Azymuth Acoustics UK

Professional Acoustic Services

Noise Impact Assessment
Ref: AA0597 RevA

34no. ASHPs
Apprentice Court,
Caversham Drive,
Manchester,
M9 4JH

On behalf of

Manchester City Council,
Town Hall,
Albert Square,
Manchester,
M2 5DB





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Contents

1.0 Introduction 4
2.0 Baseline Noise Survey 5
2.1 Measurement Procedures 5
2.2 Summary of Measurements 6
2.3 Description of Noise Climate 6
3.0 Assessment Criteria 7
3.1 British Standard 8233: 2014 7
3.2 World Health Organisation Environmental Noise Guidelines 2018 7
3.3 British Standard 4142:2014+A1: 2019 8
3.4 Microgeneration Certification Scheme 020a 2025 8
3.5 IOA/CIEH Heat Pumps Professional Advice Note 2022 8
3.6 Manchester City Council: Planning and Noise Technical Guidance 2022 9
3.7 Manchester City Council Meeting 25th September 2025 9
3.8 Recommended Noise Assessment Criteria 9
4.0 Noise Assessment 10
4.9 Air Source Heat Pumps 10
4.10 Noise Impact 10
5.0 Summary 13
Appendix A – Glossary of Acoustic Terms 14
Appendix B – Noise Survey Data 15

1.0 Introduction

Azymuth Acoustics UK (henceforth Azymuth) has been contracted by Manchester City Council to perform a Noise Impact Assessment (NIA) in relation to 34no. air source heat pumps (ASHPs) to be installed at Apprentice Court, Harpurhey, Manchester.

Azymuth understand the units will be operational 24hrs per day, with 31no. units to service individual flats and 3no. units to service communal areas. All units are to be located on the ground floor and are to be limited via a "quiet mode" restriction for the full duration of their operation.

