



**Environmental noise assessment for a proposed
re-development at 15 Sheep Market, Spalding,
Lincolnshire**

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SUMMARY

An environmental noise assessment has been carried out associated with the proposed residential conversion of the first and second floors of 15 Sheep Market, Spalding. The ground floor is also proposed to be changed from vacant building society offices to a restaurant and takeaway, which will include the installation of an extraction flue system to the rear of the building. The assessment has been carried out on behalf of Mr Peter Leo. The assessment was carried out in accordance with the ProPG Planning and Noise Guidance, the National Planning Policy Framework (NPPF) and other relevant noise standards and guidance.

It includes long term unattended noise monitoring, internal noise level predictions, assessment of the results and consideration of noise mitigation measures, where required.

The NPPF assessment carried out shows that with the proposed control measures in place, the noise impact on the proposed residential rooms is likely to be at the “Lowest Observed Adverse Effect Level”. Should the mitigation measures recommended within this report be adopted, then an acceptable noise situation should occur for future occupants of the proposed dwellings.

The ProPG initial noise risk assessment for the site shows that noise emissions incident on the proposed building are likely to be indicative of a “*Low - Medium Risk*” during the daytime period and a “*Medium Risk*” during the night-time period. Implementation of a good acoustic design process has therefore been considered to demonstrate that an acceptable noise situation can occur for the future residents of the proposed dwellings.

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1 OBJECTIVES

- 1.1** To carry out an environmental noise assessment at 15 Sheep Market, Spalding, associated with the proposed residential conversion of the first and second floors and the ground floor change of use from vacant building society offices to a restaurant and takeaway, which will include the installation of an extraction flue system to the rear of the building. The assessment is in accordance with the ProPG Planning and Noise Guidance (ProPG – Reference 7), the National Planning Policy Framework (NPPF – Reference 1) the Noise Policy Statement for England (NPSE – Reference 2), the National Policy Planning Guidance (NPPG - Reference 3), the World Health Organisation Guidance (WHO – Reference 5), British Standard (BS) 8233 (Reference 6) and British Standard 4142 (Reference 8).
- 1.2** To recommend solutions to any problems identified by the assessment.

2 CONCLUSIONS

- 2.1** Using terminology from the ProPG, noise levels across the site are likely to be indicative of a “*Low - Medium Risk*” during the daytime period and a “*Medium Risk*” during the night-time period. A good acoustic design process and methods for installing noise mitigation measures are therefore recommended and considered as part of this assessment.
- 2.2** Acceptable noise levels at or below the threshold for “*speech intelligibility and moderate annoyance, daytime and evening*” given in the WHO guidelines and reiterated in BS 8233 and the ProPG guidance limits can be achieved inside living rooms and bedrooms provided recommendations within this report are implemented.
- 2.3** Acceptable noise levels below the threshold for “*sleep disturbance, night-time*” given in the WHO guidelines and reiterated in BS 8233 and the ProPG guidance limits can be achieved inside bedrooms provided recommendations within this report are implemented.
- 2.4** The assessment of noise emissions from the proposed new extraction flue system to the rear of the building, in accordance with BS 4142 shows that noise emissions from the proposed plant are likely to result in a “low impact” when assessed at the nearest noise sensitive location (outside the bedroom of the proposed second floor flat. This is usually regarded as an acceptable noise situation.
- 2.5** Using the noise impact criteria from the Noise Policy Statement for England and the National Policy Planning Guidance, the assessment carried out shows that with the proposed mitigation measures installed, the noise impact on the proposed development is likely to be at the “Lowest Observed Adverse Effect Level”, this is deemed to be an acceptable noise situation.

3 RECOMMENDATIONS

- 3.1** This report should be used in support of the Planning Application for the proposed residential conversion of the first and second floors and the ground floor change of use from vacant

building society offices to a restaurant and takeaway at 15 Sheep Market, Spalding, which will include the installation of an extraction flue system to the rear of the building.

3.2 The following noise mitigation measures are required for the proposed development:

- The existing glazing that is currently installed on the first and second floors is unlikely to achieve acceptable internal noise levels within the proposed living rooms and bedrooms. Double glazed windows, fitted with compression seals should be fitted which achieve a minimum R_w value of 40 dB.
- Internal noise levels within the proposed living areas and the bedroom are likely to be excessive if windows are opened. Alternative methods for ventilating the dwellings must therefore be installed. It is recommended that a Type 1, 3 or 4 ventilation system (as described within Document F and the AVOG Guidance – References 4 and 9) is installed to serve all proposed habitable rooms.
- If a Type 1 or 3 ventilation system is chosen then any trickle vents fitted within the rooms must achieve a minimum $D_{n,e,w}$ value of 42 dB (when in the open position). An example of a product that achieves this minimum acoustic specification is the Greenwood 2500EAW.AC1 acoustic trickle vent (with one acoustic module).
- The separating party floor between the proposed new first floor and second floor apartments should be designed so that it achieves the airborne and impact sound insulation values for a converted dwelling, as specified within Document 'E' of the Building Regulations (Reference 10). The client will be required to demonstrate that this has been achieved by undertaking pre-completion sound insulation testing.
- Document E requirements may be insufficient for some situations, e.g. for a separating floor between the ground floor restaurant and the first floor flat above. For this situation BS 8233, Section 7.5 provides guidance and based on the assumption that the privacy requirement is 'Confidential', source room activity is 'High', and the receiving room sensitivity is 'Sensitive', this means that the minimum sound insulation criteria should be designed to meet a minimum sound insulation level ($D_{nT,w}$) of 52 dB.

If the client requires acoustic design advice to meet the sound insulation values specified in either BS 8233 or Document E of the Building Regulations, then additional work could be undertaken by Acoustic Associates at the detailed design stage, to specify the required floor construction and the construction of any flanking wall elements to meet Building Control requirements. This may require diagnostic testing of the existing floor to be undertaken to see if upgrades are required.

- Any fan unit installed as part of the extraction system serving the proposed ground floor restaurant / takeaway, should be limited to a maximum discharge side Sound Power Level (L_{WA}) of 68 dB(A). An acoustic attenuator should also be installed within the proposed discharge side ducting and must achieve the minimum insertion loss levels specified in Figure 5 of this report.

4 **BACKGROUND**

Mr Peter Leo has applied for planning permission for the proposed re-development of 15 Sheep Market, Spalding. The applicant has proposed the residential conversion of the first and second floors and the ground floor change of use from vacant building society offices to a restaurant and takeaway, which will include the installation of an extraction flue system to the rear of the building. Road traffic from the surrounding road network is the dominant noise source across the proposed site. The local planning authority have requested that an environmental noise assessment be carried out to assess the noise impact on the proposed development. Acoustic Associates (Peterborough) were asked to undertake the assessment and this report documents the findings. The location of the site is shown in Figure 1 and the existing and proposed floorplans are shown in Figures 2 and 3 respectively.

5 **POLICY, GUIDANCE AND STANDARDS**

5.1 **National Planning Policy Framework (NPPF – Reference 1)**

5.1.1 The NPPF states that planning policies and decisions should prevent

¹ “....new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of noise pollution”

5.1.2 It states further:-

²“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 ³adverse 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.....

5.2 **Noise Policy Statement for England (NPSE – Reference 2) and National Planning Policy Guidance (NPPG – Reference 3)**

The NPSE has stated that the impact of noise be classified according to an “effect level” (shown in column 3 below). The NPPG has clarified what this effect level below means in terms of its

¹ Para 180 – item e)

² Para 191

³ It refers to the Noise Policy Statement for England in order to explain what it means by “adverse impact” (see section 5.2).

perception by people at receptors and what action should be taken (columns 1 and 4 in Table 1 below).

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in 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. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
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 change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 1 – NPPG noise exposure hierarchy

5.3 World Health Organisation Guidance

5.3.1 The World Health Organisation (WHO) has published guidelines for community noise, as shown in Table 2 (Reference 5). This WHO document gives guidance for the levels of noise both inside and outside of dwellings.

Specific Environment	Critical Health Effect(s)	L _{Aeq} (dB)	Time Base (hours)	L _{Amax, fast} (dB)
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-time	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

Note: The 'daytime' and 'night-time' periods are generally referred to as 0700 to 2300 and 2300 to 0700 hours respectively.

