NOISE IMPACT ASSESSMENT

REPORT REFERENCE: **NCSL 1383**

MR LEE MOSSOP.
71 LOWTHER STREET, WHITEHAVEN, CA28 7AH.
14TH JULY 2025.

Issue 1

NOISE CONTROL SOLUTIONS LIMITED

1 INTRODUCTION

Noise Control Solutions Limited (NCSL) have been commissioned by Mr Lee Mossop to undertake a noise impact assessment for the proposed residential development at 71 Lowther Street, Whitehaven, CA28 7AH. The development comprises the conversion of the existing vacant building into eight residential HMO bedrooms and a ground floor commercial space. Due to the sensitive nature of the proposed residential dwellings, a noise impact assessment is required.

This assessment has been prepared to accompany the relevant planning application, which is to be considered by Copeland Borough Council (CBC). The scope of this application is the conversion of a commercial premises into an 8-bed HMO with a café / bar located on the ground floor level.

The proposed development requires the assessment of sound from a number of sources, using several guidance documents. The various acoustic consideration for the development are summarised below:

1. Noise received within the proposed residential dwellings due to existing road traffic. It is proposed that this will be assessed following the guidance provided within BS 8233:2014 (Source Reference 'S1').

2. Noise received within the proposed residential dwellings due to proposed commercial noise sources located within the ground floor commercial unit. It is proposed that this will be assessed following the guidance provided within BS 8233:2014 (Source Reference 'S2').

The design specifications provided by NCSL have been considered only from an acoustic perspective. Any other requirements (such as fire, structural, ventilation, building conservation etc) should be assessed by a suitable consultant.

Report pr [redacted] ONS) MSc MIOA CENG

2 COMPETENCE

This report has been prepared by Mr Andrew Todd, a corporate member of the Institute of Acoustics, a holder of a MSc in Acoustics and a Chartered Engineer registered with the United Kingdom Engineering Council. Andrew has over 17 years of experience as an acoustic consultant/engineer working in various aspects of acoustics.

3 SUMMARY OF TERMS, DESCRIPTORS & QUANTITIES

Within this report, several acoustic descriptors and quantities are referred to. Due to their specialised nature, the following summary is provided.

DECIBELS (dB): Ten times the logarithm (base 10) of the ratio between a measured quantity and a reference quantity. For sound pressure levels defined within this report, the reference quantity is 20 Micropascals (μPa).

A-WEIGHTING: The filtering of acoustic signals in order to provide a closer approximation to the human hearing response. Measurements with this weighting applied are denoted with "(A)", for example, "dB(A)".

N^{TH} PERCENTILE NOISE LEVEL ($L_{AN,T}$): The A-weighted sound pressure level, in decibels, exceeded for N% of the measurement duration (T). This metric is generally used to assess background noise levels (L_{A90}) as it allows for the removal of non-constant noise sources, for example, passing vehicles. The subscript 'T' defines the measurement duration.

EQUIVALENT CONTINUOUS NOISE LEVEL ($L_{AEQ,T}$): The logarithmically averaged sound pressure level, in decibels, over the measurement duration (T) with A-weighting applied. The subscript 'T' defines the measurement duration.

FAST TIME WEIGHTING: The integration time constant of the measurement. Fast time weighting, denoted by the subscript 'F', integrates sound pressure levels over 0.125 seconds.

MAX LEVEL ($L_{AF\ MAX}$): The maximum reported RMS sound pressure level during a measurement period. The level is A-weighted and is calculated with a Fast time weighting.

DAY-TIME AND NIGHT-TIME PERIODS: Following guidance contained within BS 4142:2014, the day-time period is defined as 07:00 to 23:00 and the night-time period is defined as 23:00 to 07:00.

NOISE SENSITIVE RECEPTOR (NSR): A premises or area which is sensitive to noise disturbance. This is generally an existing, or future residential premises close to a proposed development.

SOUND POWER LEVEL (L_W): The sound energy radiated per unit time by a sound source, measured in Watts (W) on a decibel scale with a reference value of 10^{-12} W.

DNTW+CTR: Standardised level difference + spectrum adaption term (Ctr). A single figure value of airborne sound insulation performance corrected for room characteristics.

LNTW: Standardised impact sound pressure level. A measurement of impact sound insulation corrected for room characteristics.

4 APPLICABLE LITERATURE

4.1 NATIONAL PLANNING POLICY FRAMEWORK

The National Planning Policy Framework (NPPF), updated in 2025, outlines the Government's planning policies for England and how they are expected to be applied. In respect of noise, the document states that:

Planning policies and decisions should also ensure that new development is appropriate for its location, taking into account the 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:

- *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.*

- *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

Additionally, the policy states that:

- *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 conditions should be kept to a minimum and only imposed where they are necessary, relevant to planning and to the development to be permitted, enforceable, precise and reasonable in all other respects. Agreeing conditions early is beneficial to all parties involved in the process and can speed up decision-making. Conditions that are required to be discharged before development commences should be avoided, unless there is a clear justification*

4.2 NOISE POLICY STATEMENT FOR ENGLAND (NPSE)

Published in March 2010 by DEFRA, this document defines the Government's policy on noise. It incorporates the long-term vision of promoting good health and quality of life through the effective management of noise in the context of Government policy on sustainable development. The long-term vision of the NPSE is supported by the following aims:

- *Avoid significant adverse impacts on health and quality of life.*
- *Mitigate and minimise adverse impacts of health and quality of life.*
- *Where possible, contribute to the improvement of health and quality of life.*

This document also defines three categories relating to noise impact:

- 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 EFFECT LEVEL. This is the level above which adverse effects on health and quality of life can be detected.
- SOAEL – SIGNIFICANT OBSERVED ADVERSE EFFECT LEVEL. This is the level above which significant adverse effects on health and quality of life occur.

4.3 PLANNING PRACTICE GUIDANCE

Further detail is provided within the Planning Practice Guidance (PPG) regarding how the effect levels, set out within NPSE, can be recognised and the associated concern arising from each.

At the lowest extreme, when noise is not perceived to be present, there is by definition no effect. As the noise exposure increases, it will cross the 'no observed effect' level. However, the noise has no adverse effect so long as the exposure does not cause any change in behavior, attitude or other physiological responses of those affected by it. The noise may slightly affect the acoustic character of an area but not to the extent

there is a change in quality of life. If the noise exposure is at this level no specific measures are required to manage the acoustic environment.

As the exposure increases further, it crosses the 'lowest observed adverse effect' level boundary above which the noise starts to cause small changes in behavior and attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard. The noise therefore starts to have an adverse effect and consideration needs to be given to mitigating and minimising those effects (taking account of the economic and social benefits being derived from the activity causing the noise).

Increasing noise exposure will at some point cause the 'significant observed adverse effect' level boundary to be crossed. Above this level the noise causes a material change in behavior such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. If the exposure is predicted to be above this level the planning process should be used to avoid this effect occurring, for example through the choice of sites at the plan-making stage, or by use of appropriate mitigation such as by altering the design and layout. While such decisions must be made taking account of the economic and social benefit of the activity causing or affected by the noise, it is undesirable for such exposure to be caused.

At the highest extreme, noise exposure would cause extensive and sustained adverse changes in behavior and / or health without an ability to mitigate the effect of the noise. The impacts on health and quality of life are such that regardless of the benefits of the activity causing the noise, this situation should be avoided.

Table 1 summarises the noise exposure hierarchy.

Response	Example of Outcomes	Increasing Effect Level	Action
	No Observed Effect Level		
Not Noticeable	No Effect	No Observed Effect	No Specific Measures Required

Response	Example of Outcomes	Increasing Effect Level	Action
	No Observed Adverse Effect Level		
Present & Not Intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life	No Observed Adverse Effect	No Specific Measures Required
	Lowest Observed Adverse Effect Level		
Present & Intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate & Reduce to a Minimum
	Significant Observed Adverse Effect Level		
Present & Disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Effect Level	Avoid
Present & Very Disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

TABLE 1 – NOISE EXPOSURE HIERARCHY

4.4 BS 4142:2014:2014+A1:2019 METHODS FOR RATING & ASSESSING INDUSTRIAL & COMMERCIAL SOUND

British Standard 4142:2014+A1:2019, 'Methods for Rating and Assessing Industrial and Commercial Sound' (BS 4142:2014), sets out a methodology to determine the potential impact of proposed industrial and commercial sound sources upon nearby dwellings or premises used for residential purposes. Furthermore, BS 4142:2014 is appropriate to consider the impact of existing sources of industrial and commercial sound on proposed receptors.

The methodology prescribes the measurement of the existing acoustic environment at noise sensitive receptor locations, termed the 'background sound level'.

A measurement or calculation of the noise generated by the proposed noise source at the receptor location is also required and is termed the 'specific sound level'. This value is then adjusted to reflect any acoustic characteristics which may increase audibility or annoyance to define the 'rating level'.

Once these values have been attained, an analysis can be conducted in order to assess the estimated noise impact that will occur with the introduction of the proposed source into the existing environment.

- In instances where the rating level exceeds background noise level by +10dB, this is an indication of a significant adverse impact, depending upon the context.

- In instances where the rating level exceeds background noise level by +5dB, this is an indication of an adverse impact, depending upon the context.

- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will cause an adverse noise impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

The assessment of a noise impact at a receptor should consider the context in which the sound occurs. BS 4142:2014 states that the following factors be included in the context assessment;

- The absolute level of sound
- The character and level of residual sound

- The sensitivity of the receptor.

4.5 BS 8233:2014:2014 GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS

BS 8233:2014:2014 Guidance on Sound Insulation and Noise Reduction for Buildings (BS 8233:2014) provides guidance on internal noise levels within dwellings allowing for sufficient resting and sleeping conditions, as shown in Table 2. However, it is also noted that these values may be relaxed by 5dB where a development is considered necessary or desirable with reasonable internal conditions still achieved.

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

TABLE 2 - BS 8233:2014:2014: RECOMMENDATIONS FOR INDOOR NOISE LEVELS

BS 8233:2014 also provides guidance as to acceptable external noise levels, as shown in Table 3.

Activity	Location	Desirable Noise Level	Upper Guideline Level
Relaxation	External Amenity Space	50dB $L_{Aeq,T}$	55dB $L_{Aeq,T}$

TABLE 3 - BS 8233:2014:2014: RECOMMENDATIONS FOR EXTERNAL NOISE LEVELS

BS 8233:2014, however, does recognise that these external guideline values are not achievable in all circumstances where development may be desirable. The standard also provides guidance on estimated noise reduction levels of commonly used building materials and constructions.

4.6 APPROVED DOCUMENT E: 2003

Approved Document E provides guidance on the resistance to the passage of sound in domestic buildings, schools and flats. This guidance applies to new buildings, alterations to pre-existing premises, and buildings being converted to flats and Houses of Multiple Occupancy (HMO(s)).

The document provides guidance on the internal sound insulation between dwellings, including the transmission of sound between walls, ceilings, windows and floors. It includes unwanted sound travel within different areas of a building, including common areas within schools and buildings containing flats, and in-between connecting buildings. The requirements of ADE will not remove all sound transmission between dwellings, rather ADE is provided to ensure a suitable level of sound insulation between different residential premises.

Two types of sound transmission and testing are covered by Approved Document E, airborne sound and impact sound.

Table 4 shows the acoustic performance required to pass the assessment in accordance with Approved Document E.

Test Type	New Build Premises	Converted Premises
Airborne Noise Assessment	≥ 45dB DnTw + Ctr	≥ 43dB DnTw + Ctr
Impact Noise Assessment	≤ 62dB LnTw	≤ 64dB LnTw

TABLE 4 - PERFORMANCE REQUIREMENTS FOR APPROVED DOCUMENT E

5 SITE DETAILS & BASELINE ENVIRONMENT

5.1 SITE LOCATION

The development in question is located at 71 Lowther Street, Whitehaven, CA28 7AH, (reference 'D1'). This is an existing commercial premises, previously a bank, which is now vacant. It is proposed that the ground floor will remain as a commercial unit, with the upper floors converted into eight HMO residential dwellings. The development is located within a mixed commercial / residential area. Additionally, there is a significant public highway (Lowther Street) to the south-west of the development, which carries HGVs, buses and passenger vehicles.

5.2 NOISE SENSITIVE RECEPTOR LOCATION

The residential dwellings associated with the proposed development are considered to be noise sensitive receptors and have been identified in reference to this noise impact assessment. It is noted that the proposed development comprises a number of receptors over a number of facades and floors of the development. Therefore, the potential impact of any noise source will vary depending upon the relative location of the receptor.

NSR Reference	NSR Address	Distance to Development
NSR1	Proposed HMO bedrooms. 71 Lowther Street, Whitehaven, CA28 7AH.	NA

TABLE 5 - NOISE SENSITIVE RECEPTOR DETAILS

Other receptors may be affected by noise from the proposed development. However, these other receptors would be affected equally or less than those receptors which have been identified above.

5.3 MEASUREMENT LOCATIONS

All background and ambient sound level measurements detailed within this report were taken using an outdoor microphone positioned at one Measurement Location (ML). ML1 was located at the South West

(front) façade of the existing premises, protruding from a first-floor window, at a distance of 1m from the property façade. The measured values are therefore considered to be façade levels.

These Measurement Locations are considered to be representative of the South West (front) facade of NSR1.

Location Reference	Location Description	Measured Values
ML1	NSR1 South West (Front) Façade	L_{Aeq}, L_{AFmax}, L_{A90}

TABLE 6 - MEASUREMENT LOCATIONS

5.4 LOCAL AREA MAP

A map showing the location of each element described above is shown in Figure 1 below.

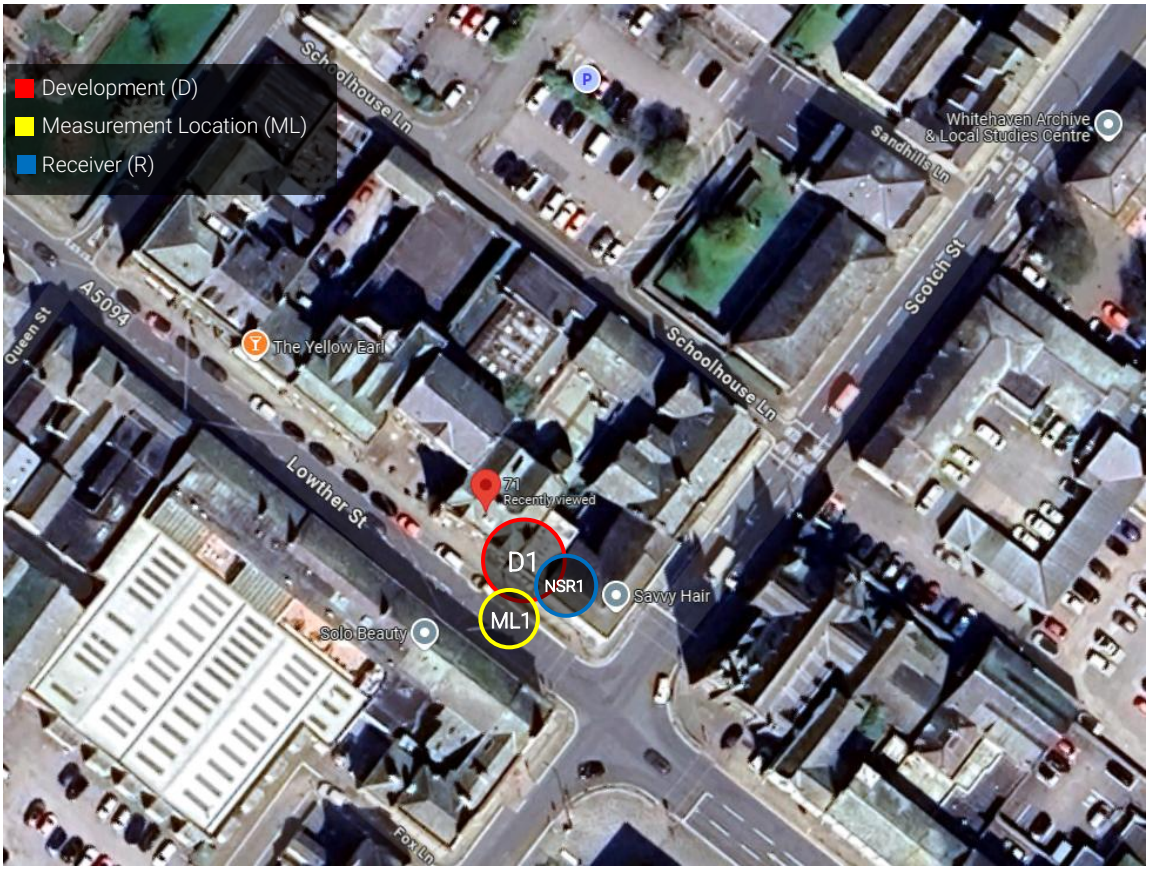


FIGURE 1 - LOCAL AREA MAP

5.5 EQUIPMENT DETAILS

All measurements detailed within this report were made using a Class 1 NTi Audio XL2 sound level meter (serial number A2A-15792-E0). Field calibration of the meter was conducted using a Class 1 Bruel & Kjaer Type 4230 94dB acoustic calibrator (serial number 1275784). Pre and post measurement sensitivity checks were conducted and showed no significant deviation to the nominal sound level meter sensitivity of 41.3mV/Pa or reference signal levels. Details of these tests are documented in Table 7.

Test Reference	dB Level	Sensitivity	Comments
Pre-test calibration	94.0dB	41.3 mV/Pa	NA
Post-test check	94.0dB	41.3 mV/Pa	No significant variance

TABLE 7 - FIELD CALIBRATION DETAILS (S/N A2A-15792-E0)

All equipment is calibrated in accordance with IEC 61672-3, IEC 61260 and BSEN 60942:2003 where applicable. Calibration certificates are available upon request.

5.6 GROUND CONDITIONS

The ground was dry throughout the survey period.

5.7 WEATHER CONDITIONS

Weather conditions during survey measurements were clement and dry. Further details of the environmental conditions are shown in Table 8.