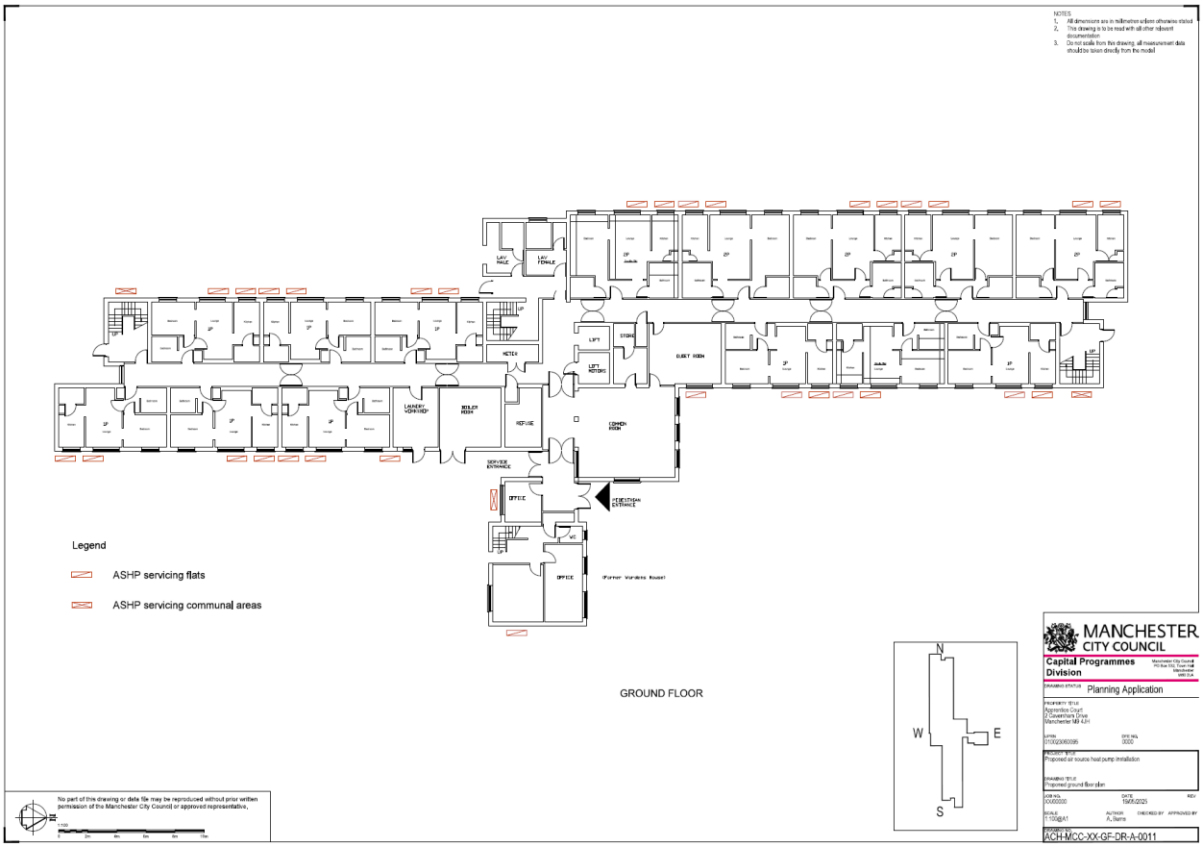


Figure 1 – Drawing of ASHP locations (ref. ACH-MCC-XX-GF-DR-A-0011)

This noise impact assessment is intended to provide information relating to the potential noise impact of the 34no. ASHPs on the surrounding environment in order to support the detailed planning application for the installation. In particular, the report sets out the following details:

- The results of a baseline noise survey undertaken in the vicinity of Apprentice Court.
- The appropriate assessment criteria and guidance relating to noise in the environment as associated with this kind of development.
- An assessment of the proposed plant items with calculated noise impact.

It is undertsood that the plant items will operate during both daytime and night-time periods. As such, night-time periods are assessed, being the worst-case scenario when background noise levels in the area would be the lowest.

2.0 Baseline Noise Survey

2.1 Measurement Procedures

The instrumentation used for the NIA consisted of a SvanTek 971 type 1 precision sound level meter. The equipment was calibrated before and after measurements. The sound level meter measured A-weighted (fast response) noise levels as well as octave bands noise levels for all measurement record.

Daytime noise level measurements were undertaken between 08:21hrs and 11:38hrs on Thursday 1st May 2025. The night-time measurements were undertaken between 23:00hrs and 00:36hrs on Wednesday 7th / Thursday 8th May 2025.

The noise measurements were undertaken using the sound level meter at the position(s) shown in figure 2 below:

- Position 1: Carpark path, Caversham Drive (~1.5m from roadside)
- Position 2: North end of Flats, Caversham Drive (~1.5m from roadside)
- Position 3: South end of Flats, Towton Street (~1.5m from roadside)



Figure 2 – Noise measurement positions

2.2 Summary of Measurements

2.1.1 Noise Survey

The following table summarises the results of the noise measurements undertaken at the proposed site in terms of the average daytime and night-time noise levels.

Location	Period	L_{AFmax}	L_{Aeq}	L_{A10}	L_{A50}	L_{A90}
1) Carpark path	Day	70.2	52.0	51.5	45.6	41.5
1) Carpark path	Night	57.8	41.8	42.4	38.2	36.0
2) North end of flats	Day	74.9	61.0	62.3	56.6	52.2
2) North end of flats	Night	68.2	51.6	52.6	38.2	34.7
3) South end of flats	Day	71.8	57.9	56.9	52.6	47.6
3) South end of flats	Night	56.7	42.1	45.0	36.5	32.4

Table 1 – Summary of noise measurements

Daytime background noise levels were measured to be between 41-52dBA L_{A90}. Night-time background noise levels were measured to be between 32-36dBA L_{A90}.

Full results of the noise levels recorded during the course of the survey are included in Appendix B of this report.

2.3 Description of Noise Climate

The main source of noise impacting the site is road traffic from the adjacent Upper Conran Street and Caversham Drive. There may also be contributions from the nearby Harpurhey Shopping Centre.

The weather throughout the daytime assessment was hot and dry, with low wind speeds

3.0 Assessment Criteria

In order to assess the extent of any measures required in order to comply with suitable conditions relating to potential noise sources, Azymuth Acoustics UK has reviewed various guidance documents and standards, these include:

- British Standard 8233: 2014
- World Health Organisation Environmental Noise Guidelines 2018
- British Standard 4142:2014+A1: 2019
- Microgeneration Certification Scheme 020a 2025
- IOA/CIEH Heat Pumps Professional Advice Note 2022
- Manchester City Council Council: Planning and Noise Technical Guidance 2022

3.1 British Standard 8233: 2014

"Guidance on sound insulation and noise reduction for buildings" (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 internal ambient noise level criteria / limits for a variety of different situations including residential properties.

