

Reynolds House Data Centre 4 Archway Hulme Manchester

Plant Noise Assessment Report

30727/PNA1

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Document Control

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1.0 Introduction

Hann Tucker Associates Limited (Hann Tucker) has been commissioned to support a planning application for the installation of new building services plant at the Reynolds House located on Archway, Manchester.

Therefore, a baseline noise survey and subsequently assessment of plant noise emissions from the new plant installations has been carried out. Based on the calculated levels of plant noise the impact on nearby noise sensitive receptors has been evaluated.

This report presents the plant noise assessment and our advice on further mitigation measures, where/if necessary.

2.0 Objectives

To establish, by means of an unmanned survey to BS 7445 to measure the prevailing environmental noise levels at up to 1No secure and accessible positions using fully computerised noise monitoring equipment.

Measurement procedures shall be in general accordance with British Standard BS 7445 "Description and measurement of environmental noise."

Measurement procedures shall also be in general accordance with those described in BS 4142: 2014, Method for rating industrial noise affecting mixed residential areas, published by the British Standards Institution.

Based on the results of the survey, to recommend daytime and night-time plant noise emission limits following liaison with the Local Authority.

To assess the noise emissions from the proposed plant, based upon data with which we are provided, to surrounding noise sensitive receptors and comment upon the acceptability.

To advise on noise control measures to achieve the plant noise limits, if required.

3.0 Acoustic Terminology

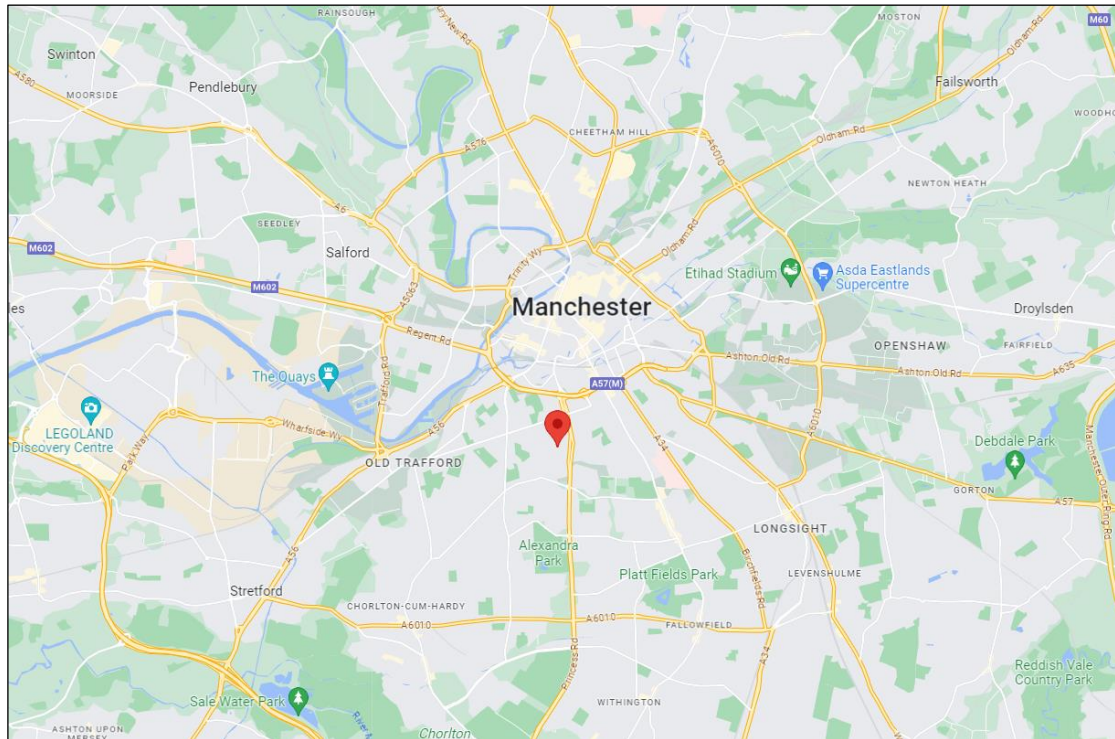
For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.



4.0 Site Description

4.1 Location

Reynolds House is located on Archway in Manchester, within the boundary of Manchester City Council. The location is shown on the Location Map below.



