PureGym – Barnsley

Acoustic Validation Testing Report

Reference: 13031.RP02.AVT.0
Prepared: 25 June 2024
Revision Number: 0

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Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	25 June 2024	James Melville	Martin Raisborough

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The recommendations within this report relate to acoustics performance only and will need to be integrated within the overall design by the lead designer to incorporate all other design disciplines such as fire, structural integrity, setting-out, etc. Similarly, any sketches appended to this report illustrate acoustic principles only and again will need to be developed into full working drawings by the lead designer to incorporate all other design disciplines.

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1.0 EXECUTIVE SUMMARY

RBA Acoustics has been appointed by PureGym to undertake an acoustic validation test for the recently installed acoustic control measures at Wombwell Road, Barnsley. The recommendations for acoustic treatment in the various areas is presented in the RBA Acoustics report 13031.RP01.NAR.2. dated 19th December 2024.

This report presents the details and results of acoustic validation tests undertaken by RBA Acoustics on Thursday 20th June 2024, the purpose of which are to confirm compliance with the adopted acoustic criteria at the nearby noise sensitive receptors. The following tests were undertaken:

Test Details	Pass / Fail	Comment
Amplified music noise breakout from the property impacting on the nearby noise sensitive properties (Planning Condition 7)	Pass	Breakout noise from the Studio and Functional areas does not exceed the otherwise ambient L_{Aeq} sound in any 1/3 octave band at the façade of the nearest affected noise sensitive properties along Wombwell Lane and therefore compliant with Planning Condition 7.
Plant Noise Impact on nearby noise sensitive receptors (Planning Condition 8)	Pass	Noise from plant installations is more than 5dB below the measured background noise level and therefore compliant with Planning Condition 8.

2.0 INTRODUCTION

RBA Acoustics has been appointed by PureGym to undertake an acoustic validation test for the recently installed acoustic control measures at Wombwell Road, Barnsley. The recommendations for acoustic treatment in the various areas is presented in the RBA Acoustics report 13031.RP01.NAR.2. dated 19th December 2024.

This report presents the details and results of acoustic validation tests undertaken by RBA Acoustics on Thursday 20th June 2024, the purpose of which are to confirm compliance with the adopted acoustic criteria at the nearby noise sensitive receptors. The following tests were undertaken:

- Amplified music noise from the Studio & Functional areas of the Gym, breaking out from the building and impacting on the nearby noise sensitive properties.
- Plant noise impact on the nearby noise sensitive properties.

The details and results of these tests are considered in turn in this report.

This report occasionally employs technical acoustic terminology. In order to assist the reader, a brief description of the acoustic parameters used in this report is included within Appendix A.

3.0 GYM NOISE BREAKOUT CRITERIA

Planning Condition 7 states the following:

"Before the use of the development commences a noise limiting device shall be installed on the site PA system so that the L_{Aeq} noise level of the breakout sound does not exceed a level 5dB below the otherwise ambient L_{Aeq} sound in any 1/3 octave band at the façade of the nearest affected noise sensitive property."

4.0 NOISE BREAKOUT TEST DETAILS

The Acoustic Validation testing was undertaken by James Melville (MSc, BSc AMIOA) of RBA Acoustics on Thursday 8th September 2022.

The equipment used to undertake the tests is presented in Appendix B. The equipment was calibrated before and after the tests using the field calibrators. No drift in calibration was observed. The sound level meter and field calibrator has been laboratory calibrated within the past 2 years, while the field calibrator has undergone an additional in-house calibration check within the past year. Calibration certificated for all equipment are available on request.

The details and results of the various tests are presented in turn in the following sections.

5.0 AIRBORNE NOISE BREAKOUT TEST RESULTS

Measurements and observations of airborne noise breakout through the external façade of the PureGym unit, impacting on the nearby noise sensitive properties along Wombwell Lane, were undertaken during the site tests.

It was noted during the site visit, that since our feasibility study of the site that a new residential property has been built which sits closer to the Gym than the receptor which was previously assessed (circa 25 metres, rather than 45 metres). Therefore, to present a robust and worst-case assessment, the closer receptor has been assessed to.

Figure 1 below indicates the location of the nearest receptor in relation to the Gym.

