

Environmental Noise Guidelines and Sound Management for UK Concerts

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Introduction

Symonds has monitored and controlled over 500 music events since 1988. The range of events and venues has been vast from the traditional 'pop concerts' held in Stadia or purpose built indoor venues, to festivals held in green field sites, to all night music events 'raves' held in sheds, to canto pop music held in the Hong Kong Stadium to classical concerts held at notable venues such as Kenwood House and Leeds Castle. The sound management for these events has been developed from a common control procedure, however, the precise process has to be tailored for each specific event.

To date, the control procedures have been successful in that no action has been taken through the courts with respect to noise for any of the UK music events where we have implemented a sound management procedure.

History of Guidelines

The first environmental noise guidelines for music events were published by the GLC Code of Practice [1] in 1976. These were based on a comparison of the music L_{A50} with the background noise L_{A50} . For outdoor events, an increase of up to 10dB(A) was allowed up to 2000 hours reducing to 6dB(A) until to 2300 hours. This guideline was applicable for up to three events per year. For more frequent events and for all indoor concerts, a 1dB(A) increase of the L_{A50} was allowed. At night, from 2300 hours to 0700 hours, the Code stated that the sound from the music should not be audible within any premises.

Throughout the 1970's, the use of the L_{Aeq} index to describe disturbance, following dose response studies, was becoming the norm, and with the many improved sound level meters being able to measure L_{Aeq} , the GLC reviewed their work [2] and replaced L_{A50} with L_{Aeq} . The Code was revised in 1978 to reflect this change with a further minor revision in 1985 [3].

Since this time further research [4][5] resulted in the publication of the latest guidance adopting absolute values for up to 3 events per year and a comparison of Music Noise Level (MNL) with the background L_{A90} . This was published in a Code of Practice by the Noise Council in 1995 [6]. The familiar guideline table is reproduced in table 1.

The MNL (L_{Aeq} of music) when assessed at the prediction stage or measured during sound checks or concerts should not exceed the guidelines shown in Table 1 at 1 metre from the façade of any noise sensitive premises for events held between the hours of 0900 and 2300.

TABLE 1 – Noise Council Guidelines

No. days	Venue Category	Guideline
1 to 3	Urban Stadia or Arenas	The MNL not exceed 75dB(A) over a 15 minute

		period
1 to 3	Other Urban and Rural Venues	The MNL not exceed 65dB(A) over a 15 minute period
4 to 12	All Venues	The MNL not exceed the background noise level by more than 15dB(A) over a 15 minute period

The Code also addresses the issue of low frequency noise, and from research at that time [7], a noise level of 80dB at distances exceeding 2km in the 63Hz or 125 Hz was shown to cause complaints of low frequency noise, whereas a level of 70dB in these octave bands was satisfactory. With limited research available this guidance was issued as a note for information.

The guidelines in table 1 are for daytime events. For events held at night, after 2300 hours, the Code specifies an inaudibility criterion, assessed inside a premises with the windows open for ventilation. There was much debate by the Noise Council committee on this issue and with the limited research in this area at that time, this was felt to be the safe option.

Since the publication of this Code, other work [8] has indicated that the inaudibility criterion may be an unnecessarily stringent guideline to apply to one off all night events. An absolute guideline has been successfully adopted [9] restricting one-off all night events to an external L_{Aeq} of 45dB(A).

Feasibility Studies

In the early days, sound management was mainly related to the control of noise during the event. However, over the past decade, concert promoters have been educated on the importance of noise related to the viability of an event. Not dissimilar to the account that has to be taken for noise for Development Planning, noise feasibility studies are now undertaken in many cases to establish the following:-

1. Whether the music event is viable on noise grounds,
2. The likely predicted noise levels inside and outside the venue
3. The need for noise control measures
4. The detail and options for effective noise control
5. To provide details on all noise issues required by the Licensing Authority.