Parameter	Survey Start	Survey End
Barometric Pressure	1014 mBar	1015 mBar
Temperature	18º Celsius	16º Celsius
Wind Velocity	3.2 ms^{-1}	3.1 ms^{-1}
Cloud Cover	0%	0%

TABLE 8 - ENVIRONMENTAL CONDITIONS

5.8 SUBJECTIVE APPRAISAL OF THE EXISTING ACOUSTIC ENVIRONMENT

During a site visit on Tuesday 1st July 2025 a subjective assessment of the existing acoustic environment, in conjunction with a review of logged audio recordings during survey measurements, was conducted by NCSL.

At the noise sensitive receptor locations, the ambient sound is dominated by noise from vehicle traffic along Lowther Street. There are no significant sources of noise to the rear of the development.

5.9 ACOUSTIC MEASUREMENTS & DEFINED SOUND LEVELS

The ambient sound level defines the total sound pressure level in a specific location at a specific time, generally composed of acoustic radiation from several sources. Measurements of ambient sound level take the form of an A-weighted equivalent continuous sound pressure level ($L_{Aeq,T}$). This metric logarithmically averages the observed sound level over the measurement period.

Measurements have been taken in order to define the existing ambient sound level at the South West (front) façade of D1. A 48-hour acoustic survey commenced at 0900hrs Tuesday 1st July 2025, allowing for the assessment of external noise levels. These measurements were taken at ML1.

The ambient sound level has been measured as an equivalent continuous A-weighted sound pressure level ($L_{Aeq,T}$) logged at 15-minute intervals. These discrete logged values have been logarithmically

averaged over a measurement time interval of 16hrs during the daytime period and 8hrs during the night-time period.

The results of this acoustic survey are summarised in Table 9.

ML	Time Period	125Hz dB(A)	250Hz dB(A)	500Hz dB(A)	1kHz dB(A)	2kHz dB(A)	Sum dB(A)	Max (10th Highest) dB(A)
ML1	Day-Time ($L_{Aeq,16hrs}$)	50	52	57	60	58	64	-
ML1	Night-Time ($L_{Aeq,8hrs}$ / L_{AFmax})	36	43	48	54	51	51	79

TABLE 9 – AMBIENT SOUND LEVELS (FAÇADE LEVELS)

These values are façade levels, and therefore a correction of -3dB has been applied before any subsequent calculations.

These ambient sound levels are considered to be representative of the ambient sound level external to the proposed receptors and have been used within this report.

Further details are shown in Appendix A.

5.10 INTERNAL SOUND INSULATION TESTING

The ground floor of the proposed development will continue to operate as a commercial unit following the conversion of the upper floors of the proposed development into residential dwellings. Noise from this commercial unit has the potential to cause a noise impact on the occupiers of the dwellings. Therefore, it is necessary to undertake an assessment of the potential noise transfer.

In order to define the existing acoustic performance of the floor and ceiling structure between the ground and intermediate floor, sound insulation tests have been conducted by NCSL. The results of these tests are shown below in Figure 2.

ISO 140-4: 1998 Standardised Level Difference.

Field measurements of airborne sound insulation between rooms.

Client: Lee Mossop

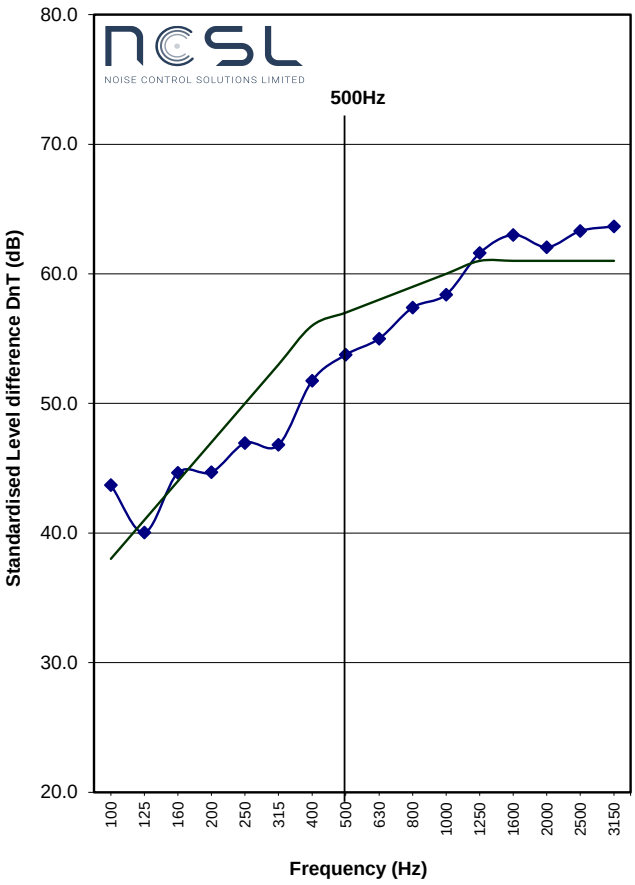
Date of test: 01/07/2025

Description and identification of the building construction and test arrangement, direction of measurement:

Source Room:	Ground Floor Commercial	Source room volume:	NA
Receiver room:	First Floor Room	Receiver room volume:	NA
Direction of test:	Vertical		
Construction:	Unknown		

Frequency range according to the curve of reference values (ISO 717-1)

Frequency (Hz)	DnT (1/3 oct) dB
100	43.7
125	40.1
160	44.7
200	44.7
250	47.0
315	46.8
400	51.8
500	53.8
630	55.0
800	57.4
1000	58.4
1250	61.6
1600	63.0
2000	62.1
2500	63.3
3150	63.7



Rating according to ISO 717-1

DnTw (Ctr) = 57 (-5) DnTw + Ctr = 52 dB

Evaluation based on field measurement results obtained by an engineering method

Test report: 1383-1 Signature:

FIGURE 2 - SOUND INSULATION TEST RESULTS

6 ASSESSMENT OF EXTERNAL NOISE SOURCES

6.1 DAYTIME MEASURED NOISE LEVELS

The proposed development includes eight HMO rooms. The measured noise levels at ML1 have been undertaken over a period which includes a full daytime and night-time period.

The measured sound levels at the South West (front) façade have been considered against the internal noise guideline levels provided within BS 8233:2014.

6.1.1 OUTDOOR AMENITY AREAS

The proposed development does not include any outdoor amenity areas, and therefore this has not been considered further within this assessment.

6.1.2 NOISE IN LIVING ROOMS AND BEDROOMS DURING THE DAYTIME

The development includes bedrooms which have windows overlooking Lowther Street to the South West (front) aspect. The free-field corrected daytime noise level at the South West (front) façade of the building is 61dB $L_{Aeq,16hr}$. The internal noise guideline level for living rooms and bedrooms during the daytime is 35dB $L_{Aeq,16hr}$.

The existing building is currently fitted with single-glazed windows, which are assumed to be of 4mm thickness. Adequate ventilation must be provided to habitable rooms which could be provided by an open window where an alternative is not provided.

An open window typically provides 13dB attenuation. With an open window for ventilation, the highest internal noise level in rooms, could be up to 48dB(A) which would exceed the internal noise guideline level provided within BS 8233:2014.

Therefore, mitigation measures to provide adequate glazing, and an alternative to an open window which provides up to 26dB attenuation is required. This will ensure that habitable rooms within the proposed development achieve internal noise guideline levels. Full details are discussed in Section 6.4 of this report.

6.2 NIGHT-TIME MEASURED NOISE LEVELS

6.2.1 NOISE IN BEDROOMS DURING THE NIGHT-TIME

The development includes bedrooms which have windows overlooking Lowther Street to the South West (front) aspect. The free-field corrected night-time noise level at the South West (front) façade of the building is 48dB $L_{Aeq,8hr}$. The internal noise guideline level for bedrooms during the night-time is 30dB $L_{Aeq,8hr}$.

The existing building is currently fitted with single-glazed windows, which are assumed to be of 4mm thickness. Adequate ventilation must be provided to habitable rooms which could be provided by an open window where an alternative is not provided.

An open window typically provides 13dB attenuation. With an open window for ventilation, the highest internal noise level in rooms, could be up to 35dB(A) which would exceed the internal noise guideline level provided within BS 8233:2014.

Therefore, mitigation measures to provide adequate glazing, and an alternative to an open window which provides up to 18dB attenuation is required. This will ensure that habitable rooms within the proposed development achieve internal noise guideline levels. Full details are discussed in Section 6.4 of this report.

In addition, the L_{AFmax} levels at each façade need to be considered during the night-time period. The free-field corrected night-time L_{AFmax} noise level (10^{th} highest) at the façades of the building is 76dB L_{AFmax}. The internal noise guideline level for bedrooms during the night-time is 45dB L_{AFmax}. Therefore, mitigation measures to provide adequate glazing, and an alternative to an open window which provides up to 31dB attenuation is required. This will ensure that habitable rooms within the proposed development achieve internal noise guideline levels. Full details are discussed in Section 6.4 of this report.

6.3 NOISE IMPACT ASSESSMENT SUMMARY

The noise level incident on each façade will vary depending on the floor level and façade facing. Furthermore, the noise level incident at the façade should be considered in octave band levels. A full assessment of the predicted internal noise levels is shown in Appendix B.

6.4 NOISE MITIGATION MEASURES

The proposed development comprises eight HMO rooms. Each proposed room has varying numbers of windows, glazing area and external wall area. Apartments located on varying facades will require different noise attenuation requirements, depending on its exact location, the nearest noise sources, and any noise screening provided by the development itself or any existing buildings and structures.

