

CLAY TARGET SHOOTING

GUIDANCE ON THE CONTROL OF NOISE



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PREFACE

This guidance has been produced by the Chartered Institute of Environmental Health (CIEH) having commissioned the services of the Building Research Establishment Ltd (BRE) to provide editing support and the methodology of measurement. It describes how noise from clay target shooting can occur and provides advice on methods to minimise or prevent annoyance and intrusion. The guidance includes details of a recommended method for the measurement and subsequent assessment of clay target shooting noise produced by BRE and derived from research sponsored by the Department of the Environment (DOE), now the Department for Environment, Food and Rural Affairs (DEFRA).

FOREWORD

The management of the environmental impact of leisure activities is of growing importance, especially in rural areas. Positive actions are required if sustainable development of the countryside is to be achieved. During 1993, in response to growing complaints about noise from clay target shooting, the DOE reviewed the planning legislation applicable to such activities. Subsequently, it decided not to recommend changes but instead encouraged interested parties to develop a voluntary code of practice to control noise. More recently the Office of the Deputy Prime Minister (formerly the DTLR) having undertaken a “consultation on possible changes to the Use Classes Order and temporary uses provisions”, has announced no change in those provisions citing existing legislative provision being adequate to deal with problems that arise.

The environmental impact of leisure activities was also examined by the Environment Committee of the House of Commons during the 1994/95 parliamentary session. The Committee felt that the ability of people to enjoy all forms of leisure appropriate to the countryside should not be constrained unless there were pressing reasons for restricting particular activities. It commented that the planning system had an important role to play in minimising any adverse impacts, but acknowledged that the system was not in itself able to counter all pressures which might arise. The Committee felt that the planning system should provide a more positive approach to dealing with difficult activities by encouraging good management practice.

It was against this background that a consultation draft of this document was launched in November 1997. Comments on the consultation draft, and the findings of the BRE research, have been taken into account during the prolonged preparation of this revised guidance note; it now updates and supercedes that consultation draft.

The CIEH, representing the regulators, with technical support from BRE, has produced this guidance in order to help enforcement officers and other interested parties resolve the conflicts that often arise between shoot operators and their neighbours. It is intended that it should provide a basis for discussion and negotiation between all parties on measures that can be taken to control noise from clay target shooting.

The CIEH advocates consultation and discussion with all parties in relation to the control of noise and we believe that this document provides a strong basis for good local decisions to be reached.

Graham Jukes
Chief Executive
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January 2003

1. INTRODUCTION

This guidance is intended to be used by those with a regulatory interest in controlling noise from clay target shooting activities principally local authorities. It may also be helpful to clay target shoot operators, owners, managers, those wishing to organise *ad hoc* events and to those with other interests in the sport whether in a professional or recreational capacity.

Two forms of shooting ground or site are typically encountered, namely:

- i) those operating regularly by virtue of an express planning permission or established use.
- ii) those operating less frequently under the provisions of the Town and Country Planning (General Permitted Development) Order 1995, which, subject to certain constraints, currently permits up to 28 days usage per annum of given land without the need for an application to the Planning Authority. This may include locations used for “one-off” isolated events, such as may be organised for charity purposes.

The general principles expressed in this guidance will be of relevance at all forms of clay target shooting sites. Whilst following this guidance cannot confer immunity from legal proceedings, compliance may be helpful in demonstrating that the best practicable means has been applied in order to control noise from the activity. The guidance should help in striking an appropriate balance between the rights of those who wish to pursue leisure and sporting interests and the rights of those who seek the peaceful enjoyment of neighbouring land.

This guidance is divided into seven sections with eight appendices. It is intended to be of assistance, for example, in assessing the ways in which the management and pattern of use of a clay target shooting site may be adapted to minimise or prevent intrusive noise. Alternatively, where a new shooting location is being considered, the guidance can be used to determine what practical noise control measures should be applied. Further, it includes a standardised methodology for the measurement of noise from clay target shooting and suggested criteria that will assist with the assessment of the impact of clay target shooting noise at dwellings.

1.1 *Limitation in scope*

The scope of this guidance is limited to clay target (pigeon) shoots. It should not be taken as having any application to other outdoor shooting events or other gun club activities.

Most of the guidance is provided in a general way. This is because local circumstances differ and consequently more or less restrictive controls may be appropriate in certain cases. In particular, where a shooting ground or site has been used for several years without giving rise to complaints, there may be no need for changes. Where specific criteria (e.g. distances, times or noise levels) are given these have been derived from experience and are not intended as precise rules to be routinely applied to every shooting ground or site.

The guidance does not deal with safety issues in detail nor is it intended that it should override any restrictions or requirements that may be imposed under any statutory provisions.

2. PLANNING AND NUISANCE LEGISLATION

In general terms, local authorities have powers and duties that control the use and development of land, or activities, which may be in conflict with other users or which may create a nuisance.

The Town and Country Planning Act 1990, the Town and Country Planning (General Permitted Development) Order 1995, and the Environmental Protection Act 1990 are applicable to clay target shooting and are referred to below.

The general provisions of the Health and Safety At Work etc. Act 1974 are also relevant in relation to the duties and obligations of site operators, owners and users in respect of ensuring the health, safety and welfare of the general public as well as employees and those entering upon shooting grounds.

2.1 *Planning control*

Planning control is primarily concerned with the type and location of new development and with changes of use or the intensification of use of land. The Town and County Planning Act 1990 defines “development” as being “the carrying out of building, engineering, mining or other operations in, on, over or under land or the making of any material change in the use of any building or other land.”

Locally prepared Development Plans provide the main guidance to local authorities in making planning decisions and as such they provide the principal means of reconciling conflicts between development and the protection of the local environment. Development Plan proposals must be subject to a suitable and sufficient environmental appraisal, defined in Planning Policy Guidance Note 12 (PPG12 - DETR) as “the process of identifying, quantifying, weighing-up and reporting on the environmental and other costs and benefits of the measures which are proposed.”. Advice on development which may have a noise impact is contained in Planning Policy Guidance Note 24 (PPG24 - DETR).

Currently, clay target shooting may occur on land without the need for express planning permission. The Town and Country Planning (General Permitted Development) Order 1995 allows the activities set out in the table below to take place at up to the specified number of days during any calendar year without formal consent:

Activity	In SSSIs	Elsewhere
Markets	14 days	14 days
Motor sports	Nil	14 days
<i>Clay target shooting</i>	<i>Nil</i>	<i>28 days</i>
War games	Nil	28 days
All others (including helicopters)	28 days	28 days

Permitted temporary use of land – the ‘28 day rule’

A local planning authority can make a direction under Article 4 of the Town and Country Planning (General Permitted Development) Order 1995 withdrawing permitted development rights and requiring a planning application, however Appendix D of Circular 9/95 advises that such rights should be withdrawn only in exceptional circumstances. The circular explains that such action will rarely be justified unless there is reliable evidence to suggest that development is likely to take place which could damage an interest of acknowledged importance and which should therefore be brought within full planning control in the public interest. Any application for planning permission made necessary because of a direction under Article 4 must be considered on its merits in the normal way.

Clay target shooting sites that require planning permission may have quantitative limits on noise emission applied in the form of attached conditions. Planning conditions may also include, for example, restrictions on days and times of use, and may prevent any alterations to the structure, layout and orientation of shooting stands, screens etc. on the site without the prior consent of the planning authority. The guidance in this document may assist with drafting suitable planning conditions.

Irrespective of whether a clay target shooting site has full planning consent or is operating under the '28 day rule' it is possible that any new and permanent works, such as the erection of stands or noise barriers, will require planning permission.

2.2 *Statutory nuisance*

The Environmental Protection Act 1990 is the principal Act under which noise control will be applied to a shoot. Part III of the Act provides the legal basis for the prevention of the occurrence or recurrence of a statutory noise nuisance by a local authority or by a private individual.

If, in the opinion of the authority, a statutory nuisance exists from the operation of the shoot, the Act requires that a statutory notice be served upon the person responsible. The notice may constrain the operation of the shoot so that a noise nuisance no longer exists. Failure to comply with the requirements of such a notice is a criminal offence and upon conviction individuals are liable to a maximum fine of £5,000. If the shoot is operated as a business, then a maximum fine of £20,000 can be levied though defence of using the 'best practicable means' may be available.

More detailed information on the Environmental Protection Act and the concept of nuisance is provided in Appendix 1 and Appendix 2.

3. CLAY TARGET SHOOTING

3.1 Introduction to the sport

Clay target shooting is the sport of shooting at flying targets, known as clay pigeons or clay targets, with a shotgun. The terminology commonly used by shooters often relates to times past, when live pigeon competitions were held. Although such competitions were made illegal in 1921, a target is still called a 'bird', a hit is referred to as a 'kill' and the machine which projects the targets is known as a 'trap'.

