



PureGym – Manchester Fort Shopping Park

Plant Noise Assessment Report

Reference: 10743.RP01.PNA.1

Prepared: 02 August 2021

Revision Number: 1

PureGym

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Revision	Comment	Date	Prepared By	Reviewed By	Approved By
0	First issue of report	23 February 2021	Martin Raisborough	James Stokes	Torben Andersen
1	Updated with revised plant scheme	02 August 2021	Martin Raisborough	James Stokes	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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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 first floor level at the Manchester Fort Shopping Park, Cheetham Hill.

This report presents the details and results of the noise survey, which was undertaken between Thursday 21st and Friday 22nd January 2021, 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 also presents the details and results of a noise impact assessment on the nearby noise sensitive receptors. The assessment has determined that the impact on the nearest affected noise sensitive properties is in accordance with the requirements of the Local Authority without the need for any mitigation measures.

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.

2.0 SITE DESCRIPTION

The unit is proposed within a row of terraced retail units that form part of the Bicester Shopping Park, an out-of-town retail park in Cheetham Hill area of north Manchester, Lancashire. The unit is proposed at 1st floor level above a Lidl store. Retail units are also located either side of the PureGym unit.

The unit is located in a mixed commercial and residential area of Cheetham Hill. A grade level car park is located to the south of the unit, while the main area of the retail park is located to the east of the site, on the opposite side of Cheetham Hill Road. Elizabeth Street bounds the site to the west, beyond which a number of light industrial units are located. To the north of the site is the A6010, Queens Road, beyond which are a line of 3 to 4 storey residential properties. These properties overlook the rear of the site, and the rear service yard area for the units. It is also understood that services plant for the Pure Gym unit are to be located in this service yard area.

The nearest affected noise sensitive receptors to the site are those located to the north of the unit, directly opposite the service yard of the gym. These are at an approximate distance of 20 metres.

A site plan indicating the location of the building, and the location of the nearest noise sensitive properties, is highlighted in the site plan in Appendix B.

3.0 ENVIRONMENTAL NOISE MONITORING

Monitoring of the prevailing background noise levels was undertaken between Thursday 21st and Friday 22nd January 2021. Measurements commenced at approximately 19:30 on Thursday 21st and concluded at around 11:45 on Friday 22nd. The equipment was installed and collected by James Melville (BSc, MSc, AMIOA), Consultant at RBA Acoustics.

3.1 Measurement Location

In order to determine the background noise climate at the nearest affected residential receptors to the site, the equipment was installed at the northern boundary of the site, within the service yard area overlooking Queens Road. The sound level meter was secured to the corner of the commercial units, with the connecting microphone mounted on a tripod such that it was approximately 1 metre from the building façade and approximately 1.5m above the ground. The prevailing noise climate at this location was considered representative of the background noise climate at the nearest noise sensitive receptors on the opposite side of Queens Road to the site.

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

The measurement location is illustrated on the site plan in site plan in Appendix B, and is also indicated in Figure 3-1 below.

Figure 3-1 – Measurement position



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

Weather conditions were considered to be suitable for the measurement of noise, it being dry with wind speeds below 4 m/s and temperatures of around 5 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. For comparison, the absolute lowest level is also shown in brackets, although these are considered atypical.

Table 1 – Summary of Noise Survey Data

Measurement Date	Measurement Period	Typical lowest $L_{A90, 15min}$ (dB)
Thursday 21 st and Friday 22 nd January 2021	Daytime (07:00 – 23:00)	48dB (44dB)
	Night-time (23:00 – 07:00)	41dB (41dB)

4.0 PLANT NOISE IMPACT

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. In order to understand acceptable levels of noise impact, reference is made to acoustic reports that have been prepared by others for this site. The AECOM Report dated 17th December 2018 in relation to the occupation of an adjacent unit by Lidl, contains details of MCC's Noise and Planning Guidance 2015, which states that it is necessary to demonstrate that:

'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 (LAeq) below the typical background (LA90) level at the nearest noise sensitive location'.