The following table summarises the noise limits suggested by BS 8233 applying to residential properties:

Activity	Room	Good Design Range $L_{Aeq,T}$ dB	
		07:00-23:00hrs	23:00-07:00hrs
Resting	Living Room	35	-
Dining	Dining Room / Area	40	-
Sleeping (daytime resting)	Bedroom (at night)	35	30

Table 2 – Noise Limits for Residential Properties Suggested in BS 8233

3.2 World Health Organisation Environmental Noise Guidelines 2018

The main purpose of the 2018 WHO guidelines is to provide recommendations for protecting human health from exposure to environmental noise originating from the following sources: transportation (road traffic, railway and aircraft), wind turbines and leisure activities.

The guidelines set out to define recommended exposure levels for environmental noise in order to protect population health. Exposure limits are average levels defined over a period of one year, measured outdoors in free field at the most exposed façade. It should be noted that the document does not provide guideline limit values for multiple noise sources in combination.

The 2018 Environmental Noise Guidelines (ENG) guidelines supersede the Community Noise Guidelines (CNG) from 1999. Nevertheless, the document recommends that all CNG indoor guideline values and any values not covered by the current guidelines should remain valid. As such, the following guidance would remain appropriate:

For protection against sleep disturbance inside dwellings, night-time noise levels should not exceed 30dB L_{Aeq} for continuous noise and 45dB L_{Amax} for typical single sound events (which are exceeded 15 times or more per night – see ProPG Appendix A.12 for more details).

To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise (interpreted as noise from all sources combined) should not exceed 55dB L_{Aeq} on balconies, terraces and in outdoor living areas.

It should be noted that exposure levels defined in ENG and CNG are for guidance purposes as relates potential adverse health impacts and should not be interpreted as absolute limits or regulations.

3.3 British Standard 4142:2014+A1: 2019

"Methods for assessing and rating industrial sound" (BS 4142) describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

- Typically, the greater the difference between background sound and industrial/commercial noise, the greater the magnitude of the impact.
- 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.
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.

BS 4142 notes that: "Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."

3.4 Microgeneration Certification Scheme 020a 2025

The Microgeneration Certification Scheme (MCS 020a) allows for ASHPs to be installed on residential properties under permitted development.

Permission is granted if noise from the ASHP is equal to or lower than the noise limit of 37.0dB $L_{Aeq,5min}$ at 1 metre from a window or door opening to a habitable room ("a room other than a bathroom, shower room, water closet or kitchen") on the façade of a neighbouring residential property (including flats within the same block of flats). Compliance is determined via a series of steps set out in MCS 020a. The 37.0dBA noise limit approximately equates to an internal noise level ≤25dBA in rooms with half-opened windows. This is in line with target night-time limits for bedrooms described in BS 8233 and ENG.

3.5 IOA/CIEH Heat Pumps Professional Advice Note 2022

This document provides advice for the installation of ground / air source heat pumps (GSHPs/ASHPs) with reference to both MCS assessment for permitted development schemes and BS 4142 assessment where planning consent is required. Insight is provided into disturbance factors not fully covered in MCS, such as noise characteristics (tonality, intermittency), structure borne sound and vibration transmission. NB these factors are addressed in alternative assessment guidance e.g. BS 4142, BS 6472 (Guide to evaluation of human exposure to vibration in buildings). The document states:

"The assessment should be proportionate and take into account the local circumstances and the nature of the installation."

3.6 Manchester City Council: Planning and Noise Technical Guidance 2022

This guidance 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.

The guidance also provides developers with information related to MCC policy on discharging planning conditions imposed by the City Wide Environmental and Public Protection Team. The document has specific sections covering policy on noise from industrial/commercial developments, entertainment venues, fixed plant and equipment etc.

In relation to fixed plant noise the document states:

"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."

3.7 Manchester City Council Meeting 25th September 2025

Azymuth attended a meeting with Manchester City Council planning, maintenance and environmental health officers on 25th September 2025, wherein a fixed noise limit was agreed for this site of 37dBA. Both the guidance detailed in Sections 3.1 to 3.6 above and the specific nature of this installation were taken into consideration when agreeing the limit.

3.8 Recommended Noise Assessment Criteria

Azymuth recommend the following noise limits to be adhered to for on-site (Apprentice Court Flats) and off-site (Caversham Drive/Braxton Walk and Towton Street) receptors.

