

59 Market St Milnsbridge

Noise Impact Assessment Report
Report 22155.NIA.01

Derek Day
59 Market Street
Milnsbridge
Huddersfield
HD3 4HZ

Report 22155.NIA.01			
Revision History			
First Issue Date: 09/03/2021			
A		D	
B		E	
C		F	
Written by:		Checked by:	Approved by:
John Cane MIOA Acoustic Consultant		Daniel Green MIOA Senior Acoustic Consultant	Kyriakos Papanagiotou MIOA Managing Director
Disclaimer KP Acoustics Ltd. has used reasonable skill and care to complete this technical document, within the terms of its brief and contract with 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 stated scope. This report is confidential to the client and we accept no responsibility to third parties to whom this report, or any part thereof, is made known. KP Acoustics Ltd. accepts no responsibility for data provided by other bodies and no legal liability arising from the use by other persons of data or opinions contained in this report. KP Acoustics Ltd. 2021			

Contents

1.0	INTRODUCTION.....	1
2.0	SITE SURVEYS	1
2.1	Site Description	1
2.2	Environmental Noise Survey Procedure	1
2.3	Measurement Positions	1
2.4	Equipment.....	2
3.0	SOUND INSULATION INVESTIGATION	3
3.1	Procedure.....	3
3.2	Equipment.....	3
4.0	RESULTS.....	4
4.1	Noise Survey.....	4
5.0	NOISE ASSESSMENT GUIDANCE.....	4
5.1	Noise Policy Statement For England 2019	4
5.2	ProPG: Planning and Noise	6
5.3	BS8233:2014	6
5.4	WHO Guidelines for Community Noise (1999)	7
5.5	ANC Residential Design Guide to Acoustics, Ventilation and Overheating	7
6.0	EXTERNAL BUILDING FABRIC SPECIFICATION	8
6.1	Non-Glazed Elements.....	8
6.2	Glazed Elements.....	9
7.0	VENTILATION.....	10
7.1	Ventilation Strategy	10
8.0	NOISE TRANSFER PREDICTIONS	11
8.1	Ground Floor Pub Operations	11
8.2	Direct Noise Transfer to First Floor from Ground Floor Bar	11
9.0	NOISE MITIGATION PROPOSALS	12
9.1	Separating Floor Between Ground and First Floors.....	13
9.2	Mitigation Measures for the Ground Floor Bar	13
10.0	NOISE TRANSFER PREDICTIONS INCLUDING PROPOSED MITIGATION MEASURES.....	15
10.1	Noise Break-in to First Floor from Ground Floor Bar	15
11.0	CONCLUSION.....	16

List of Attachments

22155.TH1-2	Environmental Noise Time Histories
Appendix A	Glossary of Acoustics Terminology
Appendix B1	Direct Noise Transfer Calculations - Existing Floor
Appendix B2	Direct Noise Transfer Calculations - Proposed Floor

1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned by Derek Day, 59 Market Street, Milnsbridge, Huddersfield, HD3 4HZ to assess the suitability of the site at 59 Market St, Milnsbridge, Huddersfield, HD3 4HZ for a residential development in accordance with the provisions of the National Planning Policy Framework and the Noise Policy Statement for England (NPSE).

This report presents the results of the environmental survey undertaken in order to measure prevailing background noise levels and outlines any necessary mitigation measures.

2.0 SITE SURVEYS

2.1 Site Description

The site is bounded by Market Street to the east, with local businesses and residential flats to all other sides. At the time of the survey, the background noise climate was dominated by road traffic noise from Market Street.

2.2 Environmental Noise Survey Procedure

A noise survey was undertaken on the proposed site as shown in Figure 2.1. The locations were chosen in order to collect data representative of the worst-case levels expected on the site due to all nearby sources.

Continuous automated monitoring was undertaken for the duration of the survey between 13:33 on 16/02/2021 and 12:38 on 17/02/2021.

Weather conditions were generally dry with light winds and therefore suitable for the measurement of environmental noise. The measurement procedure complied with ISO 1996-2:2017 Acoustics '*Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels*'.

2.3 Measurement Positions

Measurement positions are as described within Table 2.1 and shown within Figure 2.1.

Icon	Descriptor	Location Description
	Noise Measurement Position 1	The microphone was installed on a window on the 1 st floor of the front, Market Street façade, as shown in Figure 2.1. A correction of 3dB has been applied to account for non-free field conditions
	Noise Measurement Position 2	The microphone was installed on a window on the 1 st floor of the rear façade, as shown in Figure 2.1. A correction of 3dB has been applied to account for non-free field conditions

Table 2.1 Measurement positions and descriptions



Figure 2.1 Site measurement positions (Image Source: Google Maps)

2.4 Equipment

The equipment calibration was verified before and after use and no abnormalities were observed. The equipment used is described within Table 2.2.