6.4.1 FAÇADE MITIGATION MEASURES

It will be necessary to install double glazing units, in at least 4/6-20/4mm configuration, to residential rooms located on the South West (front) façade.

It is also necessary to ensure that adequate ventilation is provided to residential rooms located on the South West (front) façade. It is recommended that habitable rooms are fitted with acoustic trickle vents, such as the Greenwood 2500EAW.AC2. Ventilation requirements should be checked with a suitable consultant.

As there are no significant sources of noise noted to the rear of the development, these measures are not expected to be required to the North-East (rear) façade of the development. However, it may be prudent to install the specified glazing units throughout the residential floors to minimise noise impact from the ground floor commercial unit and/or other extraneous noise sources.

The noise mitigation measures are based upon commonly used products and materials and are shown in this report as examples. Alternatives to the recommended products may be used, however, any alternatives must meet with, or exceed the sound attenuation requirements of those used within this assessment. The minimum product performance is given below in Table 10.

Mitigation	Sound Reduction Indices (dB)						
	63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz
Double Glazing Units (4/6-20/4mm)	-	21	17	25	35	37	31
Greenwood 2500EAW.AC2	32	41.7	39.6	37.2	45.3	52.6	54.9

TABLE 10 - NOISE MITIGATION REQUIREMENTS (FIGURES IN dB)

The calculated internal noise levels, based upon the mitigation measures shown above, are detailed in Table 11.

Ref.	Plot Reference	Room Reference	Predicted Internal Noise Levels			Mitigation Requirements	
			Daytime L_{Aeq}	Night-Time L_{Aeq}	Night-Time L_{AMax}	Vents	Glazing
1	L01	Bedroom 1	31	21	44	AT_Greenwood 2500EAW.AC2	4/6-20/4
2	L01	Bedroom 2	30	21	43	AT_Greenwood 2500EAW.AC2	4/6-20/4
3	L01	Bedroom 3	31	22	44	AT_Greenwood 2500EAW.AC2	4/6-20/4
4	L02	Bedroom 5	31	22	45	AT_Greenwood 2500EAW.AC2	4/6-20/4
5	L02	Bedroom 6	32	23	45	AT_Greenwood 2500EAW.AC2	4/6-20/4
6	L02	Bedroom 7	31	22	44	AT_Greenwood 2500EAW.AC2	4/6-20/4

TABLE 11 – INTERNAL NOISE LEVELS (NORTH WEST FAÇADE)

7 ASSESSMENT OF INTERNAL COMMERCIAL NOISE

The ground floor area of D1 is to continue to be used as a commercial unit following the redevelopment and introduction of residential dwellings on the upper floors. Therefore, there is a requirement to assess the potential impact of noise from the ground floor commercial unit upon the proposed dwellings.

Following discussions with the client, it is understood that the proposed use of the ground floor commercial unit will be as a café / bar, with proposed operating hours up until 00:30hrs.

The sound insulation testing conducted between the ground and intermediate floor, as discussed in Section 5.10 of this report, show an existing sound insulation performance of 57dB (D_{nTw}).

This current performance is considered to be a good level of sound insulation.

BS 8233:2014 recommends indoor noise levels of 35dB(A) during the day-time period and 30dB(A) during the night-time period.

It is therefore expected, assuming that the noise within the ground floor commercial unit does not exceed 92dB(A) during the daytime period, and 87dB(A) during the night-time period, that the recommended noise levels presented in BS 8233:2014 will not be exceeded. For context, a noise level of 87dB(A) would be considered to be much higher than experienced within a typical small bar or restaurant premises.

It may be advisable to install a noise level limiter system within the ground floor premises to ensure these noise levels are not being breached.

8 CONCLUSIONS & RECOMMENDATIONS

Noise Control Solutions Limited (NCSL) have been commissioned by Mr Lee Mossop to undertake a noise impact assessment for the proposed residential development at 71 Lowther Street, Whitehaven, CA28 7AH. The development comprises the conversion of the existing vacant building into eight residential HMO bedrooms and a ground floor commercial space. Due to the sensitive nature of the proposed residential dwellings, a noise impact assessment is required.

This assessment has been prepared to accompany the relevant planning application, which is to be considered by Copeland Borough Council (CBC). The scope of this application is the conversion of a commercial premises into an 8-bed HMO with a café / bar located on the ground floor level.

The proposed development requires the assessment of sound from a number of sources, using several guidance documents. The various acoustic consideration for the development are summarised below:

1. Noise received within the proposed residential dwellings due to existing road traffic. It is proposed that this will be assessed following the guidance provided within BS 8233:2014 (Source Reference 'S1').

2. Noise received within the proposed residential dwellings due to proposed commercial noise sources located within the ground floor commercial unit. It is proposed that this will be assessed following the guidance provided within BS 8233:2014 (Source Reference 'S2').

The noise impact assessment includes data from an ambient sound level survey which was conducted between Tuesday 1st July 2025 and Thursday 3rd July 2025.

The results of this acoustic survey have been used to produce a series of mitigation measures, which are shown in Section 6.4 of this report. These mitigation measures have been detailed to ensure that the indoor sound levels within the proposed dwellings meet with the guideline sound levels set-out in BS 8233:2014.

It is understood that the ground floor area of D1 will remain as a commercial unit. In order to assess the potential impact of noise from the ground floor commercial unit upon the proposed dwellings, sound insulation testing has been conducted by NCSL. This results in an existing weighted sound reduction performance of 57dB D_{nTw}.

With this level of sound insulation performance, it is not expected that the proposed ground floor café / bar premises will result in an adverse noise impact to the residential dwellings located on the upper floors, based upon the internal noise level guidance provided within BS 8233:2014. This assumes that the noise level within the ground floor unit does not exceed 92dB(A) during the daytime period and 87dB(A) during the night-time period. It is expected that a café / bar premises will exhibit significantly lower noise levels than this, with literature sources suggesting an estimate of 75-80 dB(A) (Red Book of Acoustics, SoundPLAN source library).

Where the recommendations stated in this report are followed, the internal acoustic environment, in terms of the internal noise level, is expected to meet with the requirements BS 8233:2014.

Based upon the findings of this assessment, it is the recommendation of NCSL that this planning application is approved in relation to noise impact.

The design specifications provided by NCSL have been considered only from an acoustic perspective. Any other requirements (such as fire, structural, building conservation etc) should be assessed by a suitable consultant.

Any recommendations contained within this report should be approved by the relevant authority before any work commences.

9 UNCERTAINTY

All measurements within this report have been taken under repeatable conditions and therefore any uncertainty in the result will be low.

To reduce measurement uncertainty, the following steps have been taken.

- The background noise measurements were undertaken during dry weather and with wind speeds of less than 5m/s.
- The results of each measurement period were reported to the nearest 0.1dB.
- Noise measurements were made using one Class 1, integrating sound level meter.

All noise impact assessments and similar acoustic assessments inherently rely upon estimations and assumptions. This report should therefore be considered within this context.

APPENDIX A: ACOUSTIC SURVEY DATA

A1: ML1

Time	LAeq	LAF90.0%	LAF10.0%	LAFmax	LAFmin	LZeq	LCeq
10:15:00	63	54.5	66.4	75.2	47.3	76.2	74.1
10:30:00	63.8	54.2	66.7	83	48	76.1	74.2
10:45:00	64.4	54.4	66	86.5	47.1	77.3	75.3
11:00:00	63.6	54.4	66.8	79.7	47.7	77.6	75.9
11:15:00	63.4	54	65.7	89.3	46.2	74.6	72.6
11:30:00	61.7	52.4	65.1	83.6	46.6	75.1	72.9
11:45:00	62.3	52.9	66	75.3	46.6	75.4	73.3
12:00:00	60.9	53.3	64	73.9	48.6	75	72.5
12:15:00	62.7	53.4	66.1	78.5	46.2	76.2	74.1
12:30:00	62.5	53.3	64.8	84.9	47.6	75.2	73.1
12:45:00	62	52.8	65.9	75.9	47.6	76	73.8
13:00:00	61.9	52.7	65.8	77.7	47.2	75.2	73
13:15:00	63.5	54	66.9	79.1	48.7	76.2	74
13:30:00	62	54.6	65.1	75.4	47.2	76.4	74.2
13:45:00	62.3	53.5	66.3	75.9	46.1	74.8	72.9
14:00:00	62.5	52.7	66.3	78.6	46.8	75.6	73.7
14:15:00	64.3	53.3	67.2	86.3	46.5	74.8	73.1
14:30:00	65.2	54.3	67.4	84.5	45.5	77.4	75.9
14:45:00	62.2	53.4	66.1	77.2	45.2	73.5	71.7
15:00:00	62.4	52.2	66.1	81.7	44.8	74.1	72.3
15:15:00	62.5	53.3	66.2	74.8	46.3	77.5	75.5
15:30:00	62.6	54.8	66.1	78.8	49.1	75.1	72.9
15:45:00	62.1	51.8	66.1	76.5	46.2	74.2	72.1
16:00:00	63.2	53.8	67.1	77.6	47.5	74.9	73.1
16:15:00	65.1	55.4	67.9	87.6	48.4	77.5	75.9
16:30:00	62	54.3	65.9	72.5	47	74.6	72.3
16:45:00	62.2	52	66.3	75.1	45.6	74.3	72.3
17:00:00	64.7	55.3	68.3	81.2	48.7	78.8	76.9
17:15:00	64.4	54.5	67.8	77	48.4	74.8	72.9
17:30:00	67.1	56.4	71.3	78.5	49.8	75.4	74
17:45:00	68.7	59.9	72.3	81.3	52.8	77.2	75.5
18:00:00	66.4	55.3	70.5	76.9	49.3	76.6	74.6
18:15:00	67.2	54.6	67.6	91.2	46.3	75.3	73.2
18:30:00	64.4	54.7	68.4	76.2	46.9	75	73.6
18:45:00	64.9	53.8	69.7	74.5	47.8	73.6	72.1
19:00:00	65	54.2	68.4	85.3	47.3	75.1	73
19:15:00	63	54	67.5	73.1	48.6	74.8	73

