Mr Gerry Lowe
Talbot Hotel at Chipping
C/o Palewood House
Whitewell Road
Cow Ark
Nr. Clitheroe
Lancashire
BB7 3DG

10th September 2012

Dear Mr Lowe

Re: Noise modelling of function rooms at Talbot Hotel

1. Introduction

This document presents the findings of a desk-top assessment undertaken to predict the potential impact of noise from proposed function rooms associated with the redevelopment of the Talbot Hotel in Chipping.

It is understood that the Local Authority have advised that their preference is for the function room to be located within the existing barn which fronts Talbot Street. Computer noise modeling has been undertaken to predict the anticipated noise levels at nearby houses opposite the barn as a result of internal noise from the function room, including music from DJs and bands. In addition, the predicted noise levels as a result of locating the function room within the new-build extension to the rear of the development have also been modeled.

2. Noise Assessment – Relevant Guidance

2.1 National Planning Policy Framework[1]

The National Planning Policy Framework (NPPF) provides planning policies to help achieve sustainable development. The planning policies and decisions should aim to:

- avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not

[1] National Planning Policy Framework, March 2012, Communities and Local Government

have unreasonable restrictions put on them because of changes in nearby land uses since they were established;
and

- identify and protect areas of tranquility which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

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

The NPPF does not recommend specifically how the above aims can be assessed or achieved and consequently this report will rely on additional national noise guidance to provide acceptable target levels for noise.

2.2 BS 8233: 1999 'Sound insulation and noise reduction for buildings – Code of practice'

This British Standard gives guidance on acceptable internal noise levels in habitable rooms within residential premises during night-time and daytime periods. The values shown in Table 1 are given for good and reasonable conditions in habitable rooms within dwellings.

Table 1: Sound Levels in habitable rooms

Room	Criteria	Reasonable ($L_{Aeq,T}$)	Good ($L_{Aeq,T}$)
Bedrooms	Sleeping	35	30
Living Rooms	Resting	40	30

2.3 World Health Organisation (WHO) Guidelines for Community Noise 1999

The WHO Guidelines 1999 state that external amenity areas should not be subjected to daytime averaged noise levels greater than L_{Aeq} 55 dB, and preferably below L_{Aeq} 50 dB.

2.4 Noise from Pubs and Clubs Phase 1 and 2

Noise from Pubs and Clubs Phase 1 (Davies et al, DEFRA Contract No. NANR 92, 2005) is a document reviewing and summarising the various measurement and assessment procedures that were, at the time of publishing, commonly used by acoustic consultants and environmental health practitioners to assess the impact noise from pubs and clubs. Typical procedures included:

- Absolute criteria, e.g. a stated maximum internal A-weighted noise level
- Comparative criteria, e.g. the methodology within BS 4142;
- Subjective criteria, e.g. inaudibility;

- Criteria that take into account the frequency content of the noise e.g. Noise Rating curves.

Phase 1 merely presented a summary of the various methods used at that time to assess noise from pubs and clubs. It did not prescribe a single recommended method. However, Noise from Pubs and Clubs Phase 2 (Capita Symonds, DEFRA Contract No. NANR 163, 2006) attempted to address this by a process of controlled experimentation to determine which method and criteria were best suited to the assessment of entertainment noise from pubs and clubs. The results of these experiments resulted in the identification of several methodologies that gave reasonably good correlation with subjective response.

The best overall correlation came from the following metrics, in order of correlation:

- A target absolute criterion of 34 dB $L_{Aeq,5\ min}$ for a one-off event in a habitable room with windows closed. This was equivalent to a subjective rating of 'just unacceptable'. It was recommended that in addition to the absolute level, a subjective requirement that the entertainment noise itself would have a clearly audible contribution to the overall noise was also imposed, e.g. songs/tracks would be recognisable and lyrics intelligible. This subjective requirement was included to alleviate concerns that the stated criterion could be exceeded in areas with high ambient noise levels.

- $L_{A90} - L_{A90}$ (no music) which thus allows consideration of the background noise level;

- $L_{Aeq} - L_{A99.95}$ or existing Noise Act 1996 methodology ($L_{Aeq} - L_{A99.8}$).

