Post Completion Noise Testing and Verification Report – Plot 4

Site: Land off Wilbraham Road, Chorlton
Reference: 50-585-R4-2
Date: February 26



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This report has been prepared for the sole benefit, use, and information of the client. The liability of Environmental Engineering Partnership Limited T/A E3P with respect to the information contained in the report will not extend to any third party. This report has been prepared by the qualified persons as listed below.

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EXECUTIVE SUMMARY

Site Address	Wilbraham Road, Chorlton M21 0UX
National Grid Reference	E 382643, N 394254.
Background	Post completion acoustic testing is required in order to discharge a planning condition in relation to the residential development at the above address.
Surveys Completed	E3P have undertaken unattended measurements inside a worst-case living room and bedroom of selected plots during a typical weekday period. Verification of the Air Source Heat Pump was also conducted at the time whilst in operation.
Assessments Completed	Measured internal noise levels at Plot 4 relate to the unfurnished rooms and are then compared to BS 8233 and WHO guidelines for internal habitable rooms. The surveys determined compliance with the applicable criteria in the living room and bedroom of Plot 4. The noise output of the ASHP at Plot 5 was found to be compliant with those assessed in the NIA.
Remedial Mitigation Measures	Due to the outcome of the survey and verification, no remedial measures are required. All currently installed mitigation are as recommended in the original Noise Assessment.

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1. INTRODUCTION

1.1. BACKGROUND

E3P were commissioned by Kellen Homes to undertake Post Completion Noise Testing for Plot 4 at the development site off Wilbraham Road in Chorlton, to be referred to hereafter as 'the Site'.

Following submission of the Nosie Impact Assessment (50-585-R1-4) by E3P, planning permission was granted with a condition attached that required post completion noise testing for worst-case plots along with verification of mitigation and the installed Air Source Heat Pumps.

1.2. REPORT OBJECTIVES

The objectives of this report are as follows.

- Establish and measure the existing sound levels within affected rooms during typical weekday periods.
- Assess internal noise levels in accordance with criteria given in BS 8233.
- Measure noise from the ASHPs and compare to those assessed.
- Verify any mitigation measures, where required.

2. ASSESSMENT METHODOLOGY

2.1. BRITISH STANDARD BS 8233:2014+A1:2019 – GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS

The scope of this standard is the provision of recommendations for the control of noise in and around buildings including residential dwellings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new buildings or refurbished buildings undergoing a change of use, rather than to assess the effect of changes in the external noise climate.

The standard suggests suitable internal noise levels within different types of buildings, including residential dwellings, as shown in Table 1.

Table 1 BS 8233:2014 Recommended Internal Noise Levels

Criterion	Typical situation	Design criterion, $L_{Aeq,t}$ (dB)
Suitable resting and sleeping conditions	Living Room	35
	Bedroom	30