19:30:00	64.2	53.7	68.4	79.1	47.4	72.3	70.7
19:45:00	64.5	53.7	68.3	81.6	47.2	74.6	73.1
20:00:00	62.2	51.1	66.2	77.9	41.1	72.8	71.3
20:15:00	63.4	50.2	68	78.5	38.4	73.6	72
20:30:00	62.1	50	65.7	79.9	41.7	70.5	69.1
20:45:00	61.9	49.7	66.6	73.5	40.8	70.9	69.6
21:00:00	62.3	48.9	66.5	78	40.1	71.9	69.4
21:15:00	61.4	50.5	65.5	74.5	41.1	70.7	69.2
21:30:00	62	49.7	66.4	77.9	41.4	73	71.2
21:45:00	61.2	48.8	65.2	77.8	40.6	70.3	68.9
22:00:00	61.7	45.9	65.7	77.8	36.5	67.8	66.4
22:15:00	60.9	44.5	64.1	78.9	34.2	70.2	68.4
22:30:00	61.3	43.4	64.5	84.7	33.4	67.3	66.1
22:45:00	63.5	40	62.1	90.5	32.7	68	66.9
23:00:00	59.4	41.3	62.8	78.6	32.5	68.9	66.5
23:15:00	58.5	37.7	61	77.5	32.6	71.5	69
23:30:00	56.7	36.6	57.7	75.7	31.1	64.3	63
23:45:00	49	32	52.9	65.3	30.1	59.8	58.3
00:00:00	56.4	32.6	56.4	75.8	30	62.4	61.2
00:15:00	52.5	31.2	53.2	71.1	29.4	63.7	62.4
00:30:00	55.6	31.2	57.8	74.7	29.7	69.8	67.9
00:45:00	52.6	31.5	52.1	75.4	29.9	58.9	57.7
01:00:00	43.5	30.6	43.6	62.7	29.5	54.6	50.9
01:15:00	51.3	30.8	48.9	74.7	29.3	56.2	54.4
01:30:00	48.4	30.2	45.4	72.5	29.3	58.8	57.6
01:45:00	51.8	31.4	52.6	74.2	29.5	56.9	55
02:00:00	50.3	33.1	49.4	69.9	30.7	58.8	53.6
02:15:00	50.3	32.1	48.2	72.8	30.6	58.8	54.5
02:30:00	52.2	33.6	54.5	71.6	31.2	65.1	62.2
02:45:00	49	34	50.5	69.6	31.1	58.3	49.9
03:00:00	55.7	34.2	54.4	76.5	31.4	66.7	64.2
03:15:00	52.3	39.5	54	78.8	33.3	63.9	61
03:30:00	52	39.1	55.3	69.8	33.4	60.2	54.6
03:45:00	53.1	40.7	55	74.2	34.3	59	53.2
04:00:00	52.2	39.1	53.8	70.4	33.4	61	53.9
04:15:00	54.2	39	55.1	75.8	33.8	66.4	62.4
04:30:00	51.5	36.8	52.3	71.7	32.7	64.5	57.5
04:45:00	54.9	40.3	57.4	73.8	33.1	65.3	61.8
05:00:00	58.2	42.1	61	78.7	34.8	65.1	61.8
05:15:00	54.8	40.1	56.3	74.5	35.7	61.7	59.5
05:30:00	58.7	42.3	61.5	78.1	36.4	74.1	72.5
05:45:00	59.7	42.9	60.8	79.9	36.4	69.1	66.2
06:00:00	60.2	44.2	61.7	78.5	38.5	70.2	65.6
06:15:00	61.1	46.7	64.2	76	40.2	71.7	69.6
06:30:00	61.7	47.2	65.6	79.5	39	69	67.2

06:45:00	62	50.4	66.3	78.2	40.6	72.4	70.6
07:00:00	61.1	49.9	64.6	79.1	40.6	70.1	68.4
07:15:00	63.2	50.3	66.6	80.6	39.9	72.6	71
07:30:00	63.5	52.5	68.3	77.9	43.8	72.4	70.6
07:45:00	63.3	51.4	67.4	78.9	45.1	73.9	72
08:00:00	63.9	53.9	67.8	79.6	45.1	76.1	74.5
08:15:00	64.1	53.2	68.3	78.9	45.8	73.8	71.8
08:30:00	63	52.2	67.6	75.4	45	72.3	70.7
08:45:00	63.8	53.4	67.8	79.4	46.7	76	74.6
09:00:00	64.7	54.3	68.5	82.6	45.8	73.2	71.5
09:15:00	64.6	53.6	68.4	85.7	46.4	76.5	74.4
09:30:00	65.2	55.7	67.9	85.2	48.2	77.2	75.7
09:45:00	62.4	51.9	66.4	76	42.6	76.7	75
10:00:00	64.1	53.6	67.3	86.8	47	75.4	73.4
10:15:00	62.6	53.6	66.6	74.6	48.5	74.7	71.9
10:30:00	67.3	58.1	68.7	87.9	50.3	77.1	74.8
10:45:00	63.9	55.7	67.2	81.2	48.2	77.5	74.5
11:00:00	61.5	53.6	65.2	76.8	47.5	76.1	72.3
11:15:00	62.7	53.6	66.2	77.9	49.3	77.9	73.5
11:30:00	64.2	54.1	67.3	85	49.7	79.3	73.9
11:45:00	63.8	55	67.2	76.3	44.8	79.3	75.3
12:00:00	65.4	55.9	67.3	92.6	49	79	74.8
12:15:00	64.4	54.5	67.1	87.6	49.2	79.9	75.1
12:30:00	64.9	55.8	68.3	73.2	49.8	80	75.6
12:45:00	63.8	53.8	66.8	78.8	48.1	79.2	74.8
13:00:00	62.7	53	66.2	81.1	47.5	78.4	74.4
13:15:00	63.9	54.8	65.9	82.4	46.7	78.5	75.4
13:30:00	65.3	53.3	66.9	85.6	48.1	79.1	76.7
13:45:00	62.6	52.7	66.5	76.8	47	77.1	73.2
14:00:00	63.5	52.9	67	78.8	46	78	75.8
14:15:00	67.6	53.9	68.2	85.9	48	80.5	79.6
14:30:00	66	54.5	68	85.8	49.3	79.1	77.4
14:45:00	62.8	52.3	66.4	76.5	46.7	77.1	74.4
15:00:00	63.2	53.7	66.8	80	48.7	77.9	75.5
15:15:00	62.1	53.1	66	74.4	48.4	74.4	71.7
15:30:00	62.1	52.4	66.2	72.4	45.4	75.3	71.2
15:45:00	62.2	53.8	65.7	77.5	46.8	81.5	72.5
16:00:00	61.8	53.9	65.5	73.8	47.2	80.6	75.1
16:15:00	62.6	53.6	65.8	78.9	45.7	82.6	74.3
16:30:00	63.6	53.4	67.4	79.1	47.5	79.8	74.1
16:45:00	62.6	54.6	66.8	74.8	48.5	81.3	73.7
17:00:00	64.2	52.6	66.7	81.8	46.4	81.6	76.4
17:15:00	62.4	52.8	66.3	77	47.1	78.3	74
17:30:00	62.4	54.4	65.9	76.8	47.6	76.4	72.5
17:45:00	63.4	55.8	66.2	78.4	48.8	79.7	75.6

