KP Acoustics Ltd.
info@kpacoustics.com
1 Galena Road, W6 0LT London, UK
+44 (0) 208 222 8778
www.kpacoustics.com

Fizzy Hayes
Hayes

Proposed Residents Gym Acoustic Design Review
Report 27236.GYM.01.RevA

Greystar Europe Holdings Limited

Report 27236.GYM.01.RevA Revision History			
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Written by:	Checked by:	Approved by:
Daniel Stuart MIOA Senior Acoustic Consultant	**Oliver Packman MIOA** Senior Acoustic Consultant	**John Cane MIOA** Senior Acoustic Consultant

Contents

List of Attachments

1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned by Greystar Europe Holdings Ltd, to undertake an acoustic design review of the proposals to create a residents' gym at Fizzy Hayes, 8 Pressing Ln, Hayes UB3 1DR.

The site currently consists of an external residential terrace on the second floor with an existing pagoda structure. We understand that this area is little used, therefore it is the intention of the client to convert this to a permanent enclosed structure to be used as a residents gym and fitness studio.

A site plan 27116.SP1 is enclosed showing the site extent, measurement location, noise sensitive receptors.

The following assessments have been undertaken to inform suitable design in line with the requirements of the Local Authority and suitably outlined guidance:

- Assessment of proposed gym floor to adjoining residents (below):
    - Airborne sound insulation investigation of noise from amplified music or gym activities through the existing floor;
    - Impact sound investigation through the existing floor.
- Airborne sound insulation assessment of noise breakout via the external building fabric (wall and ceiling) elements to non-adjoining neighbors the external from amplified music and activity noise.
- External mechanical plant noise impact assessment from proposed external condenser to nearest noise sensitive receptors.

This report outlines our assessment of sound propagation, noise levels, and mitigation strategies as required.

2.0 INDUSTRY STANDARDS

A sound insulation investigation was undertaken on site in order to provide acoustic upgrade advice with regards to the separating floor between the proposed gym and residential floor below.

2.1 Noise Policy Statement for England 2021

The National Planning Policy Framework (NPPF) has superseded and replaces Planning Policy Guidance Note 24 (PPG24), which previously covered issues relating to noise and planning in England. Paragraph 174 of NPPF 2021 states that planning policies and decisions should aim to:

- preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans

In addition, Paragraph 185 of the NPPF states that '*Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should':*

- Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life
- Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason

The Noise Policy Statement for England (NPSE) was developed by DEFRA and published in March 2010 with the aim to 'Promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development.'

Noise Policy Statement England (NPSE) noise policy aims are as follows:

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life*

The Noise Policy Statement England (NPSE) outlines observed effect levels relating to the above, as follows:

- NOEL – No Observed Effect Level
  - This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- LOAEL – Lowest Observed Adverse Effect Level
  - This is the level above which adverse effects on health and quality of life can be detected.
- SOAEL – Significant Observed Adverse Effect Level
  - This is the level above which significant adverse effects on health and quality of life occur.

As stated in The Noise Policy Statement England (NPSE), it is not currently possible to have a single objective based measure that defines SOAEL that is applicable to all sources of noise in all situations. Specific noise levels are not stated within the guidance for this reason, and allow flexibility in the policy until further guidance is available.

2.2 ProPG: Gym Acoustics Guidance

ProPG: Gym Acoustics Guidance recommends that airborne and heavy impact noise should be limited so that noise break-in does not exceed the values shown in Table 2.1. G-Curve third octave band spectral values are provided in Appendix B.

Receptor Type	Guide Criteria (for third octave band values plots against the stated G curve - see Figure 2)	
	Airborne Sound (e.g., music) $L_{eq,T}$ (31.5Hz to 8kHz)	Heavy Impact Sound $L_{max,F}$ (31.5Hz to 8kHz)
Residential Areas	G15-G25 (day) G10-G20 (night)	G20-G25 (day) G15-G20 (night)

Table 2.1 Gym Acoustics Guidance Criteria

"Table 2.1 relevant notes:

1- *The Working Group generally found in their experience that levels below the upper values tended to avoid significantly adverse impacts (SOAEL) occurring and higher levels than these should generally be avoided, but this is highly dependent on context. The background and ambient noise levels at any given site can fluctuate (e.g., a building in an urban setting adjacent to busy infrastructure versus a building shielded from external adverse noise intrusions and/or quieter location). This variation will also cause a subjective variance in relation to the perceived noise impact, both during the design phase and the completed development and the SQA should be cognisant of which target criteria would be most appropriate to their Gym scheme. "*

2.3 BS8233:2014

BS8233:2014 *'Sound insulation and noise reduction for buildings'* describes recommended internal noise levels for residential spaces. These levels are shown in Table 2.2.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Rooms	35 dB(A)	-
Dining	Dining Room/area	40 dB(A)	-
Sleeping (daytime resting)	Bedrooms	35 dB(A)	30 dB(A)

Table 2.2 BS8233 recommended internal background noise levels

We note these noise levels are recommended regarding noise break in from non-anonymous environmental noise sources such as road and rail traffic, however are a useful reference in terms of noise breakout calculations.

