

Phase 1 Newton Heath Manchester

Noise Assessment Report -
Planning Condition 15 (Plant Noise)

Client:

Casey Group Limited
Rydings Road, Rochdale
OL12 9PS

Date:

19 March 2024

Our Ref:

22094-RP-1-R0



**JAMESON
ACOUSTICS**

Consultants in acoustics,
noise and vibration

Document Control

Revision	Date	Author	Description
0	19-03-2024	AJ	-

This report has been prepared with all reasonable skill, care and diligence for the sole benefit, use and information of the aforementioned Client in accordance with the purposes and terms agreed between ourselves and the Client. The liability of Jameson Acoustics Limited in respect of the information contained within this report will not extend to any third party.

Author	Andrew Jameson (AJ)
Position	Director
Qualifications	BSc(Hons) Acoustics, MIOA, MIET
Signature	
Date	19-03-2024

Contents

1.0 Introduction 4

2.0 Plant Installations..... 4

3.0 Nearest Noise Sensitive Receptors 5

4.0 Assessment Method & Criteria 6

5.0 Plant Noise Limits..... 7

6.0 Plant Noise Assessment (PC15 – Part A)..... 8

7.0 Post-Completion Testing (PC15 – Part B)..... 9

8.0 Conclusion..... 11

Appendix A – Acoustic Terminology 12

Appendix B – Plant Noise Calculations 13

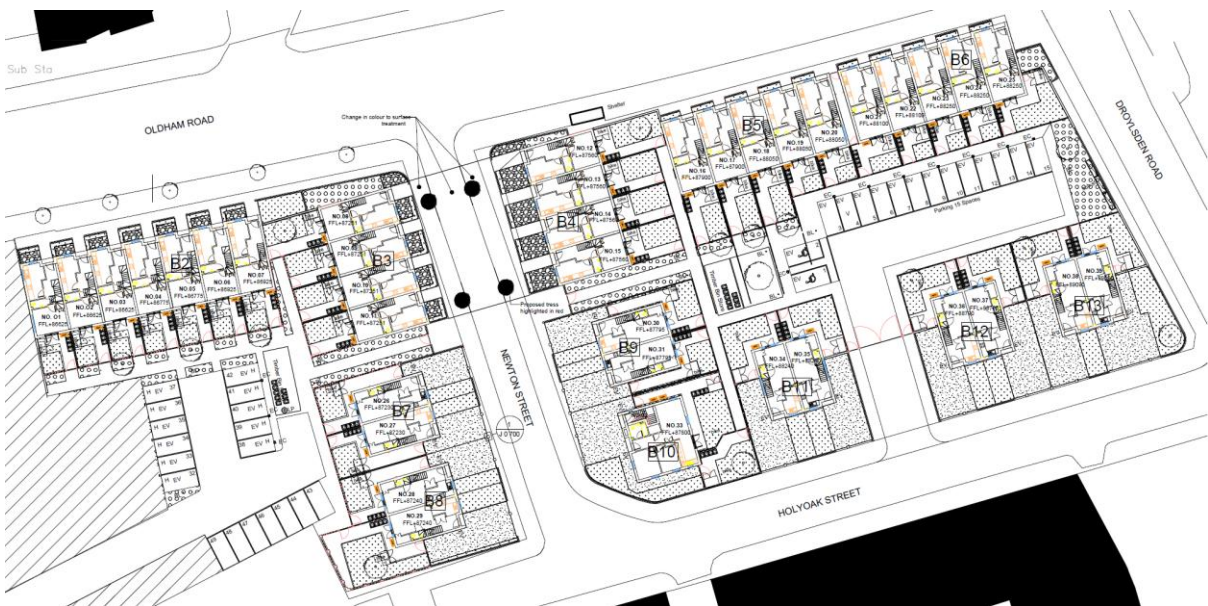
1.0 Introduction

Jameson Acoustics Limited has been commissioned by Casy Group Limited to survey and assess plant noise emissions associated with air source heat pump installations at the recently constructed Phase 1 housing development on land off Oldham Road in Newton Heath. The aim is to assist in the discharge of Planning Condition 15, which states:

No	Wording
15	(a) Prior to the first occupation of each phase of the residential element of the development, details of any externally mounted ancillary plant, equipment and servicing relevant to that phase shall be submitted for approval in writing by the City Council, as Local Planning Authority. For the avoidance of doubt, for each phase, externally mounted 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 5 dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location. (b) Prior to the first occupation of each phase of the residential element of the development, a verification report will be required to validate that the work undertaken for that phase conforms to the recommendations and requirements approved as part of part (a) of this planning condition. The verification report shall include post completion testing to confirm the noise criteria has been met. In instances of non-conformity, these shall be detailed along with mitigation measures required to ensure compliance with the noise criteria. Any mitigation measures for each phase shall be implemented in accordance with a timescale to be agreed with the City Council, as Local Planning Authority, and thereafter retained and maintained in situ.