A critical step at the feasibility stage, is to be able to accurately predict the likely noise levels in the community. Clearly, incorrect advice at this stage can have serious consequences on noise at a later date. Symonds has developed a prediction model which is based on the directivity of the sound system, the source level and frequency response of the system for a typical concert

spectrum (it has been found [2] that concerts become an ineffective form of entertainment below audience levels of around 95dB(A) with a high bias towards low frequency). Other issues that are considered, include, the natural acoustics of the venue, the distance attenuation and ground effects from the venue to the community.

Sound Rental Companies

More and more of the sound companies involved with concerts are becoming aware of the importance, where necessary, to provide a sound system that not only delivers the appropriate quality and level of sound to the audience but also contains the sound within the venue as much as possible. The PA companies are experts in their field of providing a sound system that delivers the appropriate quality and level of sound to the audience but there is often a role for the consultant to assist with measures and concepts to contain the sound.

There is inevitably an element of compromise here, but providing sufficient thought is given to the issue well in advance of the concert(s) the simple control of turning down the volume is minimised and some PA companies do actually go to considerable lengths to contain the sound.

The consultant can assist in various ways from actually advising promoters/venue owners, especially in one-off festival situations (as opposed to long tours) on the actual system that would be most appropriate and the PA companies with the greatest experience in containing sound.

The consultant through their experience of witnessing numerous different systems (virtually all the widely used systems) at common venues can advise on a wide range of practical measures to contain sound or minimise disturbance and work with the engineers from the PA companies to arrive at the most feasible solution for a particular situation.

Noise Control During the Event

Experience has shown that events where there has been thorough consultation with all parties involved in an event, including, at an early stage, the local authority, (prior to the event) run the most smoothly during the event. A meeting prior to the event, preferably on site with layout drawings and details of the sound systems to be used, is a useful forum in which to raise concerns anybody may have.

It is also essential to carry out a sound propagation test on the evening before the event in the presence of the local authority. Meteorological conditions may change between such tests and the event, but conducting the pre-event test allows for some adjustments to be made if necessary that may reduce off site noise levels.

On the day of the event, logging sound meters should be set up at the sound mixing positions. It can help to have a sign at the mix position indicating the maximum level to which the sound is to be controlled.

Clear communication between members of the sound control team and the local authority is crucial to a smooth control

operation. Dedicated radios have been found to be the best method for achieving this on site.

It has been found that using $L_{Aeq,1 \text{ minute}}$ periods at the mix positions provides the most satisfactory measure by which to control sound levels on site. All sound level measurements taken both on and off site should be taken in such a manner that may assist future licence applications.

Frequent off site checks need to be made, and during an event it often becomes apparent that propagation is of more concern at particular locations. The balance of off-site monitoring should be adjusted to reflect these changes. If an area is prone to temperature inversions, and this information is often available from the local authority, particular attention must be taken at these times.

Design of Permanent Music Venues

When designing or refurbishing buildings for concert use, it is paramount that acoustic advice is provided at an early stage. Detailed acoustic models need to be developed such that the internal acoustics and environmental noise impact can be evaluated in order to provide the necessary acoustic treatment. Important issues that need to be considered are:-

- Local Reverberation Times with frequency,
- Long delayed reflections,
- Façade sound insulation,
- External noise limits for a given operation plan.

Summary

This paper provides a review of concert guidelines and noise control techniques, which have been successfully adopted in the UK over the past 20 years.

References

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- [2] J.E.T Griffiths, Noise Control Techniques and Guidelines for Open Air Pop Concerts, IOA Autumn Conference, 1985
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- [6] Noise Council, Code of Practice on Environmental Noise Control at Concerts, 1995
- [7] J.E.T Griffiths, J.G Staunton & S. Kamath, A Study of Low Frequency Sound from Pop Concerts, Proc IOA, Vol 15, Part 7, 1993.
- [8] J.E.T Griffiths, D.C Leversedge & R.S Peirce, Noise Guidelines and Control at All Night Music Events, Proc IOA, Vol 19, Part 2, 1997.
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