



PureGym – Seven Sisters, N15

Plant Noise Impact Assessment Report

Reference: 11617.RP01.PNA.2

Prepared: 9 February 2023

Revision Number: 2



PureGym

Seven Sisters Road

London

England

N15 5JT

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Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	9 February 2023	Antonio Gomes	James Stokes
1	Updated Design	26 July 2022	Antonio Gomes	James Stokes
2	Updated Design	9 February 2023	Martin Raisborough	Torben Andersen

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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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Contents

1.0	EXECUTIVE SUMMARY.....	1
2.0	SITE DESCRIPTION.....	2
3.0	ENVIRONMENTAL NOISE MONITORING.....	3
3.1	Measurement Location.....	3
3.2	Instrumentation.....	3
3.3	Measurement Results.....	4
4.0	PLANT NOISE IMPACT ASSESSMENT	5
4.1	Local Authority Liaison.....	5
4.2	Plant Noise Emission Limits	5
4.3	Nearest Noise Sensitive Receptors	5
4.4	Proposed Plant Items.....	5
4.5	Noise Levels	5
4.6	Plant Layout	6
4.7	Proposed Mitigation	6
4.8	Plant Noise Impact Assessment.....	7
4.9	Uncertainty	8

APPENDICES

APPENDIX A ACOUSTIC TERMINOLOGY

APPENDIX B SITE DRAWINGS

APPENDIX C MEASUREMENT EQUIPMENT

APPENDIX D MEASUREMENT RESULTS

1.0 EXECUTIVE SUMMARY

RBA Acoustics has been appointed by PureGym to undertake an environmental noise survey and plant noise assessment for a potential new facility at Apex House, Seven Sisters Road.

This report presents the details and results of the survey, which was undertaken between Friday 21st and Tuesday 25th January 2022, the purpose of which was to benchmark currently prevailing background sound levels to use as a basis for assessing the impact of noise from future proposed items of building services plant on the nearby existing noise sensitive properties. This report then provides assessment of the proposed items of plant associated with the proposed PureGym unit in line with the target plant noise levels.

The predicted noise levels due to the operation of plant at the two identified noise sensitive receptor locations meet the adopted plant noise limits for both the daytime and night time periods, assuming the mitigation treatment assumed in Section 4.7 of this report.

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

2.0 SITE DESCRIPTION

The proposed PureGym unit is currently unoccupied and is in a ground floor commercial unit within Apex Gardens, a 7 storey mixed use building located on Seven Sisters Road (A503), north London. The proposed gym will include some ventilation plant that will be housed internally in the ground floor unit, ducted to atmosphere through façade louvres, and a number of heat rejection plant items proposed on the roof.

The nearest affected noise sensitive properties to the plant are those at 2nd floor level and above within the Apex Gardens building, and also the building to the east, Aster Apartments.

Site drawings indicating the location of the building, the location of the proposed duct terminations as well as the nearest residential receptors are shown in the attached Figures A and B in Appendix B.

3.0 ENVIRONMENTAL NOISE MONITORING

Monitoring of the prevailing background noise levels was undertaken between Friday 21st and Tuesday 25th January 2022. Measurements commenced at approximately 10:00 on Friday 21st and concluded at around 11:00 on Tuesday 25th. The equipment was installed and collected by James Stokes (Consultant at RBA Acoustics).

3.1 Measurement Location

To determine the background noise climate at the nearest affected residential receptors to the site, the equipment was installed at the window of Flat no 201 (used only for storage by the building management) within the Aster Apartments building, overlooking Seven Sisters Road where the prevailing noise climate was considered representative of the background noise climate at the nearest noise-sensitive receptors. The sound level meter was secured at 1m outside the window on an A-frame.

Continuous measurements of the L_{A90} , L_{Amax} and L_{Aeq} noise levels were made over 15-minute sample periods throughout the survey period.

The measurement location is illustrated in Figure B in Appendix B, and is also shown below in Figure 1.

