

NOISE IMPACT ASSESSMENT

BS 8233:2014

Residential
Development



NOISE
ASSESSMENTS LTD
YOUR LOCAL ACOUSTIC SPECIALIST

REPORT DETAILS

Report Title	Residential Development
Site Address	Anzio Camp, Blackshaw Moor, Leek, ST13 8TL
Project No.	NALPRO081025.01
Consultant Contact	[REDACTED]

QUALITY ASSURANCE

Issue No.	Status	Issue Date	Comments	Author	Approved
1	Final	06/01/26	-	[REDACTED]	[REDACTED]
2	Final	22/06/26	Updated based on council & client comments	J Mape BSc (Hons) PgDip IOA Cert. Environ. Noise Noise Consultant	D Warren Director

This report has been prepared by Noise Assessments the trading name of Noise Assessments Limited, with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

Noise Assessments Limited – Companies House Registered No. 12207511

Contents

Assessment Summary	1
1. Proposal	3
2. Noise Policy and Guidance	4
3. Subjective Impressions	10
4. Measurement Location	10
5. Measurement Procedure	11
6. Measurement Equipment	12
7. Weather Conditions	12
8. Noise Survey	12
9. BS8233:2014 Noise Assessment	13
10. Summary	15
APPENDIX A - Measurement Details	17
APPENDIX B - Equipment Details	17
APPENDIX C - Calibration Details	17
APPENDIX D - Meteorology Details	17
APPENDIX E – BS8233 Rigorous Design Calculation example and Overheating Risk Assessment	18
APPENDIX F – Layout Drawing	20
APPENDIX G Terminology and Definitions	22

Assessment Summary

Noise Assessments Ltd was commissioned to undertake a noise impact assessment with the development at Anzio Camp, Blackshaw Moor, Leek, ST13 8TL (herein referred to as the site), to assess the impact of commercial noise (Live Shooting from the Leek & District Shooting Centre) on proposed residential dwellings.

Outline permission for redevelopment of the former Anzio site for residential dwellings, retail business, amenity space, internal roads, and associated hard/soft landscaping. Including the principal means of vehicular access from the A53 Buxton Road (all other matters reserved).

There are no leisure retirement lodges, no cafe and shop, or car park with EV charging.

The properties shall be constructed to provide sound insulation against external noise to achieve internal noise levels not exceeding 35 dB LAeq and 45 dB LAmax (measured with F time weighting) for bedrooms, with openable windows, or – if windows are required to be shut to achieve this - other means of ventilation provided.

Several noise assessments of noise during various weekends during different seasons have been undertaken to assess noise from the shooting range and surrounding area. The dates of these surveys are as follows:

1. Measurements of gunshot noise levels at the shooting club and the proposed development site have been taken at worst case scenario on current levels taken during a 4hour period of afternoon range use, during a Western Society event on Sunday 13th July 2014 gave an LAeq of 54 dB for that 4-hour period and average LAmax of 53 dB. These actual results have been used as a worst-case scenario. *Noise Assessment in respect of Shooting Club noise and the Mixed-Use Development (Predicted Levels and Mitigation) Prepared 20th October 2014 Project No 1414501.*
2. Daytime noise monitoring undertaken on Saturday 13th December 2025.
3. Daytime noise monitoring undertaken on Sunday 7th June 2026.

There is no specific guidance to assess the level of noise arising from rifle shooting ranges in the UK.

The results demonstrate that, with windows partially open, internal LAeq and LAmax noise levels during the daytime are within habitable rooms are within the recommended target levels and openable windows can therefore be relied upon for ventilation for an extended period.

Assuming the use of minimum 25 dB Rw+Ctr rated glazing (4/12/4mm), daytime environmental noise would be reduced from 43 dB LAeq,16hr to interior levels of 18 dB LAeq,16hr in the bedrooms, therefore within the desirable category.

Assuming the use of minimum 25 dB Rw+Ctr rated glazing (4/12/4mm), daytime environmental noise would be reduced from 43 dB LAeq,16hr to interior level of 18 dB LAeq,16hr in the living space, therefore within the desirable category.

Assuming the use of minimum 25 dB Rw+Ctr rated glazing (4/12/4mm), maximum individual noise events reduced from 60 dB LAFmax to 35 dB LAFmax, therefore within the desirable category

Noise Levels in External Amenity Areas

BS 8233:2014 provides a desirable guideline of 50 dB LAeq,16hr for external amenity spaces and an acceptable guideline of 55 dB LAeq,16hr. Worst-case daytime noise levels were measured as 48-60 dB LAeq,16hr with typical levels of around 50 dB LAeq,16h which is within the acceptable criterion.

A noise intrusion assessment has demonstrated that, via the adoption of the proposed glazing strategy internal noise levels within proposed habitable rooms facing the direction of the Shooting Range are consistent with the guide values outlined in BS 8233 and by the WHO. It should be noted that the recommended strategy sets out the necessary minimum acoustic performance specifications of the glazing systems. Products with higher acoustic performance specifications may be utilised if desired.