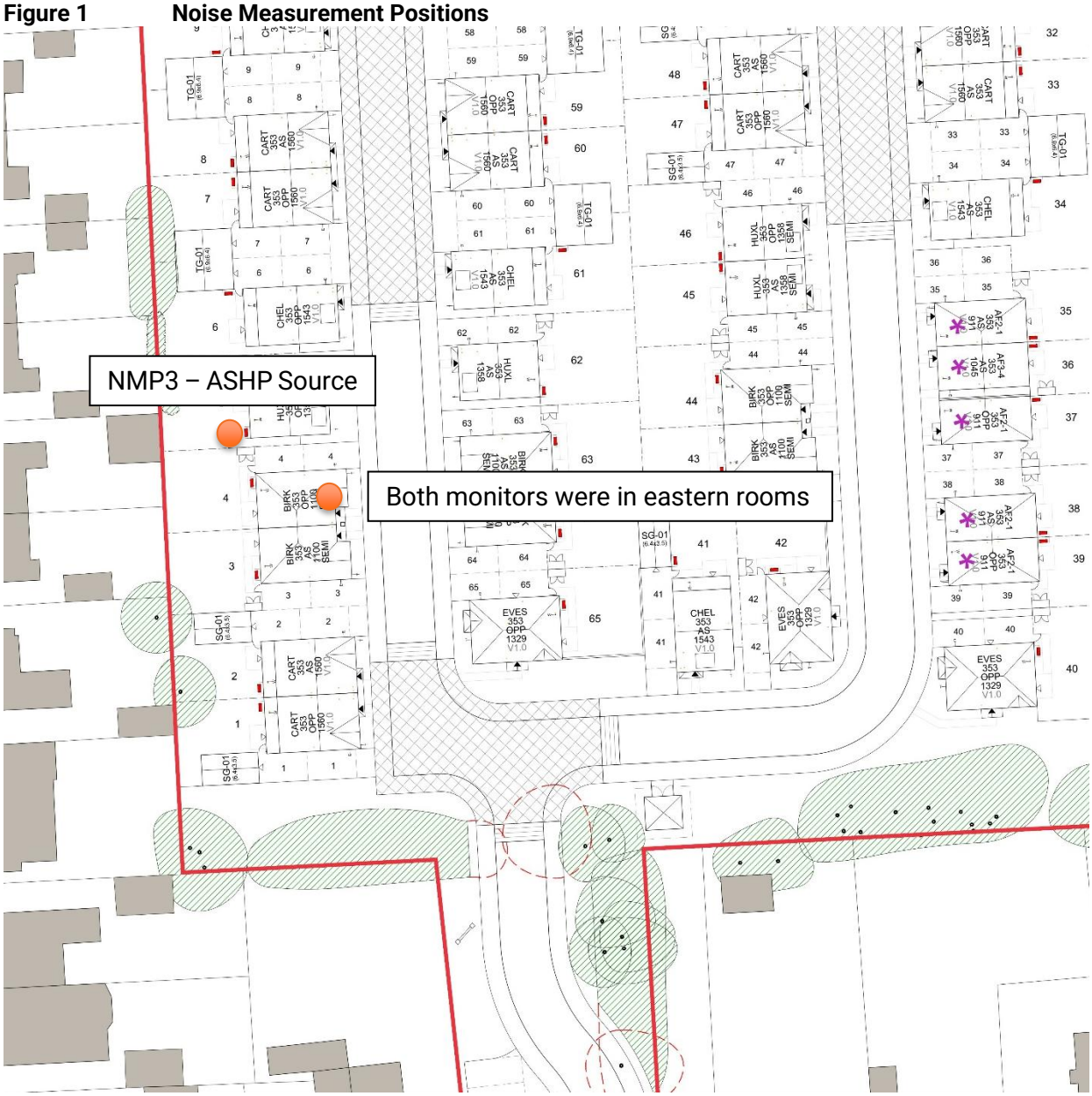
3. SURVEY RESULTS

It was noted at installation that mechanical ventilation was not required for the plot with only extract provided in the wet rooms. Trickle ventilators to the habitable rooms were open at the time of the test.

The rooms were unfurnished and so a correction to the measured values may be required.

The location of Plot 4 and the Nosie Measurement Positions are given below:

Figure 1 Noise Measurement Positions



3.1. PLOT 4

3.1.1. LIVING ROOM – INTERNAL SOUND MEASUREMENT

E3P has conducted an internal sound survey within the living room with all windows and doors closed. The survey was conducted during the following periods:

- 13:00 Tuesday 25th November to 13:00 Wednesday 26th November 2025.

The following noise measurement position was chosen for the Noise Survey:

- Noise Measurement Position 1 (NMP1): Located in the centre of the living room at a height of 1.5 m above floor level. Noise sources were noted to be distant road traffic, and on-site construction works, intermittently.

A summary of the hourly measured sound pressure levels inside the living room are presented in Table 2.

Table 2 Living Room – Unfurnished – Plot 4

Measurement Start Time	Measured ambient noise level, $L_{Aeq,T}$ (dB)	Measured maximum noise level, $L_{Amax,fast}$ (dB)
25/11/2025 13:00	24.0	44.7
25/11/2025 14:00	39.7	57.5
25/11/2025 15:00	39.2	57.8
25/11/2025 16:00	23.5	35.6
25/11/2025 17:00	21.9	32.7
25/11/2025 18:00	23.4	36.0
25/11/2025 19:00	22.4	37.6
25/11/2025 20:00	22.7	34.3
25/11/2025 21:00	23.0	36.8
25/11/2025 22:00	22.7	25.9
25/11/2025 23:00	22.7	33.8
26/11/2025 00:00	22.6	27.6
26/11/2025 01:00	20.1	23.5
26/11/2025 02:00	16.6	22.1
26/11/2025 03:00	16.7	22.0
26/11/2025 04:00	19.1	33.8
26/11/2025 05:00	22.9	32.4
26/11/2025 06:00	21.3	29.0
26/11/2025 07:00	22.7	35.5
26/11/2025 08:00	29.5	47.0
26/11/2025 09:00	31.8	51.8
26/11/2025 10:00	30.1	49.4
26/11/2025 11:00	30.2	48.9
26/11/2025 12:00	29.2	49.0

The resultant 16-hour noise level is noted to be 31.9 dB applicable to the unfurnished room. If furnishing corrections were applied, the noise level would be lower. As such, this is considered acceptable and within tolerance.

This falls below the 35 dB internal criterion by 3 dB and, as such, the installed glazing and façade insulation are acceptable.

3.1.2. BEDROOM – INTERNAL SOUND MEASUREMENT

E3P has conducted a full 24-hour survey within the bedroom with all windows and doors closed. The survey was conducted during the following periods:

- 13:00 Tuesday 25th November to 13:00 Wednesday 26th November 2025.