2.0 Plant Installations

The development’s external plant comprises an air source heat pump (ASHP) to the rear garden of each residential property. There are 39nr properties in total, as shown on the below Site Layout.



Site Layout (ASHP installed in the rear garden of each property, shown in orange)

Each ASHP (39nr in total) are of the same model and specification. The unit is the Daikin EDLA04-E2V3. Based on manufacturer's technical data sheets, the unit produces the following noise levels at 100% duty (heating).

- Sound pressure level at 1 m : 44 dB(A)
measured free-field hemi-spherical, at 1m from the front face (discharge)

Based on site survey measurements, presented later in this report, this unit does not exhibit any tonal noise characteristics. The units are new and operate without impulsivity (i.e. smooth ramp up/down operation) or irregularity/intermittency.

3.0 Nearest Noise Sensitive Receptors

The nearest and most exposed noise sensitive receptors are the residential windows of the proposed development itself.

We have considered two worst-case properties; Plot number 07 and 16, as highlighted on the below Figures. We believe these properties are exposed to the highest concentration of heat pumps (highlighted orange) in close proximity.



Noise Sensitive Receptor A – Plot 07



Noise Sensitive Receptor B – Plot 16

4.0 Assessment Method & Criteria

4.1 Local Authority Requirements

Manchester City Council (MCC) advises a BS 4142 assessment that demonstrates 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’.

4.2 BS 4142: 2014+A1: 2019

British Standard BS 4142 looks at the assessment of noise of a commercial / industrial nature. It describes methods for rating and assessing outdoor sound of an industrial and/or commercial nature “on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident”. In relation to this development, this includes sound from fixed installations, comprising M&E plant and equipment.

The assessment method is based on the difference between the measured ‘background sound level’ without the influence of any industrial noise source, and the ‘rating level’ of the industrial source, at the receiver location. The rating level is the specific noise level, plus any acoustic feature corrections applied. The standard states that:

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

5.0 Plant Noise Limits

5.1 Baseline Noise Survey

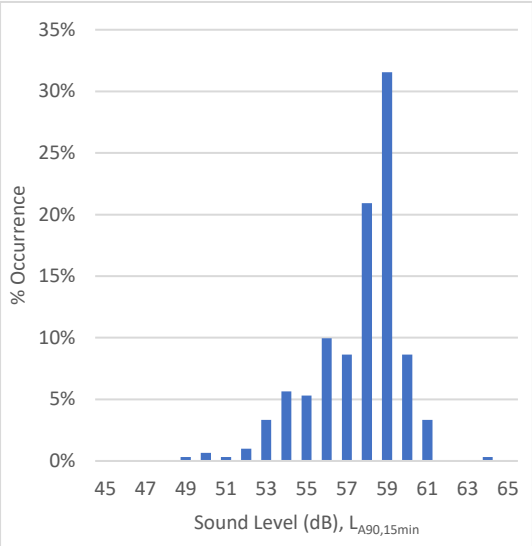
A baseline noise survey was conducted by Hann Tucker Associates. The full methodology and results of the survey are presented in their Noise Impact Assessment Report 27467/NIA1 (rev 2) dated 27 February 2020.

Their raw survey data has been analysed to determine the ‘representative’ background L_{A90} noise levels through statistical analysis for the purpose of setting daytime and night-time plant noise emission limits in full accordance with BS 4142. The analysis has been performed on the noise levels recorded at their survey Position 2, which recorded the lowest night-time background noise levels on-site, as described and illustrated below.

