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Acoustic Design Statement

Noise assessment of proposed House in Multiple Occupation at 3, Station Road, Stanley.

Report number 23-51-1005

Prepared for:

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Contents

1 Introduction

1.1.1 This report has been written by Mike Johnson of Northburn Acoustics who holds the following qualifications:

- MSc in Acoustics, vibration and noise control.
- BEng (hons) in Building Services Engineering.
- Corporate membership of the Institute of Acoustics.
- Corporate membership of the Chartered Institution of Building Services Engineers.
- Registered with the Engineering Council as a Chartered Engineer.

1.1.2 This report sets out the findings of a noise assessment at 3, Station Road, Stanley. The report is pursuant to the validation of a planning application to convert existing residential flats into a single house-in-Multiple-Occupation (HMO).

1.1.3 The brief for the report was as follows:

> *"Transfer between commercial and residential:*
>
> *Before any part of the development hereby approved is commenced a scheme of sound proofing measures shall be submitted to and approved in writing by the local planning authority. The aim of the scheme shall be to ensure that the noise insulation of walls, floors/ceilings between the adjoining premises shall be sufficient to prevent excessive ingress/egress of noise. The approved scheme shall be implemented prior to the beneficial occupation of the development and shall be permanently retained thereafter.*
>
> *As an advisory:*
>
> *Information on how to provide suitable acoustically attenuated ceilings and walls can be found within the Approved Document E- The Resistance to the Passage of Sound, web link= https://www.gov.uk/government/publications/resistance-to-sound-approved-document-e , whilst it should be noted that this document is not for commercial use it provides useful detail; when it comes to commercial adjoining residential use premises we would expect the requirements of Document E to be exceeded. Developers are advised to consult with Building Control prior to beginning the works, in order to ensure that they are satisfied with the approach.*
>
> *Traffic, although levels would assist with above:*
>
> *No residential development shall take place until a scheme of noise mitigation measures has been submitted to and approved in writing by the Local Planning Authority. The aim of the scheme shall be to protect future occupiers from road traffic/commercial noise and should ensure the following noise levels are achieved.*
>
> - *35dB LAeq 16hr bedrooms and living room during the day-time (0700 - 2300)*
> - *30 dB LAeq 8hr in all bedrooms during the night time (2300 - 0700)*

- *45 dB LAmax in bedrooms during the night-time*

The approved scheme shall be implemented prior to the beneficial occupation of the development and shall be permanently retained thereafter."

1.1.4 This report is based upon fieldwork at the site covering daytime and night-time noise measurements.

1.1.5 The following conclusions have been drawn from the noise assessment:

- The existing businesses at ground floor do not generate much noise. The sound insulation values given in table 0.1a of Approved Document E will be sufficient to mitigate sound transmission from ground floor to first floor.

- It is recommended that a sound insulation test be carried out between the ground floor and first floor to determine whether the separating floor requires an upgrade – this should be a building control issue and not a condition of planning.

- The glazing and ventilation elements described in chapter 6 will be sufficient to limit internal noise levels within habitable rooms to 35 dB L_{Aeq} during daytime (07:00-23:00), and 30 dB L_{Aeq}/45 dB L_{Amax} during night-time (23:00-07:00).

- If the above recommendations are implemented, there should be no reason to object to the proposal with regard to noise.

2 Site

2.1.1 The site is located at 3, Station Road, Stanley. It occupies the first and second floor of a three-storey terraced building.

2.1.2 The first and second floors currently have residential use classification as two individual dwellings.

2.1.3 The ground floor is currently occupied by an estate agent, and a beauty salon.

2.1.4 The proposal is to convert the first and second floors into an 11-bedroom HMO.

2.1.5 The site is subjected to noise from road traffic on Station Road.

2.1.6 A location plan is presented in Figure 1. Existing and proposed site plans are shown in Figure 2 and Figure 3 respectively.

