

**NOISE IMPACT ASSESSMENT FOR
43A CHURCH STREET, READING, RG4 8BA**

**PREPARED ON THE INSTRUCTIONS OF
SORBON ESTATES LTD**

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1. INTRODUCTION

- 1.1 Hawkins & Associates Limited ('Hawkins') has been engaged by Sorbon Estates Ltd ('Sorbon') to provide a noise impact assessment for break-out noise and plant noise for a proposed gym and fitness premises at 43A Church Street, St Martins Centre, Reading, RG4 8BA.
- 1.2 Based on the drawings provided by Sorbon, the proposed gym occupies part of the first floor of Block D at St Martin's Centre, Caversham. The accommodation comprises two principal activity spaces, identified as Space 1 and Space 2, with internal floor areas of approximately 340 m² and 246 m², respectively. Space 1 is expected to operate as a high-intensity fitness area (e.g. spin classes), while Space 2 is anticipated to be used as a yoga studio.
- 1.3 The unit is currently vacant and is subject to a proposed fit-out associated with the intended use. The principal noise sources within Space 1 will include both instructor speech and amplified music, whereas Space 2 will primarily be characterised by instructor speech noise levels. Details of the proposed internal fit-out and any associated mechanical and electrical (M&E) services installations have not been made available at the time of writing and as details are not currently available, the assessment has been undertaken based on the existing building fabric and a representative operational scenario. The assessment of any future mechanical services plant is addressed separately through the derivation of maximum permissible plant noise emissions capable of satisfying the local authority requirements.
- 1.4 Measurements have been made of the prevailing noise climate at the site boundary, which is representative of the nearest noise sensitive receivers (NSRs).
- 1.5 The intent of this report is to establish existing background noise levels at the nearest NSRs, then to predict and, if necessary, mitigate the impact of the proposed activities

and rooftop plant to an acceptable level. A Glossary of Terms used in this report can be found in **Appendix A**. Details of measurement equipment, and noise level shown as graphs can be found at **Appendix B**. A list of references can be found at **Appendix C** and calculations at **Appendix D**.

- 1.6 The author and Marie Gauthier have been responsible for work in connection with these instructions and the preparation of this report. This report has been peer reviewed by Tony Stacey and Marie Gauthier following the Hawkins & Associates Limited quality management system which is certified to ISO9001. All opinions expressed in this report are the author's, unless stated otherwise.

2. ACOUSTICS CRITERIA

2.1 National Planning Policy Framework

2.1.1 The National Planning Policy Framework (NPPF) was last revised on 12 December 2024 and sets out the government's planning policies for England and how these are expected to be applied.

2.1.2 The implications of development with respect to noise are recognised at paragraph 198 of the NPPF, where it is stated that planning policies and decisions should ensure that:

(a) 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:

- a. 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;
- b. Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

2.2 Noise Policy Statement for England (2010)

2.2.1 The Noise Policy Statement for England sets out the long-term vision of government noise policy.

2.2.2 The policy aims, through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development, to:

- (a) Avoid significant adverse impacts on health and quality of life;
- (b) Mitigate and minimise adverse impacts on health and quality of life; and
- (c) Where possible, contribute to the improvement of health and quality of life

2.2.3 In achieving these aims, the document introduces significance criteria in the form of 'effect levels' as follows:

Table 1: Noise Exposure Hierarchy

Perception	Examples Of Outcomes	Increasing Effect Level	Action
Not Noticeable	No effect.	No observed effect	No specific Measures required
Noticeable and Not Intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No observed adverse effect	No specific Measures required
Lowest Observed Adverse Effect Level			
Noticeable and Intrusive	Noise can be heard and causes small changes in and Intrusive behaviour and/or attitude, e.g. turning up volume of television, speaking more loudly, or having to close windows for some of the time because of the noise where there is no alternative ventilation. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed adverse effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			

Perception	Examples Of Outcomes	Increasing Effect Level	Action
Noticeable and Disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion, having to keep windows closed most of the time because of the noise where there is no alternative ventilation. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening, and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant observed adverse effect	Prevent
Noticeable and Very Disruptive	Extensive and regular changes in behaviour and/or an Unacceptable inability to mitigate effect of noise leading to adverse psychological stress or physiological effects, e.g. regular sleep deprivation/awakening, loss of appetite, significant/medically definable harm (auditory and non-auditory).	Unacceptable observed adverse effect	Avoid

2.2.4 The NPSE recognises that it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations and provides no guidance for how these criteria should be interpreted. Nevertheless, it is clear that there is no requirement to achieve noise levels for which there are no observable adverse impacts, but that reasonable and practicable steps should be taken to reduce adverse noise impacts in the context of sustainable development and should ensure a balance between noise sensitivity and the requirement for noise generating developments.

2.3 Institute of Acoustics: Good Practice Guide on the Control of Noise from Pubs and Clubs (2003) and related Guidance

2.3.1 The Institute of Acoustics (IOA) 'Good Practice Guide' gives guidance to prevent noise disturbance from the operation of public houses, clubs, restaurants, etc. The document was intended to provide objective criteria for assessing noise from all of the main sources of noise associated with these venues. However, the criteria proposed within the document were not subjected to a satisfactory validation process

following withdrawal of a number of parties from the working group. The guidance is, nevertheless, generally recognised as a good source for determining suitable assessment criteria for noise sources of this nature.

2.3.2 Whilst the proposed development is a gym rather than a traditional entertainment venue, amplified music is expected to form a key component of the operation and has the potential to contribute to noise breakout from the premises. The principles and assessment criteria contained within the IOA guidance are therefore considered applicable to the assessment of amplified music associated with the proposed use and provide a suitable basis for evaluating the potential for disturbance at nearby noise-sensitive receptors.

2.3.3 The criteria presented in **Table 2** are taken from the original Good Practice Guide and were published in a later article in the IOA Acoustics Bulletin in 2003. The way in which the noise arising from activities is assessed is by comparing the continuous equivalent sound pressure levels, L_{Aeq} , and the sound pressure level that is exceeded 10% of the time, L_{A10} , of 'Entertainment Noise' (**EN**) at the point of the nearest noise sensitive receiver with the background noise levels, L_{A90} , 'Without Entertainment Noise' (**WEN**).

Table 2: IOA Good Practice Guide – Proposed Objective Criteria for Entertainment Noise

Event Frequency	Suggested Regulations	Outcome if Criteria are met
Entertainment <30 times per year	L_{Aeq} (EN) should not exceed L_{A90} (WEN) by more than 5dB	EN will generally be audible but not overly obtrusive inside noise sensitive properties
Entertainment >30 times per year	L_{Aeq} (EN) should not exceed L_{A90} (WEN) by more than 5 dB and the L_{10} (EN) should not exceed L_{90} by more than 5 dB in any 1/3 octave band between 40 Hz and 160 Hz	EN will generally be audible but not overly obtrusive inside noise sensitive properties

Event Frequency	Suggested Regulations	Outcome if Criteria are met
Entertainment once per week or continues beyond 23:00 hours	L_{Aeq} (EN) should not exceed L_{A90} (WEN) and L_{10} (EN) should not exceed L_{90} (WEN) in any 1/3 octave band between 40 Hz and 160 Hz	EN will be virtually inaudible inside noise sensitive properties

2.4 Criteria Used in this Assessment for Impact on Residential Properties

2.4.1 The proposed venue is to be used as a gym and fitness facility. Amplified music is expected to form a routine component of the operation and may be used during fitness classes and general gym activities. Based on the timings of operation, amplified music may occur on a daily basis and therefore on substantially more than 30 occasions per year.