Location Map (Map data © 2023 Google)

4.2 Description

The site lies on Archway and is primarily surrounded by commercial and residential buildings. The nearest buildings are the Community Clay Studio (located 26m north-west of the proposed plant) and iomart Manchester, 28m north of the plot. Directly above the Community Clay Studio are residential buildings. Approximately 40m to the west, is a community garden centre and immediately to the south of the site is an open field.

The nearest residential receptor is approximately 28m to the north-west of the site. The site is shown on the site plan below.



Site Plan (Map Data ©2023 Google)

5.0 Project Proposals

5.1 Proposed Plant

The proposed plant is as follows:

Plant Description	Location	Qty	Plant Make	Model Number
Ground Floor Condenser Unit	Proposed plant location	12	Airedale	CR50-0 with SV15 Unit
		1		CR50-0 with SV12 Unit

5.2 Operating Hours

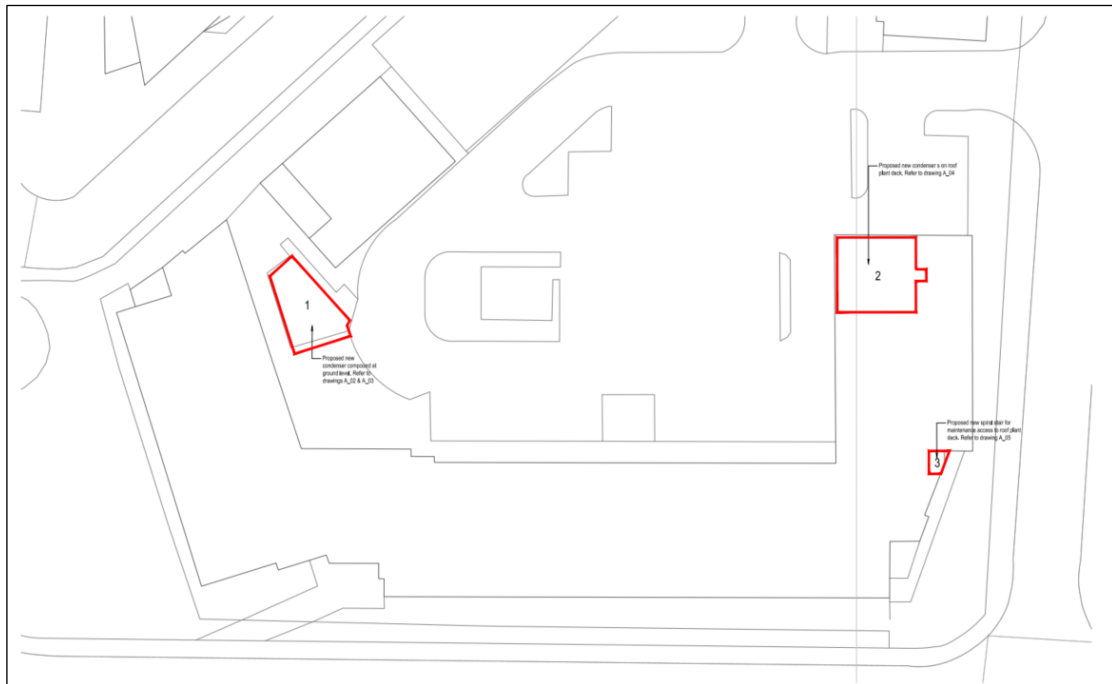
We understand that the proposed plant could operate during both daytime and night-time hours.

5.3 Drawings

Our acoustic assessment is based on the following drawings. It should be noted that only Plant Position 1 is being assessed.



Reference	Title	Date
A_01 P2	Site & Location Plan	April 2016



Mechanical Services Layout

6.0 Acoustic Standards and Guidelines

6.1 National Planning Policies

In order to provide a suitable assessment a number of national planning policies have been considered, including:

- The National Planning Policy Framework (NPPF), 2021
- The Noise Policy Statement for England (NPSE), 2010
- Planning Practice Guidance – Noise (PPGN), 2019

The above documents highlight the importance of considering the potential noise effects on any new residential development and provide a qualitative approach to assessment. However, each of the above does not provide any quantitative guidance. As such, all quantitative guidance used to form a noise impact assessment is taken from various other standards and guidance as detailed in the following sections.



