parkerjones acoustics

Llanvetherine Court Farm

Llanvetherine, Abergavenny, NP7 8NL

Noise Impact Assessment

25th February 2022
First Issue

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Revision History

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Executive Summary and Conclusions

This document has been written to assess the risk of adverse impact from noise 'pollution' generated by holding events such as weddings, parties, and functions within the converted barn and covered area at Llanvetherine Court Farm on noise-sensitive receptors (NSRs) in the surrounding area (neighbouring residential properties).

PJA has conducted:

- a review of relevant legislation/guidance;
- an on-site noise survey to determine existing background noise levels in the area;
- on-site acoustic testing of the Barn to determine the sound-reducing qualities of the building envelope and level of noise propagation to the nearest residents;
- a noise modelling exercise based upon the results of the on-site testing and accounting for the proposed improvements to the building envelope, and then using this to model music within the Barn (to predict Music Noise Levels (MNLs) at nearby residents;
- an assessment of predicted MNLs against the relevant legislation/guidance;
- a similar assessment of lower levels of music noise in the covered area, and noise from guests; and
- a Noise Management Plan which outlines the measures that the applicant/wedding operator will take to mitigate, manage, and monitor noise impacts on an ongoing basis.

Whilst there is no single, definitive set of legislation or guidance document regarding how to assess noise from wedding venues, PJA has defined MNL criteria based primarily upon the *Code of Practice on Environmental Noise Control at Concerts*, and the *Noise from Pubs and Clubs Phase II Final Report*.

Against this criterion, it has been determined that the venue should be able to continue to operate as it currently does with a low risk of adverse impact on local residents. This is on the basis of:

- The noise limiter in the Barn being continued to be operated with a limit of 100 dB L_{Aeq} internally;
- That the existing windows are replaced with new double glazing;
- That music played externally in the covered areas and garden are limited to low levels, as per Section 5.1.4.

These conclusions are drawn based upon being able to meet suggested noise criteria at all residential properties in the area. PJA notes that the applicant has already gained planning permission for the venue and has discharged the relevant noise-related condition, with substantial works to improve the sound insulation of the Barn through alterations to the internal floor and roof.

The applicants acknowledge that the local community are likely to have concerns in relation to these proposals. They are committed to managing and controlling any potential noise impacts as necessary, to minimise the level of noise impacts caused in neighbouring dwellings. This commitment is demonstrated by the fact that they have expanded the scope of this assessment to include an NMP.

The NMP (Section 5.0) details measures that will be implemented for every event – including proactively engaging with the local community, implementing a complaints management system, and the ongoing monitoring and assessment of noise to enable any adverse noise impacts to be addressed.

It is noted by that compliance with the relevant technical guidance does not necessarily constitute a zero risk of adverse impact - and noise outside of neighbouring dwellings will not necessarily be completely inaudible (though it *will* effectively be inaudible *inside* dwellings).

However, as is demonstrated in this report, PJA believes that the proposed development can operate with a low level of noise impact, in accordance with the relevant technical guidance – and suggest that the requirement to follow the NMP herein is conditioned as part of any licensing consent.

Contents

1.0 Introduction

ParkerJones Acoustics Limited (PJA) has been instructed to undertake a Noise Impact Assessment as part of the premises licence application for the use of an existing/converted barn and external covered area at Llanvetherine Court Farm, Llanvetherine, Abergavenny, NP7 8NL ('the site').

1.1 Scope and Objectives

This document, a Noise Impact Assessment (NIA), has been written to assess the risk of adverse impact from noise 'pollution' generated by the proposed development on noise-sensitive receptors (NSRs) in the surrounding area (neighbouring residential properties).

The objective of the report is to ensure that the level of noise impact (from music in particular but from patron noise as well) to residents in the local area can be mitigated and controlled to an acceptable level, as much as is reasonably possible.

To do so, PJA has conducted an environmental noise survey and noise modelling exercise. An assessment has then been made in accordance with national planning policies and relevant guidelines/standards which are used for assessing music noise and/or noise impacts on residential properties.

A detailed Noise Management Plan is also included in this report, which outlines the measures that the applicants *will* be taking to mitigate the noise impact.

Whilst every attempt has been made to ensure that this report communicates effectively to a reader who might not have much knowledge of acoustics, some parts are necessarily technical. A glossary of acoustic terminology and concepts is provided in Appendix A.

1.2 Regulations and Guidelines

This report takes into consideration national planning policies including the National Planning Policy Framework (NPPF), the Noise Policy Statement for England (NPSE) and the Planning Practice Guidance on Noise (PPG-N) (summarised in Appendix B). These policies outline the purpose and long-term vision of planning policy with respect to noise, though they leave the application of specific noise criteria to local planning policies.

In the case of this development, there are no clear guidelines that are specific to assessing its noise impact. The most relevant guidelines include the *Code of Practice on Environmental Noise Control at Concerts* guidance (which is specific to music noise assessments), BS 8233:2014 *'Guidance on sound insulation and noise reduction for buildings'* (which contains internal noise level targets which are widely applied to residential developments), and the *Noise from Pubs and Clubs Phase II Final Report* published by DEFRA in 2006 (which defines a relationship between specific music noise levels inside a dwelling and the point by which it is subjectively acceptable or inaudible).

2.0 Site and Development Description

As shown in Figure 2.1, the site in question is an existing/converted barn and external covered area/open sided barn at Llanvetherine Court Farm – situated within a rural area outside of Llanvetherine, Abergavenny.

The barn is located in the centre of the farm, in a position where it is not visible from any neighbouring property. The nearest neighbour as identified in Figure 2.1 is a house ≈200m to the west, currently an occasionally occupied second home. The next nearest property is ≈400m away to the North on Old Ross Road, with other isolated properties in all directions as highlighted in Figure 2.2.

The converted barn has been used for several years with events held within the barn, covered area, and land to the south using a Temporary Events License since spring 2018. Since then, the site gained planning permission (ref: DM/2019/00492) for the *"change of use of 2no. barns and adjacent land from agricultural to use class D2 and associated works"*.

The type of events held at the venue include weddings, private parties, and live music nights. According to the Officers Report from the approved application, *"the events business will be held all year round but larger events will be held predominantly on weekends"*.

The approved application included a condition (no. 3) requiring a scheme of noise mitigation to be submitted and implemented, which has also been discharged (ref: DM/2020/00545).

Several measures have been implemented to date, or are at least proposed to be implemented, including:

- Restriction of music noise levels
    - The use of a noise limiter within the stone barn to ensure that noise levels within do not breach 100 dB(A);
    - Restriction of music to lower noise levels:
        - within the covered structure (open sided barn/temporary marquee) – speakers and instruments but played at a significantly lower level;
        - in the garden area – PA or small speaker played at a low level to allow guests to converse easily.

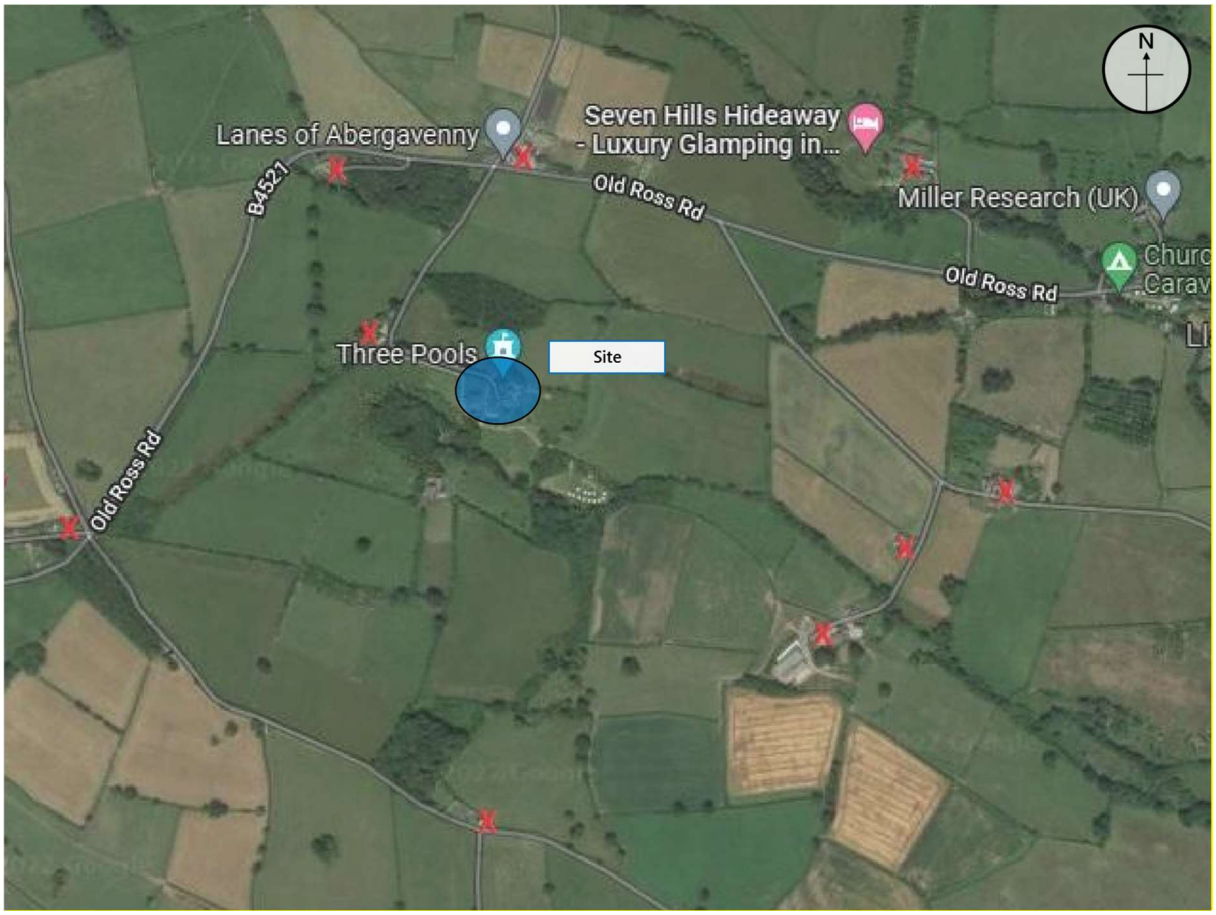
- Improvements to the Barn structure
    - The existing profiled tin roof has been replaced with a slate roof with 100mm ecotherm insulation inserted between the rafters and 57mm foam backed plasterboard;
    - The internal floor between the ground and upper floors was previously rotting with large holes, and has now been replaced with new floorboards, 200mm of earthwool insulation between joists, and a fire-rated plasterboard ceiling;
    - Existing windows are opening with wooden shutters or are simply boarded up. These are all scheduled to be replaced with double glazing.

