

CHAPTER 8 NOISE AND RADIATION

Whilst the first part of this chapter addresses the topic of noise and its effect on individuals and the environment, the second section deals with radiation. The main issues emerging from both sections are set out at the end of the chapter together with contact and reference documents referred to.

NOISE

Introduction

Noise has been defined as unwanted sound or sound which is undesired by the recipient. This simple description underlines the cardinal point that noise is subjective and involves people and their feelings. In its assessment, human values and the environment in which it occurs are important considerations in addition to its precise physical measurement.

These values are complex in themselves, for not only do people vary greatly in their susceptibility and adaptability to noise, but each of us may be annoyed by one noise and not by another of similar physical characteristics. A sound which most people would ignore in, say, the industrial part of a city, would be a disturbing noise in a quieter environment, for example at night in a residential area or in the country. The annoyance produced by noise is often related to the information it conveys or the association or emotion it excites rather than its actual intensity. Therefore, a sound of small intensity, such as a dripping tap may become unbearable simply from repetition. Thus whether a sound is a noise, or whether a noise is annoying, may depend upon many factors which are independent of its physical qualities.

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Legislation and Guidance

- **Environmental Protection Act 1990**

Section 79 of this Act places a duty on local authorities to take action to abate a statutory noise nuisance or to prevent its occurrence or recurrence. Noise includes vibration.

- **Control of Pollution Act 1974**

Empowers a local authority to control the levels of noise resulting from works of construction and demolition.

- **Noise and Statutory Nuisance Act 1993**

Gives specific powers to local authorities regarding street noise, intruder alarms and noise caused by vehicles and associated machinery or equipment.

- **Local Government (Miscellaneous Provisions) Act 1982**

Regulates public entertainment, whether within a building or in the open air. Control is exercised by licence, to which conditions may be attached.

- **DETR Codes of Practice**

Noise from Intruder Alarms
Noise from Ice Cream Chimes
Noise from Model Aircraft

These codes have statutory recognition but do not have the force of law. Infringement does not constitute an offence. However, their guidance, would be considered in any proceedings.

- **Town and Country Planning Act 1990**

Before any development can take place permission must be obtained. Local authorities are guided in respect of environmental noise by the provisions of Planning Policy Guidance Note 24 – Planning and Noise (PPG24). This document gives guidance on noise from road traffic, aircraft, railways; industrial and commercial developments; construction and waste disposal sites; sporting, entertainment and recreational facilities; and mixed noise sources.

Effects of Noise on Health

The general effects of noise may have an influence on health in many ways. For example, by preventing sleep or inducing stress; by interference with specific activities such as communication, education and recreation; disturbance of concentration and the ability of someone to work at a difficult or skilful task; it may also affect personal safety. At different times it may produce anything from exhilaration to acute irritation in the same individual.

Of all the effects, repeated interference with sleep is least to be tolerated because prolonged loss of sleep is known to be injurious to health. With the exception of the exposure to noise of relatively high intensities such as exists in some industries, and which physically damages the mechanisms of the ear, the general effect of noise is more psychological than physical. Hence, most effects of environmental noise are those that cause irritation, disturbance or annoyance.

Sources of Noise

Nearly all activity results in the production of noise of one kind or another. Major sources of noise include transportation systems such as air, road and rail; industrial activities; building and constructional works; and social and recreational activities. In Reading, the sources, which give rise to the most substantial complaints, involve social and domestic activities and noisy dogs. Complaints received about noise for the twelve-month period from the 1st April 1998 until the 31st March 1999, totalled 1,872. Of these, 837 related to social or domestic noise, 800 to noisy dogs and 235 to noise of commercial or industrial origin.

Social noise complaints, in the main, involve amplified music, discos and parties, which extend into the early hours, often affecting many other residents of the locality. It can be particularly troublesome and in order to provide a prompt response to persistent recurrences of this type of noise nuisance Reading Borough Council operates an out of hours callout system.

