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NOISE IN THE OPEN AIR

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There has recently been a noticeable increase in the number of projects that we have been involved with concerning outdoor noise. If one ignores the problems presented solely by traffic, trains or aircraft there remain two main groups of problems. There is the noise generated by the public attending places of 'entertainment' (such as pubs or sports centres) and there are the problems of use of plant outdoors by industrial or agricultural concerns.

Noise nuisance can occur due to both groups in urban, rural-resident -ial or rural areas. The density of population of this country plus the existence of new (stricter) criteria for the noise environment, has lead to the situation whereby most planned outdoor activities come up against noise as the main objection.

When dealing with these sort of problems it quickly becomes apparent that the noise control expert has a very limited practical set of means for reducing the noise sufficiently to satisfy the people disturbed. One recurring characteristic of outdoor sources is that they move about making treatment by enclosure difficult, and in the case of human sources, impractical. In the case of machinery one is often considering high power outputs and even with the best 'state-of-the-art' silencing equipment high noise levels remain (see later). In the real world, this means that (if all other reduction methods have been eliminated) a favourable court or public enquiry ruling for the user implies that the defence of 'best practical means' has been accepted, or an unfavourable ruling implies that local opposition has won and the operation becomes uneconomic (because the operator has a low chance of becoming acceptable however much he spends).

The other reduction methods referred to above include treatment of the receiver and treatment of the path. It is our experience that offers for example to pay for sound insulation of nearest dwellings (double glazing etc) are regarded as little more than peace offerings and do not seem to affect the ruling. Treatment of the path involves using distance or barriers. The former is often not a variable, except where some fixed plant is involved which can be sited as far from the dwellings as possible. Barriers are usually not justifiable at all from a cost point of view, whether made from wood/metal or earth banks. This is due to the poor performance of even a 5m barrier if neither the source nor the receiver is very close to the barrier. Since barriers have to be on the operators land and more importantly, the sources of noise may at times be working all over the site, the condition of maximum barrier effect is rarely acheived over a period of say several months.

Admittedly barriers are some help, but we often find we are talking

about the merits of a situation where without the barrier the noise will be say 20 dB(A) above background, and with it, it will be 13-15 dB(A) above background.

To go further along these lines and show the role of community response in the arguments, the next two sections are respectively given over to human activities and machinery as noise sources.

Outdoor noise from people and their transport

Places of entertainment are often noise sources, but it is less often that the building itself is the cause. Although one can find cases of internal noise being propagated to the neighbourhood, the factor that is most often argued over in licensing applications, public enquiries and court cases is the noise made by people arriving at/leaving the premises. This noise and the disturbance to the neighbourhood is usually the factor that most strongly unites any protestors. The discussions have two aspects: noise made by people still on the premises (e.g. in the car park) and noise made in the street (i.e. in a public place).

Taking these in order; noise in car parks comes from people talking, shouting or singing, and the use of vehicles e.g. door slamming, engines starting, revving etc. Noise levels for individual events vary, so the following are a guide only:-

Peak Noise Level at approx. 10m (dB(A))

	Bad cases	Moderate cases
Peoples voices	65-75	45-55
Door slamming	80	60
Car starting	75-85	60-65

It goes without saying that good behaviour is quieter than drunken behaviour. Leaving aside the question of lunch-time opening, the evening pattern (for a pub) is usually that the use of the outdoor part of the premises will be fairly constant for most of the evening, with car noises predominating up to within about half an hour of closing time. Peak time for outdoor noise is half an hour either side of closing time. In urban areas background noise is fairly constant during the evening (due to traffic) and begins to drop between 11 and 12 p.m. Assuming a steady background of 50 dB(A) at closing time, then the noises given above for even moderate cases are at least audible at 40m. There are almost always dwellings well within this range. Of course the likelihood of prolonged outdoor noise from people is much greater in the warmer months.

If the noise is to be assessed mathematically (against BS4142 or on an equal energy basis for L_{eq}) and the assessment is to be used in law then quite extensive sampling is needed to obtain representative results. It has been our experience that even in cases where it is possible to make measurements in an undisturbed situation (i.e. the behaviour is normal for the place) and the client can afford measurements to be made over a sufficient period, there are always numerous objections to any reduction of peak figures to allow for the event rate (cf. BS4142) or to include quieter periods in the consideration (e.g. calculation of L_{eq}). It is possible to advance most telling arguments for subjective reactions

based on a few peak values. This appears to be due to the nature of the source alone. People become far more exited over the noise produced by other people directly, rather than that coming say from the side of a factory with a blank wall.