2.4.2 While overall and octave band L_{Aeq} data are available for noise levels in clubs, third-octave band data is not available. Similarly, overall, third-octave and octave band data for the L_{10} metric are not available. In addition, the sound insulation data of building materials is typically not available in third-octave bands, and, therefore, the calculations for noise break-out of the venue are limited to octave band data. We therefore propose the following adjusted criteria for assessment to allow for the use of octave, rather than third-octave band data:

- i. For low-frequency noise – L_{eq} (EN) $\leq L_{90} - 3$ dB (WEN) in 63 and 125 Hz octave bands;
- ii. For broadband noise - L_{Aeq} (EN) $\leq L_{A90}$ dB (WEN).

2.5 WHO Guidelines

2.5.1 The World Health Organisation (WHO) Environmental Noise Guidelines were published in 2018. The document states:

"The current environmental noise guidelines for the European Region supersede the WHO Community Noise Guideline (CNG) from 1999. Nevertheless, the Guideline Development Group recommends that all CNG indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid."

- 2.5.2 The 'Guidelines for Community Noise' (1999) recommend that the maximum noise levels within bedrooms at night should not regularly exceed a level of 45 dB L_{Amax} .

2.6 ProPG: Planning and Noise (2017)

- 2.6.1 In 2017, the Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH) produced a Professional Practice Guidance document on Planning and Noise in the context of new residential developments.

- 2.6.2 The guidance document makes reference to the guidelines contained within BS 8233:2014. With regards to the impact of single noise events, it states that in noise-sensitive rooms at night (e.g. bedrooms), individual noise events (from all sources) should not normally exceed 45 dB L_{Amax} more than 10 times a night as this represents a threshold below which the effects of individual noise events on sleep can be regarded as negligible. It adds that it is difficult to reach a clear conclusion on when the impact of individual noise events should be regarded as "unreasonable" or "unacceptable" and recommends that a more detailed site and scheme specific assessment of the potential impact on occupants be undertaken where noise events are expected to exceed 45 dB.

2.7 Local Authority Requirements: Reading Borough Council

2.7.1 On 22 December 2025, Reading Borough Council set out the following requirements, related to noise and opening times, under planning application reference PL/25/0722:

Condition 5: *"Prior to first use of any Class E(d) use a noise assessment shall be submitted to and approved in writing by the Local Planning Authority. The assessment shall be carried out in accordance with relevant guidance and shall take into account all activities likely to take place in the Class E(d) use and shall propose suitable mitigation in order to ensure that there will be no break-out noise emanating from the premises likely to give rise to disturbance to surrounding residents. The approved mitigation shall be installed in accordance with the assessment prior to first use and shall thereafter be maintained so that it operates to the same standard.*

REASON: To safeguard the amenities of the surrounding properties and the area generally, in accordance with Policy CC8 and EN17 of the Reading Borough Local Plan 2019."

Condition 6: *"No mechanical plant shall be installed until a noise assessment of the proposed mechanical plant has been submitted and approved by the Local Planning Authority. The assessment shall be carried out in accordance with BS4142:2014 methodology. The predicted specific sound level (LAeq,TR) (with reference to BS:4142) as measured at a point 1 metre external to the nearest noise-sensitive façade shall be at least 10dB below the pre-existing background sound level, LA90,T when all plant/equipment (or any part of it) is in operation. The predicted rating level, LAr,Tr (specific sound level plus any adjustment for the characteristic features of the sound) as measured at a point 1 metre external to the nearest noise-sensitive façade (habitable window of a dwelling) shall not exceed the pre-existing background sound level, LA90,T when all plant/equipment (or any part of it) is in operation. The*

plant shall thereafter only be installed in accordance with the assessment and shall thereafter be maintained so that it operates to the same standard.

REASON: To safeguard the amenities of the adjoining premises and the area generally, in accordance with Policy CC8 and EN17 of the Reading Borough Local Plan 2019."

- 2.7.2 **Condition 8:** "The use hereby approved shall not be used by members of the public outside the hours of 06:30 to 22:30 any day.

REASON: In order to protect local residents from unreasonable disturbance arising from the use in accordance with Policy CC7 and CC8 of the Reading Borough Local Plan 2019."

- 2.7.3 **Condition 9:** "No amplified sound or music shall be played at the premises outside the following times: 07:00 to 22:00.

REASON; To safeguard the amenity of nearby premises and the area generally in accordance with Policy CC8 of the Reading Borough Local Plan 2019."

- 2.7.4 This document has been prepared to assess compliance with Conditions 5 and 6, with Conditions 8 and 9 defining the times at which the assessments are to be undertaken.

2.8 Proposed Hours of the Gym

- 2.8.1 The operational hours of the proposed gym have been restricted by planning Conditions 8 and 9 and are hence understood to be as follows:

- Daily: 06.30 - 22.30. Operational hours of the gym and classes without amplified music.
- Daily: 07.00 – 22.00. Operational hours of the gym and classes which include amplified music.

2.8.2 Accordingly, this assessment considers the potential for noise breakout associated with the proposed use during the permitted operating hours of 06:30 to 22:30 on all days of the week. In accordance with the planning permission, amplified music has been specifically assessed for the period between 07:00 and 22:00 on any day. Relevant acoustic guidance, including the principles of BS 4142:2014+A1:2019, has been considered where appropriate.

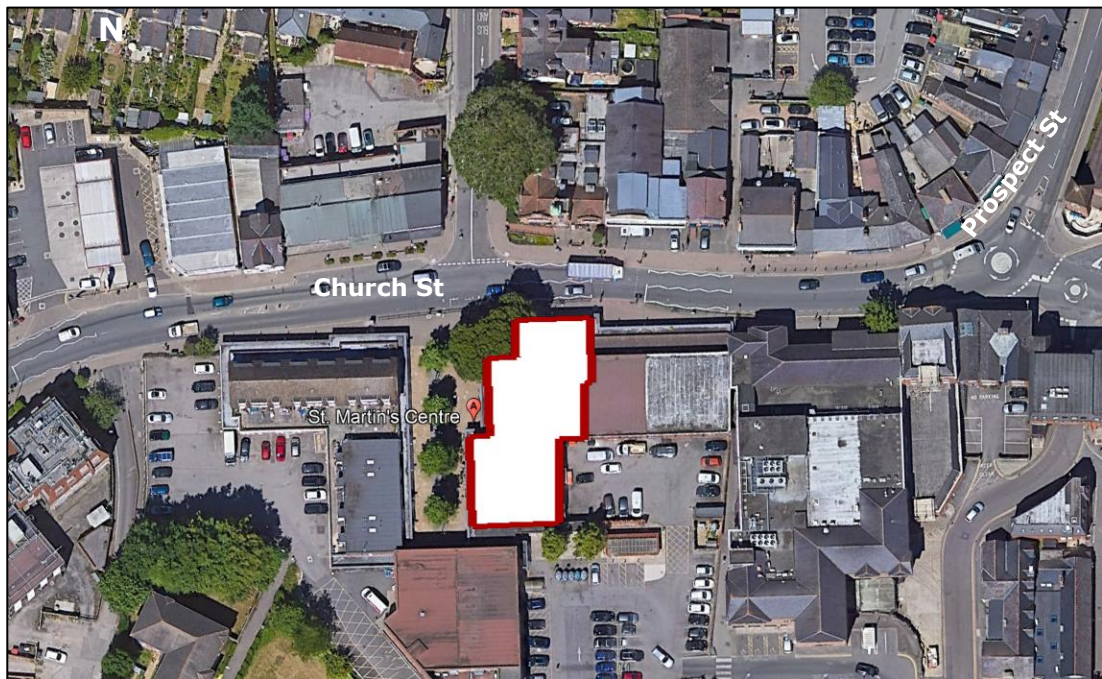
2.9 Proposed Hours of the Plant Operation

2.9.1 As the specification of any future mechanical services plant has not yet been determined, the assessment assumes that any rooftop plant may operate **at any time during the day or night**. This approach allows the assessment to consider the full range of potential operating conditions and ensures that the derived noise limits remain applicable irrespective of the final plant selection or operating regime. Any future plant installation should therefore demonstrate compliance with the specified noise limits during all periods of operation. For the purposes of the BS 4142 assessment, daytime and nighttime periods have been defined in accordance with the standard as 07:00–23:00 hours and 23:00–07:00 hours respectively.

