



ACOUSTIC
CONSULTANTS LTD

Noise Impact Assessment

**Proposed Residential Development
27 Market Place, Chippenham**

Reference: 12022/LN

Client:

Keskins Chippenham 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.

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1. Introduction

Keskins Chippenham Ltd appointed Acoustic Consultants Limited to undertake a noise impact assessment for the proposed flats above Keskins takeaway at 27 Market Place, Chippenham.

The noise impact assessment has been undertaken in accordance with the requirements of British Standard 8233:2014 (BS8233) and British Standard 4142:2014.

The author of this report is a Member of the Institute of Acoustics with 5 years' experience within the field and, as such, is considered suitably qualified to undertake a noise impact assessment. This report has been revised by a Member of the Institute of Acoustics with nine years' experience in the field.

2. The Site and Proposals

The site is the first and second floors of 27 Market Place, Chippenham. The proposals are for the conversion of these uppers to residential use.

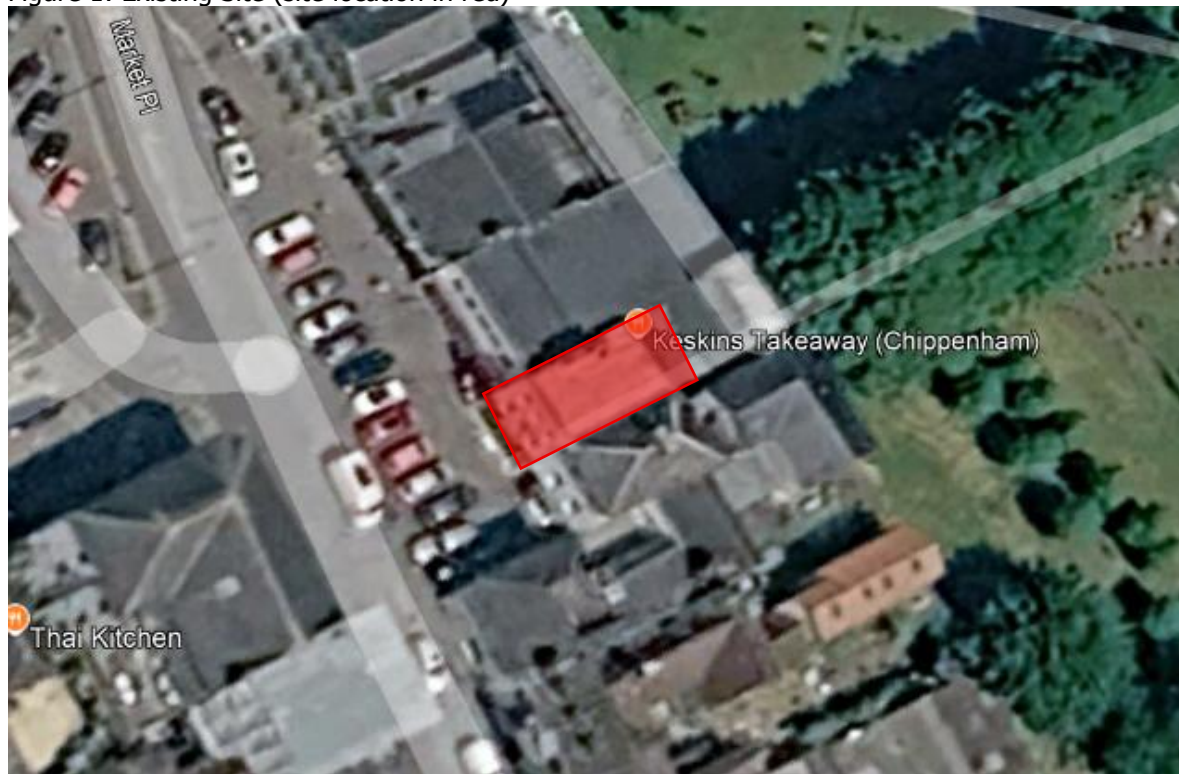
At the ground floor is a takeaway with plant servicing the takeaway at the rear of the property. The first and second floors are now occupied by two apartments, one per floor.

The main noise sources around the site are road traffic from the road directly to the west on Market Place and plant to the rear.

The dwellings also have the potential to be affected by internal noise transfer from the takeaway below. The takeaway is understood to operate until 23:00 hours Sunday-Thursday and until 00:00 on Fridays and Saturdays.

A satellite image of the site is shown below:

Figure 1: Existing Site (site location in red)



3. Planning & 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. British Standard 8233:2014

The most relevant criteria for assessing sound transfer to the adjacent residential properties is British Standard 8233:2014 'Guidance on sound insulation and noise reduction for buildings'.

Section 7.7.2 Table 4 of the British Standard provides internal ambient noise levels for dwellings from noise sources 'without a specific character' and are based on existing guidelines issued by the World Health Organisation 1999.