- On-site: Noise contribution from individual ASHP units shall not exceed 37dBA at 1m from the nearest neighbouring window of habitable rooms, including flats within the same block of flats, for both day and night periods.
- Off-site: Cumulative noise from all ASHPs operating simultaneously shall not exceed the background sound level – 5dB at 1m from the nearest (structurally seperate) noise sensitive receptors as per MCC technical guidance, namely 37.5dBA daytime and 31dBA night-time.

NB a habitable room as defined by MCS 020a is "any room used or intended to be used for sleeping or living which are not solely used for cooking purposes, but does not include bath or toilet facilities, service rooms, corridors, laundry rooms, hallways or utility rooms."

4.0 Noise Assessment

4.9 Air Source Heat Pumps

Azymuth understand the units will be operational 24hrs per day, with 31no. units to service individual flats and 3no. units to service communal areas. All units are to be located on the ground floor and to be limited via a "quiet mode" restriction for the full duration of their operation. Heat pump layout is detailed in Figure 1.

The proposed 34no. units are understood to be as follows:

- 31no. Daikin Altherma R32 Monobloc - EDLA04EV3 (quiet mode SPL 40dBA @ 1m)
- 3no. Daikin Altherma R32 Monobloc - EDLA08EV3 (quiet mode SPL 40dBA @ 1m)

Noise emissions from the above heat pumps can be characterised as broadband air movement over fan blades with low level compressor noise, with no obvious narrow band tonality.

Azymuth have calculated the sound power levels of each octave frequency band from the manufacturer data sheets of each unit. The cooling and quiet mode sound pressure octave band spectrum for both units is shown in Table 3 below:

Unit	Centre Frequency (Hz) Octave Band Sound Pressure Level (dB)								Total L_{PA} (dB)
	63	125	250	500	1k	2k	4k	8k	
EDLA 04 EV3 cooling mode	50	52	50	46	42	36	29	21	48
EDLA 08 EV3 cooling mode	51.5	54.5	51.5	43.5	44	38	31.5	22.5	50
EDLA 04 & 08 EV3 quiet mode	41	45	42	39	33	27	19	16	40

Table 3 – Manufacturer quiet mode sound pressure level for ASHP units

The Azymuth derived sound power octave band spectrum for both units is shown in Table 4 below:

Unit	Centre Frequency (Hz) Octave Band Sound Power Level (dB)								Total L_{WA} (dB)
	63	125	250	500	1k	2k	4k	8k	
EDLA 04 & 08 EV3 quiet mode	53	56	53	47	40	34	26	21	49

Table 4 – Azymuth calculated sound power level for ASHP units

4.10 Noise Impact

Azymuth have created a noise prediction model in SoundPLAN 9.1 to predict and visualise the effect of the 34no. ASHPs on the surrounding environment, including the noise levels at nearest worst-case residential receptors.

4.10.2 Grid Noise Map (GNM)

Azymuth have produced the following day and night GNMs of the proposed site, with all ASHP units operating simultaneously and at full (quiet mode) capacity.