Clay target shooting is currently enjoyed by a wide cross-section of the community as a leisure pursuit. It is also a governed and regulated competitive sport. The sport has grown quickly in recent years, under encouragement by the government for rural communities and farmers to diversify. Noise from the sport can cause disturbance and annoyance to others, even at a considerable distance from where shoots take place.

3.2 Types of shoot

In addressing the management of noise from clay target shooting it is essential to have an understanding of the different ways in which the sport may be practised. Different configurations of the sport may create their own problems on a site or require specific remedies.

Clay target shooting has at least 20 different forms of regulated competition called disciplines. These disciplines can be roughly categorised in three main groups: Trap, Skeet and Sporting. Some of the more common clay target shooting disciplines are Down the Line (DTL), English Skeet and English Sporting.

Some of these clay target shooting groups and disciplines are described in more detail in Appendix 3.

3.3 Basic site requirements

As the sport grows in popularity, so the demand for sites and facilities increases. Due to the nature of the sport, clay target shooting sites tend to be located in fairly remote rural areas. The main issues to consider when deciding upon a suitable location are the safety of the public and the potential disturbance from noise.

There will be different requirements for facilities and infrastructure at permanent shoots, temporary sites and special events. However, whatever the nature of the shoot it is essential to consider the effect the activity may have on occupiers of adjacent land.

The minimum area required for a new clay target shooting site is between 2 and 4 hectares (about 5 to 10 acres) with a minimum safety zone of 275 metres (300 yds) in front of the shooting stands in the general direction in which shooting takes place. Within this safety zone there must not be any places to which the public has access such as public highways, footpaths and bridleways, etc. Shooting close to overhead electrical and telecommunication cables must also be avoided.

As a general rule, where there are no other constraints, site operators will prefer shooting to be oriented towards the North to avoid interference from the sun.

The Trap and Skeet disciplines require an area of level ground with clear and unobtrusive backgrounds of uniform nature. The Sporting disciplines are best suited to wooded and undulating terrain and attractive natural features are always desirable, especially water, trees, hills etc.

Typical site facilities may include a shelter and refreshments area (e.g. clubhouse/marquee, etc), toilets, good access for motor vehicles to the site and adequate car parking facilities.

3.4 *Types of clay targets*

The targets used for the sport are usually in the shape of an inverted saucer made from a mixture of pitch and chalk designed to withstand being thrown from traps at very high speeds but at the same time being easily broken when hit by just a few very small lead alloy pellets shot from a gun.

There are several types of targets which are used for the various disciplines. However, only the standard 110mm target is used in all of the trap and skeet disciplines. Sporting shoots feature the full range of targets (except ZZ) to provide the variety which is the hallmark of the discipline.

The main types of clay targets are described in the figure below.

<p>STANDARD: The most commonly used target of all, must be 110 (\pm 1) mm overall diameter and 25- 26 mm in thickness.</p> <p>MIDI: Same saucer shape as the standard but with a diameter of only 90mm.</p> <p>MINI: As its name indicates, this is like a flying "Aspirin" at only 60mm in diameter and 20mm in thickness.</p> <p>BATTUE: A very thin, flat, wafer of a target of about 100mm diameter which flies very fast and falls off very suddenly.</p> <p>RABBIT: A standard sized (but thicker) flat target in the shape of a wheel designed to run fast along the ground.</p> <p>ZZ (HELICE): This is a plastic, standard sized target attached to the centre of a 2-blade propeller of different colour designed to zig-zag in flight in a totally unpredictable manner.</p>

Types of clay targets

3.5 *Traps*

These are purpose made, spring loaded devices specially designed to launch the different types of targets through distances of up to 100 metres. They vary from the very simple, hand cocked, hand loaded and hand released types to the highly sophisticated, fully automatic variety which can hold up to 400 targets in their own magazine and are electrically operated and released by remote control, either by the pressing of a button or by an acoustic system activated by the shooter's voice. Target speeds and trajectories can be easily modified and varied to suit the discipline or type of shooting required.

3.6 *Guns*

A shotgun, as defined by law, is a smooth barrelled gun, not being an airgun, with a barrel length of 24 inches or more and not exceeding 2 inches in diameter. For formalised clay target events, the maximum permitted bore of shotguns is 12, equivalent to 0.729 inches (18.5 mm). Barrel lengths vary from 26 to 32 inches.

Any type of gun of up to 12 gauge is capable of being used to shoot clay targets but there are three main types of shotgun which are suitable for clay shooting as described below.

3.6.1 Over-Under

By far the most popular used by regular participants in the sport, this gun has its two barrels one above the other, usually with just a single trigger which can be selected to fire either barrel first. Within this type there are three sub-groups of specification i.e. trap, skeet and sporting. Trap guns are generally heavier and longer barrelled (normally 30" or 32") designed to shoot slightly above the point of aim. Skeet guns are usually lighter and faster handling with barrel length from 26" to 28", while Sporting models most often come with barrel lengths of 28", 30" and 32", according to preference.

3.6.2 Semi-Automatic

This is a single barrelled gun capable of firing several rounds in quick succession, but which requires the shooter to press the trigger for each shot. The current shotgun law requires these guns to be limited to a maximum capacity of 3 cartridges. Due to their firing mechanism they are fairly easy to handle and their low recoil makes them particularly popular.

3.6.3 Side-by-Side

The original and traditional game shooting gun, with its barrels placed alongside each other in a horizontal plane, is generally a lighter gun with double triggers. Few side-by-sides are used for clay target-shooting.

3.7 Cartridges

One of the many roles that the governing bodies have to fulfil is the setting of technical rules for the conduct of competitions in the various disciplines under their jurisdiction. These include, amongst many others, defining the technical specifications of the cartridges to be used. Cartridges may have differing specifications based on target range, speed and breakability of target.

4. USING SITE LOCATION TO MINIMISE NOISE IMPACT

In order completely to avoid any likelihood of noise annoyance it will be necessary to locate the shoot so that the sound of gun fire, and any other sound associated with the shoot, is inaudible at all noise sensitive premises. Owing to the nature of the sound involved, however, the chances of finding such a location are remote.

The decision on where to locate a shoot will probably be the most important decision taken and therefore should include careful consideration of all the factors involved in order to minimise noise impact. A number of physical factors, including minimum separation distances, local topography, source directionality and the location of any noise sensitive premises should shape this decision. These factors are discussed in this section.

In addition to the physical factors, other factors such as permanency, frequency of use, intensity of use and whether the site is a new site or an existing site will have a bearing on the noise impact of the shoot. These factors are discussed in Section 5.

4.1 Minimum safety zone

Shoot organisers should have a large scale plan (1:10,000) showing the location of all shooting stands and all known public highways, footpaths, bridleways, waterways and other public rights of way in the vicinity. Further advice on the location of public rights of way can normally be obtained from the local authority department (which may be part of the district or county council) responsible for their maintenance and protection.

Organisers should note that the public have a right to use such highways, footpaths, bridleways and waterways unfettered and must ensure the safety of users and must avoid any likelihood of falling shot or clays becoming a danger to the public.

No shooting should take place in the direction of any public right of way (or any building with public access) that is within 275 metres (300 yards) of the shooting position.

In order to warn members of the general public that some shooting noise may be experienced, all footpaths, bridleways, waterways and all other areas or buildings where the public may have access within 1 kilometre radius of the shoot are recommended to have prominent signs displayed by the organisers indicating the existence of the shoot.

4.2 Noise buffer zone

As mentioned above, a minimum safety zone of 275 metres in the general direction of shooting should always be provided for safety reasons. However, a much larger buffer zone will be required to protect noise sensitive premises and other noise sensitive areas.

The size of noise buffer zone required will depend on local circumstances and on the level of shooting noise transmitted to noise sensitive areas. The advice given below is based on experience and is intended to offer practical guidance on the typical size of a noise buffer zone, rather than precise enforceable distances.

Where shooting takes place on mainly flat open land in the absence of significant sound reflecting media (e.g. rock faces, major roadways, woodland areas, substantial pools or lakes, large buildings), a noise buffer zone of at least 1.5 kilometres in the general direction of shooting and not less than 1 kilometre in the rearward arc is advisable. Preferably there should be no line of sight between the noise source and any noise sensitive areas. Where substantial topographical features interrupt the line of sight, reduced separation distances may be acceptable. Shooting should nevertheless not normally take place with separation distances of less than 1 kilometre in the direction of shooting except under very exceptional circumstances which have been fully discussed and agreed with the local authority and any affected residents.

It should also be noted that, under normal circumstances, as the noise buffer zone decreases in size, so the frequency and duration of events may also need to be decreased.

4.3 Topography

Topographical features such as hills, embankments, cuttings and depressions can, on occasion, afford substantial protection against noise due to the physical screening effect they offer and the interruption of line of sight between the noise source and noise sensitive premises. Therefore, where such topographical features are present the siting and orientation of a shooting ground should seek to take advantage of them. Care needs to be taken, however, to ensure that a topographical feature does not worsen the situation. For example, the sound of gunfire can be reflected off acoustically hard surfaces such as rock faces, sides of valleys, lakes, ponds, disused buildings etc., thus increasing noise levels or causing echoes which appear to increase the number of shots being fired. In these circumstances an improvement in the situation may be obtained by shooting away from such topographical features.