The British Standard guideline states that *"in general for steady state external noise sources it is desirable that the internal ambient noise level"* for annual average conditions does not exceed those as noted in Table 4 of the British Standard and this is summarised below:

Table 2: British Standard 8233:2014 Internal Noise Criteria

Activity	Location	07:00 to 23:00	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 $L_{Aeq,8 \text{ hour}}$

4.2. 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 Clause 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."*

Based on the initial assessment outcomes of BS4142, and depending on context, it is our opinion that the NOEL, LOAEL and SOAEL levels stated in the Noise Policy Statement for England would generally fall within the following categories when considered in conjunction with the effect levels of the NPPG Noise.

Table 3: BS4142 Difference in Relation to Effect Levels

BS4142 Assessment Difference	Corresponding Effect Level*	Action*
≤ -10 dB	No Observed Effect	No specific measures required
-9.9 dB to 0 dB	No Observed Adverse Effect	No specific measures required
	Lowest Observed Adverse Effect Level	
0.1 dB to 5 dB	Observed Adverse Effect	Mitigate and reduce to a minimum
	Significant Observed Adverse Effect Level	
5.1 dB to 10 dB	Significant Observed Adverse Effect	Avoid
≥ 10.1 dB	Unacceptable Adverse Effect	Prevent

* BS4142 states that "where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration". Therefore, the assessment levels and effect levels above are not definitive and can be modified due to context.

It should be noted that the numerical outcome only represents the initial estimate of impact, as stated in the first paragraph of Clause 11, and that contextual matters should be considered before determining what the potential impact is. This paragraph states:

The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context.

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](#)).

NOTE 1 More than one assessment might be appropriate.

The second part of Clause 11 sets out three contextual matters that should be taken into account once the initial numerical estimate has been determined. It is important to note that the three listed is not exhaustive and all pertinent factors should be considered.

Please note, Bristol City Council typically apply a more onerous criterion of a cumulative rating sound level of plant to not exceed more than 5 dB below the background sound level.

5. Noise Monitoring

A partially attended noise survey was conducted between the 8th and 11th of May 2026 to determine the existing noise levels at the property.

Simultaneous attended measurements were also conducted on the 11th of May to determine the sound level difference between the external noise and the level within the dwellings with the current building envelope and ventilation measures.

In addition, an attended sound transfer assessment was conducted on the 11th of May to determine the current performance of the separating floor between the existing takeaway and the residential premises above.

5.1. Monitoring Equipment

Sound Pressure Levels were measured using a Class 1 Sound Level Meters with 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 17025:2005, and in accordance with British Standard EN 10012:2003, and traceable to the National Standards. This equipment was checked and calibrated as noted below and the certificates are available for inspection, if required.

Table 4: Equipment and Calibration Status

Equipment Description / Manufacturer / Type	Serial Number	Date of Calibration	Calibration Certification Number
SLM, NTI, XL2	A2A-13561-E0	03/12/2025	1515640-1
Pre-Amp, NTI, MA220	13831	03/12/2025	1515640-1
Microphone, NTI, MC230A	A17955	03/12/2025	1515640-1
Calibrator, Larson Davis, CAL200	15064	10/11/2025	1515319-1
SLM, NTI, XL2	A2A-11041-E0	14/07/2025	1512782-1
Pre-Amp, NTI, MA220	1822	14/07/2025	1512782-1
Microphone, NTI, MC230	9583	14/07/2025	1512782-1
Calibrator, Larson Davis, CAL200	18273	17/03/2026	1511387-2
SLM, NTI, XL3	A3A-02255-F0	06/01/2026	UK-26-002
Pre-Amp, NTI, MA230	2365	06/01/2026	UK-26-002
Microphone, NTI, MC230A	A32947	06/01/2026	UK-26-002
Calibrator, Svanter, SV33B	175333	17/09/2025	SV175333092025

A field calibration check of each meter was carried out before and after the measurements and no significant drift over 0.1 dB was detected.

5.2. Weather Conditions

During the monitoring conditions were clear, dry, and calm. The weather conditions are not expected to have adversely affected the measured data.

