

Elizabeth Street Cheetham Hill Manchester

Acoustic Commissioning Report

31186/ACR1

15 October 2024

For:

Triton Construction
Hare Park Mills
Hare Park Lane
Hightown
Liversedge
WF15 8EP



Hann Tucker Associates

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Document Control

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1.0 Introduction

Hann Tucker Associates has been commissioned to demonstrate compliance with BREEAM Hea05 and Pol05 at newly built industrial units, which are part of Elizabeth Street development in Manchester.

In addition to the above the scheme has been granted planning permission, subject to a planning condition (13b) relating to plant noise emissions. The wording of this condition is as follows:

13a: Prior to the first use of the development, details of any externally mounted ancillary plant, equipment and servicing shall be submitted for approval in writing by the City Council, as Local; Planning Authority. For the avoidance of doubt, 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 (L_{Aeq}) of 5dB below typical background (L_{A90}) level at the nearest noise sensitive receptor.

13b: Prior to the first use of the development, a verification report will be required to validate that the work undertaken conforms to the recommendations and requirements approved as part a of this 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 the mitigation measures required to ensure compliance with the noise criteria. A verification report and measures shall be agreed until such a time as the development complies with part a of this planning condition.

On the basis of discharging the above and providing evidence to demonstrate compliance with BREEAM, the results of our acoustic commissioning are presented herein, together with relevant observations.

2.0 Acoustic Terminology

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



3.0 BREEAM 2018 Requirements

3.1 Suitably Qualified Acoustician

A prerequisite of the BREEAM: 2018 assessment is that a suitably qualified acoustician is appointed to carry out the assessment.

This report has been compiled by George Grenfell of Hann Tucker Associates, whose qualifications and professional status are summarised below along with the company credits of Hann Tucker Associates Limited.

George Grenfell Professional Qualifications and Status	
Position	Qualifications
Senior Consultant	MSc Audio Engineering Member of the Institute of Acoustics (MIOA)
Hann Tucker Associates Limited Company Credits	
Sponsor Members of the Institute of Acoustics Members of the Association of Noise Consultants ISO9001 accredited UKAS accredited for Sound Insulation Testing (No. 4083) Members of the Institute of Environmental Management and Assessment	

There are two relevant sections of BREEAM: 2018 pertinent to the acoustic design of the building. These refer to internal (Hea05) and external (Pol05) requirements and are as follows:

3.2 Hea 05

The Criteria for BREEAM 2018 Hea05 credit for internal noise is provided in the table below:

Industrial, Retail, Prisons and Other Building Types (three credits)	
Indoor Ambient Noise Levels	
Criteria	Achieve indoor ambient noise levels that comply with the design ranges given in Section 7 of BS 8233:2014.
Testing Requirement	A programme of pre-completion acoustic testing is carried out by a compliant test body in accordance with the acoustic testing and measurement procedures outlined in the Methodology on the facing page section of this BREEAM Issue.
Rooms with Specific Functions	Education space (teaching and learning spaces)refer to Table 5.14 on page 109 Medical treatment rooms refer to Table 5.15 on page 110



3.3 Pol 05

The Criteria for BREEAM 2018 Pol05 credit for plant noise emissions is provided below:

1. There are no noise-sensitive areas within the assessed building or within 800 m radius of the assessed site.

OR

2. Where there are noise-sensitive areas within the assessed building or noise-sensitive areas within 800 m radius of the assessed site, a noise impact assessment compliant with BS4142:2014 is commissioned. Noise levels must be measured or determined for:

2.a Existing background noise levels:

2.a.i at the nearest or most exposed noise-sensitive development to the proposed assessed site

2.a.ii including existing plant on a building, where the assessed development is an extension to the building

2.b Noise rating level from the assessed building.

3. The noise impact assessment must be carried out by a suitably qualified acoustic consultant.
4. The noise level from the assessed building, as measured in the locality of the nearest or most exposed noise sensitive development, must be at least 5dB lower than the background noise throughout the day and night.
5. If the noise sources from the assessed building are greater than the levels described in criterion 4, measures have been installed to attenuate the noise at its source to a level where it will comply with the criterion.



4.0 Condition 13 Wording

The wording of condition 13 is as follows:

“13a: Prior to the first use of the development, details of any externally mounted ancillary plant, equipment and servicing shall be submitted for approval in writing by the City Council, as Local; Planning Authority. For the avoidance of doubt, 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 (LAeq) of 5dB below typical background (LA90) level at the nearest noise sensitive receptor.

13b: Prior to the first use of the development, a verification report will be required to validate that the work undertaken conforms to the recommendations and requirements approved as part a of this 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 the mitigation measures required to ensure compliance with the noise criteria. A verification report and measures shall be agreed until such a time as the development complies with part a of this planning condition.”

