

NOISE IMPACT ASSESSMENT

PROPOSED FITNESS STUDIO, RHOSNESNI LANE, WREXHAM LL12 7NB

REPORT REFERENCE NO. J004058-5833-DH-01

OCTOBER 2022

Tel: 01925 759380

Email: enquiries@pdaltd.com





Document Control Sheet

Details of Assessment	
Client	Focused Fitness TC
Document Title	Noise Impact Assessment, Proposed Fitness Studio, Rhosnesni Lane, Wrexham
Report Reference	J004058-5833-DH-01

Client Address:	Company Address:
Focused Fitness 9 Ffordd Pant Gwyn Connah's Quay Deeside CH5 4UN	Philip Dunbavin Acoustics Ltd 3 Bridgewater Court Barsbank Lane Lymm WA13 0ER

Issue	Date	Author	Remark	Status
01	20/10/2022	David Hible	Initial	Issued
02				

	Name	Position
Prepared By	David Hible BA(Hons) AMIOA	Graduate Consultant
Checked By	Chris Wright BSc (Hons) MIOA	Consultant

This document has been prepared for the client only and solely for the purposes expressly defined herein. We owe no duty of care to any third parties in respect of its content. Therefore, unless expressly agreed by us in signed writing, we hereby exclude all liability to third parties, including liability for negligence, save only for liabilities that cannot be so excluded by operation of applicable law.

This report has been prepared based upon a scope of works and associated resources agreed between the client and Philip Dunbavin Acoustics Ltd (PDA). This report has been prepared with all reasonable skill, care and diligence and has been based upon the interpretation of data collected. This has been accepted in good faith as being accurate and valid at the time of the collection. This report has been based solely on the specific design assumptions and criteria stated herein.

CONTENTS

1.0	SUMMARY.....	4
2.0	INTRODUCTION	5
3.0	NOISE ASSESSMENT CRITERIA.....	6
3.1	National Planning Policy Framework (NPPF)	6
3.2	BS4142:2014	7
3.3	BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings	8
3.4	WHO Guidelines for Community Noise	8
4.0	BACKGROUND NOISE SURVEY DETAILS.....	8
4.1	Survey Times and Dates	8
4.2	Equipment Used	8
4.3	Weather	9
4.4	Measurement Positions & Procedure	9
5.0	MEASURED RESULTS	10
5.1	Description of Background Noise	11
5.2	Proposed Noise Assessment Criteria.....	11
6.0	NOISE EGRESS ASSESSMENT	11
6.1	Existing unit construction detail	11
6.1.1	Internal Noise Level	12
6.1.1	Façade Sound Insulation Assessment	12
6.1.1	Ventilation	13
6.1.1	Façade Noise Break-out	13
6.2	External Noise Levels	13
7.0	NOISE IMPACT ASSESSMENT	14
7.1	Noise Propagation Calculations	14
7.2	Initial BS4142 Assessment	15
7.3	Noise Impact Assessment – Absolute Levels.....	16
8.0	DISCUSSION OF RESULTS	16
9.0	UNCERTAINTY	17
9.1	Uncertainty in Measurements.....	17
9.2	Uncertainty in Sound Power Levels.....	17
9.3	Uncertainty in Calculation Method	17
10.0	CONCLUSION	18

APPENDIX A – DEFINITION OF ACOUSTIC TERMS

APPENDIX B – MEASURED LEVELS



1.0 SUMMARY

At the request of Focused Fitness TC a noise impact assessment has been undertaken for the proposed fitness studio at Rhosnesni Lane, Wrexham.

An assessment of the noise emissions resulting from the proposed fitness studio has been undertaken and compared with the guidelines contained within BS4142:2014 *“Methods for rating and assessing industrial and commercial sound”*, WHO Guidelines for Community Noise and BS8233:2014 *“Guidance on sound insulation and noise reduction for buildings”*.

