

Appendix 6 to the Proof of Evidence
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8.3 Controlling the spread of noise

8.3.1 General

If noisy processes can be avoided, then the amount of noise reaching the noise-sensitive area will be reduced. Alternative ways of doing this are either to increase the distance between the noise source and the sensitive area or to introduce noise reduction screens, barriers or bunds.

8.3.2 Distance

Increasing the distance from NSPs is often the most effective method of controlling noise. This might not be possible when work takes place on a restricted site or fixed structures, e.g. railway tracks. The effect of distance on noise attenuation is explained in Annex F.

Stationary plant such as compressors and generators should be located away from any noise-sensitive area.

8.3.3 Screening

On sites where it is not possible to reduce a noise problem by increasing the distance between the source and receiver, screening might have to be considered. For maximum benefit, screens should be close either to the source of noise (as with stationary plant) or to the listener. Careful positioning of noise barriers, such as bunds or noise screens, can bring about significant reductions in noise levels, although account should be taken of the visual impact of such barriers. Planting of shrubs or trees can have a beneficial psychological effect but will do little to reduce noise levels unless the planting covers an extensive area. Annex F gives information on the noise attenuation to be expected from typical barriers. If possible, decisions as to the most suitable types of screening should be made at project planning stages, because it will often be found that a site layout can itself contribute quite effectively towards the provision of useful screening. It might be necessary for safety reasons to place a hoarding around the site, in which case it should be designed taking into consideration its potential use as a noise screen. Removal of a direct line of sight between source and listener can be advantageous both physically and psychologically.

Site buildings such as offices and stores can be grouped together to form a substantial barrier separating site operations and nearby NSPs. On some sites, stacks of certain materials such as bricks, aggregate, timber or top soil can be strategically placed to provide a barrier. Areas which have been excavated below ground level such as basements or river works can be used to position static plant such as generators, compressors and pumps. This is a useful and often necessary method of reducing noise from plant that is required to operate continually day and night. Mechanical plant operating in confined spaces should be adequately ventilated, to allow for fume dispersal and to provide cooling air. Safety issues should be taken into account.

Earth bunds can be built to provide screening for major earth-moving operations and can be subsequently landscaped to become permanent features of the environment when works have been completed. The

construction of a bund can be a noisy activity and should be planned carefully, e.g. it might be possible to construct the outer side of the bund first so that remaining work on the bund is shielded from NSPs. When earth barriers are not practicable due to lack of space, it might be possible for protective features ultimately needed as permanent noise screening to be built in during the early stages of site work. Such an approach is particularly pertinent to major road construction works.

The effectiveness of a noise barrier will depend upon its length, effective height, position relative to the noise source and to the sensitive area, and the material from which it is constructed. Further guidance on this is given in Annex B.

8.4 Noise control targets

NOTE 1 Section 60 of the Control of Pollution Act 1974 [9] specifies the matters to which local authorities will have regard when serving a notice imposing requirements to limit noise and vibration emission from sites.

NOTE 2 Annexes C and D give guidance on noise levels produced by site equipment and activities, and Annex F describes methods of estimating noise from construction sites. The information contained in these annexes is intended to assist with the prediction of the levels of noise likely to emanate from a proposed construction site and to provide a useful reference when the setting of noise limits is being considered.

NOTE 3 Specific monitoring of noise from surface mineral workings is detailed in MPS 2 [15] and PAN 50 Annex A [16].

NOTE 4 Joint monitoring between the site operator and the local authority is possible.

All reasonably practicable means should be employed to ensure the protection of local communities and of people on construction sites, from detrimental effects of the noise generated by construction operations. The means employed should be determined by local circumstances and can include the methods described in 8.2 and 8.3.

Those seeking to determine suitable noise control targets for construction operations should be aware of the particular noise problem that can occur when such operations take place in existing buildings that are either occupied or contiguous with occupied buildings. Vibration introduced directly into the structure by equipment such as breakers, hammers and drills might attenuate only slowly as it is transmitted through the structure and might therefore produce unacceptable levels of noise in rooms remote from the source. In particularly sensitive situations, it might be necessary to use alternative techniques and equipment. (See also 6.3.)

