



ACOUSTIC
CONSULTANTS LTD

Noise Impact Assessment

**Proposed Residential Development
2-3 Market Place, Chippenham**

Reference: 11496/JLY

Client

MP2 Developments Ltd

Document Control

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The report has been prepared in good faith, with all reasonable skill and care, based on information provided or available at the time of its preparation and within the scope of work agreement with the Client. We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above. The report is provided for the sole use of the named Client and is confidential to them and their professional advisors. No responsibility is accepted to other parties.

The report limits itself to addressing solely on the noise, acoustic, and vibration aspects as included in this report. We provide advice only in relation to noise, vibration and acoustics. It is recommended that appropriate expert advice is sought on all the ramifications (e.g. CDM, structural, condensation, fire, legal, etc.) associated with any proposals in this report or as advised and concerning the appointment. It should be noted that noise predictions are based on the current information as we understand it and, on the performances noted in this report. Any modification to these parameters can alter the predicted level. All predictions are in any event subject to a degree of tolerance of normally plus or minus three decibels. If this tolerance is not acceptable, then it would be necessary to consider further measures.

Table of Contents

1.	Introduction	4
2.	Site and Location	5
3.	Planning and Noise	6
4.	Assessment Criteria	10
5.	Noise Monitoring	14
6.	Noise Control Measures	18
7.	Ground Floor Commercial Noise	21
8.	Summary and Conclusions	23
9.	Appendix 1 – Glossary of Acoustic Terminology	25

1. Introduction

MP2 Developments Ltd appointed Acoustic Consultants Ltd to provide a noise impact assessment for the proposed flats at 2-3 Market Place, Chippenham, SN15 3HE.

This report provides the results of a noise survey conducted on the site and an assessment of external sources of noise on the sensitive elements of the development.

This noise impact assessment has been undertaken in accordance with NPPF, PPG, BS8233:2014, ADO, BS4142:2014+A1:2019 and local guidance.

2. Site and Location

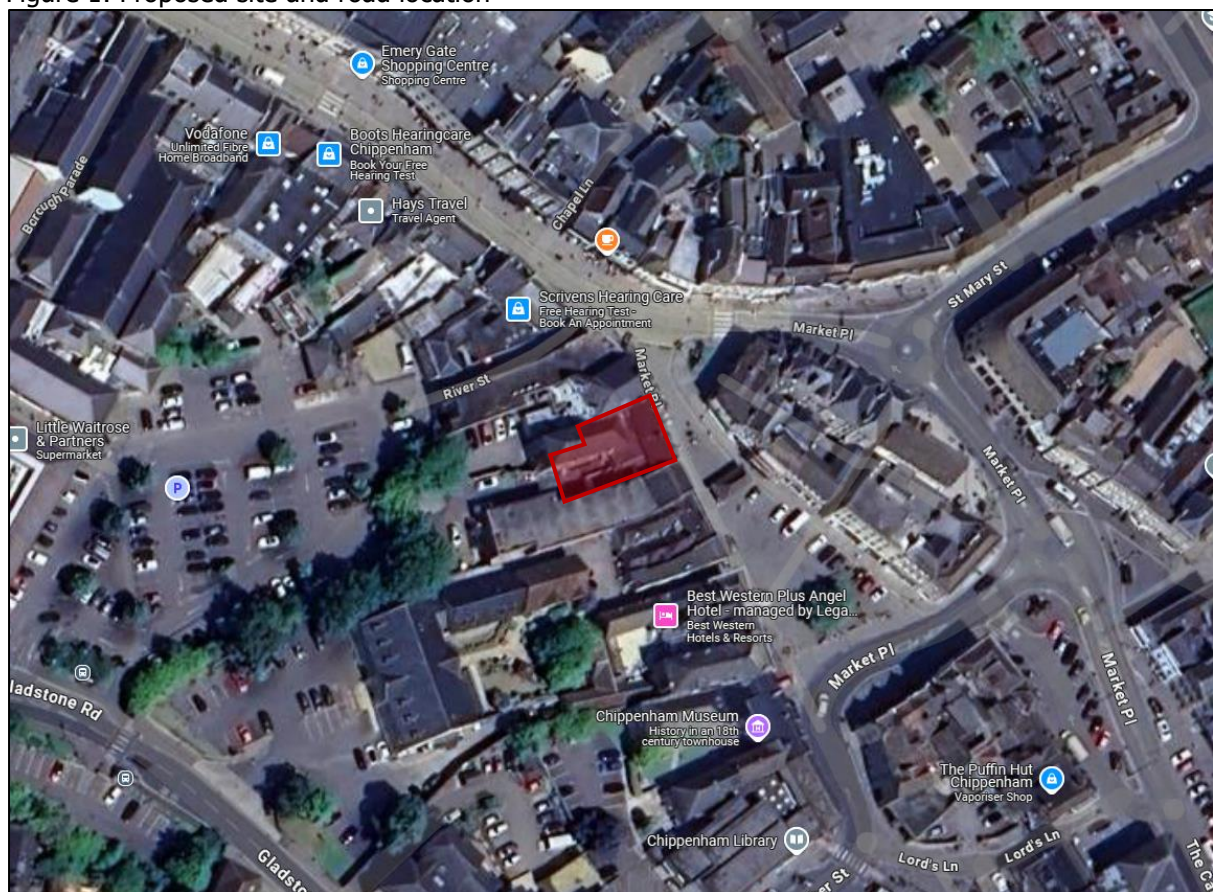
The site is situated within a mixed commercial and residential area on Market Street, Chippenham. The proposals are for the conversion from the former HSBC bank to flats on the upper floors under Class MA Permitted Development rights.