5.0 Acoustic Criteria

5.1 Internal Ambient Noise Levels (Hea05)

5.1.1 Cumulative noise levels

Internal ambient noise levels (whether from road, rail, aircraft or building services sources) should, not exceed the following acoustic design criteria:

Room Type	Indoor Ambient Noise Level Criteria (Environmental)
Office	$\leq 40 \text{ dB } L_{Aeq,5min}$
Internal Industrial Area	$\leq 55 \text{ dB } L_{Aeq,5min}$

5.1.2 Building Services Noise

Building services noise should be controlled to meet the following Noise Rating (NR) levels when measured in accordance with the Association of Noise Consultants Guidelines: *Noise Measurements in Buildings– Part 1: Noise from Building Services*.



Room Type	Indoor Ambient Noise Level Criteria (Building Services)
Office	NR35

The above levels are to be measured 1.5 m above the floor level at a position no closer than 1 m from a wall in the absence of activity noise and noise ingress.

5.2 External Plant Noise Emissions (Pol05)

Based on the typical lowest background noise levels presented in the noise impact assessment undertaken by AEC in 2022 (P4528/R1b/AGB), the following plant noise emission 'rating limits' should be achieved at 1 metre from the nearest noise sensitive window with all plant operating simultaneously.

Period	Cumulative Plant Noise Emission Limit (BS 4142:2014 Rating Level)
Daytime (07:00-23:00)	44 dBA
Night-time (23:00-07:00)	38 dBA

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

6.0 Test Procedure

Hann Tucker Associates attended site on 11 October 2024 to commission each of the units. All testing was undertaken by George Grenfell.

6.1 Equipment

The following equipment was used for the tests:

Equipment	Make / Model	Serial Number	Calibration Date
Type 1 Data Logging Sound Level Meter	Larson Davis LxT	4569	30/05/2024
SLM Calibrator	Larson Davis Cal200	3083	27/03/2024

The equipment was calibrated prior to and on completion of the survey. No significant deviations occurred.



6.2 Methodology

6.2.1 Internal Ambient Noise Levels

Hann Tucker Associates attended site to undertake indoor ambient noise level (IANL) measurements for the purpose of assessing external noise intrusion and mechanical services noise.

The rooms tested were finished, but unfurnished. Windows were closed for all measurements with mechanical ventilation systems balanced and operating at the correct duties for 'normal' conditions. Extraneous noises were excluded as far as reasonably possible.

All measurements were carried out during daytime hours (typically between 10:00-17:00 hr). In offices, internal ambient noise levels were dominated by considered steady-state mechanical services noise. Contributions from external traffic noise intrusion were not dominant. As such, internal ambient L_{Aeq} noise level measurements were taken at over shortened intervals per room, typically not less than 1-minute, and at 3No positions per room. In industrial spaces, measurement times were undertaken from 2 minutes to 5minutes and 3No positions per space.

6.2.2 External Building Services

Hann Tucker Associates visited site to undertake sound pressure level measurements of the atmospheric noise emissions from internal fixed building services plant units to demonstrate compliance with design targets and achieve Credit 1 of BREEAM section Pol 05.

The plant units were known to be operating at design duty and the measurements were taken on 11 October 2024 both with the plant operating and not operating with a view to establishing the specific noise level from each plant item.

Weather conditions were dry and were considered suitable. For each unit of fixed building services plant, the broadband and octave-band spectral L_{Aeq} sound pressure levels were recorded over a period of at least 30seconds, with atypical noises excluded as far as reasonably possible.

7.0 Measurement Results

7.1 Internal Ambient Noise Levels – Building Services (Hea05)

The following table summarises the measured internal building services noise levels. Measurements were obtained with HRU units on high, low and off.

Where results have been highlighted **green**, they comply with the criteria:



Internal Building Services Noise Measurement Results			
Test Location	HRU High	HRU Low	Criteria NR
Unit 2 Office	30	26	≤ 35
	30	26	≤ 35
	29	26	≤ 35
Unit 3 Office	33	30	≤ 35
	33	28	≤ 35
	34	29	≤ 35
Unit 9 Office	35	31	≤ 35
	34	28	≤ 35
	35	30	≤ 35

7.1.1 Discussion of Results

The measurement results indicate that noise generated by the ventilation systems within office spaces is below or equal to the proposed criterion of NR 35 for unit 2, 3 and 9 office spaces. It is understood that Unit 1 and Unit 6 are not served by any internal mechanical plant items other than toilet extract fans.

7.2 Internal Ambient Noise Levels – External Noise Intrusion (Hea05)

The following table presents the measured indoor ambient noise level from environmental noise break-in only (i.e. all building services off), presented as a dB L_{Aeq} level, in each space during our site visits. The corresponding design criteria is also presented to inform a compliance check.