3.0 ASSESSMENT OF PROPOSED GYM FLOOR

A sound insulation investigation was undertaken on site in order to provide acoustic upgrade advice with regards to the separating floor between the proposed gym and the residential use below.

3.1 Design Targets

ProPG: Gym Acoustics Guidance recommends that airborne noise should be limited so that break in does not exceed G10-G20 during the night-time period inside adjoining residential properties. Because background noise levels measured in the space were in exceedance of the upper value, and the gym will be accessible to these residential apartments, we propose that the upper criterion should be targeted (G-20).

3.2 Instrumentation

The instrumentation used during testing is shown in Table 3.1 below.

Instrument	Manufacturer and Type	Serial Number
SLM1 Precision integrating sound level meter & analyser	NTi Audio, XL2-TA Calibration No: UCRT23/1633, 1636 & 1635Calibration Date: 10/05/2023 Calibration Due: 09/05/2025	A2A-09521-E0
LS2 Active Loudspeaker	RCF ART 310A	NCFA00717
GEN 1 Pink Noise Source	NTi Audio Minirator MR-PRO	G2P-RACDR-G0
CAL2 Calibrator 2	B&K Type 4231 Calibration No: UCRT23/1739 Calibration Date: 05/06/2023 Calibration Due: 04/06/2024	2147411

Table 3.1 Instrumentation used during testing

3.3 Airborne Sound Insulation

An indicative airborne sound insulation test was undertaken from the courtyard (external) to the flats below via the ceiling, to attain an approximate indication of the airborne sound insulation performance of the existing construction.

We understand the tested floor consists of:

- External (approx. 40mm) loosely laid paving slabs on approx. 100mm pedestals
- Waterproofing membrane
- Concrete slab
- Suspended plasterboard ceiling in the flats below.

A level difference of 62dB D_w was measured, as a point of reference.

Airborne sound levels in the gym should be limited in third-octave bands at low frequencies as per Table 3.2 below to a reverberant sound pressure level of 82dB(A). This is likely to allow low level background music and typical gym activities.

Band [Hz]	Target G20	Measured Losses From Current Construction (dB)	Limiting Reverberant Sound Pressure Level L_p (dB)
31.5	64	5	69
40	56	10	65
50	49	4	53
63	43	28	72
80	39	29	68
100	35	32	68
125	32	34	66
160	29	32	61
dB(A)	30	52	**82**

Table 3.2 table showing limiting low frequency and dB(A) noise level

We understand the external paving slabs and pedestals are to be removed and a suitable internal floor build-up are to be built on the slab. Based on the airborne sound insulation test results and that that the paving slabs were loosely laid, to maintain the existing measured sound insulation performance a construction consisting of 2x18mm ply on appropriate floor channels forming 50mm+ airgap should be installed.

3. 4 Impact Drop Weight Dropping Tests

Impact drop tests were undertaken on a sample of free weight isolation flooring products. A test was undertaken on the bare untreated floor, in addition to a number of tests with a combination of isolation materials.

The combinations of materials tested were as follows:

- Bare Floor - 7.26kg @1m
- GenieMat FIT70 - 23.4kg @0.5m
- GenieMat FIT70 over GenieMat FF25 - 23.4kg @0.5m
- GenieMat FIT70 over GenieMat FF50 - 23.4kg @0.5m
- GenieMat FIT70 over GenieMat FF70LDM - 23.4kg @0.5m

Spectral results are shown graphically in Appendix C and are summarised in Table 2.2 below.

Test Arrangement	Weight	Result (G-Curve)
Bare Floor	7.26kg	72
GenieMat FIT70	23.4kg	58
GenieMat FIT70 over GenieMat FF25	23.4kg	52
GenieMat FIT70 over GenieMat FF50	23.4kg	43
Background	n/a - Reference	33

Table 2.2: Summary of heavy impact weight drop tests on different arrangements

From the above weight drop tests, the current base floor construction is unlikely to be able to be suitable for weight drop activities to be allowed, therefore the use of free weights areas is to be managed as outlined as follows. Attention should be paid to the following:

- Ensure users are not using weights too heavy for them to lift, such that they can be placed back without impact on the floor.
- Racks should be provided such that users do not have to bend down to place weights without impact.
- The use of heavier weights may require supervision to ensure proper use, or use in the daytime, where likely disturbance from dropping is minimized.
- Signage should clearly demonstrate that weight dropping is not permitted in the space.
- Additionally where staff cannot be present at all times, CCTV or similar should be used to monitor the space to ensure correct use.

If protection against accidental weight drops on rare occurrences is desired, we would recommend installing a floating floor to the free weights area. We understand it is proposed to install a floating floor and reducing weight drop height (to shin level) to achieve best practical results and protect against accidental drops.

Loading capacity of the slab should be checked with the structural engineer.

3. 4 Other Gym Equipment and Machines

Cardiovascular Machines: Noise from cardiovascular machines should be mitigated with suitable vibration isolation to prevent Synchronized Repetitive Excitation (e.g. GenieMat TMIP or iKoustic Mutepad).

Functional Gym Areas: For functional gym areas e.g. where classes may occur involving bodyweight exercises that may impact the floor, we would advise installing GenieMat FIT70 or similar.

