



PureGym, Merthyr Tydfil

Environmental Noise Survey Report

Reference: 11266.RP02.ENS.0

Prepared: 1 November 2021

Revision Number: 0



PureGym

Town Centre House
Merrion Centre
Leeds
United Kingdom

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Revision	Comment	Date	Prepared By	Reviewed By	Approved By
0	First issue	1 November 2021	Doug Shearer	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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1.0 INTRODUCTION

RBA Acoustics has been appointed by PureGym to undertake an environmental noise survey for a potential new facility within Unit 1C at the Pentrebach Retail Park, Merthyr Tydfil. The proposed unit is one of a row of terraced adjoining out-of-town retail units on the southern edge of Merthyr between Merthyr Road and the A4060.

This report presents the details and results of the survey, which was undertaken between Thursday 21st and Friday 22nd October 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 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 within the Pentrebach Retail Park, located at the southern edge of Merthyr Tydfil in South Wales and currently occupied by Ruggers, a carpet and rug company. The unit is at the south-eastern end of a row of terraced retail units, with the adjacent unit to the northwest being tenanted by a Home Bargains store. The service yard area is located immediately to the rear of the units, along the southwest boundary of the site, beyond which runs the A4054, Merthyr Road. The main customer car park is located along the front of the units, to the northeast, while the A4060, a main arterial route through the town, passes along the south-eastern boundary of the site. These two roads join at a major roundabout adjacent to the site to the south.

The site is located in a mixed commercial and residential area. The closest noise sensitive properties to the site are those within Greenhill Manor Care Home located to the east of the unit, on the opposite side of the A4060. These properties are two storeys in height and are approximately 56 metres from Unit 1.

The location of the site is shown in the plan in Figure A in Appendix B.

3.0 ENVIRONMENTAL NOISE MONITORING

Monitoring of the prevailing background noise levels was undertaken between Thursday 21st and Friday 22nd October 2021. Measurements commenced at approximately 20:00 on Thursday 21st and concluded at around 10:00 on Friday 22nd. The equipment was installed and collected by Struan Carmichael (BSc, IoA Dip., MIOA) and Doug Shearer (BEng MSc PhD, SMIOA) of RBA Acoustics.

The equipment used to undertake the tests is presented in Appendix C. The sound level meter and field calibrator has been laboratory calibrated within the past 2 years, while the field calibrator has undergone an additional calibration check within the past year. Calibration certificates for all equipment are available on request.

3.1 Measurement Location

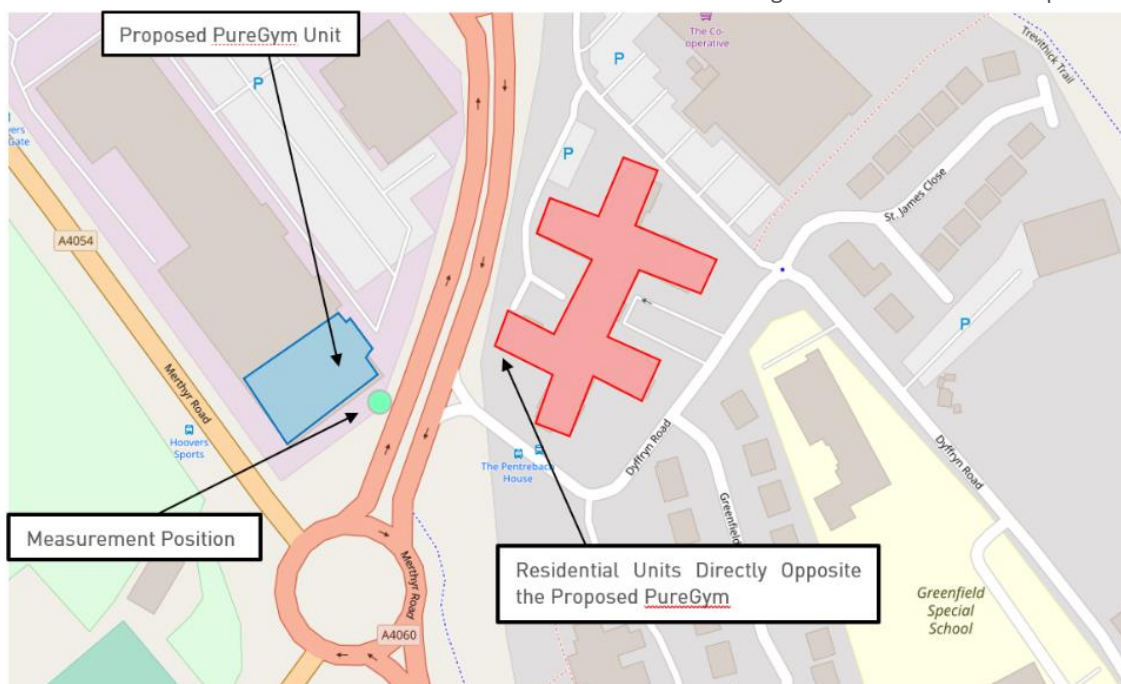
In order to determine the background noise climate at the nearest affected residential receptors to the site the equipment was installed at the eastern boundary of the site, overlooking the A4060. The measurements of noise at this position are considered representative of those at the façade of the residential properties. The sound level meter was secured to a pole and fixed to a fence post overlooking the A4060, close to the eastern corner of the proposed unit.

