



Azymuth Acoustics UK

Professional Acoustic Services

Discharge of Planning Condition 13 Ref: 98415.6

Happi Block
Bowes Street,
Manchester

On behalf of

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We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own discretion and risk.



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1.0 Introduction

Azymuth Acoustics UK (henceforth Azymuth) has been contracted by Rowlinson Construction Limited to assist with the discharging of a planning condition as relates to noise from externally mounted plant at the Happi Block, Bowes Street, Manchester site.

This noise impact assessment is intended to provide information relating to noise levels emitting from the site in order to support the discharging of the associated planning condition. In particular, the report sets out the following details:

- The results of a baseline noise survey undertaken in the vicinity of Happi Block
- An assessment of the specific noise levels
- Compliance with planning condition 13

It is assumed that all drawings and information provided by the client is up to date and correct.

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 07:54hrs and 09:23hrs on Friday 1st November 2024. The night-time measurements were undertaken between 23:00hrs and 00:11hrs on Wednesday 6th / Thursday 7th November 2024.

The noise measurements were undertaken using the sound level meter at the position(s) shown in Figure 1 below:

- Positions A/B: ~1m from left and right plantroom external louvres
- Position 1: Outside Apartment 40 (fourth floor)
- Position 2: Rear carpark (~26m from Princess Road, screened by wall)
- Position 3: Front carpark

