NoiseAir

ACOUSTIC CONSULTANCY & SOLUTIONS

Noise Surveys Sound Insulation Testing Noise Impact Assessments Noise at Work

GREAT GROUNDS LIMITED

PROPOSED WEDDING / FUNCTION VENUE GREAT GROUNDS, OAK TREE FARM, TICKHILL LANE, DILHORNE ST10 2PL

NOISE IMPACT ASSESSMENT

24th MAY 2020

REPORT REF: P4214-R1-V1

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NoiseAir
THE NOISE CONTROL CENTRE

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REPORT VERSION CONTROL:

Document Reference	Date	Checked by	Checked & Authorised by
P4214-R1-V1	24/05/2020	M. J. Malone, BSc (Hons), AMIOA	N. J. Malone, MIOA
		M. J. Malone	N. J. Malone

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1 INTRODUCTION

1.1.1 By instruction from Great Grounds Limited (the client), NoiseAir Limited was commissioned to undertake a noise impact assessment (NIA) for the proposed outdoor wedding and function events venue to be located at the Great Grounds Facility, Oak Tree Farm, Tickhill Lane, Dilhorne ST10 2PL, herein referred to as 'the site'.

1.1.2 The scope of this report covers noise breakout from the proposed wedding and function events venue, specifically a converted barn building, accommodating bands and amplified music as well as general sound reinforcement associated with typical wedding and charity events held in the United Kingdom.

1.1.3 The converted barn building was previously converted to accommodate an office and education facility and it is understood that the conversion works have been undertaken to a good standard.

1.1.4 At the time of writing, it is understood that the proposal is for a change of use at the aforementioned address to an event site for weddings and function events, up to 15 events (per calendar year).

1.1.5 It has been advised that there is a potential for multiple events to take place within a single week, however the total number of 15 events per year will not be exceeded.

1.1.6 It is advised at the time of writing that the converted barn building will accommodate bands and / or the associated audio system for music playback and controlled sound reinforcement along with a dance floor area.

1.1.7 Typical hours of operation are between 1200 and 0100. It is understood that outside of the aforementioned hours activity will cease and that there will be no permitted noise.

1.1.8 This acoustic report has been prepared to assess the results of a noise survey carried out in accordance with current guidance and includes recommendations and mitigation as appropriate.

1.2 Site Location

1.2.1 Great Grounds is located within the Oak Tree Farm site. The area is located within the rural vicinity of Staffordshire Moorlands District Council and located off Tickhill Lane which is a single-track road. Oak Tree Farm is located approximately 8 km to the east of Stoke-on-Trent.

1.2.2 The converted barn building itself is located within the grounds of Oak Tree Farm and is surrounded by tall dense forest to the north and west land and open fields to the east and south. Topography in the area is considered to be undulating with the converted barn building located in an elevated position.

1.2.3 The location of the site location is shown in **Figure 1.**

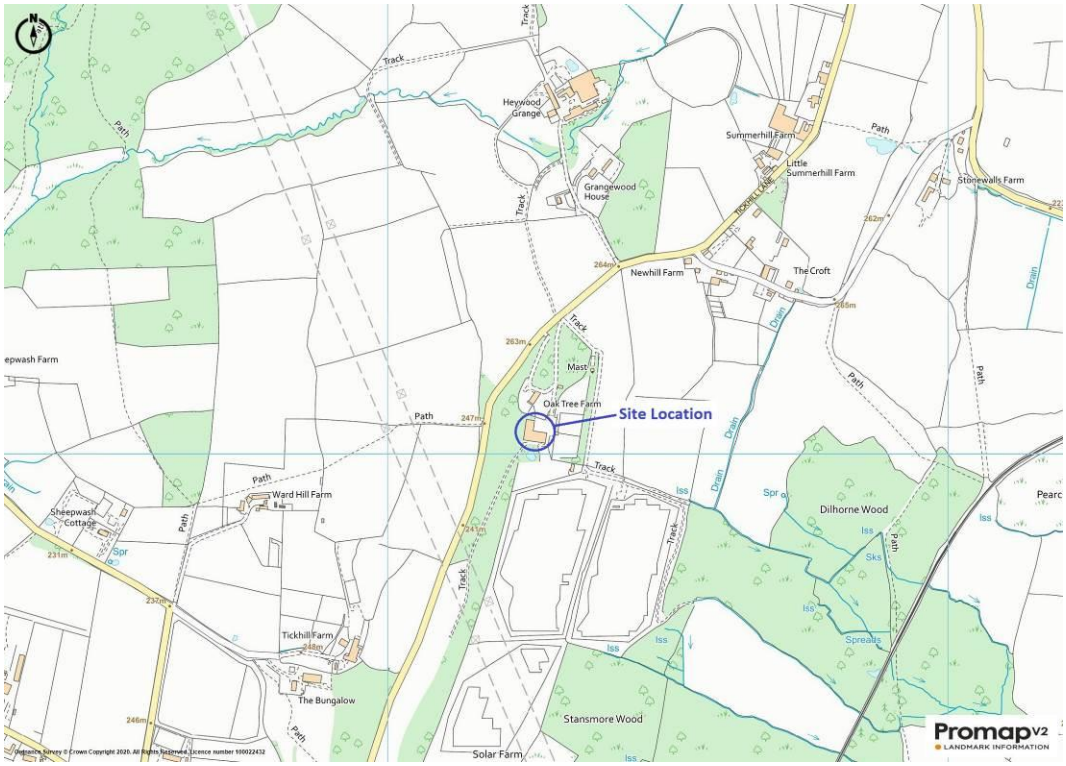

Figure 1: Site location plan.

1.3 Wedding / Function Event Venue Description

1.3.1 As previously mentioned, the proposed wedding / function events are to be accommodated within an existing converted barn building which was previously converted for the purposes of office and educational facility use.

1.3.2 The converted area of the barn is shown on **Figure 2**.



Figure 2: Converted area of barn structure.

1.3.3 The external condition of the converted barn at the time of writing is shown in **Figure 3**.



Figure 3: External condition of converted barn.

1.3.4 The internal condition of the converted barn is shown in **Figure 4**.



Figure 4: Internal condition of converted barn

1.3.5 **Figure 3** and **Figure 4** indicate that the converted barn structure is of good quality with masonry block construction to all walls, small single glazed windows to the function space (the large windows to the front are to the separate reception area) and insulated roof structure. it is noted however that small gaps exist in the insulated roof structure to allow daylight through the roof structure at selected points.

1.4 Existing Noise Sensitive Receptors

1.4.1 The closest noise sensitive receptors (NSR's) to the site are identified in **Figure 5**.



Figure 5: Site plan showing the location of the closest NSR's.

1.4.2 For the purpose of assessment, the NSR's have been selected due to proximity of the dominant noise source (reasoned to be entertainment noise from live bands and amplified music) located within the converted barn building.

1.4.3 It is noted that the closest NSR to the converted barn building is NSR3 being the residential accommodation of Oak Tree Farm. It is considered that Oak Tree Farm residence is incidental to the Great Grounds Site and therefore while the likely predicted noise levels at NSR3 is included within the report, NSR3 has been discounted from further assessment.

2 LEGISLATION AND GUIDANCE

2.1 Introduction

2.1.1 At the time of writing, no specific noise criteria have been outlined in relation to the client's proposal.

2.1.2 It is considered that while there are multiple standard and guidance documents that are available which concern amplified music and events, there is no definitive guidelines on noise from wedding and function events that accepted widely within the acoustic consultancy industry.

2.1.3 A review of all the appropriate documents which provide some level of guidance on noise from amplified music and events has therefore been undertaken in order to determine appropriate requirements such that adverse impact is unlikely to be experienced at the identified NSR's.

2.1.4 It is reasoned that due to the number of proposed events to be held at the site and the requirement for such events to continue into the morning hours acceptable noise breakout from the proposed wedding / function venue should be conservative and ultimately the goal of inaudibility should be sought at the NSR's (save for NSR3). Furthermore, controls should also be applied to low frequency noise breakout from the venue.

2.2 National Planning Policy Framework 2018

2.2.1 In July 2018 the 'National Planning Policy Framework' (NPPF) was updated from the March 2012 version as the current planning policy guidance within England. Paragraph 170 of the NPPF states:

'Planning policies and decisions should contribute to and enhance the natural and local environment by:

- *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. 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;'*

2.2.2 The NPPF continues to state in Paragraph 180:

'Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- *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.*

2.3 Noise Policy Statement for England

2.3.1 With regard to 'adverse impacts' the NPPF refers to the 'Noise Policy Statement for England' (NPSE), which defines three categories, 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'.*

2.3.2 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided. The second aim refers to the situation where the impact lies somewhere between LOAEL and SOAEL, and it requires that all reasonable steps are taken to mitigate and minimise the adverse effects of noise. However, the requirement to mitigate and minimise the adverse effects of noise does not mean that such adverse effects cannot occur.

2.4 Planning Practice Guidance

2.4.1 The Planning Practice Guidance (PPG) provides further detail about how the effect levels can be recognised. Above the NOEL noise becomes noticeable, however it has no adverse effect as it does not cause any change in behavior or attitude. Once noise crosses the LOAEL threshold it begins 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 further might cause the SOAEL threshold to be crossed. If the exposure is above this level the planning process should be used to avoid the effect occurring by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused. At the highest extreme the situation should be prevented from occurring regardless of the benefits which might arise. **Table 1** summarises the noise exposure hierarchy.

Table 1: National Planning Practice Guidance noise exposure hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for non-awakening sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance	Significant Observed Adverse Effect	Avoid

Table 1: National Planning Practice Guidance noise exposure hierarchy			
Perception	**Examples of Outcomes**	**Increasing Effect Level**	**Action**
	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.		
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

2.5 Code of Practice on Environmental Noise Control at Concerts (1995)

2.5.1 Published by the Noise Council in 1995, and commonly known as 'The Pop Code', this document sets out guidance for bodies involved in planning music events, those responsible for licensing such events and those responsible for enforcing the nuisance provisions of the Environmental Protection Act 1990 (England and Wales). **Table 2** below sets out the guidance contained in this document for events held between 09:00 and 23:00 hours. The Music Noise Level (MNL) is defined as 'the L_{Aeq} of the music noise measured at a particular location'.

Table 2: Guideline Criteria for Music Events Held Between 0900 and 2300 hours – Façade $L_{Aeq,T}$ dB		
Concert days per calendar year, per venue	**Venue Category**	**Guideline**
1 to 3	Urban Stadia or Arenas	The MNL should not exceed 75 dB(A) over 15-minute period
1 to 3	Other urban and rural venues	The MNL should not exceed 65 dB(A) over a 15-minute period
4 to 12	All venues	The MNL should not exceed the background noise level by more than 15 dB(A) over a 15-minute period

2.5.2 The background noise should be the 'arithmetic average of the hourly L_{A90} measured over the last four hours of the proposed music event or over the entire period of the proposed music event if scheduled to last for less than four hours'. It is assumed that the intention is that the background noise level is measured over the period that the music event is likely to take place rather than during that event as intimated.

2.5.3 For indoor venues 'used for up to about 30 events per calendar year' this document suggests that the music noise level should not exceed the background noise by more than 5dB(A) over a fifteen-minute period, for events finishing at 23:00 hours.

2.5.4 For events held between the hours of 2300 and 0900 hours, it is stated that the music noise should not be audible within the noise sensitive premises with windows open in a typical manner for ventilation. However, it is acknowledged that the use of 'inaudibility' as a guideline is not universally accepted as an appropriate method of control, and that this guideline is therefore proposed in the absence of more precise guidance (at that time).

2.5.5 The document goes on to state that it may be necessary to set an additional criterion in terms of low frequency noise, or apply additional controls, and references the recommendations of a study undertaken by J.E.T Griffiths, J. Staunton and S. Kamath 'A study of Low Frequency Sound from Pop Concerts'. In this regard it is recommended that a level of up to 70 dB in either the 63Hz or 125Hz octave frequency band is satisfactory; a level of 80 dB or more in either of those octave frequency bands causes significant disturbance (whilst not stated it is assumed that this is applicable externally).

2.5.6 Although based on best practice at that time, recent research (Proc IOA Vol. 28. Pt.7 2006; Griffiths and Staunton) suggests that **Table 2** above would benefit from further refinements; in particular, noise levels, number of concerts and category. One of the issues that have been raised is the step change from 3 to 4 concerts per year which in many cases means a reduction in permitted music noise level of at least 10 dB depending upon the prevailing baseline level. In practice, this change is rarely achievable for many venues. It is unlikely that the increase in concerts by one reflects the change in community response that warrants a change of 10 dB.

2.6 Good Practice Guide on Noise from Pubs and Clubs 2003

2.6.1 Whilst this document, produced by the Institute of Acoustics, does not present a method for the assessment of noise from such facilities, it does provide guidance on noise control measures available at both the design stage, and post completion, including the following which could be employed:

- The control of music noise at source, either by reducing the overall sound level of the music, or by reducing the sound level at individual frequencies which are causing, or have the potential to cause disturbance.