The following noise measurement position was chosen for the Noise Survey:

- Noise Measurement Position 2 (NMP2): Located in the centre of the bedroom at a height of 1.5 m above floor level. Noise sources were noted to be distant road traffic and on-site construction works, intermittently.

A summary of the hourly measured sound pressure levels inside the bedroom are presented in Table 3.

Table 3 Bedroom – Unfurnished – Plot 4

Measurement Start Time	Measured ambient noise level, $L_{Aeq,T}$ (dB)	Measured maximum noise level, $L_{Amax,fast}$ (dB)
25/11/2025 13:00	24.4	43.3
25/11/2025 14:00	41.7	63.2
25/11/2025 15:00	41.2	63.6
25/11/2025 16:00	22.8	41.4
25/11/2025 17:00	21.9	43.4
25/11/2025 18:00	22.9	42.7
25/11/2025 19:00	22.5	55.8
25/11/2025 20:00	22.6	42.6
25/11/2025 21:00	22.6	37.7
25/11/2025 22:00	22.6	34.2
25/11/2025 23:00	22.8	44.1
26/11/2025 00:00	22.6	35.1
26/11/2025 01:00	20.4	38.6
26/11/2025 02:00	17.4	25.8
26/11/2025 03:00	17.5	34.3
26/11/2025 04:00	19.7	47.8
26/11/2025 05:00	22.6	41.5
26/11/2025 06:00	21.7	41.5
26/11/2025 07:00	23.4	42.8
26/11/2025 08:00	31.4	50.9
26/11/2025 09:00	33.1	55.5
26/11/2025 10:00	31.9	55.7
26/11/2025 11:00	30.9	53.4
26/11/2025 12:00	31.4	53.8

The resultant 16-hour noise level is noted to be 35.0 dB and the 8 hour night-time noise level is 21.0 dB. The 10th highest maximum noise level during the night-time period was also measured and noted to be 38.3 dB. All applicable to the unfurnished room. With the correction applied to allow for furnishings, such as carpet, furniture, curtains, etc, the resultant noise levels would be lower.

With considering the tolerances and reduction for furnishings, these fall below the 35 dB, 30 dB and 45 dB internal criterion respectively. As such, the installed glazing and façade insulation are acceptable.

3.2. AIR SOURCE HEAT PUMP SOURCE SURVEY – PLOT 5

Due to intermittent works around plots 1 to 4, a measurement of ASHP noise at these plots was not possible. As such, a measurement at Plot 5 was undertaken to ensure compliance with the noise assessment, as detailed in E3P Technical Note (50-585-R3-3), appended to the rear of the report. Plot 5 was assessed with the following ASHP model:

- Daikin EDLA06EV3 with a sound power level of 60 dB L_{wA} which would result in a sound pressure level of 52 dB L_{Aeq} at 1 m.

E3P have conducted an attended measurement when no works were taking place around Plot 5 during the following periods:

- 16:06-16:18 Monday 1st December 2025.

The following noise measurement position was chosen for the Noise Survey:

- Noise Measurement Position 3 (NMP3): Located 1 m from the ASHP at the rear of Plot 5. The microphone was positioned 1.5 m above floor level.

A summary of the 1 minute measured sound pressure levels external to Plot 5, 1 m from the ASHP are presented in Table 4.

Table 4 ASHP – Plot 5

Measurement Start Time	Measured ambient noise level, $L_{Aeq,T}$ (dB)	Measured background sound level, $L_{A90,T}$ (dB)
16:06	50.0	49.6
16:07	50.2	49.6
16:08	51.0	49.9
16:09	51.4	49.6
16:10	54.8	49.7
16:11	50.1	49.6
16:12	50.0	49.6
16:13	50.3	49.5
16:14	50.2	49.8
16:15	50.6	50.0
16:16	50.3	49.8
16:17	50.9	49.7

There was intermittent sound for short periods throughout from the construction site and local sources but it is clear from the L_{A90} that the ASHP was running continuously throughout with a typical sound output of 50 dB at 1 m.

This noise level falls below the expected noise level of 52 dB at 1 m and equates to a sound power level of 58 dB L_{WA}.

As such, this is lower than expected and assessed and can be considered compliant with the assessment outcome.

Weather conditions during the survey were calm and dry. The equipment outlined in Table 4 was used for the noise survey.

Table 5 Noise Measurement Equipment and Calibration Dates

Measurement position	Equipment description	Manufacturer & type number	Serial number	Calibration due date
NMP1	Sound Level Meter	01dB Fusion	14226	7th December 2025
	Pre-amplifier	01dB Pre22	2135072	
	Microphone	GRAS 40CD	470570	
	Calibrator	Cirrus CR 515	99204	13th August 2026
NMP2 and NMP3	Sound Level Meter	CR:171A	G303884	22nd September 2026
	Pre-amplifier	MV:200F	12731F	
	Microphone	MK:224	215899D	
	Calibrator	CR:515	99403	

The sound level meters were field calibrated before and after measurements with no significant drift witnessed.