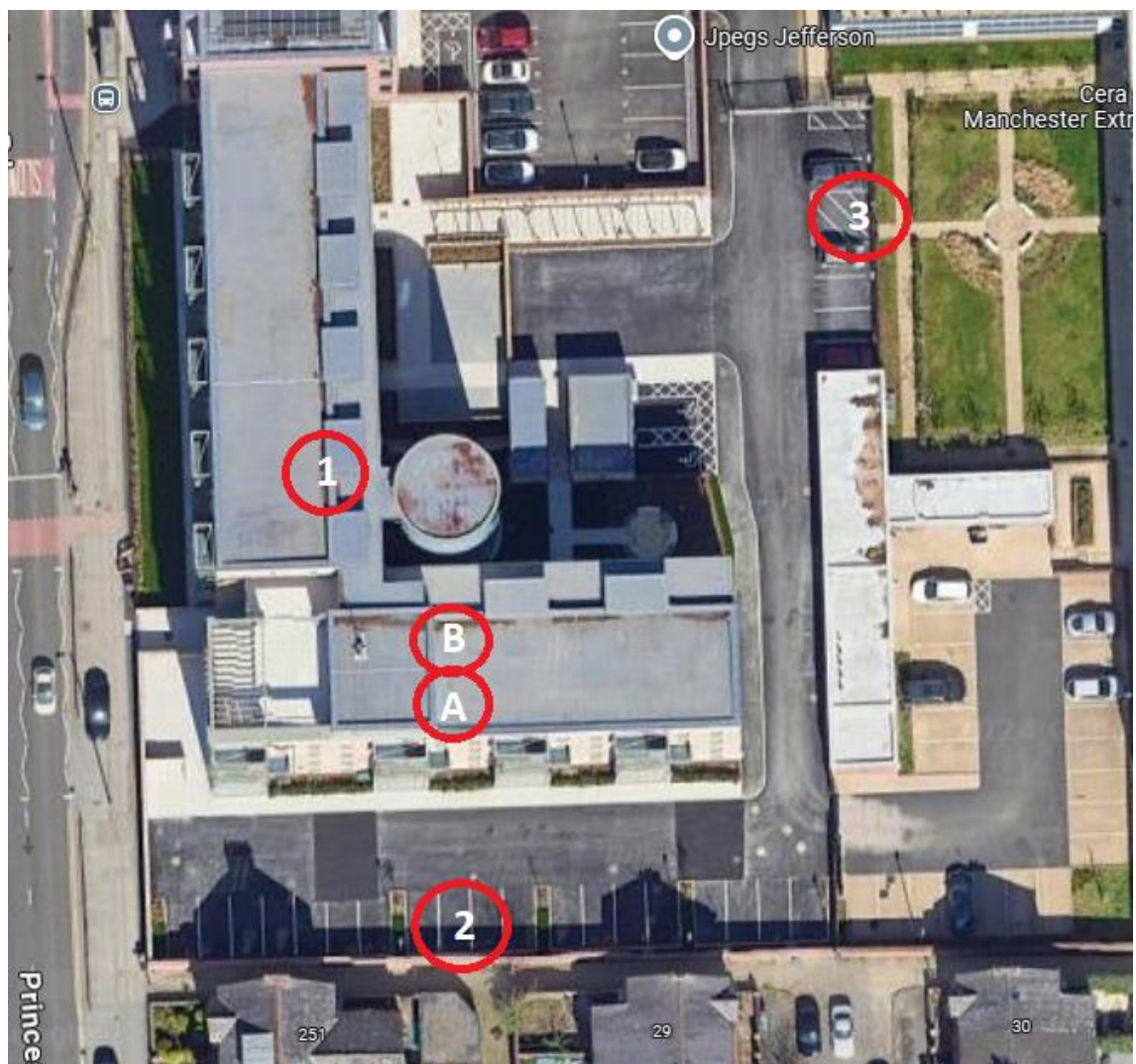


Figure 1 – Noise measurement position(s)



2.2 Summary of Measurements

2.2.1 Noise Survey

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

Location	Period	L _{AFmax}	L _{Aeq}	L _{A10}	L _{A50}	L _{A90}
A) Left Louvre	Day	55.6	54.1	54.7	54.1	53.4
B) Right Louvre	Day	52.7	50.7	51.4	50.6	49.9
1) Apartment 40	Day	59.3	52.5	54.5	52.1	49.0
1) Apartment 40	Night	64.8	52.7	53.6	50.0	46.5
2) Rear carpark	Day	64.1	55.7	58.2	55.0	50.2
2) Rear carpark	Night	65.7	54.3	56.8	52.1	44.8
3) Front carpark	Day	68.4	50.7	52.1	46.3	43.6
3) Front carpark	Night	53.1	44.2	45.5	43.8	42.4

Table 1 – Summary of noise measurements

Azymuth assumes that all measured noise levels are typical of the operating capacity of the plantroom and of the surrounding environment.

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 affecting the site originates from the adjacent Princess Road/A5103 which is a very busy road that sees a continuous flow of traffic throughout all hours of the day.

The weather during the measurement procedure was mostly dry with intermittent drizzle, wind speeds were below 5mph.



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:

- National Planning Policy Framework (NPPF 2021)
- British Standard 8233:2014
- World Health Organisation Guidelines on Community Noise
- British Standard 4142:2014+A1:2019
- Manchester City Council Planning Application: 125776/FO/2019 (Condition 13)

3.1 National Planning Policy Framework (NPPF) 2021

The NPPF provides guidance to local authorities taking into account noise in making planning decisions. Paragraph 185 of the National Planning Policy Framework (NPPF) states that planning policies and decisions should aim to:

- mitigate and reduce to a minimum to a minimum potential adverse impacts resulting from new development – and avoid noise giving rise to significant adverse impacts on health and quality of life,
- identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason;

The NPPF states that the planning system should distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework. In addition, NPPF states that the planning system should ‘prevent both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability’.

3.2 British Standard 8233: 2014

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

3.3 World Health Organisation Environmental Noise Guidelines (ENG) 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 guidelines supersede the Community Noise Guidelines 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.

3.4 British Standard 4142:2014+A1:2019

“Methods for assessing and rating industrial sound” 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.”

3.5 Manchester City Council Planning Application: 125776/FO/2019 (Condition 13)

‘13) Prior to occupation of the development a scheme for the acoustic insulation of any externally mounted ancillary equipment to ensure that it achieves a rating level (L_{Aeq}) of 5dB below the existing background (L_{A90}) in each octave band at the nearest noise sensitive location 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 equipment’

4.0 Assessment of Results

4.1 SoundPLAN Model

Azymuth has undertaken acoustic modelling with the SoundPLAN noise modelling software to predict and visualise the impact of noise from the external louvres associated with the rooftop plantroom on the surrounding environment.

