Environmental Studies
FACT SHEET
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Reducing Noise Pollution

Noise causes stress and stress is a major cause of illness. Very loud noises cause permanent damage to hearing (Factsheet 130 Noise Pollution).

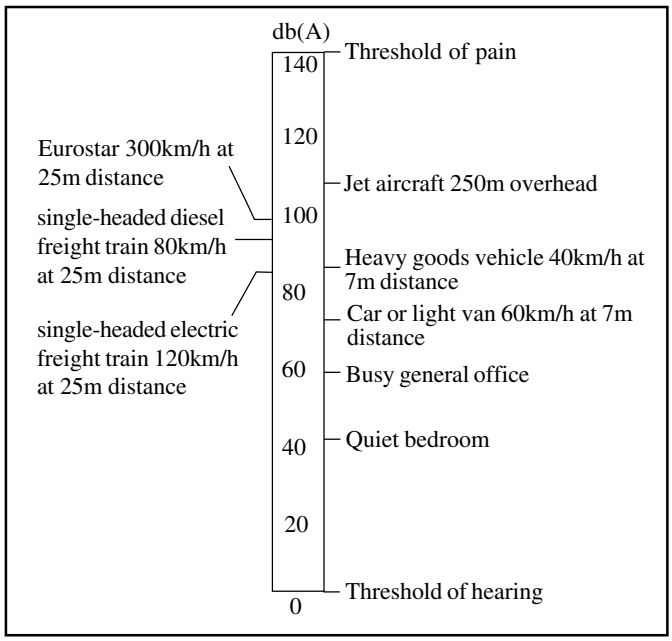
The actual loudness of a sound is only one factor that influences the scale of the problem it causes; the time and place, duration and whether the listener has any control over the sound are also important. All of these factors must be considered when attempting to reduce noise pollution. Noise nuisance is regulated by local authorities under a number of Acts:

- The Environmental Protection Act (1990)
- The Noise and Statutory Nuisance Act (1993) –includes car radios and burglar alarms
- The Noise Act (1996) – allows local authorities to restrict noise between 11pm and 7am
- Motor Vehicles (Construction and Use regulations) 1986

The decibel scale

The decibel (dB) scale is a measure of sound intensity or the size of the fluctuations in air pressure caused by sound waves. It doesn't measure sound volume. The decibel scale is logarithmic, not arithmetic. Thus, doubling the decibel level will increase the sound intensity by a huge amount. In fact, an increase of just 10dB will double the sound intensity. Fig 1 shows the relative noise levels of a range of activities.

Fig 1. Noise levels



Many noise sources contain a wide range of frequencies. However, the human ear does not respond equally to sound pressure levels over different frequencies. To compensate for this, decibels are commonly measured with a filter that emphasises sounds in certain frequencies. The "A" filter (dBA) is the one most commonly used.

This gives different weights to high and low pitched sounds to approximate the way that an average person hears sounds. The dBA scale starts at 0 – the faintest sound detectable by a human with good hearing.

Noise intensity diminishes with distance. In a large open area, which has no close sound reflecting surfaces, the effective decibel level falls by 6dB for each factor of two increase in distance.

Noise source	10m	20m	30m	40m
	100dB	94dB		88dB

In the US, the Environmental Protection Agency has stated that 70dBA is a safe average for a 24-hour day. Brief exposure to noises of up to 100dBA is considered safe provided the average does not exceed 70dBA. However, the World Health Organisation (WHO) recommends a maximum daytime level of 55dB and the EU have set an action level of 85dBA. It has been estimated that over half a million workers in the UK are exposed to noise above this level and 80% of damage claims for occupational disease relate to noise.

Road noise

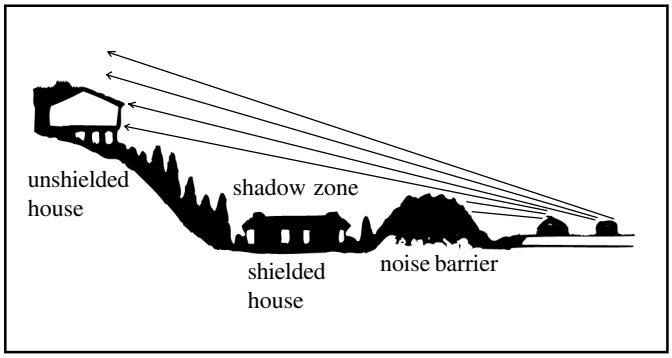
Traffic noise accounts for 66% of outside noise and is a particularly important source of noise in cities. Traffic noise is a combination of **engine noise, exhaust noise and the vibration of tyres on the road surface.** At speeds above 50km/h tyre noise becomes the most significant source and it is heavily influenced by the properties of the road surface. Improved engine design has reduced engine noise by a huge amount over the last 30 years but, over that time, there has been a huge increase in traffic volume!

Over the last 10 years the EU has strengthened legislation concerning new cars, lorries and buses which are now all much quieter than in the past.