Fixed-Pin Weight Machines: If larger fixed pin machines are installed, these should be installed with suitable in machine vibration isolation. For example CMS Danskin resistance machine impact washers.

4.0 ENVIRONMENTAL NOISE SURVEY

4.1 Procedure

A noise survey was undertaken on site at the location shown in 27236.SP1. The choice of the position was based both on accessibility and on collecting representative noise data in relation to the nearest noise sensitive receiver.

Continuous automated monitoring was undertaken for the duration of the survey between approximately 11:00 on 26/09/2023 to 11:00 on 28/09/2023.

Weather conditions were generally dry with light winds and therefore suitable for the measurement of environmental noise. The measurement procedure complied with ISO 1996-2:2007 Acoustics '*Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels*'.

4.2 Equipment

The equipment calibration was verified before and after use and no abnormalities were observed. The equipment used is described within Table 4.1.

Measurement instrumentation		Serial no.	Date	Cert no.
Noise Kit 25	NTI Audio XL2 Class 1 Sound Level Meter	A2A-21141-E0	21/07/2022	UK-22-069
	Free-field microphone NTI Acoustics MC230A	A23583		
	Preamp NTI Acoustics MA220	10992		
	NTI Audio External Weatherproof Shroud	-	-	-
B&K Type 4231 Class 1 Calibrator		2147411	05/06/2023	UCRT23/1739

Table 4.1 Measurement instrumentation

4.3 Results

The $L_{Aeq: 5min}$, $L_{Amax: 5min}$, $L_{A10: 5min}$ and $L_{A90: 5min}$ acoustic parameters were measured throughout the duration of the survey. Measured levels are shown as a time history in Figure 27236.TH1.

Representative background noise levels and logarithmically averaged L_{Aeq} levels are shown in Table 4.2 for daytime and night-time.

It should be noted that the representative background noise level has been derived from the most commonly occurring $L_{A90,5\ min}$ levels measured during the environmental noise survey undertaken on site, as shown in 27236.LA90 attached.

Time Period	Average Ambient Noise Level L_{Aeq} dB(A)	Representative Background Noise Level L_{A90} dB(A)
Daytime $L_{Aeq,16hour}$	59	49
Night-time $L_{Aeq,8hour}$	51	41

Table 4.2 Average ambient noise levels and representative background noise levels

5.0 NOISE BREAKOUT ASSESSMENT

5.1 Noise Breakout to External Environment

Using a typical source level of 82 dB(A) to represent a worst case noise levels of gym activity, and taking into account the acoustic performance of the proposed external building fabric of the proposed gym.

The calculations are based on the external building fabric elements achieving 30dB R_w or greater. The following wall construction is proposed which should achieve the performance indicated:

- 175mm Mobipanel Living Wall/Zinc shingles
- 18mm WBP External Face
- 100mm steel frame with 100mm Celotex insylation sat between
- 18mm WBP internal face
- 22mm internal cedar wall cladding

To the front of the space, bi-fold door and glazing are proposed which should be specified to meet at least 30dB R_w (whole system including glazing and frames). This should be achievable with for example, 4mm/16mm/6mm laminated double glazing. The roof construction should also achieve this performance, e.g. a typical insulated cladding pannel.

Table 5.1 shows the predicted sound pressure level at 1m from the bedroom window of the nearest noise sensitive receiver due to activity within the gym. This has been compared with the measured minimum background noise as measured during the environmental noise survey. Detailed calculations are shown in Appendix D.

Receiver	Representative Background Noise During Night-time L_{A90}	Noise Level at 1m From Receiving Window
Nearest Noise Sensitive Window	41 dB(A)	24 dB(A)

Table 5.1 Predicted noise level at 1m from the closest noise sensitive window

As can be seen from Table 5.1, noise breakout from the glazed façade of the gym is below the minimum background noise level measured during the facilities operating hours. Therefore any breakout noise from the gym at 1m from the residential windows would be masked by the existing noise profile of the area.

Furthermore, the value of 24dB(A) is to be considered externally at 1m from the facade of the building. Closed or partially closed windows would lead to further attenuation, as follows.

As previously stated, British Standard 8233:2014 'Guidance on s*ound insulation and noise reduction for buildings – Code of Practice'* gives recommendations for acceptable internal noise levels in residential properties. Assuming worst case conditions of the closest window being a bedroom, BS8233 recommends 30dB(A) for internal resting/sleeping conditions.

With calculated external levels of 24dB(A), the residential window would not need to provide any further attenuation in order for 'Good' conditions to be achieved. According to BS8233:2014, even a partially open window offers 10-15dB attenuation, thus leading to an acceptable interior noise level of 9-14dB(A) that meets this criterion.

6.0 PLANT NOISE ASSESSMENT

It is understood that 1x U-6LE2E5-4 condenser is proposed to be installed.

The closest noise sensitive receiver to the proposed installation location has been identified as a residential window of the second floor of 2 Material Walk, Hayes UB3 1DZ, located approximately 14 metres from the proposed plant installation location, as shown in 27236.SP1

We understand the requirements of the London Borough of Hillingdon are as follows:

"The rating level of noise emitted from the plant and/or machinery hereby approved shall be at least 5dB below the existing background noise level. The noise levels shall be determined at

the nearest residential property. The measurements and assessment shall be made in accordance with British Standard 4142."