Figure 1 – Baseline Survey Measurement Position



The prevailing noise climate at the measurement position was noted to consist mainly of road traffic from Seven Sisters Road and the nearby and surrounding roads, in addition to other general urban noise sources (human activity, etc.).

Weather conditions were suitable for the measurement of noise, it being dry with wind speeds below 4 m/s and temperatures of around 10 degrees.

3.2 Instrumentation

For information regarding the equipment used for the measurements please refer to Appendix C.

The sound level meter was calibrated both prior to and on completion of the survey with no calibration drifts observed. The sound level meter and calibrator have been laboratory calibrated within the last 2 years and 1 year respectively.

3.3 Measurement Results

The full results of the measured sound levels are shown as time-histories on the Graphs presented in Appendix D.

The typically lowest measured $L_{A90, 15min}$ periods over the entire survey period are summarised in the table below. These are based on the 90th percentile of the 15-minute dataset over the survey period.

Table 1 – Measured Background Noise Levels

Survey Period	Assessment Period	Typical lowest background noise level, $L_{A90, 15min}$ (dB)
Friday 21 st to Tuesday 25 th January 2022	Daytime (07:00 – 23:00)	58
	Night-time (23:00 – 07:00)	49

4.0 PLANT NOISE IMPACT ASSESSMENT

4.1 Local Authority Liaison

Noise associated with the operation of future plant items associated with the scheme has the potential to adversely impact upon the nearby noise sensitive properties.

It is our understanding that the London Borough of Harringay (LBH) requires that cumulative plant noise emissions are designed so as not to exceed a resulting noise level of 10dB below the lowest measured typical background noise level, as determined at 1m outside the windows of the nearest noise-sensitive receptor.

4.2 Plant Noise Emission Limits

Considering the above, and the typically lowest noise levels representative of those at the nearest affected noise sensitive properties fronting Seven Sisters Road, the following plant noise emission limits are recommended.

Table 2 – Cumulative Plant Noise Emission Limit at Receptor

Assessment Period	Cumulative Plant Noise Limit at Receptor * L _{A,r,T} (dB)
Daytime (07:00 – 23:00)	48
Night-time (23:00 – 07:00)	39

* These limits are to be achieved at 1 metre from the exposed façades of the noise sensitive properties fronting Seven Sisters Road due to cumulative operation of the proposed PureGym plant at representative worst-case duty.

4.3 Nearest Noise Sensitive Receptors

The nearest noise sensitive receptors to the site that are likely to be affected by noise from fixed plant items are the Aster Apartments building (Location 1) and Apex Gardens (Location 2). These are identified in Figure A in Appendix B.

4.4 Proposed Plant Items

The following items of plant are proposed:

- 3no. Condensing Units (Mitsubishi PUHY-P300YNW-A1, externally mounted on roof).
- 1 No. Condensing Units (Mitsubishi PUZ-ZM50VKA2, externally mounted on roof).
- 5no. HRU (Mitsubishi LGH 100RVX-E) internally mounted, ducted to atmosphere.
- 1No. Extract Fan (Helios SVR EC 315B) internally mounted, ducted to atmosphere.

4.5 Noise Levels

Information regarding the noise levels of the proposed plant has been provided by the manufacturers of the units. The associated plant noise levels are detailed in Table 3 below.

Table 3 – Plant Noise Levels

Plant Details	Parameter	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Condensing Units CU1-9 (Mitsubishi PUHY-P300YNW-A1)	L_p at 1m	76	64	63	60	54	50	46	41	61
Condensing Units CU1-9 (Mitsubishi PUZ-ZM50VKA2)	L_p at 1m	58	51	45	44	40	37	32	31	46
Heat Recovery Units (Mitsubishi LGH 100RVX-E)	In-duct Sound Power Level*	59	56	50	51	50	55	55	45	60
Extract Fan, EF1 (Helios SVR EC 315B)	In-duct Outlet, L_w	98	84	78	81	76	71	68	62	82

Notes :

* The manufacturer's published noise data for these units is sound pressure levels at 1 metre beneath the unit casing, with open inlets and outlets. Suitable corrections have been made to estimate the in-duct sound power levels for the unit.