Figure 1 – Nearest Noise Sensitive Receptor (Noise Breakout)



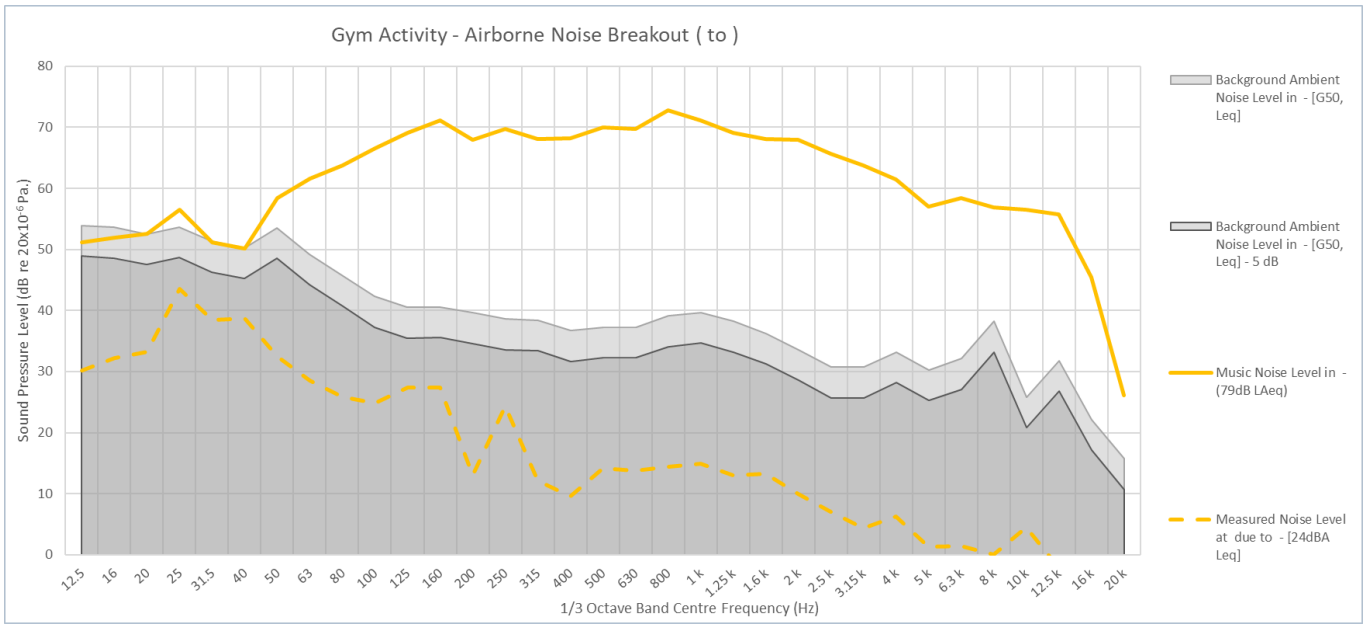
The details of the tests undertaken for each area are presented in the following sections.

5.1 Studio Area

The electroacoustic system within the Studio area of the Gym was used with a typical exercise music track, with the volume turned up to the highest level permitted by the audio system without distorting. Measurements of sound level were made outside the building along the external façade with the Studio.

The results of the noise breakout test from the Studio area are presented in Figure 2 below.

Figure 2 – Studio Area Music Noise Breakout to Nearest Noise Sensitive Receptor (25m)