6.1 Calculations

Taking all acoustic corrections into consideration, the noise level contribution expected at the closest residential window from the proposed plant would be as shown in Table 6.1. Detailed calculations are shown in the Appendix E.

Receiver	Criterion	Noise Level at 1m From the Closest Noise Sensitive Window
Residential window 2 Material Walk	36dB(A)	36dB(A)

Table 6.1 Predicted noise level and criterion at nearest noise sensitive location

As shown in Appendix E and Table 6.1, transmission of noise to the nearest sensitive windows due to the effects of the proposed plant unit installation satisfies the emissions criterion of the Local Authority.

6.0 CONCLUSION

KP Acoustics Ltd have undertaken an acoustic design review of the proposals to create a residents' gym at Fizzy Hayes, 8 Pressing Ln, Hayes UB3 1DR.

Assessment of proposed gym floor to adjoining residents below has been undertaken in terms of airborne noise. Proposed sound insulation mitigation and limiting reverberant sound pressure levels have been set for the space.

Assessment of proposed gym floor to adjoining residents below has been undertaken in terms of heavy weight drops. Suitable management strategies have been outlined as appropriate.

An environmental noise survey has been undertaken which has informed our airborne sound insulation assessment of noise breakout via the external building fabric (wall and ceiling) elements to non-adjoining neighbours. The assessment considered music and activity noise. The assessment concludes that the proposed construction should meet BS8233 requirements for internal sleeping/resting conditions at nearest noise sensitive receptors.

Noise from the proposed external condenser has been assessed, with respect to nearest noise sensitive receptors in line with Local Authority guidance. Transmission of noise to the nearest sensitive window due to the effects of the proposed plant unit installation satisfies the emissions criterion of the Local Authority.

Measurement Position Description:
The microphone was places on a tripod on the first floor terrace. The position was more than 1.5m from the nearest reflective surface therefore is considered to be free field.