The above criteria and guidance will be considered in the subsequent assessments of environmental noise impact.

4.2 British Standard 4142:2014

BS4142:2014 *Methods for rating and assessing industrial and commercial sound* describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

- sound from industrial and manufacturing processes
- sound from fixed installations which comprise mechanical and electrical plant and equipment
- sound from the loading and unloading of goods and materials at industrial and/or commercial premises
- sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

The methods described within BS4142:2014 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.

The standard is also applicable to determine rating levels for sound of an industrial or commercial nature at proposed new dwellings or premises used for residential premises. The standard is only appropriate for the assessment of external sound levels.

The assessment method described in BS4142:2014 is based on the continuous sound pressure level produced by a specific source ($L_{Aeq,Tr}$) at the assessment location. Appropriate corrections allowing for any tonality, impulsivity, other characteristics or intermittency of the specific sound source are then applied to derive the rating level ($L_{Ar,Tr}$). The rating level is then compared to the background sound level ($L_{A90,T}$) to produce the relative difference, or excess of rating level over background sound level. BS4142:2014 quantifies the estimated impact from the excess as:

- a) Typically the greater this difference, the greater the magnitude of impact.
- b) A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- d) 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.

4.3 Plant Noise Emission Limits

Based on the guidance in the sections above, and the typically lowest noise levels representative of those at the nearest affected noise sensitive properties fronting Queens Road, the following plant noise emission limits are recommended.

Table 2 – Plant Noise Emission Limits

Period	Typical lowest $L_{A90,15min}$ (dB)
Daytime (07:00 – 23:00)	43dB $L_{Ar, T}$
Night-time (23:00 – 07:00)	36dB $L_{Ar, T}$

These limits are to be achieved at 1 metre from the façade of the noise sensitive properties fronting Queens Road due to cumulative operation of the proposed PureGym plant at representative worst case duty.

4.4 Plant Noise Assessment

An assessment of noise from the proposed plant items has been undertaken in order to understand the impact on the nearby noise sensitive properties, and the need for and extend of any mitigation measures.

Our assessment has been based on the plant layout and items shown in the plan in Appendix E of this report. Based on the location and noise data for the units, the results of our assessments are presented in Table 3 below.

Table 3 – Plant Noise Assessment

Plant Details	Predicted Noise Level @ Dwellings fronting Queens Road		
	Specific Noise Level	Rating Corrections	BS 4142 Rating Noise Level
Condenser Units (10.off.) Mitsubishi PUHZ-ZRP250YKA3	29dBA	0	29dB $L_{Ar, T}$
Heat Recovery Fan Units (4 off.) Mitsubishi Lossnay LGH250RVX-E-1	17dBA	0	17dB $L_{Ar, T}$
Extract Fan (1 off.)	28dBA	0	28B $L_{Ar, T}$
Total Noise Level @ Dwellings fronting Queens Road			32dB $L_{Ar, T}$