Barriers

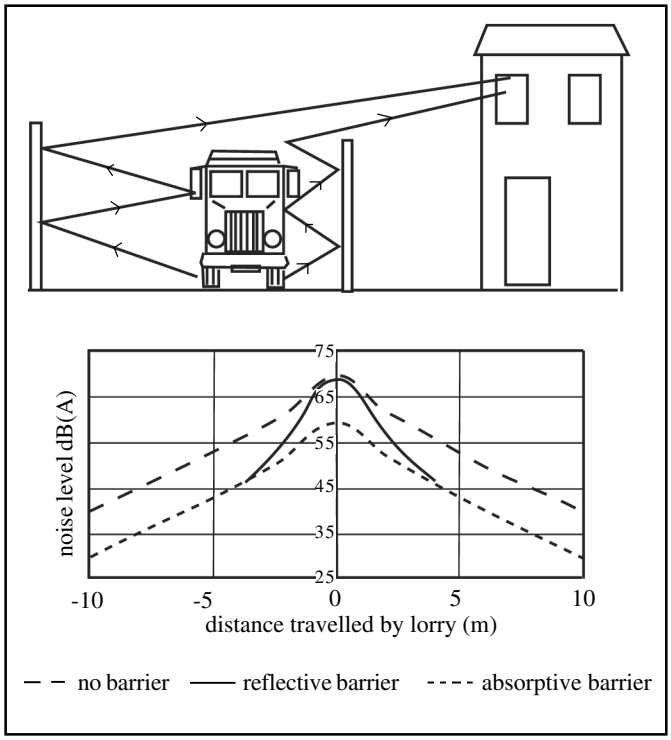
Effective noise barriers made of earth, wood, metal or concrete may reduce noise levels by 10-15dB. However, such barriers will not protect houses above the height of the barrier (Fig 2)

Fig 2. Noise Barriers



Barriers need to be as absorptive as possible and for this reason many are composite materials, i.e. they are made up of layers of different materials with air spaces in between. A reflective barrier may actually increase the amount of noise a house receives (Fig 3)

Fig 3. Approach and departure of a lorry



Mechanisms to reduce vehicle noise are summarised in Table 1.

Table 1. Reducing vehicle noise

Mechanism	Principle
Engine enclosures	Enclosure absorbs noise
Seal exhaust joints effectively	Reduces vibration
Fans turn off when not needed	Reduces number of moving parts
Buffer zones –e.g. trees	Absorb noise
Barriers –fences/walls	Absorb and reflect noise
Traffic calming	Slows traffic, reducing tyre noise
Traffic flow management	Ban lorries at certain times or along certain roads. Control of flow by sequencing traffic lights
Build new roads below the level of the land surface	Embankments absorb and reflect noise
Use porous asphalt for road surfaces	Has inverted texture which helps it to absorb noise. 20% of its volume is pore space, thus water infiltration is rapid. This reduces spray, which is a major source of road noise in wet conditions
Improve house insulation	Double or triple glazing and the use of composite wall materials help absorb sound waves (see Fig 4)

Aircraft noise

Noise is generated from the **moving parts within the engines, from the combustion process, jet flow from the nozzle and by air flow over the wing flaps and around the landing gear.**

Noise can be reduced by many of the approaches shown in Table 1. At internationally important airports such as Heathrow, the principal extra measures that are implemented are:

- Restrictions on night flying
- Preferential routes for aircraft taking off and landing – the government suggests concentrating take-offs on the minimum practicable number of specified routes – known as noise preferential routes. Effectively, this minimises the number of people who experience fly-over;
- Adoption of continuous descent approaches with late deployment of flaps and landing gear;
- Runway alternation;
- Westerly preference. The prevailing winds at Heathrow are westerlies and landing aircraft approach from the east, aircraft taking off depart to the west – this reduces the incidence of take-offs over the most densely populated areas.

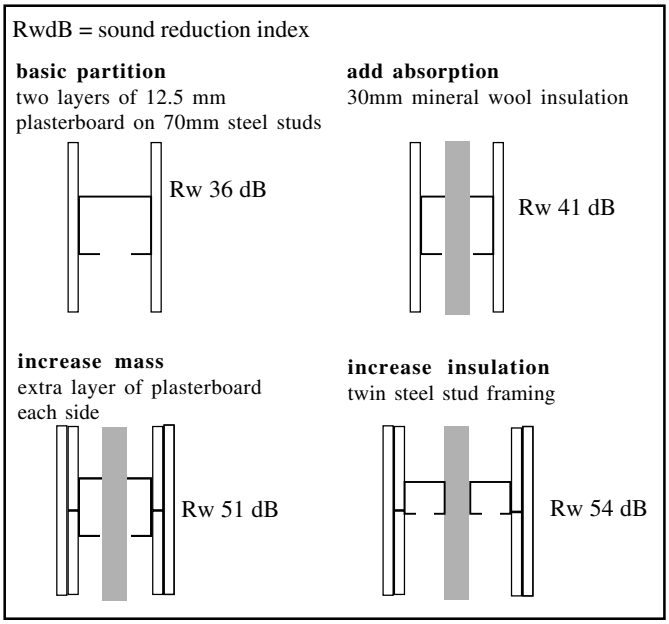
Local Authority Environmental Health Department

Noise nuisance is covered by the Environmental Protection Act (1990). Under the EPA, local authorities have the power to deal with noise from houses, shops, pubs, factories and stationary vehicles.

Complaints made to them will be investigated and, if necessary, a noise abatement notice will be served.

An alternative approach to noise reduction is to improve house insulation, using materials that are effective in absorbing sound waves (Fig 4)

Fig 4. Sound insulation



www.nsca.org.uk National Society of Clean Air and Environmental Protection

Role of local authority under EPA www.nsca.org.uk

UK Noise Association www.superscript.co.uk/ukna

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