

SHARPS REDMORE

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Report 1

Royal Arms Hotel, Nuneaton

Planning Stage Acoustic
Report

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This report has been prepared with all reasonable skill, care and diligence commensurate with an acoustic consultancy practice under the terms and brief agreed with our client at that time. Sharps Redmore provides no duty or responsibility whatsoever to any third party who relies upon its content, recommendations or conclusions.

1.0 Introduction

Sharps Redmore Acoustic Consultants (SR) has been instructed by APA leisure Limited. to provide acoustic design guidance on the proposed redevelopment of the existing Royal Arms Hotel on Main Street in Sutton Cheney, Leicestershire into apartments and houses.

Proposals include to repurpose the existing Hotel and Restaurant into 9 residential apartments, retention and modifications to the existing public house and the provision of a standalone community building with public toilets for servicing the 1485 walking trail. The existing structures to the rear will be retained and converted to make way for 4 houses and 2 bungalows with associated parking and outdoor living areas.

The existing pub will be rebranded as the 'Greyhound Inn' and will function as a typical local community leisure facility that will not hold live events or make use of amplified sound. A residential apartment is proposed at ground floor level separated from the 'Greyhound Inn' by a retained and/or new wall partition. Two apartments will also be located directly above, one of such; Flat 3 will share a party wall with the existing Greyhound Cottage.

Proposals for construction for the scheme are still under review and will be subject to any planning requirements enforced.

SR are appointed to provide acoustic advice on noise intrusion from both existing and new sources of noise, specifically those that may arise from the community building, to undertake site investigations, noise surveying and acoustic testing of existing structures.

As a minimum the project is required to comply with criteria enforced under Approved Document E (ADE) of the Building Regulations, as addressed within an enhancement to such specification may be warranted for apartments proposed under the scheme to share adjoining party walls and floors with the rebranded and repurposed Greyhound Inn. (micro-pub).

This report outlines relevant acoustic criteria (Section 2.0), provides details on noise surveying in Section 3.0, Section 4.0 provides discussion on ventilation and external noise ingress, an internal sound insulation review is given in section 5.0. The impact of noise from the community building and any mechanical services plants on future and existing properties is addressed in Section 6.0. Section 7.0 sets out the concluding remarks.

The information contained within this report relates specifically to acoustics and the adoption of any advice given should be checked as being suitable with other disciplines.

2.0 Acoustic criteria

2.1 National Policy

The National Planning Policy Framework (NPPF), July 2021, sets out the Government's planning policies for England and "these policies articulate the Government's vision of sustainable development." In respect of noise, Paragraph 185 of the NPPF states the following:

"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".*

Guidance on the interpretation of the policy aims contained within the NPPF is contained within the National Planning Policy Guidance (NPPG). The NPPG introduces the concept of a noise exposure hierarchy based on the likely average response to noise. The guidance contained in the NPPG is summarised in the table below.

Table 1 – NPPG

Perception	Example of outcomes	Increasing effect level	Action
Not noticeable	No effect	No observed effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No observed adverse effect	No specific measures required
		Lowest observed adverse effect level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, 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. Affect the acoustic character of the area such that there is a perceived change in the quality of life.	Observed adverse effect	Mitigate and reduce to a minimum
		Significant observed adverse effect level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, 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 the change in acoustic character of the area.	Significant observed adverse effect level	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress of physiological effects, e.g. Regular sleep deprivation/awakening; loss of appetite.	Unacceptable adverse effect	Prevent

The NPPF reinforces the March 2010 DEFRA publication, “Noise Policy Statement for England” (NPSE), which states three 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.”

It also outlines the concepts from toxicology utilised for noise impacts, and extended to derive a ‘significant’ level for the purposes of the NPSE.

- NOAL: No Observed Effect Level: The level below which no effect can be detected. There is no detectable effect on health and quality of life due to noise. avoid significant adverse impacts on health and quality of life;
- LOAEL: Lowest Observed Adverse Effect Level: The level above adverse effects on health and quality of life can be detected.
- SOAEL: Significant Observed Adverse Effect Level: For these purposes, the level above which significant adverse effects on health and quality of life occur.