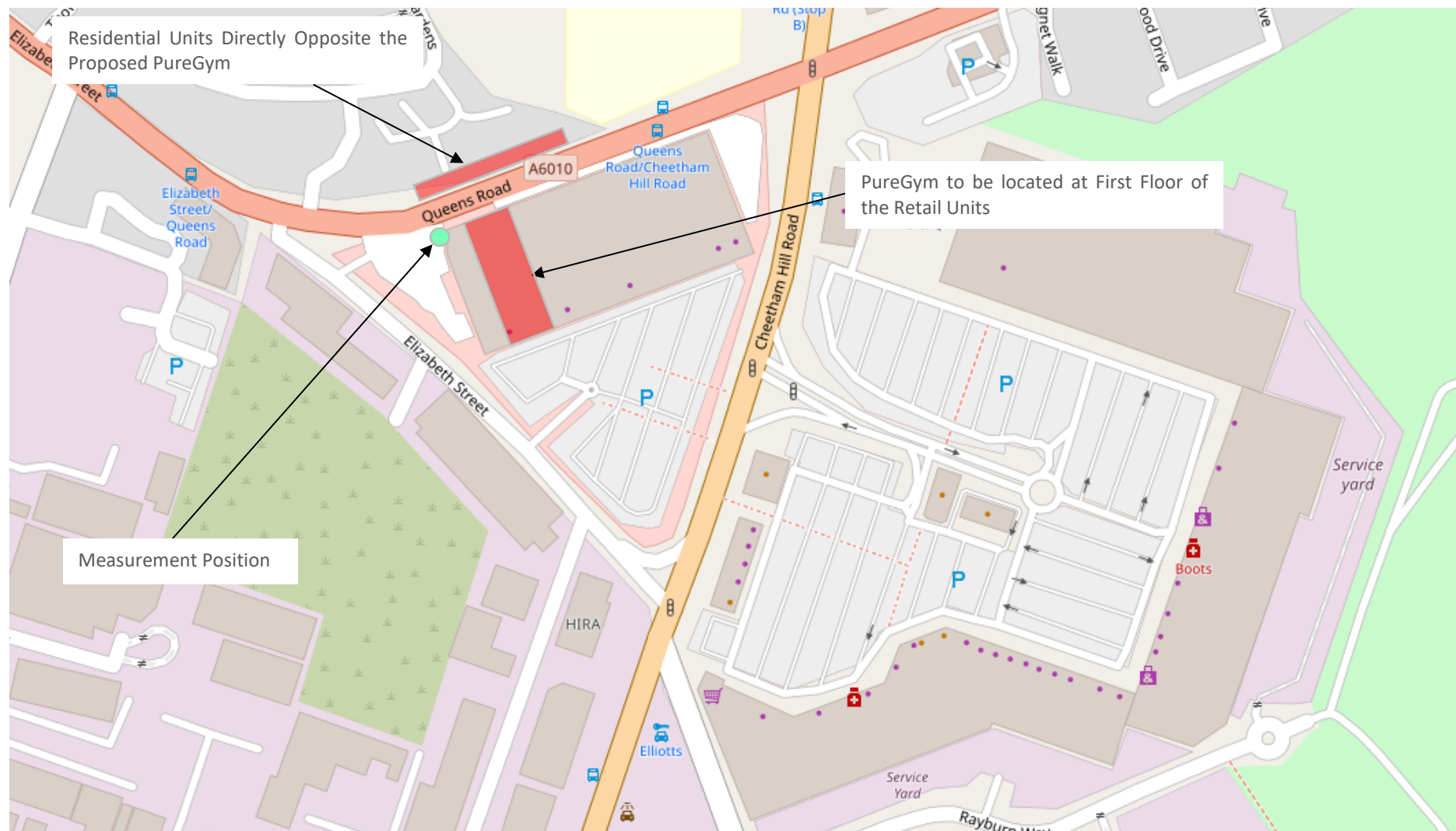
From the above it can be seen that both the daytime and night time noise emission limits are expected to be achieved without the need for mitigation.

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.



PureGym – Manchester Fort Shopping Park
Site Location
Project 10743

Figure A
02 August 2021
Not to Scale



Appendix C

Measurement Equipment

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Valid Until
Norsonic Type 1 Sound Level Meter	Nor140	1407477	473910908	10 October 2021
Norsonic Pre Amplifier	1209	22341		
Norsonic ½" Microphone	1225	358196		
Norsonic Sound Calibrator	1255	125525259	Cal 022-2019-11496	27 September 2021