- Event design
    - Events are designed so that guests remain on site as much as possible – to reduce traffic out of site late at night, as events are generally multi-day;
    - Event organisers and events are selected to encourage responsible behaviour, reducing the likelihood of attendees behaving in an out of control manner;
    - Guests are communicated to prior to the event to set expectations of behaviour in advance;

- Management
    - Neighbours are provided with a list of events planned for the year and music times. They are also provided with contact details for communication during events if they do hear noise. Visits are made to the community throughout the year to check if people have heard noise. Village email list is used to disseminate information alongside door to door visits.
    - Decibel levels are regularly checked before and during events with a log book maintained allowing the operator to review that the noise limits are being met.

Figure 2.1 – Site and surrounding area

Figure 2.2 – Wider surrounding area and locations (in red) of noise-sensitive properties



3.0 Noise Policy and Guidance

There are a number of policies and guidance documents that can be used to assess the impact of entertainment noise, and to assess the impact of noise in general on residential developments. There, unfortunately, *is not* a single, definitive guidance document which is referred by local or national planning policy that can categorically be applied to this development, and there is not a black and white noise level limit.

The assessment has made the best use of the several guidelines that are available, but PJA and the applicant recognise that whilst meeting the proposed criteria is indicative that the noise impact should be low and acceptable for the large majority of people, it does not suggest that there is no noise impact whatsoever to all and that the impact can be subjective.

The applicant is absolutely committed to addressing the concerns of the local community in relation to these proposals - and managing/controlling any potential noise impacts as necessary to minimise the likelihood of there being any adverse noise impacts caused in neighbouring dwellings.

It is for this reason that a Noise Management Plan (NMP) is detailed later in this report (Section 5.0) – in order to provide further reassurance that all reasonably practicable measures will be taken by the applicant, to minimise the likelihood of an adverse noise impact being caused. The NMP details measures that will be implemented by the applicant for every event to minimise the risk of noise impact.

3.1 Code of Practice on Environmental Noise Control at Concerts

The *Code of Practice on Environmental Noise Control at Concerts* ('the Code of Practice') provides guidance on minimising the disturbance or annoyance to local residents in the vicinity of *"large music events involving high powered amplification… held in sporting stadia, arenas, open air sites and within lightweight buildings"*. The Code of Practice was produced in 1995 by the Noise Council, which is a group of professional bodies including the Chartered Institute of Environmental Health (CIEH) and the Institute of Acoustics (IOA) amongst others.

The use of the proposed development would include amplified music occurring within the Barn (a lightweight building). Whilst the events would be unlikely to be described as a *"large music event"*, the Code of Practice would still appear to be the most relevant guideline to apply in this case.

3.1.1 Music Noise Levels – 09:00 to 23:00

The Code of Practice indicates that the Music Noise Levels (MNL) when assessed by prediction or measured during events, should not exceed the limits within the table below at 1m from the façade of any noise-sensitive premises for events held between the hours of 09:00 and 23:00 when considering a "*rural venue*".

Table 3.1 – Code of Practice noise criteria for events up to 23:00

Event days per calendar year, per venue	Guideline for events held between the hours of 09:00 and 23:00
1 to 3	The MNL should not exceed 65 dB(A) over a 15-minute period.
4 to 12	The MNL should not exceed the background noise level[1] by more than 15 dB(A) over a 15-minute period.
13 to 30	The MNL should not exceed the background noise level[1] by more than 5 dB(A) over a 15-minute period.
1 - The 'background noise level' is the prevailing sound level at a location measured in terms of the L_{A90} on an equivalent day and at an equivalent time when no concert or sound checks are taking place. The value used 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.	

3.1.2 Music Noise Levels – 23:00 to 09:00

The Code of Practice states that *"for events continuing or held between the hours 23.00 and 09.00 the music noise should not be audible within noise-sensitive premises with windows open in a typical manner for ventilation."*

However, it also recognises that the definition of "*not audible*" is not clear and it is a guideline which *"is not universally accepted as an appropriate method of control"* and that *"this guideline is proposed as there is insufficient evidence available to give more precise guidance… control can be exercised in this situation by limiting the music noise so that it is just audible outside the noise sensitive premises. When that is achieved it can be assumed that the music noise is not audible inside the noise sensitive premises".*

3.1.3 Music Noise Levels – Low Frequency

The Code of Practice provides further recommendations for noise limits which can be applied to low-frequency noise, as it is recognised that even when overall dB(A) noise level targets are being met, low-frequency noise can still be intrusive and noticeable.

It recommends that a level of up to 70 dB in the 63 Hz and 125 Hz octave frequency bands is "*satisfactory*" at nearby noise-sensitive premises, whilst a level of 80 dB or more is likely to cause a significant disturbance.

3.1.4 Noise Management

The Code of Practice states that *"it is believed that compliance with the guidelines and the other advice given here will enable successful concerts to be held whilst keeping to a minimum the disturbance caused by noise. It is recognised, though, that full compliance with this code may not eliminate all complaints, and local factors may affect the likelihood of complaints."*

It also states that *"it has been found that if there has been good public relations at the planning stage between the event organisers and those living nearby, annoyance can be kept to a minimum".*

These statements suggest that a Noise Management Plan is necessary to control and monitor noise impacts even if the development is demonstrating compliance with the limits set out above. Section 4 of the Code of Practice provides guidance on recommended noise control procedures, which are summarised in the following subsections.

Planning

Within the planning phase, the Code of Practice recommends that the event operator *"determine the sound propagation characteristics between the proposed venue and those living nearby who might be affected by noise and carry out an appropriate background noise survey. This should be undertaken by a competent person who is experienced in noise propagation and control, particularly from music events."*

The *"competent person"* (in this case PJA), should then *"check the viability of the event against the relevant guideline levels"* based upon the determining the sound levels which would be experienced by the audience to allow these guidelines to be met. This report hereafter intends to cover the points above.

Before and During the Event

The following are some of the recommendations for controlling noise before and during an event:

- Advertise and operate an attended complaint telephone number for noise complaints.
- Establish a communication network between all those involved in noise control.
- Install the loudspeaker system early enough to enable alignment and orientation to be optimised to minimise noise disturbance.
- Carry out a sound test prior to each event to ascertain the maximum level that can prevail at the monitoring position to enable the guidelines to be met.
- Carry out noise monitoring within the venue at the noise monitoring position throughout the event.

3.2 Noise from Pubs and Clubs Phase II Final Report

The *Noise from Pubs and Clubs Phase II Final Report* published by DEFRA in 2006 is an extensive research study undertaken to rank *"the impact of entertainment noise occurring infrequently for more than an hour after 23.00 hours"*.

The document follows on from Phase I of the project which was a detailed literature review of research into noise from pubs and clubs and how this can be assessed. This included the discussion of the criteria for 'inaudibility', a term which is referenced by the *Code of Practice on Environmental Noise Control at Concerts*, which is summarised in Section 3.1 of this report. However, it recognised that 'inaudibility' is subjective and relative to the scenario and that a more objective measure/set of criteria should be determined. It stated that *"the only sensible way to develop an optimal rating method is by constructing tests in which listeners are exposed to pub and club noise and are asked to subjectively rate the noise in some way (annoyance, loudness or audibility, for example)"*. This set of tests is the basis of Phase II of the study.

The conclusions of the laboratory testing indicated that *"the noise metric that appears to provide the best prediction of subjective response across the board for different entertainment noise types is the Absolute L_{Aeq}"*. The table overleaf

(extracted from Table 4 of the Phase II report) provides a relationship between the degree to which a resident is accepting of entertainment/music noise within their dwelling.

A score of 1 correlates with where the large majority of residents surveyed could not hear entertainment noise at this level (inaudibility). At a score of 2, a high percentage of people also reported this. At scores above 2, most people reported that they could hear entertainment noise.

The table suggests that most residents will accept entertainment noise levels of up to 30.6 dB L_{Aeq}, which correlates with BS 8233:2014 guidelines for night-time internal noise level targets inside bedrooms. However, to be inaudible to the majority of people, entertainment noise levels would need to be below around 20 dB L_{Aeq}.

Table 3.2 – Relationship between acceptability and absolute L_{Aeq} noise levels from entertainment noise inside a dwelling

Descriptor	Score	Absolute L_{Aeq}
Clearly acceptable	1	17.0
	2	20.4
	3	23.8
	4	27.2
Just acceptable	5	30.6
Just unacceptable	6	34.0
	7	37.4
	8	40.8
	9	44.2
Clearly unacceptable	10	47.5

3.3 BS 8233:2014

BS 8233:2014 '*Guidance on Sound Insulation and Noise Reduction for Buildings*' suggests appropriate criteria and limits for different situations. It is primarily intended to guide the design of new buildings, or refurbished buildings undergoing a change of use. This includes internal and external noise criteria for residential developments. The limits with BS 8233:2014 mirror those in the WHO's *'Guidelines for Community Noise* and *Night Noise Guidelines for Europe'* document.