Measurement instrumentation		Serial no.	Date	Cert no.
Noise Kit 8	Svantek Type 958A Class 1 Sound Level Meter	59559	26/09/2019	14012947
	MTG MK250 Free-field microphone	10904		
	Preamp Svantek SV12L	33619		
	Svantek External windshield	-	-	-
Noise Kit 9	Svantek Type 958A Class 1 Sound Level Meter	45578	15/07/2020	14012950
	Free-field microphone PCB 377B02	169770		
	Preamp PCB 426E01	128280		
	Svantek External windshield	-	-	-
Larson Davis CAL200 Class 1 Calibrator		8932	11/02/2020	04624/2

Table 2.2 Measurement instrumentation

3.0 SOUND INSULATION INVESTIGATION

In order to assess direct noise transfer from the Ground Floor bar to the proposed residential units above, a sound insulation investigation was undertaken as described below.

3.1 Procedure

High volume pink noise was generated from a loudspeaker within the Ground Floor bar, positioned to obtain a diffuse sound field. A spatial average of the resulting one-third octave band noise levels between 100 Hz and 3150 Hz was obtained by using a moving microphone technique over a minimum period of 15 seconds at each of two positions.

The same measurement procedure was used in the existing room directly above the Ground Floor bar.

The results of the tests were rated in accordance with BS EN ISO 717-1: 1997 '*Rating of sound insulation in buildings and of building elements. Part 1 Airborne sound insulation*'.

3.2 Equipment

The instrumentation used during the sound insulation investigation is shown in Table 2.2 above.

4.0 RESULTS

4.1 Noise Survey

The $L_{Aeq: 5min}$, $L_{Amax: 5min}$, $L_{A10: 5min}$ and $L_{A90: 5min}$ acoustic parameters were measured throughout the duration of the survey. Measured levels are shown as a time history in Figure 22155.TH1-2.

Measured noise levels are representative of noise exposure levels expected to be experienced by all facades of the proposed development, and are shown in Table 4.1.

Time Period	Noise Measurement Position 1 (Measured Noise level – dBA)	Noise Measurement Position 2 (Measured Noise level – dBA)
Daytime $L_{Aeq,16hour}$	72	55
Night-time $L_{Aeq,8hour}$	66	47

Table 4.1 Site average noise levels for daytime and night time

5.0 NOISE ASSESSMENT GUIDANCE

5.1 Noise Policy Statement For England 2019

The National Planning Policy Framework (NPPF) has superseded and replaces Planning Policy Guidance Note 24 (PPG24), which previously covered issues relating to noise and planning in England. Paragraph 170 of the NPPF states that planning policies and decisions should aim to:

- 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. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans

In addition, Paragraph 180 of the NPPF states that *‘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’:*

- 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

The Noise Policy Statement for England (NPSE) was developed by DEFRA and published in March 2010 with the aim to 'Promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development.'

Noise Policy Statement England (NPSE) noise policy aims are as follows:

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

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

The Noise Policy Statement England (NPSE) outlines observed effect levels relating to the above, as follows:

- 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.
- SOAEL – Significant Observed Adverse Effect Level
 - This is the level above which significant adverse effects on health and quality of life occur.

As stated in The Noise Policy Statement England (NPSE), it is not currently possible to have a single objective based measure that defines SOAEL that is applicable to all sources of noise in all situations. Specific noise levels are not stated within the guidance for this reason, and allow flexibility in the policy until further guidance is available.

5.2 ProPG: Planning and Noise

As outlined above, the National Planning Policy Framework encourages improved standards of design, although it provides no specific noise levels which should be achieved on site for varying standards of acoustic acceptability, or a prescriptive method for the assessment of noise.

ProPG: Planning and Noise was published in May 2017 in order to encourage better acoustic design for new residential schemes in order to protect future residents from the harmful effects of noise. This guidance can be seen as the missing link between the current NPPF and its predecessor, PPG24 (Planning Policy Guidance 24: Planning and Noise), which provided a prescriptive method for assessing sites for residential development, but without the nuance of ‘good acoustic design’ as outlined in ProPG.

ProPG allows the assessor to take a holistic approach to consider the site’s suitability, taking into consideration numerous design factors which previously may not have been considered alongside the noise level measured on site, for example the orientation of the building in relation to the main source of noise incident upon it.

It should be noted this document is not an official government code of practice, and neither replaces nor provides an authoritative interpretation of the law or government policy, and therefore should be seen as a good practice document only.

5.3 BS8233:2014

BS8233:2014 ‘*Sound insulation and noise reduction for buildings*’ describes recommended internal noise levels for residential spaces. These levels are shown in Table 5.1.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Rooms	35 dB(A)	-
Dining	Dining Room/area	40 dB(A)	-
Sleeping (daytime resting)	Bedrooms	35 dB(A)	30 dB(A)

Table 5.1 BS8233 recommended internal background noise levels

It should be noted that the recommended internal noise levels outlined above are not applicable under “purge ventilation” conditions as defined by Approved Document F of the Building Regulations, as this should only occur occasionally (E.G. to remove odour from painting or burnt food). However, the levels above should be achieved whilst providing sufficient background ventilation, either via passive or mechanical methods.