Review of the octave band data provides no indication of any tonal characteristics associated with the proposed plant.

4.6 Plant Layout

The proposed locations and layouts of the plant are shown in the plan in Figure C of Appendix B.

4.7 Proposed Mitigation

Our calculations indicate that attenuation would be required for the extract fan, achieving the following insertion losses as a minimum :

Attenuator Serving	Dynamic Insertion Loss (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Heat Recovery Units (Fresh air inlet and atmosphere paths, typically achieved using 600mm long, 35% free area attenuator)	3	6	10	14	20	19	14	13
EF1 (Typically achieved using 1500mm long, 35% free area attenuator)	6	13	23	37	43	44	35	20

4.8 Plant Noise Impact Assessment

Our calculation method for predicting noise levels from the proposed plant at the nearest residential windows, based on the information stated above, is summarised below.

- Source Term SPL
- 10LogR Distance Attenuation
- Screening
- Reflections

Considering the above, the results of the calculations indicate the following noise levels at 1 metre from the façade of the affected dwelling at the Aster Apartments Building (Location 1).

Table 3 – Plant Noise Assessment – Location 1

Plant Details	Predicted Noise Level @ Nearest Noise-Sensitive Receptor		
	Specific Noise Level	Rating Corrections	BS 4142 Rating Noise Level
Condensing Units CU1-9 (Mitsubishi PUHY-P300YNW-A1)	17dBA	0	17dB L _{Ar, T}
Condensing Units CU1-9 (Mitsubishi PUZ-ZM50VKA2)	7dBA	0	7dB L _{Ar, T}
Heat Recovery Units (Mitsubishi LGH 100RVX-E)	22dBA	0	22dB L _{Ar, T}
Extract Fan, EF1 (Helios SVR EC 315B)	33dBA	0	33dB L _{Ar, T}
Total Noise Level @ Receptor Location 1			33dB L_{Ar, T}

From the above it can be seen that the predicted noise level at residential receptor Location 1 meets the adopted plant noise limits for both the daytime and night time periods.

The results of the calculations indicate the following noise levels at 1 metre from the façade of the affected dwellings at Apex Gardens (Location 2).

Table 6 – Plant Noise Assessment – Location 2

Plant Details	Predicted Noise Level @ Nearest Noise-Sensitive Receptor		
	Specific Noise Level	Rating Corrections	BS 4142 Rating Noise Level
Condensing Units CU1-9 (Mitsubishi PUHY-P300YNW-A1)	31dBA	0	31dB L _{Ar, T}
Condensing Units CU1-9 (Mitsubishi PUZ-ZM50VKA2)	12dBA	0	12dB L _{Ar, T}
Heat Recovery Units (Mitsubishi LGH 100RVX-E)	13dBA	0	13dB L _{Ar, T}
Extract Fan, EF1 (Helios SVR EC 315B)	11dBA	0	11dB L _{Ar, T}
Total Noise Level @ Receptor Location 2			31dB L_{Ar, T}

From the above it can be seen that the predicted noise level residential receptor Location 2 meets the adopted plant noise limit during the daytime and night time periods.

4.9 Uncertainty

Uncertainty is an unavoidable feature of measurements in the field, which can be subject to many factors; the weather typically being the most significant of which with respect to the measurement of sound. Uncertainty is also unavoidable in the prediction of sound levels, where naturally, before the scenario being considered becomes a reality, a number of assumptions need to be relied upon. There is also the uncertainty of people's reactions, which can be influenced by a number of factors, not just the magnitude or character of the sound in question.

