

Royal London House Manchester

Plant Noise Assessment Report

31676/PNA

29 July 2024

For:
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Document Control

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1	29/07/2024	Update following receipt of TEF details.		
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1.0 Introduction

It is understood that the Level 5 office floor at Royal London House in Manchester is to be refurbished. The refurbishment will include the installation of new building services plant within the existing rooftop plant area.

Hann Tucker Associates has therefore been commissioned to assess potential noise impacts associated with the proposals on external noise sensitive receptors.

Baseline noise conditions have been established by means of a detailed noise survey, presented herein. The results of the survey have subsequently been used to assess the suitability of the proposed plant with regards to noise egress to off-site receptors.

2.0 Objectives

To inspect the site to familiarise ourselves with its layout and surroundings in order to identify suitable accessible locations for environmental noise measurements.

To establish by means of noise survey the existing L_{Amax} , L_{Aeq} and L_{A90} environmental road, rail and air traffic noise levels at secure and accessible on-site positions, using fully computerised noise monitoring equipment.

To establish plant noise limits in line with Manchester City Council's latest planning guidance document.

To assess the impact of noise egress to surrounding noise sensitive buildings from the proposed building services plant covered as part of the application for new plant equipment.

Where/if appropriate, to propose suitable mitigation measures to control noise.

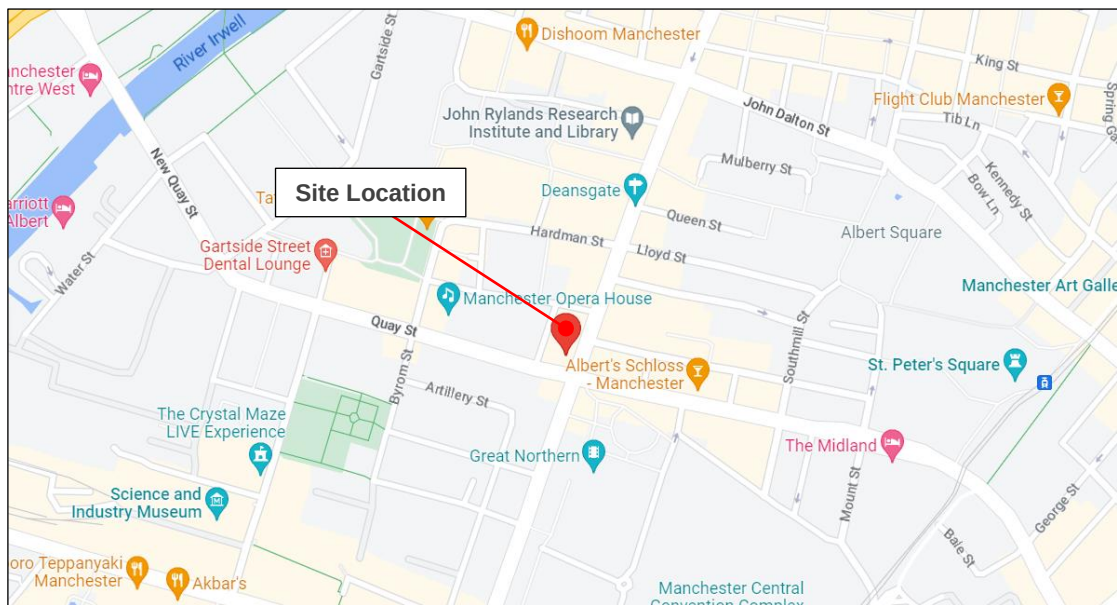
3.0 Acoustic Terminology

Please refer to Appendix A for an explanation of acoustic terminology used herein.