Noise from road traffic does not prompt many complaints from the public, probably for the reason that many feel that there are no simple remedies to the nuisance created. However, traffic noise levels are high in the built-up parts of the town near busy highways. For example, the Cemetery Junction area on the eastern side of the town, at the intersection of the A4 and A329, is estimated to be one of the fourth noisiest locations across the Berkshire area. It is also estimated that substantial sections of all main routes in the town are subject to noise levels in excess of government guidelines. This matter is also referred to in Chapter 6 – Transport.

Noise Prevention

Scrutiny of planning applications provides one of the most effective means of introducing preventative measures to protect the local environment from any adverse effects of development, and this procedure has been followed in Reading for many years. In fact, the value of this kind of examination was recommended and encouraged by the Department of the Environment some twenty years ago in the circular Planning and Noise.

Typical conditions applied to planning consents relate to time limitations on industrial and commercial operations, sound insulation of buildings; the provision of protective barriers; the orientation of buildings; and the specification of noise limits.

Other preventative measures are applied through licensing requirements for places of public entertainment, building control and the provisions of the Environmental Protection Act 1990, relating to noise nuisance and the Control of Pollution Act 1974 for construction site noise.

A noise map of the background levels in the town exists, and whilst the document requires updating it still reflects the general levels experienced throughout the town. The map consists of a number of overlays, in 5dBA bands, which indicate the pattern of noise distribution throughout the town.

Noise Abatement Zones

There are two Noise Abatement Zones within the town. Both were declared to halt and progressively reduce noise levels caused by industrial activities. Recorded noise levels measured at the boundaries of industrial premises are entered in a public register, which is available for inspection. Any exceedance of the registered levels is an offence.

The Noise Abatement Zones are located in Cardigan Road and Wilton Road. However, the industrial premises in Wilton Road, which initially prompted the declaration of the Noise Abatement Zone, have been demolished to be replaced with residential development. In effect this Noise Abatement Zone is now redundant.

Highway Noise

The Noise insulation regulations impose a duty on highway authorities to offer noise insulation to dwellings adversely affected by noise from new or enlarged roads. Eligible dwellings must be within 300 metres of the new or enlarged highway where, over the next 15 years, the received noise level is expected to exceed 68dBA L10 (18-hours) i.e. 68 decibels for 10% of the daytime period between 6.00am until 12.00pm. It also gives the highway authority discretionary powers to insulate dwellings from highways where substantial alterations have been made.

Noise Units

The basic unit for noise measurement is the decibel (dB). This unit expresses the relationship of noise levels to each other and reflects the response of the human ear. Every numerical increase or decrease of 10dB represents a factor of ten increase or decrease. For example 40dB = 10 x 30dB and 50dB = 100 x 30dB. Sometimes the decibel is expressed as dBA and the suffix A indicates that the unit has been tailored to approximate to the sound frequencies detected by the human ear.

Another unit used extensively in environmental noise assessments is Leq. This is used in conjunction with dBA and indicates the average level of noise received over a given period of time.

RADIATION

Introduction

Radiation is a subject that causes concern. It is invisible and potentially very dangerous to human health and the environment.

There are two classes of radiation; ionising and non-ionising. Ionising radiation include cosmic rays, X-rays and radiation emitted from the decay of radioactive substances. Non-ionising radiation includes light, heat, radar and radio waves and microwaves. Radiation can be either natural or artificial.

The National Radiological Protection Board (NRPB) estimates that 87% of the radiation exposure of the UK Population arises from natural sources such as cosmic radiation, earth gamma rays, radon decay products and radionuclides in our diet. The other 13% of the radiation exposure is of artificial origin and includes medical uses, fallout from nuclear weapons, discharges to the environment and other occupational and miscellaneous sources.

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Legislation and Guidance

- **Public Information for Radiation Emergencies Regulations 1992**

Requires the public provision of information regarding the risk of a radiation emergency and advice on what to do in the event of such an emergency. Local authorities must prepare and keep up to date arrangements to ensure that the public receives prompt and appropriate information.