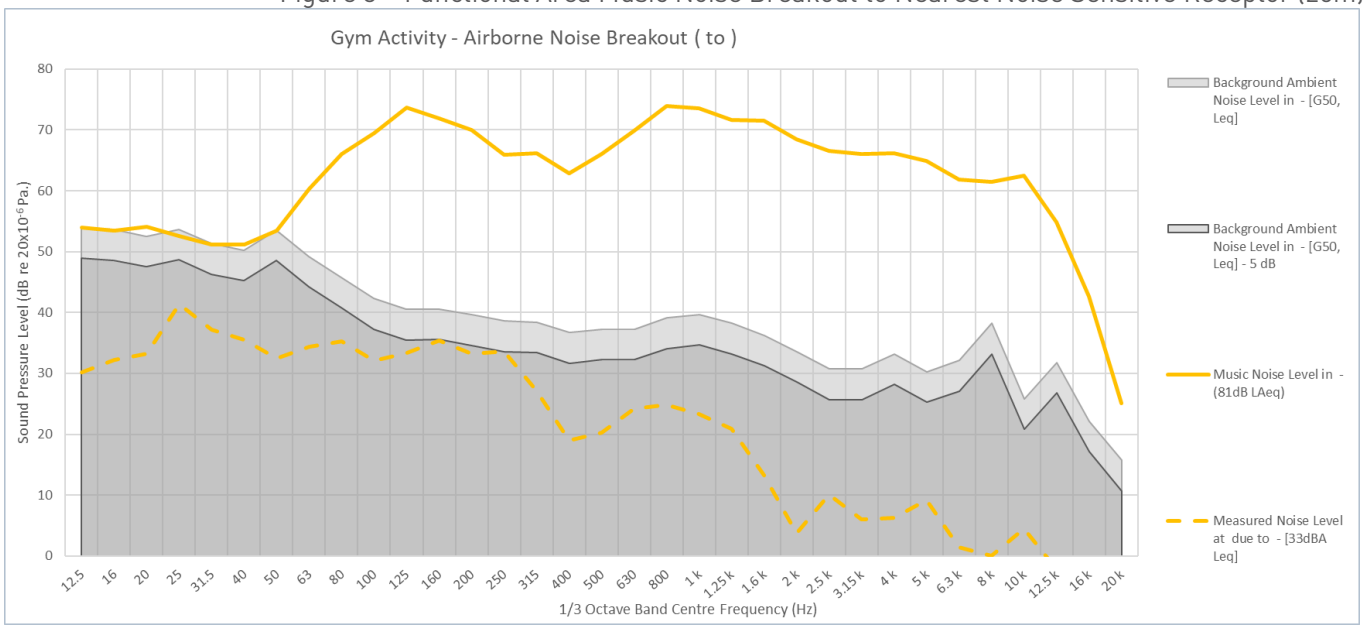
As per the above graph it can be seen that the adopted criterion is met at the nearest noise sensitive property additionally, subjectively, Gym amplified music noise was not audible above the otherwise ambient sound level during the tested.

5.2 Functional Area

The electroacoustic system within the Functional area of the Gym was used with a typical exercise music track, with the volume turned up to the highest level permitted by the audio system without distorting. Measurements of sound level were made outside the building along the external façade with the Functional Area.

The results of the noise breakout test from the Functional area are presented in Figure 3 below.

Figure 3 – Functional Area Music Noise Breakout to Nearest Noise Sensitive Receptor (25m)



As per the above graph it can be seen that the adopted criterion is met at the nearest noise sensitive property additionally, subjectively, Gym amplified music noise was not audible above the otherwise ambient sound level during the tested.

1.1 Discussion

The above validation assessments indicate that gym noise breakout is compliant with Planning Condition 7.

2.0 PLANT NOISE EMISSION LIMITS

Planning Condition 8 states:

"Within one month of the operating hours changing, a post development noise assessment shall be submitted to and approved in writing by the Local Planning Authority in order to validate the predicted noise levels stated in Environmental Noise Impact Assessment produced by RBA Acoustics dated 19th December 2023 ref: 13031.RP01.NAR.2. Should the assessment identify any noise levels above the predicted levels in the report then an action plan outlining further acoustic mitigation measures shall be submitted and approved in writing by the Local Planning Authority and thereafter implemented in accordance with the approved details."

The report referenced in the condition states the following criteria:

"No fixed plant and/or machinery shall come into operation until details of the fixed plant and machinery serving the development hereby permitted, and any mitigation measures to achieve this condition, are submitted to and approved in writing by the local planning authority. The rating level of the sound emitted from the site shall not exceed 50 dBA between 0700 and 2300 and 38 dBA at all other times. The sound levels shall be determined by measurement or calculation at the nearest noise sensitive premises. The measures and assessment shall be made according to BS4142:2014. "

In line with BS 4142: 2014, should the proposed plant be identified as having intermittent or tonal characteristics, a further penalty should be subtracted from any of the above proposed noise emission limits.