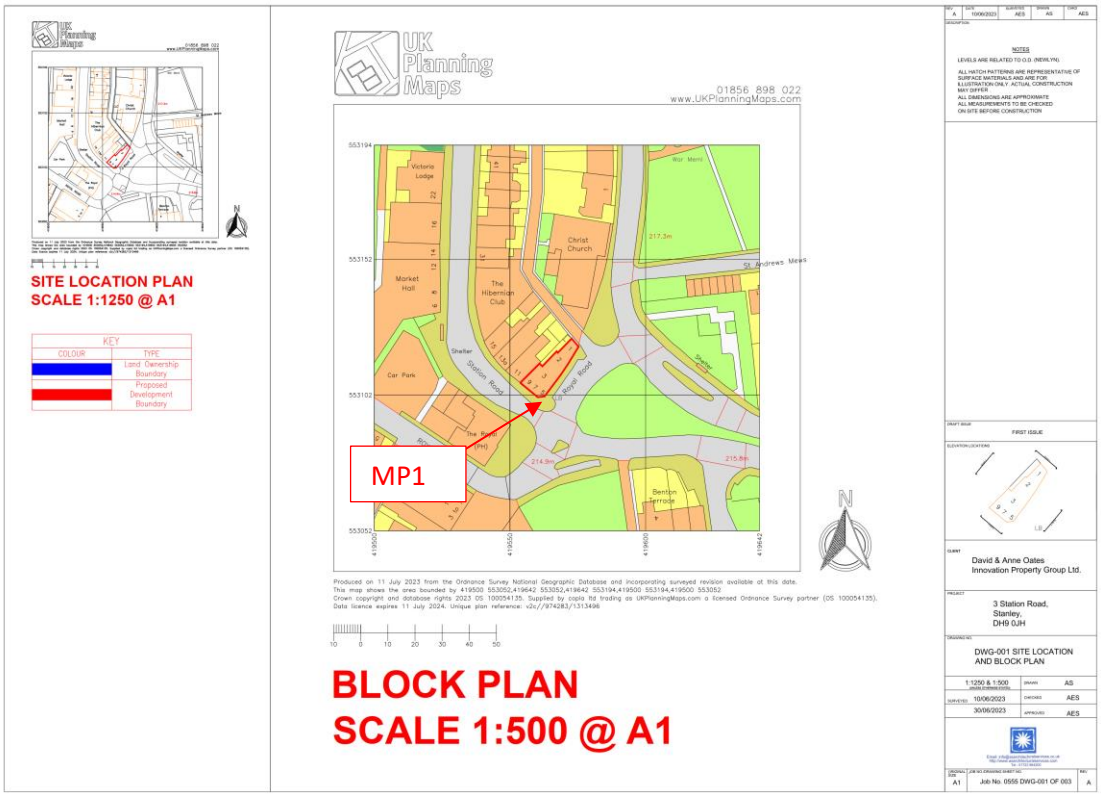


Figure 1: Existing site plan (after AS Architectural Services)

Figure 2: Existing floor plans and elevations (after AS Architectural Services)

Figure 3: Proposed floor plans and elevations (after AS Architectural Services)

3 Transfer between commercial and residential

3.1.1 Sound transmission to residential properties falls under Approved Document E (ADE) of the Building Regulations.

3.1.2 The requirements of ADE, as appropriate to this project are stated in requirement E1:

"E1. Dwelling-houses, flats and rooms for residential purposes shall be designed in such a way that they provide reasonable resistance to sound from other parts of the same building and from adjoining buildings."

3.1.3 This would normally be considered at the building control stage rather than planning. However, it is acknowledged that the planners may require assurance that the two adjoining uses are indeed compatible. This would be of particular importance in cases in which a potentially noisy use, such as a public house, is proposed to be adjacent to a noise sensitive use, such as a dwelling.

3.1.4 ADE does not specify minimum performance standards for separating elements, however, it is the view of the Secretary of State that requirement E1 would be satisfied if separating elements achieve a minimum of 43 dB $D_{nTw} + C_{tr}$ for airborne sound transmission, and a maximum value of 64 dB L'_{ntw} for impact sound transmission. These values apply only to the residential property and not the commercial property. Impact sound transmission applies only to the property below, which in this case is not residential. Therefore, there is no requirement to limit impact sound transmission to the ground floor use for this project.

3.1.5 The planners have stated that they would expect the requirements of ADE to be exceeded. This cannot be taken as a forgone conclusion because ADE states that the appropriate level of sound insulation will depend on the noise generated in the communal or non-domestic space. The document also states that specialist advice may be needed to establish if a higher standard of sound insulation is required, and if so, to determine the appropriate level.

3.1.6 The two ground-floor uses, estate agent and beauty salon, are not considered to be particularly noisy. In fact, they generally generate low levels of noise. This statement is made on the grounds that both businesses incorporate a degree of confidentiality – discussions are usually on a one-to-one basis, either on the telephone, or in person, and, in the case of the beauty salon, in private treatment rooms. There is an argument that the residential use is likely to generate more noise, given that widescreen televisions with surround sound and sub-woofers, and games consoles are the norm. On that basis, I would suggest that the residential-to-residential standards given in ADE are appropriate for this project, and that the expectations that ADE requirements be exceeded are not justified for this project.