Site Plan: Fizzy Hayes

FIGURE 27236.SP1

KP acoustics

Environmental Survey Details

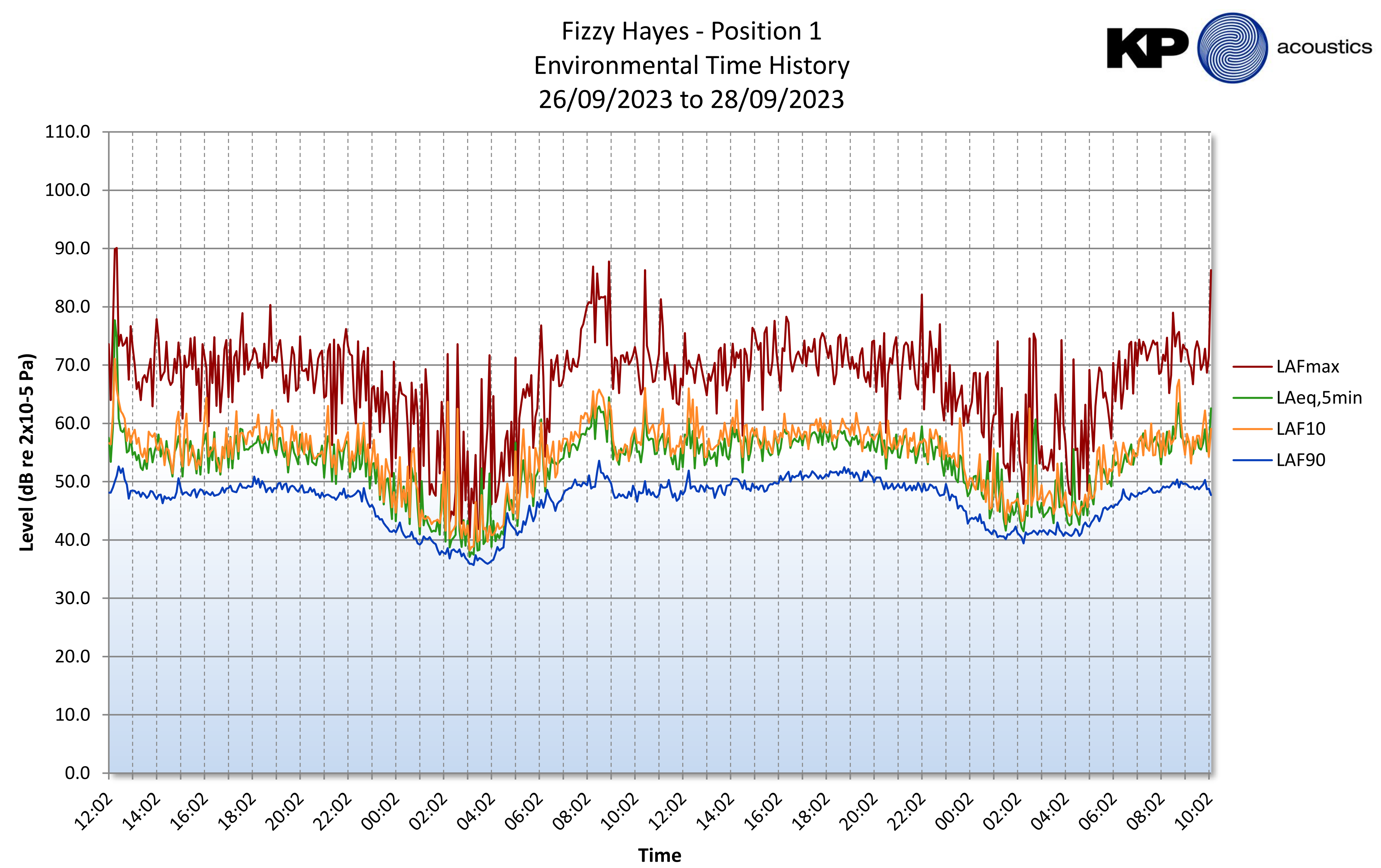


Figure 27236.TH1

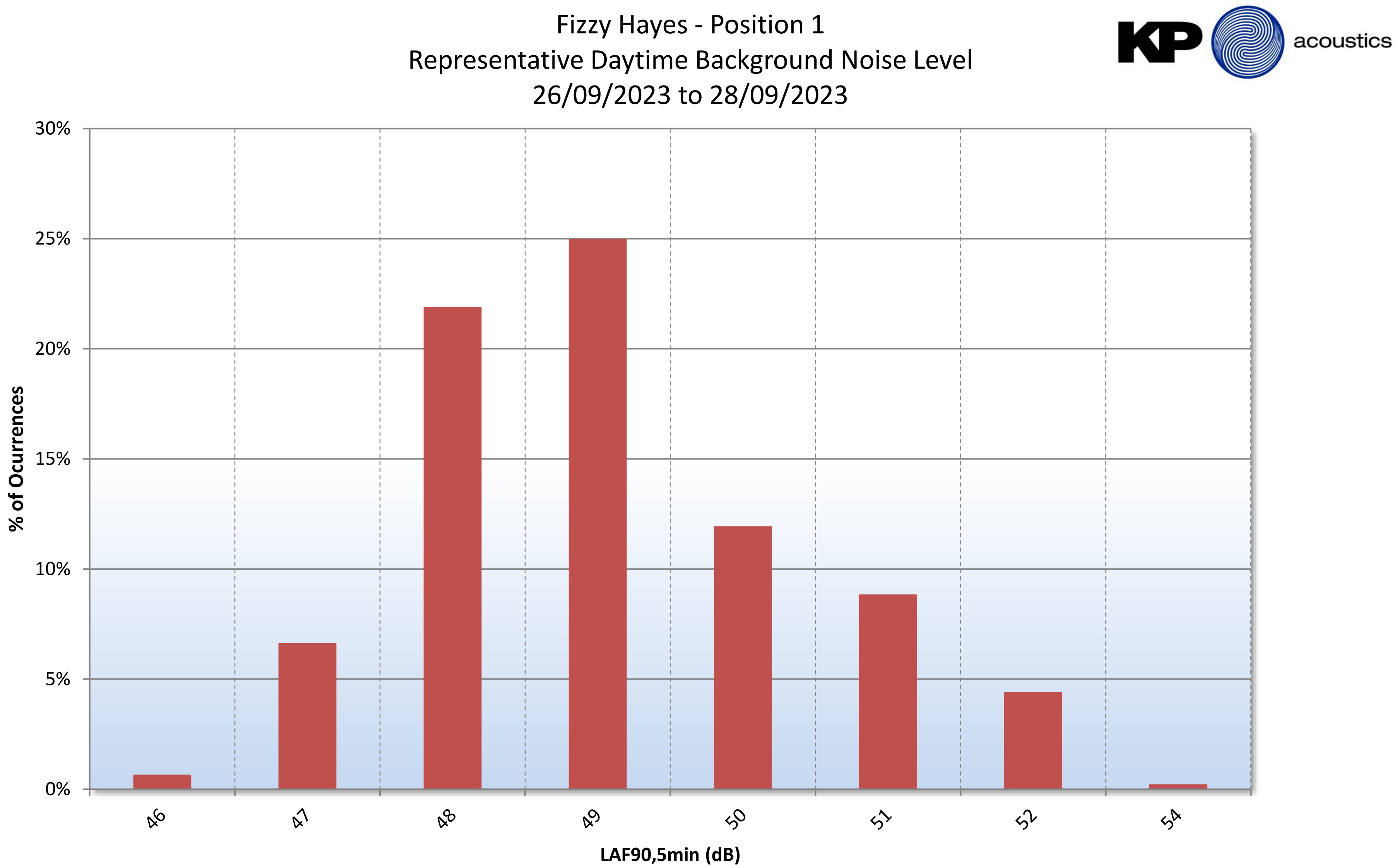


Figure 27236.Daytime L90.TH1

Fizzy Hayes - Position 1
Representative Night-time Background Noise Level
26/09/2023 to 28/09/2023