- The playing of more calming types of music towards the end of an event;

- The use of an approved system for DJ and other performers;

- The installation of sound level regulatory devices (noise limiters), connected to all permanent music and public address equipment and all available mains power sockets within the area around a stage, within a performance area, or near to a control desk. However, in very noise-sensitive situations, it may be found that such devices have to be set so low that music events are not viable; and

- Alteration to the number, location and mounting of loudspeakers so that internal music levels can be kept as low as possible and the transmission of structure-borne noise is minimised."

2.7 Noise from Pubs and Clubs Phase 1 2005

2.7.1 This report was prepared by The University of Salford and Hepworth Acoustics and had the aim of determining how a rigorous UK method for assessing noise from pubs and clubs might be devised. Several candidate assessment methods were identified and considered. The methods identified included those for general low frequency noise, those relying on an absolute criteria, and those based on relative assessments (e.g. comparison against background).

2.7.2 With regards to 'relative' assessment methods, reference is made to British Standard 4142:1997: Method for rating industrial noise affecting mixed residential and industrial areas. Whilst this assessment method is aimed at industrial noise, it compares the source noise level against the prevailing background noise level (whilst including for a +5dB source character correction where applicable). The resulting difference is used to indicate the likelihood of complaints. This assessment method is subject to a lower level cut off, below which the assessment result is not valid. This lower level cut off (a background level of below 30 dBA LA90,T, which is described as 'very low') is incorporated because at such low levels, the likelihood of complaints is not solely dictated by the identified 'difference' but is also dependant on the absolute noise level. In other words, a greater difference may be acceptable where the overall level is low.

2.7.3 Reference is also made to work undertaken by the Institute of Acoustics in 1996. An Institute of Acoustics working group was tasked with producing guidance and criteria on the control of noise from pubs and clubs. Unfortunately, due to the withdrawal of industry representatives, and because the results of the completed test work were not considered reliable, there was no associated publication. However, the annex containing the proposed criteria was published in an article (Hinton and Summerville, 2003) to stimulate discussion.

The industry representatives who withdrew have also produced a guide to noise control for licensees, which mirrors the IOA Good Practice Guide very closely. A summary of the criteria is presented in **Table 3** below.

Table 3: Numerical Limits for Audibility and Virtual Inaudibility – Tested but Inconclusive

Venue / Where	Suggested Regulations	Outcome if Criteria Met
Entertainment < 30 times / year*	$L_{Aeq,15minutes}$ (EN) should not exceed L_{A90} (WEN) by more than 5 dB	EN will generally be audible but not overly obtrusive inside the noise sensitive property
Entertainment > 30 times / year*	L_{Aeq} (EN) should not exceed L_{A90} (WEN) by more than 5 dB and the L_{10} (EN) should not exceed L_{90} (WEN) by more than 5 dB in any 1/3 octave band between 40 and 160Hz	EN will generally be audible but not overly obtrusive inside the noise sensitive property
Entertainment > once per week or continues beyond 2300 hours	L_{Aeq} (EN) should not exceed L_{A90} (WEN) and L_{10} (EN) should not exceed L_{90} (WEN) in any 1/3 octave band between 40 and 160Hz	EN will be virtually inaudible inside noise sensitive property

EN = Entertainment Noise
WEN = Representative background noise level without the entertainment noise, both measured 1 m from the façade of the noise sensitive premises.
* Not more than once a week and ends by 2300 hours.

2.7.4 Whilst the test results for the above criteria were not considered to be robust, it is worth noting the proposed criteria included a separate low frequency element.

2.7.5 With regards to absolute criteria, consideration is given in this document to the possible application of Noise Rating Curves, which are also frequency dependant, and A-weighted target values for music intrusion based on World Health Organisation guideline values which are not frequency dependant.

2.7.6 In conclusion, the document identifies 6 different assessment methods which are proposed for further consideration in the determination of a validated assessment criteria for noise from pubs and clubs. The six identified assessment methods are presented in **Table 4** below.

Table 4: Schedule of Proposed Criteria for Validation		
Name	**Parameter**	**Type**
IoA working group annex	L_{Aeq} vs L_{A90} plus L_{10} vs L_{90} in 40-160Hz 1/3 octave bands	Relative
BS4142 / Noise Act 1996	L_{Aeq} vs background (L_{A90}, L_{A99}, etc.)	Relative
Noise Rating Curve	1/3 octave (L_{eq}, L_{10} or L_{max}) vs NR curve	Absolute
Absolute L_{Aeq}	L_{Aeq}	Absolute
DIN 45680 / Moorhouse	10-160Hz 1/3 octave L_{eq} vs reference curve	Absolute
Inaudibility	Subjective	Relative

2.8 Noise from Pubs and Clubs Phase 2 Final Report May 2006

2.8.1 Produced by the Building Research Establishment and Capita Symonds for the Department for Environment Food and Rural affairs, this document presents the results of laboratory testing of different assessment methodologies and criteria for noise from pubs and clubs. This report draws on the recommendations of the Phase I report, but the number of candidate assessment test methods considered was expanded from the 6 proposed in the Phase I report, to a total of 18 variations of 9 separate methods.

2.8.2 It is concluded within this report that the noise metric that provided the best overall prediction of subjective ratings was the Absolute L_{Aeq}. With respect to this metric, subjects considered that noise was acceptable up to a level of 30.6 dB $L_{Aeq,5minute}$ for a one off event within a habitable room with windows closed. This level is equivalent to an external level of 40.6 dB $L_{Aeq,5minute}$ (free-field) externally assuming a 10 dB reduction for a partially open window.

2.8.3 However, it is recognised that the use of an absolute $L_{Aeq,T}$ single action level would be hard to use where the existing ambient noise level without the entertainment noise was close to, equal to, or above the adopted limit.

2.8.4 The next best candidate assessment method was identified to be the L_{A90} (during a music event) versus L_{A90} (no music) comparison.

2.9 Assessment Criteria to be Adopted

2.9.1 It can be seen from the summary of documents above that there is a range of different assessment methodologies and criteria which could be used for the assessment of noise from wedding / function venues. Accordingly, it is necessary to derive a set of criteria specific to this proposed use, accounting for the local environs, including the distance of local receptors and the existing ambient noise climate.

2.9.2 Following the above review, it is considered that the adopted criteria should account for the following factors:

- Local circumstances and public opinion must to be considered, at the time of writing it is understood that local residents have not formally or informally advised of their objection to the noise levels generated from such potential wedding / function events directly with the client.

- The selected criteria should include a dedicated low frequency criterion, which should be subject to an absolute low level cut off. The low level cut-off is considered important to ensure due consideration to low absolute noise levels when a simple comparison against the prevailing background level would not be appropriate.

- Due to the distance of the receptors from the source, it is considered appropriate to select an $L_{Aeq,T}$ entertainment noise level limit which is quantified relative to the prevailing background noise level, but also subject to a lower level cut-off for acceptability. This is again considered important to ensure due consideration of low absolute entertainment noise levels for which a simple comparison against background assessment would be appropriate, whilst also reflecting the findings of the Noise form Pubs and Clubs Phase II report (latest guidance document).

2.9.3 Drawing upon the above factors, the noise assessment criteria specified in **Table 5** below have been adopted for this assessment.

Table 5: Adopted Music Entertainment Assessment Criteria				
Receptor Type	**Low Frequency**		**L_{Aeq} Criteria**	
	Criteria	**Reasoning**	**Criteria**	**Reasoning**
Residential	L_{10} (EN) should not exceed L_{90} (WEN) in any 1/3 octave band between 40 and 160Hz	Based on guidance from within the Noise from Pubs and Clubs Phase 1 2005 report. This guidance provides a very conservative method of assessment, however, is considered appropriate given the proposed frequency of events and that events will continue past 2300 hours.	L_{Aeq} (EN) not to exceed L_{A90} (WEN) externally.	Based on guidance from within the Noise from Pubs and Clubs Phase 1 2005 report. This guidance is considered conservative and aims to ensure the EN will likely be virtually inaudible inside noise sensitive property.
EN = Entertainment Noise				

3 BASELINE NOISE SURVEY

3.1 Approach and Measurement Locations

3.1.1 To inform the assessment, a detailed baseline noise survey was undertaken to establish the current prevailing noise climate at a location considered representative of the nearest noise sensitive properties in relation to the proposal.

3.1.2 This survey commenced at approximately 1745 hours on Wednesday the 6th of May 2020, concluding at approximately 1345 hours on Monday the 11th May 2020. The survey therefore covered a full weekend period, when it is anticipated there is the greatest potential for noise impact from activity at the proposed site due to weekend resting and commonly lower background levels.

3.1.3 The adopted baseline noise measurement location (ML1) is shown within in **Figure 6**.

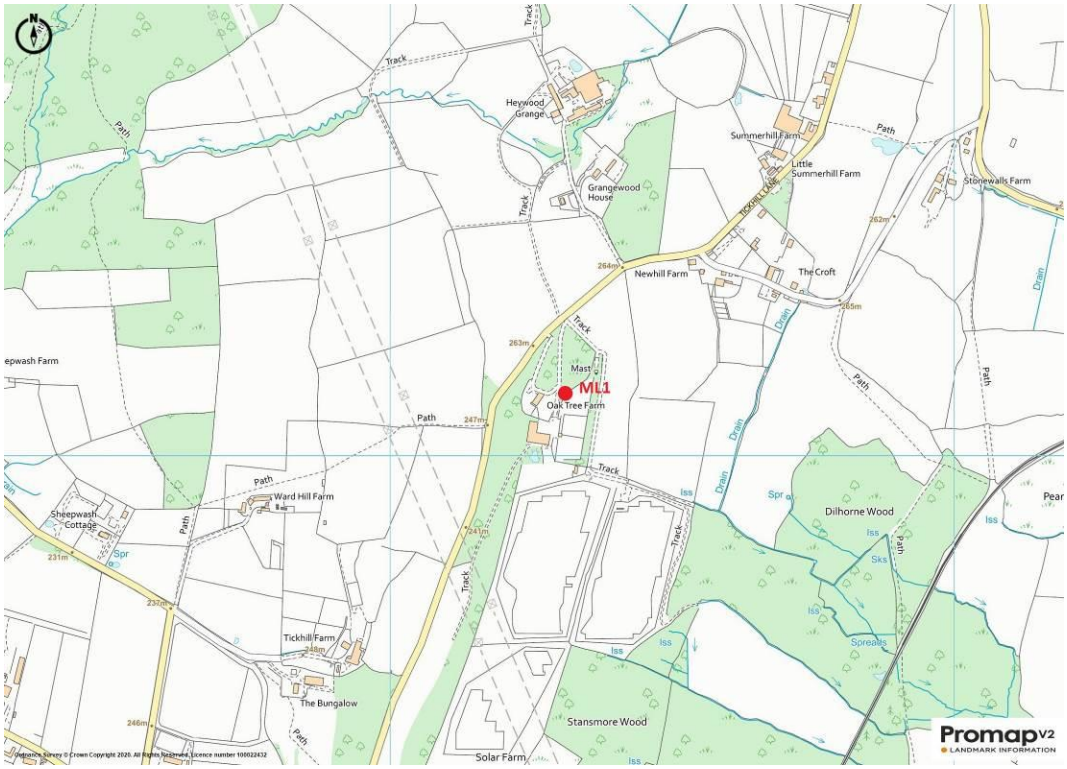

Figure 6: Site plan showing the selected monitoring position (ML1).

3.1.4 ML1 was positioned within the grounds of the site and chosen to be representative of the typical background noise levels at the NSR's.

3.1.5 The microphone was mounted >1.5 m above the ground and was subject to free field conditions.

3.1.6 The sound level meter (SLM) was installed at the beginning of the survey and left to log for the full survey duration.

3.1.7 The noise environment at ML1 was observed and noted to comprise of low level noise of a rural nature with occasional passing of vehicles on Tickhill Lane.

3.1.8 Secondary sources of noise included aircrafts passing overhead, farm animals and birdsong.

3.1.9 Weather conditions during the setup of monitoring equipment on 06/05/2020 were recorded as: 16°c, 38% humidity, low winds < 0.5 m/s^{-1} and 0% cloud clover, dry with no rain.

3.1.10 The site was visited on 08/05/2020 and weather conditions were recorded as: 17°c, 72% humidity, low winds < 0.5 m/s^{-1} and 0% cloud clover, dry with no rain.

3.1.11 Weather conditions during the collection of monitoring equipment 11/05/2020 were recorded as: 8°c, 51% humidity, low wids < 0.5 m/s^{-1}, 100% cloud clover and dry with no rain.

3.1.12 Weather conditions were checked during the survey using online records and appeared to remain relatively consistent with site measurements with typical daytime and night-time temperature fluctuations.

3.2 Equipment

3.2.1 The following class 1 sound level meter was used for the survey as detailed in **Table 6**:

Table 6: Summary of SLM used for survey

SLM	SLM Class	SLM Serial No.	Microphone	Microphone Serial No.	Calibrator	Calibrator Serial No.
NOR118	Class 1	31357	G.R.A.S. 40AF	73340	B&K4231	2482550

3.2.2 All SLM equipment was calibrated to traceable standards within the previous 2 years and the calibrator has been calibrated to UKAS standards within the last 12 months. The SLM used for survey measurements was calibrated both prior to and upon completion of the survey.