2.5 Noise from Function Room Impacting on Existing Residents

Taking the above guidance into account, it is proposed that noise from the function room is controlled to 30 dB L_{Aeq} / 45 dB L_{AFmax} in bedrooms at night. This figure is lower than that proposed by Noise from Pubs and Clubs Phase 2 (see above) and is intended to take into account the likely increased frequency of events in the function room than the 'one-off' event described in the Phase 2 document. This figure also correlates to the 'good' level for noise within bedrooms at night when the function room is likely to still be occupied.

3. Noise Modelling

3.1 Model Input Parameters

Noise modelling was undertaken using the Cadna-A software package. The information used to construct the computer model was from the following sources:

The general horizontal plan information of the area surrounding and including the proposed development site was imported from Google Earth. This was used to determine road positions, building footprint areas and relative locations and is considered accurate to within 5%. Building height information was based on site observations. Topography was included in the design of the model due to the significant banking up to the residential properties at the rear. The following global parameters were assigned to the model:

- Propagation model: ISO 9613
- Default ground absorption: 0.0 (acoustically reflecting)
- Two orders of reflection
- Buildings are reflecting (smooth, non-structured facade)

3.2 Noise Source Data

The noise source data used for the model is provided below.

Table 2: Noise source data used in Cadna-A model

Description	Reverberant Sound Pressure Level, dB, in Octave Band Centre Frequency,								
	63	125	250	500	1K	2K	4K	8K	dBA
Music bar/night club	110	110	100	100	95	90	85	85	102

* Source: Little Red Book of Acoustics, Watson & Downey

The published typical noise levels stated in Table 2 and used within this assessment correlate well to levels published within Noise from Pubs and Clubs Phase 1, which state the following typical noise levels measured by the authors:

- Busy pub/bar (no music): up to 88 dB L_{Aeq}
- Bars playing music: 90 – 95 dB L_{Aeq}
- Nightclub dance floor: up to 105 dB L_{Aeq} with octave band L_{eq} levels up to 115 dB in the 63 Hz band and up to 110 dB in the 125 Hz band.
- Difference between L_{eq} and L_{max} between 5 db and 15 dB in octave bands and overall A-weighted level, depending on type of music played and level of compression.

It is considered unlikely that the function room will in most situations generate noise levels as high as those measured within nightclubs. However for design purposes a conservative (i.e. relatively high) noise level has been assumed to take into account the potential for loud music to be played within the function room. For the purposes of prediction, it has been assumed that the octave band L_{max} noise levels will be equivalent to the predicted octave band L_{eq} + 10 dB.

3.3 Assumptions

In order to predict the noise levels that may impact nearby dwellings, assumptions needed to be made regarding the construction of the barn housing the function room. These were:

- External walls of solid masonry construction
- Windows to be 'standard' thermal double glazing
- Roof consisting of slates with cavity, mineral wool insulation and 2 layers of plasterboard to internal ceilings

Similar assumptions were made regarding the construction of the new build extension, although it is understood that the final roof construction has yet to be decided. However, providing this also has a cavity with mineral wool insulation and an under-drawn high density plasterboard ceiling of at least 2 layers, the sound insulation is likely to be similar to that obtained from a traditional slated roof with ceiling. It is understood that the proposed east facing windows to the new-build are to be full height glazed curtain wall.

To calculate the resulting internal noise levels within nearby dwellings, assumptions also had to be made regarding the construction and layout of these buildings. The following assumptions were therefore made:

- Internal noise levels were predicted within first floor bedrooms of typical dimensions i.e. 3 m x 4 m x 2.5 m high (30 m^3) with total glazed area of 2.0 m^2.

- External walls are solid masonry or cavity masonry
- Bedrooms have 'normal' furnishings and are carpeted.
- Windows consisted of standard thermal double glazing (e.g. 4/12/4) and were closed.

4. Results from Noise Model

The following screen shots from the noise model indicate the predicted noise levels (dB L_{Aeq}) at the locations of nearby facades with the function room located in the existing barn (Figure 1) and in the new-build extension (Figure 2).