Useful sound attenuation can be obtained where shooting takes place below normal ground levels, for example by utilising quarries. However, in such circumstances particular attention will need to be given to the internal features of the quarry to ensure that acoustic echoes are not produced.

When shooting is to take place in the proximity of prominent hills or valleys, an individual assessment of likely sound propagation will normally be required. In these circumstances early discussion with an acoustic consultant is recommended.

4.4 Directionality

The propagation of sound from a shotgun is directional with the noise “footprint” around a firing point being roughly pear shaped - noise levels in the direction of shooting being much greater than noise levels at the same distance to the sides and rear. Shooting high into the air will also cause a wide dispersion of sound. The propagation of sound from a shotgun is a complex process and simple noise predictions (e.g. based on the inverse square law) can produce erroneous results.

Since the propagation of sound from a shotgun is directional, the general shooting orientation should normally be away from the location of noise sensitive premises. This consideration may have to override any preferred orientation to avoid shooting into the sun. Shooting organisers should use careful selection of shooting positions and orientation in order to minimise impact on noise sensitive premises.

4.5 Noise sensitive premises and other noise sensitive locations

Noise sensitive premises typically include residential properties, churches, offices, hospitals, nursing homes, schools, and colleges. The proximity of such noise sensitive premises and any other noise sensitive areas should always be a prime concern when considering suitable site locations.

In addition, farm buildings, particularly those housing young animals, may also be considered to be noise sensitive premises in some situations. The sound of gunfire may be distressing to wild and domestic animals during certain periods (e.g. mares in foal, ewes at lambing). Alternative views have been expressed about whether or not wild birds and animals adjust to the sound of gunfire.

Given the potential sensitivity of wild and domestic animals and birds at sites adjacent to or included within shoot areas, it is advisable that shoot organisers or their representatives discuss with the owner(s) of surrounding land and with wildlife preservation bodies or nature conservation officials the particular times when animals are likely to be unusually sensitive, and arrange for a temporary suspension or reduction in activities as necessary.

4.6 Prevailing weather conditions

Wherever possible, prevailing local atmospheric conditions should be taken into account when determining shoot location and orientation. This is because atmospheric conditions have a major influence on sound propagation and, under certain conditions, can significantly increase distances over which sound are audible.

Prevailing winds in the direction of noise sensitive areas should be an important consideration and certain sites may need to have special restrictions applied for certain wind directions and strengths. If other circumstances permit, it would be advisable to arrange for the general shooting direction to be orientated towards the prevailing wind as this will reduce the total distances over which sound travels.

4.7 Presence of tree belts.

In general trees offer little sound attenuation unless the tree belts are sufficiently deep as to give some sound reduction due to the distance involved. Trees can also be responsible for undesirable echoes and sound scattering effects. If it is felt, in a particular location, that a deep dense belt of trees may offer attenuation, this will require a thorough evaluation over varying weather conditions before final decisions are made and any conditions set.

5. USING SITE MANAGEMENT TO MINIMISE NOISE IMPACT

Good site management can go a long way to alleviating complaints or, better, preventing them from arising in the first place. Shoot organisers are strongly advised to consult with the relevant local authority departments (particularly Environmental Health and Planning departments) before setting up a new shoot and when making changes to an existing shoot. Adjacent local authorities should liaise effectively with one another where there is a possibility that the noise may impact across administrative boundaries.

The following paragraphs give examples of ways of using site management to minimise the impact of noise from clay target shooting.

5.1 *Site information sheet*

Basic information about the operation of the site should be contained in a written document. The document should be made available to the local authority, police and local residents so that if complaints are made or, if it is necessary for the authorities to visit the site, it is clear who they need to speak to in order to deal with issues raised. A copy of the document should always be available on site. An example site information sheet suitable for this purpose is included at Appendix 4.

5.2 *Liaison with local residents*

It is extremely important that shoot organisers maintain a positive relationship with their immediate neighbours, both landowners and local residents. Many complaints can be avoided simply by keeping neighbours informed of activities on the site. It is also important that having informed residents of plans, they are not changed without good reason. In particular, residents should always be advised as soon as possible, and at least 28 days in advance, of any planned major event.

It is also advisable, where appropriate, that the Clerk of the Parish Council is briefed since residents who want to find out information, particularly in rural communities, are likely to approach the Clerk in the first instance.

5.3 *Restriction in times of operation*

A restriction in the times of operation of the shoot is a particularly useful control over the noise impact. However, any such restrictions must be justifiable and must take into account the likelihood of excessive noise at noise sensitive premises. It is difficult to give guidance that is applicable to all situations as restrictions may need to vary depending, for example, on the season and upon the frequency and duration of use as well as the level and potential effect of the noise. A restriction in times of operation should always be applied in the light of local circumstances and following consultation between the local authority, the shoot operator and affected persons.

If the shoot is located where there are no noise sensitive premises within approximately 2 kilometres and/or complaints have not been received about a site and are not anticipated, then constraints on shooting times are unnecessary. There may however be ancillary noisy activities connected with the shoot, for example noise associated with motor vehicle access

which may affect noise sensitive premises and which may require separate restrictions even though the shooting noise itself may not cause a problem.

Where justified complaints of noise have been received or are anticipated by the local authority, or where noise levels are measured or predicted to exceed the levels given in Section 6 of this guidance, then restricting shooting to the following times may provide a suitable remedy:

- (i) Mondays to Fridays: 09.00 to 18.00 with a maximum cumulative duration of 4 hours
- (ii) Saturdays: 10.00 to 18.00 with a maximum cumulative duration of 3 hours
- (iii) Sundays: 10.00 to 14.00 with a maximum cumulative duration of 3 hours

On those sites where shooting occurs on more than 28 days within any calendar year it may, in some circumstances, be appropriate to further restrict the times of operation and/or the number of days per week and/or weeks per year that shooting may take place.

Restrictions may also need to be applied on Christmas day, Remembrance Sunday and Bank Holidays, or for other religious or special public days of significance to the community surrounding the shoot.

In order to protect noise sensitive areas it is recommended that any 'major event' should not be staged more frequently than once in any 28 day period. A 'major event' might be a regional, national or international competition, or any other event which might attract in excess of 50% more participants than would normally use the shoot. In such cases, notification to surrounding occupiers of land and to the local authority should be regarded as essential and additional measures to reduce the impact on noise sensitive premises should normally be taken.

5.4 Number of shooting stands.

The number of shooting stands in use at any one time may be a significant factor in the overall shooting noise levels. Restrictions on the number of shooting stands in use at any one time may be necessary to reduce noise impact. Each shoot will need to be individually assessed and stand numbers discussed between the shoot operators and local authority.

5.5 Number of entrants.

Restrictions on the maximum number of entrants or the maximum number of rounds of 25 for each entrant at an event may also be useful in reducing the noise impact. Each shoot will need to be individually assessed and the number of entrants discussed between the shoot operators and local authority.

5.6 Use of low noise cartridges.

Shotgun cartridges available in gunshops are used for clay target shooting. Certain limitations as to the shot size and the weight of the shot load are enforced by the sports controlling bodies for use in events. Different types of cartridge may produce a different noise footprint and restrictions to specific cartridge type may be of use in the control of noise from the shoot. Subsonic 'lower noise' cartridges with observed feet per second velocity of

850 - 1000 are less noisy in the direction of fire than 'game' or 'clay' cartridges. However, competitive shoots does not use subsonic cartridges.

5.7 *Use of noise barriers.*

On permanent grounds and sites where problems of noise intrusion are experienced, the provision of purpose built noise barriers to redirect, absorb and screen sound may offer a solution. The effectiveness of a barrier will depend upon its length, height, construction mass, sound absorption properties and position relative to the noise source and receptor. When considering the use of a noise barrier, the following general principles apply:

- a) Locate barriers as close to the noise source as is possible
- b) Barrier structures should have an acoustically "soft" finish (e.g. soil, sand, straw baling, proprietary sound absorption products) on surfaces facing the noise source.
- c) The effective height of barriers can be enhanced, for the Sporting disciplines, if the shooting position is located in a trench or dugout whereby gun muzzles project only slightly above ground level.
- d) As a working approximation, the length of a barrier should be at least five, and preferably ten, times its height.
- e) Individual barriers should preferably be arranged around two or more sides of a given shooting stand to form an enclosure.
- f) Where individual barriers or enclosures are utilised on a shooting ground or site, substantial peripheral embankments can provide further useful sound attention.

It should be noted that most permanent noise barriers will normally require planning permission from the Local Authority. Therefore, prior to the provision of any structures or barriers consultations should always be held with the relevant Environmental Health and Planning departments. The performance of any barrier is influenced by the local topography and this will need to be considered when predicting the effect of any barrier or bund. The design and construction of some forms of noise barrier may require specialist advice from an acoustic consultant and an engineer.