3.2.3 No calibration drift was recorded across the full measurement duration.

3.3 Results

A line graph is presented within **Figure 7** showing the $L_{Aeq,15mins}$, $L_{AMax,15mins}$ and $L_{A90,15mins}$ vs. time for ML1 between the hours 1745 on the 06/05/2020 and 1345 on the 11/05/2020.

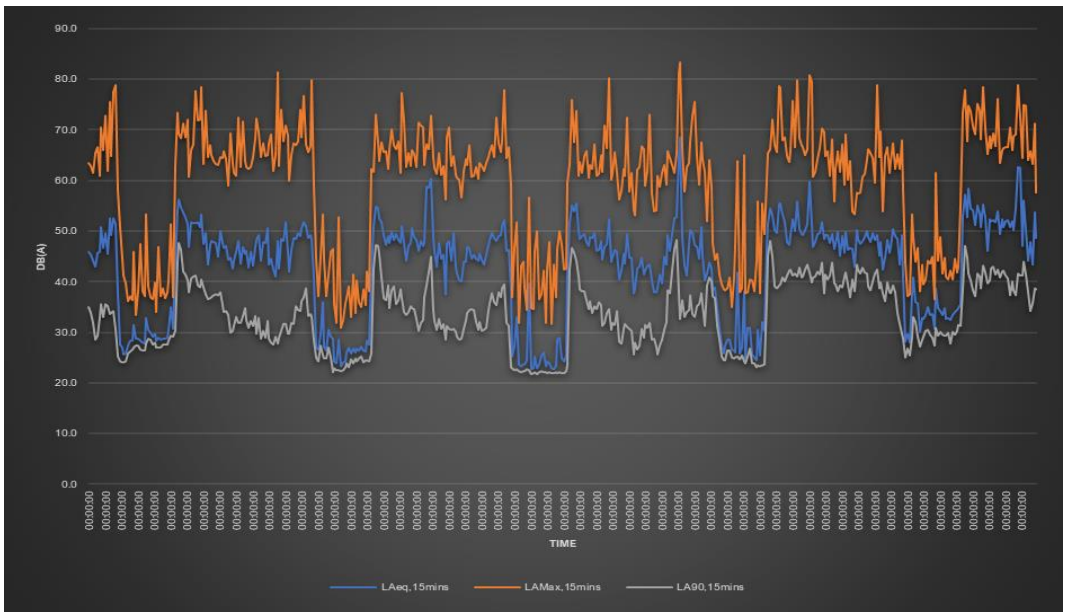

Figure 7: Line graph showing $L_{Aeq,15mins}$, $L_{AMax,15mins}$ and $L_{A90,15mins}$ vs. time for ML1.

3.3.1 A summary of the measured ambient and background noise levels recorded during the monitoring duration are presented within **Table 7** below.

Table 7: Summary of Measured Daytime and Night-time Background Noise Levels – Free Field, dB				
Measurement Location	**Time Period**	**Measurement Duration**	**Background Noise Level ($L_{A90,T}$)**	**Ambient Noise Level ($L_{Aeq,T}$)**
ML1	0700-2300	15 minutes	22-44	27-63
	2300-0700	60 minutes	22-48	23-58

3.3.2 Statistical analyses has been undertaken on the datasets from ML1 presenting histograms showing the frequency of occurrence of the sound levels measured in terms of $L_{Aeq,15mins}$ and $L_{A90,15mins}$.

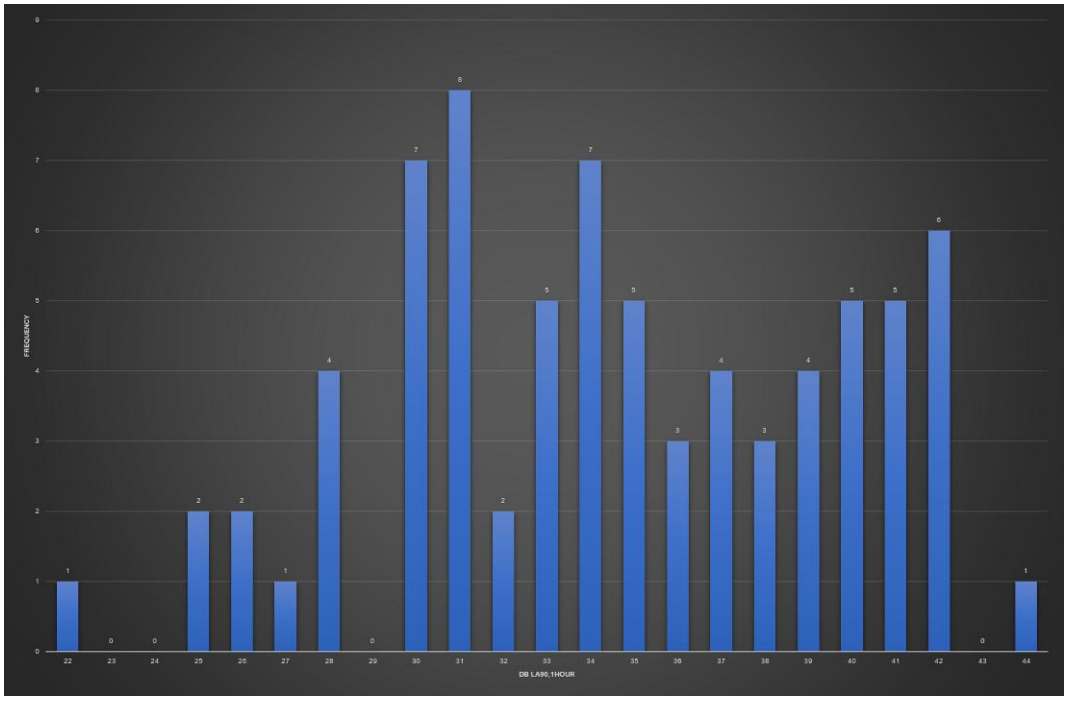

Figure 8: Histogram showing frequency of occurrence of $L_{Aeq,60mins}$, at ML1 – 0700-2300 hours.

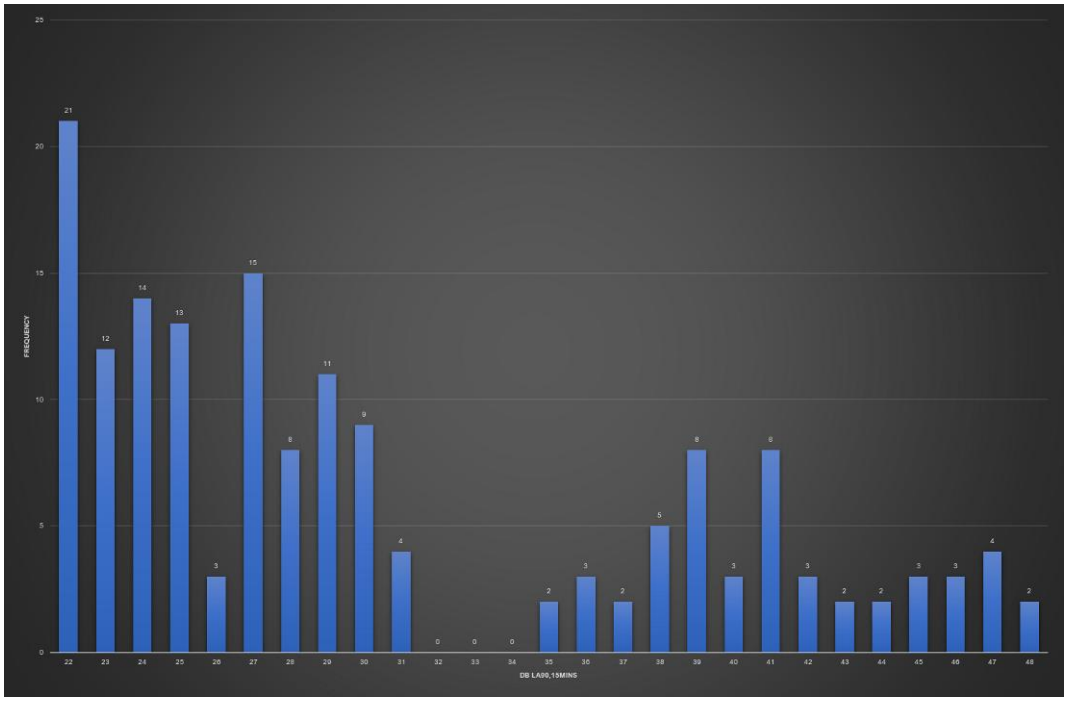

Figure 9: Histogram showing frequency of occurrence of $L_{A90,15mins}$, at ML1 – 2300 – 0700 hours.

3.3.3 Based on the frequency of occurrence of the $L_{A90,15minute}$ sound levels at ML1 a representative background sound level of 22 dB L_{A90} has been adopted for this assessment.

3.3.4 In order to suitably assess low frequency noise, the criteria 'L_{10} (EN) should not exceed the L_{90} (WEN) in any 1/3 octave band between 40 and 160Hz' the mode average of all frequency specific dB L_{90} measurements has been calculated and are presented within **Table 8.**

Table 8: Table Showing the Mode Average of Background L_{90} at the NSR Location 40 Hz to 160 Hz

40 Hz	50 Hz	63 Hz	80 Hz	100 HZ	125 Hz	160 Hz
15	21	21	15	15	20	16

4 ASSESSMENT

4.1 Determination of Entertainment Noise Level Limits

4.1.1 Drawing upon the assessment criteria determined for the proposal in Section 1, **Table 5** and the measured background noise levels presented in **Table 7** the allowable noise level limits for EN are presented in **Table 9**.

Table 9: Derived Entertainment Noise Level Limits	
Low Frequency Limit (External Free Field)	**Overall Entertainment Noise Level Limits (External Free Field)**
L_{10} (EN) should not exceed L_{90} (WEN) in any 1/3 octave band between 40 and 160Hz	L_{Aeq} (EN) not to L_{A90} (WEN) externally.

4.2 Noise Level Predictions

4.2.1 To determine whether the identified noise level limits can be achieved, a detailed noise model has been prepared for the proposed wedding / function events venue. The model extends to the surrounding area including the closest NSR's. This noise model has been used to predict the noise levels that would be generated from a typical amplified disco event held within the converted barn structure.

4.3 Noise Model

4.3.1 A 3D sound model has been constructed for the development site using SoundPLAN™. The approach to the preparation of the sound model is summarised below:

4.3.2 The 3D sound model was set to use the ISO 9613 Acoustics – Attenuation of sound during propagation outdoors noise prediction methodology. By default, this noise model predicts the noise level that would be generated downwind from the source in question (wind direction within an angle of +/- 45 degrees of the direction connecting the source and receiver, with wind blowing from the source).

4.3.3 Ordnance survey contour detail for the site and surrounding area was incorporated into the model to account for any topographic effects such as screening.

4.3.4 To reflect the local ground cover, ground absorption was set to 1 (soft ground).

4.3.5 The 3D sound model was set to include first order reflections such that the contribution of reflected noise (e.g. from building facades) was accounted for.

4.3.6 While it is considered that the main noise source (loudspeakers) inside the converted barn structure are point noise sources with directional performance characteristics, the 3D sound

model assumes equal noise breakout through the building fabric and also noise breakout from patrons congregating at the front of the building.

4.3.7 1/3 octave noise spectra used for calibration of loudspeakers (amplified music/sound reinforcement) has been based on library data available from within SoundPLAN™ internal library and has been set to that of electronic music and therefore considered to be representative of a wedding disco. Noise levels have been calibrated to a typical internal reverberant field value of 90 dB (A) inside the building structure. Error! Reference source not found. details the spectra adopted for assessment

Table 10: Table Showing Frequency Spectra of Wedding Disco Previously Recorded dB I_{eq}

40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz
70.0	105.0	102.0	94.0	87.2	83.4	81.6
200 Hz	**250 Hz**	**315 Hz**	**400 Hz**	**500 Hz**	**630 Hz**	**800 Hz**
80.8	80.4	80.4	80.7	80.0	81.0	80.7
1 KHz	**1.25 KHz**	**1.6 KHz**	**2 KHz**	**2.5 KHz**	**3.15 KHz**	**4 KHz**
80.2	79.4	78.5	77.5	76.4	75.22	74.32
5 KHz						
73.5						

4.3.8 Attenuation of the wall and roof structure has also been accounted for within the 3D sound model, calculations of the attenuation adopted can be found within Appendix C. It should be noted that the 3D sound model has been based on a homogeneous roof structure and therefore associated attenuation, it is likely therefore that the roof light areas will be required to be infilled with insulation.

4.3.9 In addition, the 3D sound model includes potential noise from guests located externally to the front of the building structure and has been set to a sound power level of 80 dB(A).

4.3.10 A noise contour plot showing the predicted noise propagation from the site is shown in **Figure 10**, predicted noise levels are also shown in **Figure 11**.