Taking into consideration the aims and guidance of the national policy when considering the impact of noise, the fact that sound can be heard and causes impact, is not reason alone for refusal of an application as consideration should also be given to the significance of the impact and the mitigation measures available.

It is possible to apply objective standards to the assessment of noise and the effect produced, the introduction of a certain noise source may be determined by several methods, as follows:

- i) The effect may be determined by reference to guideline noise values, such as those contained in the World Health Organisation (WHO) “Guidelines for Community Noise”.
- ii) Alternatively, the impact may be determined by considering the change in noise level that would result from the proposal, in an appropriate noise index for the characteristic of the noise in question. There are various criteria linking change in noise level to effect. This is the method that is suited to, for example, to the assessment of noise from road traffic because it is capable of displaying impact to all properties adjacent to a road link irrespective of their distance from the road.
- iii) Another method is described within British Standard 4142:2014 +A1:2019 ‘*Method for rating industrial and commercial sound*’ (BS 4142) to determine the significance of sound impact from sources of industrial and/or commercial nature. The sources that the revised standard is intended to assess are sound from industrial and manufacturing processes, sound from fixed plant installations, sound from loading and unloading of goods at industrial and/or commercial premises and the sound from mobile plant and vehicles, such as forklift, train or ship movements.

2.2 British Standard 8233:2014 (BS 8233)

Table 4 of BS 8233:2014 'Guidance on sound insulation and noise reduction in buildings' (BS 8233) recommends the following internal ambient noise levels for steady external noise which do not indicate any strong character. These are stated as based on existing WHO guidelines assuming normal diurnal fluctuations in external noise. See Table below.

Table 2 – External noise intrusion criteria

Room Type	07:00-23:00	23:00-07:00
Living Rooms	35 dB $L_{Aeq,16hour}$	-
Dining Room/areas	40 dB $L_{Aeq,16hour}$	-
Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

In addition to the L_{Aeq} limits given above, note 4 of BS 8233 states that “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”.

In determining the appropriate L_{AFmax} value to use, consideration has been given to The World Health Organisation's (WHO) Guidelines for Community Noise which suggests that “For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10–15 times per night”.

Note 7, Table 4 of BS 8233 states: “Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, internal target levels may be relaxed by up to 5 dB and reasonable internal noise levels still achieved”.

For outdoor areas (i.e. balconies), BS 8233 recommends that “it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ ” However, the document recognises that that these guideline values are not achievable in all circumstances and in higher noise areas a compromise might be warranted. In such circumstances, development should be designed to achieve the lowest practicable levels in these external amenity spaces.

2.3 ProPG: Planning & Noise (2017)

On 22nd June 2017, a professional practice guidance document (ProPG) was launched to provide practitioners with guidance on evaluating the potential impact of existing (predominantly transportation) noise on new residential development. This has been jointly produced by the Chartered Institute of Environmental Health (CIEH), Institute of Acoustics (IOA) and Association of Noise Consultants (ANC).

The primary goal of the ProPG is to assist in the delivery of sustainable development by promoting good health and well-being through the effective management of noise. Although it should be noted that under professional practice the guidance in ProPG does constitute national policy.

The ProPG recommends a 2-stage approach, an initial noise risk assessment of the proposed development and where the results indicate that noise requires further consideration a full assessment in the form of an Acoustic Design Statement (ADS) which would include four key elements as follows:

- Stage 1: An initial noise risk assessment of the proposed development site;
- Stage 2: A systematic consideration of four key elements

The advice contained within ProPG is based on the policy objectives contained within the NPPF and the objective noise guidelines within British Standard 8233:2014 '*Guidance on sound insulation and noise reduction for buildings*'.

Paragraph 1.3 of ProPG 2017 states:

"The scope of this ProPG is restricted to the consideration of new residential development that will be exposed predominantly to airborne noise from transport sources (noting that good professional practice should have regard to any reasonably foreseeable changes in existing and/or new sources of noise)," and also states:

"... detailed consideration of ... other sources of noise (such as dominant noise from industrial, commercial or entertainment premises) and of ground-borne noise and vibration, is outside the scope of this document."