5.8 *Weather conditions*

Local weather conditions can affect the propagation of sound. It has already been stated that prevailing wind direction should be taken into account when determining site location and shoot orientation. Effective site management will also involve responding to the weather conditions on a particular day, for example, a strong wind may elevate noise levels downwind, and a dense hard covering of snow will provide an acoustically "hard" surface which will cause reflection of sound waves and hence raise noise levels.

Where weather conditions on a particular day are so severe as to cause increased noise levels at noise sensitive premises and the layout of the shoot cannot be altered to take this into account, the shoot organiser should give consideration to cancellation of the event.

6. NOISE MEASUREMENT AND ASSESSMENT

6.1 *Measurement and Assessment*

Measurement and social survey work completed by BRE during 1997 and papers presented at the IOA conference during that year provides a basis for guidance on acceptable noise limits to be applied in the vicinity of residential premises. The guidance measures noise from clay target shooting using the Shooting Noise Level (SNL) index. Both the index and the measurement method are described in more detail in Appendix 5.

The BRE research suggests that there is no fixed shooting noise level at which annoyance starts to occur. Annoyance is less likely to occur at a mean shooting noise level (mean SNL) below 55 dB(A), and highly likely to occur at a mean shooting noise level (mean SNL) above 65dB(A). The likelihood of annoyance at levels within this range will depend upon local circumstances and some of the factors that may need to be considered are given in Appendix 5.

The research work by BRE found that there was a need for further study of the effect of background noise on annoyance due to shooting. BRE found no effect from background noise in their data but most of the measurements were made in situations where the shooting noise levels were well in excess of background. Closer examination of sites with relatively higher background levels is necessary before the role of background noise in relation to annoyance can be better understood.

To quote directly from the research conclusions:

“For a given exposure level, community annoyance was found to vary significantly between shoots, but no particular shoot characteristics or socio-demographic variables were seen to be associated with the degree of annoyance. There is some suggestion in the data that different sensitivities exist in different communities and that this affects annoyance, but the causes of differing sensitivities are not clear.

At shooting noise levels below the mid 50’s dB(A) there is little evidence of significant levels of annoyance at any site, whereas for levels in the mid to high 60’s, significant annoyance is engendered in a majority of sites. For levels in between however, the extent of the annoyance varies considerably from site to site. Thus a level of, say, 60 dB(A) may be deemed acceptable at one site, but not at another.”

It should be stressed that noise ‘annoyance’ is not the same as noise ‘nuisance’ and that the assessment of whether the noise experienced at noise sensitive premises is a nuisance will be a judgement based on a number of factors (including those given in Appendix 2). However, the level of noise experienced will usually be an important factor in any assessment of noise nuisance due to clay target shooting and it is intended that the methodology included at Appendix 5 will allow agreement to be reached on setting appropriate noise limits.

6.2 *Information and Advice*

6.2.1 Shooting Associations

There is a recognised controlling body for the sport in the UK. Clubs which are affiliated to that body are required to abide by conditions pertinent to the good rule and governance of the sport. Such associations publish a wide range of informative leaflets addressing health and safety issues and the provision of site facilities. Information about such bodies can be accessed readily through the internet.

6.2.2 Local Authorities

Local Authorities should be able to provide a wide range of advice and information to shoot organisers to help them to conduct their undertaking within the law and with the minimum of inconvenience to others. This advice is generally available free of charge, but if a charge is payable this will be confirmed in advance.

Local Authorities, usually through their Environmental Health departments, will be able to advise on all matters relating to noise control, food hygiene, sanitation and health and safety. Planning departments will advise on matters relating to planning permission and land use. Information may also be available on conservation and wildlife bodies through Leisure departments or Countryside sections. County or Unitary Councils will be able to advise on highways, footpaths, bridleways etc. The Police should be contacted for advice on firearms licensing.

6.2.3 Environmental and Conservation Bodies

Shoot organisers will be able to obtain considerable information about the area immediately surrounding their shooting ground from local environmental and conservation bodies. They will be able to advise on the sensitivity of the natural environment and any constraints that are placed upon an area because of environmental or conservation considerations.

In the first instance shoot organisers should contact the local branch of the organisation. Where there is no local branch, contact should be made with either the national or regional headquarters.

Further details of useful sources of information are given in Appendix 6.

APPENDICES

- APPENDIX 1* - Extracts from the Environmental Protection Act 1990 - Part III
Statutory Nuisances Noise
- APPENDIX 2* - The Concept of Nuisance
- APPENDIX 3* - Clay Target Shooting Disciplines
- APPENDIX 4* - Example Site Information Sheet
- APPENDIX 5* - Measurement of Clay Target Shooting Noise
- APPENDIX 6* - Sporting Environmental and Conservation and Advisory Bodies
- APPENDIX 7* - Bibliography
- APPENDIX 8* - Acknowledgements

APPENDIX 1**Extracts from the Environmental Protection Act 1990 - Part III/Noise Act 1996****Statutory Nuisances: Noise****Section 79**

- (1) The following matter constitutes a “statutory nuisance” for this part of the Act -
- g noise emitted from premises so as to be prejudicial to health or a nuisance, with the exception of premises occupied on behalf of the Crown for naval, military or air force purposes etc.
- (2) and it shall be the duty of every local authority to cause its area to be inspected from time to time to detect any statutory nuisances which ought to be dealt with under section 80 (summary proceedings for statutory nuisances), and where a complaint of a statutory nuisance is made to the local authority by a person living within its area, to take such steps as are reasonably practicable to investigate the complaint.
- (7) “noise” includes vibration;
- “premises” includes land, and any vessel unless powered by steam reciprocating machinery.

Section 80

- (1) Where a local authority is satisfied a nuisance exists, or is likely to occur or recur, in the area of authority, the local authority shall serve a notice (“an abatement notice”) imposing all or any of the following requirements -
- (a) requiring the abatement of the nuisance or prohibiting or restricting its occurrence or recurrence;
- (b) requiring the execution of such works, and the taking of such other steps, as may be necessary for any of those purposes, and the notice shall specify the time or times within which the requirement of the notice are to be complied with.
- (2) The Abatement Notice shall be served -
- (a) on the person responsible for the nuisance; or
- (c) where the person responsible for the nuisance cannot be found or the nuisance has not yet occurred, on the owner or occupier of the premises.
- (3) The person served with the notice may appeal against the notice to a Magistrates’ Court within the period of twenty one days beginning with the date on which he/she was served with the notice.
- (4) If a person on whom an Abatement Notice is served, without reasonable excuse, contravenes or fails to comply with any requirements or prohibition imposed by the notice, he/she shall be guilty of an offence.
- (5) Except in a case falling within subsection (6), a person who commits an offence under subsection (4) shall be liable on summary conviction to a fine not exceeding level 5 on the standard scale (£500) together with a further fine of an amount equal up to one tenth of that level for each day on which the offence continues after the conviction.
- (6) A person who commits an offence under subsection (4) on industrial, trade or business premises, as defined in section 79 (7), shall be liable on summary conviction to a fine not exceeding £20,000.
- (7) In any proceedings for an offence under subsection (4) in respect of a statutory nuisance it shall be a defence to prove that the best practical means, as defined in section 79 (9), were used to prevent, or counteract the effects of, the nuisance.

NOTE: The defence of best practicable means in subsection (7) is only available where the nuisance arises on industrial, trade or business premises.

Section 81

- (1) Where more than one person is responsible for a statutory nuisance section 80 shall apply to each of those persons whether or not what any one of them is responsible for would by itself amount to a nuisance.
- (2) Where a statutory nuisance which exists or has occurred within the area of a local authority, or which has affected any part of that area, appears to the local authority to be wholly or partly caused by some act or default committed or taking place outside the area, the local authority may act under section 80 as if the act or default were wholly within that area, except that any appeal shall be heard by a Magistrates’ Court having jurisdiction where the act or default is alleged to have taken place.
- (3) Where an Abatement Notice has not been complied with the local authority may, whether or not they take proceedings for an offence under section 80 (4), abate the nuisance and do whatever may be necessary in execution of the notice.

Noise Act 1996**Section 10**

- (7) The power of a local authorityto abate....a statutory nuisance....includes power to seize and remove any equipment which it appears to the authority....has been used in the emission of the noise in question.

- (8) A person who wilfully obstructs any person exercising any powers conferred under...subsection (7) is liable on summary conviction to a fine not exceeding level 3 on the standard scale.