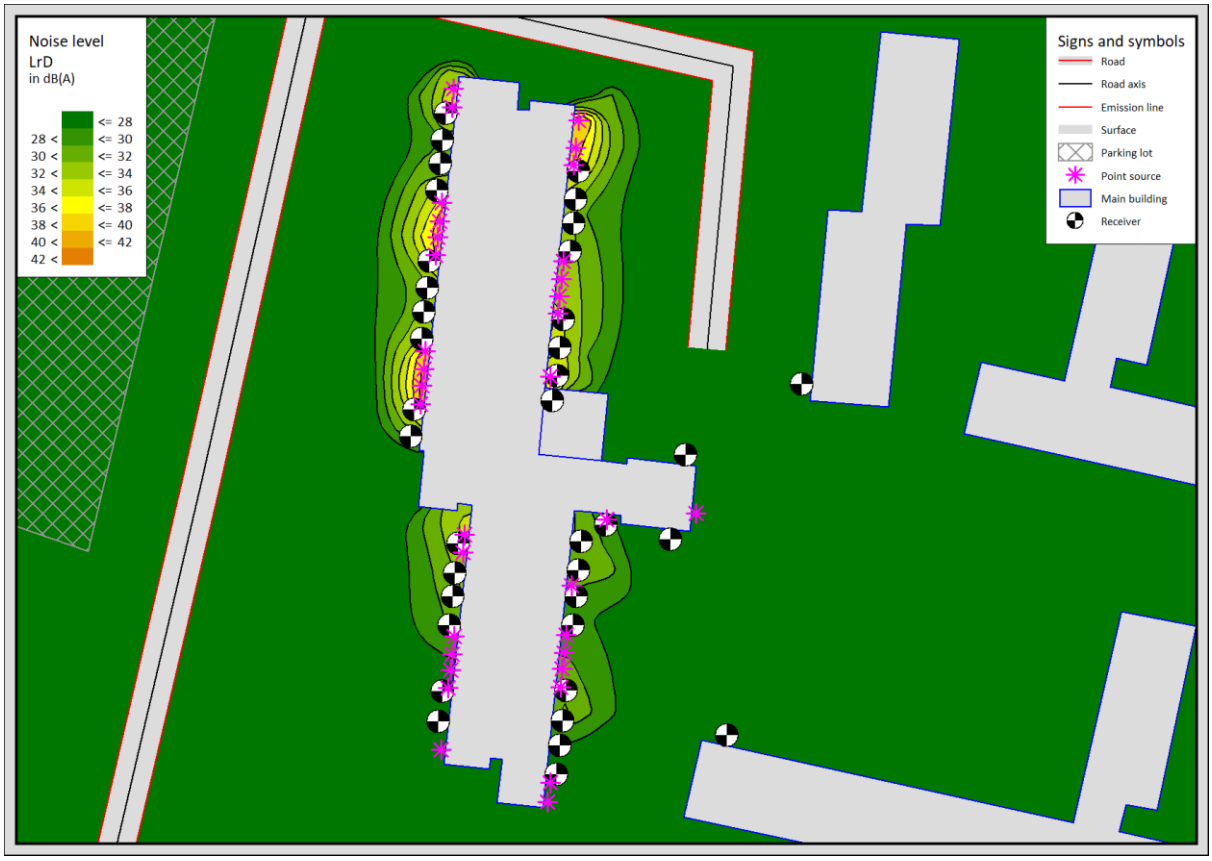


Figure 3 – Daytime GNM of Apprentice Court

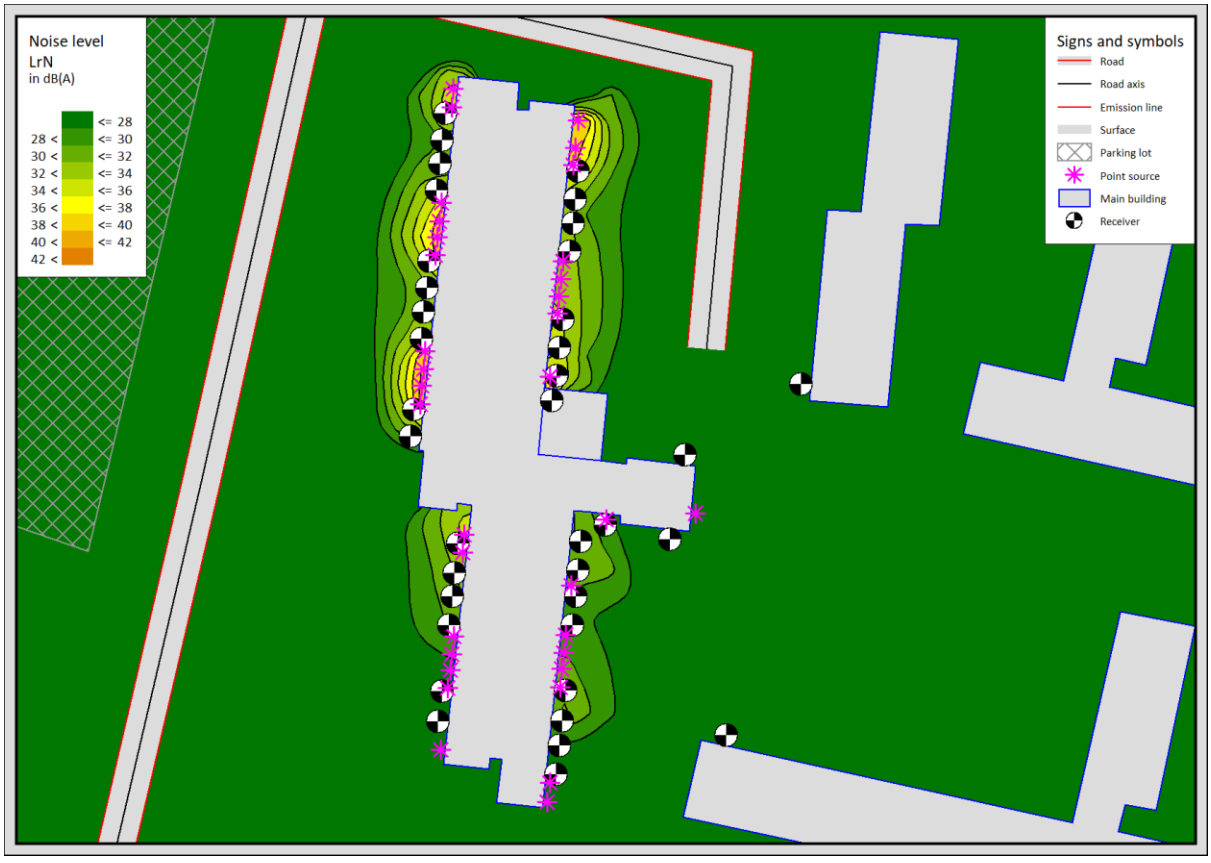


Figure 4 – Night-time GNM of Apprentice Court

4.10.3 BS 4142 Style Assessment

Azymuth have undertaken a BS 4142 style assessment against the on-site 37dBA and off-site background sound level – 5dB (37.5dBA day, 31dBA night) MCC noise limits.

The following predictions are based off a scenario in which all of the ASHPs are running at full (quiet mode) capacity 24hrs per day. If the ASHPs are running for a lesser amount of time e.g. if restricted to predominantly the daytime hours only or less units simultaneously, then the overall impact shall be less.

Source-receiver distances have been measured as the distance between the closest ASHP unit to each respective receptor.

For on-site receptors individual ASHP noise levels from neighbouring units have been assessed (i.e. not the total cumulative noise level outside a receptor window) as per the MCC agreed noise limit criteria. As such, for on-site receptors where neighbours are within the same flat block the contribution from a residents own ASHP is not included in the assessment.

For off-site receptors the cumulative noise level from all ASHPs operating simultaneously have been assessed.

The worst-case noise levels calculated via SoundPLAN have been used in each case for assessment purposes.

No penalties have been applied for characteristic noise as per a BS 4142 style assessment. ASHP noise comprises broadband air movement over fan blades with low-level compressor noise so would not be considered tonal. Individual noise contributions lie below/close to the background sound level at all