

Noise Pollution Primer

Possibly what most people mean when they use the term NOISE is 'unwanted sound' but it probably wouldn't satisfy a lawyer so Kay's definition (1931) of 'sound out of place' maybe a better one than 'unwanted sound'. However in the environmental context, noise is a form of pollution, an easier clarification perhaps since pollution is, by definition, something to be avoided, controlled or eliminated and as such, lumps noise in with other pollutants such as chemical waste, sewerage, etc. Oddly enough, the word 'noise' comes from 'nausea' which may not be totally inappropriate. According to a survey (1), the world's most unpopular noise is vomiting. Treating noise as a pollutant has an advantage in that it adds to the seriousness with which it should be treated and should encourage people to try and apply solutions.

Nature of Noise

A sound is not unlike the circles of ripples that spread from a stone thrown into a pond, all moving outward from the source, with each new ripple disturbing the water a little less than the one before as they get larger. Like ripples, a little energy source goes a long way, and that is why there is so much of it about. The amplification provided by the ossicles in the ear allow us to hear sounds so weak that they move the eardrum less than the diameter of an atom. In terms of pressure, this is about a billionth of an atmosphere and in terms of power, miniscule.

Noise can be measured in terms of sound 'pressure' (which most noise meters measure) or sound 'power' (often more relevant to the impact of sound but more tricky to measure). Sound 'intensity' is the amount of sound power in a given area but none of these are equivalent to loudness or 'perceived' loudness of sound but no instrument can measure it. Fortunately though, there are approximate relationships between these quantities. 'Volume' is roughly equivalent to 'loudness'.

Values of noise are usually referred to in decibels. These are not linear measurements but logarithmic and are not things in themselves but are measure of a difference (see Technical paper). So as a sound gets louder:-

- A 3dB increase means a doubling of sound power and sound intensity
- A 6dB increase means a doubling of sound pressure
- A 10dB increase means an approximate doubling of loudness or volume

Conversely, if the sound pressure has increased by 20dB:-

- The sound pressure has increased 10 times
- The sound power and intensity has increased about 100 times
- The loudness (volume) has got 4 times greater

Decibels have the advantage of compactness of expression over a very wide range of sound levels but summing values is not true for decibels as it is for other quantities such as weight or distance. If 2 similar 10dB sounds are heard together, the result is not 20dB but 13dB.

Levels

Whilst very high noise levels can cause physical effects, by far the largest consequence in terms of population numbers are annoyance and sleep disturbance. The relations between cause and effect of noise are complex and personal.

Loudness is the best accepted quantification of noise and in the early 30's the 'sone' was developed as a loudness indicator and eg, a supermarket may have a loudness level around 7 sones and a busy restaurant around 15 sones. However, the unit was only briefly used. Nowadays, most measurements relevant to human health are made in decibels, basically the A scale. However the units are frequently not understood and hence misused and misquoted by the media and non-experts. So the decibel has some shortcomings in the fight against environmental noise but unfortunately that's where we are at. There can hardly be anyone who doubts the impact of noise on humans but there is a major research difficulty in applying the dose-effect relationships in the case of Goodwood for example, where there are multiple noise sources racing round a track.

A Unified Approach to Noise Pollution?

In 1999, the World Health Organisation defined the onset noise thresholds for cardiovascular ailments to be long term night levels of 50dBA. It also concluded that the threshold for sleep disturbance is 42dBA and for general annoyance 35dBA. On that basis therefore, Goodwood is extremely annoying. In the UK in 2006, 101,000 people died of coronary heart disease, 3030 of whom were exposed to chronic vehicle noise. This is the chief source of noise problems in terms of numbers. Cars, motorbikes are most frequently referred to, followed closely by fireworks, the basic Goodwood Noise Cocktail, well above the WHO recommended community noise guidelines

In 2008, an holistic approach to dealing with noise and other pollutants was confirmed in law as the Integrated Pollution Prevention and Control (IPPC) Directive (2) which requires all pollutants to be dealt with in a joined up way.

This kind of thinking is still quite new. The most important Directive for assessment and management of environmental noise is the European Noise Directive (END)(3). This Directive requires member States to construct noise maps for major conurbations and noise sources to determine overall noise impacts in the community and so develop action plans to reduce high levels of noise, especially in noise 'hot-spots'. Partly because of the seriousness of noise pollution, many countries have passed new laws aimed at curbing noise. Uptake of the Directive has been slow, action plans should have been drawn up by 2008, but nevertheless, this Directive is the most promising attempt so far to tackle noise.

Noisy Neighbour

Where loud noises are concerned, our ears have essentially evolved as a warning system as noise is essentially disturbing. What smell is to burning, noise is to ears so you can't dismiss it, the peace of a quiet community is easily disturbed by noisy race meetings. It is difficult to tackle since noise is a source of power (and money) for the noise maker. All those in society who have power (position) and who strive for making noise deliberately will always win over a weak Local authority. The flipside of the power of noise is that those who complain about it and are regarded as weak and so Chichester District Council know that having opened the door, it is now an awkward issue for them to deal with so it remains an unchallenged noise issue for the local community. Goodwood think that the noise they produce is 'nice' to listen to and isn't noise at all but the bottom line is that it does conflict with neighbour's rights to peace.

However much Goodwood strives to be a 'good neighbour', the law still permits anyone to take the owners of the noise premises to Court.

References

1. Cox, T.J., 'Bad Vibes, an Investigation into the Worst Sounds in the World'. , Proc. 19th.Int.Congress on Acoustics, Madrid 2007
2. EC Directive 2008/1/EC
3. EC Directive 2002/49/EC