Sch

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- (1) where a person is convicted of a noise offence the court may make....a “forfeiture order”....
- (4) A forfeiture order operates to deprive the offender of any rights in the equipment to which it relates.]
- (4) Any expenses reasonably incurred by a local authority in abating, or preventing the recurrence of; a statutory nuisance under subsection (3) may be recovered by them from the person by whose act or default the nuisance was caused and, if that person is the owner of the premises, from any person who is for the time being the owner thereof; and the court may apportion the expenses between persons whose acts or defaults the nuisance is caused in such manner as the court consider fair and reasonable.
- (5) If a local authority is of opinion that proceedings for an offence under section 80 (4) above would afford an inadequate remedy in the case of any statutory nuisance, they may take proceedings in the High Court for the purpose of securing the abatement, prohibition or restriction of the nuisance, and the proceedings shall be maintainable notwithstanding the local authority have suffered no damage from the nuisance.

Section 82

- (1) A Magistrates’ Court may act under this section on a complaint made by any person on the grounds that he/she is aggrieved by the existence of a statutory nuisance.
- (2) If the Magistrates’ Court is satisfied that the alleged nuisance exists, or that although abated it is likely to recur on the same premises, the court shall make an order for either or both of the following purposes:-
- (a) requiring the defendant to abate the nuisance, within a time specified in the order, and to execute any works necessary for that purpose;
- (b) prohibiting a recurrence of the nuisance, and requiring the defendant, within a time specified in the order to execute any works necessary to prevent the recurrence;
- and may also impose on the defendant a fine not exceeding level 5 on the standard scale. (£500)
- (4) Proceedings for an order under subsection (2) shall be brought -
- (a) except in a case falling within (b) or (c) below, against the person responsible for the nuisance;
- (c) where the person responsible for the nuisance cannot be found, against the owner or occupier of the premises.
- (5) Where more than one person is responsible for a statutory nuisance, subsections (1) to (4) shall apply to each of those persons whether or not what any one of them is responsible for would by itself amount to a nuisance.
- (6) Before instituting proceedings for an order under subsection (2) against any person, the person aggrieved by the nuisance shall give to that person such notice in writing of his intention to bring the proceedings as is applicable to proceedings in respect of a nuisance of that description and the notice shall specify the matter complained of.

NOTE: The notice of bringing proceedings in respect of a statutory noise nuisance shall be not less than three days.

- (8) A person who, without reasonable excuse, contravenes any requirement or prohibition imposed by an order under subsection (2) shall be guilty of an offence and liable on summary conviction to a fine not exceeding level 5 (£500) on the standard scale together with a further fine of an amount equal to one-tenth of that level for each day on which the offence continues after conviction.
- (9) In any proceedings for an offence under subsection (8) in respect of a statutory nuisance it shall be a defence to prove that the best practicable means were used to prevent, or counteract the effect of, the nuisance.

NOTE: The defence of best practicable means under subsection (9) is only available where the nuisance arises on industrial, trade or business premises.

- (11) If a person is convicted of an offence under subsection (8), a Magistrates’ Court may, after giving the local authority in whose area the nuisance has occurred an opportunity of being heard, direct the authority to do anything which the person convicted was required to do by the order to which the conviction relates.
- (12) Where on the hearing of proceedings for an order under subsection (2) it is proved that the alleged nuisance existed at the date of making of the complaint, then, whether or not at the date of the hearing it still exists or is likely to recur, the court shall order the defendant (or defendants in such proportions as appears fair and reasonable) to pay to the person bringing the proceedings such amounts as the court considers reasonably sufficient to compensate him/her for any expenses properly incurred by him/her in the proceedings.

APPENDIX 2**THE CONCEPT OF NUISANCE**

For any noise to constitute a statutory nuisance, it must either be likely to cause injury to health or amount to a nuisance at common law.

- "...likely to cause..." means probably likely, not just possibly likely.
- "Health" means disease rather than accidental physical injury.
- nuisances at common law are of two types - public and private nuisances. Public nuisances may at the same time be private nuisances.
- for a nuisance to be a public nuisance, it must, as a matter of fact, affect a sufficient number of people for them to constitute a whole class of the population. Alternatively, it must be so widespread in its range or indiscriminate in its effects that it would be unreasonable to expect any private person to take action to stop it.
- the sort of effect on people which could amount to a public nuisance includes obstruction, inconvenience or offence, provided that, as a matter of fact, it is sufficiently severe.
- nevertheless, a noise not adding measurably to background levels but obtrusive and out of character with the area may amount to a statutory nuisance.
- private nuisances are different; based on the maxim "so use your property as not to injure your neighbour's", they comprise damage arising from some unlawful interference with a person's use of his land. A person affected must therefore have some legal interest in the land, eg. as owner or tenant, and the source of the nuisance must lie outside it.
- distinguish nuisances, which are examples of indirect interference, from trespasses, which involve direct interference.
- nuisances may, but do not necessarily involve negligence.
- its effect aside, the activity giving rise to the nuisance may be quite lawful.
- the interference complained of must be unreasonable and substantial; the law implies a degree of "give-and-take" between neighbours - between the right of one occupier to use his land as he likes and the right of his neighbour to live in peace, nor is it concerned in any event with trifles - the "de minimis" rule. Mere annoyance is probably not enough to constitute a nuisance nor do questions of individual taste or preference come into it.
- as a matter of law, the ordinary use of land is incapable of amounting to a private nuisance.

- what is unreasonable will be a matter of fact, depending on the circumstances. A particular noise at midday may be reasonable yet if repeated at midnight, not be. Some things are inherently noisy but must still be done; where in such circumstances noise is truly inevitable, it will not be unreasonable.
- the consent of the person affected is not to be implied by his "coming to the nuisance" but in the case of an "amenity" nuisance, such as noise, the character of the neighbourhood will be relevant to what is reasonable; "what would be a nuisance in Belgrave Square would not necessarily be so in Bermondsey." This does not hold true, however, where physical damage is caused, for example, by vibration.
- a private nuisance is nevertheless made lawful, twenty years after the person affected became aware of it if he acquiesces to it throughout that period.
- what would otherwise be nuisances, caused inevitably in the course of an activity enabled by statute, will not be so since they will not be unlawful.
- the duration of a noise or its frequency of occurrence if it is intermittent are factors relevant to how substantial an interference is. They will not be conclusive, however; a single occurrence may be a nuisance whereas something repeated may still not be.
- abnormal sensitivity on the part of a person or property affected by an alleged nuisance is to be ignored in assessing reasonableness; the standard to be applied is of the notional "ordinary man".
- nuisance is a matter of so-called "strict liability" - the person responsible need not be at fault except if some act of nature is blamed and need not have foreseen the consequences of his act etc.
- the intention of the person causing a nuisance is usually irrelevant but malice may turn a reasonable act into an unreasonable one.
- it is not necessary for officers of a local authority to witness an alleged nuisance in order to be satisfied of its existence; the evidence of a third party, if sufficiently cogent, is enough.
- once a local authority is reasonably satisfied that a statutory nuisance exists or is likely to occur or recur, it has a duty to serve an abatement notice on the person(s) believed to be responsible. Strictly, there is no discretion in this, although it will need to keep in mind the "best practicable means" defence where a nuisance relates to industrial, trade or business premises.
- "best practicable means" is interpreted by reference to the following provisions:
 - (a) "practicable" means reasonably practicable having regard among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications;
 - (b) the "means" to be employed included the design, installation, maintenance and manner and periods of operation of plant and machinery, and the design, construction and maintenance of buildings and structures;

- (c) the test is to apply only so far as compatible with any duty imposed by law;
- (d) the test is to apply only so far as compatible with safety and safe working conditions, and with the exigencies of any emergency or unforeseeable circumstances;
- in circumstances where a code of practice under section 71 of the Control of Pollution Act 1974 (noise minimisation) is applicable, regard shall also be had to guidance given in it.
- a person may commit a nuisance as part of a group of persons, even where their own contribution may be insufficient alone.
- statutory notices can be enforced other than by prosecution, i.e. by work in default, but if a local authority decides to go to court it must prove every element of its case beyond reasonable doubt. That does not mean beyond any shred of doubt. Before prosecuting, however, it should consider three things:
 - (a) whether there is a likelihood (not a certainty) of success;
 - (b) whether the likely penalty justifies it, and
 - (c) whether there is a public interest in doing so.

APPENDIX 3**CLAY TARGET SHOOTING DISCIPLINES*****Trap***

Targets are thrown either as singles or doubles from one or more traps situated some 15m in front of the shooter and generally away from the firing point at varying speeds, angles and elevations. The most common disciplines in this group are: Down-the-Line (DTL), Single Barrel, Double Rise, Automatic Ball Trap (ABT), Olympic Trap, Double Trap and Universal Trench.

Down The Line

Also known as DTL, this is a popular clay shooting discipline. Targets are thrown up to a distance of 45 to 50 metres at a fixed height of approximately 2.75m and with a horizontal 'spread' of up to 22 degrees either side of the centre line. Each competitor shoots at a single target in turn, but without moving from the stand until they have all shot at five targets. Then they all move one place to the right, and continue to do so until they have all completed a standard round of 25 birds. Variations of this discipline are: Single Barrel, Double Rise and Handicap-by-Distance.