4.0 Site Description

4.1 Location

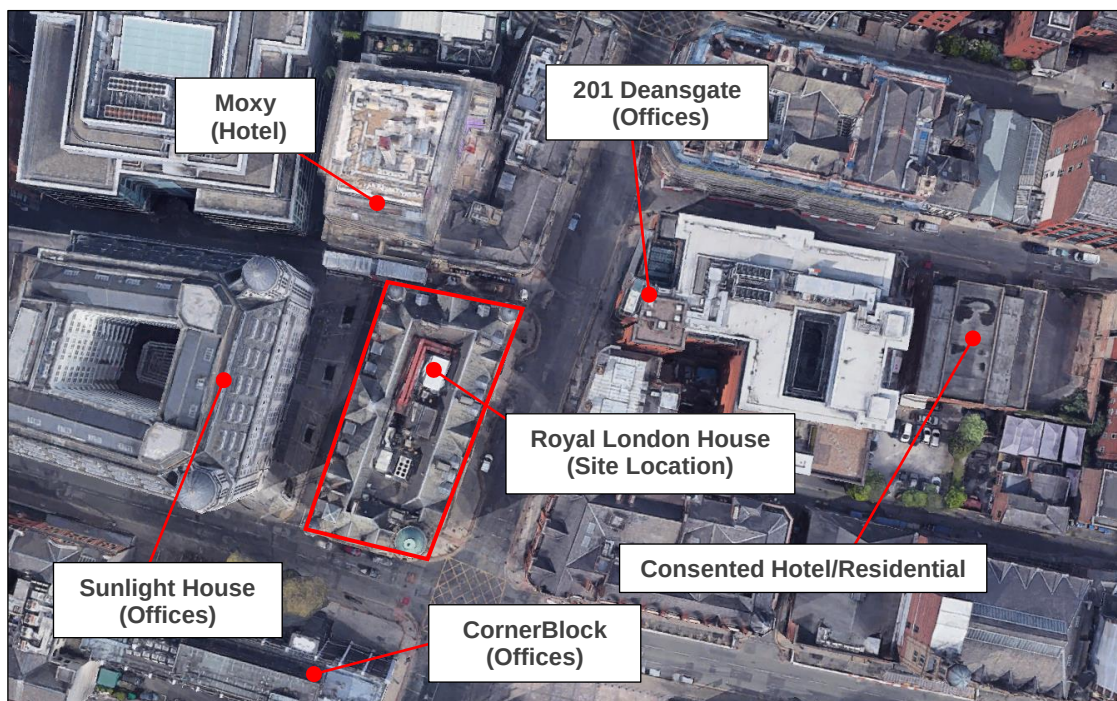
The site is located at Royal London House, Deansgate, and falls within Manchester City Council's (MCC) jurisdiction. See Location Map below.



Site Location (© maps.google.co.uk)

4.2 Description

The site is an office building with several retail units on the ground floor. The surrounding buildings comprise commercial/retail and office uses and are generally comparable in height to Royal London House. However, a Hotel, Moxy, is located on Atkinson Street, as well as a residential/hotel development granted planning permission to the east of the site. See Site Plan below.



Site Plan (© maps.google.co.uk)



5.0 Acoustic Standards & Guidelines

5.1 National Planning Policies

In order to provide a suitable assessment a number of national planning policies have been considered.

All guidance used to form a noise impact assessment is taken from various standards, guidance, and Local Authority requirements as summarised below:

- Local Planning Policy (See Section 5.2).
- British Standard 4142:2014 + A1:2019.

Detailed information for relevant planning policies and guidance can be found within Appendix B.

5.2 Local Planning Requirements

Manchester City Council requirements are outlined in Manchester City Council's Planning & Noise Technical Guidance document (October 2022).

The document aims to provide help and advice in relation to noise in a planning context to encourage good acoustic design. It outlines what is expected in relation to current guidance and policy with the aspiration that new developments achieve the highest possible standards without compromising the health and wellbeing of people that live and work within the City of Manchester.

Section 3.7.1.5 states 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”*.

6.0 Baseline Environmental Noise Survey

6.1 Procedure

Fully automated environmental noise monitoring was undertaken by Jake Howarth, BEng(Hons), MIOA, at Royal London House from approximately 11:30 hours on Monday 22 July 2024 to approximately 14:00 hours on Wednesday 24 May 2024 to establish existing baseline noise levels.