6.2 BS 4142:2014 + A1:2019

BS 4142: 2014 describes methods for rating and assessing the effects of outdoor sound levels, of an industrial and/or a commercial nature, *“on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident”*.

The impact of a specific sound is indicated by subtracting the existing background noise level from the rating level (i.e. noise level from the proposed items of plant/machinery/etc plus any acoustic feature corrections). The standard states that:

- “a difference of around +10dB or more is likely to be an indication of a significant adverse impact”;
- “a difference of around +5dB is of marginal significance is likely to be an indication of an 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”.

The noise from the new development is expressed in terms of a rating level and given as a $L_{Aeq, T}$ noise level. The existing background noise level is expressed in terms of a $L_{A90, T}$ noise level. T is the assessment time interval, which is 1-hour for operations during daytime hours (07:00 to 23:00) and 15-minutes for operations during night-time hours (23:00 to 07:00).

BS 4142:2014 states that if a noise source contains an ‘acoustic feature’, such as tonality, intermittency or impulsiveness, an appropriate penalty should be applied.

6.3 Local Authority Requirements

The site lies within the jurisdiction of Manchester City Council. Manchester City Council’s Planning and Noise Technical Guidance (June 2022) notes the following with regards to control of new fixed building services plant.

“Noise from fixed plant, equipment or machinery can be very annoying and disruptive to people living nearby particularly where that item involved emits a noise with impulsive or tonal characteristics.

Many of the complaints Environmental Health receive about noise from plant, equipment and machinery specifically concern the character of the noise emitted. Any noise assessment needs to consider not only the overall level of noise emitted, but also its particular characteristics. The noise assessment should be based on BS 4142, 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 (LAeq) below the typical background (LA90) level at the nearest noise sensitive location’.

By designing the sound pressure level of any plant items to generate a noise impact of at least 5dB below the existing background level, any plant noise impact should be of a negligible level which should not give rise to complaints from users or occupiers of existing noise-sensitive usages. See Appendix A with regards to the expectation of how to calculate a ‘typical’ background level.”

7.0 Environmental Noise Survey

7.1 Procedure

A fully automated environmental noise monitoring was undertaken by Will Robertson, Assistant Consultant, BSc (Hons), from approximately 12:00 hours on Friday 2nd June 2023 to 11:15 hours on Tuesday 6th June 2023.

Measurements were taken continuously of the A-weighted (dBA) L_{90} , L_{eq} and L_{max} sound pressure levels over 15 minute periods.

All measurements were collated in general accordance with BS 7445-1:2003 *Description and Measurement of Environmental Noise*.

7.2 Measurement Positions

The microphone was attached to a pole approximately 9 metres above ground level on the fire escape of the building, location as highlighted in the figure below. The microphone was situated approximately 1m from the nearest significantly reflective surface, therefore the microphone is considered to be in façade level conditions.



Plan Showing Measurement Positions (Map Data ©2023 Google)

7.3 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	3157	30/05/2023
1	Type 1 Calibrator	Larson Davis	Cal200	3083	27/03/2023

The sound level meter was calibrated prior to and on completion of the surveys. No significant changes were found to have occurred (no more than 0.3dB). The microphone was fitted with a windshield.

7.4 Weather Conditions

During the periods we were on site the wind conditions were light. The sky was generally clear. We understand that throughout the survey period the weather conditions were clear and warm, with temperatures ranging from 6 C to 21 C.