3.0 PLANT NOISE COMMISSIONING ASSESSMENT

3.1 General

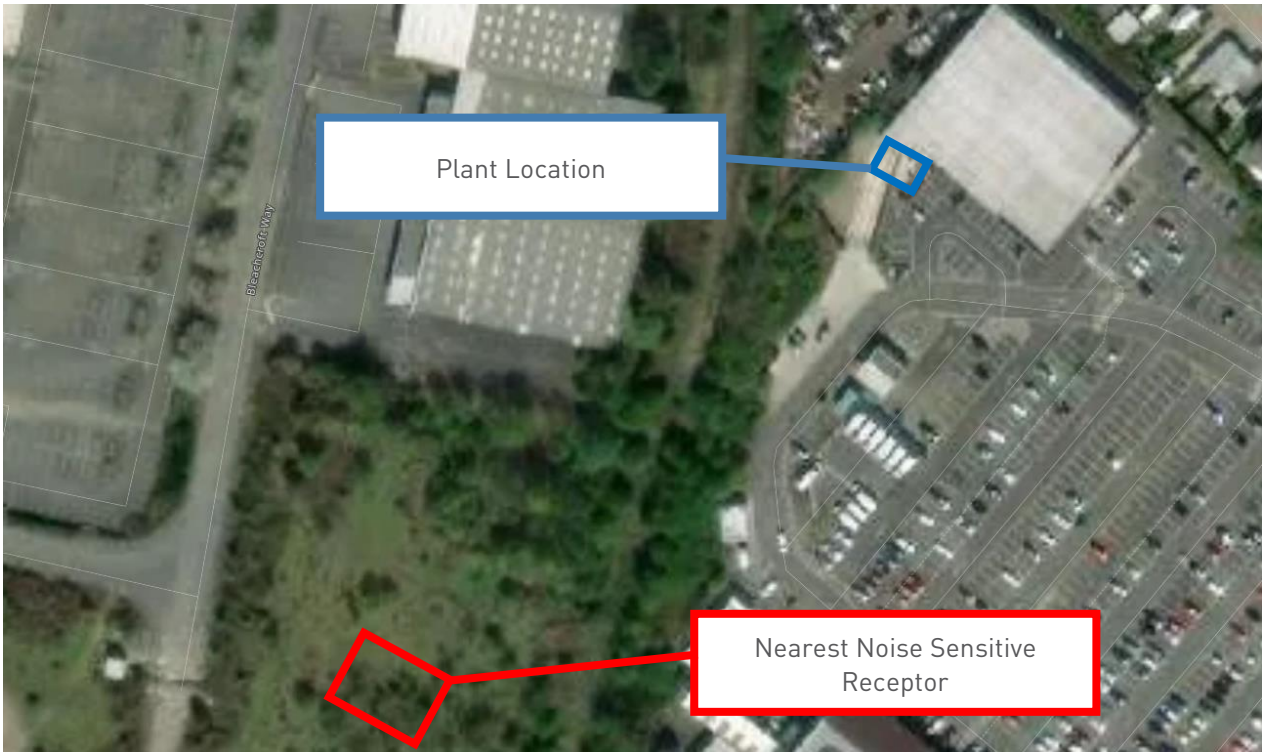
Measurements and observations of noise from the installed plant items were undertaken by James Melville (MSc, BSc, AMIOA) in the morning of Thursday 20th June 2024.

During the measurement period weather conditions were considered appropriate for the measurement of noise, it being dry with light winds around 3 m/s. The temperature was recorded to be around 21 degrees centigrade and partly cloudy with still winds.

Details of the instrumentation used to undertake the measurements are provided in Appendix B. The sound level meter was calibrated both prior to and on completion of the survey with no significant calibration drift observed. The measurements equipment has been laboratory calibrated within the past 2 years, with the field calibrator having undergone an additional calibration check within the past year.

3.2 Location of Nearest Residential Receptors

The closest residential receptor to the proposed plant is considered to be properties along Murray Drive. This receptor is identified in Figure below.



This receptor is approximately 150 metres from the plant location.

3.3 Measurement Locations

Measurements of environmental noise were undertaken for each item of noise generating plant, where noise from the plant was audible above the otherwise residual sound level at close range. Measurements of noise for each plant item were undertaken over a period of time considered suitable so as to not have been significantly affected by residual sound, but not less than 1 minute.

Additionally, a measurement of the residual sound level close to the plant location was undertaken with all plant switched off in order that a suitable correction may be applied to the ambient sound levels measured close to the plant in order to determine the specific sound levels, in accordance with BS 4142 (Methods for rating and assessing industrial and commercial sound) methodology.