3.1.7 The separating floor between the ground floor and first floor may, or may not, require an upgrade to bring it in line with ADE standards. The upgrade, if required, is not particularly onerous at all and can be achieved by either a suspended ceiling or a floating floor, as described in section 4 of ADE.

3.1.8 I would recommend that a sound insulation test be carried out across the separating floor to determine whether an upgrade is required or not. This is not a planning issue but should be carried out before the construction work commences.

4 Road traffic noise

4.1.1 The EHO has stated the maximum interal noise levels that would be permitted within rooms. These are:

35 dB $L_{Aeq,16hr}$ in bedrooms and living rooms during the daytime (0700 - 2300);

30 dB $L_{Aeq,8hr}$ in all bedrooms during the night-time (2300 – 0700);

45 dB L_{Amax} in bedrooms during the night-time.

4.1.2 The above sound levels are aligned with BS8233, the WHO, and Professional Practice (ProPG) guidelines.

4.1.3 ProPG suggests that a two-stage sequential approach be applied to assist the local authority in determining planning applications. The first stage is an initial noise risk assessment of the development site to determine whether it falls into a negligible, low, medium, or high-risk category. The criteria for stage 1, is given in Appendix A.

4.1.4 The second stage is undertaken if the site falls in the low, medium, or high-risk categories. It comprises the systematic consideration of four key elements in parallel:

Element 1 - demonstrating a “Good Acoustic Design Process”.
Element 2 - observing internal “Noise Level Guidelines”.
Element 3 - undertaking an “External Amenity Area Noise Assessment”.
Element 4 - consideration of “Other Relevant Issues”.

4.1.5 The “Good Acoustic Design Process” ranks certain noise management measures in a descending order of preference, as listed in Table 1.

	Noise management measure
i	Maximise the spatial separation of noise source(s) and receptor(s)
ii	Investigating the necessity and feasibility of reducing existing noise levels and relocating existing noise sources.
iii	Using existing topography and existing structures (that are likely to last the expected life of the noise-sensitive scheme) to screen the proposed development site from significant sources of noise.
iv	Incorporating noise barriers as part of the scheme to screen the proposed development site from significant sources of noise.
v	Using the layout of the scheme to reduce noise propagation across the site.
vi	Using the orientation of buildings to reduce the noise exposure of noise-sensitive rooms.
vii	Using the building envelope to mitigate noise to acceptable levels.

Table 1: The good acoustic design process

4.1.6 In an ideal world everyone would be able to sleep with their windows open. In the real world, however, it is often necessary to locate dwellings in close proximity to noise sources. This very fact can often mean that desirable/reasonable internal conditions cannot be achieved when windows are open. However, sound insulation by means of closed windows and an alternative means of ventilation is a legitimate means of noise mitigation, which can be used if there is no alternative.

4.1.7 The use of an alternative means of ventilation is fully supported by both Planning Practice Guidance and BS8233:2014.

5 Stage 1 - noise survey

5.1.1 This assessment has been based upon measured noise data at MP1 as indicated in Figure 1 (see page 6).

5.1.2 Daytime measurements were taken on 9th October, 2023.

5.1.3 Night-time measurements were taken on 17th October, 2023.

5.1.4 A Svantek 959 type-1 sound analyser (fitted with a one-third octave filter set), serial number 11261, was used on each occasion.

5.1.5 Measurement data is summarised in Table 2.

		Overall		
Location	Time of day	$L_{A,eq}$ (dB)	$L_{A,max}$ dB	Risk category
MP1	Day (0700-2300)	65	-	Medium
	Night (2300-0700)	57	79	Medium

Table 2: Summary of noise measurements

6 Stage 2 – Assessment

6.1.1 According to ProPG, a stage 2 assessment should be carried out if the stage 1 assessment indicates that a low, medium, or high risk exists.

6.1.2 The site falls within the medium risk category for both daytime and night-time.

6.1.3 The elements that are part of the stage 2 assessment have been considered in descending order.

6.2 Element 1 – Demonstrating a good acoustic design process.

6.2.1 Noise management measures in line with the acoustic design process are presented in Table 3.

	Noise management measure	Comment
i	Maximise the spatial separation of noise source(s) and receptor(s)	Not feasible – the building and roads already exist.
ii	Investigating the necessity and feasibility of reducing existing noise levels and relocating existing noise sources.	Not feasible – applicant has no control over the road.
iii	Using existing topography and existing structures (that are likely to last the expected life of the noise-sensitive scheme) to screen the proposed development site from significant sources of noise.	Not feasible.
iv	Incorporating noise barriers as part of the scheme to screen the proposed development site from significant sources of noise.	Not feasible.
v	Using the layout of the scheme to reduce noise propagation across the site.	Not feasible.
vi	Using the orientation of buildings to reduce the noise exposure of noise-sensitive rooms.	Not Feasible.
vii	Using the building envelope to mitigate noise to acceptable levels.	This option is feasible and should be applied as necessary. This is discussed hereafter.