3.3.1 Internal Ambient Noise Levels

Table 4 of BS 8233:2014 provides internal ambient noise level (IANL) limits for dwellings from *"steady external noise sources"*. These are summarised in Table 3.3.

Table 3.3 – BS 8233:2014 internal ambient noise level (IANL) upper limits

Activity	Location	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Resting	Living Room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$

Open Windows

In Annex G.1 of BS 8233:2014 it suggests that "*if partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15 dB*". This figure of between 10 and 15 dB is also reflected in several other guidelines, though studies by Napier University[1] show that a higher reduction can be achieved depending on the opening area, the window type and the direction in which the window opens relative to the dominant noise source. For an initial assessment, PJA considers that the level of noise reduction for a partially open window (for ventilation) would be approximately 15 dB.

3.3.2 External Amenity Ambient Noise Levels

BS 8233:2014 indicates that in external areas used for amenity space, it is desirable that external noise levels do not exceed 50 dB $L_{Aeq,T}$. This (as described within WHO guidelines) is to prevent "moderate annoyance" from noise.

3.4 World Health Organisation (WHO) Environmental Noise Guidelines

The WHO document *Guidelines for Community Noise 1999* has recently been superseded by the *Environmental Noise Guidelines for the European Region*. However, the updated guidance states that *'all WHO guidelines for community noise (CNG) indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid'*.

The document sets out guidance as to noise levels at which there will be an unacceptable impact on the local community. WHO guidelines state:

- To protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55 dB L_{Aeq} for a steady, continuous noise.
- To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50 dB L_{Aeq}.

1 Napier University. NANR116: 'Open/Closed Window Research' Sound Insulation through Ventilated Domestic Windows. (2007)

4.0 Noise Assessment

4.1 Baseline Noise Survey

PJA has attended the site and surrounding area to conduct a baseline noise survey between Thursday the 17th of February and Wednesday the 23rd of February 2022. The results have been used to determine a representative background noise level to which MNLs (music noise levels) can be assessed against, in accordance with the *Code of Practice on Environmental Noise Control at Concerts*, summarised in Section 3.1.

4.1.1 Methodology

A single monitoring position (F1) was employed with a sound level meter installed close to the boundary of the nearest noise-sensitive property – the location of which is shown in Figure 2.1 (Section 2.0). The microphone was positioned at a height of approximately 1.5m.

The sound level meter was set to log noise levels over continuous 5-minute averaging periods with a 1-second time history rate. The monitoring equipment was left unattended for the majority of the survey with the exception for a short period around the installation and collection of the sound level meter, and for a couple of hours at the start of the survey whilst the surveyor conducted acoustic testing of the Barn. The following noise indices were recorded (amongst others):

- $L_{A90,T}$: The A-weighted noise level that is exceeded for 90% of the measurement period T. This parameter is often considered as the 'average minimum level' and is therefore used in determining the representative background noise level.
- $L_{Aeq,T}$: The A-weighted equivalent continuous noise level over the measurement period T. This parameter is typically considered as a good representation of the average ambient sound level; and
- $L_{AFmax,T}$: The maximum A-weighted noise level during the measurement period T.

Appendix C contains further information on the methodology of the survey including photographs taken from site and the equipment used.

4.1.2 Soundscape and Context

Given the rural location of the site, noise levels are generally low due to the lack of major roads and railways. Audible noise sources included intermittent traffic on local roads, farming vehicles/activities, birdsong, and the rustling of trees/vegetation in the wind.

4.1.3 Results

A graph of the measured noise levels across the entire monitoring period is given in Figure 4.1 overleaf.

Table 4.1 summarises the results across the daytime (07:00 – 19:00), evening (19:00 – 23:00), late evening (23:00 – 01:00) and night-time (01:00 – 07:00) periods respectively, accumulated across the several days that the survey spanned over. The evening and late evening periods have been set on the basis that these are the time periods in which amplified music would likely be played inside the Barn.

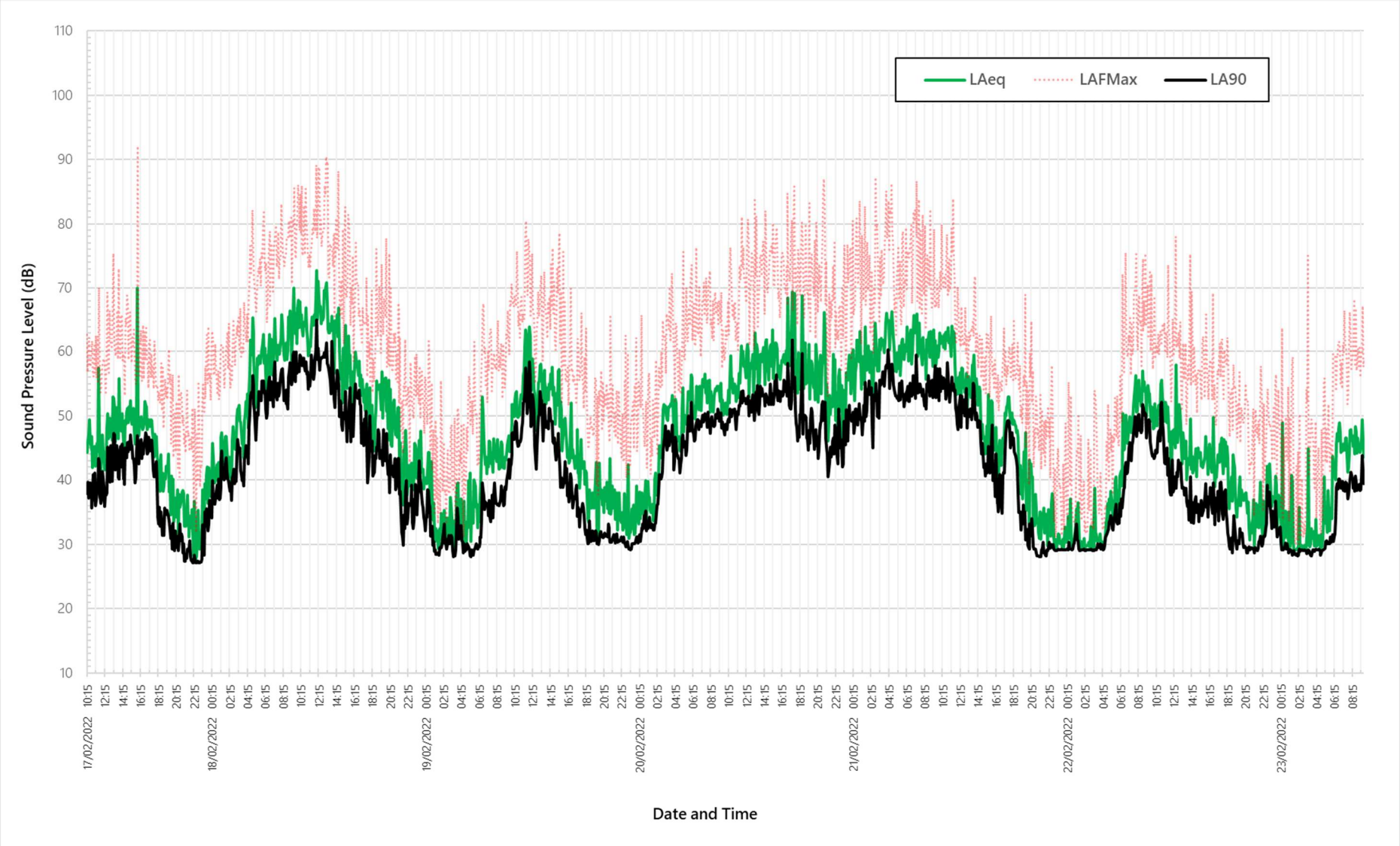
It is noted that wind speeds were exceptionally high for large periods during the first few days of the survey in particular and that ambient noise levels during this period were generally not representative. However, the length of the survey ensured that representative levels could be captured during periods of lesser/normal wind speeds. As the assessment is based upon the *minimum* background sound levels (the lowest $L_{A90,5min}$ value across the entire survey), the adverse weather conditions/inflated noise levels during the first few days can be ignored.

These minimum values are highlighted in Table 4.1 and represent very low background noise levels – hence the representative background noise level on an evening (19:00 – 23:00) when an event would be held can be defined as **27 dB $L_{A90,5min}$.**

Table 4.1 – Summary of measured noise levels across the entire survey period

Time Period	Parameter	Maximum	Minimum	Logarithmic Average	Mean Average	Modal Average	Median Average
Daytime (07:00 – 19:00)	$L_{Aeq,5min}$ (dB)	73	33	59	52	54	52
	$L_{AFMax,5min}$ (dB)	92	45	75	65	59	64
	$L_{A90,5min}$ (dB)	65	29	51	46	49	47
Evening (19:00 – 23:00)	$L_{Aeq,5min}$ (dB)	66	28	50	41	38	38
	$L_{AFMax,5min}$ (dB)	87	32	69	54	51	52
	$L_{A90,5min}$ (dB)	52	27	41	35	30	31
Late Evening (23:00 – 01:00)	$L_{Aeq,5min}$ (dB)	62	29	50	40	30	38
	$L_{AFMax,5min}$ (dB)	81	31	67	53	55	52
	$L_{A90,5min}$ (dB)	52	27	42	35	29	33
Night-time (01:00 – 07:00)	$L_{Aeq,5min}$ (dB)	66	29	55	44	30	41
	$L_{AFMax,5min}$ (dB)	87	30	71	55	61	56
	$L_{A90,5min}$ (dB)	60	28	48	39	29	36

Figure 4.1 – Graph of measured noise levels from the environmental noise survey



4.2 Criteria

Based upon the guidance outlined in **Section 3.0**, and results of the baseline noise survey, the assessment has been based upon the noise limits in **Table 4.2**, which apply to Music Noise Levels (MNL).