Where results have been highlighted green, they comply with the criteria:

Environmental Noise Break-in Measurement Results			
Test Location	Measurement Period	Measured L_{Aeq} dB	Criteria L_{Aeq} dB
Unit 1 Warehouse	2 Minutes	42	≤ 55
		41	
		40	
Unit 2 Office	1 Minute	30	≤ 40
		29	
		27	
Unit 2 Warehouse	2 Minutes	36	≤ 55
		38	
		37	
Unit 3 Office	1 Minute	31	≤ 40
		30	
		29	



Environmental Noise Break-in Measurement Results			
Test Location	Measurement Period	Measured L _{Aeq} , dB	Criteria L _{Aeq} dB
Unit 3 Warehouse	5 Minutes	38	≤ 55
		39	
		39	
Unit 6 Warehouse	2 Minutes	38	≤ 55
		39	
		38	
Unit 9 Office	1 Minute	29	≤ 40
		30	
		30	
Unit 9 Warehouse	2 Minutes	48	≤ 55
		45	
		46	

7.2.1 Discussion of Results

The measurement results indicate that all internal ambient noise levels were below the proposed criteria of 40dB L_{Aeq, 5min} for offices and 55 dB L_{Aeq, 5min} for industrial workspaces.

7.3 Plant Noise Emissions (Pol05)

7.3.1 Installed Plant Items

The following plant items have been installed across the tested units:

- Air Source Heat Pumps (Unit 2/3/4/5/6/7/8/9 - ERGA04-08EVA)
- Toilet Extract Fans (Unit 2/3/4/5/6/7/8/9 Vent Axia ACM 100)
- Heat Recovery (Units 2/3/9 VAM250 150DIA)

7.3.2 Source Measurement Results

The following table summarises the noise level measured from each plant item/louvre both with and without the plant in operation, the specific sound level refers to the resulting noise level when the residual sound is subtracted from the ambient sound.



Unit	Plant Item	Distance (m)	Ambient sound level with plant item on (L _{Aeq} dB)	Residual sound level with plant item off (L _{Aeq} dB)	Specific Sound Level (L _{Aeq} dB)
2	HRU (Intake and Discharge)	7m	51	50	44
	ASHP	1m	53	48	51
	Level 0 TEF (all)	2m	51	47	49
	Level 1 TEF (all)	7m	46	47	37*
3	HRU (Intake and Discharge)	7m	48	47	41
	ASHP	1m	50	48	46
	Level 0 TEF (all)	2m	47	46	40
	Level 1 TEF (all)	7m	46	45	39
Unit 6	ASHP	1m	50	48	46
	Level 0 TEF (all)	2m	51	49	47
Unit 9	HRU (Intake and Discharge)	7m	50	48	46
	ASHP	1m	51	50	44
	Level 0 TEF (all)	2m	50	50	40
	Level 1 TEF (all)	7m	48	47	41

* When measuring Toilet extract fans and HRU ductwork, it was noted that they were not audible above the background noise (understood to be design duty). Where background noise was measured to be higher than the source noise measurement, it is expected that the source noise is at least 10 dB below the background noise level.

7.3.3 Assessment

The noise sensitive receptors, as identified in our previous AEC noise impact assessment (P4528/R1b/AGB) are highlighted in the image below:



Onsite observations showed that noise emissions from the plant were consistent across all units. The toilet extract fans and HRU units were either inaudible or barely audible over the background noise, while the ASHPs were audible only at close range.

The ASHPs operate intermittently, running for about 5-10 minutes at a time as the building adjusts its temperature or uses hot water. Due to time constraints, it was not possible to measure the noise from the toilet extract fans or ASHPs for Units 4, 5, 7, and 8. To address this, a correction was applied to the Unit 6 assessment, as its distance from the residential receptor is similar to that of the missing units.

The noise assessment is presented in the table overleaf that assumes all plant items are running simultaneously:

Plant noise Emission Assessment – Residential Receptor				
Description	Unit 2			
	HRU (Intake and Discharge)	ASHP	Level 0 TEF (all)	Level 1 TEF (all)
Sound Pressure Level dB	44 @ 7m	51 @ 1m	49 @ 2m	37 @ 7m
Distance Correction	(165m)	(165m)	(160m)	(160m)
Barrier Correction	-10	-10	-10	-10
BS4142:2014 Corrections	0	0	0	0



Plant noise Emission Assessment – Residential Receptor				
Description	Unit 2			
	HRU (Intake and Discharge)	ASHP	Level 0 TEF (all)	Level 1 TEF (all)
Calculated Noise Level at Receptor, $L_{A_{Tr}}$	7	1	1	0
Combined Noise Level at receptor	7			
BREEAM Daytime / Night-time Plant Noise Limit, $L_{A_{Tr}}$	44/38			
Compliance	✓/✓			