The assessment indicates that the development will not result in an adverse impact at the nearest noise sensitive receivers in accordance with the recommendation described within BS4142:2014. This is therefore an indication that the proposed scheme is in accordance with the National Planning Policy Framework.

2.0 INTRODUCTION

The proposal is to convert the former retail showroom unit into a fitness studio containing various exercise machines and free weights. It is understood that the proposed opening hours will be between 06.00 – 20.30 hours Monday to Friday and 09.00 – 14.00 hours Saturday and Sunday.

The proposed fitness studio is located to the north of a small industrial estate that faces onto Rhosnesni Lane (B5100). There are other commercial properties immediately to the east and south of the current site. The nearest residential receivers are located immediately to the west and further away towards the south.

An aerial photograph showing the location of the site and the surrounding local area including the closest residential receivers is shown in Figure 1 below.

Figure 1. Proposed Site Location with Nearest Residential Receivers



3.0 NOISE ASSESSMENT CRITERIA

3.1 National Planning Policy Framework (NPPF)

National Planning Policy is guided by the National Planning Policy Framework (NPPF) updated in July 2021. With regard to Noise the Framework states the following;

Planning policies and decisions should contribute to and enhance the natural and local environment by:

- *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.*

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 impact 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 terms 'significant adverse impact' and 'adverse impact' are defined in the explanatory notes of the 'Noise Policy Statement for England (NPSE)' which states;

There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

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.

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The notes also offer an explanation of the term 'other adverse impacts' as follows;

... refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.

It should be noted that no specific noise limits for LOAEL and SOAEL have yet been specifically defined; however guidance from other acoustic standards may be employed to determine suitable levels within the overall principal of the National Planning Policy Framework.

3.2 BS4142:2014

The effect of plant noise emissions on the nearest noise sensitive residences can be assessed in accordance with BS4142:2014 – ‘*Methods for rating and assessing industrial and commercial sound*’.

The standard describes a method of determining the level of a noise of commercial or industrial nature, together with procedures for assessing the impact of such a noise outside nearby noise sensitive areas.

The standard provides a procedure for comparing the noise from commercial sources with background noise levels in the absence of the commercial noise and determining the likely impact of the noise on noise sensitive areas.

In accordance with BS 4142 the background noise level is the typical A-weighted sound pressure level at the assessment position that is exceeded for 90% of a given time interval (L_{A90}). The specific noise level is the equivalent continuous (L_{Aeq}) sound pressure level at the assessment position produced by the noise source over a given time interval.

Certain acoustic features can increase the impact over that expected from a simple comparison between the specific noise level and the background level. Where such features are present, these are considered by adding corrections to the specific noise level.

The corrections are applied based on whether the following features occur, or are expected to be present. The correction values can either be determined subjectively, or by various objective measurement procedures.

- The noise contains a distinguishable, discrete, continuous tone (whine, hiss, screech, hum, etc.).
0 – 6 dB penalty
- The noise contains distinct impulses (bangs, clicks, clatters, or thumps).
0 – 9 dB penalty.
- The noise is irregular enough to attract attention. 0 – 3 dB penalty.
- Other features. 0 – 3 dB penalty.

From the addition of the above penalties where appropriate the rating level is established, this being the value that is compared with the background noise.

According to BS 4142 an initial estimate of the impact is given for a rating level of:

- 10 dB(A) or more above the background is an indication of significant adverse impact, depending on the context.
- 5 dB(A) above the background is an indication of an adverse impact, depending on the context.
- where the rating level does not exceed the background level, this is an indication of the specific sound source having a low impact, depending on the context.

The above initial assessment may then be modified depending on the context to take into account;

- The absolute level of the sound.
- The character and level of the residual sound compared to the character and level of the specific sound.
- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:
 1. Façade insulation treatment
 2. Ventilation and / or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
 3. Acoustic screening

3.3 BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

British Standard 8233:2014, *Guidance on Sound Insulation and noise reduction for buildings*, gives guidance on internal noise levels within dwellings, flats and rooms in residential use when unoccupied. The following criteria are for Living and Dining Rooms for daytime use and Bedrooms for night time.