4.1.1 Measured Louvre Noise Levels

The following octave band noise levels were measured ~1m from the left and right louvre associated with the rooftop plant room.

The noise can be described as broadband air movement with no obvious narrow band tonality. The noise is only just perceptible against the residual environment i.e. it is of low level. These levels have been inputted into the SoundPLAN noise model.

Louvre	Octave Band Measured Noise Levels (dB)								Total SPL (dBA)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
LHS	56.1	47.5	49.5	50.3	51.0	45.5	42.5	36.4	54
RHS	55.7	46.7	47.3	48.5	46.4	42.6	39.8	33.8	51

Table 3 – Measured octave band noise levels

4.1.2 Grid Noise Map (GNM)

Azymuth have produced the following GNM to visualise the effect of noise emitting from the premises on the surrounding environment. The GNM is set to a height of 15m to reflect the height of the louvres. Noise levels at lower levels are less than this height.



Figure 2 – GNM of plant noise, 15m height

4.2 BS 4142 Assessment

The following table identifies the nearest noise sensitive receptors, the predicted sound level as a result of associated plantroom noise at these receptors and how this noise level relates to the background sound level. No penalties for tonality, impulsivity and/or intermittency have been applied.

The lowest measured background sound level (night-time) has been used for assessment purposes.

Receiver	Distance from Source to Receiver (~m)	Noise Level at Receptor (dBA)	Background Sound Level at Receptor, L ₉₀ (dBA)	Penalty for Tonality, Impulsivity and/or Intermittency (dBA)	Noise Rating Level (dBA)	Rating Level re. Background Sound Level
Nearest Off-Site Residential Receptors for BS 4142						
29 Alexandra Avenue (Rear)	30	23.8	44.8	0	23.8	-21.0
30 Alexandra Avenue (Front)	46	17.7	44.8	0	17.7	-27.1
31 Elmswood Avenue (Rear)	53	21.5	42.4	0	21.5	-20.9
Nearest On-Site Residential Receptors for BS 4142						
Apartment 34 Happi Block (3F)	8	25.3	46.5	0	25.3	-21.2
Apartment 40 Happi Block (4F)	13	24.7	46.5	0	24.7	-21.8

Table 4 – BS 4142 assessment of noise originating from Happi Block rooftop plantroom



4.2.1 Octave Band Analysis

The below tables provides an octave band analysis of the worst affected off-site receptor locations.

Receptor	Octave Band Measured Noise Levels (dB)								SPL (dBA)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
Predicted Level (L_{eq}) @ 29 Alexandra Avenue	30.0	19.9	20.9	20.9	20.4	14.0	11.0	2.5	23.8
Background Level (L_{90})	49.3	41.9	39.6	38.1	41.5	38.1	29.2	18.5	44.8
Penalty for Tonality, Impulsivity and/or Intermittency	0	0	0	0	0	0	0	0	-
Noise Rating Level	30.0	19.9	20.9	20.9	20.4	14.0	11.0	2.5	23.8
Rating Level re. Background Sound Level	-19.3	-22	-18.7	-17.2	-21.1	-24.1	-18.2	-16	-21.0

Table 5 – Octave band BS 4142 assessment for 29 Alexandra Avenue

Receptor	Octave Band Measured Noise Levels (dB)								SPL (dBA)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
Predicted Level (L_{eq}) @ 31 Elmswood Avenue	27.5	15.6	17.5	18.4	18.1	12.7	8.2	-3.1	21.5
Background Level (L_{90})	48.9	45.8	44.9	37.5	37.8	31.5	22.0	16.4	42.4
Penalty for Tonality, Impulsivity and/or Intermittency	0	0	0	0	0	0	0	0	-
Noise Rating Level	27.5	15.6	17.5	18.4	18.1	12.7	8.2	-3.1	21.5
Rating Level re. Background Sound Level	-21.4	-30.2	-27.4	-19.1	-19.7	-18.8	-13.8	-	-20.9

Table 6 – Octave band BS 4142 assessment for 31 Elmswood Avenue

5.0 Summary

Azymuth were appointed by Rowlinson Construction Limited to undertake acoustic testing in relation to noise associated with externally mounted ancillary equipment at Happi Block, Bowes Street, Manchester.