This development will seek to utilise the same principles as ProPG in terms of many aspects of good design and practice and although the site itself is currently developed, ProPG can still be considered suitable as the site sits in close proximity to large greenfield out-of-town land for which this guidance is most applicable. Para 2.3.4 of Pro PG states:

Where the LPA accepts that there is a justification that the internal target noise levels can only be practically achieved with windows closed, which may be the case in urban areas and at sites adjacent to transportation noise sources, special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort without unduly compromising other aspects of the living environment. In such circumstances, internal noise levels can be assessed with windows closed but with any façade openings used to provide "whole dwelling ventilation" in accordance with Building Regulations Approved Document F (e.g. trickle ventilators) in the open position. (See supplementary Document 2) Furthermore in this scenario the internal L_{Aeq} target noise levels should not generally be exceeded.

2.4 Internal Sound Insulation Criteria

It is understood that the Local Authority have requested details on the method of controlling noise from the micro-pub to adjoining future apartments. The scheme will also as a minimum be required to meet the requirements of Approved Document E of the Building Regulations (ADE).

Approved Document E

The minimum Building Regulations requirements for impact and airborne sound insulation for apartments in buildings 'formed from material change of use' are shown in Table 3.

Pre-completion acoustic testing to 10% of party walls and floors of the development is required under the Building Regulations. At this stage we would also suggest allowance be made for testing of walls and floors directly adjacent the Public House. Testing should be undertaken according to the relevant parts of the BS EN ISO 140/BS EN ISO 16283 series and BS EN ISO 717.

Table 3 – Airborne and impact sound insulation between dwellings

	Airborne sound insulation $D_{nT,w} + C_{tr}$ dB (minimum)	Impact sound insulation $L'_{nT,w}$ dB (maximum)
Party Walls	43	-
Party Floors	43	64

*In line with ADE the above is taken to apply where there is not a common door (the corridor wall) as the effective performance of the wall will be limited and controlled by the door.

In addition to the above, under requirement E2 of ADE the internal walls and floors in apartments between a bedroom or a room containing a water closet, and other rooms must achieve a minimum laboratory acoustic rating of R_w 40 dB.

ADE states that requirement E2 does not apply to:

- a) An internal wall which contains a door;
- b) An internal wall which separates an en-suite toilet from the associated bedroom;
- c) Existing walls and floors in a building which is subject to a material change of use.

2.5 Residential to Commercial Interfaces

From review of the proposed floor plans it is understood that a party wall will be located between the Public House and Flat 1 at ground floor level, two flats at first floor level will also sit directly above the commercial area. SR have discussed proposed use of the Public House and understand the space will function as a traditional village pub operating between the hours of 11:00-23:00 hours. Amplified sound or live music will not be a feature.

Under typical licencing and function conditions noise levels within the micro-pub greater than 75 dB are highly unlikely.

Thus, to provide generally inaudible noise from operation of the pub in apartments the structure would need to be capable of controlling noise to a level significantly below background, ideally within the region of 10 dB. Assessment within is based on such an approach.

Assuming criteria within BS 8233 is proposed internally in apartments we propose a target noise level for noise from the pub of NR 15-20. Whilst there is no direct relationship between the NR and the $L_{Aeq,T}$, it roughly equates to $L_{Aeq} - 6$ dB.

2.6 British Standard 4142:2014 +A1:2019 (BS 4142)

In respect to atmospheric noise from building services plant, the assessment of fixed plant noise is principally undertaken in accordance with the methodology in BS 4142:2014+A1:2019 '*Methods for rating and assessing industrial and commercial sound*'. The scope of this standard states that it is suitable for the assessment of:

"a) sound from industrial and manufacturing processes;

b) sound from fixed installations which comprise mechanical and electrical plant and equipment;

c) sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and d) sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site."