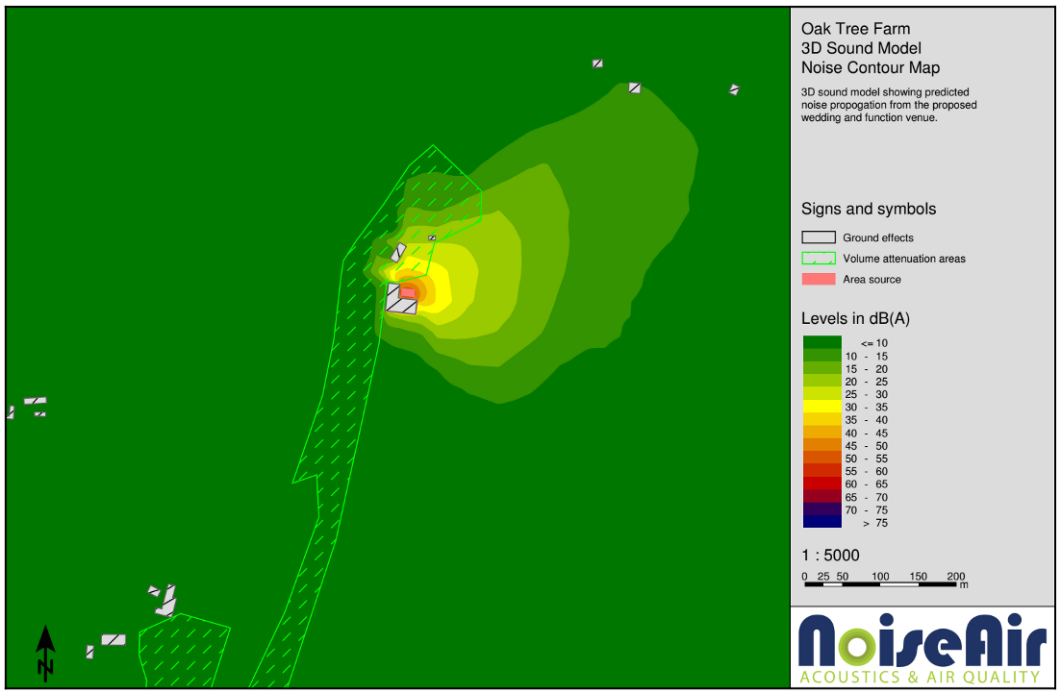

Figure 10: 3D noise contour plot showing predicted noise propagation – $L_{Aeq,T}$.

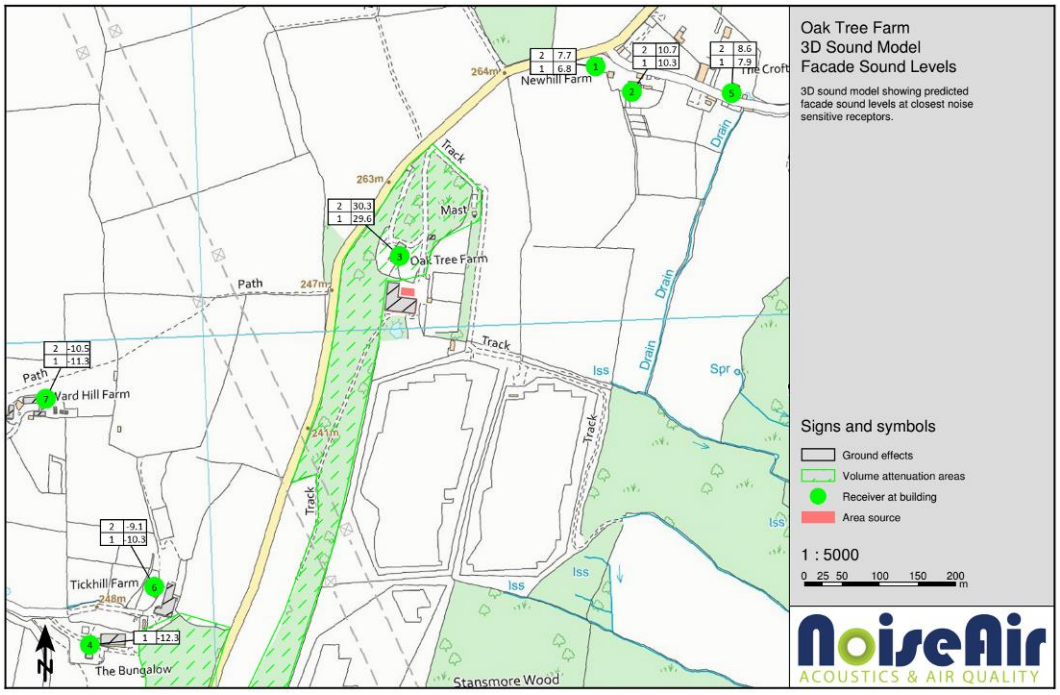

Figure 11: Plot showing predicted noise levels.

4.3.11 **Table 11** below presents the results of the noise level predictions for each receptor, including the octave band sound pressure levels between the 40Hz and 160Hz octave bands, and the overall sound pressure level in terms of $L_{Aeq,T}$.

4.3.12 Also presented in the table below are the adopted entertainment noise level limits (from **Table 5**) and the amount by which these will be met or exceeded, based on the completed noise level predictions.

Table 11: Modelled Receptor Noise Levels dB(A)

Receptor	Noise Index	Noise Level Limit, dB L_{90}	Predicted Noise Level, External Free Field, dB L_{10} (At 90 dB limit)
NSR 1	40 Hz 1/3 Octave Band (Linear)	15	13.2
	50 Hz 1/3 Octave Band (Linear)	21	14.1
	63 Hz 1/3 Octave Band (Linear)	21	11.2
	80 Hz 1/3 Octave Band (Linear)	15	3
	100 Hz 1/3 Octave Band (Linear)	15	0**
	125 Hz 1/3 Octave Band (Linear)	20	0**
	160 Hz Octave Band (Linear)	16	0**
	$L_{Aeq,T}$	**22***	**8**
NSR 2	40 Hz 1/3 Octave Band (Linear)	15	13.6
	50 Hz 1/3 Octave Band (Linear)	21	14.4
	63 Hz 1/3 Octave Band (Linear)	21	11.6
	80 Hz 1/3 Octave Band (Linear)	15	3.3
	100 Hz 1/3 Octave Band (Linear)	15	0**
	125 Hz 1/3 Octave Band (Linear)	20	0**
	160 Hz Octave Band (Linear)	16	0**
	$L_{Aeq,T}$	**22***	**11**
NSR 3	40 Hz 1/3 Octave Band (Linear)	15	29
	50 Hz 1/3 Octave Band (Linear)	21	30.2
	63 Hz 1/3 Octave Band (Linear)	21	27.5
	80 Hz 1/3 Octave Band (Linear)	15	19.4
	100 Hz 1/3 Octave Band (Linear)	15	9

Table 11: Modelled Receptor Noise Levels dB(A)			
Receptor	**Noise Index**	**Noise Level Limit, dB L_{90}**	**Predicted Noise Level, External Free Field, dB L_{10} (At 90 dB limit)**
	125 Hz 1/3 Octave Band (Linear)	20	5.7
	160 Hz Octave Band (Linear)	16	0**
	$L_{Aeq,T}$	**22***	**30**
NSR 4	40 Hz 1/3 Octave Band (Linear)	15	9.6
	50 Hz 1/3 Octave Band (Linear)	21	10.3
	63 Hz 1/3 Octave Band (Linear)	21	7
	80 Hz 1/3 Octave Band (Linear)	15	0**
	100 Hz 1/3 Octave Band (Linear)	15	0**
	125 Hz 1/3 Octave Band (Linear)	20	0**
	160 Hz Octave Band (Linear)	16	0**
	$L_{Aeq,T}$	**22***	**0****
NSR 5	40 Hz 1/3 Octave Band (Linear)	15	11.8
	50 Hz 1/3 Octave Band (Linear)	21	12.7
	63 Hz 1/3 Octave Band (Linear)	21	9.8
	80 Hz 1/3 Octave Band (Linear)	15	1.5
	100 Hz 1/3 Octave Band (Linear)	15	0**
	125 Hz 1/3 Octave Band (Linear)	20	0**
	160 Hz Octave Band (Linear)	16	0**
	$L_{Aeq,T}$	**22***	**9**
NSR 6	40 Hz 1/3 Octave Band (Linear)	15	13.5
	50 Hz 1/3 Octave Band (Linear)	21	14.3
	63 Hz 1/3 Octave Band (Linear)	21	11.1
	80 Hz 1/3 Octave Band (Linear)	15	2.9

Table 11: Modelled Receptor Noise Levels dB(A)			
Receptor	**Noise Index**	**Noise Level Limit, dB L_{90}**	**Predicted Noise Level, External Free Field, dB L_{10} (At 90 dB limit)**
	100 Hz 1/3 Octave Band (Linear)	15	0**
	125 Hz 1/3 Octave Band (Linear)	20	0**
	160 Hz Octave Band (Linear)	16	0**
	$L_{Aeq,T}$	**22***	**0****
NSR 7	40 Hz 1/3 Octave Band (Linear)	15	9.8
	50 Hz 1/3 Octave Band (Linear)	21	10.5
	63 Hz 1/3 Octave Band (Linear)	21	7.3
	80 Hz 1/3 Octave Band (Linear)	15	0**
	100 Hz 1/3 Octave Band (Linear)	15	0**
	125 Hz 1/3 Octave Band (Linear)	20	0**
	160 Hz Octave Band (Linear)	16	0**
	$L_{Aeq,T}$	**22***	**0****
* Background L_{A90} at NSR Location. ** Calculated value is <0 dB.			

4.3.13 **Table 11** demonstrates that low frequency noise levels are unlikely to exceed the limits set at the noise sensitive receptor locations given some basic improvements to the building structure, namely providing additional insulation to the roof skylight openings.

4.3.14 It should also be noted that it is likely that noise levels may fluctuate from one event to the next (depending on the precise equipment used, the arrangement of this equipment, the prevailing weather conditions and the levels setting etc.).

5 MITIGATION

5.1.1 Completed noise level predictions have identified that in order to achieve a suitable EN level of 90 dB (A) within the proposed venue whilst ensuring low frequency criteria can be met at noise sensitive receptors, best practice noise mitigation measures should be employed.

5.1.2 We therefore recommend that improvements are made to the existing building fabric, specifically additional densely packed insulation should be applied to the roof structure where the skylight openings are situated (as shown in **Figure 4**). While visually inspecting the premises no other obvious and significant noise breakout paths were noted however any opening within the building fabric should be appropriately sealed.

5.1.3 A noise limiting device capable of setting a fixed overall dB (A) level as well as individual limits across 1/3 octave bands should be integrated to any audio/PA system to be employed at the venue. An example of such a limiting device can be seen at http://savtek.com.au/sale/cesva-1-3-octave-sound-limiter/ however the required device should extend to 40 Hz.

5.1.4 It is recommended that any speaker system installed at the venue should be directional in response, with minimal rear projection and focused on the required area (away from the direction of noise sensitive receptors) with an even SPL coverage. By ensuring even coverage across a desired zone would negate the typical scenario of overly increasing volume in order to project sound to a location further afield (such as the back of a room). This is relatively easy to engineer within a multiple speaker setup (4+ speakers) and with particular attention to loud-speaker positioning, however: specific directional systems such as 'Direct Acoustics Zone Array' are available on the market and should be considered.

5.1.5 Further mitigation recommendations are made in respect to live music performance where typically, acoustic instrumentation such as drum kits can often exceed venue limits. Its is recommended that traditional acoustic drum kits are replaced by electric kits and that direct injection boxes (DI boxes) are employed for instruments such as guitars and bass guitars allowing for these instruments to be played directly through the audio/sound reinforcement system via a suitable mixing console.

5.1.6 Consideration should be given to environmental noise monitoring. Such environmental noise monitoring should be undertaken by a suitably qualified acoustic consultant (minimum IoA PGDip Acoustics and Noise Control with minimum three years' experience working with environmental noise). The environmental acoustic monitoring should be undertaken for the duration of any wedding / function event (or other event type where EN is generated) and

noise levels are to be regularly monitored at local noise sensitive receptors to ensure that the required limits are maintained. Where appropriate the acoustic consultant undertaking the environmental monitoring should be in contact with the event organiser and venue to ensure a dynamic approach to noise control is adopted. Any complaints made by local residents should be investigated as soon as possible during the event, logged and reported to the local authority post event with description of actions taken, if appropriate. Environmental noise monitoring can be used to validate the models provided in this report and provide suggestions for alterations where appropriate. Such monitoring should be undertaken to confirm the suitability of noise levels provided in this report, after which basic monitoring undertaken by the venue would likely be sufficient. In the event of any further issues in the future it may be appropriate to undertake additional monitoring undertaken by a professional consultant as outlined above.