Plant noise Emission Assessment – Residential Receptor				
Description	Unit 3			
	HRU (Intake and Discharge)	ASHP	Level 0 TEF (all)	Level 1 TEF (all)
Sound Pressure Level dB	41 @ 7m	46 @ 1m	40 @ 2m	39 @ 7m
Distance Correction	(200m)	(200m)	(190m)	(190m)
Barrier Correction	-10	-10	-10	-10
BS4142:2014 Corrections	0	0	0	0
Calculated Noise Level at Receptor, $L_{A_{Tr}}$	2	0	0	0
Combined Noise Level at receptor	2			
BREEAM Daytime / Night-time Plant Noise Limit, $L_{A_{Tr}}$	44/38			
Compliance	✓/✓			



Plant noise Emission Assessment – Residential Receptor		
Description	Unit 6	
	Level 0 TEF (all)	ASHP
Sound Pressure Level dB	47 @ 7m	46 @ 1m
Distance Correction	(105m)	(105m)
Barrier Correction	-10	-10
Correction for number of units (accounting for unit 4/5/7/8)	+7	+7
BS4142:2014 Corrections	0	0
Calculated Noise Level at Receptor, $L_{A_{Tr}}$	20	6
Combined Noise Level at receptor	20	
BREEAM Daytime / Night-time Plant Noise Limit, $L_{A_{Tr}}$	44/38	
Compliance	✓/✓	

Plant noise Emission Assessment – Residential Receptor				
Description	Unit 9			
	HRU (Intake and Discharge)	ASHP	Level 0 TEF (all)	Level 1 TEF (all)
Sound Pressure Level dB	46 @ 7m	44 @ 1m	40 @ 2m	41 @ 7m
Distance Correction	(70m)	(50m)	(50m)	(70m)
Barrier Correction	-10	0	0	-10
BS4142:2014 Corrections	0	0	0	0



Plant noise Emission Assessment – Residential Receptor				
Description	Unit 9			
	HRU (Intake and Discharge)	ASHP	Level 0 TEF (all)	Level 1 TEF (all)
Calculated Noise Level at Receptor, $L_{A_{Tr}}$	16	13	22	11
Combined Noise Level at receptor	24			
BREEAM Daytime / Night-time Plant Noise Limit, $L_{A_{Tr}}$	44/38			
Compliance	✓/✓			

Description	Cumulative Plant Noise Emission Level (All Units – All Plant Operation Simultaneously)
Combined Noise Level at receptor	25
BREEAM Daytime / Night-time Plant Noise Limit, $L_{A_{Tr}}$	44/38
Compliance	✓/✓

As indicated in the tables above, the proposed plant items are compliant with the BREEAM Pol05 requirements and the requirements of Condition 13 when noise emissions are measured at source and calculated at the nearest noise sensitive receptor.

8.0 Conclusion

In conclusion, the acoustic commissioning results for the Elizabeth Street development demonstrate full compliance with the BREEAM Hea05 and Pol05 requirements, as well as Condition 13 of the planning approval.

The internal ambient noise levels in both office and industrial spaces were found to be within the specified limits.

External plant noise emissions were also assessed, and noise levels at the nearest sensitive receptors met the required thresholds for both daytime and nighttime operation.



Additional mitigation measures should not be necessary, as the installed plant items operated within acceptable noise levels. Overall, the development satisfies all relevant acoustic performance criteria.

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Appendix A

The acoustic terms used in this report are explained below.

dB *Decibel* – the unit used for many acoustic quantities to indicate the level with respect to a standard reference level.

Because of being a logarithmic scale decibels do not have a linear relationship. For similar noises, a change in noise level of 10dB represents a doubling or halving of subjective loudness. A change of 3dB is just perceptible.

NR *Noise Rating*. A method of assessing the frequency dependent sound pressure levels within a space. Gives a single figure result based upon a weighting curve roughly in line with the equal loudness curves.

R_w *Weighted Sound Reduction Index*. A single number quantity which characterises the airborne sound insulation of a material or building element in the laboratory.

D_w *Weighted Sound Level Difference*. A single number quantity which characterises the airborne sound insulation between rooms on site.

White Noise and Pink Noise

The colour names for these different types of noise are derived from an analogy between the spectrum of frequencies of sound wave present in the sound and the equivalent spectrum of light wave frequencies.

White Noise is a random signal with constant energy at all frequencies giving a flat frequency spectrum in linear space, with a power density of 0dB per octave. Because each successive octave band has approximately twice as many contributing frequencies than the previous octave band, there is a 3dB increase in energy per octave.

Pink Noise is filtered White Noise, with energy inversely proportional to frequency with a power density of -3dB per octave. The Pink Noise -3dB/octave cancels the White Noise 3dB/octave slope, resulting in equal energy in each octave band.

Humans subjectively perceive Pink Noise as having a flat spectrum shape. Pink Noise is commonly used in acoustic testing and sound masking.