Table 1. BS8233 recommended indoor ambient noise levels

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 L _{Aeq,16hour}	–
Dining	Dining room/area	40 L _{Aeq,16hour}	–
Sleeping (daytime resting)	Bedrooms	35 L _{Aeq,16hour}	30 L _{Aeq,8hour}

It should however be stressed that the above criterion relates to steady noise, in this case from road traffic etc., excluding unusual noise events departing from the typical noise character of the area.

3.4 WHO Guidelines for Community Noise

In 1999, the WHO (World Health Organisation) published Guidelines for Community Noise, stating the following internal noise levels are applicable to dwellings.

Table 2. WHO Guidelines for Community Noise criteria

Specific Environment	Critical Health Effect(s)	L _{Aeq} dB	Time Base (hours)*
Outdoor living area	Serious annoyance, daytime and evening	55	16
	Moderate annoyance, daytime and evening	50	16
Outside Bedrooms	Sleep disturbance, window open (outdoor values) night time	45	8

* Typically taken to be daytime/evening - 07:00 – 23:00 hours, and night time 23:00 – 07:00 hours.

WHO guidelines state, 'To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55 dB L_{Aeq} on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50 dB L_{Aeq}.'

4.0 BACKGROUND NOISE SURVEY DETAILS

4.1 Survey Times and Dates

The ambient noise measurements were conducted between 12:04 on Wednesday 12 October and 14:35 Thursday 13 October 2022 with all measurements being made and partially attended by Mr David Hible and Mr Sam Iles of PDA Ltd. The measurement periods were selected to capture the quietest day and night time periods that the proposed fitness studio may be expected to operate.

4.2 Equipment Used

Throughout the survey measurements were undertaken using a Nti XL2 sound level meter. The meter is a precision grade Class 1 sound level meter (as per BS EN 61672-1: 2002) for which current calibration certificates are held and are available upon request. The meter was set to A-Weighted and fast response. The meter was calibrated directly before any measurement took place and immediately afterwards and no significant drift was observed.

4.3 Weather

During the course of the survey the weather conditions were as follows:

Table 3. Summary of Daily Weather Conditions

Date	Range of Temperature (°C)	Rainfall	Average Wind Speed (m/s)	Wind Direction
12/10/2022	9 - 15	20%	2 - 4	South-West
13/10/2022	13 - 14	None	2 - 3	South

4.4 Measurement Positions & Procedure

Ambient noise level measurements were undertaken at two positions at site. The sound level meter was fixed to a pole approximately 1.5m from ground level to the north of site for the first location and similarly to the south of site on the border of the car park with the residencies' gardens. The locations were deemed representative of the closest residential locations to the site. A range of statistical noise indicators were measured, including L_{Aeq} and L_{A90} . Measurements were setup to log every 15 - minutes.

The measurement locations are highlighted within Figure 2 below:

Figure 2. Measurement Locations



5.0 MEASURED RESULTS

A summary of the noise level measurements is given below. The levels presented in the tables have been rounded to the nearest decibel. The L_{Aeq} levels are the logarithmic average of all the measured noise levels. The L_{A90} levels have been shown as a minimum to maximum range. We have also presented the typical background level derived from a statistical analysis of the range of background levels measured. Graphs of the full measured data may be found in Appendix B.

Table 4. Summary of environmental noise measurements – Daytime hours – Long-term Position

Date	Time Period	$L_{Aeq,T}$ (dB)	Range of Background Noise level L_{A90} , (dB)	Typical Background Noise level L_{A90} , (dB)
12/10/2022	12:04 – 23:00	58	35 - 51	46
13/10/2022	07:00 – 12:00	59	40 - 54	46

Table 5. Summary of environmental noise measurements – Night-time hours – Long-term Position

Date	Time Period	L _{Aeq,T} (dB)	Range of Background Noise level L _{A90} , (dB)	Typical Background Noise Level L _{A90} , (dB)
12/10/2022 – 13/10/2022	23:00 – 07:00	49	34 - 47	40 ¹

¹ Typical Background Noise Level has been taken as the lowest L₉₀ measured between the hours of 06:00 – 07:00 during when the proposed Fitness Studio is due to operate.