END OF REPORT

APPENDIX I
LIMITATIONS



GENERAL

1. This report and any associated works (together comprising the "Services") were compiled and carried out by E3P for the client (as present in Section 1) under the E3P “Terms of Business” or with those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.

2. Unless explicitly agreed otherwise, in writing, this report has been prepared under E3P Standard Terms and Business as included within our proposal to the Client.

3. Project-specific appointment documents may be agreed upon at our discretion and a charge may be levied for both the time to review and finalise appointment documents and also for associated changes to the appointment terms. E3P reserves the right to amend the fee should any changes to the appointment terms create an increased risk to E3P.

4. The report needs to be considered in light of the proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

NOISE AND VIBRATION IMPACT ASSESSMENTS

5. Where a noise or vibration survey is required to inform an assessment, E3P will endeavour to ensure that all noise and vibration measurements taken are robust, representative and reliable in order to inform an accurate assessment.

6. Where mitigation measures are specified in this report, it should be noted that these measures are relative to a specific sound or vibration source, both in terms of the measured sound pressure and vibration level and the character of the sound source. Where either the sound pressure level or the character of the sound varies following completion of the sound survey, E3P cannot be held responsible for any subsequent variations in the proposed mitigation performance.

7. The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walkover inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. E3P cannot be held responsible for any disclosures that are provided post-production of our report and will not automatically update our report.

8. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, E3P reserves the right to review such information and, if warranted, to modify the opinions accordingly.

9. E3P does not warrant work/data undertaken/provided by others.

APPENDIX II
GLOSSARY



NOISE

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source. The most widely used weighting mechanism that best corresponds to the response of the human ear is the "A"-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or LAeq, LA90 etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective but, as a general guide, a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions. An indication of the range of sound levels commonly found in the environment is given in the following table.

Table 6 Typical Sound Pressure Levels

SOUND PRESSURE LEVEL	LOCATION/EXAMPLE
0	Threshold of hearing
20-30	Quiet bedroom at night
30-40	Living room during the day
40-50	Typical office
50-60	Inside a car
60-70	Typical high street
70-90	Inside a factory
100-110	Burglar alarm at 1 m away
110-130	Jet aircraft on take off
140	Threshold of pain

ACOUSTIC TERMINOLOGY

Table 7 Terminology

DESCRIPTOR	EXPLANATION
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2E-05 Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. "A" weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
LAeq, T	LAeq is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.
LAmax	LAmax is the maximum A-weighted sound pressure level recorded over the period stated. LAmax is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the "fast" sound level meter response.
L10 and L90	If a non-steady noise is to be described, it is necessary to know both its level and the degree of fluctuation. The Ln indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L10 is the level exceeded for 10% of the time and as such can be regarded as the "average maximum level". Similarly, L90 is the "average minimum level" and is often used to describe the background noise. It is common practice to use the L10 index to describe traffic noise.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally, as measured outside and away from buildings.
Fast	A time weighting used in the root-mean-square section of a sound level meter with a 125-millisecond time constant.
Slow	A time weighting used in the root-mean-square section of a sound level meter with a 1000-millisecond time constant.
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2E-05 Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. "A" weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

APPENDIX III
ASHP ASSESSMENT REPORT



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BY Email

Dear Gareth

TECHNICAL NOTE ON AIR SOURCE HEAT PUMP NOISE HARRY DALTON FIELDS, CHORLTON

1. BACKGROUND & OBJECTIVES

E3P have been commissioned to provide a technical note on noise associated with the proposed Air Source Heat Pumps and the noise-based conditions in relation to the planning permission for the residential development at Harry Dalton Fields in Chorlton. Specifically, the following planning conditions are required to be discharged in relation to the proposed Air Source Heat Pumps (ASHPs) and noise resultant from them:

> *25a) Any externally mounted ancillary plant, equipment and servicing to be installed 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. Prior to its installation, the scheme shall be submitted to and approved in writing by the City Council as Local Planning Authority in order to secure a reduction in the level of noise emanating from the site.*

This technical document looks to review the information in relation to the proposed ASHPs and looks to determine whether the proposed ASHPs are compliant with part a of the condition and then provides commentary and context in relation to expected noise levels.

It has been undertaken by Lee Faulkner, Associate Director at E3P, who holds the Post Graduate Diploma in Acoustics and Noise Control and is a full member of the Institute of Acoustics (MIOA) and the Institute of Environmental Science (MIEnvSci). I have over 12 years' experience in the measurement and assessment of noise and vibration for various clients, sites, and applications.

2. CONDITION 25 PART A – ASHP NOISE

E3P note that the condition requires the rating level from the ASHPs should be at least 5 dB below the typical background sound level, day and night. This is in relation to a BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' assessment.