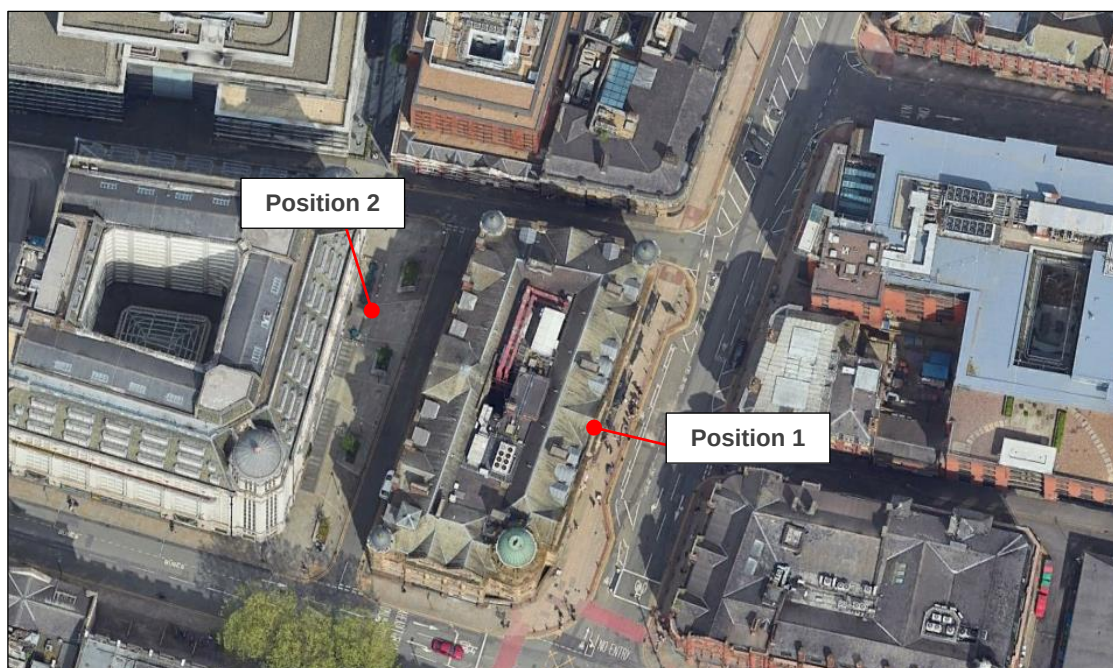
Additional attended measurements, time synchronised with the unattended measurements, were performed between 13:30 hours and 13:45 hours on 24 July 2024 with the purpose of establishing noise levels in close proximity to the nearby noise sensitive receptor and any potential difference in noise between the unattended measurement location and the nearest noise sensitive premises.

Measurements were taken continuously of the A-weighted (dBA) L_{90} , L_{eq} , and L_{max} sound pressure levels over discrete 15-minute periods in general accordance with BS 7445-1:2003 Description and Measurement of Environmental Noise.

6.2 Measurement Positions

The noise level measurements were undertaken at 2No positions as described in the table below.

Position	Type	Description
1	Unattended	Microphone located out of a 5 th floor window overlooking Deansgate. The stone ledge of the building as screening Deansgate itself from the measurement position. As such, the microphone did not have line of sight to Deansgate itself. The microphone was approximately 1m from the building facade so noise levels measured in this location are facade noise levels.
2	Attended	Microphone mounted on a tripod approximately 1.5m above ground level and 1.5m from the façade of Sunlight House. The noise levels measured in this location are facade levels.



Site Plan showing measurement locations (© maps.google.co.uk)



6.3 Weather Conditions

For the unattended survey, local weather reports indicated no notable periods of prolonged or heavy rainfall, with temperatures ranging from 15°C (night) to 21°C (day) and wind speeds less than 5m/s. During our time on site, skies were overcast, wind conditions were calm and road surfaces were dry.

During the attended survey on 24 July 2024, the weather was generally clear and dry with no periods of rainfall and calm wind conditions.

6.4 Instrumentation

The instrumentation used during the survey is presented in the Table below.