Although the microphone position was close to vegetation, these were considered to have a negligible effect as wind speeds were noted to be negligible throughout the survey period. The microphone was mounted at a height of approximately 3m and clear of the supporting fence. Measurements at this position are considered to be within the free-field and as such no corrections are appropriate. The prevailing noise climate at this location was considered representative of the background noise climate at the nearest noise sensitive receptors directly opposite. The dominant source of noise across the site was noted to be that due to vehicle movements along the nearby and surrounding roads.

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. Photographs of the equipment in position are also shown in Figure B in Appendix B.

Figure 3-1 – Measurement position



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 drift observed.

3.3 Weather conditions

At the beginning of the survey, weather conditions were noted to be dry with a gentle wind from the west, with hardly any cloud cover and temperature around 9 degrees Celsius. At the end of the survey, weather conditions were noted to be dry and sunny with low wind from the west, scattered cloud cover, with a temperature of around 12 degrees Celsius.

As the survey was unattended, detailed observations of weather conditions were not able to be made. From a nearby weather station (data accessed via www.timeanddate.com), it is noted that there was no precipitation and wind speeds did not exceed 12mph (5.3ms^{-1}) with this windspeed being recorded at noon on the 22nd, an hour after the survey ended. Recorded windspeeds during the survey were between 9 and 10mph (4 and 4.5ms^{-1}).

It must also be noted that the survey position was well sheltered from wind from the west by the extents of Ruggers, and by vegetation planted on approx. 2.5m high fences lining both major adjacent roads. It is considered that the wind speed at the survey location did not affect the survey result.

3.4 Measurement Results

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

The lowest measured $\text{LA}_{90, 15\text{min}}$ 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. We generally consider that designing to the most-commonly occurring $\text{LA}_{90, 15\text{mins}}$ period is not sufficient during those slightly quieter periods. In our opinion, a more representative value would be the “typical-lowest” level, which can be determined statistically as the lowest rounded $\text{LA}_{90, 15\text{mins}}$ level which occurs for at least 10% of the assessment period. For comparison, the absolute lowest $\text{LA}_{90, 15\text{min}}$ levels are also shown in brackets, although these are considered atypical. These are shown in Table 1 below.

Table 1: Survey Results for typical lowest $\text{LA}_{90, 15\text{ minute}}$

Measurement Date	Measurement Period	Typical lowest $\text{LA}_{90, 15\text{min}}$ (dB)
Thursday 19 th – Friday 20 th August 2021	Daytime (07:00 – 23:00)	47 (40)
	Night-time (23:00 – 07:00)	33 (31)

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.

Merthyr Tydfil County Borough Council were contacted regarding details of their plant noise policy and in correspondence from EHO Garin Eldred dated 1st November 2021 the following policy was detailed.

"In order to ensure that background noise levels at nearby dwellings do not increase, the total combined noise level from all plant should be no greater than 10 dB(A) below the existing background $L_{A90,T}$ noise level at those dwellings."

In line with this guidance therefore recommend the following criteria for plant specification.

- Daytime (07:00 – 23:00) – 37dB
- Night-time (23:00 – 07:00) – 23dB

We suggest that imposing noise emission limits as low as 23dBA is both unnecessary to achieve acceptable conditions for the nearest noise-sensitive properties, and unenforceable with regard to the ability of normal (Class 1) instrumentation to measure the noise contribution of new plant. For example, Section 1 of BS 4142: 1997, states

"The method is not suitable for assessing the noise measured inside buildings or when the background and rating noise levels are both very low...For the purposes of the standard, background noise levels below about 30dB...are considered to be very low"

Under such circumstances, we propose that, for an urban site such as the Pentrebach Retail Park, a criterion of 30dBA is a realistic minimum target to work to. Notwithstanding this, all reasonable efforts should be made to reduce noise levels as much as is reasonably practicable.