In order to assess the extent of any measures which may be necessary in order to comply with suitable conditions relating to the potential noise sources, E3P have reviewed various guidance documents and standards that are considered applicable to this type of noise, these include:

- British Standard 4142:2014+A1:2019.
- British Standard 8233:2014+A1:2019.
- Micro-generation Certification Scheme (MCS 020).
- Manchester City Council Planning & Noise Technical Guidance December 2015.

2.1. BS 4142:2014+A1:2019

The assessment that is usually applied for potential noise from fixed installations (i.e., externally mounted plant) to give rise to community response is contained in BS 4142. This standard assesses the likely effects of such sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

BS 4142 describes a method for determining the specific sound level and background sound levels outside residential buildings and for assessing whether the noise is likely to give rise to adverse impact. The specific noise level from the commercial source is rated based on any tonal or intermittent characteristics of the sound.

BS 4142 assessment methodology involves comparing the existing background sound level with the predicted rating level from the new development. The difference between the two levels can be used to indicate the likelihood of adverse impact.

2.2. BS 8233:2014+A1:2019

BS 8233 provides a code of practice for the sound insulation of a variety of building types affected by general environmental noise.

It provides recommendations for control of noise in and around buildings and suggests appropriate criteria / limits for a variety of different situations including within residential properties.

2.3. MICRO-GENERATION CERTIFICATION SCHEME (MCS 020)

UK government has put forward noise limits for maximum noise limit for wind turbines and air source heat pump installed under permitted development as part of the Micro-generation Certification Scheme. The noise limit is 42 dB $L_{Aeq,\ 5\ min}$, at 1 metre from a window or door opening of a habitable room on the façade of a neighbouring residential property.

The 42 dB noise limit would equate to an internal noise level ≤30 dB within rooms i.e., in line with target night-time limits for bedrooms described in BS 8233 and WHO Guidelines.

2.4. MANCHESTER CITY COUNCIL PLANNING & NOISE TECHNICAL GUIDANCE

Manchester City Council Planning & Noise Guidance 2015 details noise limit criteria for industrial and commercial developments along with specific noise limits for externally mounted plant associated with industrial / commercial premises. The following paragraphs are taken from the document:

> *BS 4142 should be used to assess the likely impact of noise from industrial and commercial sources at noise sensitive premises.*
>
> *Many of the noise 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: 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'.*

E3P would note that the above advice and criteria appears to relate to industrial/commercial premises and the plant or equipment associated with the operation of such. This is considered far removed from the situation here with the resultant sound from an industrial/commercial premises different in nature to a heating system associated with a domestic property.

Hence, whilst the Manchester City Council guidance is considered in this report it is not deemed wholly applicable to the current proposals. However, due to the planning condition, this will be the main consideration in any assessment of noise impact, but context and consideration of the above discussions is warranted.

3. NOISE ASSESSMENT

3.1. BS 4142 ASSESSMENT

The following Daikin ASHP models are proposed based on house types:

- AF2-1 (2B4P), AF3-1 (3B4P), AF3-4 (3B5P) AND Birkdale – Daikin EDLA04EV3 – Sound Power of 58 dB L_w.
- Euxton, Evesham and Huxley – Daikin EDLA06EV3 – Sound Power of 60 dB L_w.
- Cheltenham and Cartmel – Daikin EDLA08EV3 – Sound Power of 62 dB L_w.

The above sound power levels relate to normal typical operations.

For the purposes of this assessment, E3P has used noise modelling software, CadnaA 2023 MR1, to determine the impact of noise from the ASHPs.

The following inputs have been included in the model:

- Air Source Heat Pump Layout (ASHPL01) dated April 2022.
- A feature correction of +2 dB for just perceptible tonality is applied to the noise model. Given that these are personal ASHPs and the context of the development and receptors, this level of correction is considered robust.
- Each ASHP is input as a point source with the unit drawn in to resemble the directional output of the ASHP from the fan only.
- Site elevations have been taken as existing by way of a 2 m grid Digital Terrain Model (DTM) which contains public sector information licensed under the Open Government License v3.0.
- Existing buildings are included.
- A reflection order of 1 has been used in all calculations.
- Noise levels generated using ISO 9613-1 and ISO 9613-2 "*Acoustics – Attenuation of sound during propagation outdoors*" as incorporated into CadnaA software.

Figure 1 shows noise levels at 1.5 m height across the Site to show garden noise levels. Numbers noted in the circle on the buildings are façade noise levels, left being daytime and right being night-time.

The background sound levels to be applied here are 45 dB during the day and 41 dB at night as measured at NMP4 (noted in the submitted Noise Impact Assessment for the development (50-585-R1-4). These are derived from the long-term measurement position and are considered the lowest typical background sound levels. The daytime background is taken as the modal value between 07:00-23:00 over the full weekday and weekend period. The night-time is the median measured value between the hours of 23:00-00:00 and 05:00-07:00 when the heating systems at the majority of plots are likely to be in use.