The targets are based primarily upon the *Code of Practice on Environmental Noise Control at Concerts* as summarised in **Section 3.1**, including **Table 3.1** for pre-23:00. For context, BS 8233:2014 and WHO guidelines recommend day to day noise levels of less than 50 dB $L_{Aeq,16hrs}$ to avoid 'moderate annoyance' – hence the limits of 42 and 32 dB $L_{Aeq,15mins}$ sit comfortably within this and is seen to be a stringent standard which would be an indicator of a minimal noise impact if met.

After 23:00, the criteria from the Code of Practice talks about the inaudibility of music noise inside dwellings. A quantifiable limit for inaudibility has been based upon the *Noise from Pubs and Clubs Phase II Final Report* summarised in **Section 3.2** – whereby MNLs below 20 dB L_{Aeq} inside residential dwellings are inaudible to the majority of people. Therefore, based upon the typical reduction provided by an open window of 15 dB, this means that the MNL should not exceed 35 dB $L_{Aeq,15mins}$ at 1m outside of bedroom windows – but given that a limit of 32 dB has been set for <23:00, this lower limit applies. A 20 dB $L_{Aeq,15mins}$ limit inside a bedroom is lower than BS 8233:2014/WHO criteria of 30 dB $L_{Aeq,8hrs}$ (20 dB would be subjectively half as loud as 30 dB) and again would be an indicator of a minimal noise impact if met.

Table 4.2 – MNL (music noise level) limits

Period	MNL Limits
09:00 – 23:00	For up to **3 events** per year, the MNL should not exceed 65 dB $L_{Aeq,15mins}$ [1]
	For up to **12 events** per year, the MNL should not exceed 42 dB $L_{Aeq,15mins}$ [1]
	For up to **an unrestricted number of events** [2] per year, the MNL should not exceed 32 dB $L_{Aeq,15mins}$ [1]
	The MNL should not exceed 70 dB in the 63 Hz and 125 Hz octave frequency bands [1]
23:00 – 01:00	The MNL should not exceed 32 dB $L_{Aeq,15mins}$ for any number of events [1 3]
1 – at 1m outside of the windows of any residential dwelling in the surrounding area not under the ownership of the applicants. 2 – the CoP guide indicates for up to 30 events per year, but on the basis that the noise limit is exceptionally low at 32 dB outside and thus inaudible inside dwellings with open windows, there is no reason to restrict this to 30 events. 3 – to achieve a level of <20 dB $L_{Aeq,15mins}$ inside a dwelling which is effectively inaudible to the large majority of people	

4.3 Noise Prediction Methodology

4.3.1 Noise Modelling/Mapping

The intention of noise modelling/mapping for this assessment is to accurately determine the MNLs that would be produced by the venue during an event.

The 3-D noise mapping allows the buildings and topography of the site and surrounding area to be modelled. Noise break-out from the Barn can be represented by a series of 'area sources' placed on each element of the façade. The sound power levels of these sources can be estimated by predicting the internal noise levels from an amplified band/DJ and then accounting for the sound reduction indices of the various façade elements. 'Receiver' positions can be placed anywhere in the model to predict the MNLs at any point, including at 1m from the façade of residential dwellings.

The noise mapping, in this case, has been based upon acoustic testing conducted by PJA in and around the existing Barn, such that the mapping can be 'calibrated' to the results obtained from the site, by adjusting the model parameters appropriately. This methodology provides confidence that the results of the noise modelling are as accurate as possible. The alterations to the proposed development – which include the replacement of existing boarded windows with new double glazing have then been incorporated and modelled and set up to represent a typical evening event so that the predicted MNLs at nearby residential dwellings can be determined and assessed.

The model has been constructed using the CadnaA® software package, a commonly used 3-D noise mapping software that implements a wide range of national and international standards, guidelines and calculation algorithms, including those set out in ISO 9613-2:1996. A full explanation of the noise modelling is provided in Appendix D, along with images and noise maps from the model.

4.3.2 Sound Reducing Properties of the Barn

PJA has conducted testing and measurements both inside and outside of the Barn on the 17th of February 2021, to determine a) the sound-reducing qualities of the Barn of the existing materials which remain and b) the noise propagation to the site boundaries and receptors in the surrounding area.

The purpose of this has been to accurately determine the noise breakout such that the noise map model can be constructed and calibrated to the results measured on-site. This ensures that no assumptions have been made regarding the sound reduction indices of the building envelope, or regarding the noise levels incident on the inside of each façade of the Barn.

Appendix C provides further information with photographs from the testing exercise.

As described in Section 2.0, the construction of the Barn will be altered from its existing state – with new double-glazed windows replacing the existing boarded openings which are currently a poor performer in terms of sound insulation due to the inherent air gaps in and around the boarding. Hence the proposals will naturally improve the level of noise break-out from the barn.

Table 4.3 below presents the constructions and associated sound reduction indices used in the assessment. PJA has predicted these sound reduction indices based upon calculations using the *Insul* software package, which is specifically designed for predicting the sound reduction indices of bespoke constructions; and sound insulation testing data from other sites that PJA has assessed/tested which had similar constructions (including other former barns/stables that have been turned into wedding venues).

The assessment has looked at two scenarios, one where all doors are closed, and a worst-case scenario where all doors are open – which could reasonably be expected during warmer weather. Closed doors are also assumed to have air gaps at the threshold and not have acoustic seals.

Table 4.3 – Sound reduction indices of the Barn structure

Element	Construction	Estimated Sound Reduction Indices							
		R (dB) @ Octave Band Centre Frequencies, Hz							R_w (dB)
		63	125	250	500	1 k	2 k	4 k	
Lower Walls	Existing Stone Walls – approx. 400mm+ thick	44	46	54	61	66	71	75	64
Roof	Slate Roof with insulation backing between rafters and foam backed plasterboard approx. 2.5m above the separating floor with timber floorboards, 200mm insulation between joists, and 1 layer of 12.5mm fire-resistant plasterboard	35	44	49	53	56	57	67	56
Upper Walls	As per lower walls but with internal separating floor	44	52	61	69	76	80	100	71
Windows	Double glazing in timber frame, i.e., 4mm standard glass, 12mm air cavity, 6mm standard glass	23	24	21	33	41	44	41	35
Closed door	44mm timber door with 20mm air gap at the threshold	18	21	24	20	23	22	24	22
Open door *	N/A	7	7	8	8	9	9	10	9

* An opening can provide sound reduction from end reflections as sound travels through. For example, an open window typically provides a reduction of 15 dB. The values herein are based upon testing conducted by PJA at another site of noise breakout from a closed door versus an open door.

4.3.3 Source Noise Levels

It is anticipated that the entertainment/music in the Barn during evening wedding receptions and events could either be:

- a small, amplified band with a drumkit and guitars – i.e. rock and pop covers (around 95 - 100 dB $L_{Aeq,15min}$ internally)
- a traditional DJ using a PA system – operating with a noise limiter/level compressor (95 - 100 dB $L_{Aeq,15min}$)
- an acoustic soloist or small ensemble – i.e. an acoustic guitarist, pianist, string quartet (around 70 – 75 dB $L_{Aeq,15min}$);
- background music during ceremonies and dinner (around 60 – 65 dB $L_{Aeq,15min}$).

PJA has modelled these noise sources based upon data measured from other sites/venues. These noise levels are shown in Table 4.4, with the last two rows related to music noise in the external covered area and garden.

For example, PJA has measured 100 dB L_{Aeq} at a central position of the audience at a small 100-person capacity venue, with an amplified band (with drumkit) using a 4 kW PA system. These levels tie in with the advice from the Code of Practice which states that *"research shows that the music noise level in the audience by the mixer position at pop concerts is typically 100 dB(A)"*.

Table 4.4 – Potential source noise levels

Source	Octave Band Sound Pressure Level L_{eq} (dB)							L_{Aeq} (dB)
	63	125	250	500	1k	2k	4k	
Inside the Barn - Amplified band (including drum kit) - DJ/PA system operating at a 100 dB limit	96	97	98	98	95	91	88	100
Covered Area - Small acoustic act	70	70	75	75	70	65	65	75
Garden - Speakers playing background music (low frequency heavy music)	67	68	64	64	60	55	53	65

4.4 Predicted Noise Emissions

4.4.1 Music in the Barn

Evening – 19:00 - 23:00

Screenshots from the noise mapping are shown in Appendix D.

Figure D.1 shows the predicted MNLs at all of the NSRs in the surrounding area within an amplified band or DJ in the Barn operating with the noise limiter set to 100 dB $L_{Aeq,15mins}$ – with all doors open. Figure D.2 shows the same scenario but with all doors closed.

Table 4.5 summarises the results with respect to the suggested design criteria for MNLs before 23:00 in Table 4.2. The results are colour coded based upon the number of events per year that MNLs exceed the corresponding threshold.

It is seen that at the worst affected NSR, the current strategy of operating using a limiter set to a level of 100 dB internally would be suitable, whether doors are open or closed. At these levels, MNLs would effectively be inaudible inside most residential properties with open windows (see next section).

Table 4.5 – Predicted MNLs at nearby NSRs with an amplified band or DJ operating at 100 dB L_{Aeq} in the Barn

Noise Sensitive Receptor	Doors	Music Noise Source	Music Noise Level (MNL) at 1m outside of the most exposed window					
			dB $L_{Aeq,15min}$		dB $L_{eq,15min}$ at 63 Hz		dB $L_{eq,15min}$ at 125 Hz	
			Predicted	Criteria	Predicted	Criteria	Predicted	Criteria
Worst-affected dwelling	Doors open	Amplified band or DJ operating with the noise limiter set at 100 dB L_{Aeq} internally	30	≤65 dB for up to 3 events per year ≤42 dB for up to 12 events per year	33	<70	32	<70
	Doors closed		18	≤32 dB for up to an unrestricted number of events per year	26		21	

Late Evening – 23:00 to 01:00

PJA has suggested (in Table 4.2) based on the guidance of the Code of Practice that for music to effectively be inaudible inside bedrooms after 23:00, that MNLs should not exceed 32 dB $L_{Aeq,15mins}$ outside of bedroom windows.