In keeping with the scale of each project, therefore, it is the aim of RBA Acoustics to minimise uncertainty at each stage as far as reasonably practicable. With this in mind, RBA Acoustics follow the best practise methodologies based on the guidance within BS 4142:2014 and our experience in undertaking assessments of these nature.

Crucially, it has been determined that environmental noise measurements have been undertaken by suitably qualified staff, using in calibration equipment and avoiding adverse weather conditions.

The predictions have also been undertaken by suitably qualified staff, whilst using the best available information, an industry standard calculation method, and the most applicable calculation procedures.

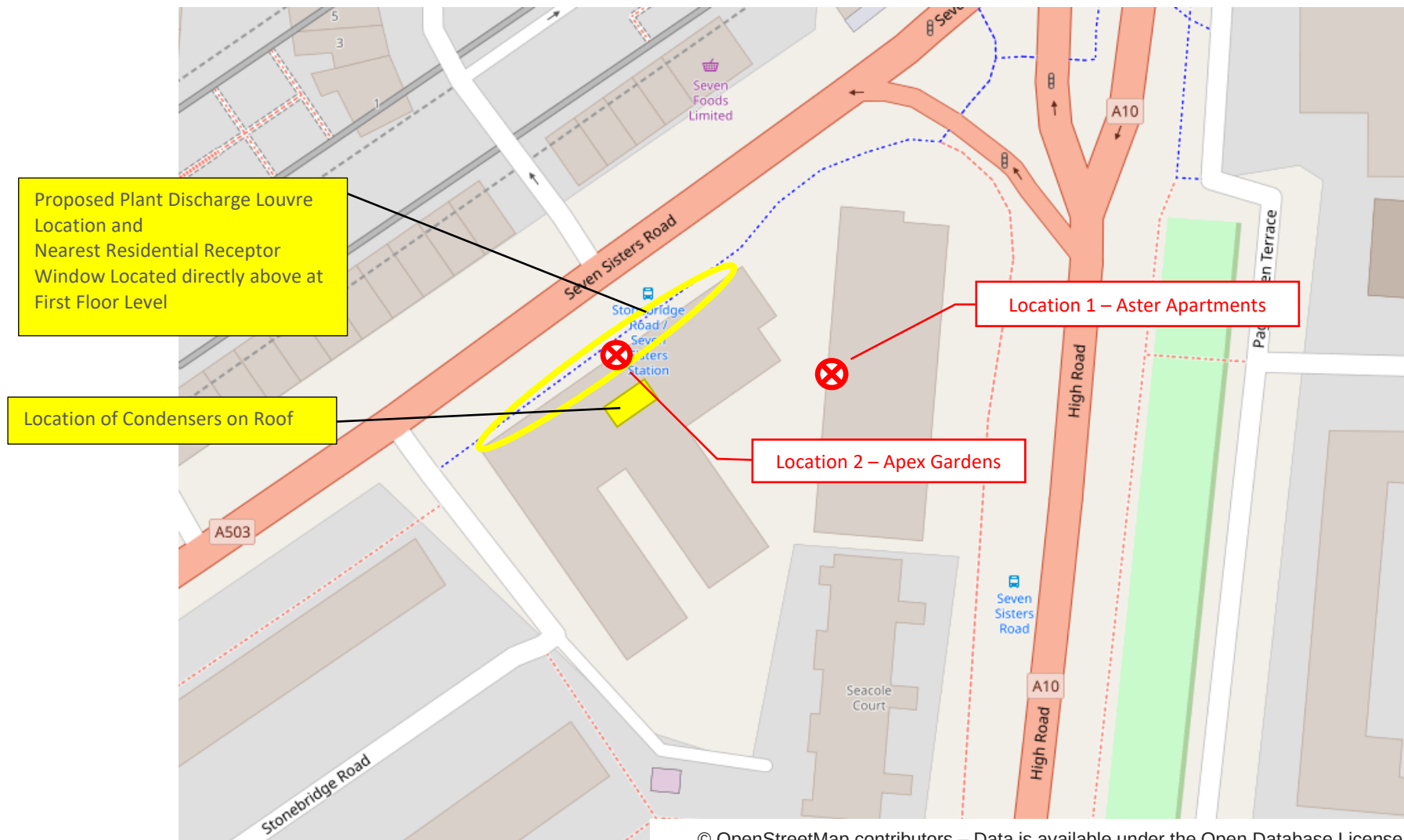
Notwithstanding this, naturally some uncertainty remains. Given the sheer number of factors involved, however, it is not feasible to place a value on the level of uncertainty, without resulting in an unhelpful range of possible outcomes. It is the professional position of RBA Acoustics that uncertainty has been kept to a realistic minimum and that the outcome of this assessment is sufficiently representative.