Monitoring of noise at sites where noise is an issue should be regarded as essential. Measurement may be carried out for a number of reasons, including the following:

- a) to allow the performance of noise control measures to be assessed;
- b) to ascertain noise from items of plant for planning purposes;
- c) to provide confirmation that planning requirements have been complied with.

Monitoring positions should reflect the purpose for which monitoring is carried out.

Monitoring to ascertain whether an item of plant or particular process is meeting an anticipated noise criterion or if noise control methods are working, might require measurements to be carried out close to the plant or process to avoid undue interference from other noise sources.

Monitoring to confirm that planning conditions imposed to protect local occupants have been met may be undertaken at NSPs or at the site boundary, with a correction applied. The choice of noise measurement locations to be included in the planning conditions should reflect the requirement to accurately assess the noise.

Monitoring is the responsibility of the site operator and should be carried out by suitably trained personnel.

7.3 Execution of works

NOTE The use of "best practicable means" (BPM) to control emissions can constitute a ground of defence against charges that a nuisance is being caused under Part III of the Control of Pollution Act 1974 [9] or Part III of the Environmental Protection Act 1990 [10].

All available techniques should be used to minimize, as far as is appropriate, the level of noise to which operators and others in the neighbourhood of site operations will be exposed.

Measures which should be taken include the following.

- a) The hours of working should be planned and account should be taken of the effects of noise upon persons in areas surrounding site operations and upon persons working on site, taking into account the nature of land use in the areas concerned, the duration of work and the likely consequence of any lengthening of work periods.
- b) Where reasonably practicable, quiet working methods should be employed, including use of the most suitable plant, reasonable hours of working for noisy operations, and economy and speed of operations. Site work continuing throughout 24 h of a day should be programmed, when appropriate, so that haulage vehicles will not arrive at or leave the site between 19.00 h and 07.00 h. On tunnel sites, for example, it is common practice to provide night-time storage areas for soil and debris.
- c) Noise should be controlled at source and the spread of noise should be limited, in accordance with Clause 8.
- d) On-site noise levels should be monitored regularly, particularly if changes in machinery or project designs are introduced, by a suitably qualified person appointed specifically for the purpose. A method of noise measurement should be agreed prior to commencement of site works. If this is not specified, the method used should be one of those described in Annex G.
- e) On those parts of a site where high levels of noise are likely to be a hazard to persons working on the site, prominent warning notices should be displayed and, where necessary, ear protectors should be provided (see also Clause 5).

When potential noise problems have been identified, or when problems have already occurred, consideration should be given to the implementation of practicable measures to avoid or minimize those problems. Local authorities, consulting with developers and their professional advisers or with site operators, will need to consider the extent of noise control measures necessary to prevent the occurrence of significant problems, and will also need to consider whether the implementation of those measures will be practicable. Local authorities might wish to consider whether to specify quantified limits on site noise and whether, additionally or instead, to lay down requirements relating to work programmes, plant to be used, siting of plant, periods of use, working hours, access points, etc. The latter approach will often be preferable in that it facilitates the monitoring of formally or informally specified requirements, both for the authorities and for the site operators.

7.4 Emergencies

NOTE Attention is drawn to Section 61 of the Control of Pollution Act 1974 [9], which requires provision to be made for emergencies (see A.3.3.3).

In the event of any emergency or unforeseen circumstances arising that cause safety to be put at risk, it is important that every effort be made to ensure that the work in question is completed as quickly and as quietly as possible and with the minimum of disturbance to people living or working nearby. The local authority should be informed as

Developers, architects and engineers will need to know whether the processes they intend using are likely to result in excessive noise and/or vibration levels. Therefore early consultation should be made with local authorities in order to ascertain the limits or restrictions, if any, likely to be imposed; before seeking consultation, the expected levels of site noise should be determined. Annexes C and D give typical noise levels created by site plant and activities, and Annex F gives guidance on estimating noise from sites.

Local authorities should ensure that any noise level limits or restrictions being imposed are necessary and practicable.