Table 2 - World Health Organisation Noise Guidance Levels

5.3.2 For impulsive noise, such as that associated with rail movements, WHO states *"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"*.

5.4 British Standard (BS) 8233:2014

BS 8233:2014 (Reference 6) also gives guidance on indoor ambient noise levels, as shown in Table 3.

Activity	Location	Noise criteria	
		07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB L _{Aeq,16hour}	-
Dining	Dining room/area	40 dB L _{Aeq,16hour}	-
Sleeping	Bedroom	35 dB L _{Aeq,16hour}	30 dB L _{Aeq,8hour}

Table 3 - BS 8233: 2014 guidance indoor ambient noise levels for dwellings.

5.5 ProPG: Professional Practice Guidance on Planning & Noise (Reference 7)

This document was produced by noise professionals to offer them guidance on noise management within the planning system in England. It recommends a 2-stage approach to managing for noise:

5.5.1 ProPG: Stage 1 – Initial Site Noise Risk Assessment

5.5.1.1 The aim of this stage is to provide an indication of the likely risk of adverse effects due to noise from developing a site. Using measurement and/or prediction, indicative future noise levels on a site are estimated.

5.5.1.2 The following excerpt shows the potential effect associated with likely site noise levels for daytime and night-time.

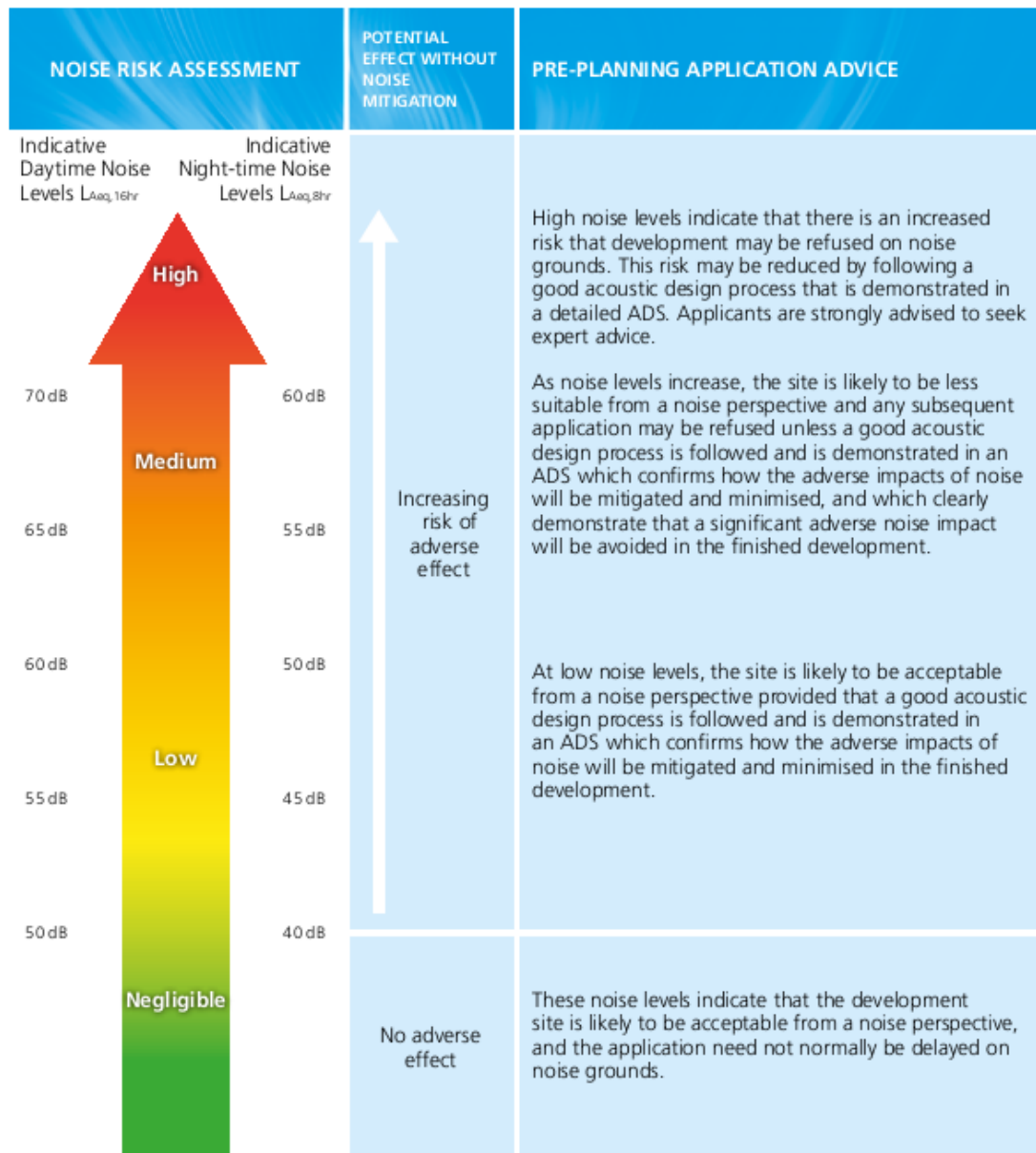


Figure 1 Notes:

- Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.
- 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".
- $L_{Aeq,16hr}$ is for daytime 0700 – 2300, $L_{Aeq,8hr}$ is for night-time 2300 – 0700.
- 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.

Figure 1. Stage 1– Initial Site Noise Risk Assessment

5.5.1.3 It must be noted that the initial assessment of noise risk is not the basis for the eventual recommendation of approval. Its aim is to give an early assessment of site suitability for residential development and the extent of the acoustic issues to be faced. The higher the risk the more important it is that good acoustic design is followed for the development.

5.5.2 ProPG: Stage 2 – Full Assessment

There are 4 stages to a full assessment and these are briefly described below.

5.5.2.1 Element 1 - Good Acoustic Design Process

Provide an integrated solution whereby development avoids “unreasonable” and prevents “unacceptable” acoustic conditions. In particular the following should be considered: -

- Check the feasibility of relocating or reducing noise levels from relevant sources.
- Consider options for planning the site or building layout.
- Consider the orientation of proposed building(s).
- Select construction types and methods for meeting building performance requirements.
- Examine the effects of noise control measures on ventilation, fire regulation, health and safety, cost, CDM (construction, design and management) etc.
- Assess the viability of alternative solutions.
- Assess external amenity area noise.

5.5.2.2 Element 2 – Internal noise level Guidelines

Seek to achieve recommended noise levels inside noise sensitive rooms in new residential development. The following excerpt from the document shows the recommended internal noise levels that should ideally be achieved.

Activity	Location	Noise criteria	
		07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room / area	40 dB $L_{Aeq,16hour}$	-
Sleeping	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$ 45 dB $L_{Amax,F}$

Table 4 – ProPG Internal Noise Level Guidelines

Note 1: Figure 2 - Note 4 in ProPG states that in most circumstances the maximum noise level $L_{Amax,F}$ should not exceed 10 times per night.

Note 2: Section 2.3.3 of ProPG states the following with respect to the reduction of noise due to the building envelope *“the acoustic performance of the building envelope will be reduced in the event windows are opened for ventilation or cooling purposes, typically reducing the insulation to no more than 10 to 15 dB(A)”*.

Note 7: *Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5 dB, the more that most people are likely to regard them as “unreasonable”. Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has*

been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as “unacceptable” by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing “unacceptable” noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form.

5.5.2.3 Element 3 – External Amenity Area Noise Assessment

The acoustic environment of external amenity areas that are an intrinsic part of the overall design assessment should always be assessed and noise levels should ideally not be above the range 50-55 dB $L_{Aeq,16hours}$. However the following follow-up advice should be noted

“In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.”

5.5.2.4 Element 4 – Assessment of Other Relevant Issues

At this stage the following should be addressed:

- compliance with relevant national and local policy
- magnitude and extent of compliance with ProPG
- likely occupants of the development
- acoustic design v unintended adverse consequences
- acoustic design v wider planning objectives

5.6 Acoustics, Ventilation and Overheating Guidance (AVOG – Reference 10)

Acoustics design considerations for dwellings may impact on the ventilation and thermal comfort of the inhabitants e.g., closing windows to prevent noise ingress may mean that alternative means are needed to provide fresh air to inhabitants and to prevent overheating. The AVOG design guide details good practice to achieve satisfactory thermal and acoustic comfort for residents. It currently addresses noise from transport sources.