The external building fabric would need to be carefully designed to achieve these recommended internal levels.

5.4 WHO Guidelines for Community Noise (1999)

WHO Guidelines for Community Noise (1999) recommends that internal noise levels for individual events should not exceed 45dB L_{Amax} more than 10-15 times per night.

It should be noted that this impact is increasingly being regarded as 'LOAEL' for this number of exceedances, as described in Section 5.1.

The external building fabric would need to be carefully designed to ensure that the above guidance is achieved.

5.5 ANC Residential Design Guide to Acoustics, Ventilation and Overheating

The ANC guide to acoustics, ventilation and overheating provides an integrated approach to achieving good acoustic design with the ventilation requirements of Approved Document F of the Building Regulations and consideration for overheating control. This good practice document recognises the interdependence of ventilation and overheating when assessing noise, and provides a methodology for assessing the noise implications surrounding ventilation and overheating control.

Ventilation

The ANC Guide to Acoustics, Ventilation and Overheating states the following with regards to ventilation:

'It is important to differentiate between the need to provide 'purge ventilation' as required occasionally under Part F, which applies to all building types, in all locations and throughout the year; against the need to provide ventilation for the 'overheating condition' which is influenced by the location, orientation, type and design of the building and may be required for sustained periods of time, or not at all, depending on the overheating risk...

Approved Document F outlines the three main types of ventilation as whole house ventilation (continuous ventilation of rooms or spaces at a relatively low rate to dilute and remove pollutants and water vapour), extract ventilation (typically for kitchens or bathrooms), and purge ventilation (manually controlled ventilation of rooms or spaces at a relatively high rate to rapidly dilute pollutants and / or water vapour, provided by natural or mechanical means).

It also provides four template systems which can be adopted to demonstrate compliance with the Building Regulations, which are outlined in Table 5.2 below.

Ventilation System	Provision with ADF System / Purpose		
	Whole Dwelling Ventilation	Extract Ventilation	Purge Ventilation
System 1 – Trickle vents & intermittent extract fans	Trickle vents	Intermittent extract fans	Typically provided by opening windows
System 2 – Passive stack	Trickle vents and passive stack ventilation	Continuous via passive stack	Typically provided by opening windows
System 3 – Cont. mechanical extract (MEV)	Continuous mechanical extract – min. low rate Trickle vents for inlet air	Continuous mechanical extract – min. high rate Trickle vents for inlet air	Typically provided by opening windows
System 4 – Cont. mechanical supply & extract with heat recovery (MEV)	Continuous mechanical supply and extract – min. low rate	Continuous mechanical supply and extract – min. high rate	Typically provided by opening windows

Table 5.2 ADF template systems

6.0 EXTERNAL BUILDING FABRIC SPECIFICATION

Sound reduction performance calculations have been undertaken in order to specify the minimum performance required from glazed and non-glazed elements in order to achieve the recommended internal noise levels shown in Table 4.1, taking into account average and maximum noise levels monitored during the environmental noise survey.

As a more robust assessment, L_{Amax} spectrum values of night-time peaks have also been considered and incorporated into the glazing calculation in order to cater for the interior limit of 45 dB L_{Amax} for individual events, as recommended in WHO Guidelines.

Please note that the glazed and non-glazed element calculations would need to be finalised once all design proposals are finalised.

6.1 Non-Glazed Elements

It is currently understood that the non-glazed building façade is comprised of the elements as shown within Table 6.1 based on the construction detail provided. The anticipated sound reduction index has been calculated, and would be expected to provide the minimum figures shown in Table 6.1 when tested in accordance with BS EN ISO, 140-3:1995.

Element	Octave band centre frequency SRI, dB					
	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz

Blockwork Cavity Wall	41	43	48	50	55	55
-----------------------	----	----	----	----	----	----

Table 6.1 Assumed sound reduction performance for non-glazed elements

6.2 Glazed Elements

Minimum octave band sound reduction index (SRI) values required for all glazed elements to be installed are shown in Table 6.2. The performance is specified for the whole window unit, including the frame and other design features such as the inclusion of trickle vents. Sole glass performance data would not demonstrate compliance with this specification.

Glazing performance calculations have been based both on average measured night-time noise levels as well as verified against the L_{Amax} spectrum of individual events in order to comply with a maximum internal noise level of 45dB(A) in bedrooms as recommended by World Health Organisation Guidelines. The combined most robust results of these calculations are shown in Table 6.2.