3. SITE LOCATION AND NOISE ENVIRONMENT

3.1 As shown in **Figure 1**, the gym site is located on Church Street, Caversham, RG4 8BA, Reading, within a mixed-use urban environment comprising retail, commercial, office uses nearby and residential in the surroundings. The proposed use will occupy the first floor of a two-storey building within St Martin's Centre. Commercial occupiers include a Costa Coffee and Boots pharmacy directly below the unit, together with a butcher, café, Superdrug store and a number of small office premises. The site is also adjacent to a Waitrose supermarket and a customer car park serving the wider commercial area.

Figure 1: Site outline for 43A Church Street, indicated by infilled white area, with surroundings (image source: Google)



3.2 During site visits, the ambient noise climate was dominated by road traffic movements along Church Street, a busy local distributor road serving the Caversham and Reading areas. Intermittent contributions from vehicle manoeuvring within the adjacent car park and activity associated with nearby commercial premises were also observed.

4. ENVIRONMENTAL NOISE SURVEY

4.1 Description

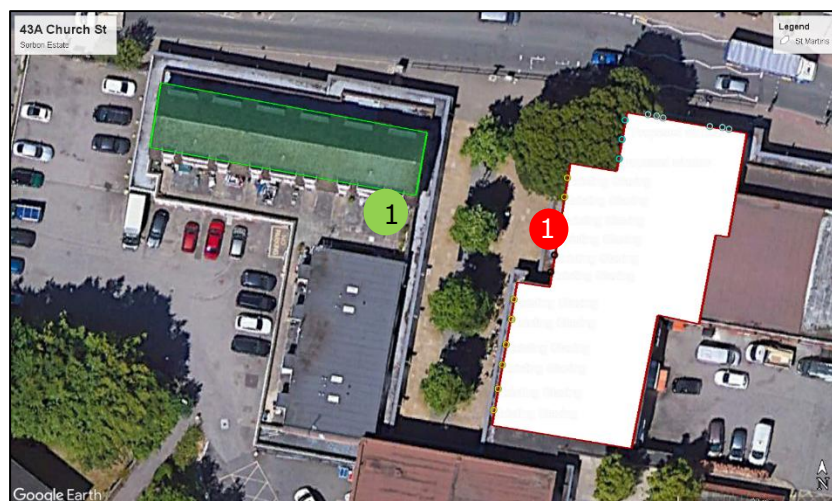
4.1.1 An unattended noise survey was carried out between 13:00 on Friday 22 May 2026 and 11:00 on Tuesday 26 May 2026 covering both weekday and weekend periods. Note that Monday 25 May was a Bank Holiday and is therefore treated as a Bank Holiday. The weather data have been analysed and show no periods of rainy conditions that potentially influenced the sound level data. The sound level meter logged noise data continuously at 15-minute intervals throughout the survey period.

4.1.2 The measurement position and NSR are described within **Table 3** and shown within **Figure 2**.

Table 3: Measurement position and description

Icon	Descriptor	Location Description
	Noise Measurement Position 1 – MP1	The microphone was installed on the west-side façade, as shown in Figure 2. It was positioned under free-field conditions at an approximate distance of 1.0 metre from the façade wall.
	Closest Noise Sensitive Receptor 1 - NSR	Nearest dwelling to the west of the proposed gym

Figure 2: Site view showing measurement location (red circle) and closest NSR (green circle)



4.2 Survey Results

- 4.2.1 Time history graphs illustrating the results of the sound level measurements obtained at monitoring position MP1 are provided in Appendix B. The raw data collected by the sound level meter can be provided upon request. Test equipment details are also given in Appendix B.
- 4.2.2 The measured sound levels exhibited a stable and predictable diurnal¹ pattern throughout the monitoring period. A review of local meteorological data indicated that no rainfall occurred during the survey and wind speeds were generally low. Accordingly, the weather conditions were considered suitable for environmental noise measurements.
- 4.2.3 According to Planning Condition 8 the proposed gym is permitted to operate between 06:30 and 22:30 on a daily basis. However, Condition 9 restricts the use of amplified music within the premises to the period between 07:00 and 22:00. Outside these hours, activity within the premises may be limited to instructor-led sessions only. Review of the survey data indicates that background sound levels during the 06:30–07:00 and 22:00–22:30 shoulder periods differ only marginally from those during the permitted music daytime period. Accordingly, a single design criterion based on the lower measured background sound level has been adopted for the full operational period.
- 4.2.4 A summary of the noise data collected at the measurement point MP1 for the assessment for the operation of the gym are summarised in **Table 4**. The data have been selected to represent the acoustic environment during the proposed operational hours of the gym, namely 06:30 to 22:30. The assessment period includes full operational days across the survey duration, whilst data collected during the partial

¹ A diurnal noise pattern describes the variation in background sound levels over the 24-hour day-night cycle, typically characterised by higher levels during the daytime and reduced levels during the night-time period, reflecting changes in human activity and road traffic

monitoring days on Friday 22 May 2026 and Tuesday 26 May 2026 have also been included for reference.

Table 4: Summary of noise level data collected at MP1, representative for the noise sensitive receptor NSR for sound sources including amplified music between 06:30 and 22:30

Measurement Period	L _{Aeq} [dBA]	L _{A90} Range [dBA]	L _{A10} Range [dBA]	L _{Amax} Range [dBA]	Representative L _{A90} [dBA]	Comments
Friday (13:15 – 22:30)	64	54-59	64-68	75-103	58	Representative L _{A90} determined in accordance with BS 4142:2014.
Saturday (06:30 – 22:30)	66	45-61	64-67	72-105	59	
Sunday (06:30 – 22:30)	65	42-66	63-76	70-100	56	
Monday (06:30 – 22:30)	63	41-58	62-69	70-97	56	
Tuesday (06:30 – 11:45)	64	49-58	63-68	73-99	56	

4.2.5 A summary of the noise data collected at measurement position MP1 and used for the plant noise assessment are presented in **Table 5** and **Table 6**. The reported values have been selected to characterise the prevailing background sound environment during both daytime and nighttime periods and form the basis of the BS 4142 assessment.

Table 5: Summary of noise level data collected at MP1, representative for the noise sensitive receptor at daytime between 07:00 and 23:00

Measurement Period	L _{Aeq} [dBA]	L _{A90} Range [dBA]	L _{A10} Range [dBA]	L _{Amax} Range [dBA]	Representative L _{A90} [dBA]	Comments
Friday (13:15 – 23:00)	64	52-59	64-68	75-103	58	Representative L _{A90} determined in accordance with BS 4142:2014.
Saturday (07:00 – 23:00)	66	46-61	64-67	72-105	59	
Sunday (07:00 – 22:00)	65	43-66	63-76	70-100	56	
Monday (07:00 – 23:00)	63	44-58	62-69	71-97	56	

Measurement Period	L _{Aeq} [dBA]	L _{A90} Range [dBA]	L _{A10} Range [dBA]	L _{Amax} Range [dBA]	Representative L _{A90} [dBA]	Comments
Tuesday (07:00 – 11:45)	64	51-58	63-68	73-99	56	

Table 6: Summary of noise level data collected at MP1, representative for the noise sensitive receptor at nighttime between 23:00 and 07:00

Measurement Period	L _{Aeq} [dBA]	L _{A90} Range [dBA]	L _{A10} Range [dBA]	L _{Amax} Range [dBA]	Representative L _{A90} [dBA]	Comments
Friday (23:00 – 07:00)	62	36-46	50-75	68-91	40	Representative L _{A90} determined in accordance with BS 4142:2014.
Saturday (23:00 – 07:00)	56	35-44	48-64	68-83	38	
Sunday (23:00 – 07:00)	56	35-43	41-64	67-87	39	
Monday (23:00 – 07:00)	57	34-50	40-66	67-82	40	

4.3 Background noise levels summary

4.3.1 Derived from the results presented in the preceding tables, background noise levels representative for operational hours, daytime and nighttime noise levels, L_{A90}, for MP1 are summarised in **Table 7**.