In summary an assessment for a dwelling will consist of the following:

- 5.6.1** Based on the estimates of noise levels at the façades, advise on glazing specifications to achieve suitable internal noise levels;

5.6.2 Advise the design team on the options for a ventilation strategy team (System 1,2,3 or 4 from Document F of the Building Regulations);

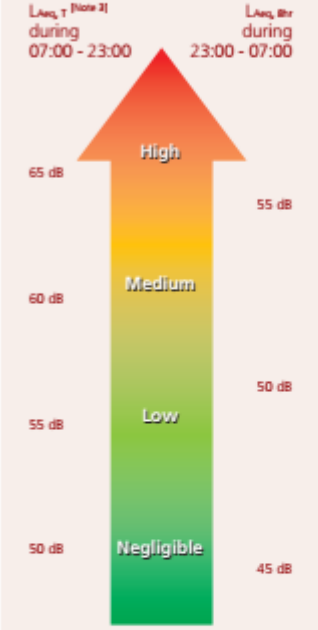
5.6.3 Assess the effects of the ventilation strategy chosen and advise accordingly to prevent noise ingress. This advice could be on measures allowing natural (windows vents or open windows) or other methods such as mechanical ventilation. The following table from AVOG is useful in guiding a design choice for ventilation for outline planning permissions.

Table B-3 Summary of potential noise issues associated with ventilation strategies described in ADF

ADF System	External noise ingress considerations	Mechanical system noise considerations	Approximate guideline free-field external noise limits. ^[Note 1]
1 or 2	Noise ingress is likely to be defined by the performance of the background ventilators (trickle vents), windows and other façade elements. Note that use of System 1, relying on the use of open trickle vents without opening windows may give rise to poor indoor air quality in airtight dwellings outside the winter period.	For System 1, intermittent kitchen and bathroom fans should have suitable noise levels to meet the guidelines in Table 3-4. System 2 has no mechanical components.	With standard double glazing and two trickle vents: • ~ $L_{Aeq,16h}$ 56 dB day • ~ $L_{Aeq,8h}$ 51 dB night • L_{AFmax} not normally exceeding ~ 67 dB more than 10x per night With high performing acoustic glazing and two 'acoustic' trickle vents: • ~ $L_{Aeq,16h}$ 66 dB day • ~ $L_{Aeq,8h}$ 61 dB night • L_{AFmax} not normally exceeding ~ 80 dB more than 10x per night
3	Noise ingress is likely to be defined by the performance of the background ventilators (trickle vents), windows and other façade elements. ADF advises that: <i>"controllable background ventilators having a minimum equivalent area of 2,500 mm² should be fitted in each room, except wet rooms..."</i>	This could be a centralised or decentralised MEV system. Guideline levels are shown in Table 3-4. For a centralised system, the location of the fan is important for structure-borne and airborne noise. System noise may affect living rooms and bedrooms as well as the rooms in which the extract inlets are located i.e. wet rooms. For a decentralised system, there are individual fans extracting from each bathroom, toilet, kitchen and utility room. The noise effects on adjacent living rooms and bedrooms should be considered. ^[Note 2]	With standard double glazing and trickle vent: • ~ $L_{Aeq,16h}$ 58 dB day • ~ $L_{Aeq,8h}$ 53 dB night • L_{AFmax} not normally exceeding ~ 69 dB more than 10x per night With high performing acoustic glazing and an 'acoustic' trickle vent: • ~ $L_{Aeq,16h}$ 68 dB day • ~ $L_{Aeq,8h}$ 63 dB night • L_{AFmax} not normally exceeding ~ 83 dB more than 10x per night
4	No trickle vents required. Consider noise ingress through other façade elements.	MVHR is a centralised system ducted to supply outlets in living rooms and bedrooms as well as to extracts in wet rooms. Guideline levels are shown in Table 3-4. The unit location is important for structure-borne and airborne noise. Consider ducted noise, particularly to bedrooms. Consider also cross-talk sound transmission via ducts. ^[Note 2]	With standard double glazing and no trickle vent: • ~ $L_{Aeq,16h}$ 62 dB day • ~ $L_{Aeq,8h}$ 57 dB night • L_{AFmax} not normally exceeding ~ 76 dB more than 10x per night With high performing acoustic glazing: • ~ $L_{Aeq,16h}$ 73 dB day • ~ $L_{Aeq,8h}$ 68 dB night • L_{AFmax} not normally exceeding ~ 90 dB more than 10x per night N.B. With secondary glazing higher sound insulation may be achieved.

- 5.6.4** Assess the risk of overheating based on input from thermal modelling in a 2-stage assessment. Stage 1 determines whether open windows will suffice to mitigate against overheating. If so, there is no further assessment required for overheating as open windows will suffice;

Table 3-2 Guidance for Level 1 site risk assessment of noise from transport noise sources ^[Note 1] relating to overheating condition

Risk category for Level 1 assessment ^[Note 5]	Potential Effect without Mitigation	Recommendation for Level 2 assessment
	Increasing risk of adverse effect	Recommended Optional
	Use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect	Not required

- Note 1** The noise levels suggested assume a steady road traffic noise source but may be adapted for other types of transport. All levels are external free-field noise levels.
- Note 2** The values presented in this table should not be regarded as fixed thresholds and reference can also be made to relevant dose-response relationships, ^[15, 17].
- Note 3** A decision must be made regarding the appropriate averaging period to use. The averaging period should reflect the nature of the noise source, the occupancy profile and times at which overheating might be likely to occur. Further guidance can be found within the 2014 IEMA Guidelines ^[29].
- Note 4** Refer also to references ^[1, 17, 18, 22] for further guidance regarding individual noise events. Where 78dB LAFmax is normally exceeded during the night-time period (23:00-07:00), a Level 2 assessment is recommended.
- Note 5** The risk of an adverse effect occurring will also depend on how frequently and for what duration the overheating condition occurs. Refer to Figure 3-2.
- Note 6** To evaluate the risk category for a dwelling, all three aspects of external noise exposure (i.e. daytime, night-time and individual noise events) should be evaluated. The highest risk category for any of the three aspects applies.

- 5.6.5** If a Stage 2 assessment is required, then, with input from the design team, advise on measures to achieve acceptable noise levels while preventing overheating could be offered.

5.7 British Standard BS 4142:2014+A1:2019

- 5.7.1 BS 4142 (Reference 8) is a standard which describes a method for assessing whether the 'specific noise' from an industrial source is likely to give rise to complaints from residents of the adjacent dwellings. The 'specific noise' levels are determined outside dwellings. The specific noise level is determined for reference time periods of 1-hour for the daytime (7am to 11pm)

and 15 minutes for the night time. Tonal or impulsive characteristics of a noise are likely to increase the scope for complaints and this is taken into account by adding a value to the specific noise source level to obtain the 'rating level'. The value may be between 0 and 15 dB depending on objective and subjective measures detailed in the standard. The following table detail the values added for the subjective method (which is the method used for this assessment).

Characteristics of noise	Noise at receptor	Value to add to specific noise level for rating level
Noise has tonal characteristics	Just perceptible	+2 dB
	Clearly perceptible	+4 dB
	Highly perceptible	+6 dB
Noise has impulsive characteristics	Just perceptible	+3 dB
	Clearly perceptible	+6 dB
	Highly perceptible	+9 dB
Other – characteristics that are neither tonal nor impulsive but are readily distinctive against the residual acoustic environment	-	+ 3 dB
Intermittency	If intermittency is readily distinctive in the residual acoustic environment	+3 dB

Table 5 – BS 4142 – Corrections to noise to calculate rating level – subjective method

5.7.2 BS 4142 requires that the rating Level of a noise is compared with the existing background noise ($L_{A90,T}$). Guidance given in the standard states the following regarding the difference between the rating Level and the background noise.

- A difference of 0 dB is indicative of a “*minor impact*”;
- A difference of +5 dB is indicative of an “*adverse impact*”;
- A difference of +10 dB is indicative of a “*significant adverse impact*”.