A planning condition was issued by Manchester City Council (MCC), this condition stated that all externally mounted ancillary equipment should achieve a rating level (L_{Aeq}) of 5dB below the existing background (L_{A90}) in each octave band at the nearest noise sensitive locations.

Azymuth have measured the noise levels at a distance of ~1m from the rooftop plant louvres. Background sound levels at the nearest on and off-site receptors have also been measured by Azymuth for both daytime and night-time.

Azymuth have undertaken acoustic modelling in SoundPLAN 8.2 to visualise and predict the impact of noise from the louvres on the surrounding environment. The measured louvre noise levels have been inputted into the noise model.

It has been found that the specific noise levels (L_{Aeq}) from the rooftop plant will be (significantly) more than 5dB below the relevant background level (L_{A90}) in each octave band at each of the nearest noise sensitive receptors and would therefore comply with the planning condition.



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.

$SRI = L_1 - L_2 + 10 \log (S/A)$, where:

L_1 = Noise level in the source room

L_2 = 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}
Friday 1 st November 2024							
07:54:30	A	00:00:30	56.5	54.2	54.7	54.1	53.4
07:55:00	A	00:00:30	54.9	54	54.5	54	53.4
07:55:30	A	00:00:30	55.3	54.2	54.8	54.2	53.5
07:56:00	B	00:00:30	55.1	50.9	51.7	50.7	50
07:57:30	B	00:00:30	51.5	50.6	51.2	50.5	49.8
07:57:00	B	00:00:30	51.6	50.7	51.2	50.6	50
08:06:00	1	00:05:00	59.9	53	55	52.6	49.9
08:11:00	1	00:05:00	60.2	52.6	54.7	52.2	48.6
08:16:00	1	00:05:00	57.9	51.9	53.9	51.5	48.4
08:24:00	2	00:05:00	65.5	55.6	58.1	54.9	50.9
08:29:00	2	00:05:00	63.3	55.4	57.9	54.6	49.7
08:34:00	2	00:05:00	66	55.4	58	54.5	48.4
08:39:00	2	00:05:00	62.2	55.4	58	54.6	49.3
08:44:00	2	00:05:00	63.2	55.9	58.3	55.3	50.9
08:49:00	2	00:05:00	64.5	56.4	58.7	55.8	52.2
08:58:00	3	00:05:00	66.8	51.7	55.2	47.1	43.9
09:03:00	3	00:05:00	66.8	46.9	47.6	45.2	42.8
09:08:00	3	00:05:00	65.8	48.4	50.2	46.4	44.1
09:13:00	3	00:05:00	67.8	50	53.9	46.4	43.8
09:18:00	3	00:05:00	77.9	54.1	56.5	46.8	43.2
09:23:00	3	00:05:00	65.3	49.3	49.1	45.7	43.6
Wednesday 6 th November 2024							
23:05:00	1	00:05:00	76.2	55.2	54	51	48.2
23:10:00	1	00:05:00	56.1	50.5	53.5	49.5	45.1
23:15:00	1	00:05:00	62.2	50.8	53.4	49.4	46.2
23:24:00	2	00:05:00	60.6	53.1	56.6	51.8	43.8
23:29:00	2	00:05:00	62.4	53.6	56.9	52.1	44.2
23:34:00	2	00:05:00	75	56.7	57.1	52.3	47.3
23:39:00	2	00:05:00	66.2	53.3	56.4	51.5	43.6
23:44:00	2	00:05:00	64.4	53.8	57	52.9	45.3
23:51:00	3	00:05:00	52.3	44.9	46.1	44.6	43.3
23:56:00	3	00:05:00	47.7	44.1	45.5	43.9	42.5
Thursday 7 th November 2024							
00:01:00	3	00:05:00	54.8	43.8	45	43.5	42.3
00:06:00	3	00:05:00	56.5	44.3	45.7	43.8	42.2
00:11:00	3	00:05:00	54.4	43.9	45.3	43.3	41.6

Table B1 – Fully tabulated noise measurement results