
Code of Practice on Environmental Noise Control at Concerts

THE NOISE COUNCIL

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1.0 INTRODUCTION

- 1.1 Large music events involving high powered amplification are held in sporting stadia, arenas, open air sites and within lightweight buildings. These events give pleasure to hundreds and in some cases thousands of people. However, the music from these events can cause disturbance to those living in the vicinity. The purpose of this code is to give guidance on how such disturbance or annoyance can be minimised.
- 1.2 This Code of Practice has been prepared by the Noise Council through a Working Party comprising specialists who are experienced in the particular problems that can arise with environmental noise control at concerts and similar music events. A list of members of the working party is shown in Appendix II and a list of technical papers providing some background data and more detailed information is given in Appendix I.
- 1.3 Various guidelines and criteria are described in this document covering a range of events from the single occasional concert to a full season. 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.
- 1.4 This Code is not designed to address the question of environmental noise arising from discotheques, clubs and public houses, nor environmental noise affecting noise sensitive premises which are structurally attached to the venue.

- 1.5 This Code is designed to assist those planning a music event, those responsible for licensing such events and those responsible for enforcing the nuisance provisions of the Environmental Protection Act 1990 (England and Wales) and the Control of Pollution Act 1974 (Scotland). It addresses the environmental problem of noise from the performance and sound checks only. Other environmental impacts of concerts and the question of meeting the requirements of the Noise at Work Regulations 1989 and the guidance given in the Health and Safety Executive's Guide to Health, Safety and Welfare at Pop Concerts and similar events are beyond the scope of this document.
- 1.6 Compliance with this Code of Practice does not of itself confer immunity from legal obligations.
- 1.7 The Noise Council is keen to receive accounts of the practical application of the Code in order to improve and enhance its content.

2.0 DEFINITIONS

Background Noise Level:	The prevailing sound level at a location, measured in terms of the $L_{A90,T}$, on an equivalent day and at an equivalent time when no concert or sound checks are taking place.
dB(A):	The A-weighted sound pressure level whereby various frequency components of sound are weighted (equalised) to reflect the way the human ear responds to different frequencies.
Delay Tower:	An additional set of loudspeakers employed to provide a better spread of sound to the audience.
L_{Aeq} :	The equivalent continuous noise level which at a given location and over a given period of time contains the same A-weighted sound energy as the actual fluctuating noise at the same location over the same period.
$L_{A90,T}$:	The A-weighted sound pressure level exceeded for 90% of the measuring period (T).
Mixer:	The location where the main sound system is controlled. As well as ensuring the correct sound balance between the various performers, the overall level of sound for the audience is controlled at this location.

Music Event: A concert or similar event where live or recorded music is performed by a solo or group of artists before an audience.

Music Noise: The noise from the music and vocals during a concert or sound checks and not affected by other local noise sources.

Music Noise Level (MNL): The L_{Aeq} of the music noise measured at a particular location.

Noise Consultant: A person given responsibility by the organiser of the event for monitoring noise levels in accordance with the prevailing conditions, and who has the ability and authority to make decisions and implement changes in noise level during the event.

Noise Monitoring Position: The location of the microphone within the venue from which the level of sound is monitored and controlled. For outdoor venues, this location tends to be at the mixer.

Noise-sensitive Premises: Includes premises used for residential purposes hospitals or similar institutions, education establishments (when in use), or places of worship (during recognised times and days of worship) or any premises used for any other purposes likely to be affected by the Music Noise.

Other Urban Venue: An urban park or similar area which is not normally used for major organised events.

Rural Venue: A park, open space or grounds of a country house in a rural area not normally used for major organised events.

Sound Engineer: Person employed to control the sound quality of the music for the audience.

Urban Stadia or Arenas: A regular venue for major sporting or similar events in an urban area.