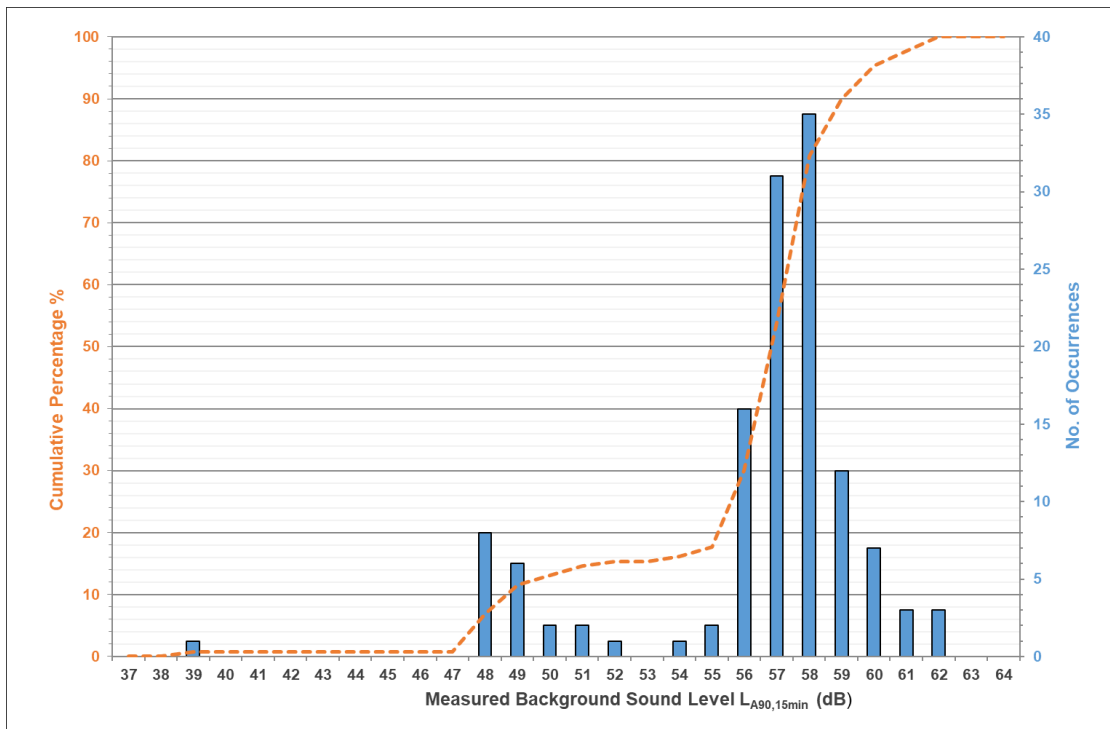
Position	Description	Manufacturer	Type	Serial Number	Calibration
1	Type 1 Data Logging Sound Level Meter	Larson Davis	824	4074	26/05/2024
	Type 1 Calibrator	Larson Davis	CAL200	3083	27/03/2024
2	Type 1 Data Logging Sound Level Meter	Brüel and Kjær	2250	3007292	25/01/2024
	Type 1 Calibrator	Brüel and Kjær	4231	2271905	05/09/2023

The sound level meters, including the extension cable, were calibrated prior to and on completion of the surveys. No significant deviations occurred (no more than 0.3 dB).