As per Table 4.5, the levels outside of the worst-affected receptor when all doors are open is 30 dB $L_{Aeq,15mins}$, within this noise limit. When doors are closed, this level goes down to 18 dB.

Table 4.6 summarises the results, presenting the predicted external noise levels outside bedrooms windows, and internal noise levels within the bedrooms (based upon an average 15 dB reduction of sound across an open window).

The meeting of the suggested criteria would mean that music is unlikely to be perceived by residents inside dwellings after 23:00.

With windows closed, there is almost no chance that music noise would be audible, as the reduction of 15 dB from an open window would increase to around 30 dB once the window is closed.

These predicted noise levels are all below the suggested internal ambient noise levels at night of 30 dB $L_{Aeq,8hrs}$ outlined by BS 8233:2014 and the WHO guidelines for environmental noise.

For further context an internal noise level of <20 dB L_{Aeq} is a target often applied to music recording studios and broadcast studios, where an exceptionally low background noise level is necessary to ensure that extraneous noise cannot be heard on recordings. Hence the predicted levels below 20 dB L_{Aeq} are exceptionally low in this context.

Table 4.6 – Predicted MNLs at nearby NSRs after 23:00

Noise Sensitive Receptor	Music Noise Level (MNL) – 100 dB inside the Barn, with doors open		
	1m outside bedroom windows dB $L_{Aeq,15mins}$	Inside bedrooms with open windows dB $L_{Aeq,15mins}$	
	Predicted	Predicted	Criteria for inaudibility[1]
Worst-affected dwelling	30	15	<20[2]

1 – Based upon the *Noise from Pubs and Clubs Phase II Final Report* summarised in Section 3.2 which suggests that levels below this are inaudible to the majority of people.
2 – Criteria inside the dwelling. Corresponding criteria outside of a window is <33 dB based upon a 15 dB reduction for an open window

4.4.2 Music in the Covered Area/Open Sided Barn

Figure D.4 in Appendix D shows the noise emissions from the covered area with an acoustic act or PA system operating at a level of 75 dB $L_{Aeq,15min}$ (as measured 3m in front of the performers/speakers).

The noise map shows that noise emissions to the worst-affected residential window would be **25 dB $L_{Aeq,15mins}$**.

Hence as per the conclusions in the previous subsection, this is a very low level that is unlikely to be perceived, indicating an acceptable impact.

4.4.3 Patrons in the Garden

Figure D.5 in Appendix D shows the noise emissions from the garden area with:

- a PA system playing low levels of background music at 65 dB $L_{Aeq,15min}$ measured 3m in front of the loudspeaker [2];
- 50 guests all speaking with a raised voice (66 dB(A) at 1m) for 100% of the time [3].

The noise map shows that noise emissions to the worst-affected residential window would be **26 dB $L_{Aeq,15mins}$**.

Hence as per the conclusions in the previous subsection, this is a very low level that is unlikely to be perceived, indicating an acceptable impact.

Part of the noise management strategy will be to ensure that guests are conscious of behaving responsibly with regards to noise affecting the neighbours (i.e. not shouting) and that when guests are outside that they stick to designated areas and avoid straying through the fields towards other properties.

2 - Music used during the wedding ceremony, wedding breakfast, or at any point in between before the evening reception, is typically kept at an intentionally low background level of around 60 – 65 dB $L_{Aeq,15mins}$ within 3m of a loudspeaker to allow guests to talk to one another without having to raise their voice to be heard over the music.

3 - This would also be equivalent to 100 guests speaking 50% of the time, 200 guests speaking 25% of the time, etc. These are considered to be worst-case scenarios.

5.0 Noise Management Plan

The results in Section 4.0 have provided a positive indication that use of the venue for weddings, parties, and live music events could proceed with a low impact on residents in the local area, providing the advice herein is adhered to.

However, it is recognised that meeting suggested noise level criteria does not automatically rule out an adverse impact or stem the possibility of complaints, as the perception of noise is relatively subjective. As with any development, there is always the possibility that the applicants may receive complaints, though the suggested criteria provide a way of determining what is a 'valid' complaint if investigated by the Council's EHO.

The purpose of this NMP is to outline how the Operator will mitigate and manage noise levels from events held at the development. This NMP will be incorporated into the Operator's overall management policy. Many of the items herein are already implemented by the Operator.

The applicant is committed to further mitigating the noise impact within reasonable measures and maintaining engagement with the local community and local residents to keep good public relations that can benefit by partially offsetting any impact, keeping any annoyance to a minimum. The aim is that any noise impact that occurs from early use of the development can be investigated and responded to, ensuring that the impact from future events is mitigated well. This will be an ongoing improvement of review and control (to a reasonable degree, as the assessment herein as demonstrated that the development should not cause an unreasonable adverse impact compared to the other similar venues which follow the same guidelines).

5.1 Noise Control Measures

The applicant will follow the recommendations within this report to ensure that MNL criteria are not exceeded, as demonstrated by the noise modelling predictions. Furthermore, the following outlines the measures that the applicant will take to control noise as much as is reasonably possible, including from sources other than music.

Some sections contain possible forms of further mitigation which *could* be taken if initial events at the venue are found to incur an unreasonable noise impact and 'valid' complaints from local residents, whereby valid means that the MNL criteria suggested in this report are shown to be exceeded by external noise monitoring conducted at the site boundaries or outside nearby properties (see Section 5.4 regarding noise monitoring). These future mitigation options *could* be taken forward if the noise impact is ongoing and on a regular basis, and all other forms of mitigation have been exhausted.

5.1.1 Internal Noise Monitoring

A system of noise monitoring will be carried out for amplified music inside the Barn during all events, weddings and functions.

Both the DJ and a staff representative will co-operate to regularly check during the evening that noise levels of 100 dB $L_{Aeq,15mins}$ are not being regularly exceeded. The monitoring will be conducted using the monitoring system which has already been installed.

All DJs will be asked prior to and during the event to ensure that they comply with the constraints of the noise limiting system set at this level. As part of sound checking earlier in the day (and before the event), the DJ will check that the system will be capable of operating within these levels prior to performing later in the evening.

Future Mitigation (if required)

If formal complaints are received from local residents, then further mitigation options could include some of the following:

- Noise limits at the edge of the dancefloor can be reduced from 100 dB to 90 - 95 dB after 23:00.
- If low frequency noise is found to be an issue, a low frequency compressor or limiter could be applied – or the DJ can simply be told to decrease the low frequency emphasis on the mixing board.

5.1.2 Live Amplified Bands

Bands will be asked prior to and during the event to mitigate noise as much as possible, i.e. drummers can use a thinner drumstick, rods, brushes, or dampening material applied inside the bass drum or on the cymbals, and other instruments and vocalists can play with the amplifier below maximum volume.

Future Mitigation (if required)

The number of events per year involving live amplified bands could be reduced, or bands could be prohibited altogether.

The type of bands that are allowed could be managed, i.e. bands using electronic drums rather than acoustic drums where the volume can be managed, or acoustic instrument only bands.

Band cut off times could be limited to 23:00.

5.1.3 Barn Construction

The Operator will replace all existing boarded up windows with new double glazing. All windows will be kept closed during loud music events (only doors can be propped open).

Future Mitigation (if required)

Doors could be kept closed as much as possible – or doors on one side of the building could always be closed, i.e. the only open doors would be leading to the covered area or the area on the east side of the barn away from the stage.

5.1.4 Outdoor Music

Music played outdoor in the covered area will be limited to small acoustic acts or a PA system that does not exceed 75 dB L_{Aeq} at 3m in front of the loudspeaker.

Music in the garden will be limited to 65 dB L_{Aeq} at 3m in front of the loudspeaker.

Future Mitigation (if required)

Outdoor music could be limited to no later than 23:00.

Additional screening could be created around the covered area, i.e. a moveable screen behind the performers.

5.1.5 Patron Noise

The event operator will provide temporary signage and have staff on hand to deal with noise generated by guests of the wedding/function. The aim of this is to:

- direct guests and vehicles to the correct entrances and parking areas upon arrival;
- direct guest to take direct routes between areas;
- encourage guests to not congregate near to the site boundaries close to other residential properties;
- encourage guests to be considerate upon leaving the premises by staff and temporary signage positioned in a prominent place near the exit.
- usher guests off-site or to their camping areas when leaving at the end of the event and remind them to minimise noise and be respectful of the residents – with temporary signage positioned in a prominent place near the exit – with a minimum bold font size of 32.

Communication will be made with taxi companies regarding the use of horns and slamming of doors.

5.1.6 Firework Displays

Firework displays will be prohibited.

Further Mitigation

If formal complaints are received, the Operator would be happy to prohibit firework displays altogether.

5.2 Event Manager Duties

There shall be a trained events supervisor/manager responsible for noise reduction measures on-site at all times during events. The manager's duties in respect of controlling the site will include but not limited to:

- Ensuring acceptable behaviour is maintained amongst guests and dealing with any sources of excess noise swiftly, reminding guests that they are in a rural area with nearby residents, giving instructions and information to guests to ensure they are aware of the need to minimise noise, dealing appropriately with any guests behaving in a loud, obnoxious or aggressive manner.;
- Placing clear signage requesting guests to respect the privacy and peace of neighbours on arrival at the site and exit at the end of the event, and also during the event, reminding guests that they have a responsibility to not disturb residents in the area;
- Ensure that instructions for guests to find the venue by car are clear and that visitors access the site in the right direction without unnecessarily accessing neighbours' properties by accident, or parking close to their properties.
- Providing direct personal contact details to residents' associations, residents any other organisations including the Council and community groups in the event that any issues need to be reported;
- Dealing with any noise or other issues reported proficiently and professionally;
- Briefing new members of staff of their duties in respect of ensuring the above considerations are upheld at each event. Where practicable all members of staff will deal with excess noise or disturbance as soon as possible should the manager not be immediately available;
- Upholding the terms of any planning approval and licensing details.
- Maintaining a log of all received complaints and actions.

