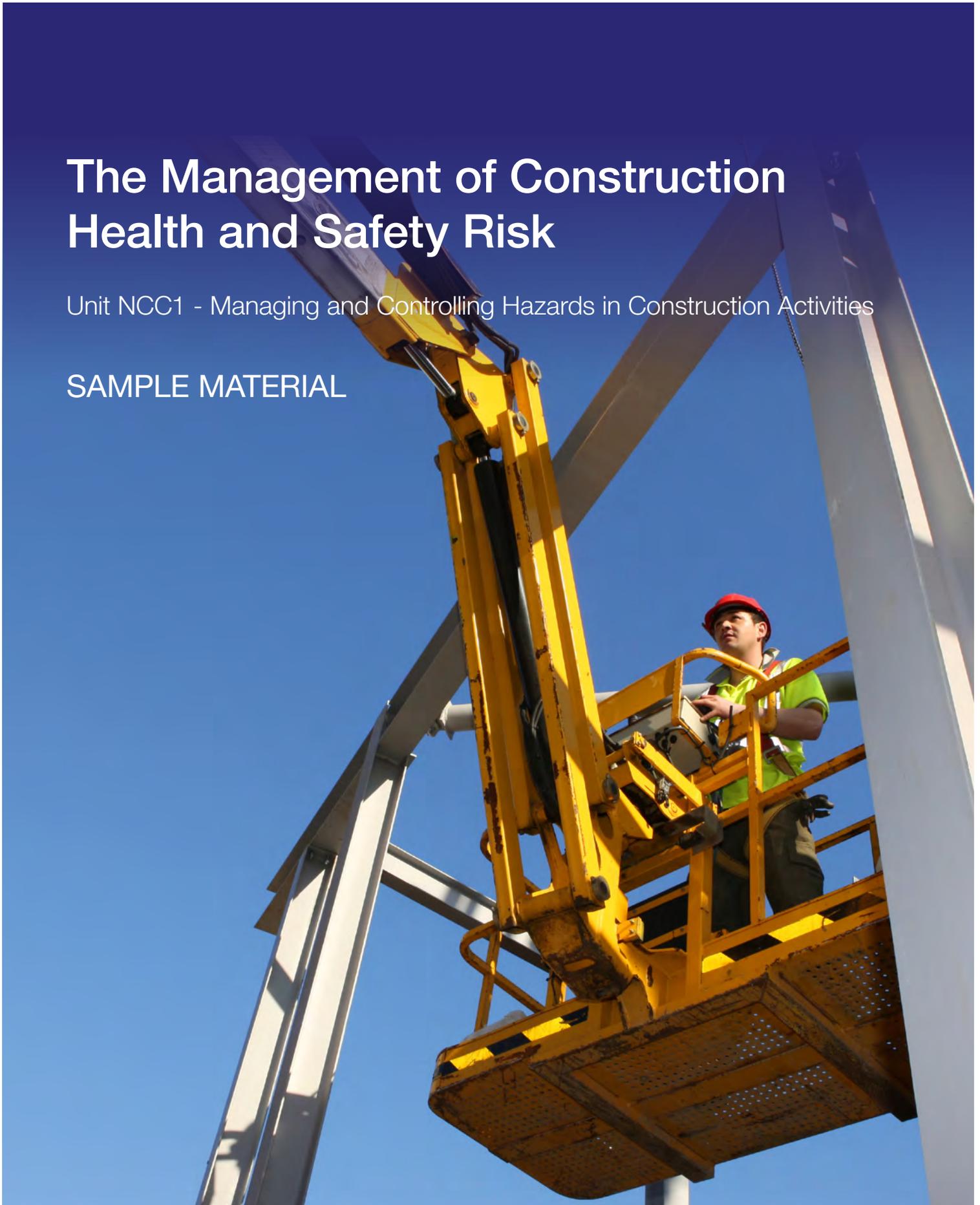


The Management of Construction Health and Safety Risk

Unit NCC1 - Managing and Controlling Hazards in Construction Activities

SAMPLE MATERIAL



RMS Publishing Ltd

Suite 3, Victoria House,
Lower High Street, Stourbridge, West Midlands DY8 1TA
Tel: +44 (0) 1384 447927 Email: sales@rmspublishing.co.uk



Waterways are used by a considerable number of boat operators that may be affected by the activities on site (for example, falling objects from a scaffold structure, flying objects from cutting, drilling or hammering operations, fumes, dust, chemicals). Boat operators may equally affect site safety, for example, collision of the boat with a scaffold structure.