Table 7: Site representative noise levels for operational times, daytime and nighttime

Time Period	Measurement Position MP1 [dBA]
Operational hours of the venue (06:30- 22:30) L _{A90}	56
Daytime Representative (07:00 – 23:00) L _{A90}	56
Night-time Representative (23:00 – 07:00) L _{A90}	38

4.4 Background threshold noise levels for operational times

4.4.1 The data shown in Table 7 above have been considered within the context of the requirements in Section 2.4 of this report. The most representative value for L_{A90} at

the NSR (56 dBA) has been used to determine the noise level limits that should not be exceeded through the operation of the proposed gym premises. **Table 8** sets out these noise level limits for the NSR for the operational hours of the gym between 06:30 and 22:30 on a daily basis.

Table 8: Background noise level and noise level limits at the NSR - **Operational hours of the gym (06:30- 22:30)**

Frequency [Hz]	63	125	250	500	1k	2k	4k	8k	Total [dBA]
L ₉₀ [dB]	62	57	51	52	50	48	44	38	56
L _{eq} Limit [dB]	59	54	-	-	-	-	-	-	-
L _{A90} /L _{Aeq} Limit [dBA]	-	-	43	49	50	49	45	37	56

4.4.2 Table 8 presents the background sound levels measured at the nearest noise-sensitive receptor (NSR) together with the corresponding noise limits adopted for the assessment of breakout noise from the proposed gym. The limits have been derived with regard to the potential for disturbance to nearby residents during the proposed operational period between 06:30 and 22:30.

4.4.3 The octave-band limits represent the maximum permissible noise levels attributable to activities within the gym as received at the NSR. Compliance with these limits would indicate that noise associated with the proposed use is unlikely to give rise to disturbance, taking account of both the level and frequency content of the noise in relation to the prevailing acoustic environment.

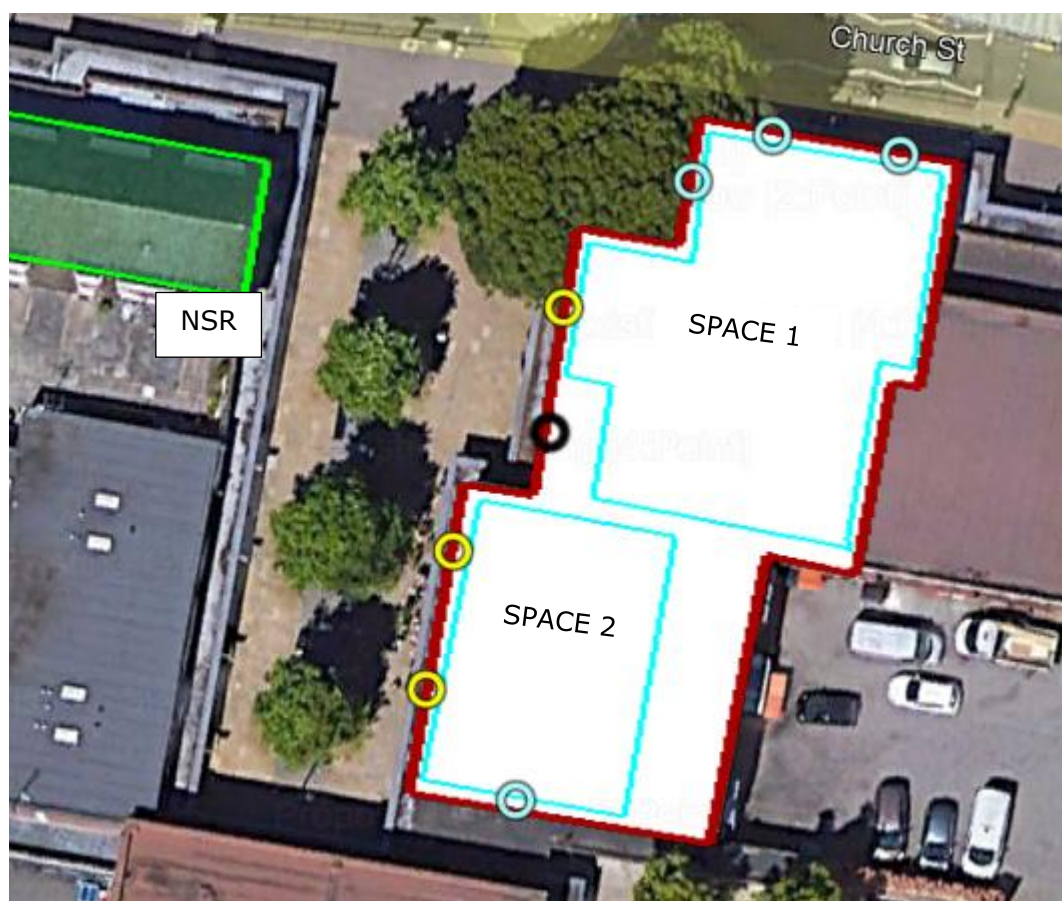
5. CALCULATED NOISE LEVELS FROM ACTIVITIES AT THE PROPOSED GYM TO THE NOISE SENSITIVE RECEIVERS

5.1 Preamble

- 5.1.1 Noise break-out calculations have been carried out in accordance with BS EN ISO 12354, '*Building acoustics – Estimation of acoustic performance of buildings from the performance of elements. Part 4: Transmission of indoor sound to the outside*' in order to assess break-out noise in accordance with Condition 5. The design details such as wall and glazing dimensions have been taken from drawings provided by Sorbon.
- 5.1.2 The building envelope generally comprises retained masonry construction with new fire-protected partitions provided around the circulation core. A number of existing windows are to be replaced with like-for-like UPVC units, whilst additional proposed windows are introduced on sections of the western façade. High-level windows and slit windows are also identified for replacement with fixed UPVC glazing.
- 5.1.3 From an acoustic perspective, the principal potential noise breakout paths are the glazed elements serving the activity spaces, particularly those facing towards nearby residential receptors. The large open-plan nature of the gym spaces, combined with the extent of perimeter glazing, suggests that façade sound insulation performance is likely to be a key consideration in controlling music and noise breakout from the two gym spaces.
- 5.1.4 **Figure 3** shows the location of the gym venue within the development and its relationship to the surrounding residential properties. The figure also identifies the various glazing elements associated with the gym, including proposed glazing (blue circles), existing glazing (yellow circles) and stairwell glazing (white circles). Whilst glazing is present on the northern and southern façades (top and bottom of the figure),

these openings are largely screened and are not orientated towards the nearest assessed receptor. Consequently, they are not expected to represent significant noise transmission paths to the nearest NSR and have not been included within the breakout noise predictions.

Figure 3: Location of the gym façade glazing (blue circles = proposed glazing, yellow = existing glazing, black = glazing at a stairwell) and the adjacent NSR used for the assessment of potential noise breakout from the proposed gym spaces



- 5.1.5 It has been assumed that windows will not be opened and that glazing will be 6 mm single glazed for the purpose of prediction. The building structure is assumed to be of brickwork cavity and the airborne sound insulation provided by the structures taken to be no less than the performance given in **Table 9**. This data should be reviewed as the design for the proposed glazing develops.