The relevant noise sources to the proposed permitted development are the commercial sources in the vicinity; these were identified to be delivery noise to the front façade on Market Place and music noise to the rear façade of the development.

There is also proposed to be commercial use retained on the ground floor. Noise from the ground floor commercial use could have an impact on the proposed first floor flats above.

The site location is marked on the satellite image of the surrounding area below:

Figure 1: Proposed site and road location



3. Planning and Noise

3.1. National Planning Policy Framework

The National Planning Policy Framework (NPPF) was published in March 2012 and revised in December 2024. Section 15 entitled 'Conserving and enhancing the natural environment' addresses noise as a requirement of planning. Paragraph 187 states:

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

e) 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; and."

Paragraph 198 states:

"198. 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:

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; and

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation. "

The document does not prescribe any assessment methodology or criteria to assess the adverse effect of noise and refers you to the NPSE.

3.2. Noise Policy Statement for England

The NPPF refers to the Noise Policy Statement for England (NPSE). This was published in March 2010 and aims to provide clarity regarding current policies and practices to enable noise management decisions to be made within the wider context, at the most appropriate level, in a cost-effective manner and in a timely fashion and applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise.

The NPSE sets out the long term vision of Government noise policy. This long term vision is supported by three noise policy aims 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 NPSE introduces the concept of "Significant adverse" and "Adverse" impacts of noise which relate to the noise policy aims. These are applied 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.

The Noise Policy Statement for England (NPSE) states that noise levels above the Lowest Observed Adverse Effect Level are acceptable in planning where reduced to a minimum.

With regard to where there is potential for noise impact it states the following in relation to the second noise policy aim:

"The second aim of the NPSE 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."

The NPSE does not provide any assessment criteria for the noted effect levels and each case must be considered on its merits.

The NPSE does, however, emphasise that in dealing with noise Local Planning Authorities are required to take a balanced approach in considering the benefits of development as against any adverse effects which arise. Paragraph 2.18 of the NPSE is particularly relevant in this respect and states:

"There is a need to integrate consideration of the economic and social benefits of the activity or policy under examination with proper consideration of the adverse environmental effects, including the impact of noise on health and quality of life. This should avoid noise being treated in isolation in any particular situation, i.e. not focusing solely on the noise impact without taking into account other related factors."

The planning need is outside the scope of noise and acoustics and will need to be addressed by others.

3.3. Planning Practice Guidance, Noise

The Planning Practice Guidance (PPG) on noise referred to here is based on the current version (July 2019) as provided on the Planning Guidance Website. It states that, *"Noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment."*

It provides generic guidance on how to determine the noise impact and what factors could be a concern.

It includes the option types to mitigate any adverse effects of noise stating that there are four broad types of mitigation. These are engineering, layout, using planning conditions or obligations and noise insulation.

Paragraph 5 of the PPG provides a table identifying the effect level and examples of effect relating to the impact effect levels provided in the NPSE. The table is duplicated below:

Table 1: PPG Noise – Perception of Effect Levels

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. 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	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

The table does not provide any objective assessment which equates to the noted effect levels. However, the PPG identifies that where noise is audible, it is not necessarily intrusive. The effect and impact on people are based primarily on the level of noise.

4. Assessment Criteria

4.1. Commercial Noise

4.1.1. British Standard 4142:2014+A1:2019

For industrial and commercial noise, the most relevant guidance is provided within British Standard 4142:2014+A1:2019. The methods described in the British Standard use outdoor sound levels to assess the likely effects of sound upon people who might be inside or outside a dwelling or other premises used for residential purposes.

The initial estimate principle is that of establishing the 'difference' between the 'rating level' and the 'background sound level'. The 'rating level' is the 'specific sound level' of the source over a period of one hour during the day (07:00 to 23:00 hours) and over a period of 15 minutes during the night (23:00 to 07:00 hours). Clause 9 entitled 'Rating Level' states:

"Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level."

An acoustic character correction should be added to the 'specific sound level' if it exhibits any tonality, impulsivity, other specific characteristics and/or intermittency at the assessment location. The value of the character correction varies, dependent on the prominence of the character of the sound source at the assessment location.

In Section 11 of the Standard, entitled 'Assessment of the Impacts', it states: *"Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level (see Clause 8) from the rating level (see Clause 9) and consider the following."*

- Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

In all instances the context needs to be considered when determining the overall impact. In terms of context BS 4142:2014 states: *"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following."*

- 1) *Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night. Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.*
- 2) *The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound, to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it.*

NOTE 3 Consideration ought to be given to evidence on human response to sound and, in particular, industrial and/or commercial sound where it is available. A number of studies are listed in the "Effects on humans of industrial and commercial sound" portion of the "Further reading" list in the Bibliography.

- 3) *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:*
 - i) *façade insulation treatment;*
 - ii) *ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and*
 - iii) *acoustic screening."*

In terms of good internal acoustic conditions, the most relevant criteria and methodology is provided in BS8233:2014. This is in accordance with a March 2020 Technical published by the ANC Working Group, which provided comments and guidance to clear any ambiguity in BS414:2014+A1:2019.

This document states the following regarding Sub-Clause 8.5 of BS4142:2014:

"Where a new noise-sensitive receptor is introduced and there is extant industrial and/or commercial sound, it ought to be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise mitigation."

Examples of such guidance might include:

- *BS8233: 2014 where an industrial/commercial sound source is constant and new residential development is proposed nearby”*

The March 2020 Technical Note later states:

“Whilst BS 4142 can be used to assist in the determination of the likelihood of an adverse or significant adverse impact, guidance on internal design criteria and mitigation is provided elsewhere. BS 8233:2014, for example, provides guidance on indoor ambient noise levels.”