Residential/commercial/industrial properties

Construction can take place in local or immediate proximity of residential, industrial or commercial property that may be either unoccupied or occupied and fully operational. Construction traffic will generally add significantly to the normal traffic loading in the area, which may result in congestion, for example, during the 'school run' period and lunch times. This may well be exacerbated by vehicles queuing near the site entrance to gain access. The increase in large goods vehicles (LGV's) in the area will lead to increased engine noise, vehicle exhaust fumes and the risk of collisions with other vehicles, pedestrians. Young children and the elderly may be particularly at risk, as they may choose to weave through semi-stationary traffic and may not be visible to large construction vehicle drivers when they decide to move their vehicles. There are additional risks where work is carried out in commercial property (shops, offices) as the work may take place in busy areas where members of the public and staff are present. In the case of industrial properties (factories, workshops), people may be at work when construction activities take place and the premises can present additional hazards from machinery, plant, equipment, chemicals, etc. being used. Construction workers may not be familiar with the hazards presented, which could increase the risk of personal injury.



Figure 2-7: Commercial properties.

Source: RMS.



Figure 2-8: Industrial properties.

Source: RMS.

Schools

Schools are very busy areas and accommodate children of various ages that may have no or little perception of danger or risk and by their nature are often very inquisitive of their surroundings. In addition to children, parents or carers that deliver children to and collect children from the school create pedestrian and vehicular traffic hazards around the immediate area. Children are frequently tempted to try to gain access to construction sites and normally achieve this when site security is poor and consideration has not been given to access through small openings. Sites often underestimate the size of openings, which some small children are able to fit through, particularly when compared with that which is required to restrict adult access.

MEANS OF ACCESS

Access to a construction site should be through a controlled point and requires adequate planning to take into account the surrounding area. Restrictions and hazards relating to safe access to a construction site may include the conditions of the highway from which access is being gained (size, speed, use). The traffic that will operate on the site needs to be considered (size, type, frequency, volume).



Figure 2-9: Means of access, overhead restrictions. Source: RMS.

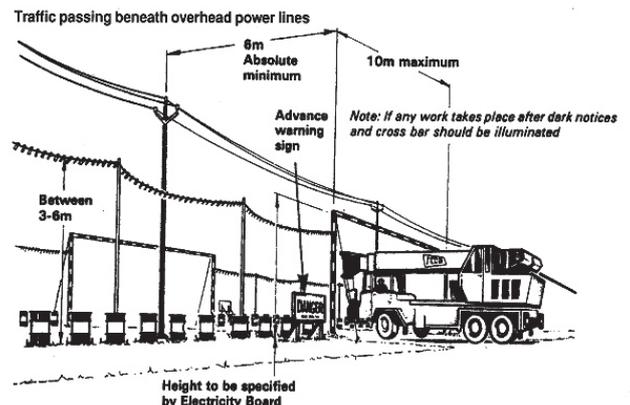


Figure 2-10: Safe distance barriers for overhead services. Source: HSE, HSG144.

9.1 - Noise

Physical and psychological effects on hearing of exposure to noise

The ear senses **sound**, which is transmitted in the form of pressure waves travelling through a substance, for example, air, water, metals etc. Unwanted sound is generally known as **noise**.

The ear has 3 basic regions **see figure ref 9-1**:

- 1) The **outer** ear channels the sound pressure waves through to the eardrum.
- 2) In the **middle** ear, the vibrations of the eardrum are transmitted through three small bones (hammer, anvil and stirrup) to the inner ear.
- 3) The cochlea in the **inner** ear is filled with fluid and contains tiny hairs (nerves) which respond to the sound. Signals are then sent to the brain via the acoustic nerve.

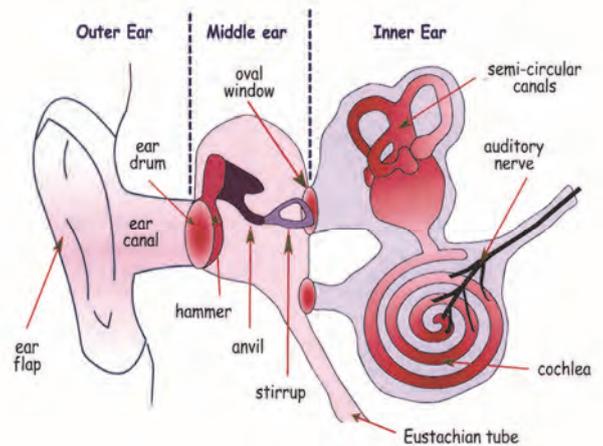


Figure 9-1: Inner ear diagram. Source: www.echalk.co.uk.