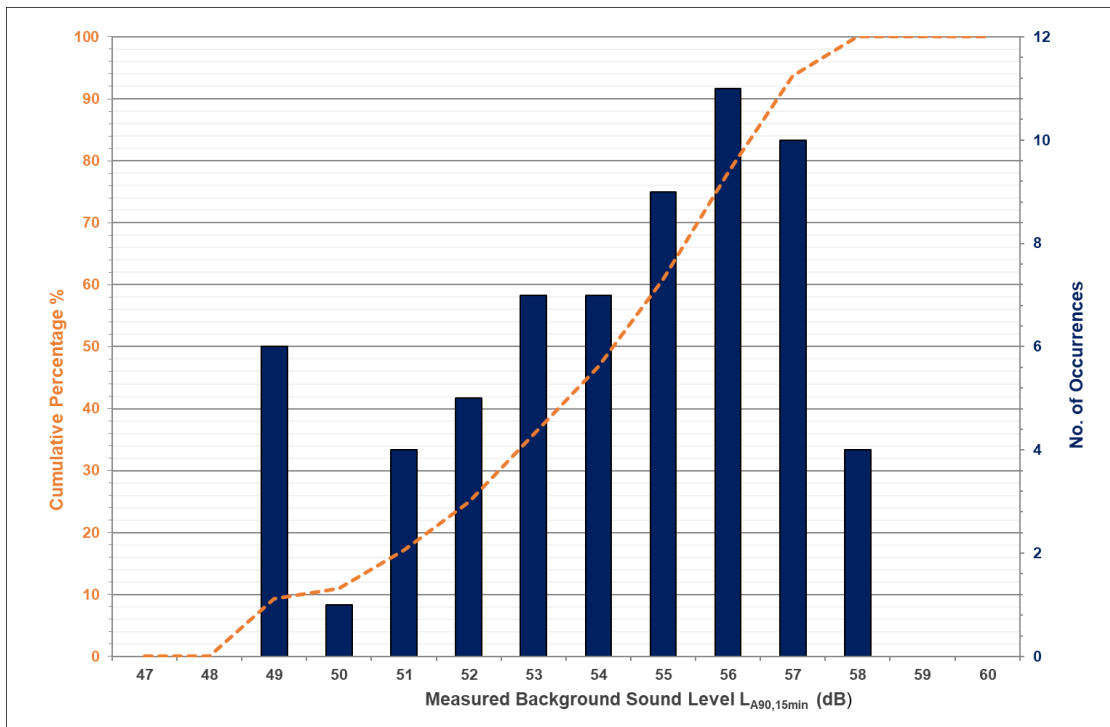
6.5 Results

The results have been plotted on Time History Graph 31676/TH1 enclosed presenting the 15 minute A-weighted (dBA) L_{90} , L_{eq} and L_{max} levels at each measurement position throughout the duration of the survey.

BS 4142 states that “the background sound level must be reliable and suitably represent the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.” Taking this into account, the following histograms have been created which display the occurrence of each sound level (L_{A90}) for the day and night-time periods.



Histogram Showing Distribution of Measured Background Noise Levels – Daytime



Histogram Showing Distribution of Measured Background Noise Levels – Night-time

Based on the above plots the L_{A90} values presented below are considered to be the 'representative' background sound levels determined through statistical analysis of the 15 minute readings.



Position	Representative $L_{A90(15min)}$ Background Sound Level (dB re 2×10^{-5} Pa)	
	Daytime (07:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours
1	56	49

The following table summarises noise levels recorded at each of the attended measurement positions.

Position	Date	Period	Sound Pressure Level (dB)		
			$L_{Aeq,T}$	$L_{A90,T}$	$L_{Amax,T}$
1	24/07/2024	13:30-13:45	62	58	78
2	24/07/2024	13:30-13:45	62	57	83

6.6 Discussion of Noise Climate

Due to the nature of the unattended survey it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period for Position 1. However, at the beginning and end of the survey period the dominant noise source was noted to be road traffic on the surrounding road network and plant noise from existing plant in the area.

Noise levels in the Position 2 were dominated by road traffic noise and pedestrians passing. Construction noise was audible in this locations, however, the measurements were carried out during quiet construction periods.

Comparing the time synchronised measurement results between Position 1 and Position 2 it can be seen that there is little difference in the measured background noise levels. As such, the background noise levels measured in Position 1 are considered to be representative of the nearest noise sensitive premises (ie Sunlight House).

7.0 Noise Impact Assessment (Overview)

The following section presents our assessment of the potential noise impacts associated with the development proposals, covering:

- **Plant Noise Emissions:** Setting limits for new items of fixed plant against MCC guidance.



It is assumed that the unit will be fully mechanically ventilated and openable windows will not be relied upon as a means of ventilation/cooling to the unit.

8.0 Fixed Plant Noise Emission Limits

8.1 Proposed Limits

On the basis of the Manchester City Council's guidance and the results of the environmental noise survey, we propose that the following cumulative plant noise emission limits be achieved at 1 metre from the nearest noise sensitive windows. These limits are 5 dB below the measured background noise level, and are presented as a façade sound pressure level.

Period	Plant Noise Limit (BS 4142 Rating Level)
Daytime (07:00-23:00)	51
Night-time (23:00-07:00)	44

For design purposes, any plant which could emit noise of a tonal, irregular or intermittent nature should be subject to an "acoustic feature" penalties in accordance with BS 4142:2014. The above limits shall be subject to the final approval of Manchester City Council.