Skeet

Skeet is a word of Scandinavian origin, though the discipline originated in America. Targets are thrown in singles and doubles from 2 trap houses situated some 40 metres apart, at opposite ends of a semicircular arc on which there are seven shooting positions. The targets are thrown at set trajectories and speeds. The main discipline in this group are English Skeet, Olympic Skeet and American (NSSA) Skeet.

Sporting

This group contains the English Sporting discipline which has the sport's biggest following. Where the previous two groups only use standard targets, in Sporting there is an infinite variety of stands. Targets are thrown in a great variety of trajectories, angles, speeds, elevations and distances and the discipline was originally devised to simulate live quarry shooting, hence some of the names commonly used on Sporting stands; Springing Teal, Driven Pheasant, Bolting Rabbit, Crossing Pigeon, Dropping Duck, etc. Disciplines in this group include English Sporting, International (FITASC) Sporting, Super Sporting and Compak Sporting.

APPENDIX 4**EXAMPLE SITE INFORMATION SHEET**

Site Name	
Site Managed by:	Site Owned By:
Club meeting times and yearly staging of events:	In the event of an emergency contact
Club Secretary/Chairman: Address: Telephone No:	Ordnance Survey Map/Diagram of Site Boundary
Shooting disciplines available:	
Rules of Membership:	Standard of behaviour required:
Noise reduction requirements:	Person to whom any complaint should be addressed: Address: Telephone No:
Local Police Station Address: Contact Officer:	
Local Environmental Health Department Address: Chief Officer:	
Planning Department Address: Contact Officer: Planning reference (if applicable):	

APPENDIX 5**MEASUREMENT OF CLAY TARGET SHOOTING NOISE****A5.1 Aim**

The basic aim of measurement is to obtain a series of shot level readings, each corresponding to successive shots. As far as possible these readings should be unaffected by any other noises occurring during the measurement period. Each shot level (see definitions) should correspond to the maximum A-weighted sound pressure level caused by the shot using time weighting F; or, alternatively, the maximum value caused by the shot in a continuous series of short Leq ($L_{Aeq, 100ms}$ or $L_{Aeq, 125ms}$) measurements. These methods will generally produce very similar values for a given series of shots. From the shot level readings, the shooting noise level, SNL, (see definitions) can be calculated.

A5.2 Measuring equipment

- (a) The components of the measurement system shall conform to type 1 of BS EN 60651.
- (b) The calibrator shall conform to type 1 of BS 7189.
- (c) The complete measurement system shall have traceable calibration to either National or International Standards.
- (d) The interval between verification of the complete measurement system shall not exceed two years.
- (e) The measurement system shall measure A-weighted and time weighted F instantaneous sound pressure level; or a continuous series of short Leq ($L_{Aeq, 100ms}$ or $L_{Aeq, 125ms}$) measurements.
- (f) Preferably the system shall also be capable of producing a permanent record of the time history of the sound pressure level L_{pA} or $L_{Aeq, 100ms}$ or $L_{Aeq, 125ms}$ measurements series.

A5.3 Site selection

- (a) Measurements should be made out of doors in the vicinity of residential premises on the most exposed aspect and at least 3.5 m from reflecting surfaces other than the ground.
- (b) Measurements should normally be made at a height of 1.2 to 1.5 m above ground.
- (c) The measurement position(s) should be as near as reasonably practical to the curtilage of the residential premises and be representative of the shooting noise level near the premises.

A5.4 Precautions against interference

- (a) Precautions should be taken to avoid potential sources of interference, including:
 - wind passing over the diaphragm of the microphone
 - rain on the windshield or nearby surfaces
 - electrical interference which can be caused in the sound level meter by, for example, power cables, transformers, radio transmitters and mobile phones.
- (b) Windshields should always be used, these being generally effective up to windspeeds of 5 m/s. Measurements should not be made during rain or when wind speeds measured at the microphone exceed 5 m/s.

A5.5 Representative measurement periods**3.6.1 For an existing shoot**

- (a) Measurements shall be made during a regular event or a major event.

Note 1: Each day of a major event can be considered separately

Note 2: If there is weekend shooting it should be included in any assessments.

For a new shoot or a variation to a shoot

- (a) Measurements may be made during a regular event, a specially set up event or a test shoot.
- (b) The shoot organisers should ensure that conditions (shooting and environmental) during any test shoot are representative of those that would occur during normal operation. The shoot organisers should note that it is in their interest to ensure a representative test shoot as they may be required to ensure similar levels are not exceeded should planning permission be granted.
- (c) The type of cartridge, gun, standing position, direction of shooting and the elevation of the muzzle should be representative of the type of shooting that will take place.
- (d) The number of shots fired during a test shoot shall exceed 25. For a small shoot 60 shots, and for a major shoot significantly more (160) would not be unreasonable. The shots should be fired within a 30 minute period.
- (e) If measurements have been made on a weekday, and the shoot organisers are seeking permission to shoot at the weekends, then this should be taken into consideration.

Note: It is the responsibility of the shoot to set up a realistic test shoot since they may be held to the resulting levels at a later date.

A5.6 Measurement protocol

- (a) The measurement duration shall be a continuous 30 minute period during shooting.
- (b) A calibrator shall be applied to the microphone of the measurement system before measurement commences. The sensitivity of the measurement system shall be adjusted if required, and the sound pressure level due to the calibrator recorded.
- (c) At the end of the measurement period the calibrator shall be re-applied, and if the sensitivity of the system has changed by more than 0.5 dB the measurements shall be discarded.
- (d) The measurement system shall be set so that it displays and records the A-weighted, *F* time weighted, instantaneous sound pressure level; or a continuous series of short Leq ($L_{Aeq, 100ms}$ or $L_{Aeq, 125ms}$) measurements.
- (e) If a time history of the level is being recorded, it should be marked/annotated contemporaneously so that the noise of the individual shots can be differentiated from other noise sources.
- (f) The wind speed and direction relative to the shoot and measurement locations shall be noted. Use of either an anemometer or the Beaufort wind scale is acceptable.
- (g) Any significant change in wind direction should be noted also. Measurements should normally be made with a positive wind vector (see definitions).

Note: In deciding if the noise level is acceptable, it is important that there is a positive wind vector. However, if the noise is unacceptably high with a non-positive wind vector, it will not be acceptable with a positive wind vector.

A5.7 Corrections to recorded levels

- (a) At most sites it is inevitable that some recorded levels will correspond to a combination of shot noise and other noises occurring at the same time. It is important to try to correct for the effect of the other noises, to get the best estimate of actual shot levels. All recorded levels can be thought of as equivalent to the logarithmic sum of the actual shot level and the contemporaneous residual noise level (see definitions). Therefore, if the contemporaneous residual noise level can be estimated reasonably well, it can be logarithmically subtracted from the recorded level to get the best estimate of the shot level (see definitions for relevant equation).
- (b) If the recorded level exceeds the estimated contemporaneous residual noise level by more than 10 dB, no such subtraction is necessary. If the exceedance is between 6 dB and 10 dB (inclusive), the subtraction is necessary. If the exceedance is less than 6 dB the shot should not be included in any calculation of the shooting noise level (see below), but may still be counted as a recorded shot.
- (c) The contemporaneous residual level can often be estimated by inspecting the levels just before and just after the shot in question, and visually interpolating between them to the nearest dB or so. Figures 1 to 3 help illustrate the way contemporaneous residual noise levels need to be taken into account. In Figure 1 the residual noise level is relatively steady and most of the louder shots are unaffected since the recorded levels are more than 10 dB above the residual level. Figure 2 is a time expansion of the first 10 minutes of Figure 1 and clearly shows two double shots marked s6, s7 and s10, s11. Such double shots can be considered as two separate shots if there is more than a 6dB fall in level between the shots. However, a correction to the second shot in the double may be required.
- (d) The measurements shown in Figure 3 were made at the same location but with a negative wind vector. The recorded levels are less than 10 dB above a relatively steady residual noise level and so will need to be corrected to obtain the shot levels. In cases where the residual level appears to be relatively steady, it may

be appropriate to use an $L_{A90, T}$ value (see definitions) calculated over the measurement period as an estimate of it.

Note: Manual readings are only likely to be practical if the sound level meter has a maximum hold facility, however, if manual readings have been made directly from a sound level meter in the absence of any record of the time history, shot levels shall only be obtained where the recorded levels are seen to exceed the residual noise level between shots by more than 10 dB. Manual readings are likely to result in a lower shooting noise level because one or more of the loudest shots may not have been recorded.

A5.8 Calculation of shooting noise level (SNL)

- (a) The *SNL* is defined as the logarithmic average of the 25 highest shot levels, from the shoot in question, over the 30 minute measurement period. The shot levels will have been obtained from recorded levels corrected where necessary for residual noise.