The noise problems described in the foregoing have a strict legal basis for argument since the noise is caused on private premises and the owner is responsible. This is true whatever the technical analysis used to rate the noise. However noise in the public street is often caused by people leaving such premises. In theory this noise is held (in Statute Law) to be nothing to do with the premises themselves, and is a matter for public order controlled by the police. Courts at different levels seem to have a variable view on this, but a common factor is that those affected by the noise (and probably appearing as protestors) will think of the street noise (whether actual or predicted) as an integral part of problem. The sort of discussions that happen are akin to those for actions in Common Law for nuisance. The noise consultant involved in that sort of case can find himself on a 'very Sticky wicket', since the value of hie scientific analyses to the court are reduced. Judgements come down to what is reasonable. Thus the percentage of time that shouts or car doors can be heard in a period which may be as short as one hour (and hence the corrections that a noise control expert would apply to the peak figures for that) become far less important than the fact that people are woken up.

The situation is made complicated by the fact that in many cases the community reaction is not just annoyance, but also fear for property and personel well-being, both mental and physical. In the case of clubs or discos the peak time for disturbance may well be 1 or 2 a.m., several nights a week.

Conclusions

I have tried to show that noise from people using licensed premises of various sorts is a problem that is hard to predict and measure, and is difficult to quantify in a consistent way due to its nature. The normal tools available to quantify more 'normal'noises do not in practice work well legally. Unfortunately it is a problem that is on the increase.

Outdoor Noise From Mobile Plant

There are many examples of sites with mobile plant operating for for years at a time e.g. quarries, open-cast pits, scrap yards etc. I have already mentioned that the plant tends to be noisy even if they are well silenced. Tables in BS5228 give typical sound power levels for various plant, but the following are taken from measurements in sand quarries and represent sustained peak values in dB(A) (SOUND LEVEL)

5 cu.yd. loading shovel at 6m	Digging	Backing	Forward	Tickover
Volvo 240	84	86	87	<70
Michigan 318	86	90	91	<70

Bulldozer Komatsu D65E 220hp.	
At 4m. scraping forward	90
At 4m. moving backwards	89

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Caterpillar 613 Tractor Scraper	185hp at 5m	
scraping forwards	83	
moving backwards	<80	
30 ton 3 axle truck, 20 mph on smooth track loaded		78 at 6m
" " " " on rough haul road, empty		90 at 6m

Sand quarries are either worked dry with such as the above or wet with dredgers floating on a lagoon. Dredging equipment is usually quieter (e.g. 70 dB(A) at 10m) but ancilliary operations still use some of the above. The nature of the site itself controls which method is used.

In North West England excavation of sand deposits is usually in con-flict with top grade farm land or areas of natural beauty, or both. Therefore a significant proportion of inhabitants and local councils are opposed to developement. In addition many putative sites are within 200m of more than 10 dwellings and 500m of 30 dwellings. Away from main roads daytime background level may regularly be as low as 35 dB(A).

The result is that many outdoor sites of various sites raise back-ground level by more than the 10 dB(A) quantified by BS4142 and in some cases, well known to the local Environmental Health Officers, the rise is over 20 dB(A). If the machinery is well silenced and the best possible use is made of earth bank screening and timing of work, there is little left for an E.H.O. to recommend and nothing for the owner left to do.

At planning enquiries for new sites, this situation is often apparent in advance, but permission will still be given due to the need for the resource. Where does this leave the neighbours? Often very annoyed indeed. They are either in the position of being told that the noise will be worse than is normally allowed (and that their complaints are reasonable) or that by normal standards of judgment (according to documents like BS4142) the noise is or will be no worse than what is reasonable. It is not possible to distinquish root causes for annoyance when there are a great number of factors operating (and the population is predisposed to be anti-developement), but a recurrent theme has been that the actual noise levels are not so important to people as the question of audiability. The fact that the noise will not be loud enough to distract, wake from sleep or materially interfere with activities becomes irrelevant to the protest argument.

This same argument is presented by persons not overly excited or involved in protests, which leads one to suppose that at very low back-ground levels, the normal rules for defining a reasonable objection based on annoyance may not be working well.

Noise From Both Types of Sources

The common theme occurring in both sections above is that the normal rules for quantifying and then judging noise as an annoyance, break down either when the source is unusual (merrymakers in the street) or the environment is unusual (very low background levels). In the first the noise is carrying information in the form of a threat of trouble, and in the second it is carrying information about an activity regarded by the listener as totally out of place.