PHYSICAL EFFECTS

Excessive noise over long periods of time can cause damage to the hairs (nerves) in the cochlea of the ear. This results in **noise induced hearing loss (deafness)**, which can be of a temporary or permanent nature. Also, a single high pressure event can damage the ear by dislocation of a bone or rupturing the ear drum. It has been shown that high levels of noise can cause, or increase the onset of, **tinnitus** ('ringing in the ears').

PSYCHOLOGICAL EFFECTS

Noise is often linked with adverse psychological effects such as stress, sleep disturbance or aggressive behaviour, and is frequently cited as the cause of friction between workers, particularly in a noisy office environment where there is a need for some individuals to concentrate on complex issues but they find this difficult or impossible because of background noise levels.

The meaning of common sound measurement terms

SOUND POWER AND PRESSURE

For noise to occur power must be available. It is the sound power of a source (measured in Watts) which causes the sound pressure (measured in Pascals) to occur at a specific point.

INTENSITY AND FREQUENCY

The amplitude of a sound wave represents the intensity of the sound pressure. When measuring the **amplitude** of sound there are two main parameters of interest (**as shown in figure ref 9-2**). One is related to the energy in the sound pressure wave and is known as the 'root mean square' (RMS) value, and the other is the 'peak' level. We use the rms sound pressure for the majority of noise measurements, apart from some impulsive types of noise when the peak value is also measured.

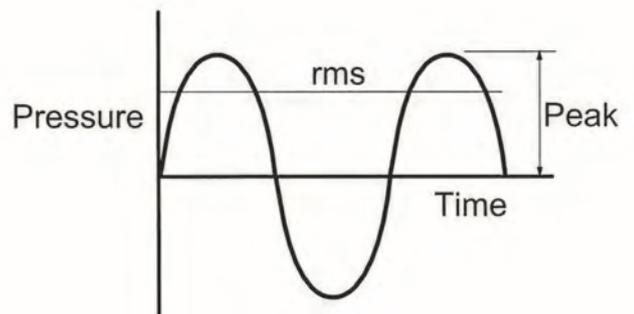


Figure 9-2: Rms and peak levels of a sound wave. Source: RMS.

Sound waves travel through air at the '**speed of sound**' which is approximately equal to 344 m/s.

A sound can have a '**frequency**' or '**pitch**', which is measured in cycles per second (Hz).

THE DECIBEL SCALE

The ear can detect pressures over a very wide range, from 20 μ Pa to 20 Pa (Pascals). To help deal with this wide range, the **decibel (dB)** is used to measure noise. A decibel is a unit of sound pressure (intensity) measured on a logarithmic scale from a base level taken to be the threshold of hearing (0dB). Typical noise levels include:

Source	dB	Source	dB
Night club	110	Radio in average room	70
Smoke detector at 1 metre	105	Library	30
Machine shop	90	Threshold of hearing	0

Figure 9-3: Typical noise levels.

Source: RMS.

Debris netting may also be slung underneath steelwork or where roof work is being conducted to catch items that may fall. In this situation it should not be assumed that the debris netting is sufficient to hold the weight of a person who might fall.

REQUIREMENTS FOR SCAFFOLD ERECTORS

Scaffold erectors must erect and dismantle scaffold in a way that minimises the risk of falling. Where practicable they should erect intermediate platforms, with guardrails and toe boards, to enable them to build the next scaffold 'lift' safely.

If a platform is not practicable, falls must be prevented (or their effects minimised) by other means, such as the use of a safety harness or similar fall arrest equipment.

The National Access and Scaffolding Confederation (NASC) provide guidance for scaffold employees on the safe erection of scaffolds.