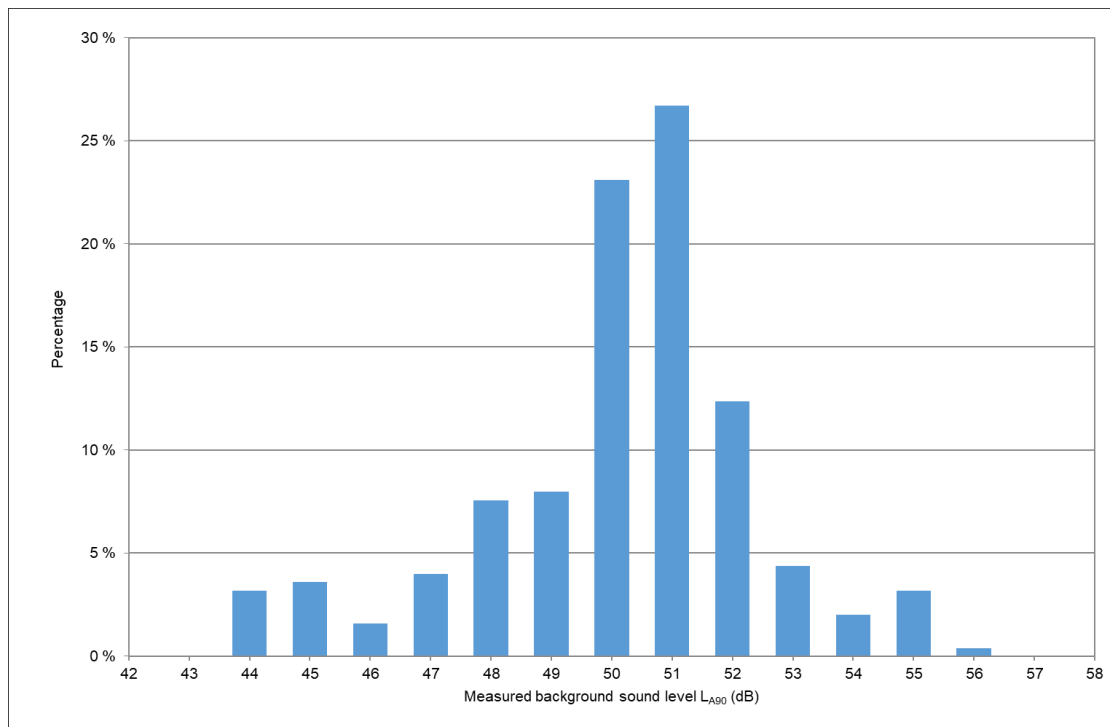
These conditions are considered suitable for obtaining representative measurement results.



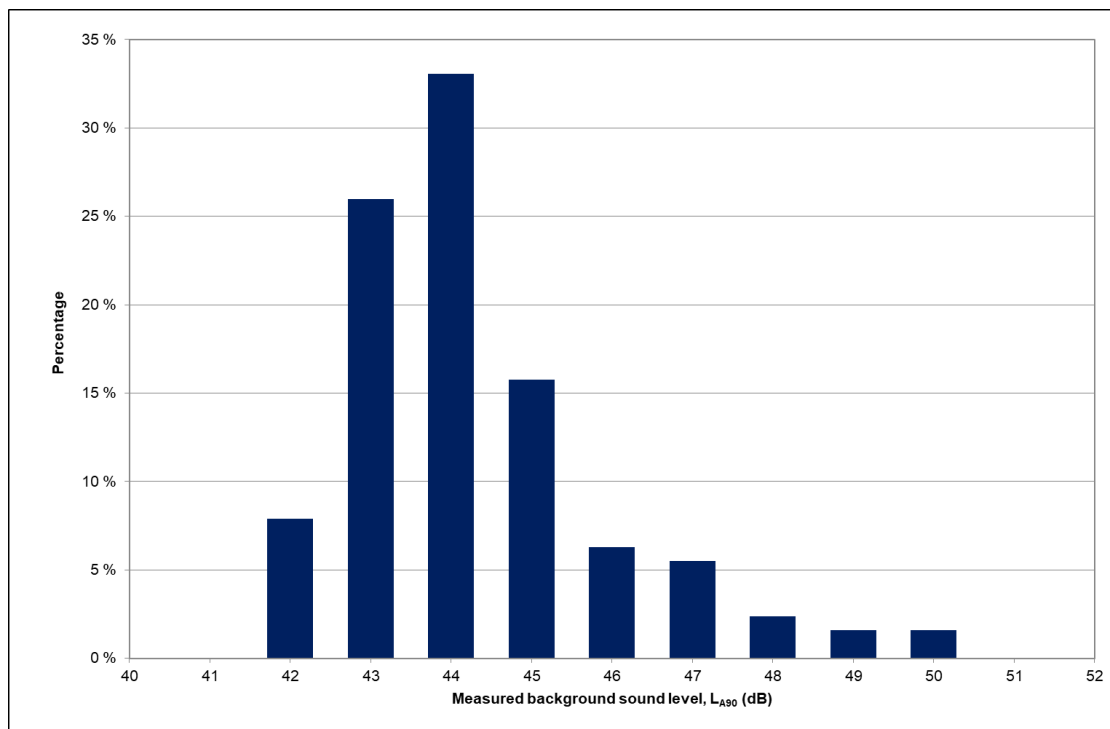
7.5 Measurement Results

The results have been plotted on Time History Graphs 30334/TH1 enclosed, presenting the 15 minute A-weighted (dBA) L_{90} , L_{Max} and L_{eq} noise 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”. Based on this, the following graphs illustrate the daytime and night-time background noise levels as histograms.