Appendix D Measurement Results

PureGym, Manchester Fort Shopping Centre

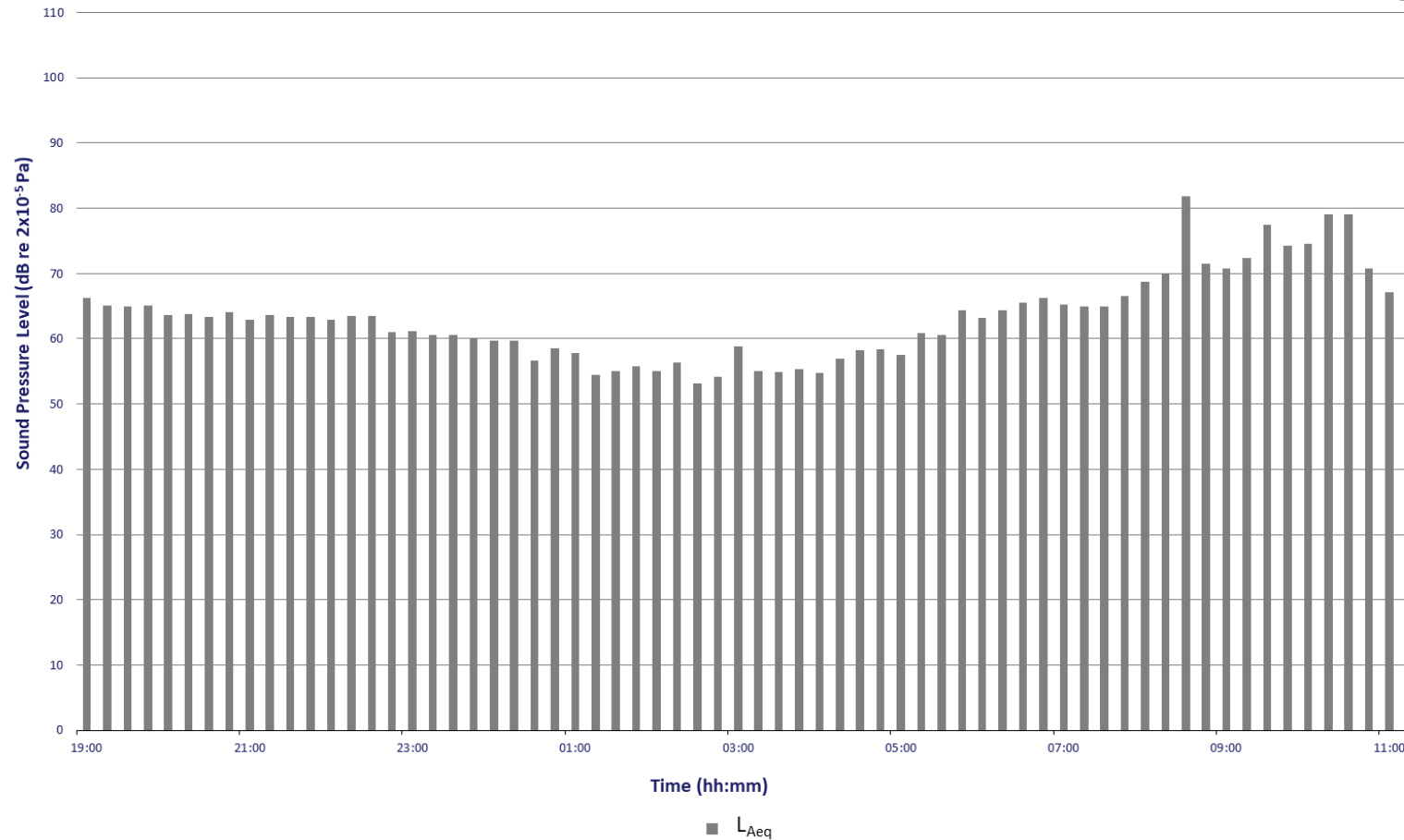
L_{Aeq} Time History

Measurement Position 1



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Graph 1



PureGym – Manchester Fort Shopping Park
Measured L_{Aeq} in 15 Minute Intervals
Project 10743