As per the *Noise Assessment in respect of Shooting Club noise and the Mixed-Use Development (Predicted Levels and Mitigation) Prepared 20th October 2014 Project No 1414501* a 5-metre-high bund to the Northeast of the Anzio site will further mitigate noise levels to the site.

1. Proposal

- 1.1 Noise Assessments Ltd was commissioned to undertake a noise impact assessment with the development at Anzio Camp, Blackshaw Moor, Leek, ST13 8TL (herein referred to as the site), to assess the impact of commercial noise (Live Shooting from the Leek & District Shooting Centre) on proposed residential dwellings.
- 1.2 Outline permission for redevelopment of the former Anzio site for residential dwellings, retail business, amenity space, internal roads, and associated hard/soft landscaping. Including the principal means of vehicular access from the A53 Buxton Road (all other matters reserved).
- 1.3 There are no leisure retirement lodges, no cafe and shop, or car park with EV charging.
- 1.4 The properties shall be constructed so as to provide sound insulation against external noise to achieve internal noise levels not exceeding 30 dB LAeq (night) and 45 dB LMax (measured with F time weighting) for bedrooms, and 35 dBA LAeq (day) for other habitable rooms, with openable windows, or – if windows are required to be shut to achieve this - other means of ventilation provided.
- 1.5 Several noise assessments of noise during various weekends have been undertaken to assess noise from the shooting range and surrounding area. The dates of these surveys are as follows:
 1. Measurements of gunshot noise levels at the shooting club and the proposed development site have been taken as a worst-case scenario on current levels taken during a 4-hour period of afternoon range use, during a Western Society event on Sunday 13th July 2014 gave an LAeq of 54 dB for that 4-hour period and average LMax of 53 dB. *Noise Assessment in respect of Shooting Club noise and the Mixed-Use Development (Predicted Levels and Mitigation) Prepared 20th October 2014 Project No 1414501.*
 2. Daytime noise monitoring undertaken on Saturday 13th December 2025.
 3. Daytime noise monitoring undertaken on Sunday 7th June 2026.
- 1.6 There is no specific guidance to assess the level of noise arising from rifle shooting ranges in the UK.

Existing Context

- 1.7 The site is mainly semi-rural area, with A53 Buxton Road and open fields and residential dwellings/caravan park nearby.
- 1.8 The Leek and District Shooting Centre operate the ranges as private ranges for their members. A variety of firearms are used at the site, ranging from .22 calibre rimfire through to .45 long colts together with black powder events. The club operates under a certificate of lawful use which restricts use of the outdoor firing ranges to hours of daylight only.

2. Noise Policy and Guidance

Noise Policy Statement for England (NPSE)

- 2.1 The NPSE sets out the Government's policy on noise and includes the long-term vision of promoting good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.
- 2.2 This long-term vision is supported by the following aims:
- 2.3 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.
- 2.4 There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:
- NOEL (No Observed Effect Level) – this is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise;
 - LOAEL (Lowest Observed Adverse Effect Level) – this is the level above which adverse effects on health and quality of life can be detected.
- 2.5 Extending these concepts further, NPSE leads to the concept of a significant observed adverse effect level:
- SOAEL (Significant Observed Adverse Effect Level) – this is the level above which significant adverse effects on health and quality of life occur.
- 2.6 NPSE acknowledges that it is not possible to have a single objective noise-based measure that defines NOEL, LOAEL and SOAEL that is applicable to all sources of noise in all situations. It is therefore suggested that more specific advice from other applicable noise standards and guidance could be employed to determine suitable noise level criteria within the overall principles of the NPSE.

National Planning Policy Framework (NPPF)

- 2.7 The revised NPPF was updated in December 2024 and sets out the government's planning policies for England and how these are expected to be applied. This document replaces the first NPPF published in March 2012 and includes minor clarifications to the revised version published in July 2018, February 2019, July 2021, and 2023.

- 2.8 Where issues of noise impact are concerned the NPPF provides brief guidance in Chapter 15 ‘*Conserving and enhancing the natural environment*’ as follows:

Paragraph 170:

Planning policies and decisions should contribute to and enhance the natural and local environment by preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.

Paragraph 180:

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.

Paragraph 182:

Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.

Planning Practice Guidance (PPG)

- 2.9 PPG is written in support of the NPPF and provides an increased level of specific planning guidance.

- 2.10 It suggests that noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. It is also suggested that noise should not be considered in isolation and separately from issues such as the economic, social and other environmental dimensions of proposed development.
- 2.11 Local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so consider:
- whether or not a significant adverse effect is occurring or likely to occur;
 - whether or not an adverse effect is occurring or likely to occur; and
 - whether or not a good standard of amenity can be achieved.