5.1.7 Additionally, the applicant should compose an effective noise management plan (NMP) with methods of minimising noise from events and provide training to all relevant personnel. As wedding and function events can occasionally be unpredictable in nature, the NMP should seek to outline to all staff and guest representatives the site procedures. The NMP should advise that any fire exits or windows (or any other openings) should remain closed for the duration of the event, guests should only be allowed to congregate in designated external areas, limits set on acceptable noise internal noise levels, procedures for accessing and egressing the site and what procedures are in place in the event of any complaints.

6 CONCLUSIONS

6.1.1 NoiseAir have been appointed by Great Grounds Limited to undertake an environmental noise assessment of a proposed wedding / function events venue at the address: Oak Tree Farm, Tickhill Lane, Dilhorne ST10 2PL.

6.1.2 The scope of this report covers noise breakout from the proposed wedding and function events venue, specifically a converted barn building, accommodating bands and amplified music as well as general sound reinforcement associated with typical wedding and charity events held in the United Kingdom.

6.1.3 A detailed baseline noise survey has been undertaken at a measurement location representative of the closest noise-sensitive receptor(s) to the site. This survey was undertaken to establish the prevailing local background noise levels during when it is anticipated that the proposal has the greatest potential to give rise to an adverse impact.

6.1.4 As there is no definitive UK noise assessment methodology which is applicable to amplified entertainment noise from a facility such as that proposed, a review of available guidance has been undertaken, including the following documents:

- Planning Policy Guidance Note 24: Planning and Noise
- Code of practice on the control of noise form pubs and clubs [Draft 1999]
- Good practice guide on the control of noise form pubs and clubs [March 2003]
- Noise form pubs and clubs Phase I [October 2005], a report by the University of Salford.
- Noise from pubs and clubs (Phase II): Final Report [May 2006] A report by the Department for Environment Food and Rural affairs; and
- Code of practice on environmental noise control at concerts.

6.1.5 Based on the results of this review, the baseline noise survey, and drawing on the specific details of this project, a series of acceptable entertainment noise level limits have been derived for the control of amplified music noise from the venue once operational.

6.1.6 A detailed noise model has been prepared for the proposal, encompassing the area out to local noise sensitive receptors. This noise model has been used to undertake a series of noise level predictions for a typical amplified music disco event within building structure. The resulting noise levels at local receptors have been predicted and assessed based on the adopted entertainment noise level limits.

6.1.7 The assessment has identified that low frequency noise levels are unlikely to exceed the limits set at the noise sensitive receptor locations given some basic improvements to the building structure, namely providing additional insulation to the roof skylight openings.

6.1.8 Further mitigation recommendations have been provided in the form a noise limiting device set across low frequency bands 40 Hz – 160 Hz as well as the overall broadband noise level and the production of a noise management plan for the site.

6.1.9 It should also be noted that it is likely that noise levels may fluctuate from one event to the next (depending on the precise equipment used, the arrangement of this equipment, the prevailing weather conditions and the levels setting etc.).

APPENDIX A - REPORT LIMITATIONS

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This Report is presented to Great Grounds Limited and may not be used or relied on by any other person or by the client in relation to any other matters not covered specifically by the scope of this report.

Notwithstanding anything to the contrary contained in the report, NoiseAir Limited is obliged to exercise reasonable skill, care and diligence in the performance of the services required by Great Grounds Limited and NoiseAir shall not be liable except to the extent that it has failed to exercise reasonable skill, care and diligence, and this report shall be read and construed accordingly.

This report has been prepared by NoiseAir Limited. No individual is personally liable in connection with the preparation of this report. By receiving this report and acting on it, the client or any other person accepts that no individual is personally liable whether in contract, tort, for breach of statutory duty or otherwise.

The conclusions and recommendations contained in this report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from who it has been requested and that such information is accurate. Information obtained by NoiseAir Limited has not been independently verified by NoiseAir Limited unless otherwise stated in the report and should be treated accordingly.

The methodology adopted and the sources of information used by NoiseAir Limited in providing its services are outlined in this report. The work described in this report was undertaken during the dates given in Section 1 and Section 2 and is based upon the conditions encountered as detailed in Section 2 and the information available up to the said date. The scope of this report and the services are accordingly factually limited by these circumstances.

Where assessments of works or costs identified in this report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

Where / if estimates and projects are made within this report, are made based on reasonable assumptions as of the date of this report, such statements however by their very nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. NoiseAir Limited specifically does not guarantee or warrant any estimates or projects contained in this report.

DISCLAIMER- This report was prepared by NoiseAir Limited. The material in it contains NoiseAir Limited best judgment in light of the information available at the time of preparation of this report. Any use which a third party makes of this report, or any reliance on, or decisions based on it are the responsibility of such third parties. NoiseAir Limited accept no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

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APPENDIX B - METER READINGS

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Noise Monitoring – ML1

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
06/05/2020	17:45:00	00:15:00	46.0	63.4	35.0
06/05/2020	18:00:00	00:15:00	45.4	62.9	33.8
06/05/2020	18:15:00	00:15:00	44.1	61.5	31.8
06/05/2020	18:30:00	00:15:00	42.9	65.4	28.6
06/05/2020	18:45:00	00:15:00	45.8	66.5	29.3
06/05/2020	19:00:00	00:15:00	46.0	61.0	33.0
06/05/2020	19:15:00	00:15:00	50.7	70.5	35.6
06/05/2020	19:30:00	00:15:00	46.6	66.0	33.1
06/05/2020	19:45:00	00:15:00	49.7	72.9	35.5
06/05/2020	20:00:00	00:15:00	45.5	62.0	35.2
06/05/2020	20:15:00	00:15:00	52.6	75.6	33.7
06/05/2020	20:30:00	00:15:00	49.3	64.8	33.9
06/05/2020	20:45:00	00:15:00	52.5	77.6	34.3
06/05/2020	21:00:00	00:15:00	51.4	78.9	30.6
06/05/2020	21:15:00	00:15:00	37.8	58.0	25.3
06/05/2020	21:30:00	00:15:00	27.5	50.8	24.2
06/05/2020	21:45:00	00:15:00	27.1	44.6	24.0
06/05/2020	22:00:00	00:15:00	25.7	41.2	24.0
06/05/2020	22:15:00	00:15:00	25.9	39.7	24.2
06/05/2020	22:30:00	00:15:00	27.3	36.2	25.8
06/05/2020	22:45:00	00:15:00	28.3	37.1	26.3
06/05/2020	23:00:00	00:15:00	28.3	36.3	26.6
06/05/2020	23:15:00	00:15:00	31.4	45.9	27.1
06/05/2020	23:30:00	00:15:00	28.7	33.5	27.3
06/05/2020	23:45:00	00:15:00	28.7	38.2	27.3
07/05/2020	00:00:00	00:15:00	28.3	47.5	26.7
07/05/2020	00:15:00	00:15:00	27.9	38.2	26.5
07/05/2020	00:30:00	00:15:00	27.8	37.2	26.4
07/05/2020	00:45:00	00:15:00	32.8	53.3	27.7
07/05/2020	01:00:00	00:15:00	30.5	39.0	28.8
07/05/2020	01:15:00	00:15:00	30.0	36.9	28.5
07/05/2020	01:30:00	00:15:00	29.1	36.6	27.6
07/05/2020	01:45:00	00:15:00	29.7	39.9	27.9
07/05/2020	02:00:00	00:15:00	28.4	34.0	27.1
07/05/2020	02:15:00	00:15:00	29.0	46.8	27.0
07/05/2020	02:30:00	00:15:00	28.5	37.1	27.0
07/05/2020	02:45:00	00:15:00	28.8	38.7	27.5
07/05/2020	03:00:00	00:15:00	28.7	36.8	27.6
07/05/2020	03:15:00	00:15:00	29.0	37.9	27.6
07/05/2020	03:30:00	00:15:00	30.5	40.3	28.4
07/05/2020	03:45:00	00:15:00	35.0	51.3	29.4
07/05/2020	04:00:00	00:15:00	30.8	36.9	29.2
07/05/2020	04:15:00	00:15:00	44.1	62.8	30.3
07/05/2020	04:30:00	00:15:00	54.2	73.4	43.9
07/05/2020	04:45:00	00:15:00	56.2	69.3	47.6
07/05/2020	05:00:00	00:15:00	54.7	68.3	46.4
07/05/2020	05:15:00	00:15:00	53.8	71.3	42.0
07/05/2020	05:30:00	00:15:00	52.8	68.5	41.4

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
07/05/2020	05:45:00	00:15:00	51.3	72.1	40.2
07/05/2020	06:00:00	00:15:00	46.8	60.8	37.9
07/05/2020	06:15:00	00:15:00	51.8	66.0	40.7
07/05/2020	06:30:00	00:15:00	51.6	67.2	41.0
07/05/2020	06:45:00	00:15:00	51.5	77.7	41.2
07/05/2020	07:00:00	00:15:00	51.7	71.8	39.3
07/05/2020	07:15:00	00:15:00	50.7	72.0	38.9
07/05/2020	07:30:00	00:15:00	53.3	78.5	40.4
07/05/2020	07:45:00	00:15:00	47.4	63.3	38.9
07/05/2020	08:00:00	00:15:00	49.6	73.8	37.5
07/05/2020	08:15:00	00:15:00	43.4	64.7	36.5
07/05/2020	08:30:00	00:15:00	47.3	66.9	36.7
07/05/2020	08:45:00	00:15:00	48.1	65.1	36.9
07/05/2020	09:00:00	00:15:00	47.8	63.8	37.3
07/05/2020	09:15:00	00:15:00	47.7	63.2	37.5
07/05/2020	09:30:00	00:15:00	44.9	63.0	37.3
07/05/2020	09:45:00	00:15:00	50.1	64.7	38.0
07/05/2020	10:00:00	00:15:00	47.7	64.5	35.3
07/05/2020	10:15:00	00:15:00	46.6	65.8	34.0
07/05/2020	10:30:00	00:15:00	47.1	64.3	34.3
07/05/2020	10:45:00	00:15:00	44.3	58.9	33.5
07/05/2020	11:00:00	00:15:00	44.7	69.4	30.0
07/05/2020	11:15:00	00:15:00	42.6	63.2	30.3
07/05/2020	11:30:00	00:15:00	44.1	61.5	31.2
07/05/2020	11:45:00	00:15:00	45.9	61.0	33.0
07/05/2020	12:00:00	00:15:00	48.1	72.5	31.9
07/05/2020	12:15:00	00:15:00	43.6	62.6	31.9
07/05/2020	12:30:00	00:15:00	46.9	71.6	33.2
07/05/2020	12:45:00	00:15:00	45.6	63.8	34.9
07/05/2020	13:00:00	00:15:00	46.1	62.7	32.4
07/05/2020	13:15:00	00:15:00	42.8	62.3	31.0
07/05/2020	13:30:00	00:15:00	45.9	62.7	32.3
07/05/2020	13:45:00	00:15:00	43.2	64.7	31.2
07/05/2020	14:00:00	00:15:00	46.9	68.4	33.2
07/05/2020	14:15:00	00:15:00	48.3	72.3	29.8
07/05/2020	14:30:00	00:15:00	49.2	69.6	32.9
07/05/2020	14:45:00	00:15:00	44.2	64.6	28.8
07/05/2020	15:00:00	00:15:00	47.9	67.4	30.3
07/05/2020	15:15:00	00:15:00	47.7	64.8	28.9
07/05/2020	15:30:00	00:15:00	50.6	65.1	32.3
07/05/2020	15:45:00	00:15:00	43.4	67.3	28.8
07/05/2020	16:00:00	00:15:00	44.6	69.1	28.0
07/05/2020	16:15:00	00:15:00	42.5	62.0	27.5
07/05/2020	16:30:00	00:15:00	41.1	65.0	29.1
07/05/2020	16:45:00	00:15:00	48.0	81.5	27.8
07/05/2020	17:00:00	00:15:00	42.6	62.8	29.0
07/05/2020	17:15:00	00:15:00	48.4	74.0	30.3
07/05/2020	17:30:00	00:15:00	48.0	67.7	31.6
07/05/2020	17:45:00	00:15:00	51.7	70.8	31.6