Table 6. Summary of environmental noise measurements – Daytime hours – Short-term Position

Date	Time Period	L _{Aeq,T} (dB)	Range of Background Noise level L _{A90} , (dB)	Typical Background Noise level L _{A90} , (dB)
13/10/2022	12:04 – 23:00	59	34 - 39	37

5.1 Description of Background Noise

Intermittent traffic noise on Rhosnesni Lane to the north and more constant distant traffic noise from Chester Road (A5152) to the west were the main noise sources. There was also noise from occasional activity on the park immediately opposite Rhosnesni Lane. Noise was also present from the other neighbouring commercial units in the form of mechanical ventilation units and loading/unloading of delivery vehicles.

5.2 Proposed Noise Assessment Criteria

Based on the advice given in Section 3 above, it is recommended that noise sources associated with the proposed fitness studio are controlled such that it does not exceed the typical background noise at each noise sensitive receiver. Noise limits are given below with respect to noise generation from the proposed fitness studio.

Table 7. Proposed daytime and night time operational noise limits for the premises

Noise Sensitive Location	Operation Period (hh:mm)	Noise limit at receiver, dBA
Rhosnesni Lane	Daytime opening hours (07:00 – 20:30)	46
	Night time (06:00 – 07:00)	40
Ffordd Dyfedd	Daytime opening hours (07:00 – 20:30)	37
	Night time (06:00 – 07:00)	31*

*Night-time noise limit has been derived by considering the difference in limit level at Rhosnesni Lane between day and night-time periods (6 dB) and deducting this from the short-term daytime measurement.

The noise limit above relates to the cumulative noise level of all activities from the development. The limits should be achieved for all noise sensitive receivers.

6.0 NOISE EGRESS ASSESSMENT

6.1 Existing unit construction detail

Based upon observations on site and plan drawings the construction of the front façade of the existing unit is mostly glazed with a brick cavity wall surrounding. The single glazing was measured at 6mm thickness. The west and southern facades are understood to be single leaf blockwork at 100mm

thickness, with the southern façade including a fire escape door. The roof/ceiling construction is understood to be 0.4mm galvanised steel sheets with a 600mm cavity suspended ceiling underlined with mineral fibre tiles.

6.1.1 Internal Noise Level

It is our understanding that typical activity in the fitness studio mainly consists of one to one training sessions where a single piece of exercise equipment is in use at one time. There are also portable speakers which are active providing background music. It is our understanding that the speakers will remain at low levels to provide background music as discussion between the trainers and clients is required during the session.

During our site visit measurements were taken within the unit during typical activity of the studio in order to ascertain an accurate representation of typical internal noise levels. Measurements were taken with the speakers on and the loudest piece of exercise equipment (Air-Bike) in use. An average of the internal noise level during this activity is shown in the table below.

Table 8. Typical Internal Reverberant Noise Levels

Element	Sound Pressure Level dB(Z), Octave Band Centre Frequency Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Fitness Studio	64	60	59	60	61	60	53	45	65

6.1.1 Façade Sound Insulation Assessment

Based on the construction of the proposed fitness studio and using the proposed façade dimensions, the expected sound insulation performance, proportional areas, and subsequent sound insulation performance of the façade elements is as follows with data taken from standard manufacturer's data.