The significance of sound impact is to be determined according, in summary, to the following process:

- i) Determine the typical background sound levels, in terms of the index L_{A90} , at the receptor locations of interest.
- ii) Determine the specific sound level of the source being assessed, in terms of its $L_{Aeq,T}$ level (T = 1 hour for day or 15 minutes for night), at the receptor location of interest.
- iii) Apply a rating level acoustic feature correction if the source sound has tonal, impulsive, intermittent, or other characteristics which attract attention.
- iv) Compare the rating sound level with the background sound level; the greater the difference between the two, the higher the likelihood of adverse impact.
- v) A difference (rating – background) of around +10 dB is an indication of significant adverse impact, depending on the context; a difference of around +5 dB is an indication of an adverse impact, depending on the context. 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 upon context.

BS 4142 introduces the concept of 'context' to the process of identifying noise impact. Section 11 of BS 4142 explains "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 (our emphasis). 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” (our emphasis).

There are many context points to consider when undertaking an assessment of sound impact including:

- The absolute level of sound;
- The character and level of the specific sound in the context of the existing noise climate; for example, is the sound to occur in a location already characterised by similar activities as those proposed?
- The sensitivity of the receptors;
- The time and duration that the specific sound is to occur;
- The conclusions of assessments undertaken using alternative assessment methods, for example WHO guideline noise values or change in noise level;

It is therefore entirely possible that whilst the numerical outcome of a BS 4142 assessment is indicative of adverse or significant adverse impact, when the proposal is considered in context the significance of the impact is reduced to an acceptable level.

2.7 Local Authority Requirements

There are currently no specific noise related requirements being enforced, in development of the scheme consideration should however be given to the various acoustic guidelines outlined above.

SR understands that the planning application is being prepared, consultation with the Local Authority has been made during this phase. The Local Authority have commented on the proposed building change of use as follows:

“A Noise Impact Assessment is required, to consider the impact of the retained micro public house use and proposed community building use on existing and proposed nearby dwellings”.

This following information looks to address the above concerns amongst other items.

3.0 Environmental Noise Survey

In order to assess noise impact from the community building and to assist in the design of the external building envelope, SR undertook unattended noise surveying at the site between Monday 22nd and Tuesday 23rd September, an attended survey was also carried between Monday 4th and Tuesday 5th October 2021. Measurements were taken with two Norsonic Type 1 sound level meters¹.

Irregular and uncharacteristic noise data was obtained during some periods of the unattended survey, attended surveying was therefore carried out on a follow up visit such that a subjective assessment of the existing climate could be made. Measurement was made towards the rear and within the existing carpark.

Weather conditions were dry with wind speeds typically less than 5 m/s during the measurement periods, and overall considered acceptable. The sound level meters were field checked for calibration before and after the measurement survey with no drift noted.

Measurement locations are shown in Figure 1, charted In Appendix A and summarised as follows:

- Location 1 (L1): An auto-logging measurement location was established towards the front of the car park, fixed on a pole at a height of approximately 1.5 metres.
- Location 2 (S1): The microphone was fixed to a tripod fixed at a height of approximately 1.5 metres in the middle of the existing hotel carpark, at a location where noise was considered representative of both existing and future properties.

Table 4: Measured noise levels summary

Location	Period	$L_{Aeq, T}$ dB	Representative Minimum L_{A90} dB	Typical Range L_{AFmax} dB
L1	Daytime 0700-2300hrs	56	$L_{A90, 5 \text{ mins}}$ 25	-
	Night-time 0700-2300hrs	52	$L_{A90, 5 \text{ mins}}$ 21	67 - 77
S1	Daytime 0700-2300hrs	53	$L_{A90, 5 \text{ mins}}$ 35	-
	Night-time 0700-2300hrs	41	$L_{A90, 5 \text{ mins}}$ 27	63 - 71

Noise data obtained during the unattended survey has been compared against data obtained during the attended survey. Only data representative of the existing site climate has been used in assessment.

Noise on the southern boundary of the site (overlooking Main Street) was considered a factor of vehicle movements along Main Street and in and around the village of Sutton Cheney. Noise during quieter periods was considered a factor of distant road traffic and wildlife, aircraft flyovers also occurred during the daytime. Using short term measured noise data, the front façade noise level has been predicted to be 59 dB L_{Aeq} (16 hour), reducing to 47 dB L_{Aeq} (8 hour) at night.