5.3 Complaints Management and Communication

The Operator will implement a clear noise complaints management procedure. Neighbours will be given a clear route to report excessive noise or anti-social behaviour directly to the operator. This will allow the complaint to be investigated and addressed quickly.

The operator will provide an email address as a minimum to residents' associations and any other organisations including the Council and community groups – so that any issues can be reported.

Complaints records will (as a minimum) include the following:

- date, time, and the name of the complainant (if given);
- nature of the complaint;
- the locality of complaint; and
- a summary of the investigation into the noise complaint, the actions that were taken and the outcome.

The response to the complaint will have the objective of investigating the incident and preventing any continuing issue by putting in place additional control or management measures to prevent the re-occurrence of the incident. The investigation into the complaint will include but not be limited to:

- a visit by the event operator or phone call/email correspondence with the complainant to verify the issue, including whether the complaint is made 'after' rather than 'during' a noise event;
- a review of event activities at the time of the incident to investigate potential sources; and
- a review of noise control measures and management actions at the time of the incident;

The investigation will be accompanied by a written record detailing any failures, incidents and what mitigation was (at the time) employed or will be used in future.

The Operator shall keep records of all noise monitoring, investigations, and complaints and these shall be made available to the EHO to examine on request.

An example of a suitable complaints' management form is given overleaf.

Table 5.1 – Example complaints management form

Complaint made by:	
Date of complaint:	
Complaint received by:	
Time of occurrences:	
Number of occurrences:	
Details of complaint:	
Action(s) taken:	
Review of action (s):	
Details of adjustment(s) made to the noise management plan if required:	
Signed (Noise supervisor): Date:	

5.4 Noise Monitoring

In order to ensure that the MNL limits are being complied with, it is anticipated that the EHO may wish to conduct noise monitoring at NSRs during events, especially during the first few months of operation.

Therefore, information will be provided to the EHO regarding the dates, times, and types of future events on a continual month by month basis. Realistically the majority of events will be booked far in advance of this and would be at regular intervals (i.e. every Saturday during the summer months).

Therefore, this schedule will be communicated to the EHO well in advance, when possible, to allow the EHO to make provisions to monitor random events without the Operator's knowledge of which events are being monitored.

Logs will be kept of the monitoring exercises with actions taken to mitigate noise further if MNL limits appear to be being exceeded.

Appendix A – Acoustic Terminology and Concepts

A.1 – Glossary

Table A.1 – Glossary of acoustic terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio of the root-mean-square pressure of the sound and a reference pressure (2x10-5 Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Frequency	Sound can occur over a range of frequencies extending from the very low, such as the rumble of thunder, up to the very high such as the crash of cymbals. Sound is generally described over the frequency range from 63Hz to 4000Hz (4kHz). This is roughly equal to the range of frequencies on a piano.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period. This parameter is typically considered as a good representation of the 'average' overall noise level. It is referred to technically as the A-weighted equivalent continuous sound level and is a dB(A) as defined above.
$L_{A90,T}$	The A-weighted noise level that is exceeded for 90% of the measurement period T. This parameter is often considered as the 'average minimum level'.
$L_{A10,T}$	The A-weighted noise level that is exceeded for 10% of the measurement period T. This parameter is often considered as the 'average maximum level';
$L_{AFmax,T}$	The maximum A-weighted noise level during the measurement period T.

A.2 – Subjective Changes in Noise Level

Table A.2 – Subjective loudness from an increase or decrease in sound pressure level

Change in sound pressure level	Relative change in sound power energy (multiplier)		Change in apparent subjective loudness (for mid-frequency range)
	Decrease	Increase	
3 dB	½	2	'Just perceptible'
5 dB	1/3	3	'Clearly noticeable'
10 dB	1/10	10	'Half or twice as loud'
20 dB	1/100	100	'Much quieter, or louder'

Appendix B – National Planning Policies

B.1 – National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England (the same principles of which can also be used in Wales) and how these are expected to be applied. The NPPF provides a framework within which local people and their council can produce their own distinctive local and neighbourhood plans. With explicit reference to noise, the NPPF states that *"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 … noise pollution".*

B.2 - Noise Policy Statement for England (NPSE)

The NPPF refers to the Noise Policy Statement for England (NPSE), which applies to most forms of noise including environmental noise. The NPSE sets out the long-term vision of Government policy which is to *"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."*. It aims that *"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 use of the terms *"significant adverse"* and *"adverse"* are key phrases within the NPSE. The guidance establishes the concept of how the level of adverse effect on health and quality of life can be referenced including:

- 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.

Under the first aim of the NPSE ("avoid significant adverse impacts on health and quality of life"), an impact in line with SOAEL should be avoided. Under the second aim ("mitigate and minimise adverse impacts on health and quality of life"), where the impact lies somewhere between LOAEL and SOAEL, requiring that all reasonable steps are taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development, but does not mean that such adverse effects cannot occur.

B.3 - Planning Practice Guidance on Noise (PPG-N)

The Planning Practice Guidance on Noise (PPG-N) is part of a suite of web-based guidance which is intended to support the implementation of the policies in the NPPF and the NPSE.

It aids in expanding on the definitions form the NPSE of NOEL, LOAEL and SOAEL, by linking these terms to 'examples of outcomes', i.e. changes in behaviour and/or attitude to noise. The table below summarises the guidance from PPG-N in this regard.

Table B.1 – Noise exposure hierarchy based on the likely average response – adapted from PPG-N

Perception	Examples of outcomes	Increasing effect level	Action
NOEL - No Observed Effect Level [1]			
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
LOAEL - Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up the volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
SOAEL - Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to a change in the acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate the 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
[1] This line is an assumption of the adverse effect level and is not explicitly referenced by PPG-N, though this appears to be a safe assumption.			

Appendix C – Noise Survey/Testing Details

C.1 – Survey Equipment

The monitoring equipment used for the baseline noise survey is detailed in the table below. The sound level meter was calibrated before and after the survey, with no significant drifts of greater than 0.5 dB observed. The sound level meter has been calibrated to a traceable standard within the 24 months preceding the survey, and the calibrators have been calibrated to a traceable standard within the 12 months preceding the survey. The equipment complies with the standards of as BS EN 60942:2003 Class 1 device.

Table C.1 – Equipment used for the noise survey

Name	Serial Number	Last Calibrated	Calibration Due
SVAN 949 Class 1 Sound Level Meter	9720	Nov-21	Nov-23
SV22 Class 1 Microphone	4012386	Nov-21	Nov-23
Cirrus CRL511E Class 1 Acoustic Calibrator	035235	Nov-21	Nov-23
Svantek SV958A Class 1 Four-channel Noise and Vibration Meter	92805	Nov-20	Nov-22
MTG MK255 preamplifier	100431	Oct-20	Oct-22
Svantek SV12L ½" microphone	19148	Oct-20	Oct-22

C.2 – Testing

Following on from Section 4.3.2 of the main body of the report, the methodology of this testing can be summarised as follows:

- The surveyor placed two large PA speakers with a combined power of 200W within the Barn, at a position representative of where the band or DJ would be located at the western end of the barn.
- The PA system was then set to play a continuous pink noise reference signal (as is standard for acoustic testing), at the maximum amplitude that the system could generate.
- A series of measurements were conducted *inside* the Barn at positions representative of:
    - the front/centre of the dancefloor, i.e. 3m in front of the PA system;
    - seating areas further back in the room away from the dancefloor;
    - behind the PA system; and
    - 1m inside of the façade at various discrete points on each elevation
- A series of measurements were then conducted *outside* of the Barn to determine the difference in noise level from inside to outside at positions including:
    - 1m from various points of the façade – lined up with those taken inside the building;
    - at discrete points along a straight line walking away from the Barn to the west and towards the baseline monitoring position by the nearest neighbouring property.

C.3 – Photographs

Figure C.2 – Photographs of the noise monitoring position from the baseline survey

Figure C.3 – Photographs of testing inside the Barn

Figure C.4 – Photographs of testing outside the Barn

Appendix D – Predicted MNLs / Noise Mapping

The noise predictions within this report have been undertaken using the proprietary software CadnaA® by DataKustik, a 3-D noise mapping package which implements a wide range of national and international standards, guidelines and calculation algorithms, including those set out in ISO 9613-2:1996.

The noise model accounts for the topography of the land based on data available from the Ordnance Survey and from a topography survey of the site. All of the objects within the model (buildings, roads, barriers, foliage, etc) have been imported from OpenStreetMap or drawn manually based upon maps/photographs taken from site. The scaled plans and elevations for the proposed development have been accounted for in the model.

The noise model has been used to predict the resulting music noise levels (MNLs) across the surrounding area incident on nearby noise-sensitive receptors.

The noise map model has assumed:

- downwind propagation, a wind direction that assists the propagation of sound from source to receptor, as a worst-case.
- a ground absorption factor of 1 in all greenfield areas;
- a ground absorption factor of 0 on car parking areas, buildings, and roads;
- a ground absorption factor of 0.5 on residential areas to represent mixed ground (a mix of roads/pavement and gardens/green areas);
- a maximum reflection factor of two where buildings and barriers are assumed to have a 'smooth' reflective façade, as a worst-case;
- receptor point heights (away from buildings) and a grid height of 4.5m to represent 1st floor windows (which are more affected than ground floor windows);
- receptor points on the façade of buildings showing the highest exposure level – points are modelled on the ground floor, 1st floor, 2nd floor etc, with the map showing the result from the worst-affected floor.