Table 9. North façade – Composite Sound Insulation Performance

Cladding Element	Proportion of Area m ²	Sound Reduction Index Octave Band Centre Frequencies (Hz) dB							
		63	125	250	500	1k	2k	4k	8k
100mm Brick Cavity	27	42	44	42	49	56	64	70	70
6mm single pane glass	30	12	17	24	30	28	24	28	28
Composite Sound Insulation	57	15	20	27	33	31	27	31	31

Table 10. West façade – Composite Sound Insulation Performance

Cladding Element	Proportion of Area m ²	Sound Reduction Index Octave Band Centre Frequencies (Hz) dB							
		63	125	250	500	1k	2k	4k	8k
100mm Concrete Block	38	27	29	26	29	38	47	53	53
Composite Sound Insulation	38	27	29	26	29	38	47	53	53

Table 11. South façade – Composite Sound Insulation Performance

Cladding Element	Proportion of Area m ²	Sound Reduction Index Octave Band Centre Frequencies (Hz) dB							
		63	125	250	500	1k	2k	4k	8k
100mm Concrete Block	52	27	29	26	29	38	47	53	53
Escape Door	5	10	15	20	22	16	24	24	24
Composite Sound Insulation	57	20	24	25	28	27	35	35	35

Table 12. Roof – Composite Sound Insulation Performance

Cladding Element	Proportion of Area m ²	Sound Reduction Index Octave Band Centre Frequencies (Hz) dB							
		63	125	250	500	1k	2k	4k	8k
0.4mm Galvanised Steel Panel with suspended mineral fibre ceiling	245	10	12	21	33	47	56	58	58
Composite Sound Insulation	245	10	12	21	33	47	56	58	58

6.1.1 Ventilation

It is understood that the fitness studio will be served by the existing mechanical ventilation unit and there will be no requirement to open doors or windows to provide ventilation. Doors and windows are assumed as normally shut for the purposes of this assessment.

6.1.1 Façade Noise Break-out

Based on the predicted internal noise levels within the café bar the façade / roof noise break-out per metre squared (i.e. sound intensity) have been used for input into the noise model as follows:

Table 13. Façade Noise Break out

Element	Sound Power Level dBA/m ² , Octave Band Centre Frequency Hz								dBA SWL/m ²
	63	125	250	500	1k	2k	4k	8k	
North Façade	34	36	36	36	42	45	35	26	48
West Façade	20	25	35	38	33	24	11	2	41
South Façade	29	31	37	41	46	38	31	22	48
Roof	45	50	48	42	32	23	14	5	53

6.2 External Noise Levels

From discussion with Focused Fitness TC it is PDA's understanding that there will be no additional external mechanical service required for the fitness studio where ventilation is provided from the existing mechanical system.

7.0 NOISE IMPACT ASSESSMENT

7.1 Noise Propagation Calculations

A 3-dimensional noise model has been created using SoundPLAN noise modelling software. The software uses the method of ISO 9613 'Acoustics – attenuation of sound during propagation outdoors – general method of calculation' and takes into account geometric spreading, ground effects, air attenuation, barrier attenuation and reflections.

The model is based upon aerial photographs and the supplied site layout plans provided by the Client. A ground absorption coefficient of 0 has been used to correspond with the intervening ground from the site through to the receivers which is predominately hard surfaces (i.e. hard standing, roads etc). It is assumed that all units and activity will be operating continuously and simultaneously.

Each façade of the existing unit has been modelled as a separate area source with noise spectra and level relative to that calculated within Section 6.1

The SoundPLAN model would suggest the following noise levels calculated at the most exposed noise sensitive receivers. For other receivers further away a lower noise level would be experienced due to greater distance attenuation provided. Noise levels are calculated at 1.5m for the receivers at ground floor level an additional 2.8m for each additional storey where required. Only the highest calculated noise level has been reported in the table below.

Table 14. Calculated noise levels at the closest receivers

Noise Sensitive Location	Operation Period (hh:mm)	Calculated Specific Noise Level, dBA
Rhosnesni Lane	Daytime opening hours (07:00 – 20:30)	39
	Night time (06:00 – 07:00)	
Ffordd Dyfedd	Daytime opening hours (07:00 – 20:30)	29
	Night time (06:00 – 07:00)	

Figure 3. Calculated noise levels at residential receivers



Therefore based upon the above calculation the worst case noise level at residential receivers will be 39 dB(A) and 29 dB(A) at Rhosnesni Lane and Ffordd Dyfed respectively.