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 ($L_{Aeq,T}$) 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 ($L_{Ar,T}$). 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 Future Plant Assessment

At the time of writing, details regarding the specific plant items, their proposed locations, noise levels and operating hours required for mechanically servicing the property are not available, as plant details are yet to be confirmed. Therefore, predictions are currently unable to be undertaken to satisfy the above requirements.

When plant information becomes available, consideration will need to be given to the following:

- The location of the nearest noise sensitive premises to the proposed locations of the plant and the distance from the plant location to the nearest noise sensitive window.
- The proposed operational hours of the plant, plant type, number of plant and location of plant.
- Manufacturer's specifications of plant and/or proposed noise levels of internal activity in octave or 1/3 octave band format.
- Calculations for the predicted noise level 1 metre from the window of the nearest sensitive property including distance, directionality and screening effects.
- The report should demonstrate that the predicted noise level outside the most affected window will comply with the limits stated in the standard condition.
- Details of any proposed attenuation measures and details of noise reductions achieved (including manufacturer's guidance on acoustic performance of any acoustic louvers, enclosure, screens etc).

A full report detailing plant selections and predicted noise levels will be prepared once such details are available.

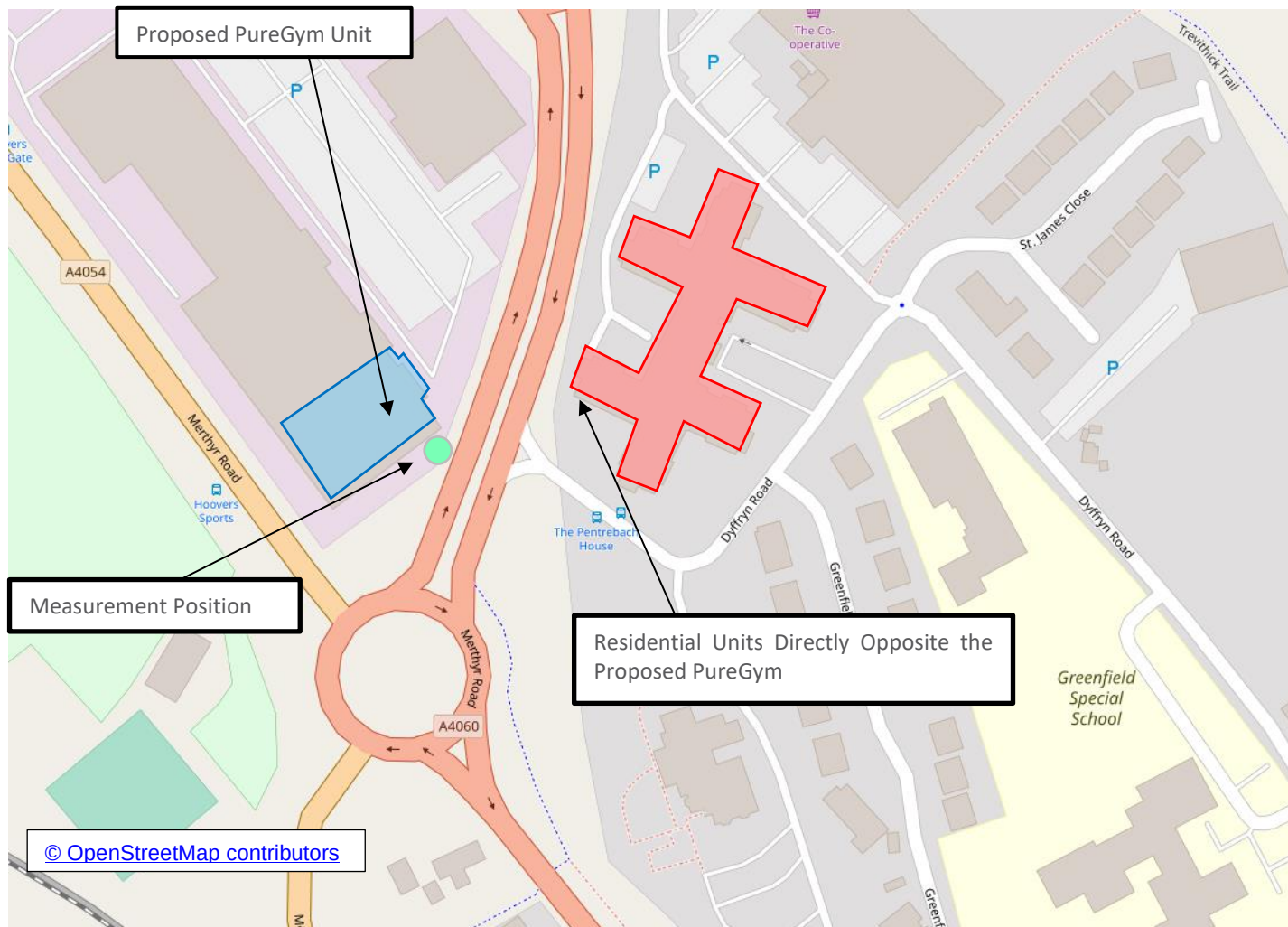
APPENDICES

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 Plan



PureGym, Merthyr Tydfil
 Site Location
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Figure A
 1 November 2021
 Not to Scale