3.0 GUIDELINES

- 3.1 The Music Noise Levels (MNL) 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

Concert days per calendar year, per venue	Venue Category	Guideline
1 to 3	Urban Stadia or Arenas	The MNL should not exceed 75dB(A) over a 15 minute period
1 to 3	Other Urban and Rural Venues	The MNL should not exceed 65dB(A) over a 15 minute period
4 to 12	All Venues	The MNL should not exceed the background noise level ¹ by more than 15dB(A) over a 15 minute period

Notes to Table 1

1. 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.
2. There are many other issues which affect the acceptability of proposed concerts. This code is designed to address the environmental noise issue alone.
3. In locations where individuals may be affected by more than one venue, the impact of all the events should be considered.
4. For those venues where more than three events per calendar year are expected, the frequency and scheduling of the events will affect the level of disturbance. In particular, additional disturbance can arise if events occur on more than three consecutive days without a reduction in the permitted MNL.
5. For indoor venues used for up to about 30 events per calendar year an MNL not exceeding the background noise by more than 5dB(A) over a fifteen minute period is recommended for events finishing no later than 2300 hours.

6. Account should be taken of the noise impact of other events at a venue. It may be appropriate to reduce the permitted noise from a concert if the other events are noisy.
7. For venues where just one event has been held on one day in any one year, it has been found possible to adopt a higher limit value without causing an unacceptable level of disturbance.

3.2 For events continuing or held between the hours 2300 and 0900 the music noise should not be audible within noise-sensitive premises with windows open in a typical manner for ventilation.

Notes to Guideline 3.2

1. The use of inaudibility as a guideline is not universally accepted as an appropriate method of control. References 6 & 7 (Appendix 1) set out the various issues. This guideline is proposed as there is insufficient evidence available to give more precise guidance.
2. 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.

3.3 The nature of music events means that these guidelines are best used in the setting of limits prior to the event (see 4.0).

3.4 Assessment of noise in terms of dB(A) is very convenient but it can underestimate the intrusiveness of low frequency noise. Furthermore, low frequency noise can be very noticeable indoors. Thus, even if the dB(A) guideline is being met, unreasonable disturbance may be occurring because of the low frequency noise. With certain types of events, therefore, it may be necessary to set an additional criterion in terms of low frequency noise, or apply additional control conditions.

Notes to Guideline 3.4

1. It has been found that it is the frequency imbalance which causes disturbance. Consequently there is less of a problem from the low frequency content of the music noise near to an open air venue than further away.

2. Although no precise guidance is available the following may be found helpful (Ref 8):
A level up to 70dB in either of the 63Hz or 125Hz octave frequency band is satisfactory; a level of 80dB or more in either of those octave frequency bands causes significant disturbance.

- 3.5 Complaints may occur simply because people some distance from the event can hear it and that, consequently, they feel the music must be loud even though the guidelines are being met. In fact topographical and climatic conditions can be such that the MNL is lower at locations nearer to the venue.
- 3.6 Although care has been taken to make these guidelines compatible with what occurs at existing venues, this may not be the case at every location. Where arrangements are satisfactory with either higher or lower noise levels than those contained in the guidelines, these limits should continue.
- 3.7 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.
- 3.8 The music noise level should be measured using an integrating-averaging sound level meter complying with type 2 or better of BS6698. The background noise level should be measured using a sound level meter complying with type 2 or better of BS5969. Time weighting F (fast response) should be used.
- 3.9 When measuring L_{Aeq} in order to determine the music noise level, care must be taken to avoid local noise sources influencing the result. When the local noise is intermittent, a series of short term L_{Aeq} measurements should be made of the music noise while the local source is absent or has subsided to typically low or mean minimum values. An average of these short term

readings will give an estimate of the music noise level. A further option would be to measure the A-weighted sound pressure level on a sound level meter complying with type 2 or better of BS5969 with the time weighting set to S (slow response) when the music is loudest and not influenced by local noise. If the local source is continuous, make a measurement of the L_{Aeq} of the local source when the music is not occurring, and make a correction to the measured L_{Aeq} when the music is occurring to obtain an estimate of the music noise level.