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
07/05/2020	18:00:00	00:15:00	45.8	68.9	29.8
07/05/2020	18:15:00	00:15:00	42.1	59.9	29.8
07/05/2020	18:30:00	00:15:00	46.3	65.1	31.9
07/05/2020	18:45:00	00:15:00	48.6	67.3	31.7
07/05/2020	19:00:00	00:15:00	48.5	67.0	35.2
07/05/2020	19:15:00	00:15:00	49.7	67.7	34.5
07/05/2020	19:30:00	00:15:00	49.1	73.9	34.2
07/05/2020	19:45:00	00:15:00	50.5	68.6	36.1
07/05/2020	20:00:00	00:15:00	51.8	76.7	37.0
07/05/2020	20:15:00	00:15:00	50.9	67.1	38.7
07/05/2020	20:30:00	00:15:00	48.7	65.6	33.2
07/05/2020	20:45:00	00:15:00	49.2	66.7	33.7
07/05/2020	21:00:00	00:15:00	48.5	79.8	33.0
07/05/2020	21:15:00	00:15:00	40.8	58.9	28.4
07/05/2020	21:30:00	00:15:00	27.0	44.6	25.0
07/05/2020	21:45:00	00:15:00	26.6	37.2	24.3
07/05/2020	22:00:00	00:15:00	29.7	45.0	27.3
07/05/2020	22:15:00	00:15:00	36.0	53.3	25.4
07/05/2020	22:30:00	00:15:00	27.2	44.6	24.9
07/05/2020	22:45:00	00:15:00	26.4	37.1	24.8
07/05/2020	23:00:00	00:15:00	30.5	41.5	27.0
07/05/2020	23:15:00	00:15:00	29.2	45.9	25.1
07/05/2020	23:30:00	00:15:00	28.8	46.5	22.1
07/05/2020	23:45:00	00:15:00	24.3	35.6	23.0
08/05/2020	00:00:00	00:15:00	23.9	31.8	22.5
08/05/2020	00:15:00	00:15:00	28.6	52.8	22.5
08/05/2020	00:30:00	00:15:00	23.3	31.0	22.3
08/05/2020	00:45:00	00:15:00	24.0	32.4	22.5
08/05/2020	01:00:00	00:15:00	24.3	35.8	23.1
08/05/2020	01:15:00	00:15:00	26.1	36.7	23.8
08/05/2020	01:30:00	00:15:00	27.1	39.0	23.1
08/05/2020	01:45:00	00:15:00	25.8	33.1	24.6
08/05/2020	02:00:00	00:15:00	26.8	41.4	23.9
08/05/2020	02:15:00	00:15:00	26.0	33.8	24.9
08/05/2020	02:30:00	00:15:00	26.8	40.3	24.3
08/05/2020	02:45:00	00:15:00	26.4	36.0	24.9
08/05/2020	03:00:00	00:15:00	27.2	35.0	25.2
08/05/2020	03:15:00	00:15:00	26.5	38.6	24.1
08/05/2020	03:30:00	00:15:00	26.2	35.4	24.4
08/05/2020	03:45:00	00:15:00	28.4	42.0	24.5
08/05/2020	04:00:00	00:15:00	27.6	38.2	24.3
08/05/2020	04:15:00	00:15:00	41.8	62.2	25.8
08/05/2020	04:30:00	00:15:00	50.9	61.7	42.6
08/05/2020	04:45:00	00:15:00	54.8	73.0	47.2
08/05/2020	05:00:00	00:15:00	54.4	67.6	47.1
08/05/2020	05:15:00	00:15:00	52.5	63.8	45.6
08/05/2020	05:30:00	00:15:00	51.8	67.6	40.8
08/05/2020	05:45:00	00:15:00	49.2	65.7	36.7
08/05/2020	06:00:00	00:15:00	47.3	65.9	36.3

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
08/05/2020	06:15:00	00:15:00	49.1	62.2	39.2
08/05/2020	06:30:00	00:15:00	47.6	66.0	34.8
08/05/2020	06:45:00	00:15:00	49.8	70.1	38.4
08/05/2020	07:00:00	00:15:00	48.3	67.0	39.0
08/05/2020	07:15:00	00:15:00	49.5	66.2	35.5
08/05/2020	07:30:00	00:15:00	48.2	67.8	36.3
08/05/2020	07:45:00	00:15:00	47.6	61.5	38.5
08/05/2020	08:00:00	00:15:00	51.0	77.3	36.8
08/05/2020	08:15:00	00:15:00	47.7	71.7	34.0
08/05/2020	08:30:00	00:15:00	44.2	62.6	33.5
08/05/2020	08:45:00	00:15:00	47.1	65.5	34.0
08/05/2020	09:00:00	00:15:00	47.7	62.8	35.1
08/05/2020	09:15:00	00:15:00	50.5	66.0	34.9
08/05/2020	09:30:00	00:15:00	48.8	65.3	34.6
08/05/2020	09:45:00	00:15:00	48.2	62.6	32.7
08/05/2020	10:00:00	00:15:00	46.2	71.5	30.3
08/05/2020	10:15:00	00:15:00	48.0	70.9	31.9
08/05/2020	10:30:00	00:15:00	47.1	70.4	32.5
08/05/2020	10:45:00	00:15:00	47.7	63.0	36.9
08/05/2020	11:00:00	00:15:00	58.7	67.1	39.2
08/05/2020	11:15:00	00:15:00	58.5	66.2	42.0
08/05/2020	11:30:00	00:15:00	60.3	72.9	45.0
08/05/2020	11:45:00	00:15:00	48.8	64.6	34.4
08/05/2020	12:00:00	00:15:00	46.1	62.5	32.2
08/05/2020	12:15:00	00:15:00	43.0	61.4	30.6
08/05/2020	12:30:00	00:15:00	47.7	65.4	32.6
08/05/2020	12:45:00	00:15:00	44.5	61.1	30.8
08/05/2020	13:00:00	00:15:00	45.4	62.9	31.7
08/05/2020	13:15:00	00:15:00	37.6	56.2	28.5
08/05/2020	13:30:00	00:15:00	47.4	68.5	31.2
08/05/2020	13:45:00	00:15:00	48.0	70.5	30.8
08/05/2020	14:00:00	00:15:00	44.2	62.9	30.6
08/05/2020	14:15:00	00:15:00	49.7	64.9	30.8
08/05/2020	14:30:00	00:15:00	42.9	61.2	30.1
08/05/2020	14:45:00	00:15:00	41.6	60.5	29.2
08/05/2020	15:00:00	00:15:00	40.2	60.2	28.6
08/05/2020	15:15:00	00:15:00	40.1	56.7	28.8
08/05/2020	15:30:00	00:15:00	43.9	62.0	30.8
08/05/2020	15:45:00	00:15:00	43.9	64.3	32.5
08/05/2020	16:00:00	00:15:00	46.8	63.0	33.8
08/05/2020	16:15:00	00:15:00	46.6	66.9	34.4
08/05/2020	16:30:00	00:15:00	44.5	60.8	34.6
08/05/2020	16:45:00	00:15:00	45.3	61.0	34.5
08/05/2020	17:00:00	00:15:00	44.5	62.7	32.1
08/05/2020	17:15:00	00:15:00	44.1	60.4	30.6
08/05/2020	17:30:00	00:15:00	45.6	63.5	32.0
08/05/2020	17:45:00	00:15:00	44.3	62.8	30.3
08/05/2020	18:00:00	00:15:00	43.3	62.0	30.5
08/05/2020	18:15:00	00:15:00	45.4	63.5	30.9

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
08/05/2020	18:30:00	00:15:00	47.2	64.6	34.4
08/05/2020	18:45:00	00:15:00	48.3	65.6	35.8
08/05/2020	19:00:00	00:15:00	49.6	66.9	37.7
08/05/2020	19:15:00	00:15:00	48.7	64.7	36.0
08/05/2020	19:30:00	00:15:00	48.0	72.4	35.3
08/05/2020	19:45:00	00:15:00	49.1	67.4	37.9
08/05/2020	20:00:00	00:15:00	49.3	65.6	36.9
08/05/2020	20:15:00	00:15:00	50.9	67.7	38.7
08/05/2020	20:30:00	00:15:00	52.2	77.8	39.5
08/05/2020	20:45:00	00:15:00	46.2	64.5	31.9
08/05/2020	21:00:00	00:15:00	46.4	66.5	31.2
08/05/2020	21:15:00	00:15:00	38.2	58.9	23.1
08/05/2020	21:30:00	00:15:00	25.3	37.0	22.9
08/05/2020	21:45:00	00:15:00	27.2	46.7	22.6
08/05/2020	22:00:00	00:15:00	33.0	51.7	22.7
08/05/2020	22:15:00	00:15:00	23.6	31.8	22.4
08/05/2020	22:30:00	00:15:00	23.3	43.1	22.1
08/05/2020	22:45:00	00:15:00	23.6	44.0	22.4
08/05/2020	23:00:00	00:15:00	23.7	38.8	22.4
08/05/2020	23:15:00	00:15:00	24.4	34.4	22.8
08/05/2020	23:30:00	00:15:00	39.6	56.7	22.6
08/05/2020	23:45:00	00:15:00	22.7	34.8	21.8
09/05/2020	00:00:00	00:15:00	23.0	34.7	21.9
09/05/2020	00:15:00	00:15:00	25.3	46.1	22.1
09/05/2020	00:30:00	00:15:00	22.9	50.0	21.8
09/05/2020	00:45:00	00:15:00	23.6	36.6	22.1
09/05/2020	01:00:00	00:15:00	25.5	37.6	22.4
09/05/2020	01:15:00	00:15:00	26.0	42.2	22.1
09/05/2020	01:30:00	00:15:00	23.3	31.9	22.1
09/05/2020	01:45:00	00:15:00	24.3	42.4	22.0
09/05/2020	02:00:00	00:15:00	23.8	47.8	22.2
09/05/2020	02:15:00	00:15:00	23.0	31.7	21.9
09/05/2020	02:30:00	00:15:00	22.7	43.3	22.0
09/05/2020	02:45:00	00:15:00	23.5	37.0	22.2
09/05/2020	03:00:00	00:15:00	28.6	46.3	22.0
09/05/2020	03:15:00	00:15:00	28.9	50.0	22.1
09/05/2020	03:30:00	00:15:00	24.9	47.3	22.0
09/05/2020	03:45:00	00:15:00	24.2	42.4	22.0
09/05/2020	04:00:00	00:15:00	25.4	42.7	22.4
09/05/2020	04:15:00	00:15:00	41.4	59.6	23.4
09/05/2020	04:30:00	00:15:00	51.5	63.3	42.5
09/05/2020	04:45:00	00:15:00	55.0	76.0	46.6
09/05/2020	05:00:00	00:15:00	54.0	67.6	45.8
09/05/2020	05:15:00	00:15:00	55.4	73.8	44.1
09/05/2020	05:30:00	00:15:00	50.0	60.9	41.1
09/05/2020	05:45:00	00:15:00	48.5	63.7	38.6
09/05/2020	06:00:00	00:15:00	49.0	61.6	38.1
09/05/2020	06:15:00	00:15:00	49.4	64.8	38.2
09/05/2020	06:30:00	00:15:00	47.8	65.8	36.3

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
09/05/2020	06:45:00	00:15:00	47.1	60.5	34.6
09/05/2020	07:00:00	00:15:00	48.8	63.1	36.1
09/05/2020	07:15:00	00:15:00	48.6	62.3	33.9
09/05/2020	07:30:00	00:15:00	49.7	67.1	35.2
09/05/2020	07:45:00	00:15:00	46.2	60.9	34.7
09/05/2020	08:00:00	00:15:00	46.4	61.3	36.0
09/05/2020	08:15:00	00:15:00	48.1	65.1	35.3
09/05/2020	08:30:00	00:15:00	44.4	61.7	31.3
09/05/2020	08:45:00	00:15:00	46.8	70.9	31.9
09/05/2020	09:00:00	00:15:00	47.5	66.4	33.8
09/05/2020	09:15:00	00:15:00	52.3	80.2	34.6
09/05/2020	09:30:00	00:15:00	44.0	60.1	30.5
09/05/2020	09:45:00	00:15:00	44.7	61.3	31.9
09/05/2020	10:00:00	00:15:00	46.4	65.7	31.4
09/05/2020	10:15:00	00:15:00	46.0	61.5	34.3
09/05/2020	10:30:00	00:15:00	40.5	56.3	28.1
09/05/2020	10:45:00	00:15:00	42.2	58.1	27.8
09/05/2020	11:00:00	00:15:00	45.5	62.3	30.7
09/05/2020	11:15:00	00:15:00	43.6	61.0	31.7
09/05/2020	11:30:00	00:15:00	49.4	72.5	31.1
09/05/2020	11:45:00	00:15:00	44.7	57.9	30.8
09/05/2020	12:00:00	00:15:00	44.7	61.5	30.4
09/05/2020	12:15:00	00:15:00	37.8	54.2	25.6
09/05/2020	12:30:00	00:15:00	38.6	53.2	27.9
09/05/2020	12:45:00	00:15:00	42.7	62.1	26.6
09/05/2020	13:00:00	00:15:00	43.0	62.6	27.4
09/05/2020	13:15:00	00:15:00	44.7	66.8	30.8
09/05/2020	13:30:00	00:15:00	41.5	66.1	28.9
09/05/2020	13:45:00	00:15:00	42.2	59.0	31.5
09/05/2020	14:00:00	00:15:00	43.1	61.9	31.0
09/05/2020	14:15:00	00:15:00	43.3	73.1	31.9
09/05/2020	14:30:00	00:15:00	40.2	57.5	28.5
09/05/2020	14:45:00	00:15:00	38.0	53.9	28.7
09/05/2020	15:00:00	00:15:00	37.9	54.1	27.2
09/05/2020	15:15:00	00:15:00	38.7	61.0	25.7
09/05/2020	15:30:00	00:15:00	41.5	58.8	27.3
09/05/2020	15:45:00	00:15:00	39.6	61.6	28.5
09/05/2020	16:00:00	00:15:00	45.0	63.0	30.6
09/05/2020	16:15:00	00:15:00	43.4	59.2	32.1
09/05/2020	16:30:00	00:15:00	49.2	65.8	38.3
09/05/2020	16:45:00	00:15:00	46.2	64.4	37.7
09/05/2020	17:00:00	00:15:00	49.4	63.1	42.2
09/05/2020	17:15:00	00:15:00	52.6	61.6	46.5
09/05/2020	17:30:00	00:15:00	52.7	65.4	48.2
09/05/2020	17:45:00	00:15:00	64.8	81.2	37.7
09/05/2020	18:00:00	00:15:00	68.6	83.3	32.7
09/05/2020	18:15:00	00:15:00	48.9	66.3	36.3
09/05/2020	18:30:00	00:15:00	43.2	57.9	33.0
09/05/2020	18:45:00	00:15:00	41.2	62.7	34.0