Radiation in the Environment

As stated previously, there are several sources of ionising radiation. It can arise from natural processes, such as the decay of uranium in the earth, and from artificial procedures, such as the use of X-rays in medicine. Radiation, consequently, is classified as natural or artificial according to its origin. Natural sources include cosmic rays, gamma rays from the earth and thoron decay products in the air, and various radionuclides in diet. Artificial sources include medical X-rays, fallout from the tests of nuclear weapons, discharges of radionuclides to the environment, industrial gamma rays and miscellaneous sources such as consumer products and air travel.

Each source has two important characteristics; the doses that it delivers to human beings and the ease with which such doses can be affected by human intervention. For example, until recent years, radiation from natural sources was regarded as unremarkable and unalterable – a background phenomenon. It is now recognised, however, that doses from radon decay

products in the home can be remarkably high, and that it is fairly easy to reduce them in existing homes and avoid them when building new homes.

The following tabulation indicates the National Radiological Protection Board estimate of the contribution from various sources to the average radiation dose received by the UK population.

Source	% Contribution
Natural (total)	87
Radon	47
Gamma	14
Internal	12
Cosmic	10
Thoron	4
Artificial (total)	13
Medical	12
Fallout	0.4
Miscellaneous	0.4
Occupational	0.2
Discharges	<0.1

Source: National Radiological Protection Board
Table 8.1: Contribution to the annual UK population radiation dose from various sources

Anthropogenic (man-made or artificial) emissions from authorised discharges, accidental unauthorised discharges, accidents such as Chernobyl and atmospheric nuclear weapons testing during the 1950/60s has increased levels of background radiation. There is natural concern, particularly after the experience of Chernobyl of accidental exposure to radiation from nuclear power stations, whether in this country or on the continent. Moreover, Reading is situated close to the nuclear establishments of the Atomic Weapons Establishment (AWE) at Aldermaston and Burghfield.

Pollution from these AWE installations could reach Reading by air currents or by transportation through the river and water systems. AWE Aldermaston has Environment Agency consents for the liquid discharges through a pipeline into the River Thames at Purley and for smaller quantities of treated waste to the local sewage works, which then discharges to a water system entering the River Thames. AWE Aldermaston also has an authorisation to discharge airborne radioactive material. Liquid discharges from AWE Burghfield enter the River Thames from the River Kennet and Foudry Brook tributaries.

There are 26 premises within the town, which are authorised by the Environment Agency for the use of radioactive materials. These uses vary from small sources used to calibrate instruments or equipment to industrial irradiation sources for the sterilisation of medical and toiletry products.

Monitoring of Radiation

In order to be alert to any changes in the background levels of radiation, routine monitoring of the environment is undertaken. The council, in addition to its own monitoring programme is a member of the Southern England Radiation Monitoring Group (SERMG), which is a co-operative body of local authorities in southern England. Environmental monitoring reports are also received annually from AWE in connection with its activities.

SERMG (Southern England Radiation Monitoring Programme)

This scheme operates essentially in two ways to make an assessment of local levels of environmental anthropogenic radioactivity. The first is that undertaken by Southampton

University, which involves a detailed radiochemical analysis of environmental samples, collected by the participating local authorities, for a wide range of alpha and gamma emitting isotopes. This approach makes a measurement of individual sample types and provides information on most man-made radioactive elements that exist in the sample. The second approach is undertaken by most local authorities and involves a measurement of the general gamma radioactivity of a specific site. The latter method is known as instantaneous, or continuous, gamma monitoring and though very useful, does not provide any information on the isotopes that are emitting the radiation. Both procedures together give a good indication of the nature and magnitude of environmentally significant radioactivity.

The Annual Report for SERMOG for 1997/98 makes the following comments on the samples received from Berkshire, Buckinghamshire and Oxfordshire for that year.

“Anthropogenic radioactivity throughout this region is currently attributable to weapons-testing fallout, permitted industrial discharges and the Chernobyl event and is radiologically insignificant. No foodstuffs so far examined show any activity that might cause concern.”