Graph 1
02 August 2021



PureGym, Manchester Fort Shopping Centre

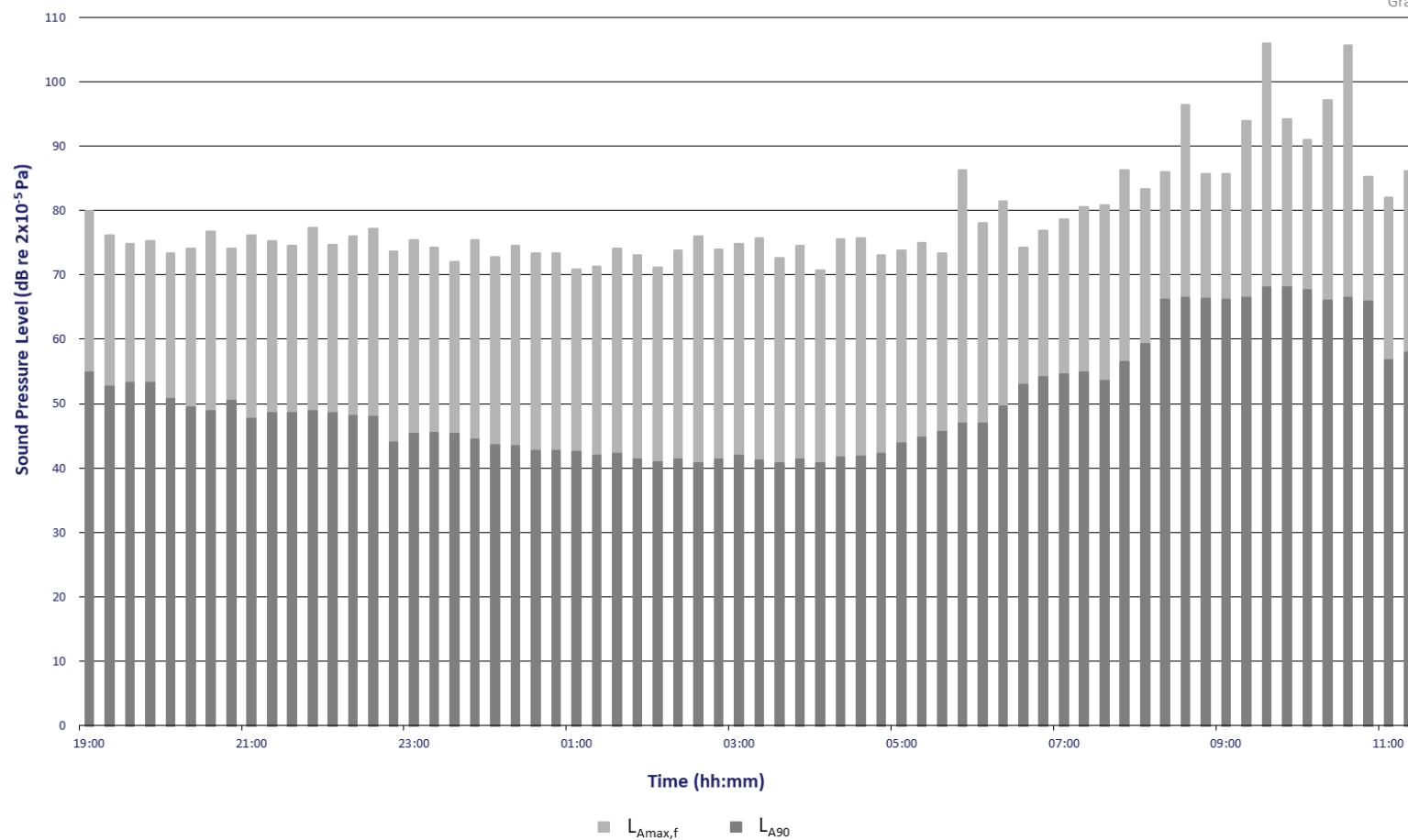
$L_{Amax,f}$ and L_{A90} Time History

Measurement Position 1



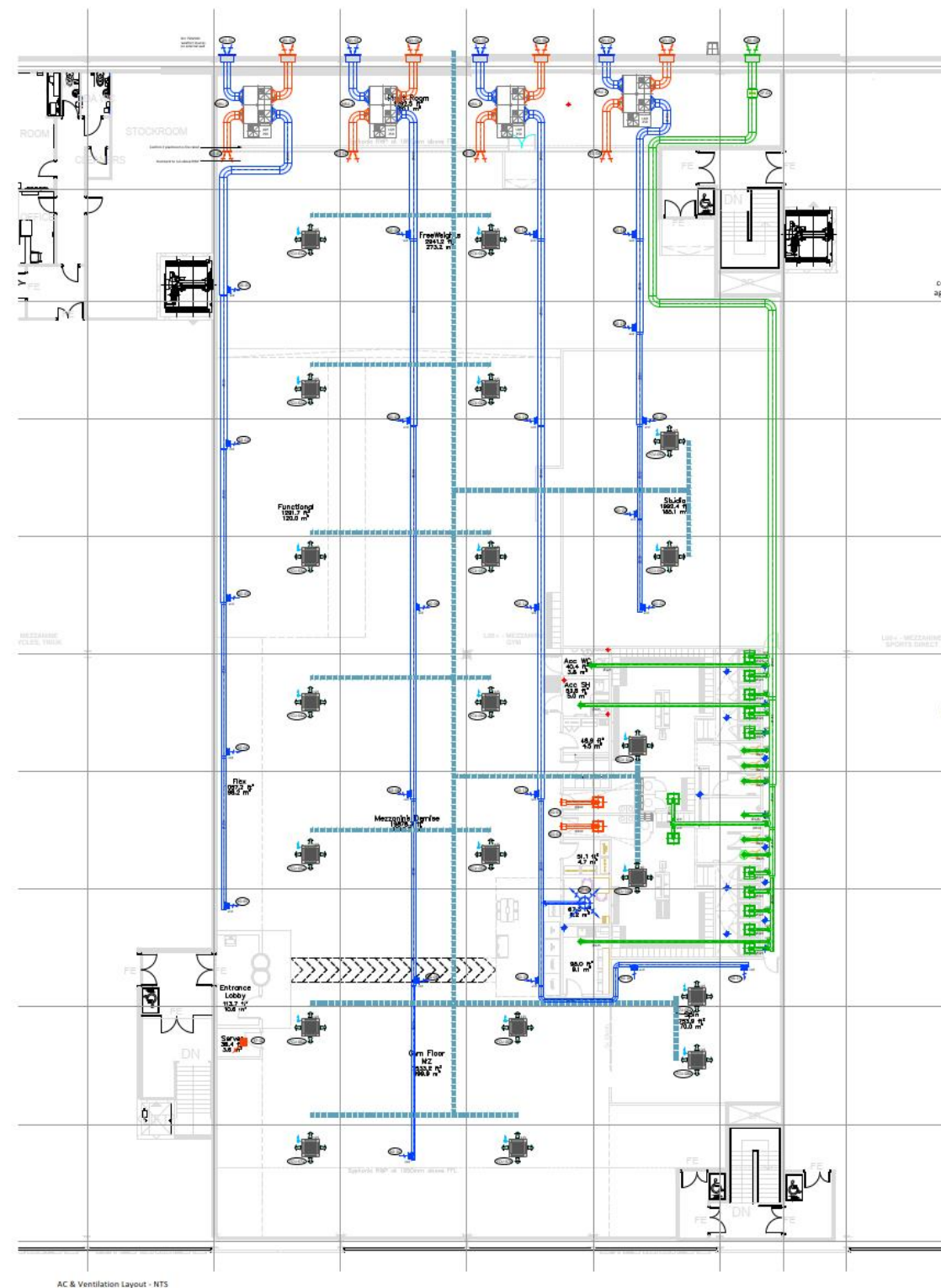
Project: 10743

Graph 2

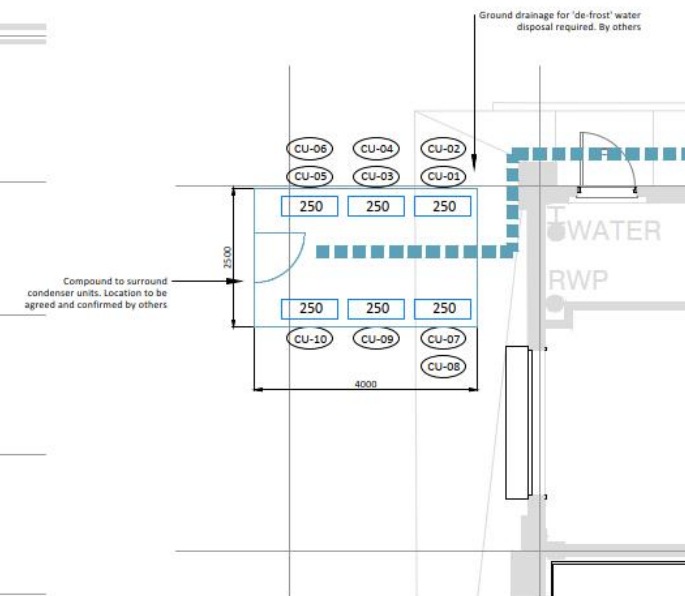


Appendix E

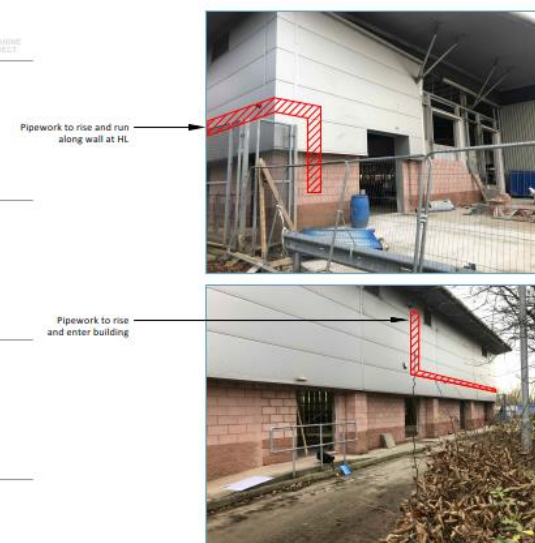
Plant Layout and Data



AC & Ventilation Layout - NTS



Indicative External Plant Compound



Indicative External Pipework Route

General Notes

Note: This drawing to be read in conjunction with all standard details and specifications.
All dimensions to be verified on site.
All works to comply with current building regulations.

Design Notes