Table 5: Weather conditions during survey

Date	Wind Speed (m/s)	Prevailing Wind Direction	Air Temperature (°C)	Precipitation (time/hrs)	Cloud Cover (%)
8 th May	3	E	8-18	0	70
9 th May	4	E	6-19	0	20
10 th May	5	E	7-14	0	30
11 th May	4	E	4-13	0	60

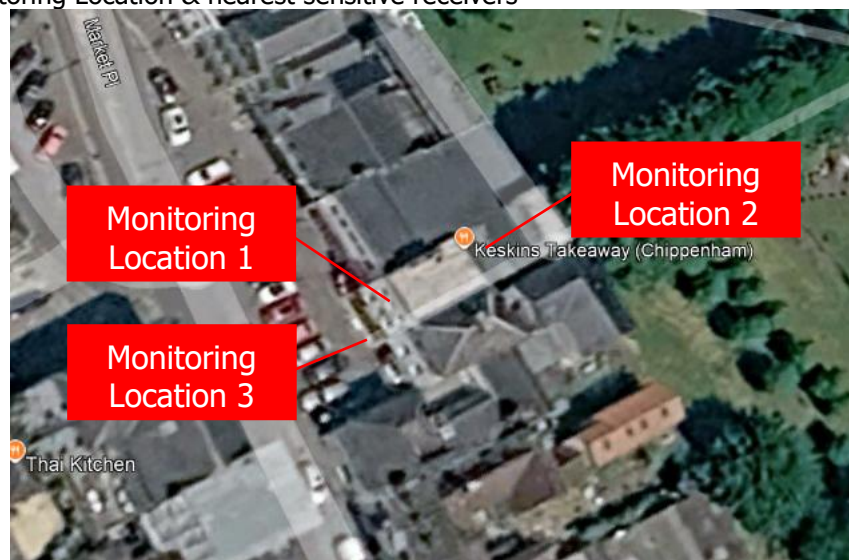
5.3. Monitoring Procedure

The figure below provides the monitoring locations from the site. The equipment was situated on the first floor. Monitoring location 1 was placed at 2nd floor level within the living space. The room had one window open as the means of ventilation as there were no trickle vents installed.

Monitoring Location 2 was placed outside of the rear window at 2nd floor level within the bedroom.

Monitoring location 3 was an attended survey measuring the external noise levels to determine the level difference between the façade level and the level within the dwelling at monitoring location 1.