9.0 Plant Noise Impact Assessment

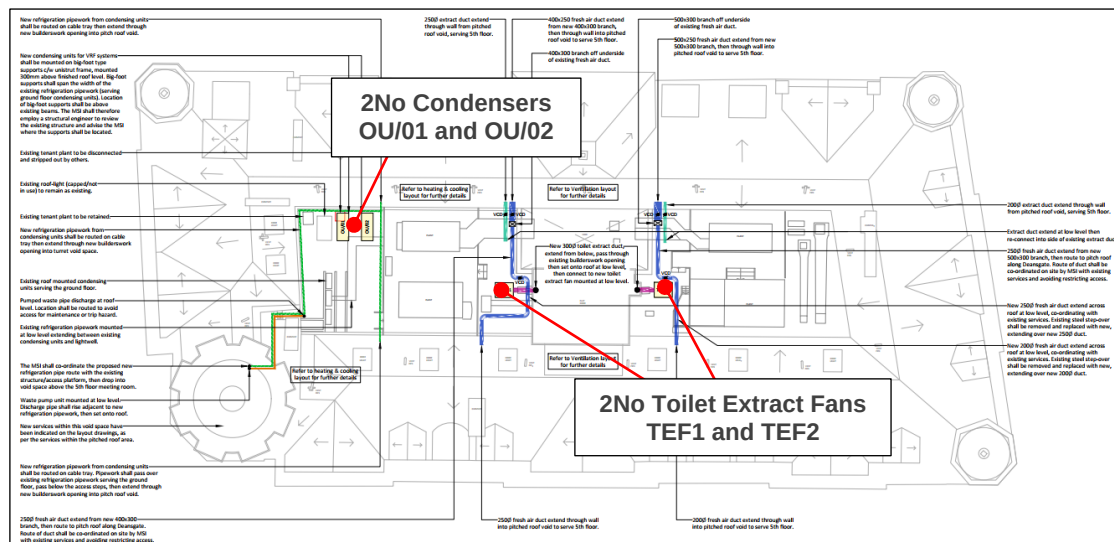
9.1 Proposed Plant

9.1.1 Plant Location

The proposed external plant consists of 2No condensing units and 2No Toilet Extract Fans located on the existing roof. The units proposed are as follows:

- Mitsubishi PURY-P550YNW-A2.
- Mitsubishi PURY-P500YNW-A2.
- 2No Flaktwoods EC TWIN FAN 315.

The location of the plant is shown on the Hilson Moran drawing provided below:



Hilson Moran Drawing 35660-HML-XX-RF-GA-M-101001 P02 Showing Location of Plant

The nearest noise sensitive premises are considered to be the following:

- Sunlight House with the most affected window located 25m from the proposed plant.

Please note that the condensers would be screened from the above receptor due to the pitched roof of Royal London House. However, it is unclear if the Toilet Extract Fans will be screened. As such, no screening as been allowed for the Toilet Extract Fans.

9.1.2 Plant Operation

It is understood that the plant will serve the Level 5 office spaces with a anticipated hours of operating being:

- 07:00 to 19:00 Monday to Friday.

Based on the above, the units are unlikely to operate during the night and at weekends.

9.1.3 Plant Noise Data

We understand the manufacturer's noise data for the condensers to be as follows:

Plant Description	Sound Pressure Level (dB re 2×10^{-5} Pa) at 1 metre at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
PURY-P500YNW	80	66	65	62	56	52	53	47	64
PURY-P550YNW	79	66	65	63	56	52	51	45	64



The manufacturer's noise data for the proposed Toilet Extract Fans is as follows:

Plant Description	Sound Power Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
TEF1 – Inlet	67	69	65	63	58	58	52	46	65
TEF1 – Outlet	72	74	70	68	63	63	57	51	70
TEF1 – Breakout	56	60	53	45	36	27	20	20	49
TEF2 – Inlet	66	67	64	62	57	57	50	44	64
TEF2 – Outlet	71	72	69	67	62	62	55	49	69
TEF2 – Breakout	55	58	52	44	35	26	20	20	47

9.2 Plant Noise Impact Assessment

The following table summarises our predictions of atmospheric noise emissions from the proposed plant to the nearest noise sensitive window.