PureGym, Merthyr Tydfil
Survey Position
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Figure B
1 November 2021
Not to Scale



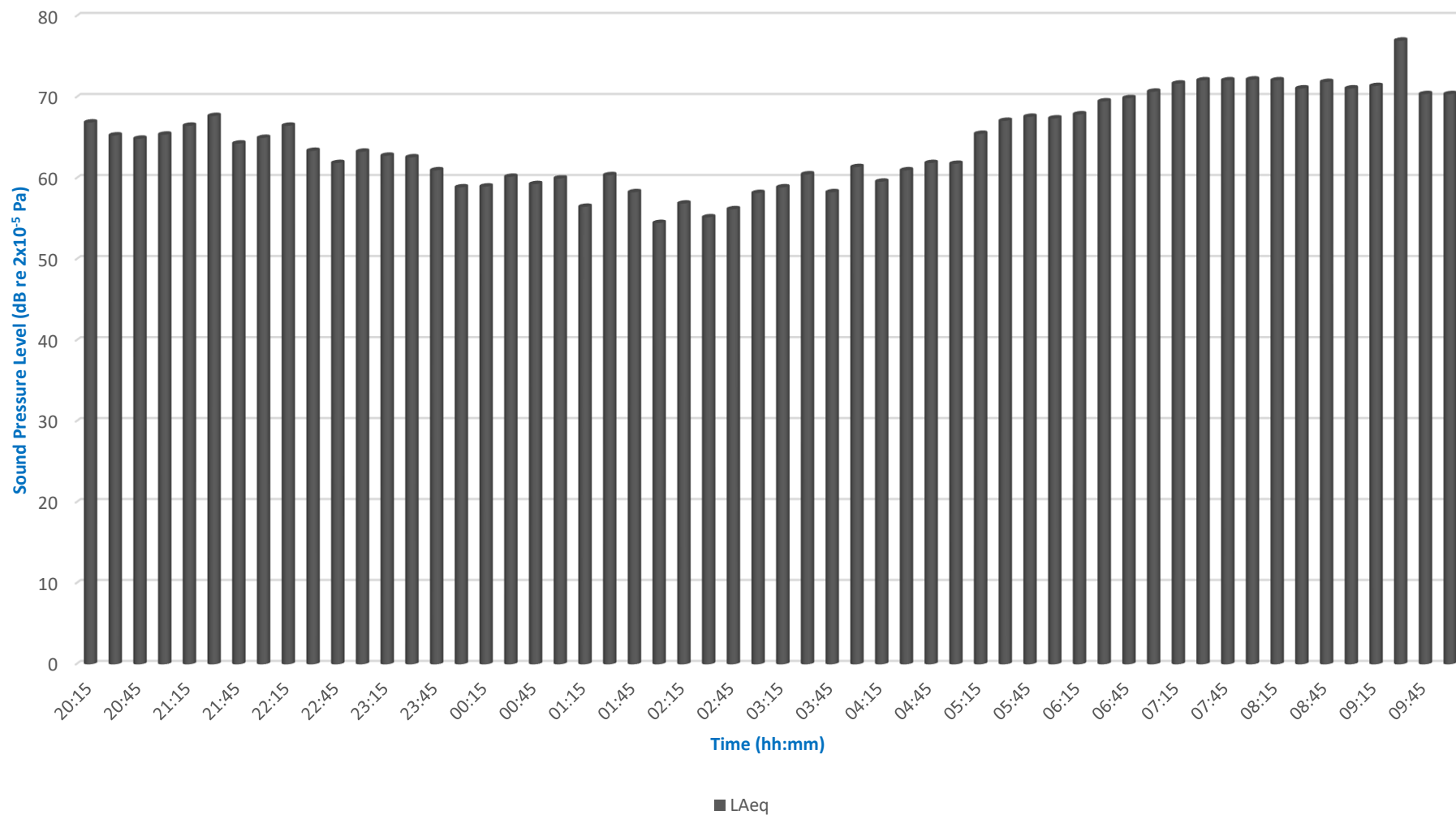
Appendix C Measurement Equipment

Table B1: Equipment Details

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Valid Until
Norsonic Type 1 Sound Level Meter	Nor140	1406969	U38863	01 September 2023
Norsonic Pre Amplifier	1209	21204		
Norsonic ½“ Microphone	1225	285599	38862	01 September 2023
Norsonic Sound Calibrator	1251	34966	U38861	01 September 2023