5.8 Criteria for this assessment

ProPG Stage 1 guidance has been used to carry out an initial noise risk assessment. The assessment then uses ProPG Stage 2 guidance to carry out a systematic approach taking account of the four key elements given in the guidance. ProPG, BS 8233 and WHO Guidance are used to assess noise inside the proposed habitable rooms of the dwellings. BS 4142 has been used to assess the potential noise impact of the new extraction system to the rear of the

building. The overall noise impact with mitigation measures in place is classified according to criteria given in the NPSE and NPPG.

6 NOISE ASSESSMENT

6.1 Ambient and Background Noise

Noise monitoring equipment was setup on the site inside the existing building, with microphone's protruding through partially open second floor windows to the front and rear of the building. Monitoring Location A was positioned at the front of the building on the second floor and Monitoring Location B was positioned at the rear of the building also on the second floor. Noise was continuously monitored between 09:45 hours on Wednesday 3rd January 2024 until 09:45 hours on Tuesday 9th January 2024. When setting up the monitoring equipment road traffic noise was clearly audible outside both the front and rear façades, however across road from the site (off Station Road), it was noted that construction works on a construction site were dominant at times with the regular use of heavy construction equipment (such as breakers). When analysing the long-term monitoring data at Monitoring Locations A and B, it is clear that construction noise will have affected the daytime ambient noise levels measured on Wednesday – Friday (3rd – 5th January 2024) and also on the Monday (8th January 2024). No construction activity was witnessed on the Tuesday morning (9th January 2024), and it is apparent from the noise monitoring results that construction works were not taking place during the weekend (6th – 7th January 2024). Weather conditions during the monitoring period were mostly dry, cloudy with some light rain showers at times, temperature ranged between 1 – 8°C, with typical wind speeds of ≤ 5 m/s mostly from the south-west. The monitoring locations are shown in Figure 1 and photographs of the monitoring locations are shown in Figure 4. The noise instrumentation used is detailed in Appendix 2 and the noise monitoring results are documented in graphical form in Appendix 3.

6.2 Specific Noise

The site is currently affected by noise emissions from the following noise source:

- Road traffic noise (dominant noise source)

Measurements taken on site at Monitoring Locations A and B have been used to determine noise emissions associated with road traffic noise emissions.

There is also potential for noise emissions from the proposed new extraction system (serving the restaurant / takeaway). This noise source has been assessed separately to BS 4142 in Section 7.3.4 of this report.

7 RESULTS

7.1 Measured noise levels

The results from the unattended noise measurements at Monitoring Locations A and B are shown graphically in Appendix 3. A summary of the measured data is also presented in Tables 6 and 7. The measurements were undertaken between 3rd – 9th January 2024. The measurement interval period was 15 minutes. The tables show the 'energy average' noise levels ($L_{Aeq,T}$), 10th highest $L_{Amax,15min}$ value (night-time period only) and background noise levels ($L_{A90,15mins}$).

Start Period	End of Period	Ambient noise level $L_{Aeq,T}$ dB(A)	10 th highest maximum noise level ($L_{Amax,15mins}$) dB(A)	Background noise level $L_{A90,15mins}$ dB(A)
Wednesday 3 rd January 09:30 hours	Wednesday 3 rd January 23:00 hours	65	-	37.0 – 62.1
Wednesday 3 rd January 23:00 hours	Thursday 4 th January 07:00 hours	59.6	69.6	31.7 – 48.5
Thursday 4 th January 07:00 hours	Thursday 4 th January 23:00 hours	63.4	-	44.6 – 58.9
Thursday 4 th January 23:00 hours	Friday 5 th January 07:00 hours	55.3	71.8	39.3 – 48.9
Friday 5 th January 07:00 hours	Friday 5 th January 23:00 hours	64.6	-	38.2 – 61.2
Friday 5 th January 23:00 hours	Saturday 6 th January 07:00 hours	55.1	70.1	35.4 – 46.1
Saturday 6 th January 07:00 hours	Saturday 6 th January 23:00 hours	60.5	-	39.7 – 59.3
Saturday 6 th January 23:00 hours	Sunday 7 th January 07:00 hours	58.7	70.4	36.2 – 49.5
Sunday 7 th January 07:00 hours	Sunday 7 th January 23:00 hours	59.6	-	37.6 – 54.5
Sunday 7 th January 23:00 hours	Monday 8 th January 07:00 hours	58.6	69.0	33.2 – 55.2
Monday 8 th January 07:00 hours	Monday 8 th January 23:00 hours	63.5	-	41.4 – 58.3
Monday 8 th January 23:00 hours	Tuesday 9 th January 07:00 hours	58.9	68.4	37.7 – 49.1
Tuesday 9 th January 07:00 hours	Tuesday 9 th January 09:45 hours	63.2	-	49.5 – 55.8

Table 6 – Summary of long-term unattended noise monitoring at Monitoring Location A

Start Period	End of Period	Ambient noise level $L_{Aeq,T}$ dB(A)	10 th highest maximum noise level ($L_{Amax,15mins}$) dB(A)	Background noise level $L_{A90,15mins}$ dB(A)
Wednesday 3 rd January 10:00 hours	Wednesday 3 rd January 23:00 hours	57.4	-	39.1 – 54.2
Wednesday 3 rd January 23:00 hours	Thursday 4 th January 07:00 hours	44.5	56.2	38.0 – 44.5
Thursday 4 th January 07:00 hours	Thursday 4 th January 23:00 hours	57.6	-	44.2 – 48.2
Thursday 4 th January 23:00 hours	Friday 5 th January 07:00 hours	47.2	58.2	42.2 – 47.5
Friday 5 th January 07:00 hours	Friday 5 th January 23:00 hours	60.4	-	42.0 – 52.2
Friday 5 th January 23:00 hours	Saturday 6 th January 07:00 hours	45.7	61.1	40.6 – 44.1
Saturday 6 th January 07:00 hours	Saturday 6 th January 23:00 hours	50.9	-	43.2 – 50.2
Saturday 6 th January 23:00 hours	Sunday 7 th January 07:00 hours	46	57.5	40.7 – 45.3
Sunday 7 th January 07:00 hours	Sunday 7 th January 23:00 hours	49.4	-	39.3 – 49.6
Sunday 7 th January 23:00 hours	Monday 8 th January 07:00 hours	45.1	56.3	38.5 – 46.5
Monday 8 th January 07:00 hours	Monday 8 th January 23:00 hours	60.6	-	43.2 – 52.6
Monday 8 th January 23:00 hours	Tuesday 9 th January 07:00 hours	46	57.6	41.1 – 47.5
Tuesday 9 th January 07:00 hours	Tuesday 9 th January 10:00 hours	51.5	-	47.7 – 50.5

Table 7 – Summary of long-term unattended noise monitoring at Monitoring Location B

7.2 ProPG Stage 1 – Initial noise risk assessment

Based upon the noise monitoring undertaken on site, noise emissions incident on the proposed building are likely to be indicative of a “*Low - Medium Risk*” during the daytime period and a “*Medium Risk*” during the night-time period. Implementation of a good acoustic design process has therefore been considered to demonstrate that an acceptable noise situation can occur for the future residents of the proposed dwellings.

7.3 ProPG Stage 2 – Full assessment of the four key elements

7.3.1 Element 1 – Good acoustic design process

The following measures should be considered to protect residential amenity inside and outside dwellings:

Orientation of buildings and outdoor amenity areas

The proposal does not feature any outdoor amenity areas therefore this does not need to be considered as part of this assessment.

Orientation of rooms within buildings

The orientation of rooms within the building was determined prior to Acoustic Associates involvement in the project, however due to the constraints of the site and the building being a converted property it is not feasible to orientate all habitable rooms (bedrooms and living rooms) on the quieter rear façade. It is therefore important to ensure that the acoustic performance of the façade elements are designed so that acceptable internal noise levels can be achieved inside all living rooms during the daytime and inside bedrooms during both the daytime and night-time periods. This has been assessed in Section 7.3.2.