Technical Guidance

ProPG: Planning and Noise

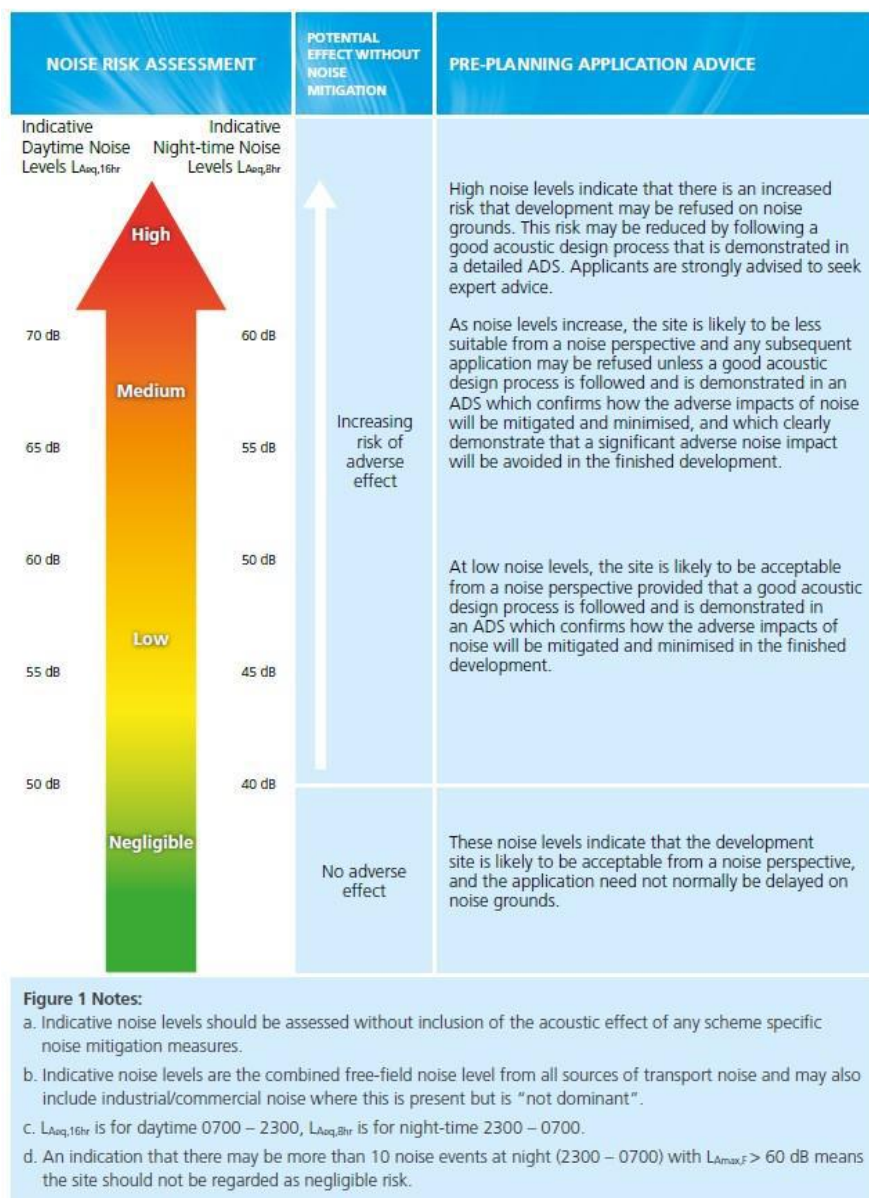
- 2.12 Professional Practice Guidance on Planning and Noise for new residential development (ProPG) was published May 2017 by the Chartered Institute of Environmental Health (CIEH), the Association of Noise Consultants (ANC) and the Institute of Acoustics (IOA). The guidance has been produced to provide practitioners with guidance on the management of noise within the planning system in England.
- 2.13 The guidance focuses on proposed new residential development and existing transport noise sources and reflects the Government's overarching Noise Policy Statement for England (NPSE, the National Planning Policy Framework (NPPF) and Planning Practice Guidance (including PPGN), as well as other authoritative sources of guidance.
- 2.14 The guidance provides advice for Local Planning Authorities (LPAs) and developers, and their respective professional advisers which complements Government planning and noise policy and guidance and, in particular, aims to:
- Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
 - Encourage the process of good acoustic design in and around new residential developments;
 - Outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
 - Improve understanding of how to determine the extent of potential noise impact and effect; and
 - Assist the delivery of sustainable development.
- 2.15 ProPG provides guidance for the producing an initial site noise risk assessment, pre-mitigation, based on the prevailing daytime and night-time noise levels across the site, from which the site

(or areas thereof) can be zoned. The Figure below shows the noise risk assessment criteria taken from Figure 1 of the ProPG.