4.1.2. **British Standard 8233:2014**

British Standard 8233:2014 entitled “Guidance on sound insulation and noise reduction for buildings” came into effect on 28th February 2014.

Section 7.7.2 Table 4 of the British Standard 8233:2014 provides internal ambient noise levels for dwellings from noise sources ‘without a specific character’.

The British Standard guideline states that noise levels should not exceed those as noted in Table 2 of the British Standard. These criteria are based on the guidance provided within WHO 1999 and are summarised below:

Table 2: British Standard 8233:2014 internal noise criteria

Activity	Location	Daytime (07:00 to 23:00)	Night-time (23:00 to 07:00)
Resting	Living Room	35 dB $L_{Aeq,16\text{ hour}}$	-
Dining	Dining Room/area	40 dB $L_{Aeq,16\text{ hour}}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16\text{ hour}}$	30 dB $L_{Aeq,8\text{ hour}}$

Section 7.7.2 Note 4 of the British Standard states “Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values”.

British Standard BS8233 provides no definitive criteria for maximum noise levels from individual events ($L_{Amax,F}$). Section 3.4 of the “Guidelines for Community Noise” published by the World Health Organisation in 1999 (WHO 1999) states “For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 L_{Amax} more than 10-15 times per night (Vallet & Verbey 1991)”.

As such, maximum noise levels would be considered acceptable if the maximum noise level from individual events do not exceed 45 dB $L_{Amax(F)}$ no more than 10 to 15 times during the night-time period.

Note 7 of BS8233:2014 states "Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved."

4.2. Noise from Amplified Music

There are no specific noise limits for noise from amplified music from licensed premises. However, many local authorities throughout the UK, including Bristol, Basingstoke, Sheffield, and Edinburgh apply NR curve criteria for amplified music.

The internal criterion of NR20 is a more onerous criterion than other guidelines and Standards, such as World Health Organisation (1999) and British Standard 8233:2014.

The NR criterion approach places emphasis on low frequency noise, which is often the prominent aspect of amplified music.

We would therefore consider this a suitable internal criterion for the proposed dwellings.

NR20 sound pressure levels should not exceed the following octave band criteria inside the nearest noise sensitive receiver.

Table 3: NR20 Octave Band Sound Pressure Levels

Octave Frequency Band (Hz)	NR20 Sound Pressure Level Limit (dBA)
63	51
125	39
250	31
500	24
1000	20
2000	17
4000	14
8000	13

5. Noise Monitoring

A noise monitoring was undertaken from the 12th to the 16th of June 2025 to determine the impact of existing commercial noise on the proposed site.

5.1. Monitoring Equipment

Sound Pressure Levels were measured using a Class 1 sound level meter with a half-inch condenser microphone, using the 'fast' setting. The equipment is checked regularly using a Quality System meeting the requirements of British Standard EN ISO/IEC 17025:2017 "General requirements for the competence of testing and calibration laboratories"; in accordance with British Standard EN 10012:2003 "Measurement management systems. Requirements for measurement processes and measuring equipment"; and traceable to the National Standards.

This equipment was checked and calibrated as noted below and the certificates are available for inspection.

Table 4: Equipment and Calibration Status

Equipment Description / Manufacturer / Type	Serial Number	Date of Calibration	Calibration Certification Number
SLM, NTI, XL2	A2A-11041-E0	07/07/2023	44799
Pre-Amp, NTI, MA220	1822	07/07/2023	44799
Microphone, NTI, MC230	9583	07/07/2023	44799
Calibrator, Larson Davis, CAL200	18273	27/02/2025	1511387-2
SLM, NTI, XL3	A3A-01423-F0	27/01/2025	UK-25-011
Pre-Amp, NTI, MA220	14613	27/01/2025	UK-25-011
Microphone, NTI, MC230A	A28049	27/01/2025	UK-25-011
Calibrator, Larson Davis CAL200	18293	08/04/2025	1511929-1

The measurement system was checked before and after use with the noted calibrator and no significant drift was detected.

5.2. Weather Conditions

The weather conditions throughout the survey were as follows:

Table 5: Weather Conditions at the Monitoring Location over the Survey Period

Date	Wind Speed (m/s)	Prevailing wind Direction	Temperature (°C)	Precipitation Time (hrs)
12/06/25	3-8*	NW	16	0
13/06/25	1-4	N	17	0
14/06/25	2-8*	E	15	0
15/06/25	3-6*	E	15	0
16/06/25	2-3	E	16	0