Measured daytime background sound level



Measured night-time background sound level

Based on the above the typical lowest L_{A90} (15 min) measurements recorded during the survey are presented in the table below:

Position	Typical Lowest Measured $L_{A90}(15min)$ Background Sound Level (dB re 2×10^{-5} Pa)	
	Daytime (07:00 – 23:00) Hours	Night-time (23:00 – 07:00) Hours
1	50	43

7.6 Discussion Of Noise Climate

Due to the nature of the survey, i.e. unattended, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However, at the beginning and end of the survey period the noise climate was noted to be dominated by road traffic noise from Old Birley Street. It should also be noted that there was a discreet hum from nearby plant noise and frequent pedestrian pass by during the time we were visiting site.



8.0 Plant Noise Emission Criteria

On the basis of the results of the environmental noise survey, and on the requirements of the local planning authority (see Section 6.3), we propose that the following plant noise emission criteria be achieved at 1 metre from the nearest noise sensitive residential window.

These limits are presented as façade levels, and include influence of a building façade as would be present at the assessment location (ie 1m from receptor window).

Noise Rating Limit, $L_{A,T,r}$ dB	
Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
45	38

The above criteria are to be achieved with all of the proposed plant operating simultaneously.

Noise shall be assessed in accordance with BS 4142:2014 with corrections applied for any plant emitting noise of a tonal or irregular quality.

It should be noted that the above are subject to the final approval of the Local Authority.

9.0 Plant Noise Impact Assessment

9.1 Plant Noise Data

We understand the manufacturer's noise data for the equipment to be as seen in the tables below. We understand that the following noise data is based on the design duty the units will be running at following install. The data is described in sound power level form.

Plant Description	Sound Power Level (dB re 2×10^{-5} Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
CR50-0	82	66	57	57	54	48	40	25	61

9.2 Worst Affected Receptors

It is noted that the nearest off-site noise sensitive premises is the residential building, as illustrated in Section 4.2. Our calculations have been undertaken to this receptor from each item of plant around the building, and accounts for attenuating factors such as distance attenuation.



9.3 Plant Noise Impact Assessment

9.3.1 Initial Assessment

It should be noted that the proposed plant is not anticipated to exhibit any tonal or impulsive characteristics provided it is well maintained. All proposed external plant will be inverter driven and, therefore, will gently ramp up and down depending on the demands on the various systems. To be robust, however, a +3dB intermittency correction has been applied to account for the fact that the proposed plant will operate due to demand rather than constantly.

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

Plant Description	Plant Noise Assessment
	CR50-0 with SV15 Unit
Sound Power	82
Quantity Correction	+11
Distance Correction (36m)	-45
Barrier Correction	0
Façade correction	0
Acoustic Feature Correction (ref BS4142)	+3
Rating Level at 1m from NSP	30
Cumulative Sound Pressure Level at 1m from NSP	30
Daytime Criteria	45
Daytime Exceedance	-15
Nighttime Criteria	38
Nighttime Exceedance	-8

Our calculations indicate that the proposed plant **should** be capable of achieving the plant noise limits set in accordance with the requirements of the Local Authority and requires the need for additional attenuation measures.



10.0 Conclusions

An environmental noise survey has been undertaken to establish the prevailing noise levels in the vicinity of the site.

Plant noise emission criteria have been recommended based on the results of the noise survey and with reference to the Local Authority's typical planning requirements.

An assessment has been carried out to determine the plant noise emissions at the nearest noise sensitive window from the proposed plant selections. The assessment indicates that the proposed plant should be capable of achieving the proposed environmental noise criteria at the nearest noise sensitive residential window without the need for additional noise mitigation measures.

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).

Reynolds House