3.4 Identified Noise Generating Plant Items

Immediately prior to the measurements of noise from the plant, the heating within the PureGym unit was turned up high so as to present a high load on the condenser units lined up along the southwestern façade of the Gym.

This was considered to represent worst case operation of these units.

From our observations on site, noise from the following items of plant was noted to be audible at close inspection:

- 7No.Condensing Units (Mitsubishi PUZ-M250YKA)

3.5 Measurement Details

The results of the sound level measurements are presented in Table 1 below.

Table 1 – Measured Sound Levels

Measurement	Measured Sound Pressure Level (dB re $20x10^{-6}$ Pa.) @ Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Residual Sound Level	44	39	35	34	36	28	17	10	39
Condenser Units @ 5 meters	53	49	45	42	40	38	35	28	46

In correcting the ambient sound level measurements of the plant for residual sound, the following specific sound levels of the plant are obtained:

Table 2 – Plant Specific Sound Levels

Measurement	Specific Sound Pressure Level (dB re $20x10^{-6}$ Pa.) @ Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Condenser Units @ 5 meters	53	48	45	40	38	37	35	28	44

Finally, correcting the above specific sound levels of plant for distance and screening, the following sound levels are predicted at the façade of the nearest affected noise sensitive properties along hele Road.

Table 3 – Plant Specific Sound Levels at the Identified Noise Sensitive Receptors

Measurement	Specific Sound Pressure Level (dB re $20x10^{-6}$ Pa.) @ Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Condenser Units @ 5 meters	53	48	45	40	38	37	35	28	44
Distance Loss (150m Line Source)	15	15	15	15	15	15	15	15	-
TOTAL at receptor (L_{Atr})	38	33	30	25	23	22	20	13	30

The total rating level for the cumulative plant noise at the nearest receptor is 30dBA this is within the adopted plant noise emission limit of 38dBA, and it is considered, therefore, that plant noise emissions are in accordance with the requirements of the Local Authority.

4.0 CONCLUSION

This report has presented the results of verification measurements and subsequent assessments at the new PureGym, Barnsley.

The verification measurements and subsequent analysis confirms the following:

- Music noise breakout from Gym areas meets the local authority criteria and is therefore compliant with Condition 7.
- Noise from mechanical plant associated the Gym areas meets the local authority criteria and is therefore compliant with Condition 8.

APPENDICES

Appendix A Acoustic Terminology

dB	Decibel - Used as a measurement of sound pressure level. It is the logarithmic ratio of the noise being assessed to a standard reference level.
dB(A)	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dB(A) level. Because of being a logarithmic scale noise levels in dB(A) do not have a linear relationship to each other. For similar noises, a change in noise level of 10dB(A) represents a doubling or halving of subjective loudness. A change of 3dB(A) is just perceptible.
L_{eq}	L_{eq} is defined as a notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (1 hour).
L_{Aeq}	The level of notional steady sound which, over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measured over that period.
L_{An} (e.g L_{A10}, L_{A90})	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time, hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the average minimum level and is often used to describe the background noise.
$L_{max,T}$	The instantaneous maximum sound pressure level which occurred during the measurement period, T. It is commonly used to measure the effect of very short duration bursts of noise, such as for example sudden bangs, shouts, car horns, emergency sirens etc. which audibly stand out from the general level of, say, traffic noise, but because of their very short duration, maybe only a very small fraction of a second, may not have any effect on the L_{eq} value.
Noise Rating (NR)	A standardised set of curves relating octave-band sound pressure level to the centre frequency of the octave bands, each of which is characterised by a 'noise rating' (NR), which is numerically equal to the sound pressure level at the intersection with the ordinate at 1kHz.

Appendix B Details of Measurement Equipment

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Valid Until
Norsonic Type 1 Sound Level Meter	Nor140	1406007	U41328	22 June 2024
Norsonic Pre Amplifier	1209	20043		
Norsonic ½" Microphone	1225	208146	41327	22 June 2024
Norsonic Sound Calibrator	1251	34127	U41326	22 June 2024
Norsonic Type 1 Sound Level Meter	Nor140	1406969	U45341	12 September 2025
Norsonic Pre Amplifier	1209	21204		
Norsonic ½" Microphone	1225	285599	45340	12 September 2025
Norsonic Sound Calibrator	1251	34966	U45339	12 September 2025

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