Elevation	Octave band centre frequency SRI, dB						$R_w(C;C_{tr})$, dB
	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	
East Elevation	26	27	34	40	38	46	37 (-1;-4)
West Elevation	24	20	25	34	37	35	31 (-2;-4)

Table 6.2 Required glazing performance

The nominated glazing supplier should verify that their proposed window system meets the attenuation figures shown at each centre frequency band as shown in Table 6.2.

Example glazing types that would be expected achieve the above spectral values are shown in Table 6.3.

Elevation	Example glazing type
East Elevation	10/12/6
West Elevation	4/12/4

Table 6.3 Example glazing types

All major building elements should be tested in accordance with BS EN ISO 140-3:1995.

Independent testing at a UKAS accredited laboratory will be required in order to confirm the performance of the chosen system for an 'actual' configuration.

7.0 VENTILATION

7.1 Ventilation Strategy

Based on the noise levels measured on site, appropriate ventilation systems are outlined in Table 7.1 and 7.2 below in order to ensure the internal noise environment is not compromised.

Ventilation System	Whole Dwelling Ventilation	Extract Ventilation
ADF System 1	Trickle vents providing a minimum performance of 40dB $D_{n,e,w}$	Intermittent extract fans
ADF System 3	Continuous mechanical extract (low rate) and trickle vents for supply providing a minimum performance of 40dB $D_{n,e,w}$	Continuous mechanical extract (high rate) with trickle vents providing inlet air
ADF System 4	Continuous mechanical supply and extract (low rate)	Continuous mechanical supply and extract (high rate)

Table 7.1 Ventilation systems (east façade)

Ventilation System	Whole Dwelling Ventilation	Extract Ventilation
ADF System 1	Trickle vents providing a minimum performance of 23dB $D_{n,e,w}$	Intermittent extract fans
ADF System 3	Continuous mechanical extract (low rate) and trickle vents for supply providing a minimum performance of 23dB $D_{n,e,w}$	Continuous mechanical extract (high rate) with trickle vents providing inlet air
ADF System 4	Continuous mechanical supply and extract (low rate)	Continuous mechanical supply and extract (high rate)

Table 7.2 Ventilation systems (west façade)

In the case of mechanical ventilation, systems should be designed to meet the internal noise levels as defined in CIBSE Guide A (2015), as shown in Table 7.2.

Room Type	LAeq, dB	NR
Bedrooms	30	25
Living Rooms	35	30
Kitchen	45-50	40-45

Table 7.2 CIBSE Guide A 2015 guidance levels for mechanical building services

In all cases, purge ventilation would be provided by openable windows. As outlined in Section 5.3, the internal noise level requirement would not be applicable during purge conditions as this would only occur occasionally.

8.0 NOISE TRANSFER PREDICTIONS

8.1 Ground Floor Pub Operations

The ground floor pub operates with live bands on some evenings, stopping at 11pm. It is understood that these include acoustic instruments, singers and some backing tracks, but do not normally include drums. The pub then goes on to operate until 1am on Fridays and Saturdays, but without live music. To assess the two scenarios above, they are both presented below.

8.2 Direct Noise Transfer to First Floor from Ground Floor Bar

Using a typical source level of 90dB(A) to represent a worst case of live music (acoustic guitar, karaoke, singer and backing track) source noise levels within the Ground Floor bar, and taking into account the measured D_w rating of the separating floor, Table 8.1 shows predicted sound

pressure levels within the proposed First Floor residential bedrooms. Full calculations are shown in Appendix B1.

Receiver	BS8233:2014 Requirement During Daytime Hours (07:00-23:00)	Predicted Noise Levels Within Proposed First Floor Bedrooms
1st Floor Bedrooms	35 dB(A)	44 dB(A)

Table 8.1 Predicted noise levels due to the bar operation within first floor bedrooms (daytime)

Using a typical source level of 75dB(A) to represent a worst case of 10 simultaneous raised voices as source noise levels within the Ground Floor bar, and taking into account the measured D_w rating of the separating floor, Table 8.2 shows predicted sound pressure levels within the proposed First Floor residential bedrooms. Full calculations are shown in Appendix B1.

Receiver	BS8233:2014 Requirement During Night-time Hours (23:00-07:00)	Predicted Noise Levels Within Proposed First Floor Bedrooms
1st Floor Bedrooms	30 dB(A)	24 dB(A)

Table 8.2 Predicted noise levels due to the bar operation within first floor bedrooms (night-time)

As shown in Table 8.1, and Appendix B1, the direct noise transfer through the separating floor during daytime with the existing construction would be above the criterion stipulated in BS8233. Therefore, any direct sound transfer could cause noise nuisance to the future residential occupiers above.

Upgrade measures for the separating floor are outlined in Section 8.1 in order to ensure that direct noise transfer is controlled to within acceptable levels.