Figure 1: Predicted noise levels at nearby dwellings from function room in barn

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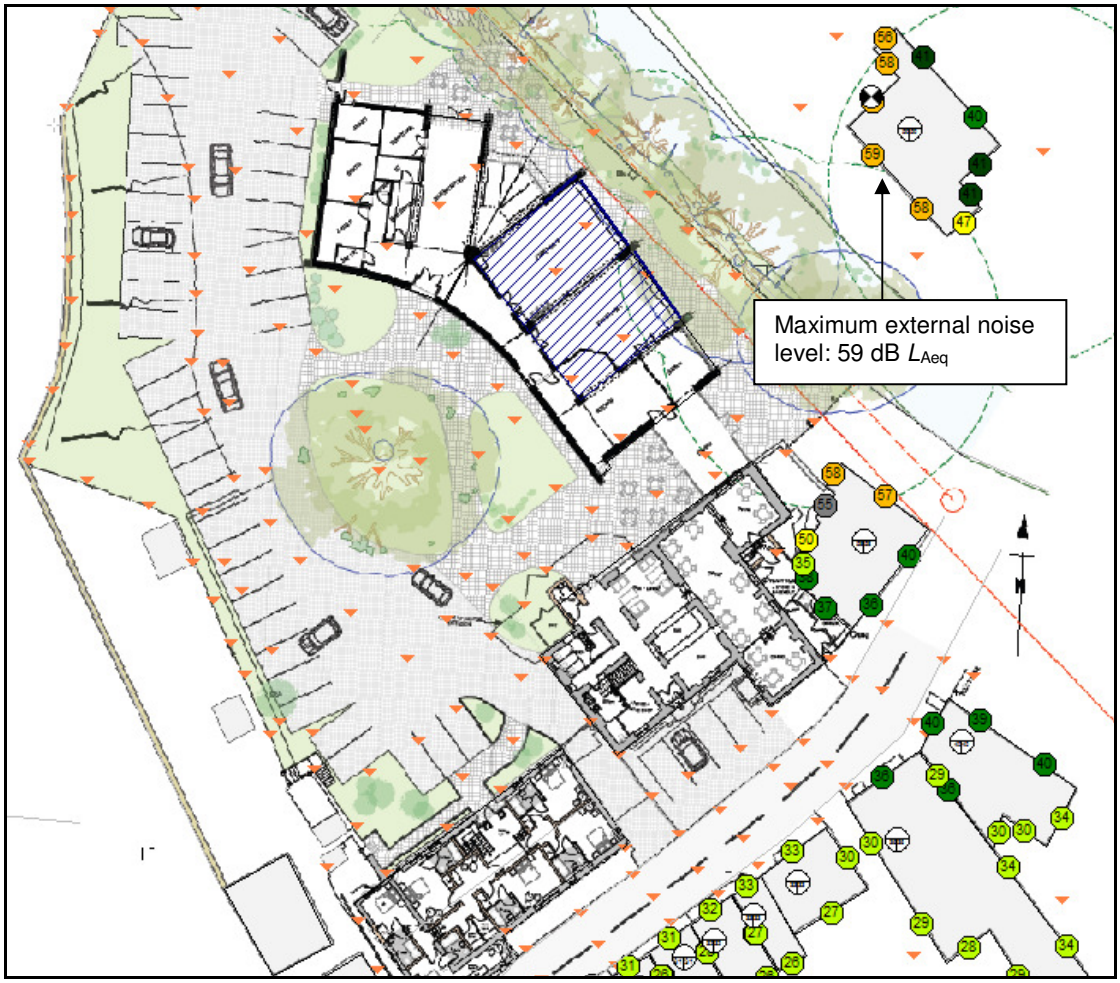
Figure 2: Predicted noise levels at nearby dwellings from function room in new-build extension



Based on the predicted external noise levels, the following internal noise levels are predicted within bedrooms with windows closed (if necessary, full calculations may be provided on request).

- Predicted internal noise levels within dwellings on Talbot Street due to noise from function room in converted barn: 35 dB L_{Aeq} / 45 dB L_{Amax}.
- Predicted internal noise levels within dwelling to east of new-build due to noise from function room in new-build extension: 33 dB L_{Aeq} / 43 dB L_{Amax} (although external noise levels are higher at this location than for the Talbot Street location, the reduced angle of incidence to the window results in lower internal noise levels).

As can be seen, with the function room located within the converted barn, noise levels within the dwellings opposite on Talbot Street are predicted to exceed the target levels of 30 dB L_{Aeq} / 45 dB L_{AFmax} when music is playing. However, there is a similar exceedance of the L_{Aeq} within the nearest dwelling to the east of the proposed extension with the function room located in this alternative venue. In each case, the glazing was found to be the primary cause.