- 3.10 The nature of many concerts requires the sound volume level to be increased during the event to enhance the performance. The prevailing noise control restrictions should be borne in mind so that the sound volume at the start of the event is not too high, hence allowing scope for an increase during the event.
- 3.11 Some concerts are accompanied by associated activities (e.g. fairgrounds) which can be noisy. These should be taken into account when setting the limit for the music noise level.
- 3.12 When monitoring the music noise level, the sound of the audience applause can be a significant contributor. It is not possible to address this issue precisely; instead it is recommended that any such effect be noted.

4.0 RECOMMENDED NOISE CONTROL PROCEDURE

- 4.1 This procedure has been developed over several years and found to provide an effective means of addressing the problem of environmental noise control at events. The main features of the procedure are set out below and references are made to various technical papers which give more details.

Planning

- 4.2 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.
- 4.3 Check the viability of the event against the relevant guideline levels. This is achieved by determining from 4.2 above the sound level experienced by the audience which would allow the guidelines to be met. Research shows that the music noise level in the audience by the mixer position at pop concerts is typically 100dB(A), and that levels below 95dB(A) will be unlikely to provide satisfactory entertainment for the audience.
- 4.4 Prospective licensees should give the local authority as much notice as possible of the proposed event especially if more than one event is planned during a calendar year.

- 4.5 The local authority should make use of licensing conditions and statutory powers to implement the procedures described in this Code of Practice. Examples of possible conditions are given in Appendix III.

- 4.6 The Noise Consultant should be appointed.

Before the Event

- 4.7 Install the loudspeaker system early enough to enable alignment and orientation to be optimised to minimise noise disturbance.
- 4.8 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. This effectively calibrates the system, taking into account as far as possible prevailing weather conditions, and, for indoor events, the sound insulation of the venue.

Notes to Guideline 4.8

1. It should be remembered that the introduction of an audience to a venue increases the acoustic absorption present. This has the effect of reducing the sound level in the venue for a given amplifier setting compared with the sound test. This should be borne in mind when setting the limit levels.

During the Event

- 4.9 Advertise and operate an attended complaint telephone number through which noise complaints can be channelled. This will enable an immediate response to the complaints to be given and the Noise Consultant to judge whether or not any adjustment to the music noise level is needed.
- 4.10 Establish a communication network between all those involved in noise

control. This should include the local police authority.

Note to Guideline 4.10

1. It is difficult to communicate effectively in noisy environments, especially in the vicinity of the mixer. It has been found helpful for those involved in the communication network to use head-sets with their two way radio systems.

4.11 Carry out noise monitoring within the venue at the noise monitoring position and at sample locations outside the venue throughout the event. If the event is employing one or more delay towers, additional noise monitoring may be needed inside the venue to control the sound output from them.

4.12 Although the limit value set at 4.8 above would be in terms of 15 minute L_{Aeq} , useful control can be exercised by monitoring the L_{Aeq} over one minute periods. This enables an early warning to be obtained of possible breaches in the 15 minute limit. It is sometimes appropriate to set an additional control limit in terms of the one minute L_{Aeq} (typically some 2-3dB(A) above the 15 minute value) and to use a level recorder display to assist the sound engineer in checking compliance with the limit. The Noise Consultant should advise the sound engineer of any breaches in the prescribed noise limit, to enable a reduction in level as appropriate. The sound engineer should also be advised of occasions when the limit has only just been met.

APPENDIX I

References

1. Noise Control Techniques and Guidelines for Open Air Concerts, J.E.T. Griffiths (ProcIOA, Vol. 7, Part 3, 1985).
2. A Noise Control Procedure for Open Air Pop Concerts, J.E.T. Griffiths, S.W. Turner and A.D. Wallis (ProcIOA, Vol 8, Part 4, 1986).
3. Noise Control in the Built Environment, edited by John Roberts and Diane Fairhall, Gower Technical, 1988 (Chapters 1, 2 and 3).
4. Environmental Noise Guidelines proposed for the new Health & Safety Executive Guide for Pop Concerts, J.E.T. Griffiths and A. Dove (ProcIOA, Vol 14, Part 5, 1992).
5. A Survey of Sound Levels at Pop Concerts, J.E.T. Griffiths (HSE Contract Research Report No 35/1991).
6. Inaudibility - an Established Criterion, A.W.M. Somerville (ProcIOA, Vol 13, Part 8, 1991).
7. Noise Control at All-night Acid House Raves, K. Dibble (ProcIOA, Vol 13, Part 8, 1991).
8. A study of Low Frequency Sound from Pop Concerts, J.E.T. Griffiths, J. Staunton and S. Kamath (ProcIOA, Vol 15, Part 7, 1993)