9.0 NOISE MITIGATION PROPOSALS

Further to the findings outlined in Section 7.0, an electronic noise limiter system should be implemented and the floor separating the Ground and First Floors should be upgraded to ensure that noise generated within the bar does not have any negative effect on the amenity of the proposed residential bedrooms to be located over the First, Second and Third Floors.

9.1 Separating Floor Between Ground and First Floors

It is understood that the floor at present is comprised of timber joist system with a plasterboard ceiling as the underfloor soffit. In order to address the airborne sound insulation for the single joist system, we would recommend the following upgrades:

- Removal of all current floorboards within the First Floor
- Joist void should be cleared of all current debris and enhanced by the installation of 150mm mineral wool insulation (density 60kg/m³) within the joist void, held in place with chicken wire or similar
- Direct fixing of 2x18mm Versapanel or similar cementitious board, on the joists, with perimeter flanking strip isolating the Versapanel board from the flanking walls

General Advice

For airborne sound insulation, special attention should be given to workmanship regarding the proper sealing of junctions and penetration details. Where any gaps between external (flanking) walls and floors exist, they should be caulked with sealant or similar type material. It should be also noted that flanking strips (Yelofon ES5/100) should be installed around the perimeter of the floor to isolate the floor from walls and skirtings. The strip should be turned up so that the skirting boards rest on them and any excess cut away.

Ideally, a gap between the head of the wall and the underside of the soffit should not be greater than 10mm. A polyethylene backing rod could be inserted in the gap with tightly packed mineral wool while silicone caulk is used to seal the joint.

In the case of any new walls, isolation strips would need to be used, which would isolate the wall leaves from the sub-floor, therefore minimising any flanking paths. Please note that a material such as Monarfloor or Regupol Isolation Strip can be used to isolate any new walls built on any steel structure.

9.2 Mitigation Measures for the Ground Floor Bar

Installation of a Sound Limiter

In order to ensure that the source noise levels are controlled within the Ground Floor bar, we would recommend that a sound limiter is installed by the future bar occupier. The system designer should be able to advise on the type and standard of sound limiter suitable for the proposed installation.

The limiter should enable the separate control of the different zones and incorporate all elements of the sound system, including any additional filters or amplifiers. Programmable limiters are preferred as these permit more sophisticated control of frequency content and volume and are fully tamper-proof. Programmed limits should match those shown in Table 9.1.

Noise Limiter	Octave band centre frequency SRI, dB							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Maximum permissible levels within the bar to meet the requirements of BS8233	91	87	88	86	82	71	60	59

Table 9.1 Maximum permissible noise levels within the bar

On-going attention will need to be given by the bar to transmitted noise levels to ensure that the final operational conditions do not undermine the settings of the limiter. Different types of music and activities can result in varied subjective effects. It is strongly recommended that the management remain aware as the operation becomes established and reset the limiter, if necessary.

Loudspeaker Mounting

Rigid mounting systems are inadequate for the control of transmitted sound from the speakers. To ensure efficient control of noise it is recommended that a proprietary frame support is used for each speaker.

This must incorporate suitable anti-vibration mounting between support and speaker enclosure, with no rigid connections permitted to short-circuit the isolation

The use of neoprene mounts or hangers is recommended. These are expected to provide a static deflection of approximately 3-5mm (i.e. under the load of the speaker). High stiffness neoprene / rubber and metal springs should be avoided in general. The use of neoprene mounts or hangers in fully-enclosed metal casings is not advisable as if these are angled the casings can short circuit. Any mount / hanger must be capable of maintaining a 30 degree offset without any rigid components short-circuiting the mount. It must be noted, however, that vertical alignment is more effective.

Generally available speaker vibration mountings are not typically effective for isolation of this standard. Use of heavy duty, proprietary supports coupled with hangers / mounts will be far more effective.

Should the suspended installation of bass cabinets not be possible, we would recommend the use of a proprietary resilient pad on which the cabinets can rest. We would therefore recommend a product such as Regupol 6010BA which would isolate the speakers from generating any vibro-acoustic excitation of the structure.

10.0 NOISE TRANSFER PREDICTIONS INCLUDING PROPOSED MITIGATION MEASURES

10.1 Noise Break-in to First Floor from Ground Floor Bar

Based on the proposed floor build-up specified within Section 8.1, calculations have been undertaken in order to assess potential noise break-in to the proposed residential units on the First Floor due to activity within the Ground Floor bar. Full calculations are shown in Appendix B2.

Receiver	BS8233:2014 Requirement During Daytime Hours (07:00-23:00)	Predicted Noise Levels Within Proposed First Floor Bedrooms
1st Floor Bedrooms	35 dB(A)	35 dB(A)

Table 10.1 Predicted noise levels due to the bar operation within first floor bedrooms (daytime)

Receiver	BS8233:2014 Requirement During Night-time Hours (23:00-07:00)	Predicted Noise Levels Within Proposed First Floor Bedrooms
1st Floor Bedrooms	30 dB(A)	19 dB(A)

Table 10.2 Predicted noise levels due to the bar operation within first floor bedrooms (night-time)

As shown in Table 10.1, Table 10.2 and Appendix B2, the direct noise transfer through the separating floor with the construction as specified in Section 8.1 would be below the criterion stipulated in BS8233, any therefore the amenity of the residential units would be protected at all times.