*Data omitted from assessment due to high wind speeds

5.3. Monitoring Procedure

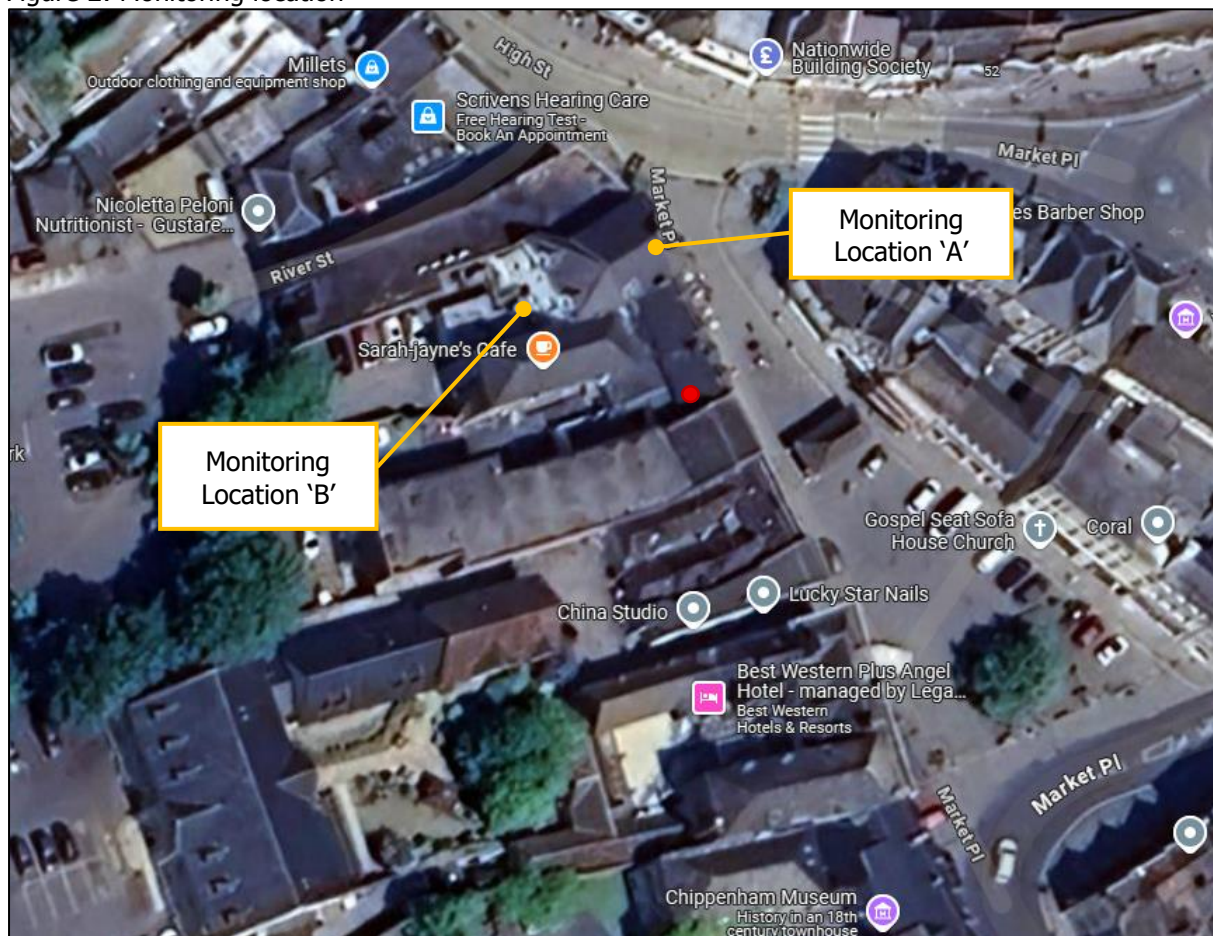
The sound level meter at Monitoring Location 'A' was elevated through a partially open window on the second floor in a façade position overlooking Market Place. The main source of noise identified during the survey installation was road traffic noise which is not applicable to the permitted development application.

The sound level meter at Monitoring Location 'B' elevated through a partially open window on the second floor in a façade position overlooking the rear yard and car park. The weekday noise climate was determined by construction work at the adjacent 1 Market Place site, which is atypical and will be omitted from the assessment. Otherwise, the noise climate was identified to be determined by activity in the car park to the west. No fixed plant noise was audible at this location.

On collection of the sound level meters, noise events which are relevant to the permitted development application were identified in the survey data. These comprised commercial delivery noise during the night at Monitoring Location 'A' and amplified music noise at Monitoring Location 'B'.

The monitoring locations are shown on the figure below:

Figure 2: Monitoring location

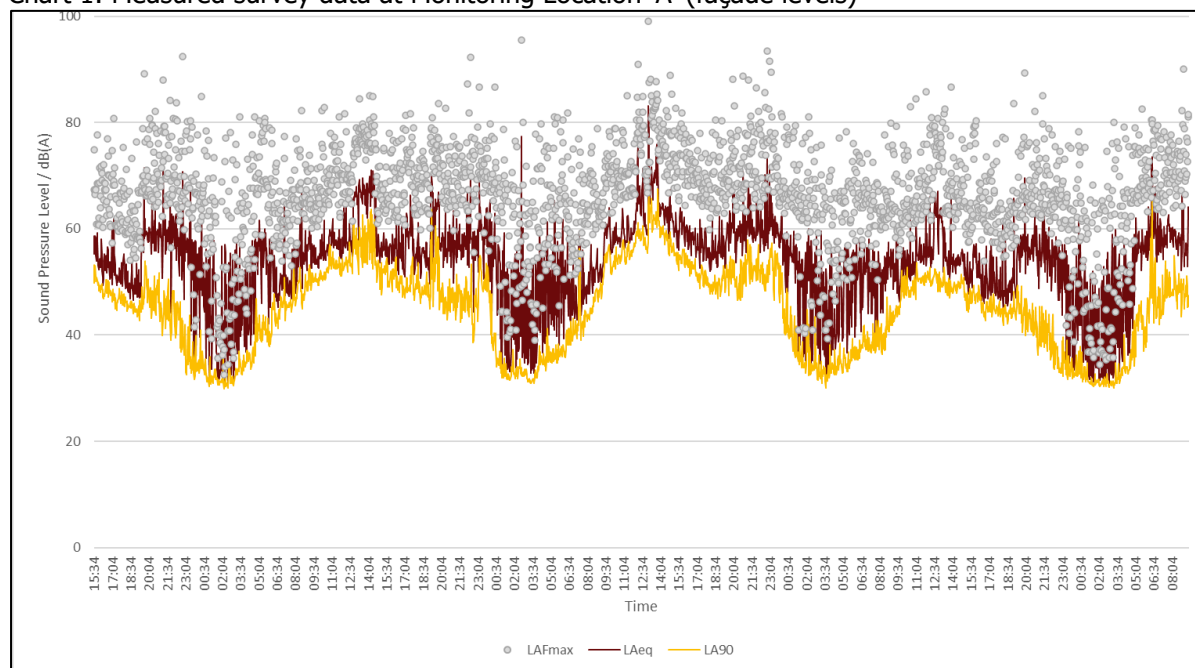


5.4. Measured Noise Levels

5.4.1. Monitoring Location 'A'

The measured equivalent ($L_{Aeq, T}$), maximum (L_{AFmax}), and background ($L_{A90, T}$) noise levels during the survey are shown in the chart below:

Chart 1: Measured survey data at Monitoring Location 'A' (façade levels)



The measured equivalent (L_{Aeq}) and night-time maximum (L_{AFmax}) noise levels during the typical 24 hours of the survey are provided in the table below.

Table 6: Equivalent noise level and maximum noise levels at Monitoring Location 'A' (façade levels)

Parameter	Sound Pressure Level [dB] per Octave Band [Hz]								dBA
	63	125	250	500	1000	2000	4000	8000	
$L_{Aeq, 16\text{hour}}$	62	61	62	59	57	51	45	39	61
$L_{Aeq, 8\text{hour}}$	59	61	61	54	52	50	46	40	58
L_{AFmax}^*	72	71	73	72	76	75	66	56	80

*10th highest maximum noise event during one night period

Please note, as the site falls under MA permitted development, only specific sources need to be assessed – for the front façade, this was found to be commercial noise.

Commercial delivery noise was identified in the survey data at Monitoring Location 'A' between 04:50 and 05:50 on Thursday night/Friday morning. The equivalent noise spectrum measured during this event was as follows:

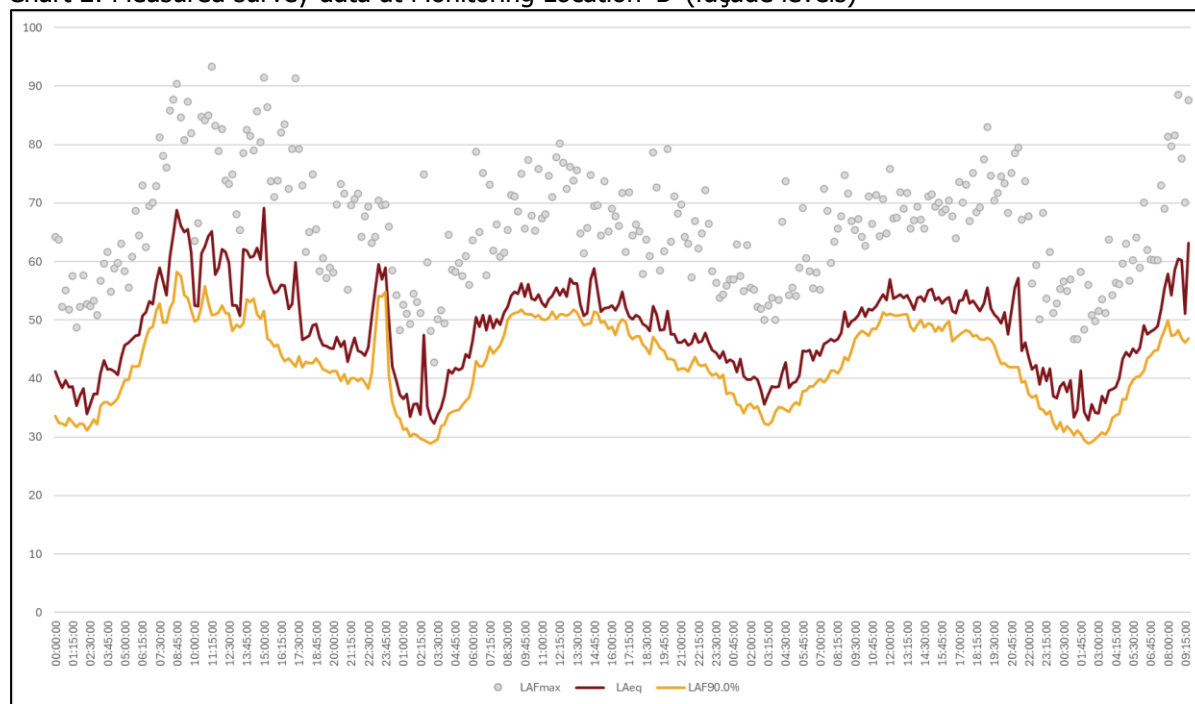
Table 7: Typical equivalent noise level of music measured at Monitoring Location 'A' (façade level)

Time and Date	Sound Pressure Level [dB] per Octave Band [Hz]								dBA
	63	125	250	500	1000	2000	4000	8000	
13/06/2025 04:50	53	51	49	49	49	48	44	40	54

5.4.2. Monitoring Location 'B'

The measured equivalent ($L_{Aeq, T}$), maximum (L_{AFmax}), and background ($L_{A90, T}$) noise levels during the survey are shown in the chart below:

Chart 2: Measured survey data at Monitoring Location 'B' (façade levels)



The measured equivalent (L_{Aeq}) and night-time maximum (L_{AFmax}) noise levels during the typical 24 hours of the survey are provided in the table below.