Table 9: Assumed minimum airborne sound insulation performance of building elements

Element	Airborne Sound Insulation Performance – Sound Reduction Index, R (dB)							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Glazing Type Single Pane 6mm St Gobain	18	21	26	32	34	32	36	42
Wall Type Brickwork Cavity	36	40	44	45	51	56	56	56*
* The values at 8 kHz have been extrapolated from the 4 kHz value.								

5.1.6 The proposed development comprises a gym and fitness facility in which amplified music is expected to form a routine part of the operation. At the time of writing, details of the proposed sound system and operational sound levels were not available. Consequently, it is necessary to adopt representative source noise levels for assessment purposes.

5.1.7 As the gym is not yet operational, the internal noise levels associated with music playback cannot be directly measured. Accordingly, the assessment has been based on noise level data obtained from comparable facilities where amplified music forms a significant component of the user experience. The adopted source levels are intended to represent a realistic upper operating scenario for a commercial gym environment, where music is clearly audible and capable of motivating participants during exercise classes, whilst still allowing instructors to communicate effectively with the clients. These assumed levels are not intended to represent nightclub, live music venue or concert conditions. Should the future operation of the gym involve internal music levels significantly greater than those adopted within this assessment, particularly at low frequencies, the conclusions of this report may require review. The sound pressure levels expected to arise within the two gym spaces during a class are shown in **Table 10**.

Table 10: Representative reverberant noise data for Recorded Background Music and Instructors Speech Levels

Noise Source	Sound Pressure Level [dBZ]								
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Total [dBA]
Recorded Background Music (suitable for intense training Space 1)	86	92	87	84	87	81	79	90	90
Loud Speech (suitable for audible instruction Space 1)*	67	68	70	72	69	61	54	45	73
Raised Speech (suitable for instruction in Yoga Studio Space 2)*	63	64	67	67	61	52	45	38	67
* It is assumed that the instructor is not facing towards the windows; therefore, direct contribution has not been considered, but reverberant values have been averaged over the duration of a class									

5.2 Results of Predictions

5.2.1 Noise breakout from the proposed gym and fitness venue has been predicted at the nearest noise-sensitive receptor (NSR), identified in **Figure 4**. The approximate dimensions of the representative windows used within the assessment can be determined from this figure. The receptor is located approximately 20 m from the building and represents the closest residential façade. The receptor has a direct line of sight to two façades of the proposed gym venue. A third façade is partially obscured by an existing tree and screened by the geometry of the building and the residential terrace block.

Figure 4: 3D view showing the proposed gym and fitness venue, the closest noise-sensitive receptor (NSR) and the façade elements considered within the breakout noise assessment. The coloured façade areas indicated F1, F2 and F3 are the building elements included within the noise propagation calculations



5.2.2 Prediction calculations have been undertaken on the basis that all external doors and windows remain closed during periods when amplified music and instructor speech are simultaneously present within the two fitness studios. The assessment considers a representative worst-case operating scenario in which both studios are in use concurrently. The breakout noise predictions have been carried out in accordance with the methodology contained within BS EN ISO 12354-4. Composite façade sound reduction indices have been derived from the individual sound insulation performance and surface areas of the wall and glazing elements to determine the overall acoustic performance of each façade considered within the assessment. This assumption reflects the intended operation of the premises and forms an important component of the noise control strategy.

5.2.3 As details of the future tenant fit-out are not currently available, the assessment has been based on the existing building fabric and the representative internal noise levels described above. The predicted noise levels at the nearest NSR are presented in **Table 11**.

Table 11: Predicted sound pressure levels at the NSR arising from the dominant noise sources at the gym

Position NSR	Sound Pressure Level at Receiver [dBA]								Total [dBA]
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
Recorded Background Music (Space 1)	16	28	26	23	27	24	18	21	33
Loud Speech (Space 1)	-8	0	5	6	3	-6	-16	-30	10
Raised Speech (Space 2)	11	9	7	2	-7	-15	-25	-37	3

5.2.4 The predicted breakout noise levels associated with amplified music have been compared with the representative background sound levels (WEN) derived from the noise survey. This comparison has been undertaken in accordance with the principles of the IOA Good Practice Guide, Section 2.3 of this document, to assess the likelihood of disturbance at nearby noise-sensitive receptors. To ensure that amplified music levels remain consistent with those adopted within this assessment, a suitably configured noise limiting device should be installed within Space 1. The comparisons of predicted and recommended noise limits are given in **Table 12**.

Table 12: Comparison of predicted sound pressure levels at NSR with recommended limits – **Amplified Music and Speech between 07:00 and 22:00**

Music and Speech	Sound Pressure Level [dBA]								
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Total
Predicted L_{Aeq} at NSR	16	28	26	23	27	24	18	21	33
Measured L_{A90} at NSR	35	41	43	49	50	49	45	37	56
WEN Limit¹	32	38	43	49	50	49	45	37	56
Predicted EN L_{Aeq}	16	28	26	23	27	24	18	21	33
Green = below recommended limit, Amber = very close to limit, Red = exceeds limit ¹ Based on L_{A90} -3 dB at 63 and 125 Hz									

5.2.5 As the proposed gym may accommodate classes during the opening and closing 30-minute periods when amplified music is not expected to be in use, an assessment of

instructor speech noise from both Space 1 and Space 2 alone has also been undertaken, the results are shown in **Table 13**. Hence, this assessment also considers the potential for noise breakout associated with 'loud' and 'raised' speech during classes and provides an indication of the likely impact during periods when amplified music is absent.

Table 13: Comparison of predicted sound pressure levels at NSR with recommended limits – **Speech between 06:30 and 22:30**

Speech	Sound Pressure Level [dBA]								
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Total
Predicted L_{Aeq} at NSR	-8	0	5	6	3	-6	-16	-30	10
Measured L_{A90} at NSR	35	41	43	49	50	49	45	37	56
Predicted L_{Aeq}	-8	0	5	6	3	-6	-16	-30	10
Green = below recommended limit, Amber = very close to limit, Red = exceeds limit									

5.2.6 The prediction results from Table 12 and Table 13 indicate that, assuming a minimum glazing specification of 6 mm single glazing and closed-window operation during periods of amplified music, the resulting breakout noise levels at the nearest noise-sensitive receptor are not expected to exceed the adopted IOA assessment criteria. The proposed gym is therefore not expected to give rise to significant noise disturbance during either the amplified music period (07:00–22:00) or the wider permitted operating hours of 06:30–22:30.

6. PLANT NOISE ASSESSMENT

6.1 Preamble

6.1.1 The specification of any future mechanical services plant has not yet been determined. Accordingly, this assessment has been undertaken to establish the maximum permissible plant noise emissions that would satisfy the requirements of Condition 6 of the planning permission. The derived noise limits are intended to inform the selection, design and installation of any future rooftop plant serving the development.