7.3.2 Element 2 – Internal noise level guidelines

Based upon the noise monitoring undertaken on site, daytime and night-time noise levels that will be incident on the worst affected façade of the proposed residential dwellings (facing Sheep Market) have been predicted. For the purposes of this assessment daytime periods when construction activity was taken place at a nearby site (off Station Road), during the daytime of 3rd – 5th and 8th January 2024 have been excluded from the calculations. The worst-case measured daytime and night-time ambient noise levels have then been used to predict incident façade levels of 63.2 dB(A) during the daytime period and 59.6 dB(A) during the night-time period.

Table 8 summarises these predictions. Also included in the table are predicted internal noise levels within the worst affected living area and bedroom, allowing for an assumed 15 dB(A) reduction for a partially open window.

Assessment Location (see Figure 3)	Predicted Noise Level Incident on the Building Façade dB(A)		Predicted Internal Noise Level with a Partially Open Window dB(A)		Compliance with ProPG / WHO / BS 8233 Guidance
	Daytime	Night-Time	Daytime	Night-Time	
Second Floor – Proposed Living / Kitchen / Dining Room	63	-	48	-	NO
First Floor – Proposed Bedroom	63	60	48	45	NO

Table 8 – Internal noise level predictions with a partially opened window

Ventilation and glazing

Site layouts should be designed so that the internal target ambient noise levels can be achieved with open windows in as many properties as possible to demonstrate good acoustic design.

Where it is not possible to achieve reasonable internal noise levels with open windows (which is

the case with the living areas and bedrooms on the proposed site), then alternative means for suitably ventilating properties will be required.

The WHO gives guidance on indoor noise levels above which critical health effects occur: 35 dB(A) – speech intelligibility disturbance and 30 dB(A) – sleep disturbance. ProPG and BS 8233 also imply that an internal night-time level of <30 dB(A) is suitable for bedrooms and an internal daytime level of <35 dB(A) is suitable for living rooms and bedrooms.

Noise can enter a building through many paths, e.g: windows, walls, roof, etc. However, in most cases windows and vents provide the main path and it is important to ensure that their insulation is specified correctly. Table 9 shows the predicted internal noise levels within the proposed living rooms and bedrooms. The predicted internal noise levels are based upon the assumption that the existing glazing will be replaced, and new windows will be fitted that must achieve a minimum R_w value of 40 dB and will typically be in the closed position. Alternative ventilation arrangements will be required, as detailed within the reports recommendations. Room volumes and glazed areas have been calculated based on the proposed floorplans. For the purposes of this assessment two acoustic trickle vents, which achieve the minimum acoustic specification detailed in Section 3.2 (when in the open position), have been assumed to provide background ventilation to each living area and bedroom. The reverberation time in both the living areas and bedrooms has been assumed to be 0.5 seconds.

Assessment Location (see Figure 3)	Predicted Noise Level Incident on the Building Façade dB(A)		Predicted Internal Noise Level with Reports Recommendations Implemented dB(A)		Compliance with ProPG / WHO / BS 8233 Guidance
	Daytime	Night-Time	Daytime	Night-Time	
Second Floor – Proposed Living / Kitchen / Dining Room	63	-	28	-	YES
First Floor – Proposed Bedroom	63	60	31	29	YES

Table 9 – Predicted Internal noise levels (with proposed glazing / ventilation Installed and windows in the closed position with trickle vents open)

It can be seen that with the proposed upgraded windows in the closed position and with the recommended ventilation system (see Section 3.2) installed and serving the living areas and each bedroom, the development should meet the ProPG, WHO and BS 8233 internal noise criteria. This is deemed to be an acceptable noise situation. Any ventilation system installed should comply with the Approved Document F (Reference 4).

Assessment of the Maximum Noise Levels

An assessment of the maximum noise levels during the night-time period has been carried out for the worst affected bedroom (First Floor – Bedroom (see Figure 3)). The results in Table 9 indicate that within the worst affected bedroom during the night-time period, the proposed façade insulation should reduce noise emissions from 60 dB(A) outside the window to a level of 29 dB(A) within the room, which equates to a reduction of 31 dB(A).

It can be seen in Table 6 that the 10th highest $L_{Amax,15mins}$ value during the night-time periods assessed ranged from 68 – 72 dB(A) on the worst affected façade (overlooking Sheep Market). Therefore, with the proposed façade insulation installed it is anticipated that the 10th highest $L_{Amax,T}$ values will be reduced to approximately 37 – 41 dB(A) within the worst affected bedroom. This is deemed to be an acceptable noise situation as it achieves the ProPG and WHO criteria.

7.3.3 Element 3 – External amenity area noise assessment

Protection of outdoor amenity areas

The proposal does not feature any outdoor amenity areas therefore this does not need to be considered as part of this assessment.

7.3.4 Element 4 – Assessment of Other Relevant Issues

British Standard (BS) 4142 Assessment

The proposed installation of an extraction flue system to the rear of the building (serving the proposed new ground floor restaurant and takeaway) has the potential to generate noise emissions of an industrial / commercial nature and therefore the impact of this new noise source needs to be assessed in accordance with British Standard (BS) 4142. As the proposed extraction plant will be used during daytime hours only (07:00 – 23:00 hours), a night-time assessment is not required.

The client has not yet selected a make or model for the extraction system that is to be installed, however they have informed Acoustic Associates that any system installed is likely to be identical to a system installed at a different premises they own at 35 Broadway Peterborough. As part of the application for the Peterborough site the applicant proposed a system with a fan unit that generates a discharge Sound Power Level (L_{WA}) of 68 dB(A) (Exoflue Flueboost 350 centrifugal fan) and they also proposed the installation of an acoustic attenuator, to be installed within the discharge ductwork (Model:CP01-M35-120). Details of these units have been shown in Figure 5 of this report. As part of the previous application the applicant's acoustician calculated that with the proposed fan and discharge attenuator fitted, the Sound Pressure Level (L_{PA}) at a distance of 2m from the flue discharge point would be approximately 31 dB(A) (see Figure 6).

The proposed discharge point of the flue at the Sheep Market site is reported to be approximately 1m above the guttering level on the rear of the building (northern façade) and will therefore be at least 2m from the nearest bedroom window of the proposed second floor residential property. For the purposes of the BS 4142 assessment, the specific sound level from the proposed extraction system has been assumed to be 31 dB(A) at the residential façade.

The BS 4142 Assessment also requires a typical daytime background sound level to be determined. From the analysis of the long-term monitoring data at Monitoring Locations A and B the daytime modal background sound levels ($L_{A90,15mins}$) were 53 and 49 dB(A) respectively.

For the purposes of the BS 4142 Assessment the lowest modal daytime background sound levels of 49 dB(A) has been used to represent a worst-case scenario.

The daytime BS 4142 Assessment has been undertaken below in Table 10.

Stage	Daytime Assessment at Rear Building Facade	Comments
Specific sound level $L_{Aeq,T}$ dB(A)	31	Predicted sound pressure level at 2m from the flue discharge point, assuming a fan unit with a discharge Sound Power Level (L_{WA}) of 68 dB(A) with a discharge acoustic attenuator installed (see Section 7.3.4 and Figures 5 and 6).
Penalty dB	+5	The plant could potentially feature tonality that is just perceptible (+2dB) and the use of the equipment could be intermittent (noticeable on and off conditions) (+3dB)
Rating sound level dB(A) $L_{AR,TR}$	36	Specific sound level + penalty
Assumed background sound level L_{A90} dB(A)	49	See section 7.3.4 and Appendix 3
Excess of "Rating" Level over background	-13 dB	See section 5.7.2
BS 4142 Assessment	<i>Low Impact</i>	See section 5.7.2
Assessment when taking account of context	-	The assessment assumes that the new extraction plant will be operating continuously throughout the sites daytime operating times. Other existing plant, (inverter and air conditioning units) already serve nearby buildings, therefore the proposed extraction system will not be out of character from the existing residual noise environment.
Uncertainty of the assessment	-	The background sound measurements were undertaken over a number of days. The lowest modal daytime background sound value ($L_{A90,15minutes}$) from Monitoring Locations A and B has been used. Based upon the above the uncertainty of the assessment is low.

Table 10 – Daytime BS 4142 Assessment Outside Proposed Second Floor Rear Bedroom

It can be seen from the assessment above that the impact of sound emissions from the new extraction system is likely to be at a level where a “low impact” is likely to occur in accordance with BS 4142. This is deemed to be an acceptable noise situation.