Table 8: Equivalent noise level and maximum noise levels at Monitoring Location 'B' (façade levels)

Parameter	Sound Pressure Level [dB] per Octave Band [Hz]								dBA
	63	125	250	500	1000	2000	4000	8000	
$L_{Aeq, 16 \text{ hours}}$	58	54	50	50	49	43	36	34	52
$L_{Aeq, 8 \text{ hours}}$	47	45	40	39	38	32	23	18	41
L_{AFmax}^*	63	59	57	61	61	54	52	45	64

*10th highest maximum noise event during one night period

Please note, as the site falls under MA permitted development, only specific sources need to be assessed – for the rear façade, this was found to be amplified music noise.

Amplified music noise was identified in the survey data at Monitoring Location 'B' between 20:00 and 22:00 on the Friday evening. The typical equivalent noise spectrum measured is as follows:

Table 9: Typical equivalent noise level of music measured at Monitoring Location 'B' (façade level)

Time and Date	Sound Pressure Level [dB] per Octave Band [Hz]								dBA
	63	125	250	500	1000	2000	4000	8000	
13/06/2025 20:00	53	51	49	49	49	48	44	40	54

6. Noise Control Measures

British Standard 4142:2014 does not provide any quantitative internal noise levels for commercial noise within new dwellings; however, Section 11 states the following regarding context:

"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including:

"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:

- i) facade insulation treatment;*
- ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and*
- iii) acoustic screening."*

It is therefore reasonable to state that, where the proposed dwelling is designed to achieve good acoustic conditions, i.e. BS8233, the noise impact can be considered low and acceptable.

The design target is to achieve an internal ambient noise level which does not exceed the internal daytime noise criteria within a dwelling of 35 dB $L_{Aeq,16\text{hour}}$ during the day and 30 dB $L_{Aeq,8\text{hour}}$ during night within the habitable rooms. British Standard 8233:2014 does not provide any guidance on noise with a specific character, therefore we have considered noise levels with a worst-case assumption for character (+9 dB for impulsivity).

6.1. Calculation Method

Calculations for the internal ambient noise levels due to external noise have been undertaken using the calculation method provided in Annex G Section G.2 of British Standard 8233:2014.

The calculations have been undertaken using the building façade construction specified below and the octave band free-field design equivalent noise levels from the noise survey.

The calculations are based on the dimensions within the Armstrong Architecture drawings (Drawing Nos AA/25/23/02-03 Dated June 2025). The rooms are generally taken to have a height of 2.8 metres and rooms within the roofs 2.4 metres. The reverberation time with habitable rooms is considered to be 0.5 seconds across the frequency spectrum.

6.2. External Wall Construction

The exact construction specification of the external wall is unknown; for the purposes of this assessment, the wall is considered to be plastered solid brickwork with a minimum surface mass of at least 480 kg/m².

The above construction is expected to achieve the following sound reduction indices:

Table 10: Required minimum sound insulation performance of external walls

Construction Type	Sound Reduction Index 'R' (dB) per Octave Band (Hz)								R _w
	63	125	250	500	1k	2k	4k	8k	
Plastered solid brickwork – 480 kg/m ²	37	42	45	49	54	57	57	57	53

Any alternative constructions must achieve the above noted performance.

6.3. Roof Construction

It is understood that the third floor rooms are located within the roof. The following sound reduction indices would be considered representative of the existing roof:

Table 11: Required Minimum Sound Reduction Index of Roof

Construction	Sound Reduction Index 'R' (dB) per Octave Band (Hz)								R _w
	63	125	250	500	1k	2k	4k	8k	
Timber Joist Roof	17	22	37	42	50	57	57	57	44

Any alternative constructions should achieve the above noted performance.

6.4. Window Construction

The windows on all elevations could be openable at occupier discretion. However, they need to be sealed airtight to control external noise when the windows are closed. There should be no un-attenuated vents or openings in the building façade.

The existing windows are of traditional single-glazed sash window construction. It is recommended that these are replaced with double glazed window units where feasible.

Where the existing windows are protected by heritage constraints, a secondary pane could instead be installed internally to control external noise. These can be provided by proprietary suppliers such as Storm Windows and the secondary glazing constructions typically provide a performance well in excess of the minimum set out below.

The minimum performance requirements for windows are provided below. Other constructions may also achieve these levels of sound attenuation.

Table 12: Required minimum sound reduction indices of windows

Construction	Sound Reduction Index 'R' (dB) per Octave Band (Hz)								R _w
	63	125	250	500	1k	2k	4k	8k	
Double Glazed 4/12/4	20	24	20	25	35	38	35	36	31

Please note that the above performances are requirements for the whole window element, to include frame and seals, not just the glass. The window supplier should confirm the above performances are achievable when tested to the current British Standards.

6.5. Effect of Mitigation Measures

With the noted building construction, and suitable ventilation provisions, the predicted internal noise levels within the proposed dwellings are within the criteria of British Standard 8233:2014 for commercial noise with character and NR20 for amplified music.

Calculations for the worst-case assessed room per façade is shown below:

Figure 3: Mitigation calculations for living room on the front façade

Figure 3.7: Calculation for living room on the front façade

Free Field Level at Façade									
Octave Band	63	125	250	500	1000	2000	4000	8000	dBA
Commercial marker (rating level)	59	57	55	55	55	54	50	46	60
Building Façade Construction									
External Element	63	125	250	500	1000	2000	4000	8000	
215mm concrete block, fairfaced, 355kgm ² , 1470kgm ³ - 52 R _w	40	40	42	45	56	66	73	73	
	Area	10	0	0	0	0	0	0	0
Double Glazed: 4/12/4 - 31 R _w	20	24	20	25	35	38	35	36	
	Area	3	0	0	0	0	0	0	0
at, timber-joist roof, asphalt on boarding, 12mm plasterboard ceiling, thermal insulation - 44 R _w	17	22	37	42	50	57	57	57	
	Area	23	0	0	0	0	0	0	0
Calculations to BS EN 12354									
	63	125	250	500	1000	2000	4000	8000	
Sum	0	0	0	0	0	0	0	0	
10log sum	-19	-24	-30	-35	-44	-48	-45	-46	
10log S/A	2	2	2	2	2	2	2	2	
correction factor +3	3	3	3	3	3	3	3	3	
Octave Band	63	125	250	500	1000	2000	4000	8000	dBA
Commercial marker	46	39	31	26	16	12	10	5	28

Figure 4: Mitigation calculations for bedroom on the roof

Figure 11: Calculation calculations for: Sound on the road.