¹ All meters have a full traceable history and were calibrated before and after use showing no significant drift. Auto-logging measurements were taken in 5-minute sample periods.

Noise levels in the centre of the site and towards the rear were observed to have been contributed to by the same sources as described above, albeit at a lower level, dependant on distance attenuation and the degree to which buildings screened noise. Noise at an unscreened location was measured to be in the region of 53 dB L_{Aeq} (16 hour) during the day and 41 dB L_{Aeq} (8 hour) at night.

Figure 1 – Measurement locations



4.0 External building envelope

Based on the external noise environment measured during the survey and existing elevations indicating window areas within the main building which are to remain, the following recommendations are made ahead regarding the sound insulation of the building façade.

A strategy adopting ventilation through natural means is being considered, trickle ventilators are being proposed across the site to achieve minimum air flow requirements of Approved Document F. Consideration will also need to be given to the control of potential overheating and guidance in the Acoustics Ventilation and Overheating Residential Design Guide - January 2020 (version 1) (AVO guide)² has been reviewed.

Measured noise levels indicate all proposed dwellings will be subject to daytime and night-time noise levels that fall under the optional/low risk category for noise mitigation in the AVO guide, when dealing with overheating.

ProPG outlines the following:

"In addition to providing purge ventilation, open windows can also be used to mitigate overheating. Therefore, should the LPA accept a scheme is to be assessed with windows closed, but this scheme is reliant on open windows to mitigate overheating, it is also necessary to consider the potential noise impact during the overheating condition. In this case a more detailed assessment of the potential impact on occupants should be provided in the ADS [Acoustic Design Statement]. It should be noted that overheating issues will vary across the country and any specific design solutions will need to be developed alongside advice from energy consultants."

SR consider the use of open windows and doors to provide relief from overheating, and purge ventilation for the discharge of odours etc to likely be acceptable on this scheme.

- A thermal lining will be required to existing external façade elements, the lining combined with existing masonry has been assessed as providing a laboratory sound reduction of at least 44 dB ($R_w + C_{tr}$).
- Floor plans and elevation layout drawings have been used in assessment, should changes to the proposals be made the following minimum laboratory sound reduction requirements³ may need be applicable and further assessment is advised.

² Under Table 3.2 (Level 1 risk assessment) of the Acoustics Ventilation and Overheating Residential Design Guide - January 2020 (version 1)., the incident noise levels on the building would place some parts of the scheme in the medium to high category, where measures such as the MVHR system is a suitable mitigation approach.

³ Assuming the façade will feature an acoustic trickle/ wall ventilator, window sound insulation provided is inclusive of the ventilator and may need to be upgraded if the ventilator were to degrade its performance.

Front façade of existing to be retained building:

- Living Rooms - minimum 6mm secondary glazed pane (assumed >50mm void)
 - Minimum 6mm secondary glazed pane (assumed >50mm void)
 - Ventilators $\geq 31 \text{ dB } D_{n,e,w} + C_{tr}$
- Bedrooms
 - Minimum 6mm secondary glazed pane (assumed >50mm void)
 - Ventilators $\geq 37 \text{ dB } D_{n,e,w} + C_{tr}$

Other façades of retained building:

- Living Spaces and Bedrooms
 - Minimum 4mm secondary glazed pane (assumed >50mm void)
 - Ventilators $\geq 31 \text{ dB } D_{n,e,w} + C_{tr}$

Both shared and private outdoor amenity areas will be a feature of the proposed development, noise in such areas are predicted to be subject to noise levels less than 55 dB L_{Aeq} , and in most instances where screened from Main Street to levels less 50 dB L_{Aeq} , below the recommended guidance limits of BS 8233 and therefore considered to be a of a level that would be generally acoustically acceptable.

5.0 Internal Sound Insulation

5.1 Separating Party walls

To comply with the minimum requirements of ADE, all flanking elements will need to be adequately controlled and new build Party walls between dwellings of the existing building should be constructed from a partition capable of providing $R_w + C_{tr}$ 51 dB as a minimum. Details for new partitions can be developed further at a later date.

Where existing constructions will serve as Party Walls will need to be upgraded accordingly.