APPENDIX II

Noise Council Working Party Membership

S.W. Turner*	Technical Director, TBV Science
A. Somerville*	Department of Environmental Health, City of Edinburgh District Council
A.D. Wallis*	Cirrus Research Limited
J. Bickerdike	Leeds Polytechnic
K. Dibble	Ken Dibble Acoustics
J.E.T. Griffiths	Director, Travers Morgan Environment
S.S. Kamath	Director, Pollution & Scientific, London Borough of Brent.
J. Sargent	Building Research Establishment
J. Staunton	Associate, Travers Morgan Environment

* Full members of the Noise Council

APPENDIX III

Sample Conditions Concerning Environmental Noise Control at Concerts

- 1.0 The licensee shall appoint a suitably qualified and experienced noise control consultant⁺, to the approval of the Licensing Authority, no later than..... weeks prior to the event. The noise control consultant⁺ shall liaise between all parties including the Licensee, Promoter, sound system supplier, sound engineer and the licensing authority etc. on all matters relating to noise control prior to and during the event.
- 2.0 If not already carried out, the noise control consultant⁺ shall carry out a survey to determine the background noise levels (as defined by the Code of Practice on Environmental Noise Control at Concerts) at..... locations around the venue representative of the noise sensitive premises likely to experience the largest increase in noise/highest noise level* as a result of the concert. The information obtained from this survey shall be made available to the licensing authority..... weeks prior to the event.
- 3.0 A noise propagation test shall be undertaken at least..... hours prior to the start of the event in order to set appropriate control limits at the sound mixer position. The sound system shall be configured and operated in a similar manner as intended for the event. The sound source used for the test shall be similar in character to the music likely to be produced during the event.

- 4.0 The control limits set at the mixer position shall be adequate to ensure that Music Noise Level (MNL) shall not at any noise sensitive premises exceed.....dB(A) over a 15 minute period/the background noise level by more thandB(A) over a 15 minute period* throughout the duration of the concert.
- 5.0 The control limits set at the mixer position shall be adequate to ensure that the MNL shall not at any noise sensitive premises exceed.....dB(A) over a 15 minute period/the background noise level by more thandB(A) over a 15 minute period* throughout any rehearsal or sound check for the event.
- 6.0 The Licensee shall ensure that the promoter, sound system supplier and all individual sound engineers are informed of the sound control limits and that any instructions from the noise control consultant⁺ regarding noise levels shall be implemented.
- 7.0 The appointed noise control consultant⁺ shall continually monitor noise levels at the sound mixer position and advise the sound engineer accordingly to ensure that the noise limits are not exceeded. The Licensing Authority shall have access to the results of the noise monitoring at any time.
- 8.0 Rehearsals and sound checks are permitted only between the following hours:
.....hrs to.....hrs.

9.0 Music from the event is permitted only between the following hours:
.....hrs to.....hrs.

Note: Suitable noise conditions should also be considered with respect to minimising noise exposure to the audience and people working at the event as advised in the HSE document "Guide to Health, Safety and Welfare at Pop Concerts and Similar Events".

*delete as appropriate.

*i.e. the Noise Consultant

THE NOISE COUNCIL

The Noise Council was established by a group of professional bodies concerned with problems relating to noise and vibration in the community and industrial environments. Its aims and objectives are to promote and respond to issues relating to noise and vibration, and to make independent technical and scientific expertise available to international and national agencies, central and local government, commerce and industry.

The Founding Bodies are:

- The Chartered Institute of Environmental Health
- The Institute of Acoustics
- The Royal Environmental Health Institute of Scotland
- The Institute of Occupational Safety & Health

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