This results in a criteria of 40 dB during the day in rear gardens and 36 dB at 1st floor bedrooms windows.

Table 3.1 below details the expected noise levels in gardens during the day and at 1st floor windows at night. For garden noise levels, the noise level in the centre of the garden is used for an average assessment. Furthermore, it is considered reasonable to assume that were residents outside to experience the noise, its unlikely heating would be required inside and that residents would sit or socialise within close proximity of the unit.

The grid noise map is appended to the rear and shows 1st floor façade levels and coloured grid at 1.5 m height.

Bold values are in exceedance of the -5 dB criterion.

TABLE 3.1 BS4142 ASSESSMENT

PLOT	PREDICTED RATING LEVEL IN GARDEN (DAYTIME), $L_{A,r}$ (dB)	DAYTIME CRITERION (dB)	PREDICTED RATING LEVEL AT FAÇADE (NIGHT-TIME), $L_{A,r}$ (dB)	NIGHT-TIME CRITERION (dB)
1 and 2	39	40	36	36
3 and 4	35	40	34	36
5	35	40	33	36
6	36	40	35	36
7 and 8	38	40	35	36
9	38	40	35	36
10	35	40	35	36
11 and 12	35	40	34	36
13 and 14	34	40	35	36
15 and 16	35	40	34	36
17 and 18	34	40	35	36
19 and 20	36	40	36	36
21 and 22	35	40	34	36
23 and 24	35	40	**38**	36
25 and 26	37	40	34	36
27 and 28	36	40	**37**	36
29	36	40	33	36
30	35	40	35	36
31	38	40	36	36
32 and 33	40	40	35	36
34	39	40	**37**	36
35 to 37	37	40	**37**	36
38 and 39	37	40	35	36
40	35	40	33	36
41	35	40	36	36
42	39	40	32	36
43 and 44	38	40	34	36
45 and 46	36	40	**37**	36
47and 48	35	40	**38**	36

PLOT	PREDICTED RATING LEVEL IN GARDEN (DAYTIME), $L_{A,r}$ (dB)	DAYTIME CRITERION (dB)	PREDICTED RATING LEVEL AT FAÇADE (NIGHT-TIME), $L_{A,r}$ (dB)	NIGHT-TIME CRITERION (dB)
49 and 50	38	40	**37**	36
51 and 52	36	40	35	36
53	36	40	33	36
54	36	40	33	36
55 and 56	36	40	33	36
57	34	40	34	36
58	39	40	35	36
59 and 60	39	40	**37**	36
61	38	40	35	36
62	35	40	36	36
63 and 64	39	40	**37**	36
65	37	40	34	36

In accordance with the guidance in BS4142, the assessment in Table 3.1 above indicates that all plots would not experience an exceedance of the MCC criterion during the day, i.e., the ASHP noise levels are equal to, or more than, 5 dB below the existing background noise levels.

During the night, most plots achieve the MCC criterion except for plots 23, 24, 27, 28,34, 35 to 37, 45 to 50, 59, 60, 63 and 64 that would experience a rating level of between 1 and 4 dB below the background sound level. NO plots are subject to an exceedance of the background sound level.

It is worth noting, that all criteria are achieved at existing plots that surround the site.

3.2. INTERNAL NOISE LEVELS

The predicted noise levels from the ASHPs have been assessed against the guidance provided in BS8233:2014+A1:2019 which provide acceptable internal noise levels. The highest predicted façade noise level from ASHPs is noted to be 38 dB at night. When considering an open window provides attenuation of approximately 13 dB, internal noise levels in bedrooms should not exceed 25 dB, 5 dB below the 30 dB criterion for sleeping conditions.

The above assessment demonstrates that noise from the ASHP would be suitably controlled to achieve appropriate internal noise levels in the worst affected proposed properties. Based on the assessment findings in BS 4142 and BS 8233, the predicted ASHP noise levels can be considered acceptable and suitable to discharge Condition 25a, subject to approval from MCC.

In accordance with national planning policy, noise shouldn't be considered in isolation. It is understood that ASHPs are low carbon technology (compared to traditional heating systems) and are a part of the solution for the government meeting its carbon neutral goals.

3.3. MCS 020 ASSESSMENT

The MCS 020 assessment sets an absolute criterion of 42 dB for noise from ASHPs. As shown in Table 3.1, predicted noise levels fall below this noise level and, as such, the ASHP noise output would satisfy permitted development as described in MCS 020.

4. DISCUSSION AND OTHER APPLICATIONS

In order to discharge and comply with Condition 25a, MCC requires compliance with the -5 dB criterion for daytime and night-time periods. However, the assessment has shown, although mostly in compliance, plots that would exceed this criteria.