- 2.16 ProPG recommends internal and external sound levels in line with those described in BS 8233 and WHO Guidelines.

BS 8233:2014 Guidance on sound insulation and noise reduction for buildings

- 2.17 This British Standard was published in February 2014 and supersedes BS 8233:1999, which is withdrawn.
- 2.18 This Standard provides guidance for the control of noise in and around buildings and is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building.



2.19 For dwellings, the main considerations are:

- for bedrooms, the acoustic effect on sleep; and
- for other rooms, the acoustic effect on resting, listening and communicating.

2.20 It is desirable that the internal ambient noise level does not exceed the following guideline values.

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-

Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$
----------------------------	---------	------------------------	-----------------------

- 2.21 For traditional external areas that are used for amenity space, such as gardens, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments.
- 2.22 However, it is also recognized that these external noise guideline values are not achievable in all circumstances where development might be desirable. 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.
- 2.23 When determining the sound insulation of a building envelope, the requirements should be determined on the basis of the assessment of:
- the level and characteristics of the noise outside the building
 - the design noise levels in the rooms and other spaces of the building
- 2.24 Initial estimates may be obtained using calculations based on single-figure data, however, for detailed noise intrusion calculations to be undertaken, knowledge or assumptions of the following are required.
- Frequency characteristics of the noise source(s).
 - Frequency characteristics of the sound reducing elements.
 - Surface area of the common construction separating the two areas.
 - Reverberation time of the receiving space.

World Health Organisation (WHO)

- 2.25 The World Health Organisation 'Guidelines for Community Noise' 1999 aims to provide environmental health authorities and professionals with guidance on the adverse health effects of community noise on people.
- 2.26 This document presents a summary of research and opinions on the impacts of noise and recommends guideline values for avoidance of particular effects e.g. annoyance and sleep disturbance. It is the primary reference point for other guidance value-based documents, such as BS 8233.
- 2.27 The following guideline values have been derived according to specific environments. The values relevant to residential development are shown in the table below.

Specific Environment	Critical Health Effect(s)	L _{Aeq} (dB)	Time base (hrs)	L _{Amax,f} (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

2.28 The above values are consistent with those recommended within BS 8233, however unlike BS 8233:2014, the WHO guidelines present a specific guide value for L_{Amax} levels affecting bedrooms. The research suggests that sleep disturbance effects have been observed at individual L_{Amax} exposures of 45 dB or less. Consequently, it is important to limit the number of individual noise events with a L_{Amax} exceeding 45 dB.

AVO: Acoustics, Ventilation and Overheating Residential Design Guide

2.29 The AVO guide recommends an approach to acoustic assessments for residential development that takes into consideration the interdependence of provisions for acoustics, ventilation and overheating. The application of the AVO Guide is intended to demonstrate good acoustic design in accordance with ProPG. A two-stage assessment approach is advised as:

- Stage 1: Site Risk Assessment
- Stage 2: Detailed Assessment of Adverse Effect

2.30 The guide provides a means of assessment to satisfy the need to consider acoustics, ventilation and overheating at the planning stage. It also assists in educating clients, environmental health officers, planning officers and other stakeholders of the interdependence of design for acoustics, ventilation and overheating.

3. Subjective Impressions

3.1 The noise climate in and around the site is dominated by traffic on the A Road, and occasional bang sound from the guns/riffles etc. The site forms part of a mainly residential development and open fields.

4. Measurement Location

4.1 Noise monitoring equipment for measuring sound levels was set up to capture daytime noise on 13th December 2025 and 7th June 2026. The location of the measurement position is shown in Figure 1.

- 4.2 The data collected during this period has been used to characterise the existing acoustic environment at the proposed development site.
- 4.3 Measurement and site location are shown in figure 1 below:

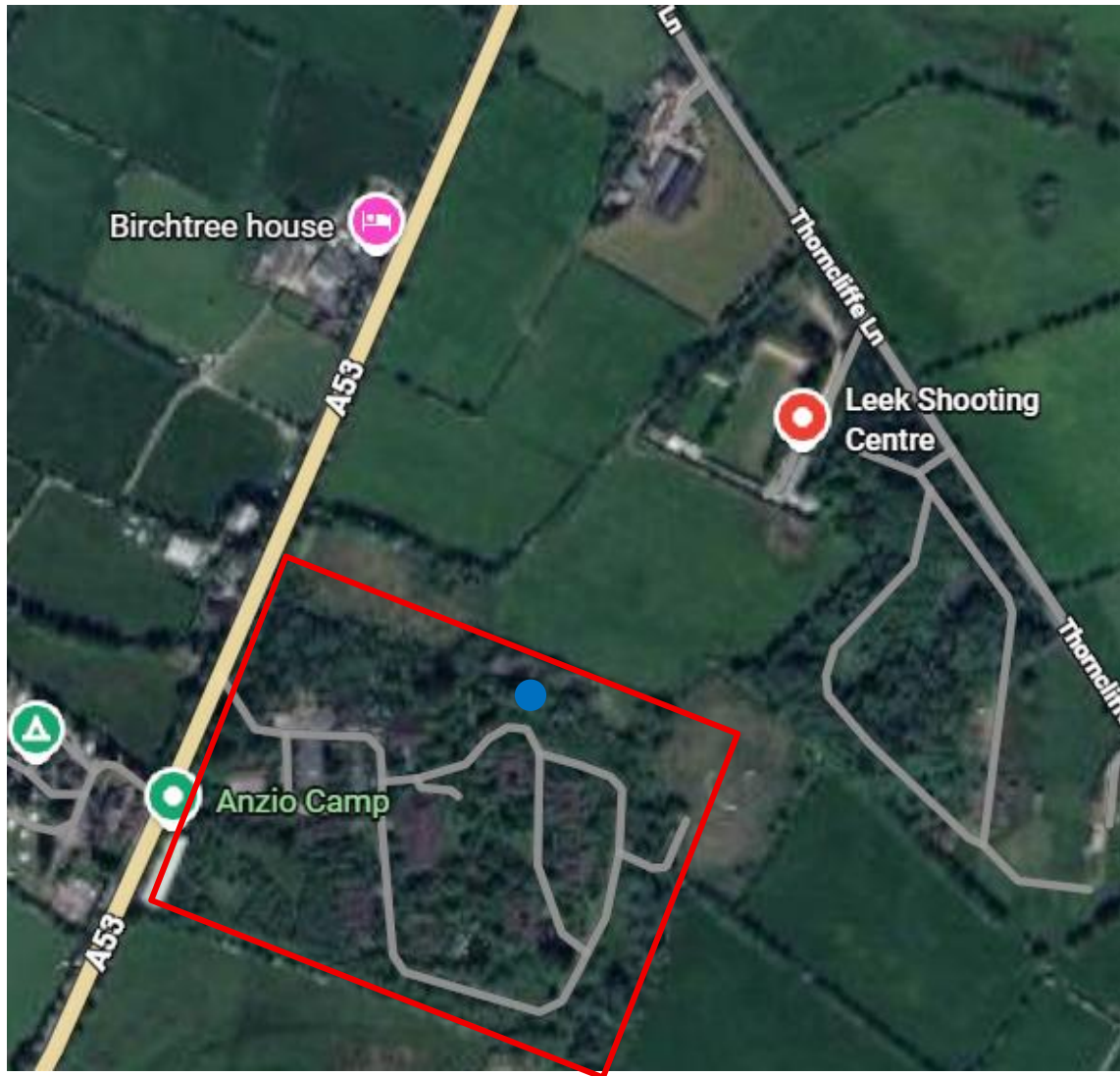


Figure 1: Site & Measurement Location

● Measurement location M1 / Site location

5. Measurement Procedure

- 5.1 Noise levels were measured on the 13th December 2025 and 7th June 2026. Full measurement times and durations can be found in **Appendix A**.

6. Measurement Equipment

- 6.1 Measurements were undertaken using a calibrated, Pulsar N45 class 1 sound level meter. Full equipment details can be found in **Appendix B**.
- 6.2 Measurements at the monitoring location was 'free field' (no vertical reflective surfaces within 3.5 metres of the microphone) and at a height of between 1.2 – 1.5 metres above ground level. During all measurements the microphone was protected with an outdoor windshield.
- 6.3 The location of the SLM is 1m from the proposed façade of the dwellings.
- 6.4 The calibration level of the meter was checked before and after the survey with a sound calibrator with no variation in the levels observed.
- 6.5 The sound level meters were set to measure various noise parameters including LAeq and LAmax values using a 'fast' time weighting.
- 6.6 Full calibration details can be provided on request.

7. Weather Conditions

- 7.1 Weather conditions were deemed acceptable for noise measurement. Full meteorological conditions are detailed in **Appendix D**.

8. Noise Survey

- 8.1 A noise survey was conducted on the 13th December 2025, and 7th June 2026. For the purposes of the assessment the loudest 16hr day and 8hr night were selected and are tabulated below.

Measurement Summary				
Measurement	Date	Period	LAeq (dB)	LAFmax (dB)
M1	13/12/25	Day (16hr)	43	60
	07/06/26	Day (16hr)	44	58

9. BS8233:2014 Noise Assessment

Noise Level Calculations

- 9.1 The noise intrusion levels with windows closed have been determined using the methodology outlined in Annex G.2 of BS 8233 and a few assumptions regarding potential construction details for various elements of the building envelope. Detailed proposed internal layouts are available (**Appendix F**) and therefore the dimensions of external facades, windows, and ceiling areas used in the calculations have been taken from these plans.
- 9.2 The sound reduction indices (SRI) of the assumed elements comprising the building envelope are presented below. The SRI data is presented as guidance only and alternatives with equivalent or better acoustic performance specifications may be utilised if required.
- 9.3 Based on the recommended glazing and ventilation specification, example calculations have been provided for a representative bedroom and living space. Noise intrusion levels with windows open have been determined assuming that the insulation provided by a window, partially open for ventilation, is 15 dB as suggested by BS 8233 and WHO.
- 9.4 Noise intrusion levels with windows closed have been determined assuming that the insulation provided by a window open.