6.2 Noise limits

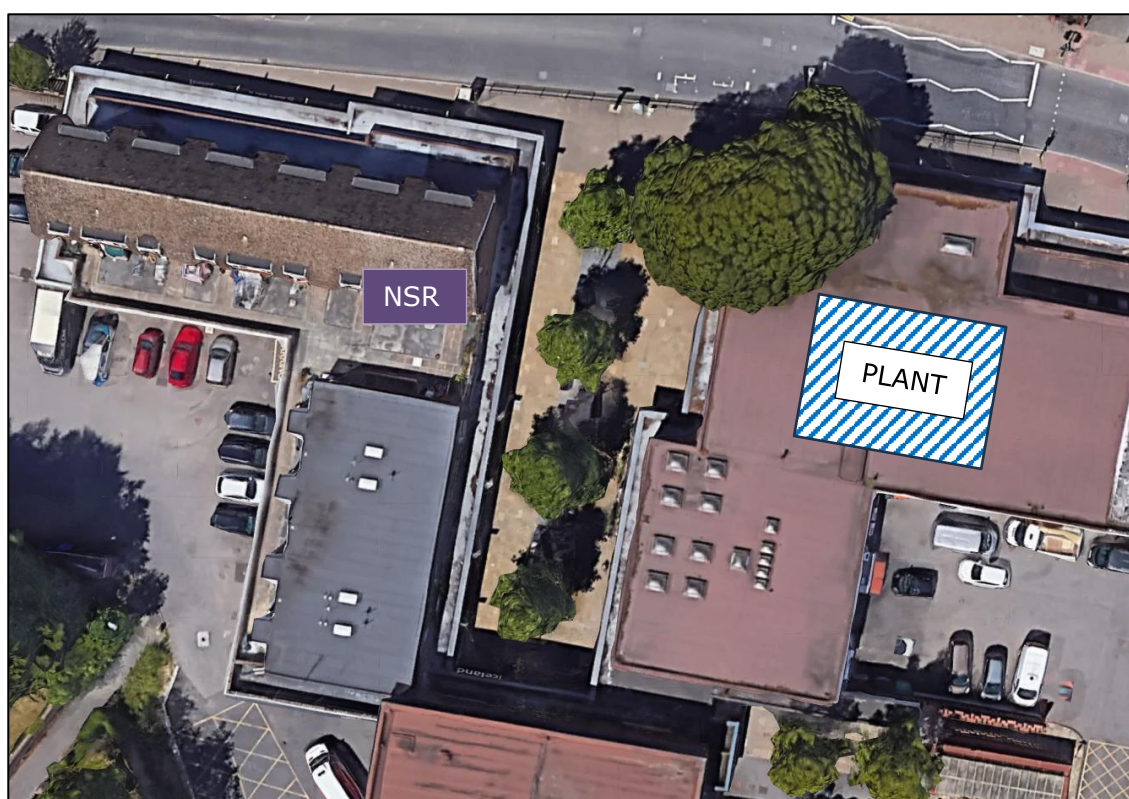
6.2.1 The planning condition requires that the specific sound level associated with the operation of any mechanical plant does not exceed the existing background sound level by the prescribed margin of 10 dB at the nearest noise-sensitive receptor. In the absence of a defined plant specification, the assessment has been undertaken by deriving the maximum cumulative sound power level that could be emitted by a future plant installation whilst remaining compliant with the condition.

6.2.2 Noise propagation calculations have been undertaken using representative plant locations on the roof of the building and the measured background sound levels presented in Section 4.3. The calculations account for attenuation over distance together with any screening effects provided by the building structure where relevant. The derived limits represent the maximum cumulative sound power level of all plant serving the development and are therefore applicable irrespective of the final equipment selection.

6.2.3 A potential rooftop plant area has been identified by the authors for assessment purposes and is shown in **Figure 5**. The location shown is indicative only and has been adopted to establish representative plant noise limits. Based on site observations and

a review of the available elevation drawings, no significant screening effect is anticipated between the indicative rooftop plant location and the nearest noise-sensitive receptor. Accordingly, a screening correction of 0 dB has been adopted within the assessment. Any future plant installation should be located within, or acoustically equivalent to, the area identified in Figure 5, unless an alternative assessment is undertaken to demonstrate compliance with the requirements of the planning condition.

Figure 5: Indicative rooftop area adopted by the authors for this assessment of future mechanical services plant



- 6.2.4 The resulting sound power limits should be considered cumulative limits applicable to all mechanical services plant associated with the development. Where multiple items of plant are proposed, the combined sound power output of all equipment should not exceed the limits presented within this report unless further assessment demonstrates compliance with the requirements of Condition 6.

6.3 Specific Sound Level Assessment

- 6.3.1 Condition 6 of the planning permission requires that the predicted specific sound level associated with any mechanical plant serving the development is at least **10 dB** below the pre-existing background sound level at the nearest noise-sensitive receptor. In addition, the BS 4142 rating level, including any applicable character corrections, should not exceed the prevailing background sound level. Accordingly, the maximum permissible plant noise emissions have been derived during both the daytime and night-time periods by reference to the measured background sound levels and are shown within **Table 14**.

Table 14: Maximum permissible plant sound power levels (L_{WA}) derived from the measured background sound levels, L_p , at the closest NSR

Time	L_D @ NSR [dBA]*	Distance to NSR [m]	Directivity Q	Screening [dB]	Condition 6 Correction	Maximum L_{WA} [dBA]
Daytime 07:00 – 23:00	56	33	2	0	-10	84
Nighttime 23:00 – 07:00	38	33	2	0	-10	66
* Taken from Table 7						

6.4 Rating Level Assessment

- 6.4.1 In addition to the specific sound level criterion, Condition 6 requires that the BS 4142 rating level associated with the operation of any mechanical services plant **does not exceed** the prevailing background sound level at the nearest noise-sensitive receptor. The rating level is determined by applying any relevant corrections for acoustic character, including tonality, impulsivity and intermittency, to the specific sound level and here more than one acoustic characteristic is present, the applicable corrections are added arithmetically. The character corrections defined within BS 4142:2014+A1:2019 are summarised in **Table 15**.

Table 15: BS 4142:2014+A1:2019 Character Corrections

Acoustic Feature	Subjective Perception at Receptor	Correction, C [dB]
Tonality	Not perceptible	0
Tonality	Just perceptible	+2
Tonality	Clearly perceptible	+4
Tonality	Highly perceptible	+6
Impulsivity	Just perceptible	+3
Impulsivity	Clearly perceptible	+6
Impulsivity	Highly perceptible	+9
Intermittency	Distinctly audible intermittency	+3

6.4.2 Accordingly, the maximum permissible plant noise emissions have also been assessed with reference to the BS 4142 rating level criterion to establish the cumulative sound power levels capable of complying with the requirements of Condition 6 during both the daytime and nighttime periods.

Table 16: Maximum permissible plant sound power levels derived from the measured background sound levels at the closest NSR

Period	L _D @ NSR [dBA]*	Distance to NSR [m]	Directivity Q	Screening [dB]	Character Correction	L _{WA} [dBA]**
Daytime 07:00 – 23:00	56	33	2	0	C	94 - C
Nighttime 23:00 – 07:00	38	33	2	0	C	66 - C
* Taken from Table 7 ** C derived from Table 15						

7. DISCUSSION AND FURTHER RECOMMENDATIONS

- 7.1 The assessment has considered the potential for noise breakout associated with the proposed use of a gym where two large spaces are available, including amplified music and noise due to raised instructor speech levels. The calculations indicate that compliance with the adopted assessment criteria can be achieved, provided that the building envelope performs in accordance with the assumptions set out within this report.
- 7.2 In particular, the assessment assumes that all external windows comprise a minimum of 6 mm single glazing and are maintained in a closed position during periods of amplified music and organised fitness activities.
- 7.3 To ensure that amplified music levels remain consistent with those adopted within this assessment, a suitably configured noise limiting device should be installed (within Space 1 in this assessment, where amplified music is expected) and maintained such that internal music levels do not exceed the source noise levels assumed in the breakout noise calculations.
- 7.4 Based on the available information, the proposed use is **not expected** to give rise to adverse noise impacts at nearby residential properties. Predicted breakout noise levels are considered consistent with the requirements of Condition 5 and are not expected to result in significant disturbance to nearby occupants during the proposed hours of operation.
- 7.5 The derived sound power limits related to Condition 6 are dependent on the assumed plant location and acoustic characteristics and should not be interpreted as universally applicable across the roof area.

8. UNCERTAINTY

8.1 Measured data:

- (a) The unattended noise survey was undertaken over an extended monitoring period, including weekday and weekend conditions, enabling representative daytime and nighttime background sound levels to be identified;
- (b) The measurement position was selected to provide data representative of the nearest noise-sensitive receptor considered within this assessment;
- (c) A Class 1 sound level meter complying with the relevant international standards was used throughout the survey. The instrumentation had been calibrated by a UKAS-accredited laboratory within the preceding two years;
- (d) Field calibration checks were undertaken immediately before and after the survey period. No significant calibration drift was observed.