Figure 2: Monitoring Location & nearest sensitive receivers

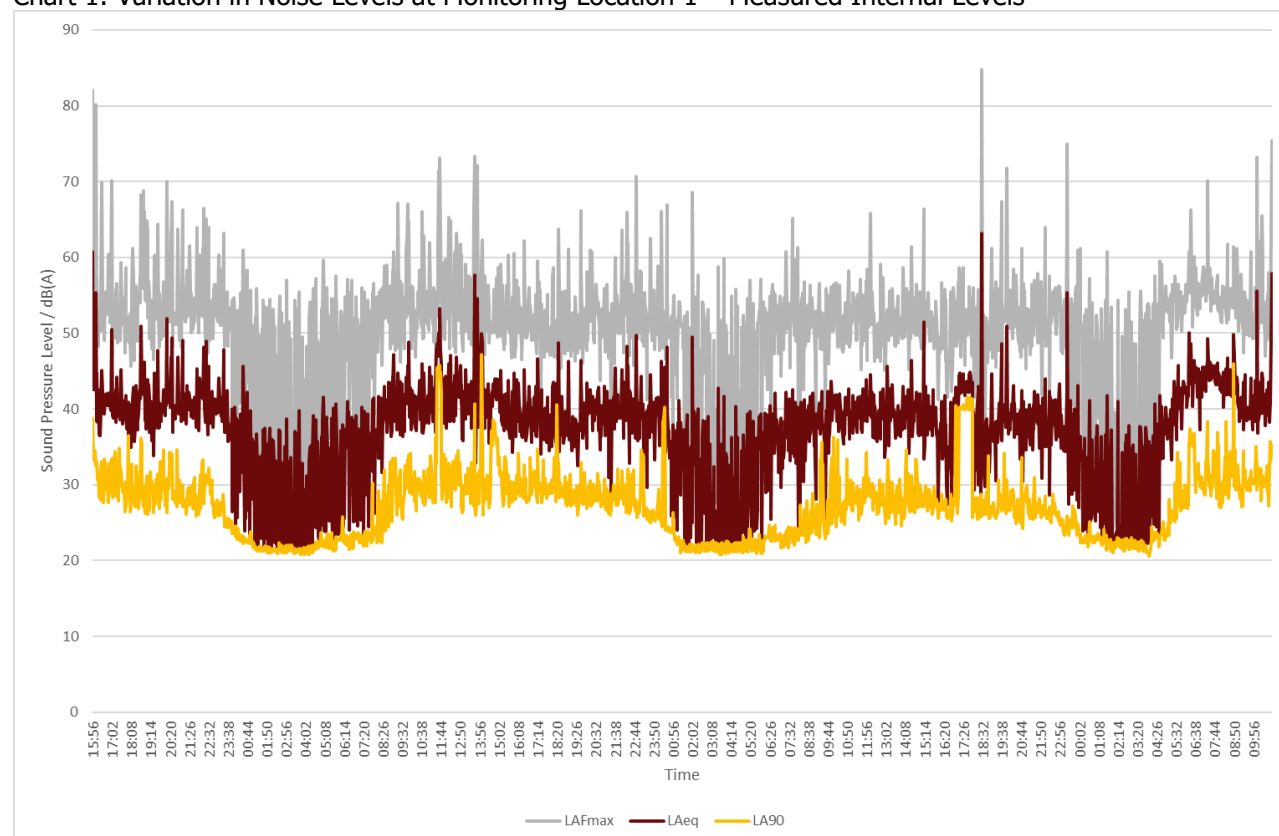


5.4. Measured Noise Levels

5.4.1. Monitoring Location 1 (Internal on Market Place Façade)

A chart of the variation in ambient noise levels with time is provided below:

Chart 1: Variation in Noise Levels at Monitoring Location 1 – Measured Internal Levels



From the measured noise data, we have determined the following measured internal 'daytime' and 'night-time' equivalent noise levels, and maximum noise levels within the room at monitoring location 1:

Table 6: Measured Octave Band Noise at 'Monitoring Location 1' (Measured Internal Levels)

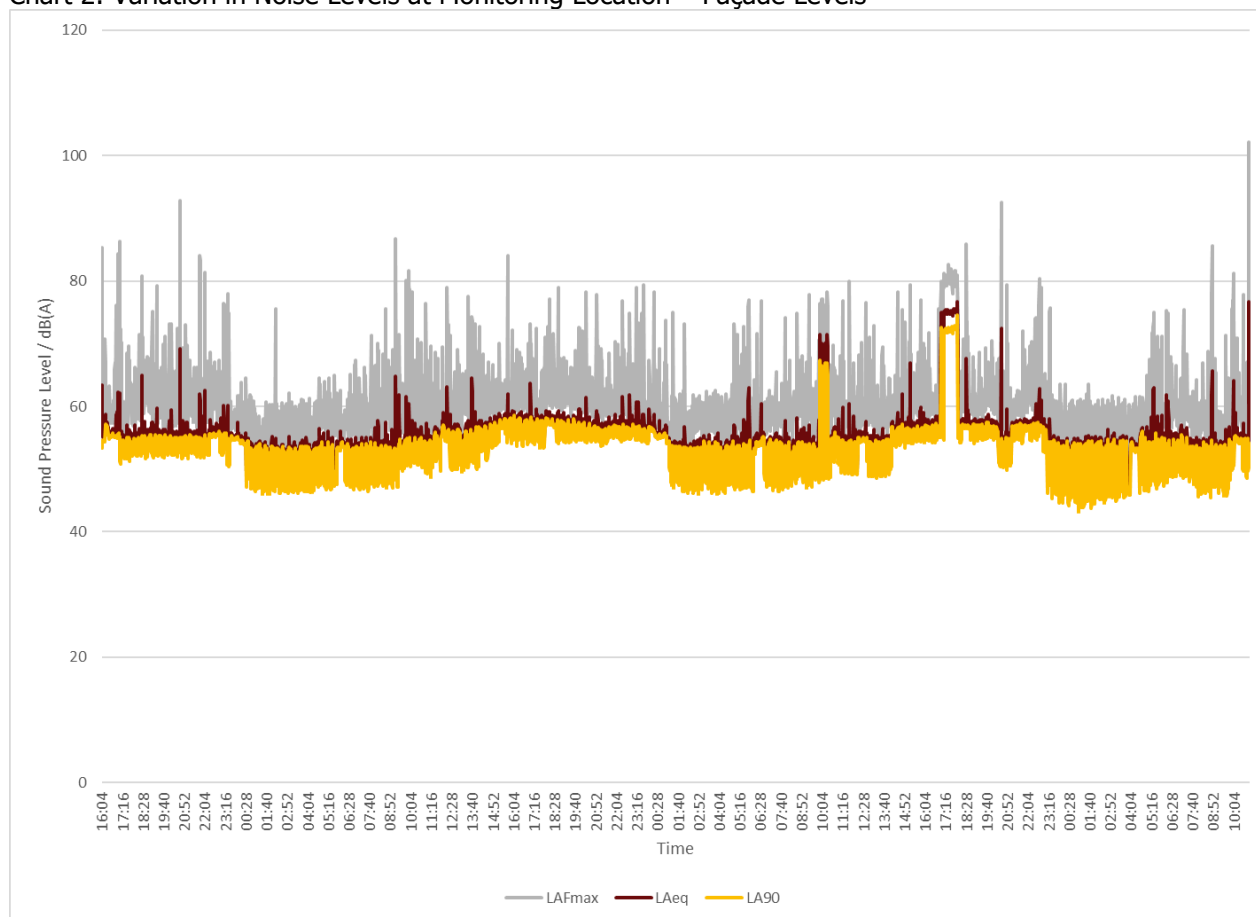
Parameter	63	125	250	500	1000	2000	4000	8000	dB(A)
Day $L_{eq,(16hr)}$	46	48	42	39	38	34	24	28	43
Night $L_{eq,(8hr)}$	43	46	37	34	34	29	17	16	38
Night $L_{max(F)}^{(1)}$	57	56	51	52	57	52	36	35	59