Parameter	Measured External Free-Field Noise Level at facade	Internal Noise Level with Windows Open for Ventilation	Internal Noise Level with Windows Closed and Vents Open	ProPG Guidance	BS 8233 Classification
<i>Living Space</i>					
Daytime $L_{Aeq,16hr}$ (dB)	44	29	19	Low Risk of Adverse Effects	Desirable (≤ 35)
<i>Bedrooms</i>					
Daytime $L_{Aeq,16hr}$ (dB)	44	53	19	Low Risk of Adverse Effects	Desirable (≤ 35)
$L_{Amax(f)}$ (dB)	60	45	35	Low Risk of Adverse Effects	Desirable (≤ 45)

- 9.5 The results demonstrate that, with windows partially open, internal L_{Aeq} and L_{Amax} noise levels during the daytime are within habitable rooms are within the recommended target levels and openable windows can therefore be relied upon for ventilation for an extended period.

Assessment of Noise Levels in Living Rooms and Bedrooms

- 9.6 The results demonstrate that, with windows closed, internal LAeq noise levels during the day within habitable rooms are expected to be within the recommended target levels.
- 9.7 Care should be taken not to confuse a reliance on closed windows to achieve the noise level criteria with the need to have sealed glazing units. Windows may remain openable for rapid or purge ventilation, or at the occupant's choice.

Internal Noise Levels in Habitable Rooms

- 9.8 Assuming the use of minimum 25 dB Rw+Ctr rated glazing (4/12/4mm), daytime environmental noise would be reduced from 44 dB LAeq,16hr to interior levels of 19 dB LAeq,16hr in the bedrooms, therefore within the desirable category.
- 9.9 Assuming the use of minimum 25 dB Rw+Ctr rated glazing (4/12/4mm), daytime environmental noise would be reduced from 44 dB LAeq,16hr to interior level of 19 dB LAeq,16hr in the living space, therefore within the desirable category.
- 9.10 Assuming the use of minimum 25 dB Rw+Ctr rated glazing (4/12/4mm), maximum individual noise events reduced from 60 dB LAFmax to 35 dB LAFmax, therefore within the desirable category

Noise Levels in External Amenity Areas

- 9.11 BS 8233:2014 provides a desirable guideline of 50 dB LAeq,16hr for external amenity spaces and an acceptable guideline of 55 dB LAeq,16hr. Worst-case daytime noise levels were measured as 48-60 dB LAeq,16hr with typical levels of around 50 dB LAeq,16h which is within the acceptable criterion.
- 9.12 As per the *Noise Assessment in respect of Shooting Club noise and the Mixed-Use Development (Predicted Levels and Mitigation) Prepared 20th October 2014 Project No 1414501* a 5-metre-high bund to the Northeast of the Anzio site will further mitigate noise levels to the site.

10. Summary

10.1 Noise Assessments Ltd was commissioned to undertake a noise impact assessment with the development at Anzio Camp, Blackshaw Moor, Leek, ST13 8TL (herein referred to as the site), to assess the impact of commercial noise (Live Shooting from the Leek & District Shooting Centre) on proposed residential dwellings.

10.2 Outline permission for redevelopment of the former Anzio site for residential dwellings, retail business, amenity space, internal roads, and associated hard/soft landscaping. Including the principal means of vehicular access from the A53 Buxton Road (all other matters reserved). There are no leisure retirement lodges, no cafe and shop, or car park with EV charging.

10.3 The properties shall be constructed to provide sound insulation against external noise to achieve internal noise levels not exceeding 35 dB LAeq and 45 dB LMax (measured with F time weighting) for bedrooms, with openable windows, or – if windows are required to be shut to achieve this - other means of ventilation provided.

10.4 Several noise assessments of noise during various weekends during different seasons have been undertaken to assess noise from the shooting range and surrounding area. The dates of these surveys are as follows:

1. Measurements of gunshot noise levels at the shooting club and the proposed development site have been taken at worst case scenario on current levels taken during a 4-hour period of afternoon range use, during a Western Society event on Sunday 13th July 2014 gave an LAeq of 54 dB for that 4-hour period and average LMax of 53 dB. These actual results have been used as a worst-case scenario. Noise Assessment in respect of Shooting Club noise and the Mixed-Use Development (Predicted Levels and Mitigation) Prepared 20th October 2014 Project No 1414501.
2. Daytime noise monitoring undertaken on Saturday 13th December 2025.
3. Daytime noise monitoring undertaken on Sunday 7th June 2026.