18:00:00	62.1	53.4	65	80.5	47.5	80.4	75
18:15:00	61.5	53.3	65.2	74.2	47.2	78.6	72.2
18:30:00	63.3	53.8	67	79.2	47.1	79.5	73.1
18:45:00	62.4	53.6	66.3	75.5	47.2	79.5	75.2
19:00:00	62.4	54	66.3	78	48.5	79.1	73.5
19:15:00	63	53.3	66.3	81	46.3	78.7	72.1
19:30:00	63.8	53.3	66.4	88.4	45.1	77.6	72.6
19:45:00	64.3	53.4	68.3	79.7	43.7	78	73.3
20:00:00	62.6	51.4	67.4	77.6	46.8	77.5	72.2
20:15:00	61.3	53.5	64.9	76.9	47	77.5	73.1
20:30:00	63.1	50.8	68.2	75.5	44	73.2	70.6
20:45:00	63.2	50.6	67.3	82.5	44.7	73.1	70.4
21:00:00	63.1	50.7	67.2	82.8	44	74.6	71.5
21:15:00	64.3	49.4	67.7	84.7	41.1	75.8	73.7
21:30:00	67.4	51.1	66.9	95.6	46.8	74.5	72
21:45:00	64.5	48.1	65.8	90.5	43.2	71.9	69.4
22:00:00	63.3	49.1	67.2	79.2	43.4	72.4	69.1
22:15:00	71.8	48.6	66.2	98	42	81.9	81.3
22:30:00	61.1	47.7	65.3	77.9	40	72.1	69.7
22:45:00	60.8	44.7	64	81.5	38.9	70.2	67.5
23:00:00	61	42.7	63.4	82.9	36.9	71.9	70.7
23:15:00	58.1	41.5	60.3	77	35.3	68	65.2
23:30:00	57.4	36.9	60.1	75.5	33.7	67.7	64.5
23:45:00	58	34.9	57.9	76.2	32	66.4	63.7
00:00:00	56.2	35	55.7	74.2	32.1	67.3	63.6
00:15:00	60.4	34	55.9	82.3	31.8	73.6	71.7
00:30:00	52.1	33.3	51.2	74.8	32	64.2	58.4
00:45:00	52.8	34.3	53.3	71.9	32	64.3	60.1
01:00:00	50.6	32.9	49.8	70	31.2	63.7	60.3
01:15:00	50.7	32.7	50.5	70.9	31.1	60.9	58.2
01:30:00	45.9	31.5	45	67.8	30.5	57.4	52.8
01:45:00	42	31.4	42.9	61.7	30.3	56.3	49.7
02:00:00	42.8	30.8	37.3	70.8	29.9	54.7	46.3
02:15:00	46.9	31.8	49.9	67.1	30.4	59.7	57.4
02:30:00	44	32.3	43.9	63.7	30.9	60.4	54.6
02:45:00	51.3	34.5	51.8	71.4	31.2	61.1	55.1
03:00:00	53.6	37.1	53.1	74.4	31.2	66.7	62.7
03:15:00	48.4	37.8	50.4	71.2	32.4	61.6	51.2
03:30:00	52.3	39.6	53.8	71	33.4	61.9	58
03:45:00	56.1	42.7	58.3	75.5	37.2	65.1	61.9
04:00:00	55.9	41.2	59.2	72.1	34.4	63.4	59.1
04:15:00	54.9	38.2	57.5	73.4	32.4	61.6	57.9
04:30:00	55.1	38.7	58.2	71.3	33.5	63.7	58.4
04:45:00	55.5	43.5	57.5	73.8	36.8	63.9	58.6
05:00:00	56.8	43.7	55	80.3	38	73.5	71.1

05:15:00	58.3	43.5	59.4	78.4	35.7	68.8	66.9
05:30:00	58.5	44.2	61.4	78.3	36.7	73.9	72.5
05:45:00	59.1	45.5	62.7	78.2	39.1	70.5	68.7
06:00:00	58.6	45.5	62.8	74.5	40	66.3	64.2
06:15:00	60.8	44	62.5	79.3	37.6	71.3	69.5
06:30:00	60.5	46.5	64.5	78.7	37.9	69	67.8
06:45:00	62.1	48.4	64.9	79.3	40.3	74.5	71.9
07:00:00	60	49.6	63.6	73.4	42.3	69.4	67.2
07:15:00	65.2	49.9	66.7	88.6	44.2	73.1	70.8
07:30:00	63.6	52	67.4	88.6	44.2	73.6	71
07:45:00	64.7	52	68.7	83	45	76.2	74.6
08:00:00	64.1	53.1	68.4	77.8	45.8	74.8	72.5
08:15:00	62.4	51.9	67.1	75.7	46.1	72.2	70.2
08:30:00	64	51.7	68.7	76.2	46	76.4	75.1
08:45:00	64.3	54.4	68.5	78.3	46.4	76	72.4
08:58:42	63.6	53.9	67.8	75.9	49	74.4	72.4

APPENDIX B: NOISE BREAK-IN CALCULATIONS

APPENDIX B

BS8233:2014 INTERNAL NOISE CALCULATION

FORM VERSION: 2.3

NOISE CONTROL SOLUTIONS LIMITED

Project Details	
NCSL Peoject Reference:	1383
Plot Reference:	L01
Room Reference:	Bedroom 1
Façade Reference:	NA

Room Details	
Length (m)	4.3
Width (m)	5.5
Height (m)	3
Surface Area (m^2)	106.1
Volume (m^3)	70.95
Reverberation Time (s)	0.5

Vent Specification:	AT_Greenwood 2500EAW.AC2	No:	1
Wall Specification:	Two leaves of 102.5mm brickwork, 50mm cavity,rigid wall ties	Area:	20
Glazing Specification:	4/6-20/4	Area:	4
Ceiling / Roof Specification:	Pitched Roof	Area:	0

	REF	125	250	500	1000	2000	Sum
$L_{eq,ff}$ Daytime External noise level (free-field), dB(Z)	$A_{day,Leq,Ext}$	63.1	57.6	57.2	57.0	53.8	**65.9**
$L_{eq,ff}$ Night-time External noise level (free-field), dB(Z)	$A_{night,Leq,Ext}$	49.1	48.6	48.2	51.0	46.8	**56.0**
$L_{Max,ff}$ Night-time External noise level (free-field), dB(Z)	$A_{night,Max,Ext}$	72.1	70.6	71.2	72.0	69.8	**78.2**
$D_{n,e}$ Sound reduction of vent	-	42	40	37	45	53	-
$(A_0/S)\ 10^{\wedge(-Dn,e/10)}$	B	0.00003	0.00005	0.00008	0.00001	0.00000	-
R_{wi} Sound reduction of window	-	21	17	25	35	37	-
$(S_{wi}/S_f)\ 10^{\wedge(-Rwi/10)}$	C	0.00132	0.00333	0.00053	0.00005	0.00003	-
R_{ew} Sound reduction of external wall	-	37	42	52	60	63	-
$(S_{ew}/S_f)\ 10^{\wedge(-Rew/10)}$	D	0.00017	0.00005	0.00001	0.00000	0.00000	-
R_{rr} Sound reduction of roof	-	40	48	54	59	56	-
$(S_{rr}/S_f)\ 10^{\wedge(-Rrr/10)}$	E	0.00000	0.00000	0.00000	0.00000	0.00000	-
10*log(B+C+D+E)	F	-28.2	-24.7	-32.1	-41.8	-44.4	-
A Room Absorption (m^2)	-	22.8	22.8	22.8	22.8	22.8	-
10*log(S/A)	G	0.2	0.2	0.2	0.2	0.2	-
A-weighting	A_{weight}	-16.1	-8.6	-3.2	0.0	1.2	-
L_{Aeq} Daytime Internal noise level, dB(A)	A_n+F+G+3+ A_{weight}	22.0	27.6	25.1	18.4	13.8	**31**
L_{Aeq} Night-time Internal noise level, dB(A)	A_n+F+G+3+ A_{weight}	8.0	18.6	16.1	12.4	6.8	**21**
L_{AMax} Night-time Internal noise level, dB(A)	A_n+F+G+3+ A_{weight}	31.0	40.6	39.1	33.4	29.8	**44**

APPENDIX B

BS8233:2014 INTERNAL NOISE CALCULATION

FORM VERSION: 2.3

NOISE CONTROL SOLUTIONS LIMITED

Project Details	
NCSL Peoject Reference:	1383
Plot Reference:	L01
Room Reference:	Bedroom 2
Façade Reference:	NA

Room Details	
Length (m)	4.2
Width (m)	3.8
Height (m)	3
Surface Area (m^2)	79.92
Volume (m^3)	47.88
Reverberation Time (s)	0.5

Vent Specification:	AT_Greenwood 2500EAW.AC2	**No:**	1
Wall Specification:	Two leaves of 102.5mm brickwork, 50mm cavity,rigid wall ties	**Area:**	20
Glazing Specification:	4/6-20/4	**Area:**	2
Ceiling / Roof Specification:	Pitched Roof	**Area:**	0

	REF	125	250	500	1000	2000	Sum
$L_{eq,ff}$ Daytime External noise level (free-field), dB(Z)	$A_{day,Leq,Ext}$	63.1	57.6	57.2	57.0	53.8	**65.9**
$L_{eq,ff}$ Night-time External noise level (free-field), dB(Z)	$A_{night,Leq,Ext}$	49.1	48.6	48.2	51.0	46.8	**56.0**
$L_{Max,ff}$ Night-time External noise level (free-field), dB(Z)	$A_{night,Max,Ext}$	72.1	70.6	71.2	72.0	69.8	**78.2**
$D_{n,e}$ Sound reduction of vent	-	42	40	37	45	53	-
$(A_0/S)\ 10^{\wedge(-Dn,e/10)}$	**B**	0.00003	0.00005	0.00009	0.00001	0.00000	-
R_{wi} Sound reduction of window	-	21	17	25	35	37	-
$(S_{wi}/S_f)\ 10^{\wedge(-Rwi/10)}$	**C**	0.00072	0.00181	0.00029	0.00003	0.00002	-
R_{ew} Sound reduction of external wall	-	37	42	52	60	63	-
$(S_{ew}/S_f)\ 10^{\wedge(-Rew/10)}$	**D**	0.00018	0.00006	0.00001	0.00000	0.00000	-
R_{rr} Sound reduction of roof	-	40	48	54	59	56	-
$(S_{rr}/S_f)\ 10^{\wedge(-Rrr/10)}$	**E**	0.00000	0.00000	0.00000	0.00000	0.00000	-
10*log(B+C+D+E)	**F**	-30.3	-27.2	-34.2	-43.7	-46.8	-
A Room Absorption (m^2)	-	15.4	15.4	15.4	15.4	15.4	-
10*log(S/A)	**G**	1.5	1.5	1.5	1.5	1.5	-
A-weighting	A_{weight}	-16.1	-8.6	-3.2	0.0	1.2	-
L_{Aeq} Daytime Internal noise level, dB(A)	A_n+F+G+3+ A_{weight}	21.2	26.4	24.3	17.9	12.8	**30**
L_{Aeq} Night-time Internal noise level, dB(A)	A_n+F+G+3+ A_{weight}	7.2	17.4	15.3	11.9	5.8	**21**
L_{AMax} Night-time Internal noise level, dB(A)	A_n+F+G+3+ A_{weight}	30.2	39.4	38.3	32.9	28.8	**43**