Due to the absence of a coastline for these counties the variety of samples is more restricted than for many of the other participating authorities. On the basis of samples examined so far this region represents one of very low anthropogenic radioactivity. There is currently no evidence of radioisotope discharges attributable to AWE Aldermaston and Burghfield or to AEA Harwell. All of these sites are permitted through Environment Agency authorisation to discharge controlled quantities of radioactive materials into the environment. These discharges are not radiologically significant.”

During the 1997/8 period Reading provided samples of fruit, vegetables, other foods, soil, freshwater sediment, riverweed and grass.

Radon Gas

In some parts of the country there is concern that the radioactive gas, radon, seeps into homes and builds up to dangerous levels. It is a particular problem in areas with granite rocks, such as Cornwall. Reading is situated on clays, sands and gravels or chalk and is, therefore, not likely to experience problems. However, in order to confirm this, the council participated in a nation-wide survey in 1987/88. Twenty-five homes of variable type and in different areas of Reading were tested.

The results ranged from 6-80 Bq/m³ with an average of 33.2 Bq/m³. This is a low level of activity and confirms that radon is not a problem locally. The NRPB action level is 400 Bq/m³ averaged over one year. The World Health Organisation (WHO) air quality guidelines for Europe recommend simple remedial measures be considered for buildings with concentrations of more than 100 Bq/m³. (Bq is the abbreviated form of the unit Becquerel. This unit describes the rate at which decays occur. One Bq corresponds to the decay of one radionuclide atom per second).

River Water Monitoring

The council held a Community Inquiry in March 1994, to gauge public concern over health, safety and environmental effects of the activities of AWE Aldermaston and Burghfield. Helena Kennedy QC, who conducted the Inquiry, recommended that the Government establish an independent public inquiry into the whole range of health, safety and environmental matters connected with these establishments. It also became apparent at the hearings that there was considerable public disquiet over potential nuclear contamination of the Rivers Kennet and Thames and, in view of this, the council undertook to extend its sampling programme to specifically include water from these rivers.

Transportation of Radioactive Material

Radioactive material from AWE is transported along Burghfield Road to the A4. Local campaigning groups suggest that, at times, the local road system south of the town in Pingewood may also be used. Material is also transported by rail from Winfrith in Dorset via Reading, Newbury and Oxford to Sellafield for reprocessing.

Main Issues

- Noise is unwanted or undesirable sound which is inherently subjective,
- Environmental noise can be a significant local pollutant,
- Noise can damage health,
- There are two Noise Abatement Zones within the town,
- Transportation noise adversely affects residential properties adjacent to major highways,
- Social and entertainment noise is the main source of complaint in Reading,
- The council operates a 24-hour, 365-day a year noise callout service,
- Cemetery Junction and Southampton Street are two of the noisiest roads in Berkshire,
- 87% of the background level of radiation is naturally occurring,
- 13% of the background level of radiation is from artificial sources,
- Reading is within close proximity of AWE and could be vulnerable in the event of a major incident,
- The rivers Kennet and Thames receive treated effluent from nuclear establishments upstream,
- The 1998 analysis of radiation in Reading demonstrated that recorded radiation levels were insignificant.

Key Contact

For further information contact Richard Marks on 0118 939 0314

References

1. British Standards Institution: BS 4142:1990 Method of Rating Industrial noise Affecting Mixed Residential and Industrial Areas
2. British Standards Institution: BS 5228: Parts 1, 3 and 4 1984/86 Noise Control on Construction and Other Sites
3. DETR: Planning and Policy Guidance Note 24 (PPG24) Planning and Noise
4. DETR: Code of Practice - Noise from Audible Intruder Alarms 1982
5. DETR: Code of Practice – Noise from Ice Cream Chimes etc 1982
6. DETR: Code of Practice – Noise from Model Aircraft 1982

7. The Noise Council: Code of Practice on Environmental Noise Control at Concerts
8. NRPB: Living With Radiation
9. Reading Borough Council: Background Noise Level Assessment of Reading
10. SERMOG: Annual Report 1997/99
11. World Health Organisation (WHO): Environmental Health Criteria 12