1) 10th Highest L_{AFmax} occurring during the night-time period

5.4.2. Monitoring Location 2 (At Rear Façade)

A chart of the variation in ambient noise levels with time is provided below:

Chart 2: Variation in Noise Levels at Monitoring Location – Façade Levels



From the measured noise data, we have determined the following free-field octave band design 'daytime' and 'night-time' equivalent noise levels, and maximum noise levels at the monitoring location 2:

Table 7: Measured Octave Band Design Noise at 'Monitoring Location 2' (free-field Levels)

Parameter	63	125	250	500	1000	2000	4000	8000	dB(A)
Day $L_{eq, (16hr)}$	59	65	56	56	52	50	40	32	58
Night $L_{eq, (8hr)}$	54	63	52	51	42	38	33	29	52
Night $L_{max(F)}^{(1)}$	70	79	69	65	58	53	47	40	68
Worst Case $L_{eq} (15 \text{ minutes})$	66	69	62	57	51	46	40	35	59

1) 10th Highest L_{AFmax} occurring during the night-time period

5.4.3. Monitoring Location 3

The table below provides the measured noise levels from the attended noise survey with a comparison between the same time period measured at monitoring location 1 and monitoring location 3.

Table 8: Measured Octave Band Design Noise at 'Monitoring Location 1 & 3'

Parameter	63	125	250	500	1000	2000	4000	8000
Monitoring Location 1 (dBA)	68	64	56	57	55	52	48	53
Monitoring Location 3 (dBA)	43	47	40	38	37	33	21	16
Level Difference (D)	25	17	16	18	18	19	27	37

5.5. Party Floor Performance

Field measurements of airborne sound insulation between rooms are carried out in full accordance with ISO 140-4:1998(E). The ratings of airborne sound insulation are calculated in accordance with British Standard EN ISO 717-1-1997.

Two sound sources are used to feed broadband (pink) noise into the source room simultaneously; being driven in phase with similar but uncorrelated signals. The one-third octave band sound pressure levels are measured in the source and receiving rooms with one measurement position in each.

Measurements are undertaken using the moving microphone technique with 30 second sweeps with the duration of each traverse period of at least 15 seconds. The microphone is located at least one metre from any of the room surfaces and travelled in an arc with a sweep radius of approximately 1.5 metres and a traverse angle greater than ten degrees of the room planes. For the calculation process, it is the level difference of the source and receive measurements.

The measured octave band level difference (D) of the Separating Party Floor are provided in the table below.

Table 9: Expected Sound Reduction Indices of Separating floor

Frequency (Hz)	125	250	500	1k	2k	4k	D _w
Level Difference, D	27	36	45	50	58	62	47

6. Noise Assessment (External Noise)

6.1. Measured Internal Noise Levels (Market Place Façade)

Below are the measured noise levels measured within habitable rooms within 27 Market Place.

Table 10: Measured internal noise levels

Parameter	Sound Pressure Level (dB) per Octave Band (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
L_{eq} , 16 hours	46	48	42	39	38	34	24	28	43
L_{eq} , 8 hours	43	46	37	34	34	29	17	16	38
L_{Fmax}	57	56	51	52	57	52	36	35	59

The table below details whether the measured noise levels meet criteria of BS8233.

Table 11: Measured internal noise levels and comparison to relevant internal noise guidelines

Monitoring Position	Parameter	Measured Noise Level, dB	Criterion, dB	Pass/Fail
A	Daytime, L_{Aeq} , 16 hours	43	35	Fail
	Night Time, L_{Aeq} , 8 hours	38	30	Fail
	Night Time, L_{AFmax}	59	45	Fail

Measured internal ambient noise levels failed to meet criteria in all cases.

6.2. Measured External Plant Spectrum (Rear)

Below are the measured noise levels measured externally at the rear of 27 Market Place.

Table 12: Measured Octave Band Design Noise at 'Monitoring Location 2' (Facade Levels)

Parameter	63	125	250	500	1000	2000	4000	8000	dB(A)
Day L_{eq} , 16 hour	59	65	56	56	52	50	40	32	58
Night L_{eq} , 8 hour	54	63	52	51	42	38	33	29	52
Night L_{Fmax}	70	79	69	65	58	53	47	40	68
Worst Case L_{eq} 15 minutes	66	69	62	57	51	46	40	35	59

1) 10th Highest L_{AFmax} occurring during the night-time period

6.3. Design Noise Levels

Below are the design noise levels used for the assessment at the front and rear façades of 27 Market Place, Chippenham.