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_n (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.

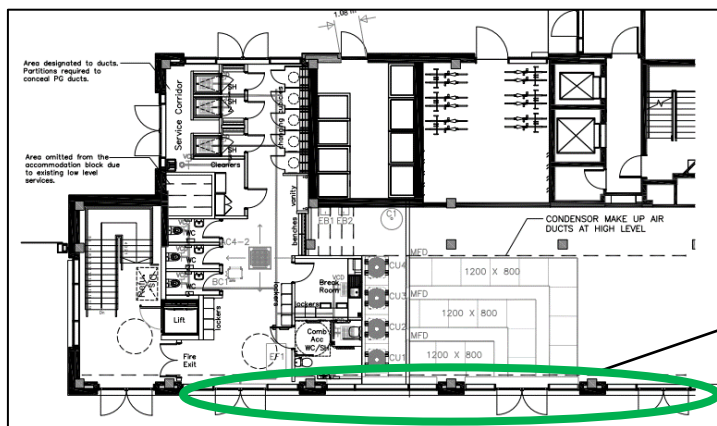
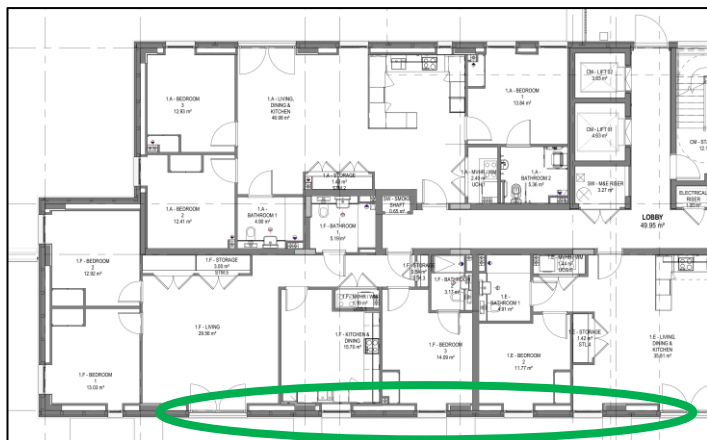
Appendix B Site Drawings



PureGym – Seven Sisters, N15
 Site, Plant & Receptor Locations
 Project 11617

Figure A
 9 February 2023
 Not to Scale





Baseline Noise Survey Location

Proposed Ventilation Atmospheric
Plant Duct Terminations via Weather
Louvre

Appendix C

Measurement Equipment

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Valid Until
Norsonic Type 1 Sound Level Meter	Nor140	1406262	U37578	8 April 2023
Norsonic Pre Amplifier	1209	20487		
Norsonic ½" Microphone	1225	225566	37577	7 April 2023
Norsonic Sound Calibrator	1251	34429	U37576	7 April 2023