APPENDIX B

BS8233:2014 INTERNAL NOISE CALCULATION

FORM VERSION: 2.3

NOISE CONTROL SOLUTIONS LIMITED

Project Details	
NCSL Peoject Reference:	1383
Plot Reference:	L01
Room Reference:	Bedroom 3
Façade Reference:	NA

Room Details	
Length (m)	5.5
Width (m)	4.1
Height (m)	3
Surface Area (m^2)	102.7
Volume (m^3)	67.65
Reverberation Time (s)	0.5

Vent Specification:	AT_Greenwood 2500EAW.AC2	**No:**	1
Wall Specification:	Two leaves of 102.5mm brickwork, 50mm cavity,rigid wall ties	**Area:**	20
Glazing Specification:	4/6-20/4	**Area:**	4
Ceiling / Roof Specification:	Pitched Roof	**Area:**	0

	REF	125	250	500	1000	2000	Sum
$L_{eq,ff}$ Daytime External noise level (free-field), dB(Z)	**$A_{day,Leq,Ext}$**	63.1	57.6	57.2	57.0	53.8	**65.9**
$L_{eq,ff}$ Night-time External noise level (free-field), dB(Z)	**$A_{night,Leq,Ext}$**	49.1	48.6	48.2	51.0	46.8	**56.0**
$L_{Max,ff}$ Night-time External noise level (free-field), dB(Z)	**$A_{night,Max,Ext}$**	72.1	70.6	71.2	72.0	69.8	**78.2**
$D_{n,e}$ Sound reduction of vent	-	42	40	37	45	53	-
$(A_0/S)\ 10^{\wedge(-Dn,e/10)}$	**B**	0.00003	0.00005	0.00008	0.00001	0.00000	-
R_{wi} Sound reduction of window	-	21	17	25	35	37	-
$(S_{wi}/S_f)\ 10^{\wedge(-Rwi/10)}$	**C**	0.00132	0.00333	0.00053	0.00005	0.00003	-
R_{ew} Sound reduction of external wall	-	37	42	52	60	63	-
$(S_{ew}/S_f)\ 10^{\wedge(-Rew/10)}$	**D**	0.00017	0.00005	0.00001	0.00000	0.00000	-
R_{rr} Sound reduction of roof	-	40	48	54	59	56	-
$(S_{rr}/S_f)\ 10^{\wedge(-Rrr/10)}$	**E**	0.00000	0.00000	0.00000	0.00000	0.00000	-
10*log(B+C+D+E)	**F**	-28.2	-24.7	-32.1	-41.8	-44.4	-
A Room Absorption (m^2)	-	21.8	21.8	21.8	21.8	21.8	-
10*log(S/A)	**G**	0.4	0.4	0.4	0.4	0.4	-
A-weighting	**A_{weight}**	-16.1	-8.6	-3.2	0.0	1.2	-
L_{Aeq} Daytime Internal noise level, dB(A)	**A_n+F+G+3+ A_{weight}**	22.2	27.8	25.3	18.6	14.0	**31**
L_{Aeq} Night-time Internal noise level, dB(A)	**A_n+F+G+3+ A_{weight}**	8.2	18.8	16.3	12.6	7.0	**22**
L_{AMax} Night-time Internal noise level, dB(A)	**A_n+F+G+3+ A_{weight}**	31.2	40.8	39.3	33.6	30.0	**44**

APPENDIX B

BS8233:2014 INTERNAL NOISE CALCULATION

FORM VERSION: 2.3

NOISE CONTROL SOLUTIONS LIMITED

Project Details	
NCSL Peoject Reference:	1383
Plot Reference:	L02
Room Reference:	Bedroom 5
Façade Reference:	NA

Room Details	
Length (m)	4.6
Width (m)	4.3
Height (m)	3
Surface Area (m^2)	92.96
Volume (m^3)	59.34
Reverberation Time (s)	0.5

Vent Specification:	AT_Greenwood 2500EAW.AC2	**No:**	1
Wall Specification:	Two leaves of 102.5mm brickwork, 50mm cavity,rigid wall ties	**Area:**	20
Glazing Specification:	4/6-20/4	**Area:**	4
Ceiling / Roof Specification:	Pitched Roof	**Area:**	19.78

	REF	125	250	500	1000	2000	Sum
$L_{eq,ff}$ Daytime External noise level (free-field), dB(Z)	**$A_{day,Leq,Ext}$**	63.1	57.6	57.2	57.0	53.8	**65.9**
$L_{eq,ff}$ Night-time External noise level (free-field), dB(Z)	**$A_{night,Leq,Ext}$**	49.1	48.6	48.2	51.0	46.8	**56.0**
$L_{Max,ff}$ Night-time External noise level (free-field), dB(Z)	**$A_{night,Max,Ext}$**	72.1	70.6	71.2	72.0	69.8	**78.2**
$D_{n,e}$ Sound reduction of vent	-	42	40	37	45	53	-
$(A_0/S)\ 10^{\wedge(-Dn,e/10)}$	**B**	0.00002	0.00003	0.00004	0.00001	0.00000	-
R_{wi} Sound reduction of window	-	21	17	25	35	37	-
$(S_{wi}/S_f)\ 10^{\wedge(-Rwi/10)}$	**C**	0.00073	0.00182	0.00029	0.00003	0.00002	-
R_{ew} Sound reduction of external wall	-	37	42	52	60	63	-
$(S_{ew}/S_f)\ 10^{\wedge(-Rew/10)}$	**D**	0.00009	0.00003	0.00000	0.00000	0.00000	-
R_{rr} Sound reduction of roof	-	40	48	54	59	56	-
$(S_{rr}/S_f)\ 10^{\wedge(-Rrr/10)}$	**E**	0.00005	0.00001	0.00000	0.00000	0.00000	-
10*log(B+C+D+E)	**F**	-30.6	-27.2	-34.7	-44.4	-46.8	-
A Room Absorption (m^2)	-	19.1	19.1	19.1	19.1	19.1	-
10*log(S/A)	**G**	3.6	3.6	3.6	3.6	3.6	-
A-weighting	**A_{weight}**	-16.1	-8.6	-3.2	0.0	1.2	-
L_{Aeq} Daytime Internal noise level, dB(A)	**A_n+F+G+3+ A_{weight}**	23.0	28.4	25.9	19.2	14.8	**31**
L_{Aeq} Night-time Internal noise level, dB(A)	**A_n+F+G+3+ A_{weight}**	9.0	19.4	16.9	13.2	7.8	**22**
L_{AMax} Night-time Internal noise level, dB(A)	**A_n+F+G+3+ A_{weight}**	32.0	41.4	39.9	34.2	30.8	**45**

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BS8233:2014 INTERNAL NOISE CALCULATION

FORM VERSION: 2.3

NOISE CONTROL SOLUTIONS LIMITED

Project Details	
NCSL Peoject Reference:	1383
Plot Reference:	L02
Room Reference:	Bedroom 6
Façade Reference:	NA

Room Details	
Length (m)	4.3
Width (m)	3.9
Height (m)	3
Surface Area (m^2)	82.74
Volume (m^3)	50.31
Reverberation Time (s)	0.5

Vent Specification:	AT_Greenwood 2500EAW.AC2	**No:**	1
Wall Specification:	Two leaves of 102.5mm brickwork, 50mm cavity,rigid wall ties	**Area:**	20
Glazing Specification:	4/6-20/4	**Area:**	4
Ceiling / Roof Specification:	Pitched Roof	**Area:**	16.77