7.2 Works preparation

NOTE Additional guidance on planning site operations is given in CIRIA Report 120 [8].

A project design should be so arranged that the number of operations likely to be particularly disturbing is kept to a minimum. Designers should also remember that project designs can have considerable influence upon operators' use of sites. Project designs should include the location of items such as haulage roads, batching plants and generators.

Appropriate investigations into ground conditions should be made when preliminary surveys are being carried out in order that consideration can be given to methods of working which could avoid problems.

A survey of the immediate neighbourhood surrounding a site should be undertaken to indicate the location of sensitive areas.

Guidance should be sought concerning recommended noise levels for the neighbourhood surrounding a site, and concerning acceptance of the proposed methods of working, in very general terms, from the relevant authorities at the same time as approvals are being requested for the commencement of work. This procedure is intended to enable work to proceed smoothly.

When works involve a tender stage, details of consents or other restrictions should be given to tenderers as early as possible.

When a number of site operators will be working on one site, overall site operations should be coordinated. Preferred routes for off-site movement of vehicles should be established with the local highway authority and the police. Access traffic should be routed away from NSPs.

Tenderers for a project should select the most appropriate plant in order that limits will not be exceeded. They should also be aware of the extent of control measures that will be necessary so that appropriate cost allowances can be made.

Tenderers should satisfy themselves that proposed methods of working and phasing of operations will meet the local authority's requirements. They should be clear about this before submitting their tenders.

Tenderers should take due regard of the following before tendering:

- a) site layout, e.g. location of static noise sources, and use of site buildings, material dumps, etc., as ad hoc barriers;
- b) types of machinery likely to be used and whether alternative types or techniques would achieve less disturbance.

NOTE Example criteria for the implementation of these measures are outlined in Annex E.

activities are likely to continue for a significant period of time either continuously or sporadically:

- 1) Noise insulation (NI) – this is the provision of secondary glazing to the windows of affected habitable rooms. Additional ventilation provision might also be necessary to allow the windows to be kept closed whilst maintaining the appropriate number of air changes in the room. Secondary glazing increases attenuation and this can provide a significant improvement to the internal noise environment.
- 2) Temporary or permanent re-housing (TRH) – where construction noise levels are such that noise insulation will not provide sufficient attenuation to prevent disturbance or interference with activities or sleep, then the occupants can be temporarily re-housed away from the construction site. However, if the nature of the construction activities means that re-housing would be necessary for a significant extent of time, e.g. in excess of six months, then there might be advantages in offering permanent re-housing, i.e. the property would be purchased by the developer and the occupants would purchase another property elsewhere. The property would then remain vacant or be used by site personnel for the duration of the works, after which it can be re-sold.

7 Project supervision

7.1 General

The intention throughout any construction programme should be to minimize levels of site noise whilst having due regard to the practicability and economic implication of any proposed control or mitigation measures.

Planners, developers, architects, engineers and environmental health officers can all assist in preventing excessive noise levels. Prevention can be achieved by giving careful consideration to the plant, processes, activities and programme associated with any construction project.

NOTE The Construction (Design and Management) Regulations 2007 [4] came into effect on 6 April 2007. They replaced the Construction (Design and Management) Regulations 1994 [5] and the Construction (Health, Safety and Welfare) Regulations 1996 [6]. An Approved Code of Practice [7] provides practical guidance on complying with the duties set out in the Regulations.

The key aim of these are to integrate health and safety into the management of the project and to encourage everyone involved to work together to:

- a) *improve the planning and management of projects from the very start;*
- b) *identify risks early on so that they can be eliminated or reduced at the design or planning stage and the remaining risks can be properly managed;*
- c) *target effort where it can do the most good in terms of health and safety; and*
- d) *discourage bureaucracy.*

soon as possible if it is found necessary to exceed permitted noise limits because of an emergency.

8 Control of noise

8.1 General

NOTE 1 Guidance on groundborne noise from sub-surface construction activities is given in BS 5228-2:2008, 8.7.