Source noise levels would need to be controlled within the bar to the limits stated in Section 8.2.

11.0 CONCLUSION

An environmental noise survey has been undertaken at 59 Market St, Milnsbridge, Huddersfield, HD3 4HZ allowing the assessment of daytime and night-time levels likely to be experienced by the proposed development.

Measured noise levels allowed a robust glazing specification to be proposed which would provide internal noise levels for all residential environments of the development commensurate to the design range of BS8233.

In addition, sound insulation upgrade solutions for the floors have been proposed, which would provide internal noise levels for all residential environments of the development commensurate to the design range of BS8233, and Building Regulations requirements.

No further mitigation measures should be required in order to protect the proposed residential units from external noise intrusion and internal noise intrusion from the Ground Floor bar.

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq} . The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for no more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise.

L_{90}

This is the level exceeded for no more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPLIED ACOUSTIC TERMINOLOGY

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than a single source and 4 sources produce a 6dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Hearing perception is highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.

59 Market St, Milnsbridge, Huddersfield, HD3 4HZ
Environmental Noise Time History
From 16 February 2021 To 17 February 2021

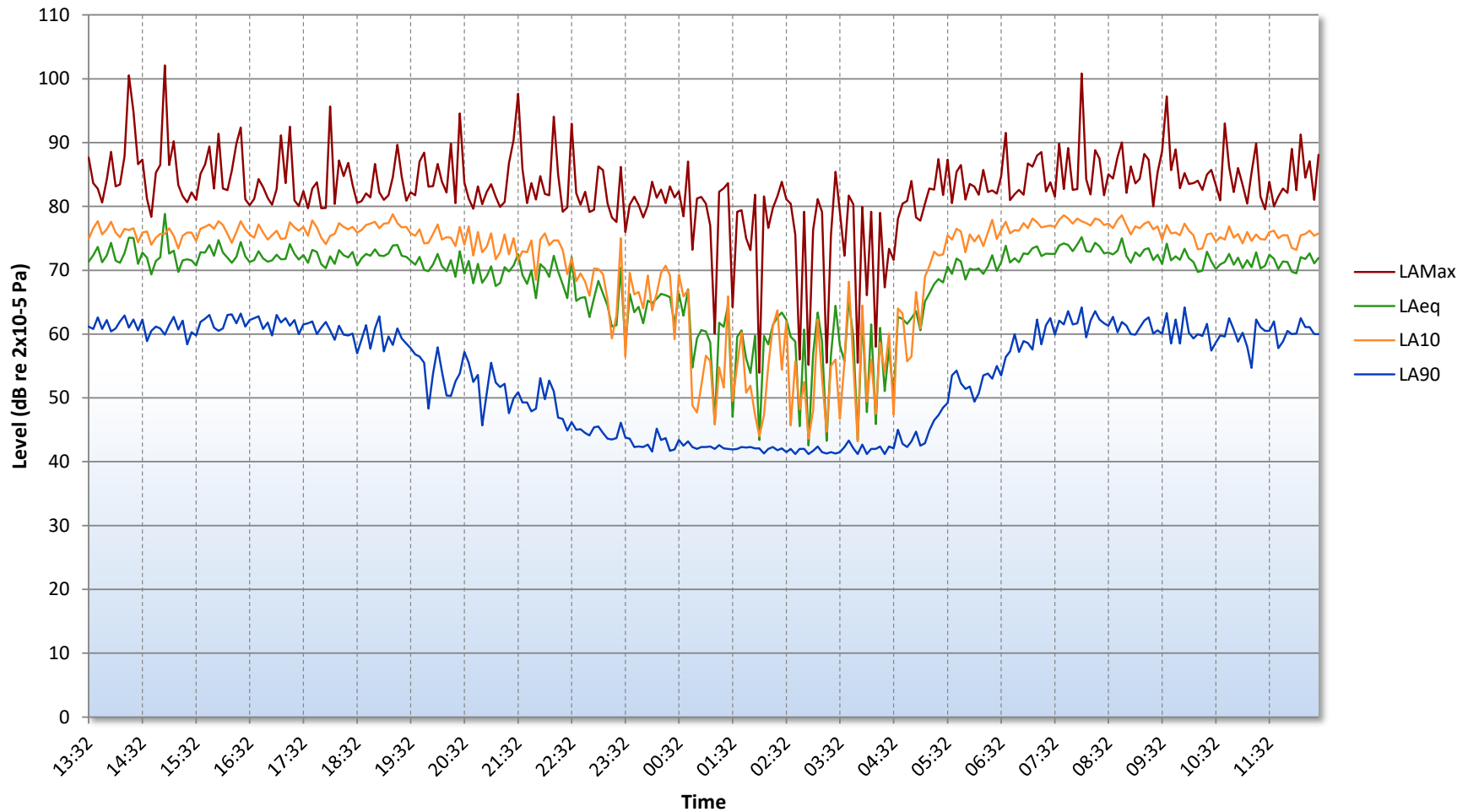


Figure 22155.TH1

59 Market St, Milnsbridge, Huddersfield, HD3 4HZ
Environmental Noise Time History
From 16 February 2021 To 17 February 2021