8.2 Noise breakout assessment:

- (a) As the gym is not yet operational, representative internal noise levels have been adopted based on measurements and experience from comparable facilities;
- (b) The assessment has been undertaken assuming a minimum glazing specification of 6 mm single glazing and that external windows and doors remain closed during periods when amplified music is in use;
- (c) Details of the proposed tenant fit-out are not currently available. The assessment has therefore been based upon the existing building fabric and does not account for any future acoustic treatment that may be incorporated within the premises;
- (d) The assessment assumes that amplified music and raised voice speech levels represent the dominant source of breakout noise and that internal noise levels do not exceed those adopted within this report, particularly at low frequencies;

(e) Noise propagation calculations have been undertaken using standard acoustic prediction methods and do not include any beneficial attenuation that may be provided by localised screening features, vegetation or future site-specific mitigation measures.

8.3 Plant noise assessment:

(a) The specification, location and operating characteristics of any future mechanical services plant are not currently known;

(b) The plant noise assessment has therefore been undertaken to derive maximum permissible sound power levels rather than assess specific equipment;

(c) No allowance has been made for screening by acoustic enclosures, barriers or other mitigation measures that may be incorporated as part of the final plant design.

9. CONCLUSIONS

- 9.1 Hawkins has been engaged by Sorbon Estate to provide a noise impact assessment for proposed gym and fitness venue. The assessment has been undertaken in support of the discharge of Conditions 5 and 6 attached to the planning permission.
- 9.2 An unattended noise survey was undertaken to establish the prevailing background noise climate at the nearest noise-sensitive receptors. The survey data demonstrated a consistent diurnal pattern and have been used to derive representative daytime and night-time assessment criteria for both breakout noise and mechanical services plant noise.
- 9.3 The breakout noise assessment has been undertaken with reference to the principles and criteria contained within the Institute of Acoustics (IOA) Good Practice Guide. Whilst developed primarily for entertainment and leisure venues, the guidance is considered appropriate for assessing the potential impact of amplified music associated with the proposed gym use. As the gym is not yet operational, the assessment has been based on representative amplified music and instructor speech levels.
- 9.4 The prediction results indicate that noise breakout associated with amplified music and instructor speech is not expected to exceed the adopted assessment criteria at the nearest noise-sensitive receptor. Accordingly, the proposed gym is **not expected** to give rise to significant disturbance at nearby residential properties during the permitted operating hours with the recommendation of installation of a noise limiter to 90 dBA L_{Aeq} in the spaces where there is amplified music.
- 9.5 The assessment of mechanical services plant noise has been undertaken in accordance with the principles of BS 4142:2014+A1:2019. As details of any future plant installation are not currently available, the assessment has derived **maximum**

permissible cumulative plant sound power levels capable of satisfying the requirements of Condition 6 during both daytime and nighttime periods.

- 9.6 Any future mechanical services plant should be selected and installed such that the cumulative sound power output does not exceed the limits presented in Section 6. Where multiple items of plant are proposed, compliance should be demonstrated based on the combined noise emissions from all equipment operating simultaneously.
- 9.7 Subject to the assumptions and recommendations contained within this report, the proposed gym and fitness facility is considered capable of operating without giving rise to unacceptable noise impacts at nearby noise-sensitive receptors. The assessment demonstrates that compliance with the breakout noise requirements of Condition 5 can be achieved through adherence to the criteria derived from the IOA Good Practice Guide, whilst compliance with the mechanical services plant requirements of Condition 6 can be achieved through the adoption of the plant noise limits derived in accordance with BS 4142:2014+A1:2019. Accordingly, the proposed development is considered capable of satisfying the requirements of Conditions 5 and 6 of the planning permission.

APPENDIX A

Glossary of Terms

Appendix A

Glossary of Terms

Term	Symbol	Description
Decibel	<i>dB</i>	A unit used to quantify the pressure level of sound. Defined as 20 times the logarithm of the ratio between the root-mean-square of a given sound field and a reference pressure level ($20 \times 10^{-5}\text{Pa}$ – Threshold of hearing)
A-Weighted Decibel	<i>dBA</i>	A-weighting is a correction factor applied to decibel values in order to give a more accurate representation of human hearing which compensates for the varying sensitivity of the human ear with frequency
Background Noise Level	<i>L_{A90}</i>	The sound level exceeded 90% of the time. Typically used to describe background noise, this is regarded as the 'average minimum level' and quantifies the common sound level of a fluctuating sound field.
Statistical Noise Level Indicator	<i>L_{A10}</i>	L_{A10} is a statistical noise level descriptor representing the sound level that is exceeded for 10% of the measured time period. In practice, L_{A10} is commonly used to describe higher, intermittent noise levels, such as traffic pass-bys, and is often taken as an indicator of the typical maximum noise
Equivalent continuous A-weighted sound pressure level	<i>L_{Aeq,T}</i>	The value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, T , has the same mean-squared sound pressure as the sound under consideration that varies with time
Maximum A-weighted sound pressure level	<i>L_{Amax}</i>	The maximum A-weighted sound pressure level. This effectively describes the highest noise level recorded at an instant in time, over a given time period. It is used to measure individual, short lived noise events that may not have a significant effect on the L_{Aeq} of that period.
Sound reduction index	<i>R</i>	A laboratory measure of the sound insulating properties of a material or building element in a stated frequency band
Octave band	-	A band of frequencies in which the upper limit of the band is twice the frequency of the lower limit
Sound power level	<i>L_w</i>	A measure of the total acoustic energy emitted by a source, independent of distance or surrounding environment.
Sound pressure level	<i>L_p</i>	A measure of the sound level at a specific location, which varies depending on distance, environment, and propagation effects