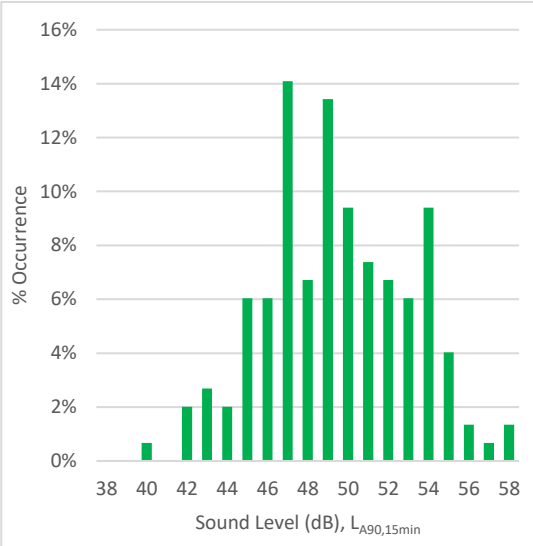
Position	Description
1	Unattended free-field measurement approximately 3m, above ground level, overlooking Oldham Road.
2	Unattended free-field measurement approximately 3m, above ground level, overlooking Old Church Street.
3	Unattended free-field measurement approximately 3m, above ground level, overlooking Holyoak Street.



The following Figures present the results of our statistical analysis of the Position 2 data sets during daytime (07:00-23:00) and night-time (23:00-07:00) periods. From these figures, we would take the lowest notable modal value, which would give 56 dB L_{A90} (daytime) and 47 dB L_{A90} (night-time).



Daytime $L_{A90,15min}$ (07:00-23:00)



Night-time $L_{A90,15min}$ (23:00-07:00)

5.2 Plant Noise Limits

Based on the MCC requirement and above statistical analysis, the following plant noise limits shall be achieved by all normal plant operating concurrently as an incident free-field noise level at 1m from the nearest noise sensitive residential windows. Plant noise shall be assessed in accordance with BS 4142: 2014.

Location	Maximum Plant Noise Rating Level, $L_{A,r,Tr}$	
	Daytime (07:00-23:00)	Night-time (23:00-07:00)
Nearby noise sensitive receptors	51 dB	42 dB

6.0 Plant Noise Assessment (PC15 – Part A)

Calculations of cumulative noise levels from the simultaneous operation of all heat pumps operating at full duty are presented in Appendix B. These calculations consider industry standard acoustic corrections for distance, screening, reflections and directionality.

The calculations are performed to the first floor bedroom window of the receptor, at a height of circa 4 metres above ground level.

Screening loss is occasionally afforded by intervening houses, but more commonly by solid 1.6 m high timber fencing erected around each rear garden. A simplified (and conservative) screening loss has been applied: 0

dB for no screening, 5 dB if the unit is just visible, 8 dB if the unit is partially screened, and 10 dB if the unit is fully screened.

For reflections, the heat pumps are mounted close the rear wall of each dwelling, meaning the Q-factor is 2 and the reflection correction is +3 dB.

For directionality, front discharge heat pumps are known to be loudest on their frontage (fan face). Measurements of three different specification front discharge heat pumps by Jameson Acoustics demonstrate that noise levels are consistently 5 to 7 dB lower when measured at 60 to 90 degrees off-axis from the front discharge fan. Hence, where the heat pump orientation is such that the front face is more than 60 degrees is off-axis from the receptor location (e.g. heat pump directly below the first floor window directly above the unit), the conservative end of the correction (5 dB) has been applied.

The following tables summarise the results of our BS 4142 plant noise calculations to NSR A (Plot 07) and NSR B (Plot 16) and evaluates the results against the above night-time plant noise limit.

Receptor	Noise Rating Level, $L_{A,r,Tr}$ (dB)	Night-time Plant Noise Limit, $L_{A,r,Tr}$ (dB)	Compliance/ Exceedance
NSR A – Plot 07	41	42	✓
NSR B – Plot 16	41	42	✓

The assessment demonstrates that the cumulative noise rating level at the two identified worst-case receptors achieves the night-time plant noise emissions limit.

7.0 Post-Completion Testing (PC15 – Part B)

Part B of Planning Condition 15 requires a verification report to validate that the works undertaken conform to Part A of the condition. Part of this verification report requests post-completion noise testing, which has been carried out by Jameson Acoustics.

Our site test visit was carried out on Tuesday 5 March 2024 between 06:30-07:00hr using the following noise logger equipment.

Description	Equipment	Serial Nr	Lab Calibration Expiry	Lab Calibration Certificate Nr
Class 1 sound level meter	Svantek 971A (with Type 7152 microphone)	131642 (85571)	9 Nov 2024	10 Nov 2022
Class 1 sound calibrator	Cirrus CR:515	57570	28 Nov 2024	1153776

The equipment was calibrated before and after the survey, with no notable drifts in level noted.