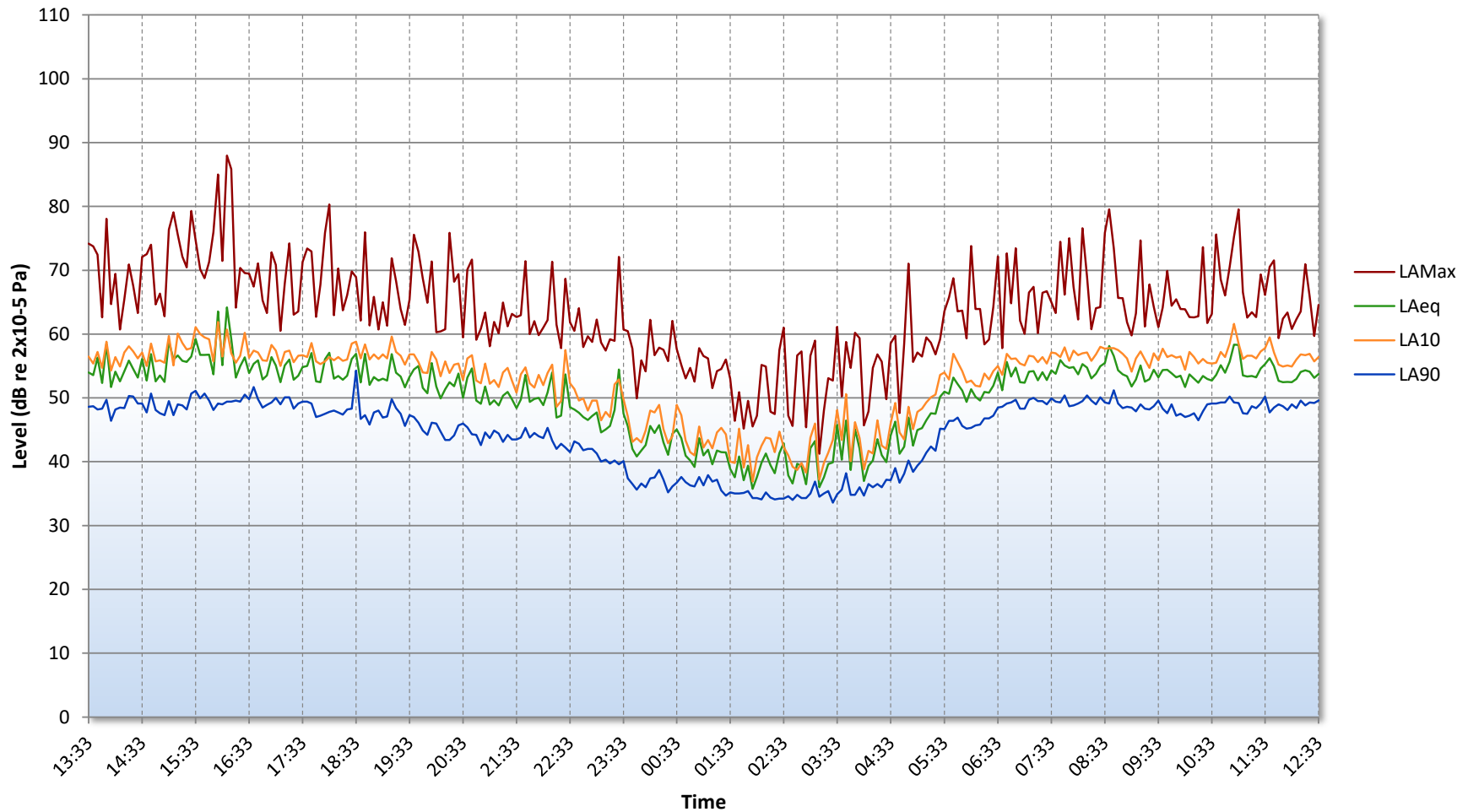


Figure 22155.TH2

APPENDIX B1

59 Market St, Milnsbridge, Huddersfield, HD3 4HZ

DIRECT NOISE TRANSFER CALCULATIONS - EXISTING FLOOR

Source: Ground Floor Bar (Live Music Until 11pm)	Frequency, Hz								dB(A)
Receiver: Bedroom of Proposed First Floor Flats	63	125	250	500	1k	2k	4k	8k	
Measured music to be shifted to 90dBA	116	105	106	104	100	89	78	77	104.8
Sound Pressure level of worst case activity within ground floor bar	101	90	91	89	85	74	63	62	90
On site SRI of existing separating floor, dB	-37.2	-37.2	-47.7	-59.2	-49.8	-53.9	-53.9	-53.9	
Approximate area (S) of the separating floor (12m²)	12	12	12	12	12	12	12	12	
Correction for area (S), dB	11	11	11	11	11	11	11	11	
Volume of receiving room (29m³)	29	29	29	29	29	29	29	29	
Expected reverberation time of receiver space (0.5s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Correction for absorption in receiver space, dB	-9	-9	-9	-9	-9	-9	-9	-9	
Sound Pressure Level at Within Receiver Space	66	55	45	32	37	22	11	10	44

Direct Transfer Noise Criterion 35

Source: Ground Floor Bar (Raised Voices After 11pm)	Frequency, Hz								dB(A)
Receiver: Bedroom of Proposed First Floor Flats	63	125	250	500	1k	2k	4k	8k	
Raised Voice, Sound Power (ANSI 3.5:1997)	48	59	70	75	72	64	57	48	75.5
Raised Voice, Sound Pressure Level at 1m	37	48	59	64	61	53	46	37	64.5
Adjustment for Ten Persons	10	10	10	10	10	10	10	10	
Sound Pressure level of worst case activity within ground floor bar	47	58	69	74	71	63	56	47	75
On site SRI of existing separating floor, dB	-37.2	-37.2	-47.7	-59.2	-49.8	-53.9	-53.9	-53.9	
Approximate area (S) of the separating floor (12m²)	12	12	12	12	12	12	12	12	
Correction for area (S), dB	11	11	11	11	11	11	11	11	
Volume of receiving room (29m³)	30	30	30	30	30	30	30	30	
Expected reverberation time of receiver space (0.5s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Correction for absorption in receiver space, dB	-10	-10	-10	-10	-10	-10	-10	-10	
Sound Pressure Level at Within Receiver Space	11	22	22	16	22	10	4	-5	24

Direct Transfer Noise Criterion 30