APPENDIX B

B1 Measurement Equipment,
B2 Noise Data and Meteorological Conditions

Appendix B1 Measurement Equipment**Table B1:** Measurement Equipment

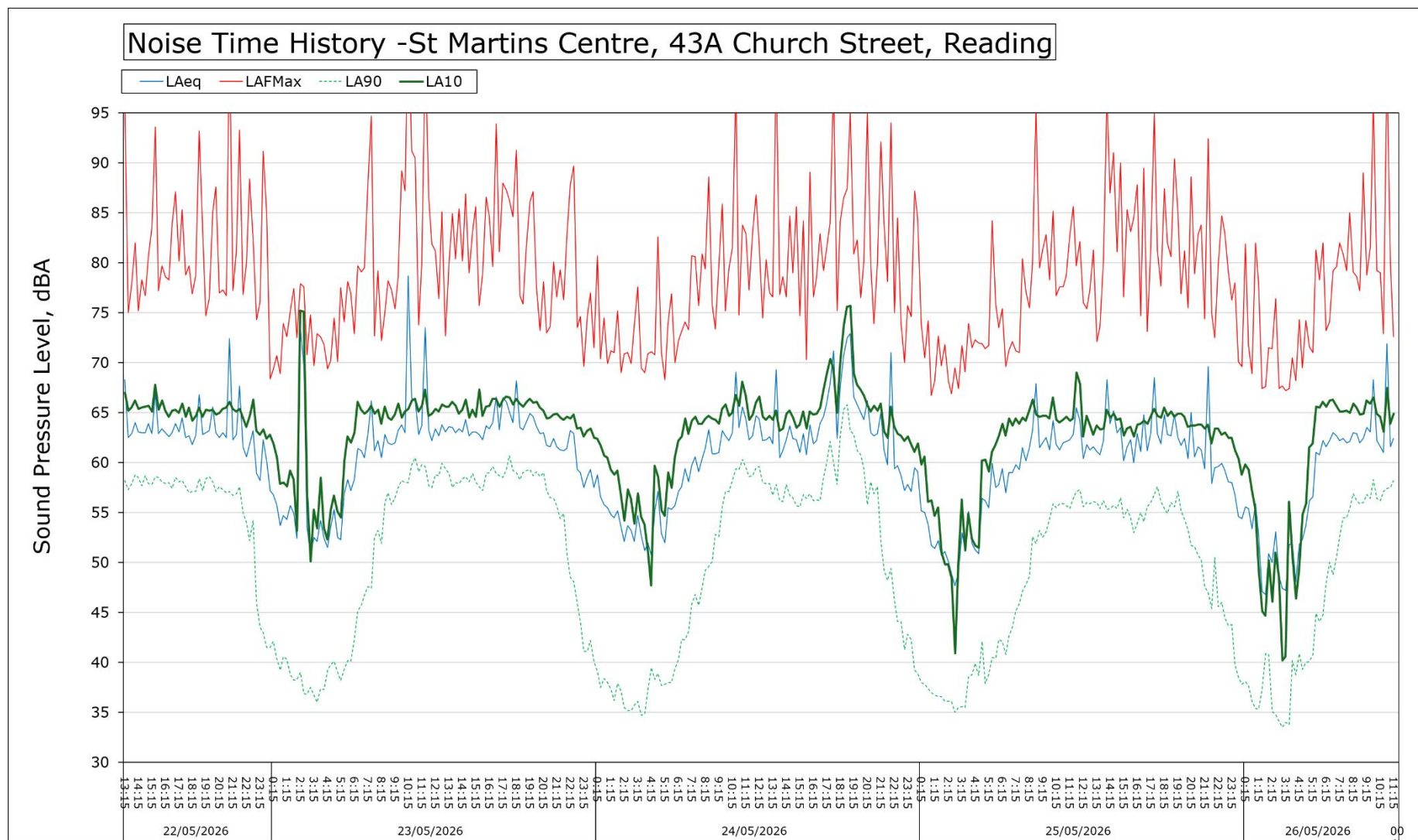
Equipment	Serial Number	Calibration Due Date
NTi XL3 Class 1 Sound Level Meter	A3A-00815-D1	20/08/2027
Nti Larson Davies Field Calibrator	21037	18/07/2026

Test equipment was field calibrated before and after measurement. No significant drift was revealed by field calibration.

Appendix B2 Noise and Weather Data

Sound level data collected at MP1 are summarised in **Figure B2-1**. Raw noise data are available upon request. Weather data from local weather station data resource suggests that no rain showers occurred during the survey measurements.

Figure B2-1: Summary of sound level data collected at MP1



APPENDIX C

References

Appendix C

References

Documents that have been referenced in this report or are applicable to it include:

1. BS 7445-1:2003, Description and measurement of environmental noise. Guide to quantities and procedures.
2. BS 7445-2:1991, Description and measurement of environmental noise. Guide to the acquisition of data pertinent to land use.
3. BS 7445-3:1991, Description and measurement of environmental noise. Guide to application to noise limits.
4. World Health Organisation (WHO) Guidelines for Community Noise (1999).
5. BS 8233:2014, Guidance on sound insulation and noise reduction for buildings.
6. BS 4142:2014, Methods for rating and assessing commercial and industrial sound
7. Sound Research Laboratories Ltd (1988), Noise Control in Building Services.
8. National Planning Policy Framework (December 2024).
9. Noise Policy Statement for England (2010).
10. British Standard; BS EN 12354-4:2000, '*Building acoustics. Estimation of acoustic performance in buildings from the performance of elements. Transmission of indoor sound to the outside*'.
11. BS EN ISO 11654:1997, '*Acoustics – Sound absorbers for use in buildings – Rating of sound absorption*'.
12. Institute of Acoustics (2003). *Good Practice Guide on the Control of Noise from Pubs and Clubs*.
13. Reading Borough Council. Conditions & Reasons response to Application No. PL/25/0722. 22 December 2025.

APPENDIX D

Calculations

Appendix D: Calculations

Figure D -1: Composite breakout noise calculations at the nearest noise-sensitive receptor (NSR) from Façade 1 (F1, Figure 4) for amplified music and instructor speech.

Music and Speech Sources - Façade 1									TOTAL
Frequency [Hz]	63	125	250	500	1k	2k	4k	8k	[dBA]
Source spectrum, Lp,in [dB]	86	92	87	84	87	81	79	90	90
Diffusivity, Cd [dB]	-5								-
Transmission Loss, TL [dB]	25	28	33	38	41	39	43	48	-
Area of element, S [m ²]	21	21	21	21	21	21	21	21	-
Directivity, Dc [dB]	3								-
Screening, [dB]	5								-
Distance to NSR, [m]	28								-
Sound Pressure Level at NSR (Z-weighted)	28	31	20	12	13	8	2	8	19

Figure D -2: Composite breakout noise calculations at the nearest noise-sensitive receptor (NSR) from Façade 2 (F2, Figure 4) for amplified music and instructor speech.

Music and Speech Sources - Façade 2									TOTAL
Frequency [Hz]	63	125	250	500	1k	2k	4k	8k	[dBA]
Source spectrum, Lp,in [dB]	86	92	87	84	87	81	79	90	90
Diffusivity, Cd [dB]	-5								-
Transmission Loss, TL [dB]	25	29	33	39	41	39	43	49	-
Area of element, S [m ²]	30	30	30	30	30	30	30	30	-
Directivity, Dc [dB]	3								-
Distance to NSR, [m]	20								-
Sound Pressure Level at NSR (Z-weighted)	42	44	34	27	27	22	17	22	33

Figure D -3: Composite breakout noise calculations at the nearest noise-sensitive receptor (NSR) from Façade 1 (F1, Figure 4) for instructor speech.

Speech Source - Façade 1									TOTAL
Frequency [Hz]	63	125	250	500	1k	2k	4k	8k	[dBA]
Source spectrum, Lp,in [dB]	67	68	70	72	69	61	54	45	73
Diffusivity, Cd [dB]	-5								-
Transmission Loss, TL [dB]	25	28	33	38	41	39	43	48	-
Area of element, S [m^2]	21	21	21	21	21	21	21	21	-
Directivity, Dc [dB]	3								-
Screening, [dB]	5								-
Distance to NSR, [m]	28								-
Sound Pressure Level at NSR (Z-weighted)	9	6	3	0	-5	-12	-23	-37	1

Figure D-4: Composite breakout noise calculations at the nearest noise-sensitive receptor (NSR) from Façade 2 (F2, Figure 4) for instructor speech.

Speech Source - Façade 2									TOTAL
Frequency [Hz]	63	125	250	500	1k	2k	4k	8k	[dBA]
Source spectrum, Lp,in [dB]	67	68	70	72	69	61	54	45	73
Diffusivity, Cd [dB]	-5								-
Transmission Loss, TL [dB]	25	28	33	39	41	39	43	49	-
Area of element, S [m^2]	30	30	30	30	30	30	30	30	-
Directivity, Dc [dB]	3								-
Distance to NSR, [m]	20								-
Sound Pressure Level at NSR (Z-weighted)	18	16	12	9	4	-3	-14	-28	10

Figure D-5: Composite breakout noise calculations at the nearest noise-sensitive receptor (NSR) from Façade 3 (F3, Figure 4) for instructor speech.

Speech Source - Façade 3									TOTAL
Frequency [Hz]	63	125	250	500	1k	2k	4k	8k	[dBA]
Source spectrum, Lp,in [dB]	63	64	67	67	61	52	45	38	67
Diffusivity, Cd [dB]	-6								-
Transmission Loss, TL [dB]	28	31	36	41	44	43	46	51	-
Area of element, S [m^2]	0	0	0	0	0	0	0	0	-
Directivity, Dc [dB]	3								-
Distance to NSR	23								-
Sound Pressure Level at NSR	11	9	7	2	-7	-15	-25	-37	3