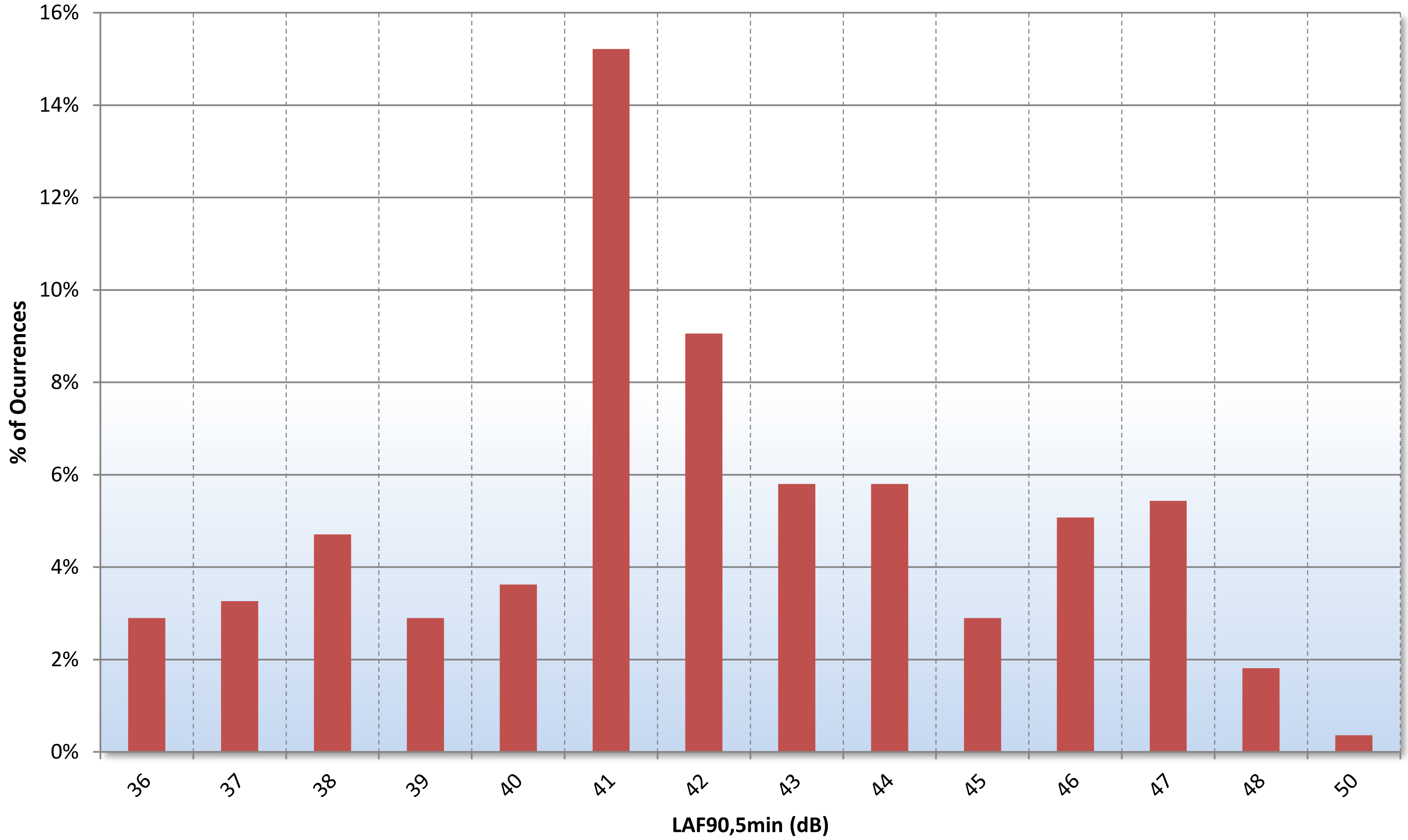


Figure 27236.Night-time L90.TH1

APPENDIX A

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for no more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise.

L_{90}

This is the level exceeded for no more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPENDIX A

APPLIED ACOUSTIC TERMINOLOGY

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than a single source and 4 sources produce a 6dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Hearing perception is highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a guide to explain increases or decreases in sound levels fo

r many scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.

APPENDIX B

PRO:PG GYM ACOUSTICS GUIDANCE ON NOISE CRITERIA

The criteria are proposed as guidance only and are formed from experience of the authors and contributors, developed from a low level of public response from the historic use of NR-curve based targets. This new framework is called the G-Curves, defined in Appendix G, provides a way to reference sound spectra data in a single figure, in a similar way to NR, but the reference is in 1/3 octaves to provide improved resolution. It is important to note this is not the same as an NR curve, but provides a consistent way to present the gym sound data. Furthermore, using a 1/3 octave band curve as the upper limit for resulting gym noise, enables the practitioner to undertake a visual, graphical analysis of the resulting impact noise. Such analysis can be crucial in identifying compliance with the curve at lower frequencies, where resulting impact noise can often be most disturbing. Therefore, in cases where background noise is dominant at higher frequencies, it may be possible to exclude such frequencies and visually assess low-frequency compliance with the curve, even if analysis of the single-figure G-value alone (inclusive of all assessment frequencies and elevated due to background noise dominance) provides an 'artificially' pessimistic result. In such common examples, the graphical analysis can provide a truer assessment of the actual level of resulting noise and therefore of the potential to affect users of adjacent noise-sensitive spaces.