The modelling was repeated with acoustic double glazing (10/12/6.4 laminated) in place of standard thermal double glazing. This resulted in the following predicted internal noise levels:

- Predicted internal noise levels within dwellings on Talbot Street due to noise from function room in converted barn with acoustic double glazing: 31 dB L_{Aeq} / 41 dB L_{Amax}.
- Predicted internal noise levels within dwelling to east of new-build due to noise from function room in new-build extension: 28 dB L_{Aeq} / 38 dB L_{Amax}.

It can be seen that the predicted internal noise levels with acoustic double glazing provided to the function room is 1 dB above the 30 dB L_{Aeq} target level at the nearest dwelling with the function room within the barn. However, with the function room located within the new-build extension – and with acoustic double glazing specified - both target levels are predicted to be achieved within the nearest dwelling. The model also predicts external noise levels within the garden of the nearest dwelling to the east of the proposed extension (with the function room located here) would be in the order of 50 – 53 dB L_{Aeq}. This would fall within the limit range suggested by the WHO for noise in external amenity areas.

In order to achieve internal noise levels much lower than around 30 dB L_{Aeq} within dwellings close to the function room, it would be necessary to specify secondary glazing to the function room windows within the converted barn e.g. a double glazed unit with a specification of 4/20/4, i.e. 4 mm panes each side of a 20 mm cavity, 200 mm cavity with lined reveal and 6 mm secondary pane. Further enhancements to the roof construction may also be necessary.

5. Comments

It can be seen from the results of the noise modelling that high performance acoustic glazing will be required to whichever building is finally selected to house the function room. With 10/12/6.4 laminated glazing to the barn, the internal noise levels within nearby dwellings is predicted to be 1 dB above the target L_{Aeq} level but 4 dB below the target L_{Amax} level. Achieving the target L_{Aeq} levels would require even higher performance double glazing or a secondary glazing system.

Both L_{Aeq} and L_{Amax} target levels are predicted to be met at the nearest dwellings with the function room located within the new extension and with acoustic double glazing specified.

It is to be noted that this assessment has assumed that all nearby dwellings have standard thermal double glazing, which in reality – and considering the age of the properties – may not be the case for all dwellings. Furthermore the assessment has assumed windows within dwellings will be closed; noise levels will be significantly higher when windows are open, for example to provide ventilation.

It is to be appreciated that with the function room located within the converted barn, a higher number of dwellings (i.e. most of those on Talbot Street) are predicted to be affected to some extent by noise from the function room. With the function room located within the new-build extension, the number of affected dwellings is restricted primarily to the single dwelling to the immediate east of the extension and the dwelling attached to the existing Talbot Hotel building. However, this assessment has assumed that all windows (and indeed doors) to the function room remain closed at all times. There should be no access provided directly from the function room to the area in front of nearby dwellings. This could have implications on the proposed layout of verandas or other public areas associated with the development. Ideally, all access to the function room should be via an internal buffer zone or from the courtyard side of the hotel.

6. Potential Mitigation Measures

Based on the results of the modelling exercise, the following recommendations are provided to control noise from the function room (the recommendations apply equally to either the converted barn or the new-build extension, depending on which is finally selected to house the function room):

- All glazing to function room, including roof lights are to achieve a minimum sound reduction index of 35 dB $R_w + C_{tr.}$ This could be achieved with a glazing configuration of 10/12/6.4 laminated.
- External doors to the function room are to be solid-core wood with minimum mass of 25 kg/m^2 and effectively sealed on all edges. If the door is required to be opened for access and egress during an event, then a lobbied arrangement of doors with the above specification and with automatic closers (at least one door closed at all times) should be provided. Doors should not be provided on any elevation facing a residential dwelling.
- Roof of function room to be either pitched with roofing slates or a flat roof with a minimum 150 mm cavity with minimum 100 mm mineral wool insulation and ceiling consisting of 2 x 12.5 mm Soundbloc plasterboard internally to achieve a minimum overall sound reduction index of 45 dB R_w.
- The external walls are to be either solid masonry or cavity masonry to achieve a minimum overall sound reduction index of 54 dB R_w. In the case of the barn which has an existing solid stone construction, it is recommended that the walls be rendered air tight by removing any existing plaster lining and applying a parge coat of render to the internal surface prior to skimming. Alternatively, the walls may be lined internally with plasterboard on a resilient frame and with mineral wool insulation in the cavity.
- The function room shall be provided with mechanical ventilation to ensure that windows are not opened during an event for ventilation.

If you require clarification on any of the above issues, please do not hesitate to contact me.

Yours sincerely

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