From site inspection and discussion it is understood that the structural boundary walls within the existing building are single skin masonry (thickness yet to be confirmed) but anticipated to be minimum 100mm. For compliance with ADE a minimum performance of $D_{nT,w} + C_{tr}$ 43 dB will be required, such performance could be met through installation of an independent wall lining to one-side comprising the following:

- 2no. 15mm acoustic plasterboard
- 25mm clearance to independent studwork fixed from floor to soffit, 25mm mineral wool insulation in void.
- Existing masonry (assumed minimum 100mm thick)

Implementation of the above construction with appropriate control of flanking elements is capable of providing a performance in excess of the Building Regulations by at least 5 dB, considering typical noise levels no more than L_{Aeq} 75 dB within the micro-pub, such performance would be deemed to reduce noise in adjacent dwellings to a satisfactory level.

With regard to flanking elements, the existing external envelope building envelope will likely need to feature an independent thermal lining such as BG Thermaline, an independent thermal lining (minimum 10mm clearance gap) around perimeter apartment walls will be appropriate for controlling sound flanking to meet the requirements above.

5.2 Corridor and communal walls

Walls separating apartments from corridors and stairwells etc are required to comply with requirement E1 of ADE as set out in Table 3, proposals for such walls can be developed during the detailed design stage.

5.3 Internal floor, walls and doors of dwellings

Internal walls and floors within dwellings under requirement E3 of ADE are generally required to achieve a laboratory sound reduction of minimum R_w 40 dB. This is considered to apply to all room envelopes including stairwells, storerooms etc. and bedrooms. Suitable specifications can be developed in due course.

Entrance doorsets (including frame, seals etc.) to apartments from common areas should be rated at R_w 29 dB minimum measured according to BS EN ISO 10140-2:2010 or equivalent previous standard and rated according to BS EN ISO 717-1:1997.

5.4 Separating Party Floors

The existing floors are to be retained where practical, the exact build-up is currently unknown. Existing sound insulation (see 5.6) was measured in the building to the rear which is understood from inspection to be similar build-up to the main building. Acoustic upgrades will be required regardless. Specific details will be developed in due course and will be dependent on existing constructions and available space. For the floor to provide adequate acoustic separation for meeting ADE and controlling noise transfer from the micro-pub to acceptable levels, either of the following will be required.

- New flooring. SR advise installation of Collecta Screedboard 28 or equivalent
- Existing floorboards or replacement i.e. 12mm T&G chipboard
- Existing timber joists (depth unknown assumed to be approximately 180mm) to be retained and/or replaced (the void should be filled with 50mm mineral wool insulation)

Existing ceiling to be replaced as follows:

- 25mm clearance to new independent timber ceiling joists with 100mm mineral wool insulation
- 2no. 15mm acoustic plasterboard
- Floor void between existing floor boards/replacement floor and plasterboard ceiling to be in excess of 250mm

Or,

- 3no. 15mm acoustic plasterboard fixed to existing joists on acoustic hangers with 100mm mineral wool insulation in the void.
- Floor void between existing floor boards/replacement floor and plasterboard ceiling to be in excess of 200mm

Either installation is capable of achieving an enhancement on the performance requirements of ADE by 5 dB and would therefore be considered to be acceptable for controlling noise from the micro-pub to dwellings proposed above to acceptable levels.

The density/thickness of board linings could be reduced in other areas where compliance with ADE only is to be targeted, alternatively, acoustic hangers for fixing plasterboard on a suspended grid could potentially be omitted in these areas.

5.5 Impact Control

Installation of a composite floor deck such as Collecta Screedboard plus new ceilings constructed from one of the build-ups identified above will provide sufficient control of impact noise within the development.

5.6 In-Situ Acoustic Testing

A visit to site to undertake acoustic testing and inspection of the existing in-situ constructions was carried out on 20th September. Due to the current layouts and open staircases, limited area for suitable acoustic testing was made available at the time.

A sound insulation test of the existing floor was undertaken however towards the rear of the property, the test was carried to provide confidence in our assumptions of the existing structure, which is understood to feature timber joists (approx. 180mm) with a gypsum ceiling below and original floorboards above.

