Reducing the noise nuisance

Rupert Thornely-Taylor assesses the issues of noise pollution for the freight industry…

The freight transport industry comes into contact with noise, vibration and the law in five main ways. The first is through planning legislation, affecting the original grant of permission for developments involving lorry movements, and the enforcement of planning conditions on existing permitted developments. The second is through the regulations on operators' licences. The third is through environmental protection legislation. The fourth is through regulations on the construction and use of vehicles, and the fifth is through the common law of nuisance.

Of these five ways, the first three are the most common. Provided a transport operator maintains his vehicles, the construction and use regulations (which implement EU directives) are mainly a concern for vehicle manufacturers, and although there have been landmark common law judgements concerning noise nuisance from the use of public roads, and rather more cases involving noise nuisance from premises, most matters involving noise and vibration arise in the planning context, the licensing context and environmental protection, which includes statutory nuisance.

Noise is generally more of an issue than vibration, provided vibration is defined as movement of the ground or structures transmitted from the wheels through the road. So defined, vibration is usually only an issue in the case of poorly maintained roads, and when most people talk of traffic vibration, they mean low frequency noise transmitted through the air, making windows rattle.

When planning, licensing or statutory nuisance cases arise, the issue is always the same: the effect of the noise of lorry movements on people. Usually, assessment of these effects involves separate consideration of daytime and night-time, with annoyance and interference with task performance being the main daytime concerns, and sleep disturbance being the main issue for times which encroach on the night period, often taken as being 11:00pm to 7:00am.

Many transport operations involve early starts, or deliveries to supermarkets early in the morning or round the clock. Others can involve significant daytime activity, and secondary noise effects such as noise from maintenance facilities or noise from the handling of the goods transported, such as scrap metal or aggregates, all come under scrutiny.

Although the legal concept of nuisance, and noise and vibration can be forms of nuisance, need not involve anything more than a value judgement, in noise cases, predictions and measurements of noise levels usually feature prominently. Almost all noise is assessed using the 'A-weighted decibel', abbreviated dB(A), which is a measure of sound pressure weighted to approximate the response of the human ear. The decibel measures proportional changes so that, for example, every 10dB(A) increase is roughly a doubling of loudness. A level of 30dB(A) is very quiet; at 90dB(A), you have to shout to be understood. Variations in dB(A) level over time are assessed using the equivalent continuous sound level index, abbreviated L_{Aeq}, which is the same as the instantaneous noise level in dB(A), with the level reduced by 3dB for every halving of the duration of the noise during the assessment period. For example, the five minute L_{Aeq} (relevant to night noise assessments) of engine noise at 50dB(A) becomes 47dB L_{Aeq} if the engine is on for only 2.5 minutes, and the one hour L_{Aeq} of a machine measuring 50dB(A) at the receiver becomes 44dB if it is on for only 15 minutes. Noise from separate, different events is treated in a similar way.

The UK differs from many other countries in not laying down firm standards for noise from industrial and commercial sites. If the vehicles concerned are moving on commercial premises, British Standard 4142:1997 provides a means of predicting the likelihood of complaints about noise from commercial premises, based on a comparison of the noise with the background in its absence. The noise being rated is measured in L_{Aeq} (over one hour by day or five minutes by night) with an added 5dB penalty if the noise has special characteristics (for example, tonal or impulsive). The background is measured in terms of the level exceeded to 90% of the time without the presence of the noise being rated. It always assesses noise measured outside a house, rather than indoors. If the rating level gives a number about 10dB greater than the background level, complaints may be expected. While BS 4142 is not a regulation of any kind, it is used in support of an opinion

Specific environment		Critical health effect(s)
Outdoor living areas	55dB $L_{Aeq, 16h}$ 50dB $L_{Aeq, 16h}$	Serious annoyance, daytime and evening Moderate annoyance, daytime and evening
Dwelling indoors	35dB $L_{Aeq, 16h}$	Speech intelligibility and moderate annoyance daytime and evening
Inside Bedrooms	30dB $L_{Aeq, 8h}$ 45dB $L_{Amax, fast}$	Sleep disturbance, night-time
Inside Bedrooms	45dB $L_{Aeq, 8h}$ 60dB $L_{Amax, fast}$	Sleep disturbance, window open (outdoor values)