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
09/05/2020	19:00:00	00:15:00	47.4	63.5	34.5
09/05/2020	19:15:00	00:15:00	50.2	67.6	37.4
09/05/2020	19:30:00	00:15:00	49.6	72.8	33.7
09/05/2020	19:45:00	00:15:00	47.2	75.5	33.1
09/05/2020	20:00:00	00:15:00	46.9	64.9	35.1
09/05/2020	20:15:00	00:15:00	44.6	59.1	35.5
09/05/2020	20:30:00	00:15:00	50.8	67.6	37.7
09/05/2020	20:45:00	00:15:00	45.2	64.2	35.3
09/05/2020	21:00:00	00:15:00	40.3	61.8	31.3
09/05/2020	21:15:00	00:15:00	41.7	52.0	39.2
09/05/2020	21:30:00	00:15:00	43.8	64.1	40.8
09/05/2020	21:45:00	00:15:00	42.7	58.8	40.0
09/05/2020	22:00:00	00:15:00	38.4	47.6	37.1
09/05/2020	22:15:00	00:15:00	38.9	44.4	36.7
09/05/2020	22:30:00	00:15:00	34.9	45.6	31.3
09/05/2020	22:45:00	00:15:00	30.9	41.4	28.6
09/05/2020	23:00:00	00:15:00	27.5	39.5	25.2
09/05/2020	23:15:00	00:15:00	25.9	38.6	24.4
09/05/2020	23:30:00	00:15:00	27.3	38.4	24.4
09/05/2020	23:45:00	00:15:00	28.5	38.7	26.5
10/05/2020	00:00:00	00:15:00	28.6	40.9	26.5
10/05/2020	00:15:00	00:15:00	26.7	35.0	25.1
10/05/2020	00:30:00	00:15:00	26.4	40.9	24.8
10/05/2020	00:45:00	00:15:00	26.1	47.3	25.0
10/05/2020	01:00:00	00:15:00	41.8	63.8	25.3
10/05/2020	01:15:00	00:15:00	25.8	38.0	24.7
10/05/2020	01:30:00	00:15:00	27.0	38.8	25.5
10/05/2020	01:45:00	00:15:00	38.2	65.1	24.3
10/05/2020	02:00:00	00:15:00	24.8	37.7	23.8
10/05/2020	02:15:00	00:15:00	31.0	38.0	25.3
10/05/2020	02:30:00	00:15:00	31.0	40.4	26.8
10/05/2020	02:45:00	00:15:00	25.6	40.2	23.9
10/05/2020	03:00:00	00:15:00	25.1	38.1	23.8
10/05/2020	03:15:00	00:15:00	24.5	44.2	23.2
10/05/2020	03:30:00	00:15:00	30.5	55.8	23.5
10/05/2020	03:45:00	00:15:00	25.4	37.7	23.3
10/05/2020	04:00:00	00:15:00	32.0	55.5	23.4
10/05/2020	04:15:00	00:15:00	30.4	49.5	23.7
10/05/2020	04:30:00	00:15:00	46.8	60.2	36.4
10/05/2020	04:45:00	00:15:00	51.4	65.4	45.2
10/05/2020	05:00:00	00:15:00	54.4	66.1	48.1
10/05/2020	05:15:00	00:15:00	53.1	72.1	45.0
10/05/2020	05:30:00	00:15:00	50.2	66.9	39.0
10/05/2020	05:45:00	00:15:00	49.6	65.6	38.8
10/05/2020	06:00:00	00:15:00	55.4	78.7	39.3
10/05/2020	06:15:00	00:15:00	55.5	78.2	39.4
10/05/2020	06:30:00	00:15:00	53.3	67.9	40.9
10/05/2020	06:45:00	00:15:00	51.8	68.5	40.0
10/05/2020	07:00:00	00:15:00	47.9	64.8	41.2

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
10/05/2020	07:15:00	00:15:00	47.3	63.6	42.3
10/05/2020	07:30:00	00:15:00	49.3	65.8	42.4
10/05/2020	07:45:00	00:15:00	52.3	75.8	41.3
10/05/2020	08:00:00	00:15:00	50.0	66.5	41.6
10/05/2020	08:15:00	00:15:00	55.9	79.8	41.0
10/05/2020	08:30:00	00:15:00	50.4	68.4	42.8
10/05/2020	08:45:00	00:15:00	49.5	67.0	40.9
10/05/2020	09:00:00	00:15:00	49.2	66.5	41.1
10/05/2020	09:15:00	00:15:00	50.2	65.1	42.4
10/05/2020	09:30:00	00:15:00	51.3	66.2	43.4
10/05/2020	09:45:00	00:15:00	59.7	80.8	41.9
10/05/2020	10:00:00	00:15:00	51.4	79.5	39.9
10/05/2020	10:15:00	00:15:00	46.9	60.7	40.8
10/05/2020	10:30:00	00:15:00	47.9	61.7	41.1
10/05/2020	10:45:00	00:15:00	49.5	64.3	42.1
10/05/2020	11:00:00	00:15:00	49.7	66.4	41.5
10/05/2020	11:15:00	00:15:00	51.7	70.3	43.7
10/05/2020	11:30:00	00:15:00	48.5	69.6	37.8
10/05/2020	11:45:00	00:15:00	49.2	64.8	41.4
10/05/2020	12:00:00	00:15:00	49.2	65.9	40.4
10/05/2020	12:15:00	00:15:00	47.7	61.0	41.3
10/05/2020	12:30:00	00:15:00	49.4	68.2	43.7
10/05/2020	12:45:00	00:15:00	46.5	55.9	39.7
10/05/2020	13:00:00	00:15:00	47.5	62.2	39.5
10/05/2020	13:15:00	00:15:00	49.8	65.8	38.2
10/05/2020	13:30:00	00:15:00	45.2	61.8	39.3
10/05/2020	13:45:00	00:15:00	49.0	67.2	38.9
10/05/2020	14:00:00	00:15:00	45.8	59.2	41.1
10/05/2020	14:15:00	00:15:00	49.9	69.2	41.9
10/05/2020	14:30:00	00:15:00	46.4	60.1	39.4
10/05/2020	14:45:00	00:15:00	46.7	63.9	36.9
10/05/2020	15:00:00	00:15:00	46.5	53.9	40.5
10/05/2020	15:15:00	00:15:00	43.0	53.3	38.1
10/05/2020	15:30:00	00:15:00	50.3	57.7	43.4
10/05/2020	15:45:00	00:15:00	48.4	57.5	42.4
10/05/2020	16:00:00	00:15:00	47.5	57.6	41.6
10/05/2020	16:15:00	00:15:00	48.0	60.8	42.8
10/05/2020	16:30:00	00:15:00	48.8	61.3	41.8
10/05/2020	16:45:00	00:15:00	50.0	64.3	41.6
10/05/2020	17:00:00	00:15:00	48.8	66.1	39.0
10/05/2020	17:15:00	00:15:00	47.9	65.5	38.3
10/05/2020	17:30:00	00:15:00	49.7	64.5	40.0
10/05/2020	17:45:00	00:15:00	48.3	59.6	41.6
10/05/2020	18:00:00	00:15:00	49.3	78.8	42.4
10/05/2020	18:15:00	00:15:00	45.2	64.7	38.7
10/05/2020	18:30:00	00:15:00	47.9	69.7	39.8
10/05/2020	18:45:00	00:15:00	42.4	54.0	37.8
10/05/2020	19:00:00	00:15:00	44.7	64.9	36.1
10/05/2020	19:15:00	00:15:00	48.3	66.6	39.9

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
10/05/2020	19:30:00	00:15:00	45.8	61.5	37.9
10/05/2020	19:45:00	00:15:00	46.8	63.8	37.7
10/05/2020	20:00:00	00:15:00	50.4	67.4	39.2
10/05/2020	20:15:00	00:15:00	49.1	62.2	37.9
10/05/2020	20:30:00	00:15:00	48.4	65.2	33.8
10/05/2020	20:45:00	00:15:00	43.4	62.2	31.7
10/05/2020	21:00:00	00:15:00	49.2	68.0	29.8
10/05/2020	21:15:00	00:15:00	40.9	58.2	28.7
10/05/2020	21:30:00	00:15:00	28.2	43.8	25.0
10/05/2020	21:45:00	00:15:00	29.7	37.2	26.8
10/05/2020	22:00:00	00:15:00	28.0	37.5	25.5
10/05/2020	22:15:00	00:15:00	37.5	53.4	29.2
10/05/2020	22:30:00	00:15:00	40.8	49.1	33.1
10/05/2020	22:45:00	00:15:00	35.9	44.0	32.0
10/05/2020	23:00:00	00:15:00	35.7	46.7	29.1
10/05/2020	23:15:00	00:15:00	30.2	38.1	27.2
10/05/2020	23:30:00	00:15:00	32.8	43.4	28.5
10/05/2020	23:45:00	00:15:00	32.7	39.5	29.1
11/05/2020	00:00:00	00:15:00	33.5	40.4	30.3
11/05/2020	00:15:00	00:15:00	35.0	44.1	30.5
11/05/2020	00:30:00	00:15:00	33.4	43.6	29.5
11/05/2020	00:45:00	00:15:00	33.6	45.0	28.9
11/05/2020	01:00:00	00:15:00	30.7	36.6	27.4
11/05/2020	01:15:00	00:15:00	38.8	61.5	31.0
11/05/2020	01:30:00	00:15:00	34.9	44.1	29.3
11/05/2020	01:45:00	00:15:00	34.3	48.8	30.2
11/05/2020	02:00:00	00:15:00	33.4	41.7	29.6
11/05/2020	02:15:00	00:15:00	34.9	44.7	29.4
11/05/2020	02:30:00	00:15:00	32.6	41.1	29.3
11/05/2020	02:45:00	00:15:00	32.9	40.4	29.9
11/05/2020	03:00:00	00:15:00	32.4	42.3	27.8
11/05/2020	03:15:00	00:15:00	33.5	40.5	30.1
11/05/2020	03:30:00	00:15:00	34.1	44.6	29.5
11/05/2020	03:45:00	00:15:00	34.5	41.8	30.3
11/05/2020	04:00:00	00:15:00	34.9	43.0	31.4
11/05/2020	04:15:00	00:15:00	35.6	55.3	31.3
11/05/2020	04:30:00	00:15:00	52.9	73.4	38.6
11/05/2020	04:45:00	00:15:00	57.2	77.8	47.0
11/05/2020	05:00:00	00:15:00	52.8	67.8	44.7
11/05/2020	05:15:00	00:15:00	58.4	74.8	41.7
11/05/2020	05:30:00	00:15:00	54.4	73.6	40.3
11/05/2020	05:45:00	00:15:00	54.2	70.7	38.4
11/05/2020	06:00:00	00:15:00	51.2	69.2	37.2
11/05/2020	06:15:00	00:15:00	55.0	75.2	41.6
11/05/2020	06:30:00	00:15:00	53.5	73.8	41.1
11/05/2020	06:45:00	00:15:00	50.8	68.1	38.7
11/05/2020	07:00:00	00:15:00	55.3	78.5	43.2
11/05/2020	07:15:00	00:15:00	52.7	70.2	41.8
11/05/2020	07:30:00	00:15:00	46.1	65.3	39.6

Start Date	Start Time	Duration	LAeq	LAFMax	LA90
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
11/05/2020	07:45:00	00:15:00	52.3	68.7	40.3
11/05/2020	08:00:00	00:15:00	51.9	66.3	42.6
11/05/2020	08:15:00	00:15:00	52.1	69.3	42.9
11/05/2020	08:30:00	00:15:00	51.8	66.7	41.4
11/05/2020	08:45:00	00:15:00	53.9	76.1	42.4
11/05/2020	09:00:00	00:15:00	49.5	63.5	40.9
11/05/2020	09:15:00	00:15:00	52.4	66.0	42.0
11/05/2020	09:30:00	00:15:00	50.8	66.4	42.3
11/05/2020	09:45:00	00:15:00	51.9	66.6	41.3
11/05/2020	10:00:00	00:15:00	52.2	66.5	40.7
11/05/2020	10:15:00	00:15:00	50.8	70.5	37.4
11/05/2020	10:30:00	00:15:00	52.0	66.0	40.0
11/05/2020	10:45:00	00:15:00	50.3	68.8	38.3
11/05/2020	11:00:00	00:15:00	54.7	69.2	37.4
11/05/2020	11:15:00	00:15:00	62.6	78.9	41.6
11/05/2020	11:30:00	00:15:00	62.5	72.5	41.3
11/05/2020	11:45:00	00:15:00	47.1	64.4	41.3
11/05/2020	12:00:00	00:15:00	56.1	75.0	44.0
11/05/2020	12:15:00	00:15:00	50.2	74.7	41.4
11/05/2020	12:30:00	00:15:00	44.1	64.0	38.0
11/05/2020	12:45:00	00:15:00	47.9	65.9	34.3
11/05/2020	13:00:00	00:15:00	43.3	63.2	35.8
11/05/2020	13:15:00	00:15:00	53.7	71.2	38.7
11/05/2020	13:30:00	00:15:00	48.7	57.7	38.6