Figure D.1 – Images from the noise modelling

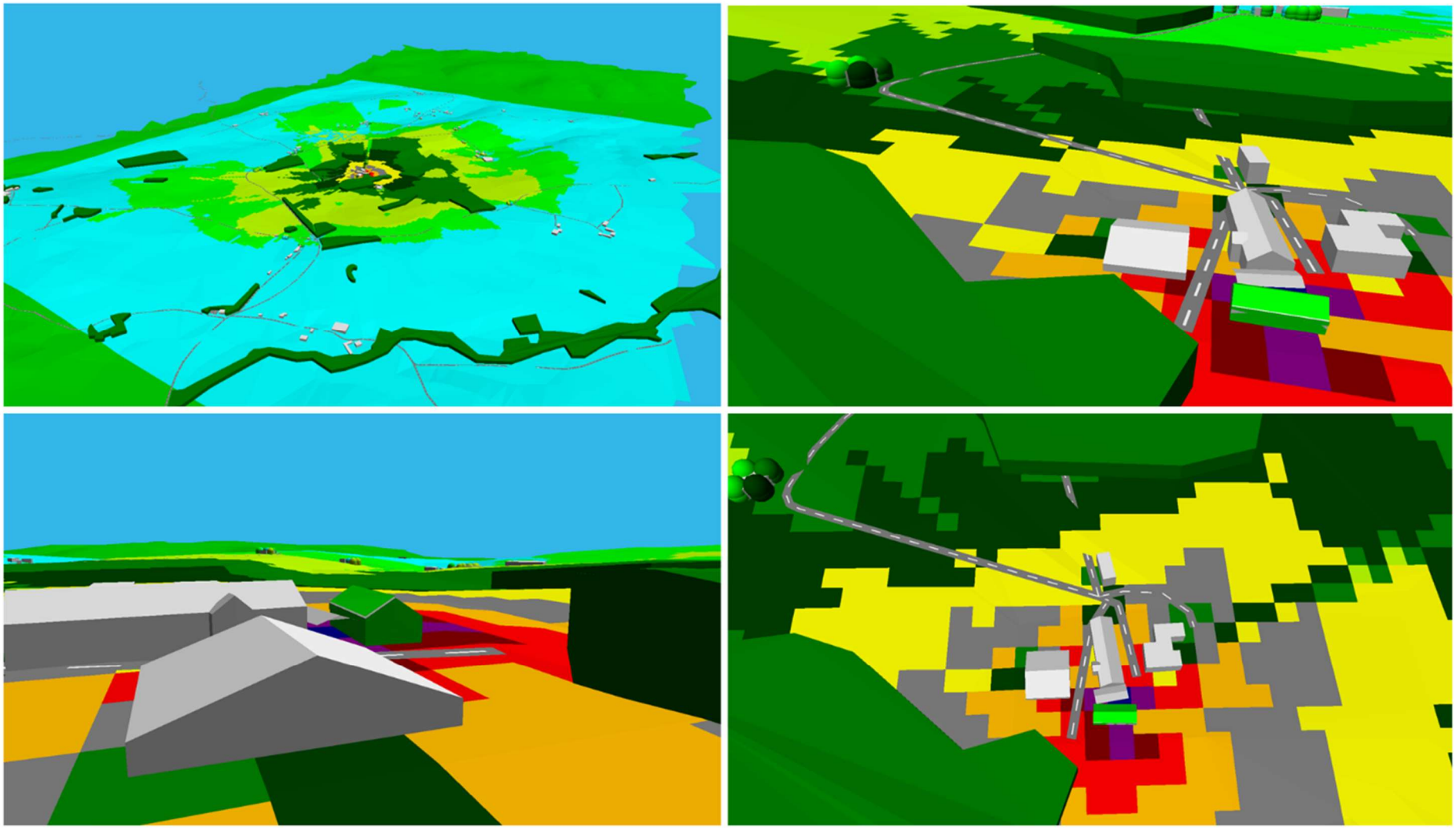


Figure D.2 - MNL with amplified band or DJ in barn operating with the noise limiter set to 100 dB L_{Aeq} internally - **doors open**

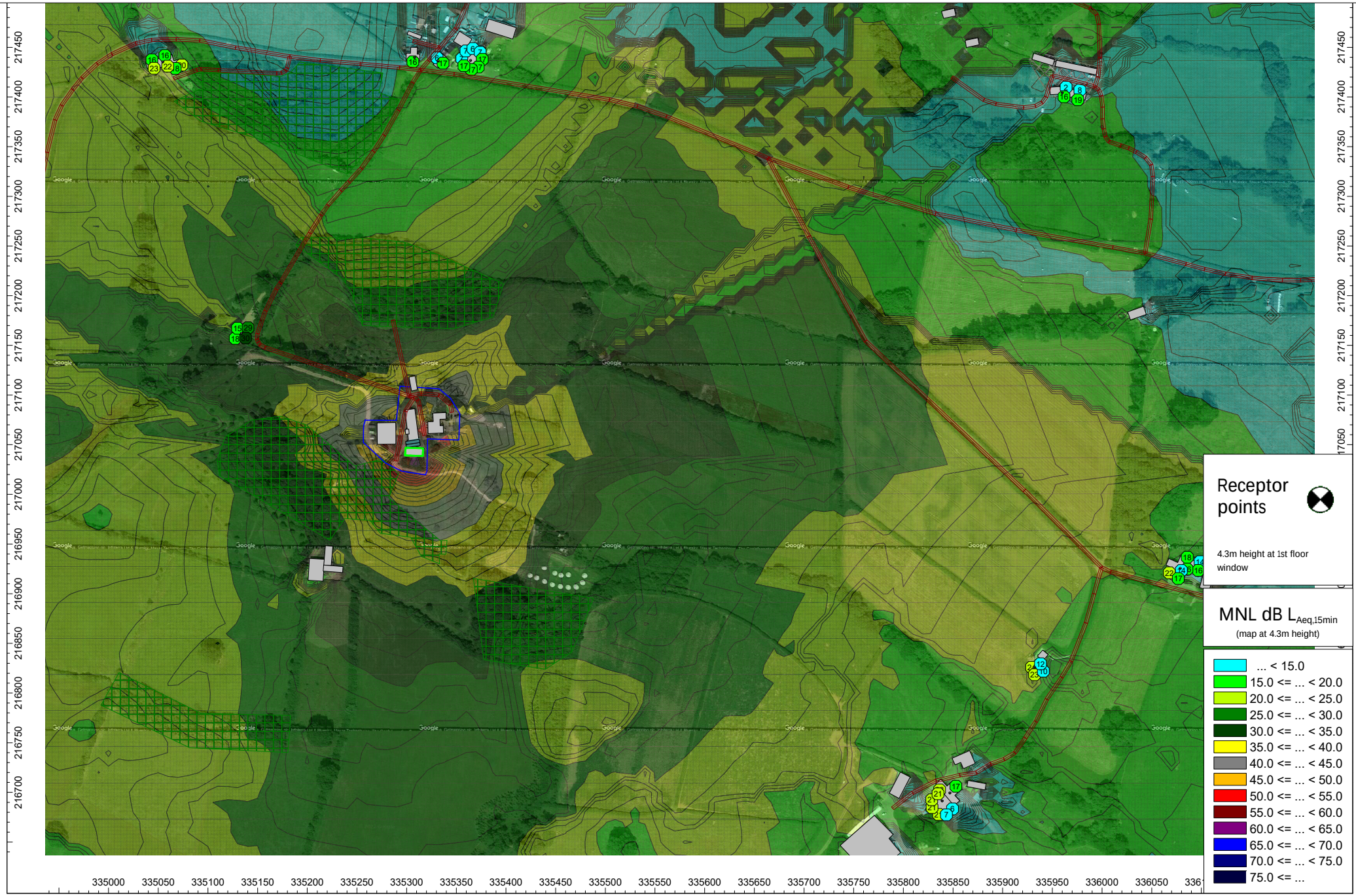


Figure D.3 - MNL with amplified band or DJ in barn operating with the noise limiter set to 100 dB L_{Aeq} internally - **doors closed**