Appendix D

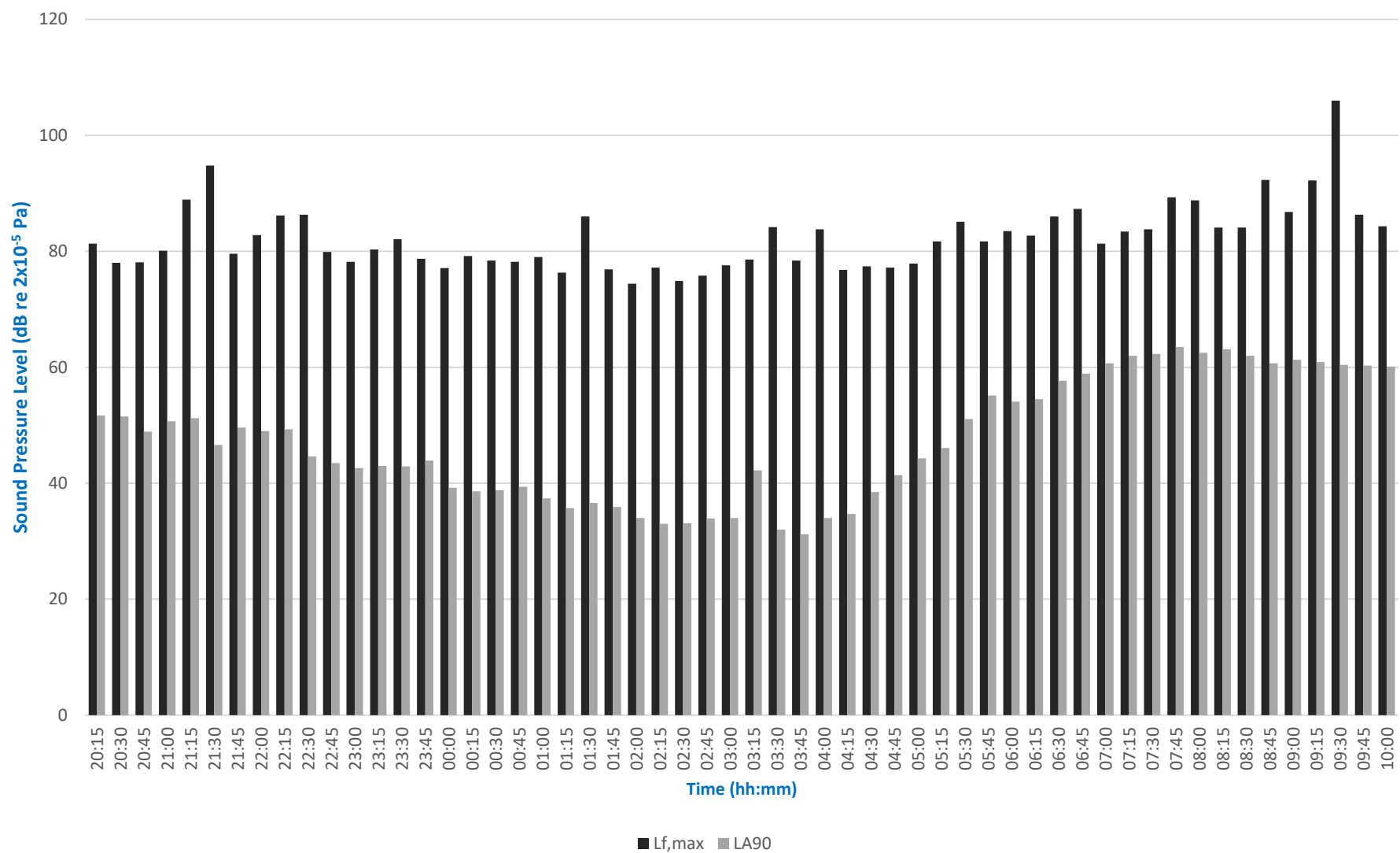
Measurement Results



PureGym, Merthyr Tydfil
 Measured L_{Aeq} in 15 Minute Intervals
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Graph 1
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PureGym, Merthyr Tydfil
 Measured LA90 and LAfmax in 15 Minute Intervals
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Graph 2
 1 November 2021



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