Description	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
PURY-P500YNW Sound Pressure Level at 1m	80	66	65	62	56	52	53	47	64
Distance Correction 1m to 25m	-22	-22	-22	-22	-22	-22	-22	-22	-
Barrier Correction (No line of sight)	-5	-5	-5	-5	-5	-5	-5	-5	-
Calculated Noise Level at Receptor	53	39	38	35	29	25	26	20	37
PURY-P550YNW Sound Pressure Level at 1m	79	66	65	63	56	52	51	45	64
Distance Correction 1m to 25m	-22	-22	-22	-22	-22	-22	-22	-22	-
Barrier Correction (No line of sight)	-5	-5	-5	-5	-5	-5	-5	-5	-
Calculated Noise Level at Receptor	52	39	38	36	29	25	24	18	37
TEF1 Sound Pressure Level at 1m (Combined Outlet and Breakout)	57	64	63	64	60	61	55	49	67
Distance Correction 1m to 27m	29	29	28	29	29	29	29	29	-
Barrier Correction (Assumed line of sight)	0	0	0	0	0	0	0	0	-
Calculated Noise Level at Receptor	28	35	35	35	31	32	26	20	38



Description	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
TEF2 Sound Pressure Level at 1m (Combined Outlet and Breakout)	56	62	62	63	59	60	53	47	66
Distance Correction 1m to 27m	29	29	28	29	29	29	29	29	-
Barrier Correction (Assumed line of sight)	0	0	0	0	0	0	0	0	-
Calculated Noise Level at Receptor	27	33	34	34	30	31	24	18	37
Calculated Cumulative Specific Noise Level at Receptor	56	43	43	41	36	35	31	25	43

The calculations show that the levels of plant noise egress from the plant are likely to be more than 10 dB below the requirements of Manchester City Council. As such, it is likely that any acoustic feature corrections, in-line with BS4142:2014 would not be required as the plant is unlikely to be audible at the receptor.

Therefore, the proposed plant should be capable of achieving the requirements of the Local Authority outlined in Section 8.1 without any dedicated mitigation measures.

10.0 Conclusions

The Level 5 office areas at Royal London House in Manchester are to be refurbished. As part of these works, new building external services plant are proposed in the form of 2No external condensers and 2No Toilet Extract Fans.

A noise survey has been carried out in the vicinity of the site and plant noise egress limits established for the nearby noise sensitive receptors.

On the basis of the noise emission limits, the plant has been assessed and demonstrated to be in line with the requirements of Manchester City Council.

Appendix A

The acoustic terms used in this report are defined as follows:

dB Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. 30dB + 30dB = 33dB, not 60dB).

dBA The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The _A subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted

It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.

L_{90,T} L₉₀ is the noise level exceeded for 90% of the period *T* (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.

L_{eq,T} L_{eq,T} is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, *T*.

L_{max} L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.

Sound Pressure Level (L_p) is the sound pressure relative to a standard reference pressure of 2×10^{-5} Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).

Sound Power Level (SWL or L_w) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).

Appendix B

Planning Policies, Standards & Guidance

B.1 British Standard 4142:2014 + A1:2019

When setting plant noise emission criteria reference is commonly made to BS 4142:2014 *“Methods for rating and assessing industrial and commercial sound”*.

The procedure contained in BS 4142:2014 provides an assessment of the likely effects of sound on people when comparing the specific noise levels from the source with representative background noise levels. Where the noise contains “a tone, impulse or other characteristic” then various corrections can be added to the specific (source) noise level to obtain the “rating level”.

BS 4142 states that: *“The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs”. An estimation of the impact of the specific noise can be obtained by the difference of the rating noise level and the background noise level and considering the following:*

- *“Typically, the greater this 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 a 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.”*

The determination of the “rating level” and the “background level” are both open to interpretation, depending on the context.

Appendix C

Time History Plot

Royal London House

Position 1

L_{eq} , L_{max} and L_{90} Noise Levels

Monday 22 July 2024 to Wednesday 24 July 2024

LA_{max}

LA_{eq}

LA₉₀