Free Field Level at Façade

Octave Band	63	125	250	500	1000	2000	4000	8000	dBA
Music marker	50	48	46	46	46	45	41	37	51

Building Façade Construction

External Element	63	125	250	500	1000	2000	4000	8000
215mm concrete block, fairfaced, 355kgm ² , 1470kgm ³ - 52 R _w	40	40	42	45	56	66	73	73
	Area	2	0	0	0	0	0	0
Double Glazed: 4/12/4 - 31 R _w	20	24	20	25	35	38	35	36
	Area	3	0	0	0	0	0	0
at, timber-joist roof, asphalt on boarding, 12mm plasterboard ceiling, thermal insulation - 44 R _w	17	22	37	42	50	57	57	57
	Area	7	0	0	0	0	0	0
	0	0	0	0	0	0	0	0

Calculations to BS EN 12354

	63	125	250	500	1000	2000	4000	8000
Sum	0	0	0	0	0	0	0	0
10log sum	-18	-23	-25	-30	-40	-43	-40	-41
10log S/A	4	4	4	4	4	4	4	4
correction factor +3	3	3	3	3	3	3	3	3

Octave Band	63	125	250	500	1000	2000	4000	8000	dBA
Music marker	38	31	27	22	13	8	7	2	24
NR Calc:									
Commercial marker	3	11	17	19	13	13	13	10	NR19

7. Ground Floor Commercial Noise

The proposed ground floor commercial use will need to be suitably controlled to achieve acceptable internal noise levels within the dwellings above. It will also need to achieve the requirements of Approved Document E of the Building Regulations on completion. This report considers the requirements of planning.

7.1. Design Retail Noise Levels

The retail operator is unknown at this stage. A typical representative sound level spectrum for generic retail / commercial use is considered to be as follows:

Table 13: Retail operational noise levels

Source	Sound Pressure Level (dB) per Octave Band (Hz)								dB(A)
	63	125	250	500	1000	2000	4000	8000	
Retail / Commercial	59	66	65	68	65	62	56	56	70

The above will be applied for the assessment of the commercial to residential adjacency below.

7.2. Sound Insulation of Separating Floor

The first floor comprises two construction types: a historic concrete slab of unknown thickness and density to the rear of the building and a posi-joist floor to the front of the building.

7.2.1. Concrete Floor

The exact specification of the existing concrete floor is unknown. In order to control the transfer of commercial noise up into the flats above, it could comprise a 200-millimetre reinforced concrete slab (mass 460 kg/m²).

This system would typically achieve the following sound reduction indices:

Table 14: Required minimum sound reduction index of existing concrete slab above commercial use

Element	Sound Reduction Index / dB per Octave Band (Hz)						R _w
	125	250	500	1k	2k	4k	
200mm RC concrete slab (460 kg/m ²)	37	36	45	52	59	62	49

Where the minimum mass of 460 kg/m² is not achieved, it may be necessary to install a plasterboard ceiling below to control sound transfer between the retail and residential use. This could be reviewed when the mass of the existing concrete is known. Please note that the above addresses planning requirements only and does not consider the requirements of Approved Document 'E' of the Building Regulations.

7.2.2. Lightweight Floor

The lightweight floor will comprise a floating floor system above the existing posi-joist system as follows:

- Floating floor within the dwellings above to comprise:
 - 18-millimetre T&G flooring board (minimum mass 12 kg/m²).
 - Minimum 70-millimetre timber battens.
 - 60-millimetre mineral wool between battens (33 kg/m³).
- Existing floor and ceiling comprising:
 - Plywood deck or similar to provide minimum mass 10 kg/m².
 - 253-millimetre posi-joists with 100-millimetre mineral wool insulation (33 kg/m³) in the cavity.
 - Two layers of staggered and sealed 12.5-millimetre plasterboard (minimum mass 16 kg/m²) fixed to the joists above with resilient bars.

This system would be expected achieve in the order of the following sound reduction indices as calculated in Insul:

Table 15: Required minimum sound reduction index of lightweight floor above commercial use

Element	Sound Reduction Index / dB per Octave Band (Hz)						R _w
	125	250	500	1k	2k	4k	
Lightweight Floor	36	46	50	52	55	60	53

Any alternative constructions would need to achieve the sound reduction indices above at a minimum and may require reassessing.

7.3. Predicted Noise Levels in Residential Above

On the basis of the above, the predicted sound level within the proposed habitable rooms above would be as follows:

Table 16: Predicted retail noise levels in residential above

Floor Type	Sound Pressure Level (dB) per Octave Band (Hz)						dB(A)
	125	250	500	1000	2000	4000	
Concrete (see Section 7.2.1)	28	28	22	12	6	-5	23
Lightweight (see Section 7.2.2)	34	23	22	17	11	0	24

The above would comfortably control retail noise levels to within the requirements of BS8233 as observed in the habitable rooms above. This is also subject to suitable detailed design and flanking noise control. Please note that the above addresses planning requirements only and does not consider the requirements of Approved Document 'E' of the Building Regulations.