Fig. 1 The WHO guidelines

that a noise is a nuisance, by saying that complaint about the noise is reasonable if a standard procedure concludes that complaints would be expected. BS 4142 is used extensively in noise assessments for planning applications, as advised in Planning Policy Guidance PPG 24, and if the conclusion is that complaints are likely, and conditions cannot be applied to deal with the problem, refusal is likely. It is also referred to in other kinds of noise assessment.

In the last few years, increasing prominence has been given to guidelines published by the World Health Organisation. They are often referred to in support of an argument that noise from a commercial operation is unacceptable, but although they do involve absolute standards, it is a mistake to interpret them as limits. The document explains that the guideline values presented are essentially values for the onset of effects (ie. annoyance or sleep disturbance) from noise exposure and that it does not set noise standards.

A table of guideline values is given related to adverse health effects, which refers to any temporary or long-term deterioration in physical, psychological or social functioning that is associated with noise exposure.

Many tribunals have spent long hours considering whether a proposed development or an existing operation causes the WHO guidelines to be exceeded. Although they are nothing more than indications of what a noise effect-free world is like, they are being given increasing weight in decision-making, despite the stringency of the levels involved.

When it comes to determination of noise cases in tribunals, the effect of noise on sleep is the most critical. An operation that is limited to daytime hours only is likely to be found much more acceptable than an operation which involves noisy activity at night, and to a lesser extent in the evening and early morning. Planning permissions and vehicle operators' licences frequently contain restrictions on hours of operation for this reason. The convention is to assume that bedroom windows are partially open, and the standard assumption is made that the difference between outside and inside noise levels is 15dB(A).

This means that, in any case where residential façades look on to a yard of any kind involving night-time vehicle movements, there is likely to be a major noise issue.

Naturally, the first consequence of a noise problem arising is the need for measures to reduce the noise effect. Apart from restrictions on operating times, what measures are available? Distance, or course, is one, and over hard surfaces, noise levels from individual sources decay by 6dB per doubling of distance (if the sources are many and spread over a wide area, you tend not to double the distance from all of them and the reduction is less). Over soft surfaces or when there are fences and buildings between, the decay can be 8dB or more per doubling of distance. Not many cases involve the luxury of being able to move the noise sources far enough away to solve the problem and attention focuses on one of the most important means of noise reduction: the noise barrier. Noise barriers interrupt the path of transmission from source to receiver, and their effect is the difference between the noise level with no barrier and the noise that comes over the top (or round the ends). Sound has wavelengths reckoned in metres and bends over noise barriers. A barrier whose top just reaches the line of sight from source to receiver gives a 5dB noise reduction, although a hard-faced barrier will cause reflections on the source side that may diminish the benefit. Above this height, the critical dimension is called the 'path difference', which is the length of the detour the sound has to make to get over the top compared with the shortest route had the barrier not there. The bigger the path difference, the greater the effect, and geometry dictates that this means barriers are best when close to the source or close to the receiver. If they are close to the source, though, it may be necessary to provide more that just an impervious fence (which is basically all that is required), and to make the source side sound absorbent by facing it with rock wool retained by geotextile.

Sound insulation of the affected façades can be a solution, although alternative ventilation has to be provided, and sound insulation cannot be made a condition of a planning consent. It only works, administratively, when there is agreement on all sides that it is the appropriate solution. An aggrieved resident can argue in court that they are entitled to natural ventilation.

Noise is frequently underestimated by those planning developments and land use. Resolving noise problems can turn out to be difficult, and noise can be a show stopper, of that there is no doubt.

Rupert Thornely-Taylor
Chairman
Association of Noise Consultants
6 Trap Rd
Guilden Morden
Royston
Hertfordshire SG8 0JE
Tel: 01763 852958
Fax: 01763 853252
mail@association-of-noise-consultants.co.uk
www.association-of-noise-consultants.co.uk