Noise Policy Statement for England and National Planning Policy Guidance Assessment

Using the noise impact criteria from the Noise Policy Statement for England (NPSE) and the NPPG the assessment carried out shows that, the noise impact on the proposed residential dwellings is likely to be at a level where a “Lowest Observed Adverse Effect” could occur. Provided the recommended noise mitigation measures are installed, then this is deemed to be an acceptable noise situation.

There are no other relevant issues likely to affect this assessment as detailed in Element 4 of the ProPG Stage 2 Assessment.

7.4 ProPG Stage 2 – Recommendation to the decision maker

It is recommended that the mitigation measures proposed within the recommendations section of this report are implemented as part of the development and the recommendation to the decision maker is that Planning Permission should be awarded, subject to conditions corresponding with the recommendations in Section 3 of this report.

8 UNCERTAINTIES

The main uncertainties relating to assessments of this type relate to:

- Measured noise levels used
- Sources of noise that have been assumed

Uncertainties relating to the daytime and night-time measured noise levels are deemed to be low, due to measurements being undertaken over numerous daytime and night-time periods.

However, a number of the daytime readings had to be excluded due to construction noise contributions from a nearby construction site (off Station Road).

The dominant noise source is road traffic, and the measured values show consistent noise levels from road traffic over a long-term monitoring period (even when excluding the daytime periods when construction noise was significant).

Manufacturers data for the proposed extraction system and the proposed discharge acoustic silencer have been used to inform the predictions of industrial / commercial noise emissions from the site. If an alternative extraction system is used then its discharge Sound Power Level (L_{WA}) should not exceed 68 dB(A) and the insertion loss values for any alternative discharge acoustic attenuator installed should meet the minimum values specified in Figure 5.

REFERENCES

1. *Ministry of Housing, Communities and Local Government. National Policy Planning Framework ;, 2021.*
2. *Noise Policy Statement for England; DEFRA, 2010.*
3. *DEFRA. National Policy Planning Guidance (revised 2019).*
4. *Document F Ventilation Regulations; thenbs, 2010.*
5. *World Health Organisation Guidance, Guidelines for Community Noise; WHO, 1999.*
6. *British Standard BS 8233, Guidance on sound insulation and noise reduction for buildings; BSI, 2014.*
7. *ProPG working group. ProPG: Planning & Noise: Professional Practice Guidance on Planning & Noise: New Residential Development;;, 2017.*
8. *British Standard BS 4142:2014+A1:2019, Methods of rating and assessing industrial and commercial sound; BSI, 2014, amended 2019.*
9. *ANC + IOA. Acoustics Ventilation and Overheating Guide V1.1;;, 2020.*
10. *HM Government. Approved Document E: Resistance to the passage of sound. The Building Regulations 2010 (2003 edition incorporating 2004, 2010, 2013 & 2015 amendments), ISBN 978 1 85 946 616 2;;, 2010.*
11. *Sharman Architecture Pre Planning Application Document at 15 Sheepmarket, Spalding, Lincolnshire, PE11 1BE for Mr Peter Leo, dated 30th November 2023*

Appendix 1 – Glossary of terms

Sound Pressure	The variation of ambient pressure that is detected by the ear as sound.
Noise	Unwanted sound
decibel (dB)	Ten times the logarithm of the square of the ratio of the Sound Pressure to a reference pressure (20 micro-Pascal's).
Sound Pressure Level (L_p)	The decibel version of the Sound Pressure.
A-Weighting	A frequency weighting which simulates the response of the ear. An A-Weighted Sound Pressure Level is denoted by L _{pA} and has units of dB(A)
L_{Aeq,T}	The value of the A-weighted sound pressure level, in decibels [dB(A)], of a continuous steady sound that within a specified time interval (T), for example 16 hours, has the same mean-square sound pressure as a sound that varies with time. Therefore, the average over a 16 hour period would be denoted as L _{Aeq,16h}
L_{Amax,T}	The maximum A-Weighted sound pressure level that was encountered during the measurement period.
L_{A90,T}	The A-Weighted sound pressure level that is exceeded for 90% of the time (T). This is usually used a measure of background noise.
Free Field	Where noise can propagate freely without any reflections from buildings etc.
Octave Band	A band of frequencies the upper limit of which is twice the lower limit. They are known by their centre frequency, e.g., 63, 125, 250, 500, 1000, 2000
NPSE Criteria	
NOEL	No Observed Effect Level
LOAEL	Lowest Observed Adverse Effect Level
SOAEL	Significant Observed Adverse Effect Level

BS 4142 Terms

T_r	The reference time interval over which an equivalent continuous A-weighted sound pressure is determined. Day time = 1 hour Night-time = 15 minutes
T_m	The measurement time interval over which measurements are taken.
Ambient Noise	Total sound in a given situation at a given time.
Residual Noise	The ambient noise remaining at a given position in a given situation when the specific noise is suppressed to a degree such that it does not contribute to the ambient noise.
Specific Noise Level Rating Level L_{Ar,T_r}	The dB L_{Aeq,T_r} of the noise sources being assessed at a site. The specific noise level plus any correction for the character of the noise, known as the Rating Level.
Assessment Level	Difference between Rating Level ($L_{Ar,T}$) and Background Noise ($L_{A90,T}$)
Sound Power Level (L_{WA})	The noise level from the source in terms of sound power, in dB(A).

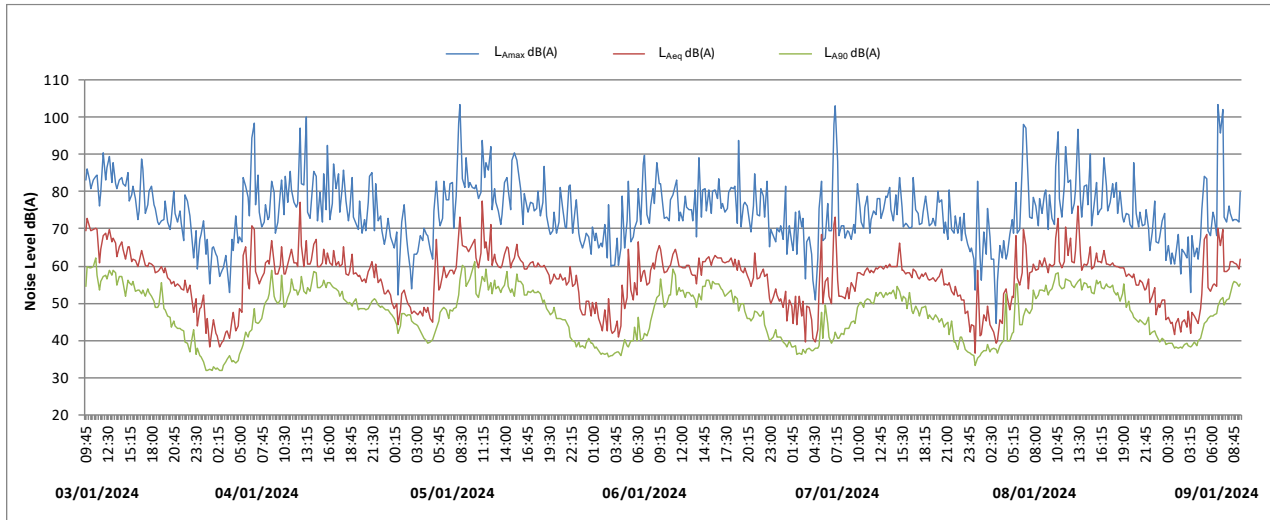
Appendix 2 – Noise instrumentation

Type	Manufacturer	Description	Serial Number	Last Calibration Date	Calibration Certificate No.
957	Svantek	Sound level meter	27591	12/09/2022	1132547
820	Larson Davis	Sound level meter	1013	23/06/2022	1129260
4230	Brueel & Kjaer	Sound level calibrator	781674	08/03/2023	1141312