The existing structure was found to achieve $D_{nT,w} + C_{tr}$ 38 dB, a performance similar to that which would be achieved from a single joist floor with no resilience. Thus, through installation of additional mass and resilience a significant improvement on that currently existing can be realised.

6.0 Noise Impact Assessment

6.1 Community Building

A new standalone community centre is also proposed as part of the works, the building is to be located on green space to the north east of the existing car park and will serve as a daytime resting place for people walking the Bosworth 1485 trail. The building will feature a small community indoor area with patio doors to an open terrace, a kitchenette, storage and toilet. Noise from occupants is likely to be minimal however to ensure a robust assessment, noise from gathering outside on the patio during warm days has been considered.

The location of the community centre relative to the existing and proposed future dwellings is shown in Figure 2 below.

Figure 2 – Site plan showing community building



Based on experience and SR internal measurement data for similar sources, a free field noise level of 65 L_{Aeq} dB has been applied within the patio of the community building. Noise at the nearest affected property identified as the proposed house (number 5) to the north is predicted to be in the region of 35 L_{Aeq} dB. Accounting for existing background noise levels, the cumulative noise level in the garden of House 5 is predicted, summarised in Table 5.

Table 5: Community Building Noise Impact

Receptor	Community Operational Noise $L_{Aeq,T}$ dB	Cumulative Noise Level $L_{Aeq,T}$ dB	Change dB	NPPG Impact
Garden of House 5	35	53	0	No measures required

The predicted level is significantly below the lowest BS 8233 recommended guidance of 50 dB L_{Aeq} for outdoor living, the level predicted is also significantly lower than the measured existing background L_{Aeq} noise level. In view of the above SR anticipate noise arising from use of the proposed community building to be negligible.

6.2 Fixed Building Services Plant

Noise from fixed buildings services plant should be considered to lower noise impact at existing properties, existing background noise levels were measured to be of a low level. Whilst the latest version of BS 4142 doesn't make comment on very low measurements, a previous version BS 4142:1997 does. The standard states 'background noise levels below about 30 dB and rating levels below about 35 dB are considered to be very low.

In view of this, SR recommend cumulative plant noise rating limits that must not be exceeded when assessed in accordance with BS 4142 in Table 6, the limits given are applicable at the windows of the nearest noise sensitive residential receptors (NSR's).

Table 6: Measured minimum background noise levels and plant noise limits

Receptor	Period	Cumulative plant noise limit rating dB
1m from windows of nearest existing properties	Daytime 0700-2300hrs	35
	Night time 0700-2300hrs	35

7.0 Conclusions

- 7.1 Sharps Redmore have undertaken an acoustic planning assessment of the proposed redevelopment of the Royal Arms Hotel, Nuneaton.
- 7.2 The report addresses noise incident on the site against relevant acoustic standards, the potential for noise transfer from the repurposed public house and the noise impact from operation of both the community building and any fixed building services plant associated with the new scheme.
- 7.3 Based on the noise survey undertaken, primarily measuring road traffic around the site which was the dominant source, consideration has been given to noise and its impact on future inhabitants. Operational noise from the development is also considered and the following key items have been recommended/concluded.
- Ventilation provided through natural means would be a suitable strategy assuming windows and ventilators capable of meeting the sound insulation performances given within areas installed. Such specifications are considered to be capable of limiting noise intrusion to levels that would be in line with relevant standards and guidelines.
 - The use of open windows is a suitable strategy acoustically to provide purge ventilation and combat overheating should an assessment indicate a need for greater air changes than those provided by background ventilation.
 - Noise limits are proposed for any atmospheric plant emissions, to identified noise sensitive receivers in the vicinity, in line with BS 4142:2014 national guidance.
- 7.4 Sound insulation between the retained and rebranded public house and new residential units is required to meet Building Regulations Part E as a minimum irrespective of planning requirements. A higher performance is however recommended for this interface to assist in controlling noise to levels that would avoid disturbance. SR have considered the existing separating structure and made recommendations for upgrades which could be implemented.
- 7.5 Noise at nearby dwellings, both existing and proposed, from use of the community building has been assessed and predicted to have negligible impact.
- 7.6 Overall the proposed development is considered acoustically acceptable whilst protecting the amenity of its residents and not introducing any significant adverse noise impacts to its neighbours.

