EP800YSNW-A

Condenser Sound Pressure Level (dB) at 1m at Octave Band Centre Frequency (Hz)								dBA
63	125	250	500	1k	2k	4k	8k	
84	73	73	71	65	62	57	52	72

Whilst it is not possible to assess plant irregularity or impulsiveness based on manufacturer's sound data, BS 4142: 2014 provides an objective method for assessing the audibility of tones in sound. The one-third octave method states that if the level of a one third octave band exceeds the level of both adjacent one third octave bands by the following amounts, then a tonal component may be identified as present:

- 15dB in the low-frequency one-third-octave bands (25Hz to 125Hz);
- 8dB in the mid-frequency one-third-octave bands (160Hz to 400Hz);
- 5dB in the high-frequency one-third-octave bands (500Hz to 10kHz).

However, one third octave band sound data is rarely available from manufacturers as is the case in this instance.

By applying the same principal to the octave band sound data in the tables above, a review indicates that these items are unlikely to exhibit a tonal component. As such, no character correction has been applied to the specific sound level for these items.

Should one third octave band sound data become available a revised assessment should be undertaken.

7.2 Operating Hours

We understand that the proposed 12No. Condenser units have the potential to operate 24 hours a day.

In order to undertake a worst case assessment, it is assumed that the proposed 12No. Condenser units will operate for the full 1 hour daytime and 15 minute night-time assessment periods.

7.3 Plant Location

The location of the proposed 12No. Condenser units has been taken from the following drawing.

Author	Drawing No.	Revision	Date
Crookes Walker Consulting Limited	2042-RF-5002	P02	24.04.21

This indicates that the proposed 12No. Condenser units are to be situated at roof level of 2 Hardman Street towards the north west corner of the roof.

7.4 Nearest Receptor

It is understood that the nearest receptor is the non-noise sensitive windows of the office building situated approximately 30m to the north of the proposed 12No. Condenser units.

Based on the above it is proposed to achieve the cumulative atmospheric plant sound emissions limits for non-noise sensitive receptors at the windows of the office building to the north.

7.5 Assessment

The table below details the calculated cumulative L_{Aeq} atmospheric plant sound emission levels at the nearest receptors along with the proposed cumulative atmospheric plant sound emission limits and the differences between them.

Receptor	Descriptor	Period	
		Daytime	**Night-time**
North Office Windows	Calculated Cumulative Atmospheric Plant Sound Emission Level L_{Aeq} (dB)	43	43
	Cumulative Atmospheric Plant Sound Emission Limits L_{Aeq} (dB)	54	50
	Difference (dB)	-11	-7

The calculated cumulative L_{Aeq} atmospheric plant sound emission levels at the nearest receptor are between 7dB and 11dB below the proposed cumulative atmospheric plant sound emission limits.

The assessment therefore indicates that the building services proposals are likely to achieve the proposed cumulative atmospheric plant sound emission limits at the nearest receptor.

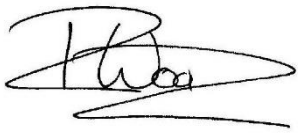
8.0 Conclusion

The Local Authority's plant sound emission requirements for the proposed plant item have been established.

A detailed environmental sound survey has been undertaken in order to establish existing environmental sound levels at the site.

An assessment of atmospheric sound emissions from the proposed 12No. Condenser units to the nearest receptor has been undertaken.

The assessment indicates that the proposed 12No. Condenser units are likely to achieve the proposed cumulative atmospheric plant sound emission limits at the nearest receptor.



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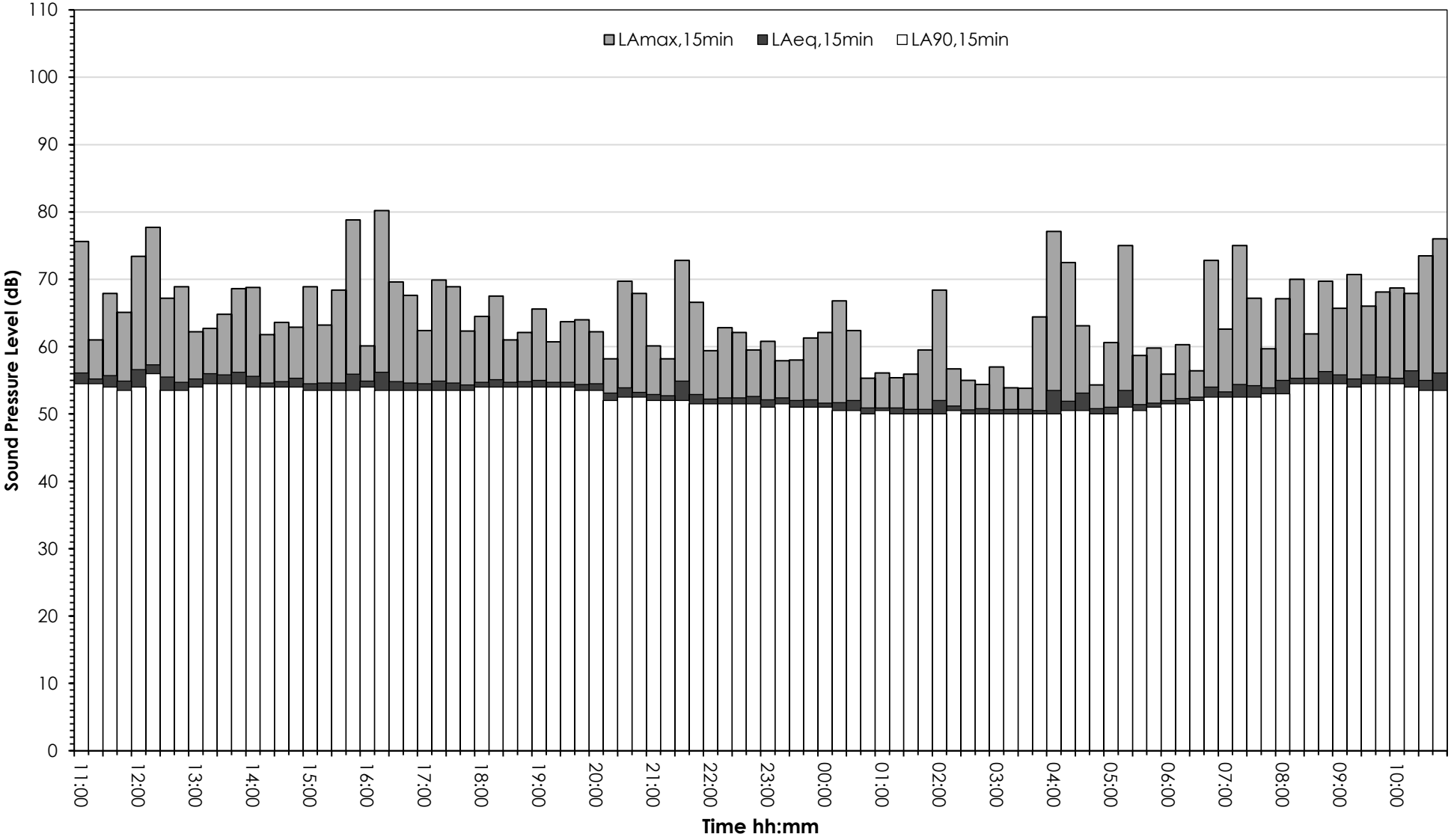
0821/THG1

2 Hardman Square, Manchester

Time History Graph - Wednesday 5 May 2021 to Thursday 6 May 2021

$L_{Amax,15min}$, $L_{Aeq,15min}$ & $L_{A90,15min}$ Noise Levels at Position A