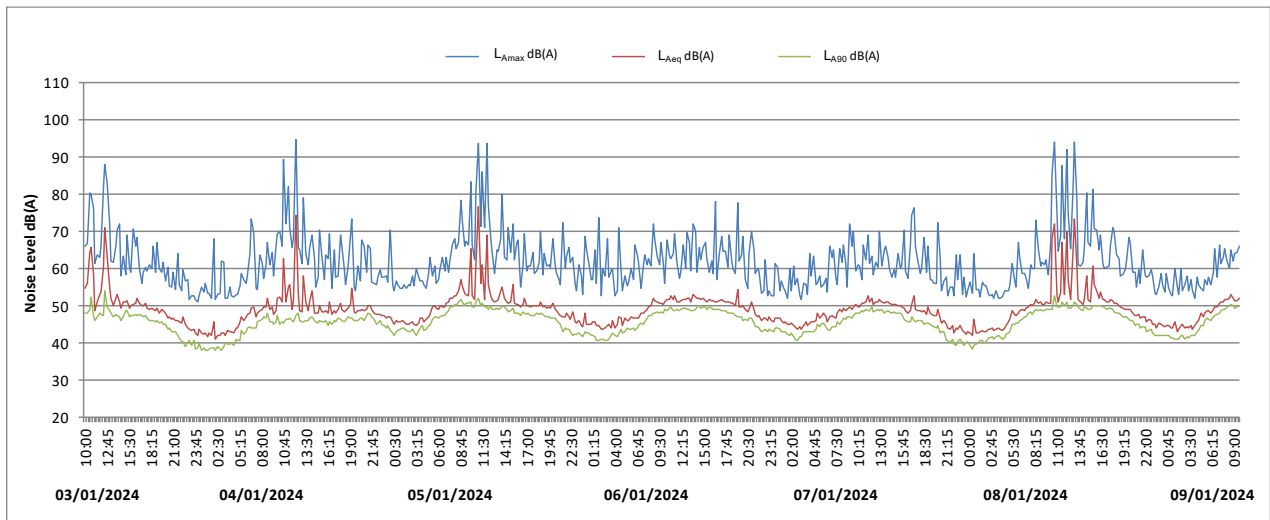
The calibration of the instrumentation was checked at the start and end of the tests and there was no significant drift.

Appendix 3 – Results of noise monitoring on site

A3.1 Location A



A3.2 Location B



Notes: When setting up the monitoring equipment road traffic noise was mostly dominant, however across road from the site (off Station Road), it was noted that construction works on a construction site were dominant at times with the regular use of heavy construction equipment (such as breakers). When analysing the long-term monitoring data at Monitoring Locations A and B, it is clear that construction noise will have affected the daytime ambient noise levels measured on Wednesday – Friday (3rd – 5th January 2024) and also on the Monday (8th January 2024). No construction activity was witnessed on the Tuesday morning (9th January 2024) and it is apparent from the noise monitoring results that construction works were not taking place during the weekend (6th – 7th January 2024).