The façade to the rear's design free field noise level is taken from the worst case 15-minute period. A 3dB correction has been applied for intermittency.

Table 13: Measured Octave Band Design Noise Levels (free-field levels)

Façade	Parameter	63	125	250	500	1000	2000	4000	8000	dB(A)
Front	Day $L_{eq,(16hr)}$	71	65	58	57	56	53	51	65	63
	Night $L_{eq,(8hr)}$	68	63	53	52	52	48	44	53	58
	Night $L_{max(F)}$	82	73	67	70	75	71	63	72	79
Rear	Day $L_{r,T}$	66	69	62	57	51	46	40	35	59
	Night $L_{r,T}$	66	69	62	57	51	46	40	35	59
	Night $L_{max(F)}$	67	76	66	62	55	50	44	37	65

6.4. Noise Mitigation Measures

6.4.1. Calculation Method

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

However, at the rear of the property, we aim to achieve a lower criterion than that specified in BS 8233:2014, targeting a rating level at least 5 dB below the BS8233 as the criteria set out in the British Standard are intended for sources with specific character.

We aim to target the criteria specified in BS8233:2014 and WHO 1999 for the façade overlooking Market Place.

The calculations have been undertaken using the building façade constructions specified below and the measured noise levels from commercial activities.

The calculations are based on the following assumptions:

- Room dimensions are taken to be 5x4x2.4m for living rooms and 3x4x2.4m for bedrooms.
- Reverberation time of 0.5 seconds within all habitable rooms; this is considered a representative figure for furnished rooms.

The development is ventilated via natural ventilation, with no continuous mechanical extract ventilation (MEV). As such, in accordance with Approved Document F, trickle vents have a total minimum equivalent area of 8000mm²

Alternative constructions to those noted below could be used, however they are required to meet to sound reduction spectra stated below at a minimum.

6.4.2. External Wall Construction

The existing construction of the facades is not currently known but at a worst case would be expected to comprise single skin fairfaced 140mm concrete block with a minimum surface mass of 147kg/m². This would be expected to have the minimum performance provided below.

Table 14: Expected sound insulation performance of existing external walls

Construction	SRI (dB) per Octave Band (Hz)								R _w (dB)
	63	125	250	500	1k	2k	4k	8k	
Masonry	30	33	39	45	54	62	69	69	50

The client should confirm the above is correct. Please advise on any discrepancies.

6.4.3. Roof Construction

The roof construction appears to be a pitched roof with tiles on felt, insulation and a plasterboard layer. This construction is expected to achieve the following sound reduction indices at a minimum.

Table 15: Expected sound insulation performance of existing roof construction

Construction	SRI (dB) per Octave Band (Hz)								R _w (dB)
	63	125	250	500	1k	2k	4k	8k	
Pitched with tiles and insulated plasterboard layer	26	31	39	47	52	58	58	58	49

The client should confirm the above is correct. Please advise on any discrepancies.

6.4.4. Window Construction

The existing window construction consists of the original single glazed window with a secondary double-glazed window.

The windows should be housed in sturdy and good quality frames with airtight compression seals. The sound insulation performance for the windows should achieve the performance shown in the table below as a minimum; a typical build up is also provided. The supplier should confirm the performance (octave band R and R_w) is achievable with the chosen systems.

Table 16: Required Minimum Sound Insulation of Windows

Facade	Room	Sound Reduction Index / dB per Octave Band (Hz)								R _w (dB)	Typical Construction
		63	125	250	500	1k	2k	4k	8k		
Front	Living Space	20	25	22	33	40	43	44	44	36	10/12/4
	Bedrooms	21	26	27	34	40	38	46	46	37	10/12/16
Rear	Living Space	16	21	20	31	39	37	47	46	33	6/12/6.4
	Bedrooms	21	26	27	34	40	38	46	46	37	10/12/16

From our site visit, it is understood the habitable rooms comprise the original single glaze panes with new secondary double-glazed windows internally. In our experience, secondary glazing can achieve in excess the of the performances set out above. The supplier of the secondary panes should confirm the sound reduction indices their system can achieve in situ when installed in this manner.

6.4.5. Ventilation

There are no current ventilators at the site. The rooms are served by openable windows providing natural ventilation. As set out above, the survey data shows that suitable internal noise levels are not currently being achieved with windows partially open for ventilation.

Therefore, habitable rooms will need to be ventilated via attenuated means. The ventilation should include the necessary sound attenuation in order that the ingress of external noise is controlled to be compatible with the building fabric.

The vents are required to achieve the following element normalised level difference ($D_{n,e}$) in the open position. The supplier of any chosen ventilation product should provide test data confirming that the ventilation system meets the following performance data. There should be no unattended vents or openings in the façade.