A5.9 Calculation of a mean shooting noise level

- (a) The mean *SNL* is the arithmetic average of individual *SNL* values. The number of individual *SNL* values to be used, and the shooting conditions they should represent, depends on the specific purpose of the measurements. For example, when assessing a major shoot that has planning permission, a reasonable number of measurements should be made over a period of several months. Alternatively, when measurements are conducted in support of an assertion that there is not a noise problem, it is particularly important that measurements are made with a positive wind vector.
- (b) When calculating the mean *SNL*, one of the procedures below should be followed, as appropriate:
- (i) Determine the mean *SNL* from five separate events for a shoot that has planning permission over a period of several months, or
 - (ii) Determine the mean *SNL* from two separate events for a shoot that is operating under “the 28 day rule”, or
 - (iii) Determine the mean *SNL* for a shoot that is seeking planning permission. One or two measurements would be appropriate for a small shoot, whilst four or five would be the appropriate number for a major shoot operating on more than one day a week, having a number of stands, or intending to hold major events.

A5.10 Reporting of Results

The following information should be reported:

- (a) Description of shoot.
- (b) Measurement time.
- (c) Mode of operation.
- (d) Location of measurement positions and their relationship to shoot location. This should include details of the microphone height above ground level, the topography of intervening land, and reflecting surfaces such as buildings.
- (e) Instrumentation system used including type, manufacturer serial number and verification dates.
- (f) Operational test using reference signal or calibrator.
- (g) Weather conditions including general wind condition.
- (h) Date, day of the week and time of measurement.

A5.11 Setting limits

Any limits set will be a matter for local negotiation, but should normally be set according to the following guidelines:

- (a) The limit shall take the form of a mean *SNL* of x dB, not to be exceeded.
- (b) x will depend on local circumstances, but would normally be expected to fall somewhere in the range 55 to 65 dB.
- (c) Factors that should be considered in selecting x are:
 - the locality and general background noise levels;
 - on which day(s) of the week shooting occurs;
 - at which time(s) of day(s) e.g. morning, afternoon, evening;
 - the intensity of shooting – e.g. number of shooting days per year;
 - the type of shoot – e.g. 28 day or with planning approval;
 - the rate of fire.

Note 1: Planning permission should not normally be granted for a major shoot if the mean *SNL* exceeds 55dB where the background level is less than 45dB.

Note 2: Individual tuitions that last for no more than a couple of hours in total are generally acceptable up to a maximum *SNL* of 65dB during weekdays between the hours of 10am to 5pm.

Note 3: *SNL* values of around 65dB and are likely to evoke a strong adverse community response. The shoot should take active steps to achieve a very significant reduction in mean *SNL* and/or to make a commensurate reduction in the number of hours that they shoot per week.

Note 4: It would be unusual to consider the levels at premises within the grounds of the shoot.

A5.12 Definitions

Shot level L_{shot}

The maximum A-weighted sound pressure level caused by the shot using time weighting F; or, alternatively, the maximum value caused by the shot in a continuous series of short Leq measurements (i.e. $L_{\text{Aeq}, 100\text{ms}}$ or $L_{\text{Aeq}, 125\text{ms}}$). Where the recorded level does not correspond to the shot level because of the effect of other noise sources it is denoted below as L'_{shot} .

The shot level L_{shot} can be obtained from the recorded level L'_{shot} by logarithmically subtracting the contemporaneous residual noise level $L_{\text{A,r}}$, according to the equation below.

$$L_{\text{shot}} = 10 * \lg((10^{\wedge}(L'_{\text{shot}}/10)) - (10^{\wedge}(L_{\text{A,r}}/10)))$$

Residual noise

All noise other than that from the shots being measured.

Contemporaneous residual noise level $L_{\text{A,r}}$

The approximate A-weighted sound pressure level of the residual noise occurring at the same time as the shot whose level is to be determined.

Positive wind vector

A positive wind vector occurs when the wind is blowing directly from the shoot towards the measurement site, plus or minus forty-five degrees. For example, if the residential premises are due east of a shoot then measurements made with the wind blowing in the arc between South West and North West have a positive wind vector.

Recorded shot

A recorded shot is one identifiable from a time history record and/or from a set of measurements.

*Shooting Noise Level *SNL**

The logarithmic average of the 25 highest shot levels from the shoot in question, over the 30 minute measurement period, calculated according to the equation below. The shot levels will have been obtained from recorded levels corrected where necessary for residual noise.

$$SNL = 10 * \lg(((10^{\wedge}(L_{\text{shot},1}/10)) + (10^{\wedge}(L_{\text{shot},2}/10)) + \dots + (10^{\wedge}(L_{\text{shot},25}/10))))/25)$$

where $L_{\text{shot},1}$ to $L_{\text{shot},25}$ are the 25 highest shot levels.

Note: It should be clearly understood that the *SNL* is not equivalent to an $L_{\text{Aeq}, 30\text{minute}}$

$L_{\text{A90}, T}$

The A-weighted sound pressure level of the noise at the measurement position that is exceeded for 90% of a given time interval, *T* (usually 30 minutes), measured using a time weighting F.

Major shoot

A major shoot will have planning permission or is seeking to get it and operate on more than one day a week, have a number of stands, or holds major events.

Major event

A major event would typically consist of a regional, national or international competition, or a sponsored or other event that may attract in excess of 50% more participants than would normally use the shoot.

A5.13 Example calculations*i. Example calculation of Shooting Noise Level*

This example shows the calculation of the SNL and the mean SNL in a situation where the shots are more than 10 dB over the contemporaneous residual level.

Reference number of shot	Recorded shot level L'_{shot}	Recorded shot levels L'_{shot} sorted in descending order	Shot level L_{shot}	$10^{(L_{\text{shot}}/10)}$
	(dB)	(dB)	(dB)	
1	63.4	70.7	70.7	11748976
2	61.9	70.2	70.2	10471285
3	64.6	69.4	69.4	8709636
4	61.0	68.3	68.3	6760830
5	61.0	68.1	68.1	6456542
6	68.3	67.4	67.4	5495409
7	69.4	67.3	67.3	5370318
8	60.4	67.2	67.2	5248075
9	63.5	67.2	67.2	5248075
10	66.9	66.9	66.9	4897788
11	67.2	65.8	65.8	3801894
12	63.9	65.7	65.7	3715352
13	62.9	64.7	64.7	2951209
14	64.7	64.6	64.6	2884032
15	65.7	64.3	64.3	2691535
16	68.1	63.9	63.9	2454709
17	67.2	63.5	63.5	2238721
18	62.4	63.5	63.5	2238721
19	63.5	63.4	63.4	2187762
20	62.3	63.4	63.4	2187762
21	61.3	62.9	62.9	1949845
22	62.0	62.4	62.4	1737801
23	65.8	62.3	62.3	1698244
24	60.8	62	62	1584893
25	67.4	61.9	61.9	1548817
26	60.6			
27	70.2			
28	70.7			
29	64.3			
30	67.3			
31	63.4			

Table 1 Example of calculation of SNL

Table 1 shows the 31 marked shots in Figure 1. In this example all the shots are more than 10 dB over the contemporaneous residual level; consequently the shot levels and recorded shot levels are the same.

The SNL is the logarithmic average of the 25 highest shot levels and equals 66.3 dB.

If, for example, the SNL calculated in the same way on four other occasions was, 63.8, 67.3, 62.9 and 65.4 then the mean Shooting Noise Level (mean SNL) would be the arithmetic average of these five SNLs and would equal 65.1 dB.