APPENDIX B2

59 Market St, Milnsbridge, Huddersfield, HD3 4HZ

DIRECT NOISE TRANSFER CALCULATIONS - PROPOSED FLOOR

Source: Ground Floor Bar (Live Music Until 11pm)	Frequency, Hz								dB(A)
Receiver: Bedroom of Proposed First Floor Flats	63	125	250	500	1k	2k	4k	8k	
Measured music to be shifted to 90dBA	116	105	106	104	100	89	78	77	104.8
Sound Pressure level of worst case activity within ground floor bar	101	90	91	89	85	74	63	62	90
Sound Pressure level of noise-limited within ground floor bar	91	87	88	86	82	71	60	59	87
SRI of proposed separating floor, dB	-39	-46	-51	-56	-59	-60	-71	-75	
Approximate area (S) of the separating floor (12m ²)	12	12	12	12	12	12	12	12	
Correction for area (S), dB	11	11	11	11	11	11	11	11	
Volume of receiving room (29m ³)	29	29	29	29	29	29	29	29	
Expected reverberation time of receiver space (0.5s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Correction for absorption in receiver space, dB	-9	-9	-9	-9	-9	-9	-9	-9	
Sound Pressure Level at Within Receiver Space	54	43	39	32	25	13	-9	-14	35

Direct Transfer Noise Criterion 35

Source: Ground Floor Bar (Raised Voices After 11pm)	Frequency, Hz								dB(A)
Receiver: Bedroom of Proposed First Floor Flats	63	125	250	500	1k	2k	4k	8k	
Raised Voice, Sound Power (ANSI 3.5:1997)	48	59	70	75	72	64	57	48	75.5
Raised Voice, Sound Pressure Level at 1m	37	48	59	64	61	53	46	37	64.5
Adjustment for Ten Persons	10	10	10	10	10	10	10	10	
Sound Pressure level of worst case activity within ground floor bar	47	58	69	74	71	63	56	47	75
SRI of proposed separating floor, dB	-39	-46	-51	-56	-59	-60	-71	-75	
Approximate area (S) of the separating floor (12m ²)	12	12	12	12	12	12	12	12	
Correction for area (S), dB	11	11	11	11	11	11	11	11	
Volume of receiving room (29m ³)	30	30	30	30	30	30	30	30	
Expected reverberation time of receiver space (0.5s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Correction for absorption in receiver space, dB	-10	-10	-10	-10	-10	-10	-10	-10	
Sound Pressure Level at Within Receiver Space	9	13	19	19	13	4	-14	-26	19

Direct Transfer Noise Criterion 30