Ventilation - 223 @ 12l/s/p. Total = 2,676l/s
Unit Selection - 4x LGH250 (694l/s each) = 2,776l/s

Heating / Cooling
Selection - 18x PLA-125 (12.5kW each) = 225kW
Changing Areas - 2x PLA-71 (1x per changing area)

Ductwork Distribution -
The 4x Lossnay will be located in the plantroom at high level.
note, ceiling height is approx 3m in this area. Ductwork to distribute generally as indicated. Note, on grid line F low point due to roof beam is approx 3.3m. Largest ductwork at this point will be 300mm dia plus clearance.

AC Distribution -
The Condensers will be externally mounted in enclosure (by others). External pipework to run as indicated on photos below, mounted to external wall, confirm where nearest internal drain is for condensate discharge. Internally pipework to run at HL between steel work and cross above ductwork where required.

PRELIMINARY

ambient
air conditioning

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Engineers

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Pure Gym

Project/Location
**Pure Gym Manchester
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Drawing Title
**Ventilation
And
Air Conditioning
Layout - Mezzanine**

Scale
1:100 A3

Drawn
M.S.

Engineer
J.M.

Approved
[Signature]

Server: \\Projects\\All Drawings\\Ambient Drawings

Project No.
C000

Drawing No.
M01

Revision
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