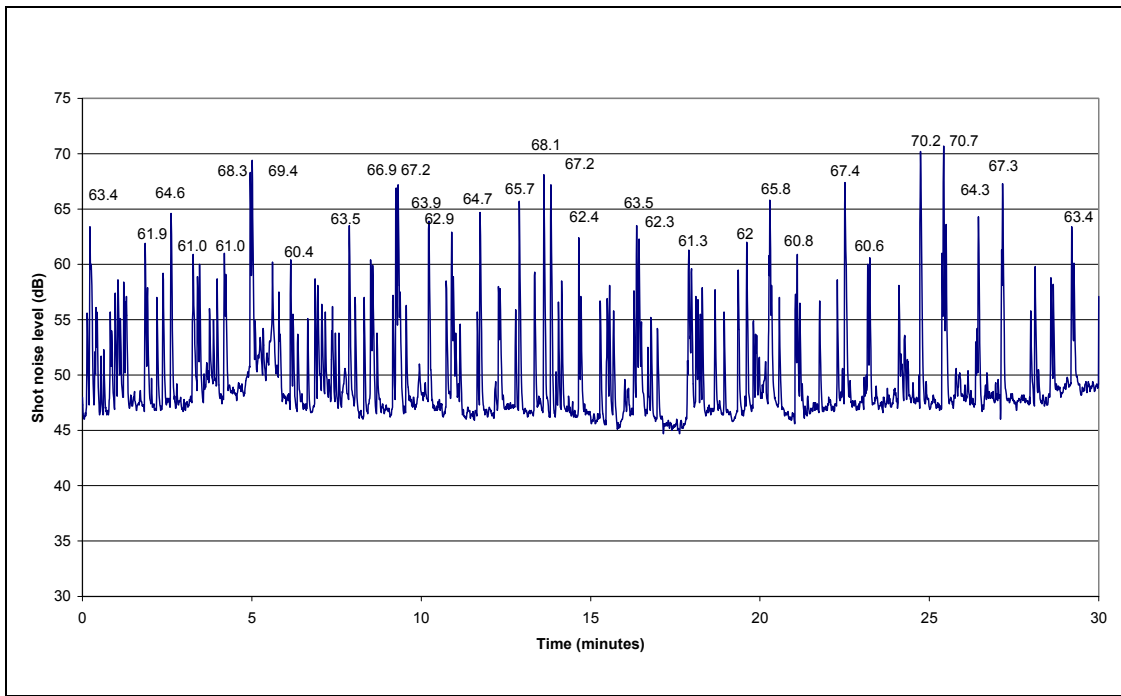


Figure 1: 30min time history of shot noise levels, louder shots marked

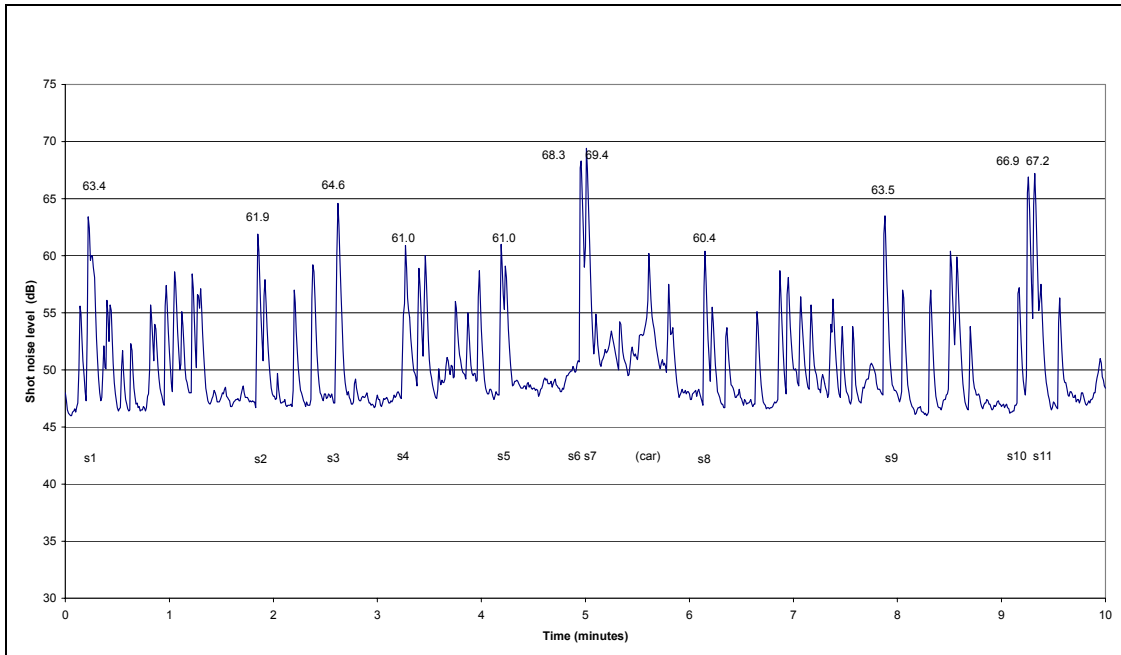


Figure 2: 10min time history of recorded shot levels, louder shots marked (expanded first 10min from Fig 1)

ii. Example calculation of shot level where correction is required

In this example the contemporaneous residual level has been determined as 42.1 dB on the basis of $L_{A90, 30\text{min}}$. The example uses a sample of 16 shots recorded in a 3.5 minute period to illustrate the correction of the recorded shot levels for contemporaneous residual level. Table 2 shows the 16 marked shots in Figure 3. Shots 2 and 6 (marked with an *) are less than 6 dB over the contemporaneous residual level and would not be included in any subsequent calculation of SNL. Note that the subsequent calculation of SNL will use the 25 loudest shots over a 30 minute measurement period.

Reference number of shot	Recorded shot level L'_{shot}	Residual noise level $L_{A,r}$	Shot level L_{shot}
	(dB)	(dB)	(dB)
1	48.9	42.1	47.9
2	46.7*	42.1	*
3	48.5	42.1	47.4
4	48.7	42.1	47.6
5	49.6	42.1	48.7
6	46.9*	42.1	*
7	48.6	42.1	47.5
8	49.2	42.1	48.3
9	49.0	42.1	48.0
10	48.3	42.1	47.1
11	48.8	42.1	47.8
12	49.2	42.1	48.3
13	48.7	42.1	47.6
14	49.1	42.1	48.1
15	49.4	42.1	48.5
16	48.9	42.1	47.9

Table 2: Example of calculation of shot level with correction for contemporaneous residual level

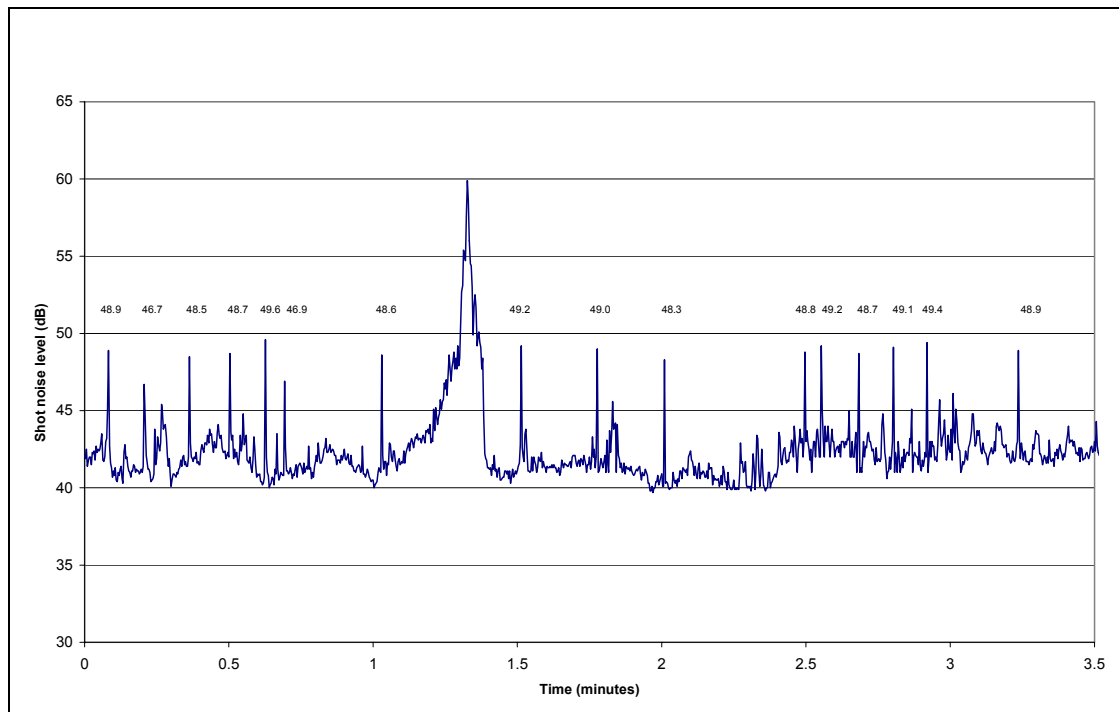


Figure 3: 3.5min time history of recorded shot levels

APPENDIX 6**FURTHER INFORMATION**

Institute of Acoustics
77A St Peter's Street
St Albans
Herts, AL1 3BN

Association of Noise Consultants
6 Trap Road
Guilden Morden
Royston
Herts, SG8 0JE

Countryside Agency
John Dower House
Crescent Place
Cheltenham, GL50 3RA

Council for the Protection of Rural England
Warwick House
25 Buckingham Palace road
London, SW1W 0PP

English Nature
Northminster House
Peterborough, PE1 1UA

Countryside Alliance
The Old Town
367 Kennington Road
London, SE11 4PT

Game Conservancy Trust
Burgate Manor
Fordingbridge
Hampshire, SP6 1EF

Forestry Commission
231 Corstorphine Road
Edinburgh, EH12 7AT

National Farmers Union
164 Shaftesbury Avenue
London, WC2H 8HL

Herpetological Conservation Trust
665a Christchurch Road
Boscombe
Bournemouth, BH1 4AP

Wildlife Trust
The Kiln, Waterside
Mather Road
Newark
Nottinghamshire, NG24 1WT

Wildlife & Countryside Link
31 Pitfield Street
London, N1 6HB

Shooting Associations and Bodies – please refer to an internet or library search

Wildfowl & Wetlands Trust
Slimbridge
Gloucestershire, GL2 7BT

APPENDIX 7

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APPENDIX 8**ACKNOWLEDGEMENTS**

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