The following table shows the required sound reduction of ventilation for all habitable rooms on all floors. The minimum number of vents is also provided and was assumed on achieving the typical minimum equivalent area criteria of Approved Document F ($\geq 8000\text{mm}^2$ per habitable room, for multi storey dwellings).

Please note that the minimum equivalent area provided may not apply in certain situations, such as when a dwelling has only one exposed façade. In any case, expert advice should always be sought, including guidance on the minimum number of vents, as the stated minimum ventilation performance may be subject to change. For further guidance, please refer to Approved Document F (ADF).

Table 17: Required Minimum Sound Insulation Performance of Vents

Façade	Room	D _{ne} (dB) per Octave Band (Hz)								D _{new} (dB)	Typical Construction (open)	No. vents required
		63	125	250	500	1k	2k	4k	8k			
Market Place (Front)	Living Spaces	30	36	38	36	32	37	40	48	35	Acoustic Trickle eg SF X V25 / SF 418 (EA 2500 mm ²)	4
	Bedrooms	32	41	39	36	42	44	45	45	42	Acoustic Trickle eg. Greenwood 2500EAW.AC1 (EA 2749 mm ²)	2
Rear	Living Spaces	30	35	35	36	34	29	33	34	32	Standard Trickle eg XS13 4400 EA+XC13 412	3
	Bedrooms	32	41	39	36	42	44	45	45	42	Acoustic Trickle eg. Greenwood 2500EAW.AC1	2

The above sets out the minimum sound reduction performance required for vents in terms of the element normalised level difference per zone. It might not be possible to install window-fitted trickle vents due to the secondary glazing system installed on site. Where the windows are retained and confirmed to provide the required sound reduction indices, wall vents or mechanical ventilation could be considered, providing the sound reduction provided by the chosen system achieves the minimum performance set out above.

Where a mechanical ventilation system is required, as a guide, the system should be designed such that the single figure sound reduction between the atmosphere and habitable rooms is 43 dBA on the Market Place façade and 39 dBA on the rear façade.

6.4.6. Effect of Mitigation Measures

Based on our calculations, the predicted internal noise levels within the proposed dwellings could achieve the criteria of British Standard 8233:2014 of 35 dB $L_{Aeq,16hour}$ in the daytime rooms, and 30 dB $L_{Aeq,8hour}$ and 45 dB L_{AFmax} in the night-time rooms, with the noise mitigation measures set out above.

Noise ingress calculations for the worst-case rooms are provided below. Calculation accuracy demonstration is provided below. A margin of safety below criteria has been allowed for within all calculations. Deviation from advised mitigation measures increases risk of failure.

Free Field Level at Façade									
Octave Band	63	125	250	500	1000	2000	4000	8000	dBA
Day, $L_{Aeq,16hour}$	71	65	58	57	56	53	51	65	66
Night $L_{Aeq,8hour}$	68	63	53	52	52	48	44	53	58
Night-time $L_{Aeq,8hour}$	82	73	67	70	75	71	63	72	78

Building Façade Construction									
External Element	63	125	250	500	1000	2000	4000	8000	
Trickle: Greenwood 2500EAW.AC1 (open) - 42 Dnew (EA 2749 mm2)	D_{se}	32	41	39	36	42	44	45	45
Total EA = 5498	Number of	2							
Approved Document F Compliant		0	0	0	0	0	0	0	0
100mm concrete block, fairfaced, 147kgm2, 1470kgm3 - 48 Rw		30	34	38	41	51	59	65	65
	Area	8							
		0	0	0	0	0	0	0	0
Double Glazed: 10/12/6 - 37 Rw		21	26	27	34	40	38	46	46
	Area	2							
		0	0	0	0	0	0	0	0

Calculations to BS EN 12354									
	63	125	250	500	1000	2000	4000	8000	
Sum	0.00353	0.000885463	0.000715287	0.000622139	0.000157251	0.000108295	7.0296E-05	7.00724E-05	
10log sum	-24.52355918	-30.52829783	-31.45519765	-32.0611252	-38.03405582	-39.6539083	-41.53069678	-41.54452857	
10log S/A	0.17728767	0.17728767	0.17728767	0.17728767	0.17728767	0.17728767	0.17728767	0.17728767	
correction factor +3	3	3	3	3	3	3	3	3	

Octave Band	63	125	250	500	1000	2000	4000	8000	dBA
Day, $L_{Aeq,16hour}$	50	38	30	28	21	17	13	27	31
Night $L_{Aeq,8hour}$	47	36	25	23	17	12	6	15	26
Night-time $L_{Aeq,8hour}$	61	46	39	41	40	35	25	34	44