During the survey, weather conditions were suitable for obtaining representative readings. The sky was overcast and wind speeds were low.

Measurements were taken with heat pumps operational and non-operational. In order to induce a load on the heat pumps, internal controllers were set to increase internal temperatures in the dwelling to 30 degrees, forcing the heat pump to operate at full duty.

3nr dwellings were selected for the survey. NB The heat pumps were in the process of being commissioned during our visit, which limited the availability of testable units. The three units selected were to Plots 30, 34 and 35, which backed onto the inner courtyard (car park) of the site with the aim of minimising the influence of road traffic noise.

Measurements were taken at a distance of 1 metre from the front (discharge) face of the units. It should be noted, however, that even at this close distance, the influence of road traffic noise could not be eliminated.

At this time of the morning, traffic flows were sporadic meaning they unduly influenced L_{Aeq} levels. However, the L_{A90} levels, which represent the noise level recorded over 90% of the measurement period, were largely unaffected. Given that the noise generated by heat pumps is constant (steady state), the L_{A90} values was deemed to be the most suitable parameter to use (i.e. it excludes peak rises in noise levels during the measurement period, and gives a true reflection of the steady state noise floor).

In order to further minimise traffic noise effects, measurements were taken over shortened 1-minute periods.

The results of the 'cleanest' measurements (i.e. those where the traffic influence was minimised as best as possible) are summarised below. These are the lowest recorded L_{A90} values with and without the heat pump operational at each plot.

Measurement	Measured Noise Level at 1m from front discharge face (dB)
Plot 30 – ASHP on	52
Plot 34 – ASHP on	52
Plot 35 – ASHP on	52
Background	50

The following table presents our calculation of the equivalent free-field source noise level at 1m from the face discharge for comparison against the product specification of 44 dBA at 1m, presented in Section 2.0.

Receptor	ASHP
Measured source noise level, dBA	52
Residual (background) noise level, dBA	50
Source noise level corrected for background, dB : $10 \times \log_{10}(10^{(L1/10)} - 10^{(L2/10)})$	48
Reflection correction to free-field (Q factor = 2 to 1)	-3
ASHP noise level at 1m (free-field), dBA	45

The results indicate a good correlation between the measured and published noise data for the heat pump (within 1 dB), which demonstrates with reasonable confidence that the heat pumps are performing as specified. Even if the 1 dB is added to the assessed noise rating level in Section 6.0, the results would still achieve the night-time plant noise limit.

The following photographs were taken during our survey, showing the label on the heat pump and a typical heat pump installation within a rear garden.



Photographs of typical heat pump install & model specification

8.0 Conclusion

Jameson Acoustics Limited has been commissioned by Casy Group Limited to survey and assess plant noise emissions associated with air source heat pump installations at the recently constructed Phase 1 housing development on land off Oldham Road in Newton Heath. The aim is to assist in the discharge of Planning Condition 15.

The assessment demonstrates that plant noise emission levels satisfy the local planning authority noise requirements (as calculated and installed).

Appendix A – Acoustic Terminology

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.
dB(A)	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 (e.g. $L_{Aeq,T}$ in dB). Noise 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 only just perceptible.
$L_{Aeq,T}$	$L_{Aeq,T}$ is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time measurement period, T .
$L_{10,T}$	L_{10} is the noise level exceeded for 10% of the measurement period T (i.e. the quietest 10% of the measurement) and has, for many years, been used in the assessment of road traffic noise.
$L_{90,T}$	L_{90} is the noise level exceeded for 90% of the measurement period T (i.e. the quietest 10% of the measurement) and is often used to describe the 'background' noise level.
L_{max}	L_{max} is the maximum sound pressure level recorded over the measurement period, T . L_{max} is often used in assessing scheduled environmental noise 'events' (such as train passbys), particularly at night where such events may cause sleep disturbance.
R_w	The weighted sound reduction index, R_w , is a single figure description of sound reduction as defined in BS EN ISO 717-1. It is single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies. The R_w is calculated from sound insulation measurements taken in an acoustic laboratory. Sound insulation ratings derived from site measurements are invariably lower than the laboratory figures and are referred to as the apparent weighted sound reduction index, R'_w .
$D_{n,e,w}$	The weighted element-normalised level difference, $D_{n,e,w}$, is a single figure description of the sound insulation performance of small building elements, such as a trickle ventilator.
C_{tr}	C_{tr} is correction term applied against the sound insulation single-number values (e.g. R_w) to provide a weighting against low frequency performance. The reference values used within the C_{tr} calculation are based on urban traffic noise.