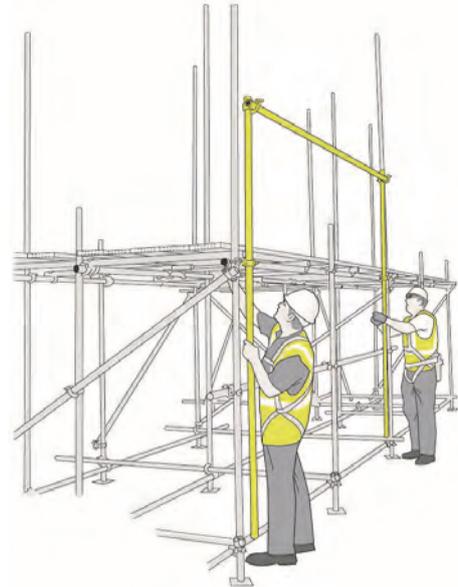


Figure 10-23: Fitting advanced guardrail system. Source: NASC.

Part 2 of Schedule 3 of the WAH 2005 requires that scaffolds only be erected by those that have received appropriate and specific training.

"12. Scaffolding may be assembled, dismantled or significantly altered only under the supervision of a competent person and by persons who have received appropriate and specific training in the operations envisaged which addresses specific risks which the operations may entail and precautions to be taken, and more particularly in -

- (a) understanding of the plan for the assembly, dismantling or alteration of the scaffolding concerned;*
- (b) safety during the assembly, dismantling or alteration of the scaffolding concerned;*
- (c) measures to prevent the risk of persons, materials or objects falling;*
- (d) safety measures in the event of changing weather conditions which could adversely affect the safety of the scaffolding concerned;*
- (e) permissible loadings;*
- (f) any other risks which the assembly, dismantling or alteration of the scaffolding may entail."*

Figure 10-24: Competency and training.

Source: WAH Schedule 3 Part 2.

MEANS OF ACCESS

"So far as is reasonably practicable as regards any place of work under the employer's control, the maintenance of it in a condition that is safe and without risks to health and the provision and maintenance of means of access to and egress from it that are safe and without such risks."

Figure 10-25: Means of access.

Source: HASAWA 1974 s2(2)(d).

General access must not be allowed to any scaffold until its erection has been fully completed. Access must be prevented to any subsequent sections of scaffold that are not completed and a 'scaffold incomplete' sign displayed. Ladders often provide access and egress to and from scaffolds where stairs cannot be provided.



Figure 10-26: Stair access.

Source: RMS.



Figure 10-27: Ladder access.

Source: RMS.



Figure 12-25: Dry rot - characteristic cuboidal cracking.
Source: Safeguard Europe Ltd.



Figure 12-26: Timber damaged by death watch beetle.
Source: Rudders and Paynes Ltd.

Weakened or split boards may be caused by damage by occupants, loss of natural preservatives and the effects of corroded nails.

Roof defects

Common defects of roof tiles include corrosion of nails that fix the tiles to battens and rafters, the decay of battens, and the cracking of tiles caused by harmful growth. Another aspect to be considered is the mortar applied for ridge tiles, which tends to decay or flake off over the years. Roof light materials often deteriorate on exposure to sunlight and become brittle, lose structural strength and are easily fractured. Often they are covered with felt to prevent leaks or become obscured from the rest of the roof by the growth of moss. Hidden roof lights present a risk to workers of falling through.

Unstable foundations

Most of the common problems associated with foundations depend on the geology of the ground upon which a building stands. For example, settlement or subsidence may result if it is built prematurely on made up ground or the water table height is causing the ground to expand or contract.

The leaning Tower of Pisa is perhaps the most famous example of building subsidence. The tower began to sink after construction had progressed to the second floor in 1178. This was due to a shallow three-metre foundation, set in weak, unstable sandy subsoil, a design that was flawed from the beginning.

Unstable foundations may occur due to traffic vibrations, deterioration of building materials and through change of use, for example, increased floor loading. Problems with unstable foundations may lead to an unstable building structure, which increases the risks of premature collapse during deconstruction or demolition.



Figure 12-27: The leaning tower of Pisa, Italy. Source: Marshai.

Review of factors affecting the structure

DRAWINGS, STRUCTURAL CALCULATIONS, HEALTH AND SAFETY

Before work commences every effort should be made to find the original design drawings, together with the calculations made by the architect. If the building is of recent construction these will be found in the health and safety file related to the structure.

This will provide information on how the structure was built, for example, reinforced concrete frame or steel frame. If it is a large structure, it will be important to identify any pre-stressed or post-stressed concrete beams present within the structure and whether any floor slabs or piles were involved in the build. It is also important to determine the age of the structure and its previous use.

It is the client's responsibility to provide such information to the contractor. Prior to deconstruction/demolition, any structural alterations that might affect the load-bearing capacity of walls and floors should be reviewed to avoid premature collapse.