8. Summary and Conclusions

MP2 Developments Ltd appointed Acoustic Consultants Limited to provide a noise impact assessment for the proposed change of use to flats of the upper floors at 2-3 Market Place, Chippenham.

This report provides the results of a noise survey conducted on the site and an assessment of external sources of noise on the sensitive elements of the development, including a music source.

This noise impact assessment has been undertaken in accordance with NPPF, PPG, BS8233:2014, BS4142:2014+A:2019 and local guidance.

Based on room dimensions of the drawings provided, noise control measures were designed. It was recommended that:

- the existing windows of traditional single-glazed sash window construction are replaced with double glazed window units where feasible.

OR

- Where the existing windows are protected by heritage constraints, a secondary pane could instead be installed internally, as these secondary glazing constructions typically provide a performance well in excess of the minimum set out in this report (see Section 6.4).

With either of the recommended window constructions above, the predicted internal noise levels due to external noise are within the assessment criteria.

Also, on the basis of the recommended first floor construction set out in Section 7 of this report, it was recommended that the separating floor could comprise:

- Floating floor within the dwellings above to comprise:
 - 18-millimetre T&G flooring board (minimum mass 12 kg/m²).
 - Minimum 70-millimetre timber battens.
 - 60-millimetre mineral wool between battens (33 kg/m³).
- Existing floor and ceiling comprising:
 - Plywood deck or similar to provide minimum mass 10 kg/m².
 - 253-millimetre posi-joists with 100-millimetre mineral wool insulation (33 kg/m³) in the cavity.
 - Two layers of staggered and sealed 12.5-millimetre plasterboard (minimum mass 16 kg/m²) fixed to the joists above with resilient bars.

It is predicted that suitable internal noise levels can be achieved due to retail noise transfer within the building using the above or similar construction methods (to achieve the minimum sound reduction performance as set out in Section 7.2). Please note that this addresses planning requirements only and does not consider the requirements of Approved Document 'E' of the Building Regulations.

9. Appendix 1 – Glossary of Acoustic Terminology

A-weighted sound pressure p_A – value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network.

A-weighted sound pressure level, L_{pA} – quantity of A-weighted sound pressure given by the following formula in decibels (dBA)

$$L_{pA} = 10 \log_{10} (p_A/p_0)^2$$

where:

p_A is the A-weighted sound pressure in pascals (Pa);
 p_0 is the reference sound pressure (20 μ Pa)

Background sound level, $L_{A90,T}$ – A-weighted sound pressure level that is exceeded by the residual sound assessment location for 90% of a given time interval, T, measured using weighting F and quoted to the nearest whole number of decibels

Break-in - noise transmission into a structure from outside.

Decibel (dB) – The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithms are taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ – value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

$$L_{Aeq,T} = 10 \lg_{10} \left\{ (1/T) \int_{t_1}^{t_2} [p_A(t)^2/p_0^2] dt \right\} \quad (1)$$

where:

p_0 is the reference sound pressure (20 μ Pa); and

$p_A(t)$ is the instantaneous A-weighted sound pressure (Pa) at time t

NOTE The equivalent continuous A-weighted sound pressure level is quoted to the nearest whole number of decibels.

Facade level – sound pressure level 1 m in front of the façade. Facade level measurements of L_{pA} are typically 1 dB to 3 dB higher than corresponding free-field measurements because of the reflection from the facade.

Free-field level – sound pressure level away from reflecting surfaces. Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e. not 3.5 m from the reflecting surface in the direction of the source).

Octave and Third Octave Bands – The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz and is generally more sensitive to medium and high frequencies than to low frequencies within the range. There are many methods of describing the frequency content of a noise. The most common methods split the frequency range into defined bands, in which the mid-frequency is used as the band descriptor and in the case of octave bands is double that of the band lower. For example, two adjacent octave bands are 250 Hz and 500 Hz. Third octave bands provide a fine resolution by dividing each octave band into three bands. For example, third octave bands would be 160 Hz, 250 Hz, 315 Hz for the same 250 Hz octave band.

Sound pressure level – Sound pressure level is stated on many of the charts. It is the amplitude of the acoustic pressure fluctuations in a sound wave, fundamentally measured in Pascals (Pa), typically from 20 micro-Pascals to 100 Pascals, but commonly simplified onto the decibel scale.

Sound reduction index, R – laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.

Specific sound level, $L_s = L_{Aeq,Tr}$ – equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r .

Structure-borne noise – audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements.

Rating level, $L_{Ar,Tr}$ – Specific sound level plus any adjustment for the characteristic features of the sound.

Reverberation Time, T – The reverberation time is defined as the time taken for a noise level in an enclosed space to decay by 60 dB from a steady level once the noise source has stopped. It is measured in seconds. Often a 60 dB decay cannot be measured so the reverberation time is measured over a lesser range and corrected back to the time for a 60 dB drop assuming a constant decay rate. Common parameters are T20 (time taken for a 20 dB decay multiplied by three) and T30 (time taken for a 30 dB decay multiplied by two).

Vibration Dose Value, VDV – measure of the total vibration experienced over a specified period of time.

Estimated Vibration Dose Value, $eVDV$ – estimation of the total vibration experienced over a specified period of time. This is usually based on the number of events and shortened measurement data.

Weighted sound reduction index, R_w – Single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies. The weighted sound reduction index is used to characterize the insulation of a material or product that has been measured in a laboratory (see BS EN ISO 717-1).



ACOUSTIC
CONSULTANTS LTD

Head Office: 194 West Street, Bedminster, Bristol, BS3 3NB
T: 0117 986 2956

www.acoustic-ltd.co.uk

Registered Office: 194 West St, Bristol, BS3 3NB Registered No: 8544901