APPENDIX C – STRUCTURE ATTENUATION CALCULATIONS

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Sound Insulation Prediction (v8.0.4)

Program copyright Marshall Day Acoustics 2014

NoiseAir - Key No. 0381

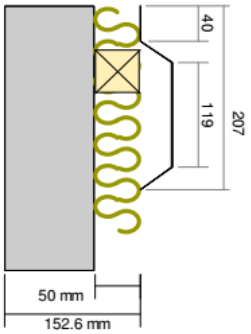
Margin of error is generally within Rw +/- 3 dB

Job Name:

Job No.: Page No.: Notes:

Date: 25 May 20 Initials:mmalone

File Name: Wall.ixl



Rw	54 dB
C	-2 dB
C_{tr}	-7 dB
D_{nTw}	56 dB [V:50m3] [A:11m2]

System description

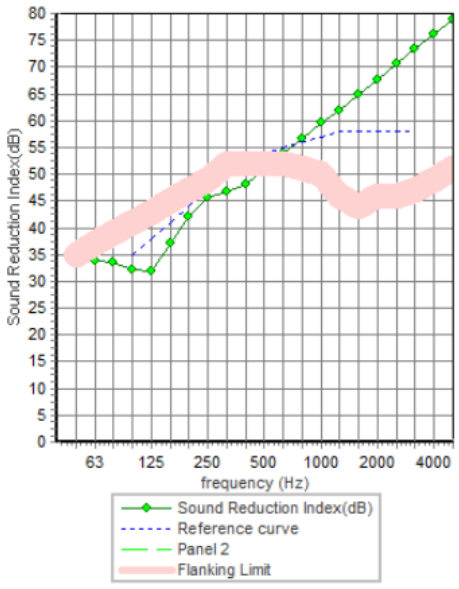
Panel 1: 1 x 102.0 mm Lightw eight concrete (ρ:1300 kg/m3,E:3.7GPa,η:0.03)

Cavity: Timber stud: Stud spacing 600 mm , Infill NoiseBlock DFB (50 mm) Thickness 50 mm (ρ:180 kg/m3, Rf:4000 Pa.s/m2)
Panel 2+ 1 x 0.6 mm Trapezblech 35-207 (ρ:7800 kg/m3,E:2.1E02GPa,η:0.01)

Mass-air-mass resonant frequency =105 Hz

frequency (Hz)	R(dB)	R(dB)
50	34	
63	34	34
80	34	
100	32	
125	32	33
160	37	
200	42	
250	46	44
315	47	
400	48	
500	51	50
630	54	
800	57	
1000	60	59
1250	62	
1600	65	
2000	68	67
2500	71	
3150	73	
4000	76	76
5000	79	

Panel Size 2.7x4 m; Mass 147.1 kg/m2



Sound Insulation Prediction (v8.0.4)

Program copyright Marshall Day Acoustics 2014

NoiseAir - Key No. 0381

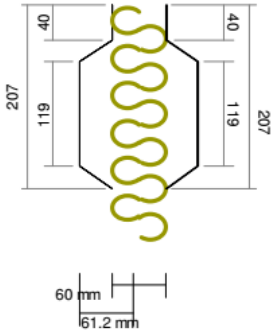
Margin of error is generally within Rw +/- 3 dB

Job Name:

Job No.: Page No.: Notes:

Date: 25 May 20 Initials:mmalone

File Name: Roof.ixl



Rw	34 dB
C	-2 dB
C_{tr}	-8 dB
D_{nTw}	36 dB [V:50m3] [A:11m2]

System description

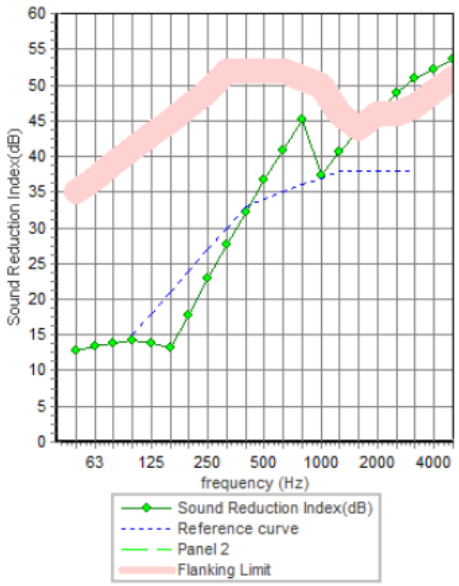
Panel 1: 1 x 0.6 mm Trapezblech 35-207 (ρ:7800 kg/m3,E:2.1E02GPa,η:0.01)

Cavity: None: Stud spacing 600 mm , Infill Fibreglass (10kg/m3) Thickness 60 mm (ρ:10 kg/m3, Rf:4000 Pa.s/m2)
Panel 2+ 1 x 0.6 mm Trapezblech 35-207 (ρ:7800 kg/m3,E:2.1E02GPa,η:0.01)

Mass-air-mass resonant frequency =134 Hz

frequency (Hz)	R(dB)	R(dB)
50	13	
63	13	13
80	14	
100	14	
125	14	14
160	13	
200	18	
250	23	21
315	28	
400	32	
500	37	35
630	41	
800	45	
1000	37	40
1250	41	
1600	43	
2000	46	46
2500	49	
3150	51	
4000	52	52
5000	54	

Panel Size 2.7x4 m; Mass 11.6 kg/m2



APPENDIX D - GLOSSARY

A-weighted sound pressure, p_A	Value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network. *NOTE: The A-weighting network modifies the electrical response of a sound level meter with frequency in approximately the same way as the sensitivity of the human hearing system.*
A-weighted sound pressure level, L_{pA}	Quantity of A-weighted sound pressure in decibels (dBA).
Acoustic environment	Sound from all sound sources as modified by the environment [BS ISO 12913-1:2013].
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far. *NOTE: The ambient sound comprises the residual sound and the specific sound when present.*
Ambient sound level, $L_a = L_{Aeq,T}$ (BS4142:2014)	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T *NOTE: The ambient sound level is a measure of the residual sound and the specific sound when present.*
Background sound	Underlying level of sound over a period, *T*, which might in part be an indication of relative quietness at a given location.
Background sound level, $L_{A90,T}$ (BS4142:2014)	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
Break-in	Noise transmission into a structure from outside.
Break-out	Noise transmission from inside a structure to the outside.
Cross-talk	Noise transmission between one room and another room or space via a duct or other path.
C_{tr}	Correction term applied against the sound insulation single-number values (R_w, D_w, and $D_{nT,w}$) to provide a weighting against low frequency performance. *NOTE: The reference values used within the C_{tr} calculation are based on urban traffic noise.*
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, T, has the same mean-squared sound pressure as the sound under consideration that varies with time.
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ (BS4142:2014)	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time.
Equivalent sound absorption area of a room, A	Hypothetical area of a totally absorbing surface without diffraction effects, expressed in square metres (m2), which, if it were the only absorbing element in the room, would give the same reverberation time as the room under consideration
Facade level	Sound pressure level 1 m in front of the façade. *NOTE: Facade level measurements of L_{pA} are typically 1 dB to 2 dB higher than corresponding free-field measurements because of the reflection from the facade.*
Free-field level	Sound pressure level away from reflecting surfaces. *NOTE: Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e. not 3.5 m from the reflecting surface in the direction of the source). Estimates of noise from aircraft overhead usually include a correction of 2 dB to allow for reflections from the ground.*

Impact sound pressure level, L_i	Average sound pressure level in a specific frequency band in a room below a floor when it is excited by a standard tapping machine or equivalent.
Indoor ambient noise	Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants. *NOTE: The location(s) within the room at which the ambient indoor noise is to be measured or calculated ought to be considered.*
Measurement time interval, T_m (BS4142:2014)	Total time over which measurements are taken. *NOTE: This may consist of the sum of a number of non-contiguous, short-term measurement time intervals.*
Noise criteria	Numerical indices used to define design goals in a given space.
Noise rating, NR	Graphical method for rating a noise by comparing the noise spectrum with a family of noise rating curves.
Normalised impact sound pressure level, L_n	Impact sound pressure level normalized for a standard absorption area in the receiving room. *NOTE: Normalised impact sound pressure level is usually used to characterize the insulation of a floor in a laboratory against impact sound in a stated frequency band.*
Octave band	Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit.
Percentile level, $L_{AN,T}$	A-weighted sound pressure level obtained using time-weighting "F", which is exceeded for *N*% of a specified time interval.
Reference time interval, T_r (BS4142:2014)	Specified interval over which the specific sound level is determined. *NOTE: This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night from 23:00 h to 07:00 h.*
Residual sound (BS4142:2014)	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level, $L_r = L_{Aeq,T}$ (BS4142:2014)	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T.
Rating level, $L_{Ar,Tr}$	Equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise. *NOTE: This is used in BS 7445 and BS 4142 for rating industrial noise, where the noise is the specific noise from the source under investigation.*
Reverberation time, *T*	Time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped.
Sound exposure level, *L*AE	Level of a sound, of 1 s duration, that has the same sound energy as the actual noise event considered.
Sound level difference, *D*	Difference between the sound pressure level in the source room and the sound pressure level in the receiving room.
Sound pressure, *p*	Root-mean-square value of the variation in air pressure, measured in pascals (Pa) above and below atmospheric pressure, caused by the sound.
Sound pressure level, L_p	Quantity of sound pressure, in decibels (dB).
Sound reduction index, *R*	Laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.

Specific sound level, $L_s = L_{Aeq,Tr}$ (BS4142:2014)	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.
Specific sound source (BS4142:2014)	Sound source being assessed.
Standardised impact sound pressure level, L'_{nT}	Impact sound pressure level normalized to a reverberation time in the receiving room of 0.5 s.
Standardised level difference, D_{nT}	Difference in sound level between a pair of rooms, in a stated frequency band, normalized to a reference reverberation time of 0.5 s for dwellings.
Groundborne noise	Audible noise caused by the vibration of elements of a structure, for which the vibration propagation path from the source is partially or wholly through the ground. *NOTE Common sources of ground-borne noise include railways and heavy construction work on adjacent construction sites.*
Structure-borne noise	Audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements. *NOTE Common sources of structure-borne noise include building services plant, manufacturing machinery and construction or demolition of the structure.*
Third octave band	Band of frequencies in which the upper limit of the band is 2% times the frequency of the lower limit.
Weighted level difference, D_w	Single-number quantity that characterizes airborne sound insulation between rooms, but which is not adjusted to reference conditions. *NOTE Weighted level difference is used to characterize the insulation between rooms in a building as they are. Values cannot normally be compared with measurements made under other conditions (see BS EN ISO 717-1).*
Weighted normalised impact sound pressure level, $L'_{n,w}$	Single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Weighted sound reduction index, R_w	Single-number quantity which characterizes the airborne sound insulating properties of a material or
Weighted standardised impact sound pressure level $L'_{nT,w}$	Single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Weighted standardised level difference, $D_{nT,w}$	Single-number quantity that characterizes the airborne sound insulation between rooms.

Symbols

D_w	Weighted level difference (dB)
D_{nT}	Standardized level difference (dB)
$D_{nT,w}$	Weighted standardized level difference (dB)
L_{Amax}	Maximum noise level (dB)
$L_{Ar,Tr}$	Rating level (dB)
L_n	Normalised impact sound pressure level (dB)
L'_{nT}	Standardised impact sound pressure level (dB)
$L'_{nT,w}$	Weighted standardised impact sound pressure level (dB)
$L'_{n,w}$	Weighted normalised impact sound pressure level (dB)
L_p	Sound pressure level (dB)
L_{pA}	A-weighted sound pressure level (dB)
$L_{AN,T}$	Percentile level (dB)
L_{AE}	Sound exposure level (dB)
$LAeq,T$	Equivalent continuous A-weighted sound pressure level (dB)
p	Sound pressure (Pa)
p_A	A-weighted sound pressure (dB)
$p_{A(t)}$	Instantaneous A-weighted sound pressure (Pa)

R	Sound reduction index (dB)
R_w	Weighted sound reduction index (dB)
T	Time interval (also used for reverberation time) (s)
t_0	Reference time interval (s)

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