E3P, as discussed, consider the criteria to be more applicable to commercial/industrial installations rather than individual heating systems at residential properties. As such, the assessment aimed to consider this within the context of the assessment and found that although marginal exceedances are noted, the overall noise levels would be acceptable.

Indeed, there is precedent for this as noted in approved applications, as follows:

4.1. CDN/22/0790 - DISCHARGE OF CONDITIONS 5 (SECURED BY DESIGN), 9 (LANDSCAPING), 16 (AIR SOURCE HEAT PUMP - ACOUSTIC INSULATION) AND 17 (AIR SOURCE HEAT PUMP - VERIFICATION) FROM PLANNING APPROVAL REFERENCE 128754/FO/2020 – 25 & 25A CHANDOS ROAD SOUTH, MANCHESTER M21 0TH.

This condition discharge assessment was accompanied by a Noise Impact Assessment, produced by AEC and dated 1st November 2022. The condition in relation to ASHP noise (16 and 17) were discharged by MCC.

Within this approved noise report, they state within 3.7:

> *Baseline noise levels between 0500-0700h would typically be the same or slightly nosier than those presented above. Although background noise levels may drop slightly further in the middle of the night, between say 0030h and 0500h, the ASHPs would typically not be operating during these periods when most people are asleep. Furthermore, the middle of the night, when people are asleep, is considered to be not as sensitive as around 2200- 0000h, when people are more likely to be awake and trying to get to sleep.*

This supports E3Ps use of the above hours in relation to night-time periods. Furthermore, the consultant notes MCCs criteria of -5 dB but conclude the following:

> *As stated in the introduction above, MCC has placed a condition on the ASHP noise to achieve a rating level of -5dB below the background noise levels at the nearest noise sensitive premises. This is based on an assessment in general accordance with BS4142, discussed above, and should be subject to contextual factors and consideration of absolute noise levels where appropriate.*

The assessment found an exceedance of the MCC criteria at an existing property but concluded that:

> *The predicted internal noise level of 20dB$L_{Aeq,T}$ is significantly below the recommended noise level of 30dB$L_{Aeq,8hrs}$ for bedrooms during the night-time period.*

The above assessment demonstrates that noise from the ASHP would be suitably controlled to achieve appropriate internal noise levels in the worst affected neighbouring property. Based on the assessment findings in Table 5.2 and 5.4, the measured ASHP noise levels could be considered acceptable and suitable to discharge Conditions 16 & 17, subject to approval from MCC

4.2. 129071/FO/2021 – INSTALLATION OF AIR SOURCE HEAT PUMPS (ASHP) TO EACH DWELLINGHOUSE – 9 AND 11 CARNABY STREET, MANCHESTER M9 4DF

A noise assessment was submitted as part of the application and produced by Azymuth Acoustics UK and dated 28th October 2020. The application was approved in March 2021.

This assessment followed the following criteria:

1. Microgeneration Certification Scheme plant noise limit of 42dB $L_{Aeq, 5min}$ externally at the nearest noise sensitive receptor (window to living or bedroom).
2. It is understood that Manchester City Council typically requires plant noise to be limited to 5dBA below the typical Background Sound Level (BSL, L_{A90}) at the nearest receptor. However, it would be asserted that this limit would only apply to noise from industrial / commercial sources.
3. Based on the domestic nature of the proposal it would be recommended that worst case cumulative ASHP noise levels should not exceed the typical night-time background sound level at the nearest noise sensitive receptor.
4. An absolute cumulative receptor rating noise limit of 32dB would be recommended for the site (as suggested in BS 4142), which experiences unusually low background sound levels at night for an urban area. An absolute external receptor limit of 32dBA would equate to internal levels approx. 20dBA inside bedrooms i.e., comfortably compliant with the BS 8233 recommended noise limit of 30dBA in bedrooms at night.

The BS 4142 assessment found that the rating level would fall below the background sound level by 3 dB, not achieving the MCC criterion. A similar outcome that is expected here with a difference of between -1 and -4 dB at some plots.

The report concluded:

Predicted noise levels at the nearest noise sensitive receptors would be up to 3 dB below level of the measured night-time background sound level during periods where all units are working under Night Mode 3 operation. However, it should be noted that background levels are low as relates an urban area. BS 4142 would suggest this level would be below that where an adverse impact would be indicated.

A night-time absolute receptor rating level noise limit of 32dB $L_{Aeq, 5min}$ (ie 10dB below the MCS target level) would be recommended with the aim of compliance with all suggested assessment criteria in Section 3.6 above. As such, all installations in the proposed scheme would meet requirements assuming permanent adoption of 'night mode' operation and installation of sound reduction kits.

It can be seen that the proposed installation would comply with MCS 020 and WHO / BS 8233 night-time noise limit criteria assuming a habitable room receptor with window open. Compliance with MCS criteria would suggest that the units are eligible for installation under permitted development rights.