Appendix B – Plant Noise Calculations

NSR A - Plot 07																									
Description	Plot Nr	1	2	3	4	5	6	7	8	9	10	11	26	27	28	29									
Sound Pressure Level, L_{Aeq} (dB)		44	44	44	44	44	44	44	44	44	44	44	44	44	44	44									
Distance (m)		26	23	18	14	9	5	3.5	10	8	11	14	18	24	28	34									
Distance Loss (dB)		-28	-27	-25	-23	-19	-14	-11	-20	-18	-21	-23	-25	-28	-29	-31									
Reflection (A factor)		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2									
Reflection Correction (dB)		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3									
Screening?		Full	Full	Full	Full	Just visible	None	None	Full	Full	None	None	Just visible	Partial	Full	Full									
Screening Loss (dB)		-10	-10	-10	-10	-5	0	0	-10	-10	0	0	-5	-8	-10	-10									
Directionality		>60° off-axis	>60° off-axis	>60° off-axis	>60° off-axis	>60° off-axis	>60° off-axis	>60° off-axis	on-axis	on-axis	on-axis	on-axis	on-axis	on-axis	on-axis	on-axis									
Directionality Correction (dB)		-5	-5	-5	-5	-5	-5	-5	0	0	0	0	0	0	0	0									
Specific Noise Level at Window, L_{Aeq} (dB)		4	5	7	9	18	28	31	17	19	26	24	17	11	8	6									
Acoustic Feature Correction, re. BS 4142 (dB)		0	1	2	3	4	5	5	6	7	8	9	10	11	12	13									
Noise Rating Level at Window, L_{Aeq} (dB)		4	6	9	12	22	33	36	23	26	34	33	27	22	20	19									
10^4 (dB/10)		3	4	8	16	158	1995	3981	200	398	2512	1995	501	158	100	79									
Cumulative Noise Rating Level, L_{Aeq} (dB)		41																							
NSR B - Plot 16																									
Description	Plot Nr	12	13	14	15	16	17	18	19	20	21	22	23	24	25	30	31	32	33	34	35	36	37	38	39
Sound Pressure Level, L_{Aeq} (dB)		44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Distance (m)		11	9	7	9	4	5	8	12	16	19	23	27	31	35	15	19	23	23	23	24	35	40	47	52
Distance Loss (dB)		-21	-19	-17	-19	-11	-14	-18	-21	-24	-26	-27	-29	-30	-31	-23	-25	-27	-27	-27	-28	-31	-32	-33	-34
Reflection (A factor)		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Reflection Correction (dB)		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Screening?		Full	Full	Just visible	None	None	None	Just visible	Full	Full	Full	Full	Full	Full	Full	Partial	Full	Full	Full	Partial	Partial	Just visible	Partial	Just visible	Partial
Screening Loss (dB)		-10	-10	-5	0	0	0	-5	-10	-10	-10	-10	-10	-10	-10	-8	-10	-10	-10	-8	-8	-5	-8	-5	-8
Directionality		on-axis	on-axis	on-axis	on-axis	>60° off-axis	>60° off-axis	>60° off-axis	>60° off-axis	>60° off-axis	>60° off-axis	>60° off-axis	>60° off-axis	>60° off-axis	>60° off-axis	>60° off-axis	>60° off-axis	on-axis	on-axis	on-axis	on-axis	on-axis	on-axis	on-axis	on-axis
Directionality Correction (dB)		0	0	0	0	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	0	0	0	0	0	0	-5	-5
Specific Noise Level at Window, L_{Aeq} (dB)		16	18	25	28	31	28	19	11	8	6	5	3	2	1	11	7	10	10	12	11	11	7	4	0
Acoustic Feature Correction, re. BS 4142 (dB)		0	1	2	3	4	5	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Noise Rating Level at Window, L_{Aeq} (dB)		16	19	27	31	35	33	24	17	15	14	14	13	13	13	24	21	25	26	29	29	30	27	25	22
10^4 (dB/10)		40	79	501	1259	3162	1995	251	50	32	25	25	20	20	20	251	126	316	398	794	794	1000	501	316	158
Cumulative Noise Rating Level, L_{Aeq} (dB)		41																							