7.2 Initial BS4142 Assessment

An assessment has been undertaken in accordance with BS4142:2014, our assessment is based on the worst-case noise levels predicted at the nearby noise sensitive receivers as described above (see Table 11 above) and compared against the typical Background Sound Levels derived within Section 5.2.

Table 15. Comparison of Proposed Operations with background sound levels

Location	Operation Period	Predicted Specific Sound Level $L_{Aeq,T}$ (dB)	Rating Level L_{Ar} (dB)	Representative Background $L_{A90(15-min)}$ (dB)	Difference between Rating Level and Background (dB)
Rhosnesni Lane	Daytime	39	39	46	-7
	Night-time			40	-1
Ffordd Dyfed	Daytime	29	29	37	-8
	Night-time			31	-2

It is noted that BS4142 indicates the following:

10 dB(A) or more above the background is an indication of significant adverse impact, depending on the context.

5 dB(A) above the background is an indication of an adverse impact, depending on the context.

Where the rating level does not exceed the background level, this is an indication of the specific sound source having a low impact, depending on the context.

As the assessment has indicated that the Rating Level does not exceed the Background Sound Level during either day or night-time periods, in accordance with BS4142:2014 an initial assessment estimate impact would indicate that the specific sound will be below a level that is considered to be an adverse impact and will have a low impact. It should be noted however that that in accordance with BS4142:2014 this initial impact will need to be modified to account for context of the site. This is further discussed within Section 8.0.

It is important to note that consideration has been taken into account for the noise caused from the dropping of weights, and how this may imply a impulsive penalty. However, as the weight drop would cause an internal reverberant sound pressure level which the resultant level at the receiver is well below the existing ambient level, we would suggest that the impulsive character would be unidentifiable to the receiver and hence no penalty correction required.

7.3 Noise Impact Assessment – Absolute Levels

If comparison is made with the predicted specific noise levels described within Section 7.1 it can be seen that the predicted noise from the proposed scheme will be below the 50dB L_{Aeq} WHO guidance for the onset of moderate annoyance during the daytime for outdoor living areas.

In addition the predicted level is more than 10 dB below the existing ambient noise level during daytime opening hours at the nearest receiver and would therefore be non-contributory for this period as it would not increase the ambient noise level.

With regards to the worst case noise period the rating noise level at the facade of the most noise sensitive dwelling was predicted to be 39 dB L_{Aeq} and as such, is likely to comfortably achieve the WHO recommended noise criteria of 45 dB L_{Aeq} outside a bedroom window during the night-time. Taking into account a 15dB reduction for an open window, the internal noise level contributions from the proposed fitness studio is predicted to be 24 dB L_{Aeq} therefore satisfying the BS8233 recommended night-time internal noise level of 30 dB L_{Aeq} .

8.0 DISCUSSION OF RESULTS

The BS4142 initial estimate is described within Section 7.2, however it should also be noted that BS4142 indicates that this initial estimate of impact needs to be modified for context. With reference to the context BS4142 indicates that the significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. BS4142 indicates that pertinent factors that could modify context would include: the absolute level of sound; the character and level of the residual sound compared to the character and level of the specific sound; the sensitivity of the receptor and whether dwellings or other premises used for residential purpose already incorporate design measurements that secure good internal and/or outdoor acoustic conditions.

With reference to context, as described within Section 7.3 the absolute noise levels associated with the scheme are below the existing ambient noise climate and therefore it is unlikely that there will be an increase to existing L_{Aeq} levels. As the proposed fitness studio is located within an operational industrial estate, we would note that the character of the noise sources associated with the studio would be similar to that of the existing noise sources.