Accordingly, there is precedent to exceed the MCC criterion as long as it can be shown that acceptable external and internal noise levels, in relation to BS 8233 and the criteria stipulated in MCS 020 is achieved. As such, no adverse impact is predicted at existing and proposed receptors and the MCC criteria is achieved at most plots. Where a plot is not compliant, internal noise levels, with windows open, are well below the 30 dB criterion stipulated for sleeping conditions.

I trust the report is clear and concise but please do not hesitate to contact me should you require further information.

Yours sincerely,
For and on behalf of E3P Ltd

Lee Faulkner
Associate Director

LEE FAULKNER

Curriculum Vitae

POSITION
Associate Director

QUALIFICATIONS
BSc (Hons), PGDip

PROFESSIONAL MEMBERSHIPS

Member of the Institute of Acoustics (MIOA)

AREAS OF EXPERTISE

Environmental Noise Surveys and Assessment

Noise and Vibration Assessments in accordance with British Standards

3D Noise Modelling

Noise and Vibration Environmental Impact Assessments

Construction Noise and Vibration

Sound Verification Testing

PROFILE

Mr Lee Faulkner is an Associate Director at E3P. His current role involves management of the Acoustic Division at E3P including Noise and Vibration Assessments and Reporting for multiple projects. Lee has over 12 years' experience in the industry and has worked on a multitude of differing projects and sites.

Lee has extensive experience of complex environmental noise assessments, providing detailed and tailored advice on a site-by-site basis that is not only in accordance with the relevant standards but also a cost-effective solution for the client.

Lee has extensive experience in the calculation of complex noise levels across various sites such as those constrained by transportation sources, commercial, industrial and entertainment noise. Noise Modelling of various projects, including residential developments and the Esso Refinery, using SoundPLAN and CadnaA.

SELECTED PROJECT EXPERIENCE

Residential Development, Kinross
Noise and Vibration Chapter for the wider EIA. Construction and Operational Noise and Vibration Impacts were assessed for existing and proposed receptors. Key noise sources consisted of existing road traffic and commercial premises and proposed skate park and sports fields. The proximity of the M8 was particularly constraining. The Chapter addressed construction noise and vibration impacts upon existing receptors and existing noise upon the proposed receptors. Mitigation measures included for acoustic barriers, higher spec glazing and alternative ventilation.

Residential Development, Longsight
Noise Impact Assessment in support of the planning application for a residential development on a parcel of land in a residential location near to a speedway track and sports centre. Included specification of acoustic glazing and also acoustic barrier height to protect future residents from road traffic noise and leisure noise.

Noise Modelling of Noise at Work Levels for Esso Refinery, Fawley
Esso, Fawley required noise measurements to be taken at a total of 11 blocks for the operations at their Fawley Refinery. This meant a high number of noise measurements were taken due to the scale of the area. The results of the noise survey were used to create contour noise graphics using 3D Noise Modelling in order to determine the noise levels across each block.

NOISE AND VIBRATION ES CHAPTER FOR LEISURE DEVELOPMENT

Noise and Vibration monitoring was required in order to provide baseline conditions across the Site. A Noise and Vibration ES Chapter was provided which addressed construction noise and vibration, construction generated traffic, rail noise and vibration and proposed impacts such as new leisure facilities and fixed plant items. The assessment overcame issues with rail noise for very closely situated receptor by way of an earth bund.

SOUND VERIFICATION TESTING, SHEFFIELD

Sound Testing in order to verify the effectiveness of the installed glazing and alternative ventilation applied to a residential scheme, following the recommendations of a Noise Impact Assessment. Noise Surveys were undertaken over an entire 48-hour period in a dwelling for each phase and showed compliance with the necessary criteria given in the British Standard

NEW SUPERMARKET, SHIPLEY

Noise Impact Assessment in support of a planning application for a new supermarket in Shipley including a Café Retail Unit. Assessed for noise associated with the delivery yard, fan units and the petrol filling station associated with the development. Lee advised on the acoustic fence locations and heights and to ensure no exceedance of the applicable criterion.

NOISE AT WORK ASSESSMENT, YORKSHIRE

Atlas Steel Structures required a Noise at Work Assessment for their daytime and night-time shifts to accompany their annual risk assessment. The Noise at Work Survey comprised the use of personal dose badges and spot measurements to quantify the noise levels across the factory floor. The Noise at Work Assessment advised that existing hearing protection was overprotecting, and so alternative protection was recommended.

Figure 1 - ASHP Grid Noise Map - Calculation at 1.5m above ground level



Project:
Land off Wilbraham Road, Chorlton

Project-No:
50-585

Client:
Anwyl Homes

Specific Noise Level, LAeq,1hr (dB)

... <= 40.5
40.5 < ...

Noise Map Objects

Point Source
Area Source
Road
Building
Building Evaluati
Calculation Area

e3p

Project Engineer: Lee Faulkner
Date: 11/07/2023