Free Field Level at Façade									
Octave Band	63	125	250	500	1000	2000	4000	8000	dBA
Day, $L_{Aeq,16hour}$	66	69	62	57	51	46	40	35	59

Building Façade Construction									
External Element	63	125	250	500	1000	2000	4000	8000	
Trickle: Greenwood 2500EAW.AC1 (open) - 42 Dnew (EA 2749 mm2)	D_{se}	32	41	39	36	42	44	45	45
Total EA = 5498	Number of	2							
Approved Document F Compliant		0	0	0	0	0	0	0	0
100mm concrete block, fairfaced, 147kgm2, 1470kgm3 - 48 Rw		30	34	38	41	51	59	65	65
	Area	8							
		0	0	0	0	0	0	0	0
Double Glazed: 10/12/6 - 37 Rw		21	26	27	34	40	38	46	46
	Area	2							

Calculations to BS EN 12354									
	63	125	250	500	1000	2000	4000	8000	
Sum	0.00353	0.000885463	0.000715287	0.000622139	0.000157251	0.000108295	7.0296E-05	7.00724E-05	
10log sum	-24.52355918	-30.52829783	-31.45519765	-32.0611252	-38.03405582	-39.6539083	-41.53069678	-41.54452857	
10log S/A	0.17728767	0.17728767	0.17728767	0.17728767	0.17728767	0.17728767	0.17728767	0.17728767	
correction factor +3	3	3	3	3	3	3	3	3	

Octave Band	63	125	250	500	1000	2000	4000	8000	dBA
Day, $L_{Aeq,16hour}$	45	42	34	28	16	10	2	-3	30

7. Takeaway Airborne Noise Control

It will be necessary to design the separating elements between the proposed restaurant on the ground floor and dwelling rooms above to ensure suitable levels are achieved.

7.1. Operational Noise Levels

To determine a typical worst-case noise emission from patrons inside the ground floor dining area we have assumed that the maximum capacity of up to 12 patrons due to the available area of the commercial unit. We have taken this from the floor area of the customer area and the occupant capacity as per the Approved Document B2 area for a restaurant/bar of 1m² per person.

To determine the noise levels within the restaurant, we have considered typical sound pressure levels at 1 metre for speech spectra in octave bands for conversation at normal vocal effort set out in ANSI 3.5. We have calculated a reverberant level within the takeaway and considered 50% of voices speaking at any one time.

This assumption in our opinion is representative of a worst case operational noise level for the restaurant when full. Our experience tells us that restaurant noise levels of this size are considerably quieter than the level predicted. This is therefore considered a worst case assumption in our opinion.

Table 18: Predicted Takeaway Operational Noise Levels - Octave Band, Frequency Levels, dB

Frequency (Hz)	125	250	500	1k	2k	4k	8k	dBA
Takeaway Reverberant Level <i>L_{eq,T}</i>	59	70	72	66	61	56	51	72

7.2. Sound Insulation of Separating Party Floor

From on-site tests, we have determined that the sound level difference provided by the existing floor construction is as follows.

Table 19: Expected Sound Reduction Indices of Separating floor

Frequency (Hz)	125	250	500	1k	2k	4k	Dw
R (dB)	27	36	45	50	58	62	47

7.3. Effect of Noise Control Measures

Table 20: Predicted patron level within habitable room above, based on level differences measured

Frequency (Hz)	125	250	500	1k	2k	4k	dBA
Predicted Patron Level (dBA)	59	70	72	66	61	56	72
Floor Sound Reduction (D)	27	36	45	50	58	62	-
Level in Bedroom (dBA)	33	34	28	17	4	-5	29

With the operational noise levels in the restaurant stated in Table 20 above along with the assumed floor achieving sound reduction indices stated above, the predicted internal equivalent noise level within the dwelling is expected to be 23dBA $L_{Aeq(T)}$. This is considered to be within the daytime and nighttime criteria of BS 8233 and therefore, the planning uses are considered acceptable.

8. Summary & Conclusions

Keskins Chippenham Ltd appointed Acoustic Consultants Limited to undertake a noise impact assessment for the proposed flats above Keskins takeaway at 27 Market Place, Chippenham.

The noise impact assessment has been undertaken in accordance with the requirements of British Standard 8233:2014 (BS8233) and British Standard 4142:2014.

Based on our assessment, good internal conditions can be met where suitable noise mitigation measures are incorporated into the building envelope as specified within Section 6.4 of this report.

Predicted noise levels within the residential property above the takeaway due to noise transfer of typical takeaway noise (speech) were within the criteria of BS8233 during day and night-time periods.

On the basis of the above, the proposed development would achieve the aims of the NPPF and could be considered acceptable in terms of noise.

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:

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

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, $L_s = L_{Aeq,T_r}$ – 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_{A,r,T_r} – 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).



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