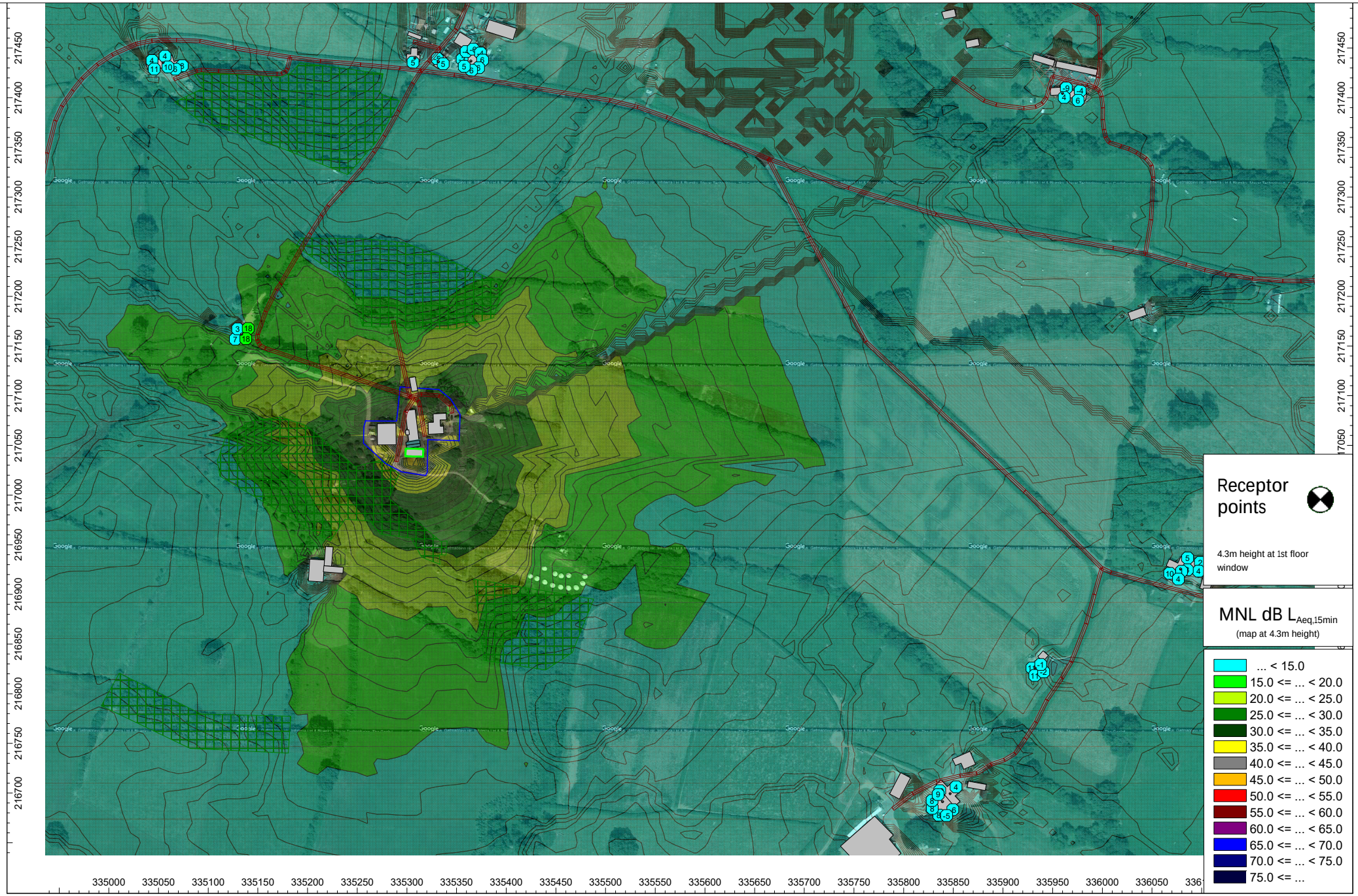


Figure D.4 - MNL with acoustic act or PA system operating at 75 dB L_{Aeq} under the canopy/open sided barn

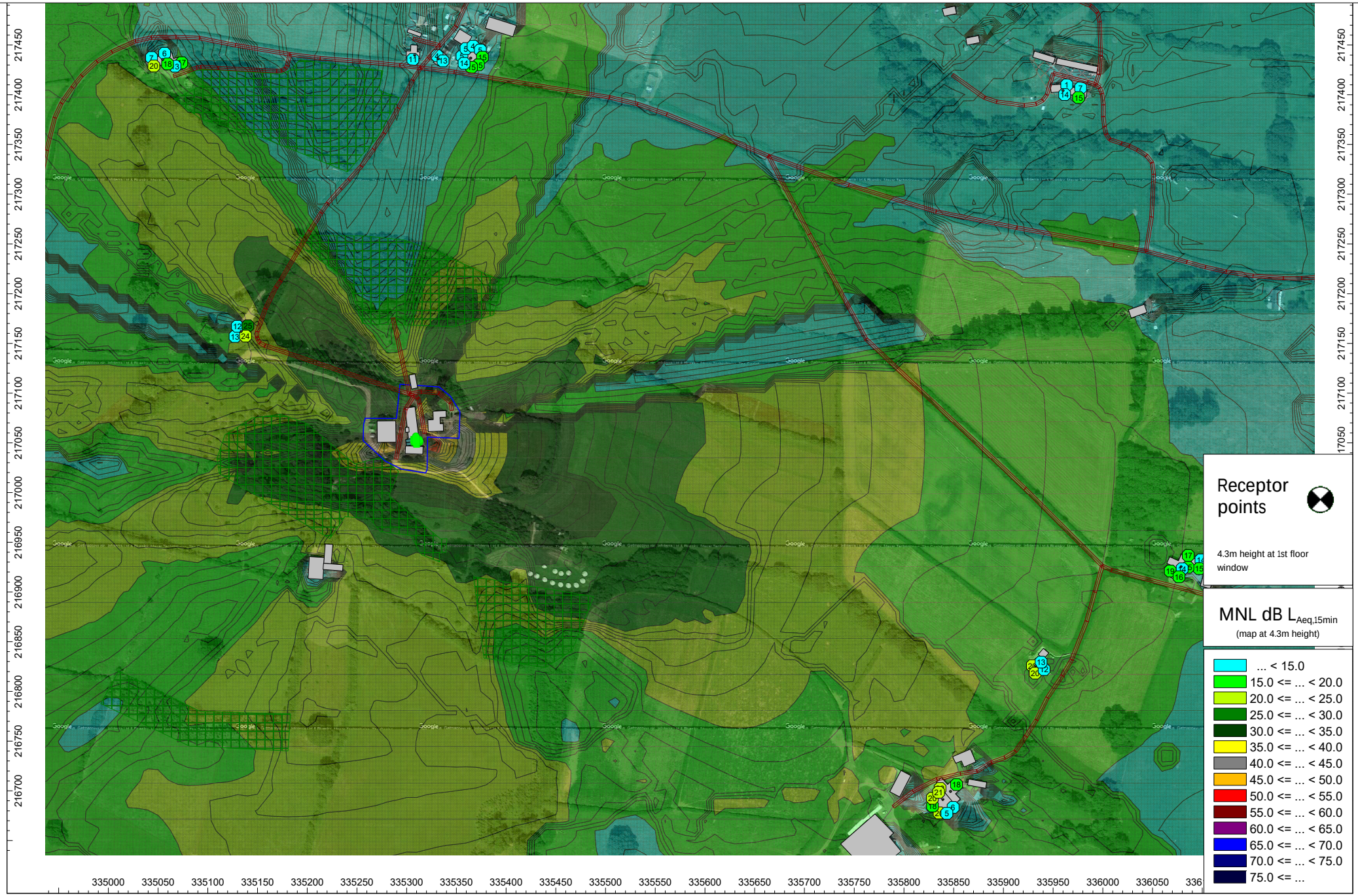
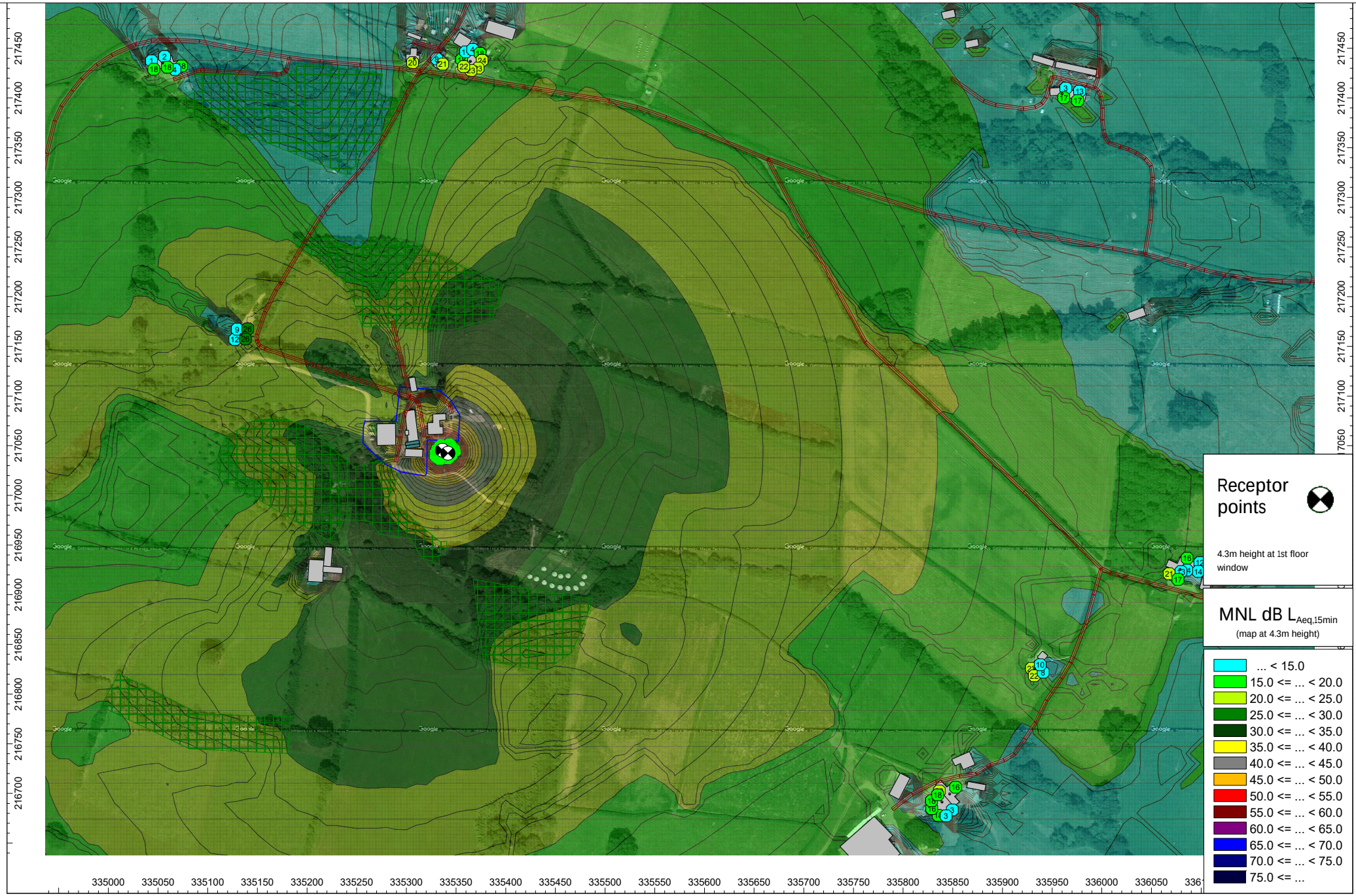


Figure D.5 - MNL with background music at 65 dB L_{Aeq} and 50 guests speaking with raised voices in the garden area



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