APPENDIX A

NOISE SURVEY DATA

Figure A1: Auto-logger tabulated survey data, location L1.

20th to 21st September 2021

Time	L _{Aeq} dB	L _{Afmax} dB (Typical)	L _{A90} dB (Typical)
(2021/09/20 18:00:00.00)	60	76	33
(2021/09/20 19:00:00.00)	58	72	30
(2021/09/20 20:00:00.00)	57	72	31
(2021/09/20 21:00:00.00)	53	72	28
(2021/09/20 22:00:00.00)	49	66	25
(2021/09/20 23:00:00.00)	50	69	24
(2021/09/21 00:00:00.00)	45	37	20
(2021/09/21 00:00:00.00)	41	33	21
(2021/09/21 01:00:00.00)	45	57	21
(2021/09/21 02:00:00.00)	46	38	21
(2021/09/21 03:00:00.00)	48	52	23
(2021/09/21 04:00:00.00)	54	72	27
(2021/09/21 05:00:00.00)	59	75	34
(2021/09/21 06:00:00.00)	60	76	33

Figure A2: Attended tabulated survey data, location S1.

Daytime: 4th October 2021

Time	L _{Aeq} dB	L _{Afmax} dB	L _{A90} dB
(2021/10/04 14:30:00.00)	54	68	41
(2021/10/04 14:46:51.00)	51	66	38
(2021/10/04 15:22:47.00)	54	77	38
(2021/10/04 15:37:47.00)	54	70	37
(2021/10/04 15:52:47.00)	53	70	35
(2021/10/04 16:07:47.00)	54	70	36
(2021/10/04 16:23:49.00)	51	69	38
(2021/10/04 16:38:49.00)	53	70	39
(2021/10/04 16:54:26.00)	54	68	41

Night-time: 5th October 2021

Time	L _{Aeq} dB	L _{Afmax} dB	L _{A90} dB
(2021/10/05 03:29:12.00)	36	64	29
(2021/10/05 03:44:12.00)	39	63	28
(2021/10/05 03:59:13.00)	40	70	27
(2021/10/05 04:14:13.00)	44	71	27
(2021/10/05 04:29:13.00)	40	67	27
(2021/10/04 16:54:26.00)	36	64	29

APPENDIX B

ACOUSTIC TERMINOLOGY

Acoustic Terminology

B.1 These are the main noise indices in use in the UK:

dB(A): The human ear does not hear all frequencies with the same intensity. It is most sensitive to sounds in the 500 Hz-8 kHz range. Above and below this range the ear becomes progressively less sensitive. To compensate for this, sound level meters incorporate electronic filtering to correspond with the varying sensitivity of the ear. This filtering is called A-weighting and Sound Pressure Levels obtained with this weighting are referred to as A-weighted and signified as dB(A).

L_{A90} : The sound level (in dBA) exceeded for 90% of the time. This unit gives an indication of the sound level during the quieter periods of time in any given sample. It is used to describe the “background noise level” of an area.

$L_{Aeq, T}$: The equivalent continuous sound pressure level over a period of time, T; (in dBA). This unit may be described as “the notional steady noise level that would provide, over a period, the same energy as the varying noise in question”. In other words, the energy average level. This unit is now used to measure a wide variety of different types of noise of an industrial or commercial nature, as well as road traffic, aircraft and trains.

L_{A1} : The sound pressure level (in dBA) exceeded for 1% of the time. This unit can give an indication of a regular maximum noise level from such activities as dance music.

L_{Ae} : The sound exposure level, (previously denoted SEL) is the noise level of an event, such as a train or aircraft event, normally expressed in a 1 second time period.

L_{Amin} : The minimum sound pressure level (in dBA) measured over the time period.

L_{Amax} : The maximum level of sound (in dBA), i.e. the peak level of sound measured in any given period. This unit is used to measure and assess transient noises, i.e. gun shots, individual vehicles, etc.