Figure 1 - Location Plan

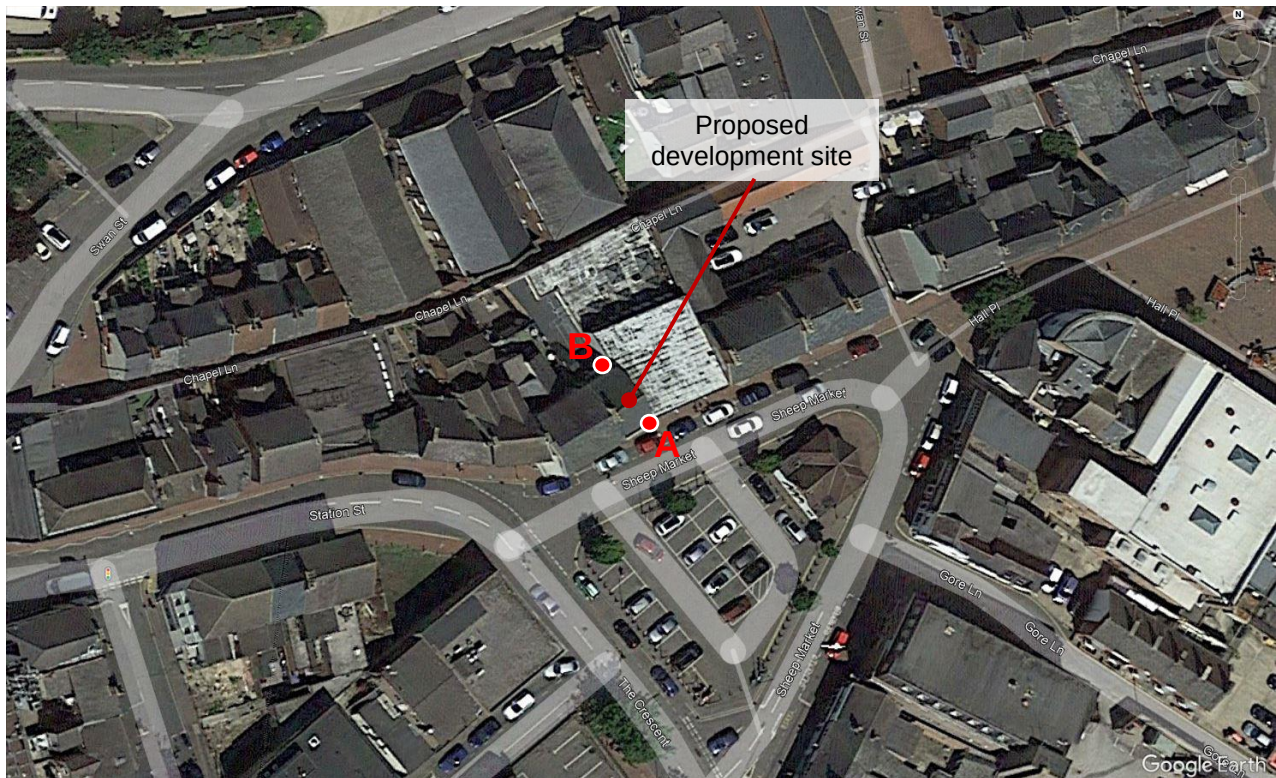


Figure 2 – Existing Floorplans

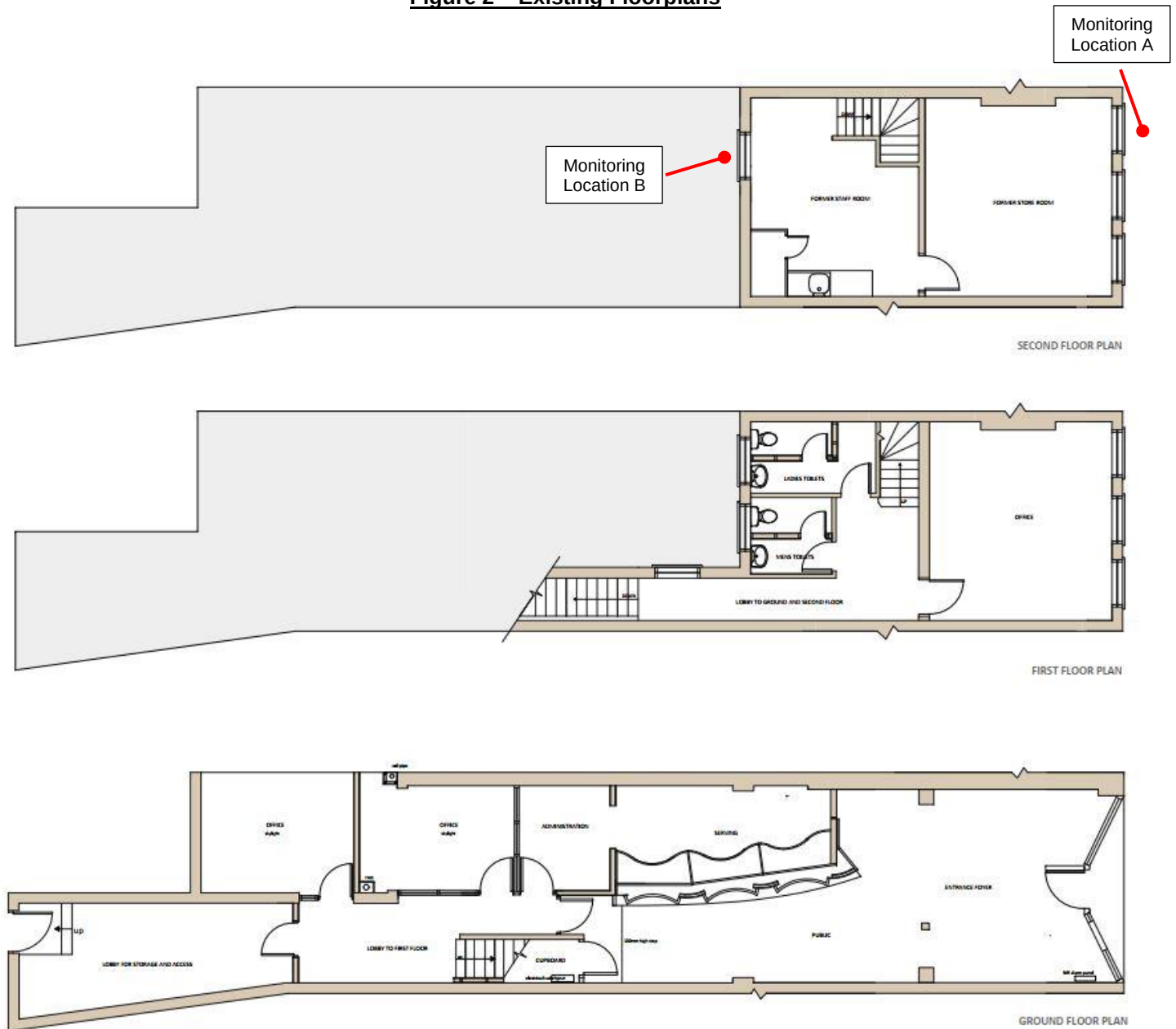


Figure 3 – Proposed Floorplans

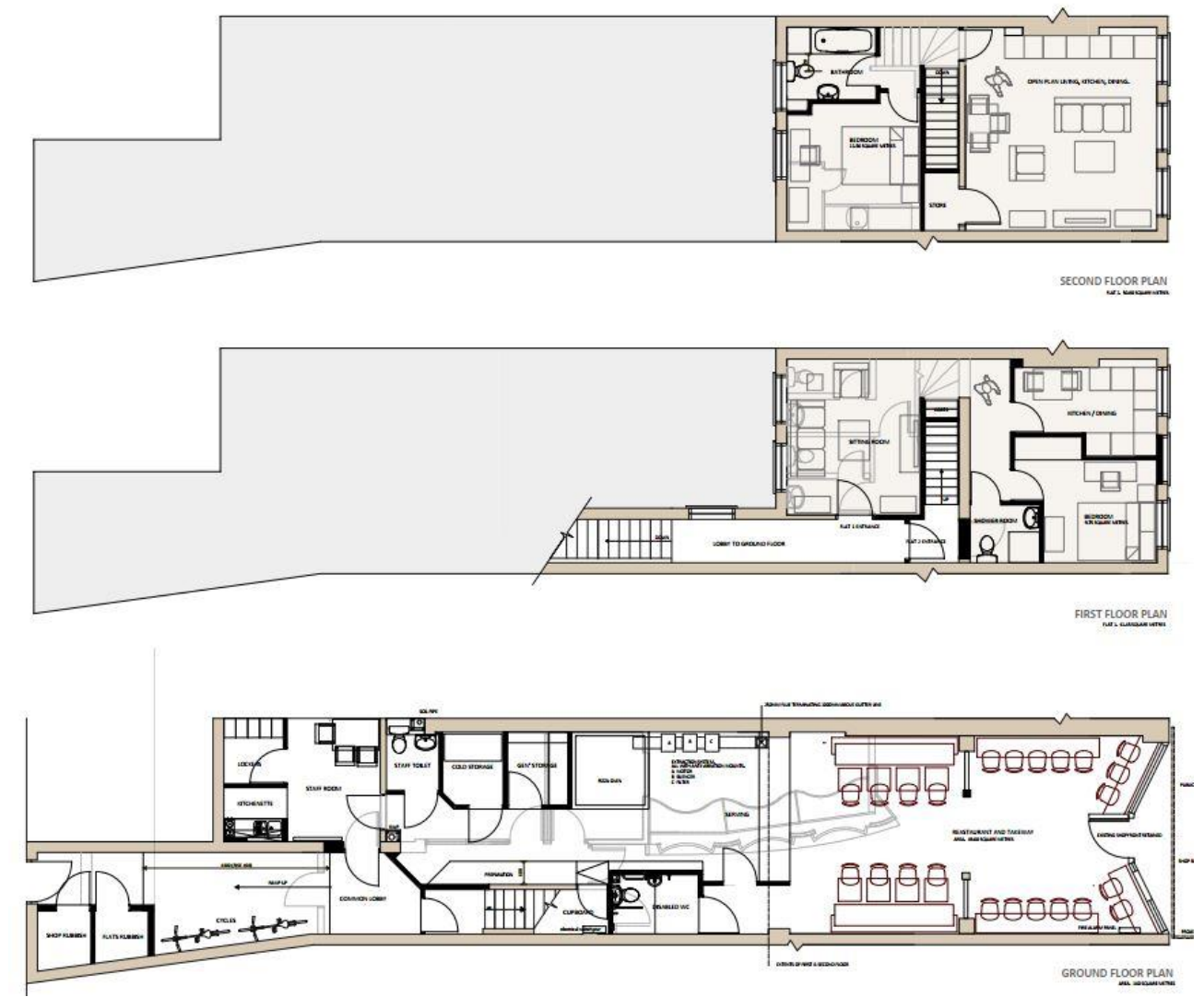


Figure 4 – Photographs

Monitoring Location A



Monitoring Location B



Figure 5 – Details Of Assumed Extractor Fan Noise Emissions And Proposed Sample Discharge Acoustic Attenuator (From Sharman Architecture Pre-Planning Application Document – Reference 11)

Manufacturers Sound Power Level Data For Assumed Exoflue Flueboost 350 Centrifugal Fan:



Flueboost 350, Full speed - Sound Power Levels, dB re. 1pW

Test No.	Test Details	Octave Band (Hz)								dB(A)
		63	125	250	500	1k	2k	4k	8k	
9	Discharge	62.9	63.5	65.9	65.2	62.9	58.7	56.7	50.0	67.5
10	Breakout	67.1	62.4	69.1	69.3	67.4	67.2	64.4	56.3	73.5
11	Inlet	60.6	61.9	61.9	60.8	56.6	55.0	50.4	44.2	63.0

: at background

dB(A) : overall A-weighted sound power level

Manufacturers Insertion Loss Values For Assumed Discharge Acoustic Attenuator (Acoustica CP01-M35-120):

INSERTION LOSS (dB) – CENTRE BAND FREQUENCY								
Hz	63	125	250	500	1K	2K	4K	8K
CP01-M35-120	4	7	10	20	31	28	17	14

Figure 6 – Calculation Of Sound Pressure Level At 2m From The Proposed Discharge Point Of The New Extraction System (From Sharman Architecture Pre Planning Application Document – Reference 11)

35 Broadway. External Noise Transmission.														
Kitchen Extract System.														
NOISE EMISSION CALCULATION														
ITEM	PARAMETER				HZ	63	125	250	500	1K	2K	4K	8K	dBA
1	Schedule of Plant		Qty											
2	Exoflue													
3	Model: Flueboost 350	1	Swl	dB	+	63	64	66	65	63	59	57	50	68
4	Ductwork natural losses	Lot	IL	dB	-	15	10	3	2	6	8	8	9	
5	Directivity	1	IL	dB	-	0	0	0	2	7	8	8	8	
6	Discharge Attenuator Model:CP01-M35-120	Primary	1	IL	dB	4	7	10	20	31	28	17	14	
7														
8														
9														
10														
11	Revised Sound Power Level:	1	Swl	dB	+	44	47	53	41	19	15	24	19	45
12														
13														
14														
15	Distance to nearest receptor Metres:	r	2	dB	-	14	14	14	14	14	14	14	14	14
16	SPL=SWL -20log(r) + 10log(Q) -11 dB.	Q	2											
17														
18														
19														
20	Spl at receptor			dB	+	30	33	39	27	5	1	10	5	31
21														
22														
23	Façade correction			dB	+									
24														
25														
26														
27	Specific noise level at receptor			dB	+	30	33	39	27	5	1	10	5	31
28	(1m outside noise sensitive window)													