Our assessment indicates that the noise level is likely to be 7 dB or more below day-time Background Sound Level and 1 dB or more below the night-time Background Sound Level and therefore, comfortably achieves the LPA's criteria. Furthermore, it has a low impact in accordance with BS4142. We would consider that the context described above would reduce the impact of the scheme, however this would not further modify the outcome of the assessment.

It is noted that the NPPF requires that significant adverse impacts due to a new development should be avoided and other adverse impact should be mitigated and reduced to a minimum. Based upon the above assessment it is concluded that the sound levels arising from the operations of the proposed development will not result in an adverse impact and will therefore comply with the requirements of the NPPF.

9.0 UNCERTAINTY

BS4142 indicates that an assessment of noise impact should consider uncertainty within the assessment. This uncertainty can arise from: uncertainty in measurements; uncertainty in sound emission and sound power level; and uncertainty in calculation method.

9.1 Uncertainty in Measurements

It is noted that the instrumentation used for the assessment conform to Class 1 accuracy in accordance with IEC 61672. In addition, the instrumentation has been calibrated to national standards and were field calibrated at the time of the measurements. The measurements were undertaken at positions representative to the nearest residential receivers.

We would therefore consider that the effect of uncertainty on the measurement of background sound would be minimal.

9.2 Uncertainty in Sound Power Levels

We have calculated the reverberant sound levels of the noise sources associated with the scheme based upon measurements taken within the proposed unit. It should be ensured that the fitness studio development operates within these reverberant sound levels.

9.3 Uncertainty in Calculation Method

It is noted that the calculations have been undertaken utilising a known prediction method and have utilised the standard ISO 9613. In addition calculations have been undertaken utilising commercial prediction software. We would therefore consider that this would minimise uncertainty in the assessment.



10.0 CONCLUSION

At the request of Focused Fitness TC a noise impact assessment has been undertaken for the proposed fitness studio at Rhosnesni Lane, Wrexham.

An assessment of the noise emissions resulting from the proposed fitness studio has been undertaken and compared with the guidelines contained within BS4142:2014 *“Methods for rating and assessing industrial and commercial sound”*, WHO Guidelines for Community Noise and BS8233:2014 *“Guidance on sound insulation and noise reduction for buildings”*.

The assessment indicates that the development will not result in an adverse impact at the nearest noise sensitive receivers in accordance with the recommendation described within BS4142:2014. This is therefore an indication that the proposed scheme is in accordance with the National Planning Policy Framework.

APPENDIX A – DEFINITION OF ACOUSTIC TERMS

The decibel

This is the basic unit of noise, denoted dB.

A Weighting

This is a weighting process which simulates the human ear's different sensitivity at different frequencies. A weighting can be shown two typical ways, 50 dB(A) L_{eq} or 50 dB L_{Aeq} . Both mean the same thing. (See below for a definition of L_{eq}). The dB(A) level can be regarded as the overall level perceived by human beings.

L_{eq} and $L_{eq(s)}$

This is the equivalent continuous noise level which contains the same acoustic energy as the actual time-varying sound. In other words it is a kind of average noise level. It is denoted dB L_{eq} or, for A-weighted figures dB(A) L_{eq} or dB L_{Aeq} . It can also be expressed in terms of frequency analysis (see later). $L_{eq(s)}$ is the sample L_{eq} level.

L_n

This is the level exceeded for n% of the time. It is denoted dB L_n or, for A-weighted figures dB(A) L_n or dB L_{An} . It can be expressed in terms of frequency analysis (see later). L_{90} is the level exceeded for 90% of the time and is a measure of the lowest level typically reached. L_{10} is the level exceeded for 10% of the time and is the highest level typically reached. L_{50} is the level exceeded for 50% of the time and, mathematically, it is the median.

L_{max}

This is the maximum level reached during a measurement period. The "time constant", or the ability of the equipment to respond to impulses is usually expressed along with it, e.g. "Fast", "Slow", etc. It is denoted dB L_{max} or, for A-weighted figures dB(A) L_{max} , dB L_{Amax} , etc. It can also be expressed in terms of frequency analysis.