The values proposed in Table 2 provide a guide for those setting criteria, whilst being mindful of the locality and context. The working group have based these values on their experience and review of criteria from real examples from local authorities. This includes four London and three Scottish environmental health departments that use NR15 to NR25 night-time (with and without an open window assessment (the latter depending on the mainly Scottish authorities) and similar criteria during the day time (up to NR30) have resulted in mitigating complaints, for all but the most sensitive of the population. Other councils in England use the 63Hz and 125Hz criteria of 47 dB and 41 dB (Noise Council's Code of Practice (1995)) which equates to NR15 at 63 Hz and NR22 at 125 Hz and is used for all types of development include music noise. One other English City Council have an NR20 criteria for the 63 Hz and 125 Hz frequencies. Such use of these NR curves by these and other local authorities have been typically used (and been demonstrated) to avoid complaints and therefore mitigate further strain on local authorities' resources. The working group's experience also typically matches that of the local authorities (in terms of suitable criteria to mitigate complaints - refer also to Table 2 Notes), although it was unanimously agreed that the octave bands for the NR curves for low frequency impact noise from gyms (approximately 20 Hz to 300 Hz) do not provide sufficient resolution when attempting to select the appropriate remedial measures/specifications. Therefore, the G-curves were proposed, as third octave bands, as NR curves are not readily available (or were at least not found) and it was necessary to establish an alternative a uniform curve. Loosely based on the NR curve, when log-summed for each centre band frequency, the G Curve would approximate to the NR value (G Curves being within 0.3 to 1.8 dB, depending on octave band centre frequency); for example, log-summing the third octave bands of 50 Hz, 63 Hz and 80 Hz would give an octave band value at 63 Hz similar to the NR value.

Good acoustic design is an approach described in ProPG: Planning & Noise, Section 2 and expanded upon in Supplementary Document 2. When applied to Gyms, this will require proper consideration of the type of structure and context of the location to determine suitable criteria and what may be practicable to achieve. This should inform the Acoustic Design Statement by the SQA to inform the approach to Stage 1 and Stage 2 deliverables, as set out in Figure 1.

It is recognised that the values in Table 2 will not be suitable in all settings, particularly where the background noise is particularly low. Equally where background levels are higher, more relaxed criteria may be appropriate. It may also be difficult to accurately measure compliance because of the noise floor of Type 1 instruments. In this case compliance should be demonstrated either by calculation or by demonstration that there is an absence of adverse impact

APPENDIX B

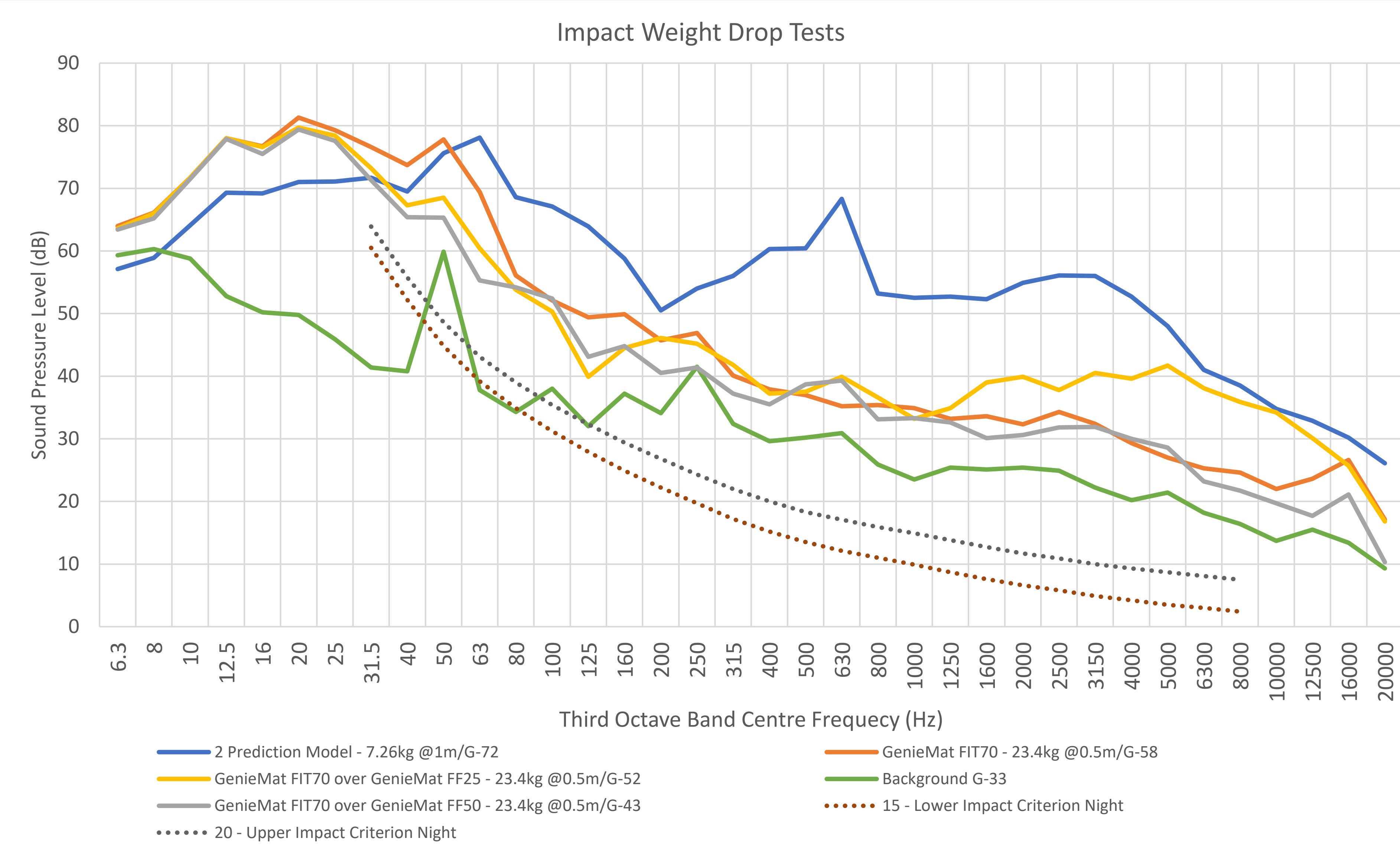
The G-Curves are provided for use with this guidance and are based on interpretations of the NR Curves. They provide single reference ratings which when one-third octave measurement data are plotted against the curves the value which is not broken by the data represents the G-Curve rating.