	REF	125	250	500	1000	2000	Sum
$L_{eq,ff}$ Daytime External noise level (free-field), dB(Z)	**$A_{day,Leq,Ext}$**	63.1	57.6	57.2	57.0	53.8	**65.9**
$L_{eq,ff}$ Night-time External noise level (free-field), dB(Z)	**$A_{night,Leq,Ext}$**	49.1	48.6	48.2	51.0	46.8	**56.0**
$L_{Max,ff}$ Night-time External noise level (free-field), dB(Z)	**$A_{night,Max,Ext}$**	72.1	70.6	71.2	72.0	69.8	**78.2**
$D_{n,e}$ Sound reduction of vent	-	42	40	37	45	53	-
$(A_0/S)\ 10^{\wedge(-Dn,e/10)}$	**B**	0.00002	0.00003	0.00005	0.00001	0.00000	-
R_{wi} Sound reduction of window	-	21	17	25	35	37	-
$(S_{wi}/S_f)\ 10^{\wedge(-Rwi/10)}$	**C**	0.00078	0.00196	0.00031	0.00003	0.00002	-
R_{ew} Sound reduction of external wall	-	37	42	52	60	63	-
$(S_{ew}/S_f)\ 10^{\wedge(-Rew/10)}$	**D**	0.00010	0.00003	0.00000	0.00000	0.00000	-
R_{rr} Sound reduction of roof	-	40	48	54	59	56	-
$(S_{rr}/S_f)\ 10^{\wedge(-Rrr/10)}$	**E**	0.00004	0.00001	0.00000	0.00000	0.00000	-
10*log(B+C+D+E)	**F**	-30.3	-26.9	-34.4	-44.1	-46.5	-
A Room Absorption (m^2)	-	16.2	16.2	16.2	16.2	16.2	-
10*log(S/A)	**G**	4.0	4.0	4.0	4.0	4.0	-
A-weighting	**A_{weight}**	-16.1	-8.6	-3.2	0.0	1.2	-
L_{Aeq} Daytime Internal noise level, dB(A)	**A_n+F+G+3+ A_{weight}**	23.7	29.1	26.6	19.9	15.5	**32**
L_{Aeq} Night-time Internal noise level, dB(A)	**A_n+F+G+3+ A_{weight}**	9.7	20.1	17.6	13.9	8.5	**23**
L_{AMax} Night-time Internal noise level, dB(A)	**A_n+F+G+3+ A_{weight}**	32.7	42.1	40.6	34.9	31.5	**45**

APPENDIX B

BS8233:2014 INTERNAL NOISE CALCULATION

FORM VERSION: 2.3

NOISE CONTROL SOLUTIONS LIMITED

Project Details	
NCSL Peoject Reference:	1383
Plot Reference:	L02
Room Reference:	Bedroom 7
Façade Reference:	NA

Room Details	
Length (m)	5
Width (m)	4.2
Height (m)	3
Surface Area (m^2)	97.2
Volume (m^3)	63
Reverberation Time (s)	0.5

Vent Specification:	AT_Greenwood 2500EAW.AC2	No:	1
Wall Specification:	Two leaves of 102.5mm brickwork, 50mm cavity,rigid wall ties	Area:	20
Glazing Specification:	4/6-20/4	Area:	4
Ceiling / Roof Specification:	Pitched Roof	Area:	21

	REF	125	250	500	1000	2000	Sum
$L_{eq,ff}$ Daytime External noise level (free-field), dB(Z)	$A_{day,Leq,Ext}$	63.1	57.6	57.2	57.0	53.8	**65.9**
$L_{eq,ff}$ Night-time External noise level (free-field), dB(Z)	$A_{night,Leq,Ext}$	49.1	48.6	48.2	51.0	46.8	**56.0**
$L_{Max,ff}$ Night-time External noise level (free-field), dB(Z)	$A_{night,Max,Ext}$	72.1	70.6	71.2	72.0	69.8	**78.2**
$D_{n,e}$ Sound reduction of vent	-	42	40	37	45	53	-
$(A_0/S)\ 10^{\wedge(-Dn,e/10)}$	B	0.00002	0.00002	0.00004	0.00001	0.00000	-
R_{wi} Sound reduction of window	-	21	17	25	35	37	-
$(S_{wi}/S_f)\ 10^{\wedge(-Rwi/10)}$	C	0.00071	0.00177	0.00028	0.00003	0.00002	-
R_{ew} Sound reduction of external wall	-	37	42	52	60	63	-
$(S_{ew}/S_f)\ 10^{\wedge(-Rew/10)}$	D	0.00009	0.00003	0.00000	0.00000	0.00000	-
R_{rr} Sound reduction of roof	-	40	48	54	59	56	-
$(S_{rr}/S_f)\ 10^{\wedge(-Rrr/10)}$	E	0.00005	0.00001	0.00000	0.00000	0.00000	-
10*log(B+C+D+E)	F	-30.7	-27.4	-34.8	-44.5	-46.9	-
A Room Absorption (m^2)	-	20.3	20.3	20.3	20.3	20.3	-
10*log(S/A)	G	3.5	3.5	3.5	3.5	3.5	-
A-weighting	A_{weight}	-16.1	-8.6	-3.2	0.0	1.2	-
L_{Aeq} Daytime Internal noise level, dB(A)	A_n+F+G+3+ A_{weight}	22.8	28.1	25.6	19.0	14.5	**31**
L_{Aeq} Night-time Internal noise level, dB(A)	A_n+F+G+3+ A_{weight}	8.8	19.1	16.6	13.0	7.5	**22**
L_{AMax} Night-time Internal noise level, dB(A)	A_n+F+G+3+ A_{weight}	31.8	41.1	39.6	34.0	30.5	**44**

TERMS AND CONDITIONS OF BUSINESS

1. GENERAL

Work done or services undertaken are subject to the terms and conditions detailed below and all other conditions, warranties and representations, expressed or implied are hereby excluded.

2. PRICES

Prices are based on current costs, exchange rates, duty and freight and are subject to change without notice. The quoted price does not cover the cost of attending meetings, telephone calls or email exchanges. This is charged separately at a pro rata hourly rate of £75 per hour.

3. TIMING ESTIMATES

Timing estimates are made in good faith and date from receipt of a written order and full information to enable us to proceed. While NCSL makes every effort to fulfil them, such estimates are subject to unforeseen events and if not maintained, cannot give rise to any claim.

4. CANCELLATION AND RETURNS

Cancellation of orders for services, training or consultancy is only acceptable by prior agreement of NCSL and a charge will normally be made. NCSL reserve the right to cancel any work at any time.

5. CLAIMS

Claims for errors etc should be notified within 10 days of date of receipt.

6. PAYMENT TERMS

Full payment is required before any work is undertaken by NCSL. Failure to comply with the terms of payment may result in delayed delivery of services and a review of the Customer's credit account (if applicable). Should the customer become subject to an administration order, or becomes bankrupt or goes into liquidation, NCSL has a right to cancel any contract and discontinue any work.

7. RETENTION OF TITLE

All reports & data remain the property of NCSL. Under no circumstances will a customer's purchase order override our Retention of Title clause. In the case of software and data, the ownership remains with NCSL. Payment of invoices in full will entitle the customer to use reports or other services under licence until (a) a set expiry date is passed (b) they cease trading. In both instances, the licence shall then revert to NCSL. All measurement data and reports are the sole property of NCSL and shall not be reproduced or distributed without written consent from NCSL.

8. TEST REPORTS

NCSL shall not be liable for any subsequent loss or damage incurred by the client as a result of information supplied in a test report.
Any specifications or targets supplied by NCSL are to be considered as guidance only. No guarantee is offered by NCSL that the meeting of any supplied targets or specifications will solve the relevant issue or prevent future issues.

9. RESPONSIBILITY

Every effort is made to ensure accuracy in description, drawings and other information in correspondence etc but no warranty is given in this respect and NCSL shall not be liable for any error therein. NCSL carries out all tests and/or advises only on the basis that the same are carried out, made or given without any responsibility whether for negligence or otherwise. NCSL and its servants or agents will not be liable for any damage or loss direct or indirect of whatsoever kind, whether or not the same results directly or indirectly from negligence on the part of NCSL or its servants or agents.

10. CONFIDENTIALITY

Unless specifically excluded in the terms of an individual contract between NCSL and its Customer, the following shall apply to all reports, advice, drawings, photographs, specifications or data:

i. The above shall not be disclosed to third parties or used in litigation without the consent of NCSL.
ii. Where NCSL has given consent to disclosure, the Customer shall draw the attention of the third party to these terms of business and the basis on which NCSL undertakes test, reporting and advising. The Customer shall indemnify NCSL for any failure to do so.
iii. The above items are submitted to the Customer as confidential documents. Confidentiality shall continue to apply after completion of the business but shall cease to apply to information or knowledge which may come into the public domain.

11. CONSTRUCTION AND ARBITRATION

The laws of England shall govern all contracts and the parties submit to exclusive jurisdiction of the courts of England, unless otherwise agreed.

12. JOB SPECIFIC TERMS

NCSL will not be held responsible for any adverse impact arising from the introduction of proposed palliative measures. Furthermore, no guarantee is given regarding the effectiveness of any proposed palliative and/or mitigation measures. The client is responsible for any palliative measures, including, but not limited to, the sourcing of suppliers, the quality of installation, the cost of all materials / installation, maintenance and safety. All advice given should be taken as guidance only. It is the responsibility of the client to ensure the safe operation of any mitigation measures, including but not limited to, adequate fire safety and ventilation requirements. NCSL provide no guarantee that adherence to provided specifications will result in no further noise and/or vibration complaints and/or the elimination of noise and/or vibration issues. NCSL do not supply, procure, install or maintain any materials. We reserve the right to publicise the work conducted by NCSL, including, where appropriate, client logos etc. On occasion, work may be conducted by sub-contract partners.