Frequency Analysis

Whereas dB(A) gives a very useful overall figure, it has its limitations in that it cannot be used to model or predict the effect of noise control and mitigation as this nearly always has radically different performance at different frequencies.

Frequency analysis expresses an overall noise level at each frequency or band of frequencies in the audible range. Octave band analysis divides the audible range into 10 bands from 31.5 Hz to 16 kHz and the noise level in each band can be expressed in any form e.g. L_{eq} , L_{90} , L_{max} etc. One third octave band analysis uses 30 bands.

Narrow band analysis takes the process to resolutions of less than 1 Hz. This is useful for identifying the existence of tones (whines, hums, etc.) and in pin-pointing the sources.

APPENDIX B – MEASURED LEVELS

Figure 4. Long-term Noise Survey

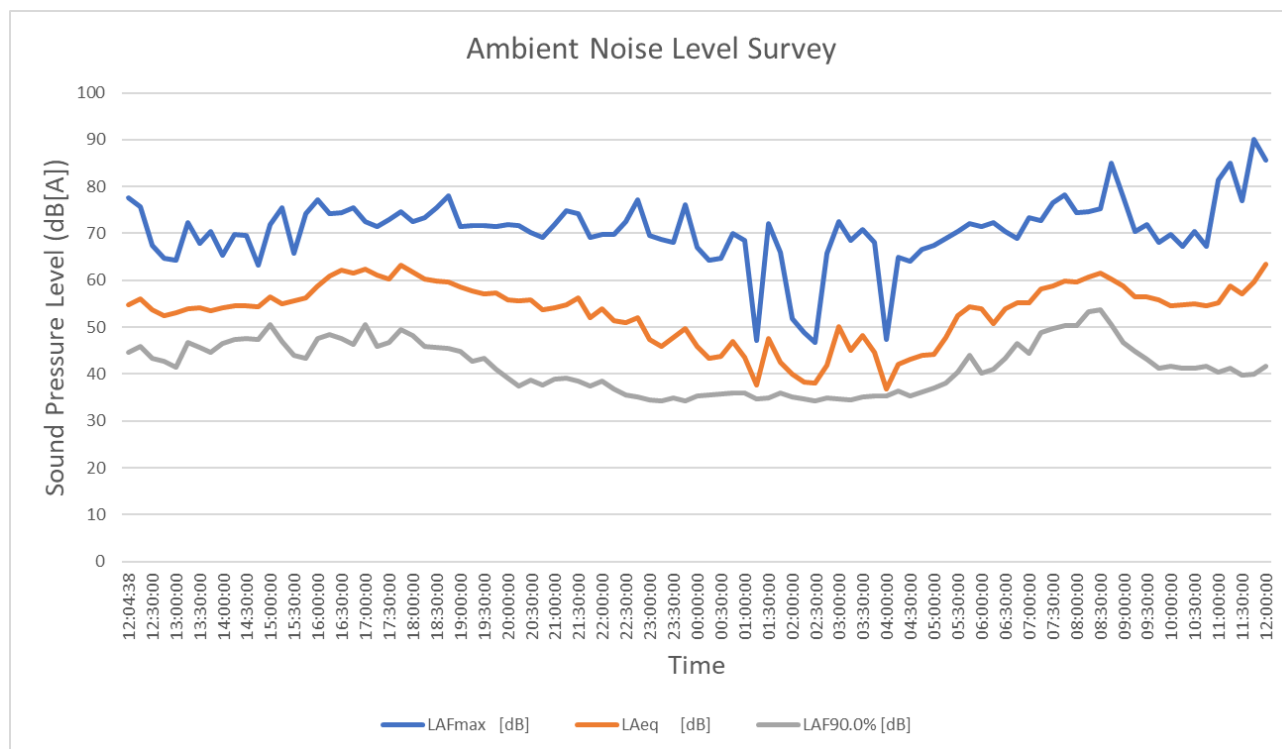


Figure 5. Short-term Noise Survey