Table 3: Noise management measures

6.3 Element 2 - Observing internal "Noise Level Guidelines".

6.3.1 The building façade has been assessed with reference to the maximum internal sound levels set by the planners.

6.3.2 In simplistic terms, an indication of the sound insulation value of the external façade can be estimated by subtracting the desired internal level from the external levels. The indicative minimum façade insulation is presented in Table 4.

Location	Time of day	External	Internal target	Sound insulation required ($R_w + C_{tr}$)	Glazing must be selected to provide	Suitable glazing options
MP1	Daytime $L_{Aeq,16\text{-}hour}$ dB(A)	65 dB	35 dB	30 dB	30 dB $R_w + C_{tr}$	4/20/6 or Secondary glazing
	Night-time $L_{Aeq,8\text{-}hour}$ dB(A)	57 dB	30 dB	27 dB		
	Night-time $L_{Amax,8\text{-}hour}$ dB(A)	79 dB	45 dB	34 dB	34 dB R_w	

Table 4: Indicative minimum façade sound insulation requirements

6.3.3 The internal target levels would not be achievable when windows are open. This is because open windows will only provide 15 dB of attenuation.

Therefore, an alternative means of ventilation is required. The ventilation path should be chosen such that the D_{new} value is 10 dB higher than the $R_w + C_{tr}$ value of the glazing.

6.3.4 The options for ventilation include attenuated passive wall vents, such as Ryton AAC125HP, or mechanical ventilation with heat recovery (MVHR).

6.3.5 An MVHR system works by extracting warm air from rooms through a heat exchanger, and then ducting to the outside. Fresh air from outside is drawn in through the heat exchanger; it is then ducted throughout the dwelling encouraging positive air circulation. Energy is transferred between the inlet and exhaust ducts via the heat exchanger. It is recommended that such systems should be selected such that the self-noise and the noise from the outside will not exceed NR25 in any of the habitable rooms.

6.4 Comments on ventilation strategy

6.4.1 Paragraph 2.72(g) of Professional Practice Guidance on Planning and Noise (ProPG) states:

"*Where the LPA accepts that there is a justification that the internal L_{Aeq} target noise levels can only be practically achieved with windows closed, and provided care has been taken to design the accommodation so that it provides good living conditions (in respect of acoustics, ventilation and thermal comfort), then internal noise levels can be assessed with windows closed. In this scenario any system used to provide 'whole dwelling ventilation' (e.g. trickle ventilators) should be in the open position and the internal target noise levels should not generally be exceeded. It should also be noted that the internal noise level guidelines are generally not applicable when windows are open solely to provide purge ventilation as this should only occur occasionally.*"

6.4.2 This view is supported by paragraph 8.4.5.4 of BS8233:2014 which states:

"The Building Regulations supporting documents on ventilation [48, 49, 50] recommend that habitable rooms in dwellings have background ventilation. Where openable windows cannot be relied upon for this ventilation, trickle vents can be used and sound attenuating types are available. However, windows may remain openable for rapid or purge ventilation, or at the occupants choice."

6.5 Notes on overheating

6.5.1 The subject of overheating is complex and should ultimately be addressed by a specialist. It can be challenging to mitigate against because comfort is subjective.

6.5.2 However, I recently attended a webinar on this subject, which was hosted by the Institute of Acoustics.

It was stated that:

- Comfort is subjective;
- In most cases overheating is avoidable with good design;

- For living rooms, kitchens and bedrooms: the number of hours during which ΔT is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3 per cent of occupied hours. (CIBSE TM52 Criterion 1: Hours of exceedance).
- For bedrooms only: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26 °C for more than 1% of annual hours. (Note: 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32 hours, so 33 or more hours above 26 °C will be recorded as a fail).

6.5.3 It was also stated that the heat within a building is a function of:

- Site context, i.e. proximity to other buildings which is especially prevalent in cities, which can be 8°C warmer than in towns and villages;
- External temperatures;
- Internal gains, i.e. cooking, hot water storage, lighting (LED v halogen), etc;
- Building design, i.e. thermal insulation;
- Solar gains.

6.5.4 It was also stated that, in designing for the future, a cooling hierarchy should be followed in descending order of preference:

- Minimise internal heat gain, i.e. avoid hot water storage and halogen lighting;
- Reduce the amount of heat entering a building through orientation, shading, albedo, fenestration, insulation, etc.
- Manage the heat within a building through exposed thermal mass and high ceilings;
- Natural ventilation;
- MVHR;
- Air conditioning.