10.5 There is no specific guidance to assess the level of noise arising from rifle shooting ranges in the UK.

10.6 The results demonstrate that, with windows partially open, internal LAeq and LMax noise levels during the daytime are within habitable rooms are within the recommended target levels and openable windows can therefore be relied upon for ventilation for an extended period.

10.7 Assuming the use of minimum 25 dB Rw+Ctr rated glazing (4/12/4mm), daytime environmental noise would be reduced from 43 dB LAeq,16hr to interior levels of 18 dB LAeq,16hr in the bedrooms, therefore within the desirable category.

10.8 Assuming the use of minimum 25 dB Rw+Ctr rated glazing (4/12/4mm), daytime environmental noise would be reduced from 43 dB LAeq,16hr to interior level of 18 dB LAeq,16hr in the living space, therefore within the desirable category

10.9 Assuming the use of minimum 25 dB Rw+Ctr rated glazing (4/12/4mm), maximum individual noise events reduced from 60 dB LAFmax to 35 dB LAFmax, therefore within the desirable category.

Noise Levels in External Amenity Areas

10.10 BS 8233:2014 provides a desirable guideline of 50 dB LAeq,16hr for external amenity spaces and an acceptable guideline of 55 dB LAeq,16hr. Worst-case daytime noise levels were measured as 48-60 dB LAeq,16hr with typical levels of around 50 dB LAeq,16h which is within the acceptable criterion.

10.11 A noise intrusion assessment has demonstrated that, via the adoption of the proposed glazing strategy internal noise levels within proposed habitable rooms facing the direction of the shooting range are consistent with the guide values outlined in BS 8233 and by the WHO. It should be noted that the recommended strategy sets out the necessary minimum acoustic performance specifications of the glazing systems. Products with higher acoustic performance specifications may be utilised if desired.

10.12 As per the *Noise Assessment in respect of Shooting Club noise and the Mixed-Use Development (Predicted Levels and Mitigation) Prepared 20th October 2014 Project No 1414501* a 5-metre-high bund to the Northeast of the Anzio site will further mitigate noise levels to the site.

Appendices

APPENDIX A - Measurement Details				
Measurement	Start Date	Start Time	End Date	End Time
M1	13/12/25	09:30	13/12/25	23:00
	07/06/26	09:30	08/06/26	09:00

APPENDIX B - Equipment Details				
Equipment	Make	Model	Class	Serial Number
Sound Meter	Pulsar	N45	1	1365
Calibrator	Pulsar	PM1	1	011121C

APPENDIX C - Calibration Details					
Measurement	Calibrator Ref Level (dB)	Level Before (dB)	Deviation Before (dB)	Level After (dB)	Deviation After (dB)
M1	94.0	94.0	0	94.0	0

*New calibration certificates can be provided on request.

APPENDIX D - Meteorology Details						
Date	Temp C	Wind Speed m/s*	Wind Direction	Humidity %	Precipitation mm	Cloud Cover (Oktas)
13/12/25	6	1.6	E	81	0.0	1/8
07/06/26	18	2.0	E	80	0.0	2/8

*Windspeeds measured on site using a Skywatch Xplorer 2 Anemo-Thermometer

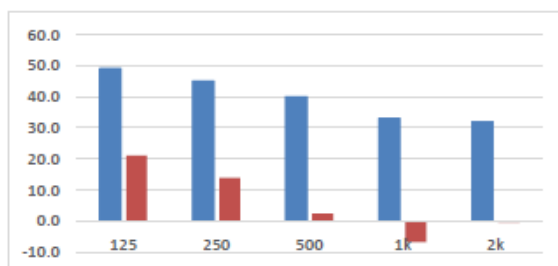
APPENDIX E – BS8233 Rigorous Design Calculation example and Overheating Risk Assessment

BS8233:2014 Specification Calculation Summary

Bedroom - night time

Room Properties		Sound Insulation Properties					
Room Width (m)	3.0	Freq. Hz	125	250	500	1k	2k
Room Depth (m)	4.0	Wall, dB R_{w+Ctr}	41	45	45	54	58
Room Height (m)	2.4	Roof, dB R_{w+Ctr}	41	45	45	54	58
Glazed Area (m ²)	1.8	Glazing, dB R_{w+Ctr}	26	27	34	40	38
Is dwelling within roof?	☒	Vents, dB $D_{f,R,w+Ctr}$	34	38	43	42	34

Noise Levels, dB



External Level	42 dB LAeq
Internal Level	9 dB LAeq
Insertion Loss	33 dB LAeq

Sound Insulation Requirement

Minimum Sound Insulation Requirement			Suitable Systems
Glazing	32	dB R_{w+Ctr}	Double Glazing <i>10/12/6mm</i>
Ventilation	40	dB $D_{f,R,w+Ctr}$	Acoustically treated trickle vent <i>Titan Xtra Sound Attenuator V75+C50</i>