Appendix D

Measurement Results

PureGym, Seven Sisters

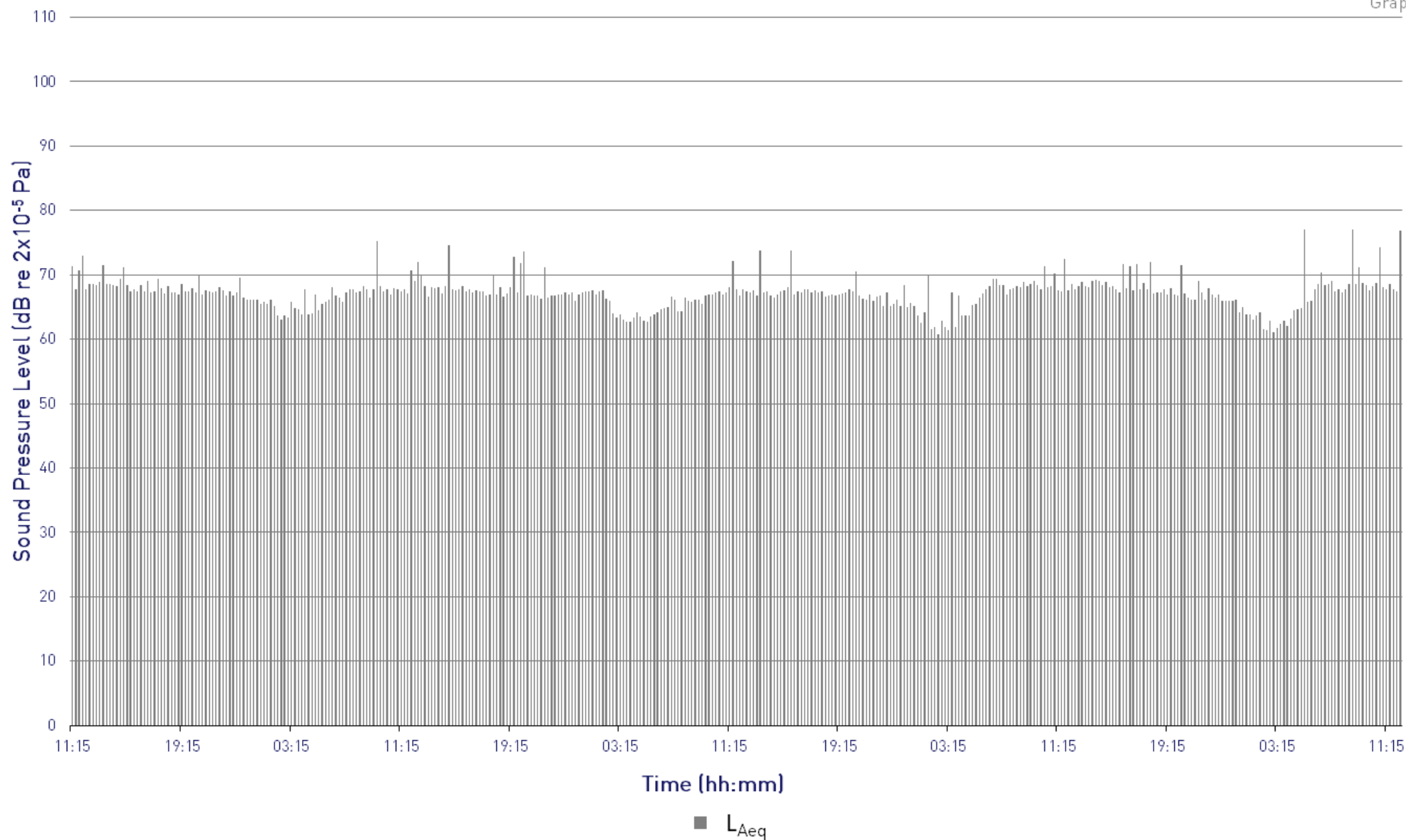
L_{Aeq} Time History

2nd Floor Level Window, Friday 21st January to Tuesday 25th January 2022



Project: 11617

Graph 1



PureGym, Seven Sisters