receptors thus intermittency of individual ASHPs would likely not be clearly perceptible, especially in the case of on-site receptors where the dominant noise contribution is likely the residents own ASHP (i.e. neighbouring ASHP intermittency will not be clearly perceptible over residents own ASHP). Impulsivity is not applicable to ASHPs.

Noise Source Location	Receptor Location	Source – Receiver Distance (~m)	MCC Noise Limit (dBA)	Predicted Noise Level (dBA)	Noise Level re. MCC Noise Limit
Off-site Receptors (neighbouring buildings)					
All Apprentice Court ASHPs	11 Caversham Drive	17	37.5	21.7	**-15.8**
			31.0		**-9.3**
All Apprentice Court ASHPs	15 Towton Street	17	37.5	20.9	**-16.6**
			31.0		**-10.1**
Apprentice Court On-site Receptors (neighbours within the same flat block)					
Flat 29's ASHP	Flat 13 Lounge (Ground Floor)	1	37.0	37.2	**+0.2**
Flat 28's ASHP	Flat 12 Lounge (Ground Floor)	1	37.0	37.0	**0.0**
Flat 23's ASHP	Flat 9 Lounge (Ground Floor)	1	37.0	36.8	**-0.2**

Table 5 – Predicted noise levels at nearest noise sensitive receptors

As shown in the table above, the predicted noise levels are generally compliant with the MCC noise limits at both on and off site receptor locations. There is a marginal 0.2dB exceedance at Apprentice Court ground floor Flat 13's lounge window from Flat 29's ASHP, indicating a marginal noise impact at this receptor however no noise impact at all other receptors. Thus, the overall noise impact is marginal to none.

5.0 Summary

Azymuth Acoustics UK has been contracted by Manchester City Council to perform a Noise Impact Assessment (NIA) in relation to 34no. ASHPs to be installed at Apprentice Court, Harpurhey, Manchester.