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	0.000553	0.00022	7E-05	8.8E-05	0.00055
Term 2	0.000628	0.0005	1E-04	2.5E-05	4E-05
Term 3	5.96E-05	2.4E-05	2.4E-05	3E-06	1.2E-06
Term 4	0	0	0	0	0
Internal, dB L_{eq}	21.1	13.8	2.4	-6.8	-0.5
Internal, dB LAeq	5.0	5.2	-0.8	-6.8	0.7

Façade Components

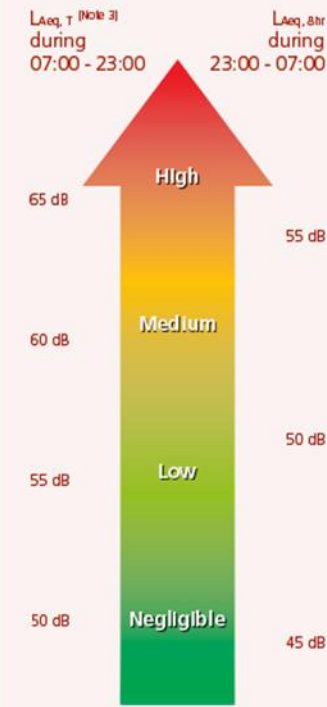
Roof	Not Within Roof Space
Glazing	Double Glazing
Vents	Acoustically treated trickle vent

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq} = 10 \log_{10} \left(\sum_{i=1}^n \left(A_i \cdot 10^{\frac{-D_{i,eq}}{10}} + S_i \cdot 10^{\frac{-R_{i,eq}}{10}} + S_i \cdot 10^{\frac{-R_{i,eq}}{10}} + S_i \cdot 10^{\frac{-R_{i,eq}}{10}} \right) \right) + 10 \log_{10} (S)$$

Suitable systems gives as reference only. Other products that achieve the required sound insulation values are available.

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
 $L_{Aeq, T}$ ^[Note 3] during 07:00 - 23:00 $L_{Aeq, str}$ during 23:00 - 07:00 65 dB High 60 dB Medium 55 dB Low 50 dB Negligible 55 dB 50 dB 45 dB	Increasing risk of adverse effect Use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect	Recommended Optional 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 ^[23].

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.

APPENDIX F – Layout Drawing



APPENDIX G Terminology and Definitions

Noise

Sound only becomes noise (often defined as 'unwanted sound' or sound that is considered undesirable or disruptive) when it causes or contributes to some harmful or otherwise unwanted effect, like annoyance or sleep disturbance.

Acoustic Environment

Sound from all sound sources as modified by the environment.

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

Value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval T, has the same mean square sound pressure as a sound under consideration whose level varies with time.

A-weighting

The human ear is most sensitive to frequencies in the range 1 kHz to 5 kHz. On each side of this range the sensitivity falls off. A-weighting is used in sound level meters to replicate this sensitivity and respond in the same way as the human ear.

Octave Band

Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit.

Maximum Sound Pressure Level $L_{Amax,T}$

Highest value of the A-weighted sound pressure level with a specified time weighting that occurs during a given event or measuring period.

The $L_{A10,T}$ Sound Level

The A-weighted sound pressure that is exceeded for 10% of a given time interval, T. It is often used to evaluate road traffic noise.

The $L_{A90,T}$ Sound Level

The A-weighted sound pressure that is exceeded for 90% of a given time interval, T, measured using time weighting F. It is often referred to as the background noise level and which might in part be an indication of relative quietness at a given location

Free-field Level

The sound pressure level away from reflecting surfaces.

NOTE Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the

measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e. not 3.5 m from the reflecting surface in the direction of the source).

Façade Level

The sound pressure level 1 m in front of the façade.

NOTE Facade level measurements of LpA are typically 1 dB to 2 dB higher than corresponding free-field measurements because of the reflection from the facade.

Indoor Ambient Noise

Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants.

ABOUT US

HERE TO HELP

We undertake various noise assessments and noise survey for a wide range of clients to meet their noise requirements and obligations, including for Planning Applications, new developments, building extensions, change of use, small businesses, restaurants, shops and much more.

QUALIFIED AND EXPERIENCED

Over 15 years UK and international acoustic engineering experience of undertaking Noise Monitoring, acoustic solutions, noise survey and Reporting.

Members of the Institute of Acoustics. Undertaken projects in Manchester, North West and across the UK.

GET THE PROJECT DONE

We offer competitive, cost effective acoustic solutions, delivering a noise survey report which complies with Local Planning Authority requirements and sound insulation or health and safety obligations.

We can also undertake Noise Modelling if required.