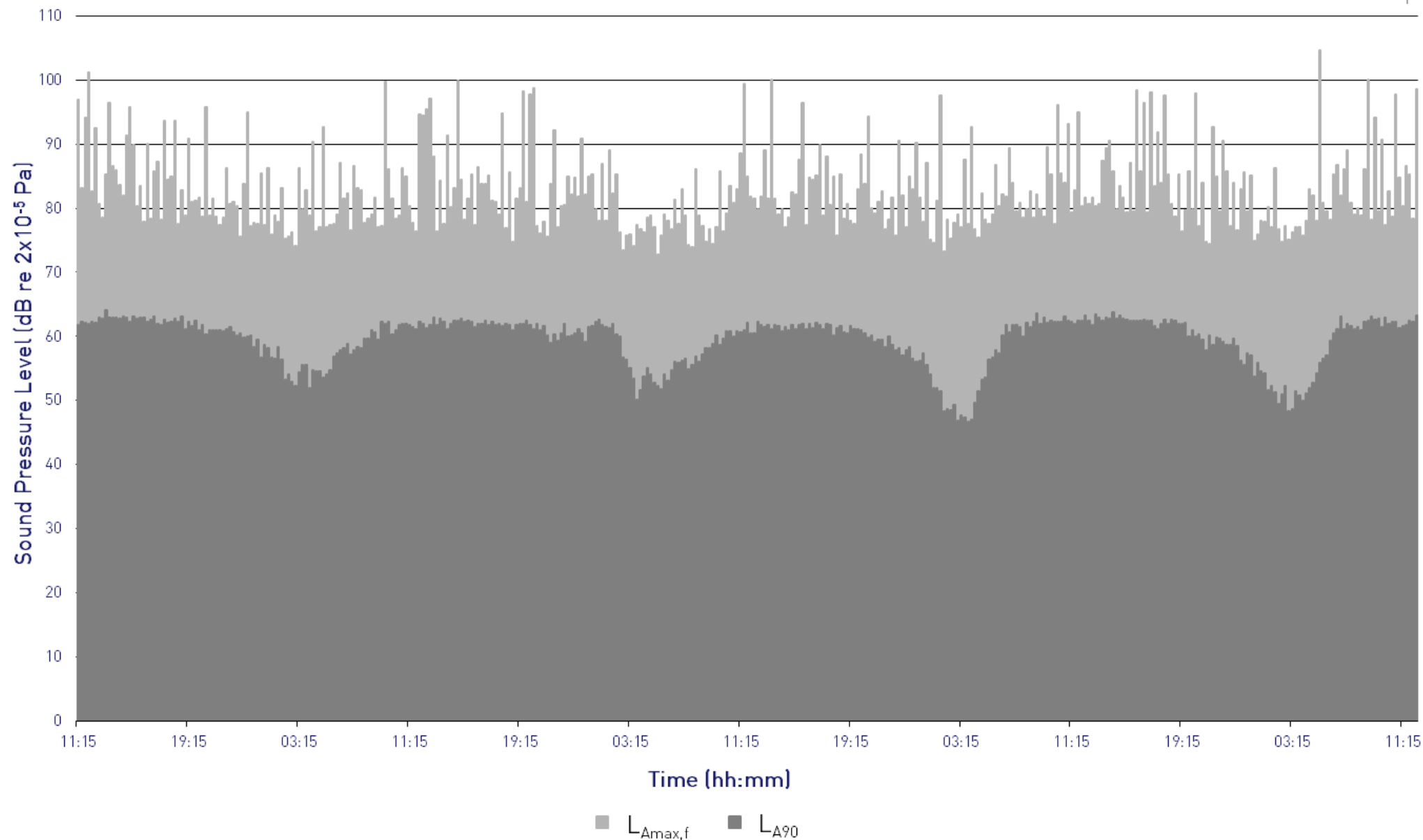
$L_{Amax,f}$ and L_{A90} Time History

2nd Floor Level Window, Friday 21st January to Tuesday 25th January 2022



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Graph 2



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