This NIA is intended to provide information relating to the potential noise impact of the 34no. ASHPs on the surrounding environment in order to support the detailed planning application for the installation.

Azymuth understand the units will be operational 24hrs per day, with 31no. units to service individual flats and 3no. units to service communal areas. All units are to be located on the ground floor and to be limited via a "quiet mode" restriction for the full duration of their operation.

A baseline noise survey was undertaken in the vicinity of Apprentice Court, Harpurhey. Daytime background noise levels were measured to be between 41-52dBA L_{A90}. Night-time background noise levels were measured to be between 32-36dBA L_{A90}.

Azymuth have produced a noise model in SoundPLAN 9.1 to predict and visualise the effect of noise from the site on the surrounding environment. The ASHPs have been modelled to run at full (quiet mode) capacity 24hrs per day. Azymuth have assessed the noise impact at the worst affected off-site receptors believed to be located at Caversham Drive/Braxton Walk and Towton Street, and on-site receptors where neighbours are within the same flat block.

Azymuth have produced a BS 4142 style assessment of noise originating from the site against the 37dBA noise limit as agreed with Manchester City Council on 25th September 2025 for on-site receptors, and background sound level – 5dB for off-site receptors (37.5dBA daytime and 31dBA night-time). It has been found that the predicted noise levels are generally compliant with the MCC noise limits at both on and off site receptor locations. There is a marginal 0.2dB exceedance at Apprentice Court ground floor Flat 13's lounge window from Flat 29's ASHP, indicating a marginal noise impact at this receptor however no noise impact at all other receptors. Thus, the overall noise impact is marginal to none.

NB if the ASHPs are running for a lesser amount of time e.g. if restricted to predominantly the daytime hours only or less units simultaneously, then the overall impact shall be less.

Appendix A – Glossary of Acoustic Terms

Decibel (dB)
This is the unit used to measure sound. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro Pascal to 100 Pascal).

dB (A)
This is a measure of the overall noise level of sound across the audible spectrum with a frequency weighting (i.e. A-weighting) to compensate for the sensitivity of the human ear to sound of different frequencies. The A-weighting curve is implemented in sound level meters using an electronic filter that approximately corresponds to the frequency response of the ear.

Octave Band Noise Level
The human ear is sensitive to sound over a range of frequencies between approximately 20Hz to 20kHz. The ear is also generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum can be divided into frequency bands. The most commonly used frequency bands are octave bands, in which the mid-frequency of each band is twice that of the band below it.

L_{Aeq}
This is the equivalent steady sound level in dB(A) containing the same acoustic energy as the actual fluctuating sound level over a given time period.

Reverberation Time (RT or sometimes T_{30} or T_{60})
This is the time taken for the reverberant sound energy in an enclosure to decay one millionth of its equilibrium value, i.e. by 60dB, after the source has been switched off. The reverberation time is frequency dependent and it is customary to measure its value in octave or one-third octave bands. Reverberation occurs when sound waves are repeatedly reflected from each surface of the room.

Sound Reduction Index (SRI)
Difference measured between the amount of energy flowing towards the wall in the source room and the total amount of energy entering the receiving room (usual range 100 - 3150Hz for one third octave band values). The SRI varies with frequency and is measured in a laboratory in either octave or one-third octave bands.

SRI = L1 - L2 + 10 log (S/A), where:
L1 = Noise level in the source room
L2 = Noise levels in the receiving room
S = Surface area of test specimen
A = Equivalent acoustic absorption area in the receiving room

Weighted Sound Reduction Index (R_w)
This is a weighted single figure descriptor of the sound insulation performance of a partition measured under laboratory conditions. The procedure used to quantify the R_w is to compare the sound reduction index (SRI) in each of the one-third octave bands from 100Hz to 3150Hz against a set of standard reference curves.