Construction and demolition works can pose different noise control problems compared with most other types of industrial activity for the following reasons:

- they are mainly carried out in the open;
- they are of temporary duration although they can cause great disturbance while they last;
- the noise they make arises from many different activities and kinds of plant, and its intensity and character can vary greatly at different phases of the work; and
- the sites cannot be excluded by planning control, as factories can, from areas that are sensitive to noise.

If a site upon which construction or demolition work will be carried out involves an existing operational railway, special features that are significant in relation to noise control have to be taken into account. Advice should be sought in such cases from the appropriate railway authorities.

NOTE 2 EC Directive 2000/14/EC [11] deals with noise from particular sources, for example, many categories of construction plant and equipment.

Much of the noise from construction and demolition sites is generated by plant and machinery. The noise levels so generated are unacceptable in many instances and reductions are necessary for the benefit of both the industry and the public.

8.2 Control of noise at source

8.2.1 General

NOTE Attention is drawn to regulatory requirements contained within the Health and Safety at Work etc Act 1974 [12], the Workplace (Health, Safety and Welfare) Regulations 1992 [13] and the Management of Health and Safety at Work Regulations 1992 [14] in respect of reversing warning systems.

There are many general measures that can reduce noise levels at source such as:

- a) avoid unnecessary revving of engines and switch off equipment when not required;
- b) keep internal haul routes well maintained and avoid steep gradients;
- c) use rubber linings in, for example, chutes and dumpers to reduce impact noise;
- d) minimize drop height of materials;
- e) start up plant and vehicles sequentially rather than all together.

The movement of plant onto and around the site should have regard to the normal operating hours of the site and the location of any NSPs as far as is reasonably practicable.

The use of conventional audible reversing alarms has caused problems on some sites and alternatives are available. Audible reversing warning systems on mobile plant and vehicles should be of a type which, whilst ensuring that they give proper warning, have a minimum noise impact on persons outside sites. When reversing, mobile plant and vehicles

Table B.1 Methods of reducing noise levels from construction plant

Plant	Noise reduction of plant		Alternative plant
	Source of noise	Possible remedies (to be discussed with machine manufacturers)	
Hammer drive piling equipment	Pneumatic/diesel hammer or steam winch vibrator driver	Enclose hammer head and top of pile in acoustic screen	Bored piling Vibratory system Drop hammer completely enclosed in box with opening at top for crane access Steel jacket completely enclosing drop hammer with dolly and polystyrene chips fed to impact surface to dissipate energy Pressed-in piling which generates its driving force from the frictional restraint of other piles
	Sheet pile	Acoustically dampen sheet steel piles to reduce levels of resonant vibration	
	Impact on pile	Use resilient pad (dolly) between pile and hammer head. Packing needs to be kept in good condition	
	Cranes cables, pile guides and attachments	Careful alignment of pile and rig	
	Power units or base machine	Fix more efficient sound reduction equipment or exhaust. Acoustically dampen panels and covers. When intended by the manufacturer, engine panels need to be kept closed. Use acoustic screens when possible	
Earth-moving plant: • bulldozer • compactor • crane • dump truck • dumper • excavator • grader • loader • scraper	Engine	Fit more efficient exhaust sound reduction equipment Manufacturers' enclosure panels need to be kept closed	Alternative super silenced plant might be available. Consult manufacturers for details
		5 to 10	

Table B.1 Methods of reducing noise levels from construction plant (continued)

Plant	Noise reduction of plant		Alternative plant
	Source of noise	Possible remedies (to be discussed with machine manufacturers)	
Riveters	Impact on rivet	Enclose work area in acoustic shed	Design for high tensile steel bolts instead of rivets
Pumps	Engine pulsing	Use machine inside acoustic enclosure with allowance for engine cooling and exhaust	Up to 20
Batching plant	Engine	Fit more efficient sound reduction equipment on diesel or petrol engines Enclose the engine	5 to 10
	Filling	Do not let aggregate fall from an excessive height	
	Cleaning	Do not hammer the drum	
Materials handling	Impact of material	Do not drop materials from excessive heights. Screen dropping zones, especially on conveyor systems. Line chutes and dump trucks with a resilient material	Up to 15