The values are presented graphically below in Table G1 as whole figures.

Table G1: G Curve values between 31.5Hz and 4kHz.

G Curves	31.5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz
G50	84	78	71	67	64	61	58	56	54	52	50	49	48	47	46	45	44	43	42	41	41	40
G45	81	74	68	63	59	57	54	52	50	48	46	44	43	42	41	40	39	38	37	36	36	35
G40	78	70	64	59	55	52	50	47	45	43	41	39	38	37	36	35	34	33	32	31	31	30
G35	74	67	60	55	51	48	45	43	41	38	36	34	33	32	31	30	29	28	27	26	25	25
G30	71	63	56	51	47	44	41	38	36	34	31	30	28	27	26	25	24	23	22	21	20	20
G25	67	59	52	47	43	40	37	34	31	29	27	25	23	22	21	20	19	18	17	16	15	14
G20	64	56	49	43	39	35	32	29	27	24	22	20	18	17	16	15	14	13	12	11	10	9
G15	61	52	45	39	35	31	28	25	22	20	17	15	14	12	11	10	9	8	7	6	5	4
G10	57	49	41	35	31	27	24	21	18	15	13	10	9	7	6	5	4	3	2	1	0	-1

APPENDIX C



Impact Weight Drop Tests
Sound Pressure Level (dB)
Third Octave Band Centre Frequecy (Hz)
2 Prediction Model - 7.26kg @1m/G-72
GenieMat FIT70 - 23.4kg @0.5m/G-58
GenieMat FIT70 over GenieMat FF25 - 23.4kg @0.5m/G-52
Background G-33
GenieMat FIT70 over GenieMat FF50 - 23.4kg @0.5m/G-43
15 - Lower Impact Criterion Night
20 - Upper Impact Criterion Night

APPENDIX D

Fizzy Hayes

NOISE BREAKOUT CALCULATIONS

Source: Proposed Gym Receiver: NSR 1	*Frequency, Hz* 63	125	250	500	1k	2k	4k	8k	*dB(A)*
Measured Sound Pressure level within function space	**73**	**71**	**70**	**75**	**78**	**77**	**73**	**75**	**82**
Approximate area (S) of the façade overlooking receiver location (30m²)	20	20	20	20	20	20	20	20	
Correction for area (S), dB	**13**	**13**	**13**	**13**	**13**	**13**	**13**	**13**	**19**
On site composite SRI of façade, dB	**-20**	**-24**	**-28**	**-32**	**-34**	**-36**	**-38**	**-36**	
Correction for distance, dB	**-23**	**-23**	**-23**	**-23**	**-23**	**-23**	**-23**	**-23**	
Correction due to no reverberant field externally + propagation effect of the wall surface, dB	**-14**	**-14**	**-14**	**-14**	**-14**	**-14**	**-14**	**-14**	
Sound Pressure Level at 1m from Receiving Façade	**29**	**23**	**18**	**19**	**20**	**17**	**11**	**15**	**24**

Breakout Noise Criterion	36

APPENDIX E

Fizzy Hayes, Hayes

PLANT NOISE EMISSIONS CALCULATIONS

Source: Gym Condenser Receiver: 2 Material Walk, Hayes UB3 1DZ	*Frequency, Hz* *63*	 *125*	 *250*	 *500*	 *1k*	 *2k*	 *4k*	 *8k*	*dB(A)*
1no. Condenser U-6LE2ES-4	59	56	56	54	51	46	42	33	56
1x reflective surface near condenser	3	3	3	3	3	3	3	3	
Distance correction (14m)	-23	-23	-23	-23	-23	-23	-23	-23	
Sound Pressure Level at Receiver due to All Units, dB	**39**	**36**	**36**	**34**	**31**	**26**	**22**	**13**	**36**

Design Criterion	**36**