Appendix B – Noise Survey Data

Start	Position	Time	L_{Amax}	L_{Aeq}	L_{A10}	L_{A50}	L_{A90}
Thursday 1st May 2025							
08:26:00	1	00:05:00	79.4	50.7	48.6	43.9	40.9
08:31:00	1	00:05:00	74.6	50.8	52.3	46.4	42.1
08:36:00	1	00:05:00	73.6	53.6	53	49.3	42.8
08:41:00	1	00:05:00	70	52.9	54.8	51.6	44
08:48:00	2	00:05:00	67.8	59	62.5	56.9	52.4
08:53:00	2	00:05:00	69.4	59.2	62.6	57	53.4
08:58:00	2	00:05:00	83.8	61	62.5	58.2	53
09:03:00	2	00:05:00	71.9	59.8	62.7	57.8	53.1
09:10:00	3	00:05:00	66.7	53.1	54.7	51.6	47.7
09:15:00	3	00:05:00	70.3	52.4	53.9	50.5	46.9
09:20:00	3	00:05:00	59.2	50.4	52.6	49.6	45.9
09:25:00	3	00:05:00	76.6	53.7	54.7	51.1	47
09:32:00	1	00:05:00	63.3	45.6	47.3	43	39.9
09:37:00	1	00:05:00	61.9	46.4	48.9	43.5	41.3
09:42:00	1	00:05:00	66.2	45.9	48.8	42.6	39.6
09:47:00	1	00:05:00	71.9	53.2	51.6	43.1	40.3
09:54:00	2	00:05:00	76	58.6	62.5	55.3	50.6
09:59:00	2	00:05:00	76.7	58.1	61.5	54.9	50
10:04:00	2	00:05:00	70.7	57.8	60.8	55.1	51
10:09:00	2	00:05:00	87.9	67.4	61.4	56.5	53.2
10:16:00	3	00:05:00	71.2	52.3	54.7	50.3	46.2
10:21:00	3	00:05:00	81.3	60.3	57.5	51.5	45.8
10:26:00	3	00:05:00	64	51	53.6	49.1	45.8
10:31:00	3	00:05:00	76.9	54.1	55.6	51.6	47.1
10:38:00	1	00:05:00	61.8	46.2	48.4	43.6	41
10:43:00	1	00:05:00	83.5	55.6	52.7	45.2	41.8
10:48:00	1	00:05:00	61.5	49.7	53.1	46.4	42.6
10:53:00	1	00:05:00	74.7	56.3	59	48.2	42
11:00:00	2	00:05:00	72.4	60.9	64.1	59.2	54.2
11:05:00	2	00:05:00	75.8	59.3	61.5	55.2	51.2
11:10:00	2	00:05:00	72	59.3	62.7	56.7	51.4
11:15:00	2	00:05:00	74.9	60.1	62.6	56.9	52.4
11:23:00	3	00:05:00	74.9	57.1	60.3	52.8	47.4
11:28:00	3	00:05:00	80.4	61.7	63.6	58.1	55.3
11:33:00	3	00:05:00	79.4	64.8	68.1	64.9	50.2
11:38:00	3	00:05:00	60.4	50.8	53.2	50.1	46.3

Table B1 – Fully tabulated daytime noise measurement results

Start	Position	Time	L_{Amax}	L_{Aeq}	L_{A10}	L_{A50}	L_{A90}
Wednesday 7th May 2025							
23:05:00	1	00:05:00	72.2	46.2	45.8	40.8	37.3
23:10:00	1	00:05:00	63.6	42	44.1	39.2	37.3
23:15:00	1	00:05:00	49.3	39	41.2	37.6	35.5
23:20:00	1	00:05:00	46	37.9	40.3	36.7	35
23:25:00	1	00:05:00	60.6	41.3	43.4	38.6	36.9
23:30:00	1	00:05:00	55	37.8	39.7	36.4	34.2
23:37:00	2	00:05:00	71	53.7	56.5	38.1	34.7
23:42:00	2	00:05:00	67	50.2	51	37.2	34.1
23:47:00	2	00:05:00	69.6	51.6	52.4	36.3	34.3
23:52:00	2	00:05:00	64.8	48.5	49.9	39.6	35.5
23:57:00	2	00:05:00	72.1	54.1	57	40.5	35.4
Thursday 8th May 2025							
00:02:00	2	00:05:00	64.7	46.9	48.8	37.5	34
00:11:00	3	00:05:00	65.3	45.3	47.5	37.2	32.5
00:16:00	3	00:05:00	56.8	41.7	44.8	38	34
00:21:00	3	00:05:00	49.5	40	43.5	37	33.8
00:26:00	3	00:05:00	52	40	43.6	34	31.5
00:31:00	3	00:05:00	51.8	40.7	44.1	35.5	31
00:36:00	3	00:05:00	64.7	42.5	46.4	37.3	31.3

Table B2 – Fully tabulated night-time noise measurement results