6.5.5 Combi-boilers would avoid hot water storage.

6.5.6 The use of LED lighting would minimise internal heat gains.

6.5.7 The northern elevation will benefit from the solar shading effect of the building itself, and, as such, will not be subjected to direct solar heating.

6.5.8 Further reductions in solar gains could be achieved using solar reflecting glass, and/or external solar shading, such as vertical fins on the southern elevation.

6.5.9 All recommendations in this report are limited to the acoustic performance only, and do not address the suitability of any vent for ventilation purposes.

6.6 Element 3 – undertaking "External Amenity Area Noise Assessment"

6.6.1 Element 3 is not relevant as there are no external amenity areas.

6.7 Element 4 – Consideration of "Other Relevant Issues".

6.7.1 I am not aware of any other relevant issues.

7 Conclusions

The following conclusions have been drawn from the noise assessment:

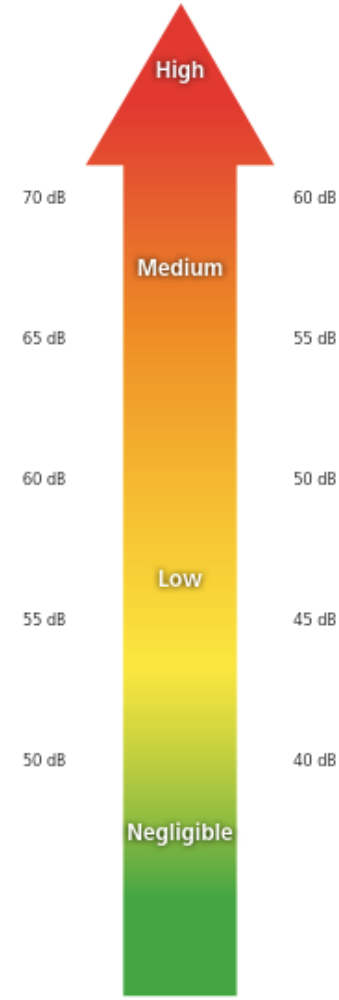
- The existing businesses at ground floor do not generate much noise. The sound insulation values given in table 0.1a of Approved Document E will be sufficient to mitigate sound transmission from ground floor to first floor.

- It is recommended that a sound insulation test be carried out between the ground floor and first floor to determine whether the separating floor requires an upgrade – this should be a building control issue and not a condition of planning.

- The glazing and ventilation elements described in chapter 6 will be sufficient to limit internal noise levels within habitable rooms to 35 dB L_{Aeq} during daytime (07:00-23:00), and 30 dB L_{Aeq}/45 dB L_{Amax} during night-time (23:00-07:00).

- If the above recommendations are implemented, there should be no reason to object to the proposal with regard to noise.

Appendix A – Stage 1 assessment criteria



NOISE RISK ASSESSMENT	POTENTIAL EFFECT WITHOUT NOISE MITIGATION	PRE-PLANNING APPLICATION ADVICE
Indicative Daytime Noise Levels $L_{Aeq,16hr}$ / Indicative Night-time Noise Levels $L_{Aeq,8hr}$	Increasing risk of adverse effect	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice. As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development. At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.
	No adverse effect	These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.

Figure 1 Notes:

a. Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.

b. Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is "not dominant".

c. $L_{Aeq,16hr}$ is for daytime 0700 – 2300, $L_{Aeq,8hr}$ is for night-time 2300 – 0700.

d. An indication that there may be more than 10 noise events at night (2300 – 0700) with $L_{Amax,F}$ > 60 dB means the site should not be regarded as negligible risk.

Appendix B – Glossary of acoustic terms

Sound Pressure Level (L_p)

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 µPa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$L_p = 20 \log10(p/p_0)$

Where Lp = sound pressure level in dB; p = rms sound pressure in Pa; and p_0 = reference sound pressure (20 µPa).

A-weighting Network

A frequency filtering system, which approximates the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$

The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T, has the same mean-square sound pressure as a sound that varies with time.

$L_{AN, T}$

The A-weighted sound pressure level in decibels exceeded for N% of the measurement period, T.

$L_{AF\ max}$

The maximum A-weighted noise level recorded during the measurement period. The subscript ‘F’ denotes fast time weighting, slow time weighting ‘S’ is also used.

Background noise level $L_{A90, T}$

The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T. L_{A90} is typically taken as representative of background noise.

Specific noise level $L_{Aeq, Tr}$

The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.

Rating level $L_{Ar, Tr}$

The specific noise level plus any adjustment for the characteristic features of the noise