INLAND WATERWAYS ASSOCIATION

GUIDANCE NOTE

Noise

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INTRODUCTION

Construction work on a restoration site can generate high levels of noise from the activities carried out and the equipment commonly in use. Operations such as brick cutting and mortar mixing can pose a risk to volunteers because of the proximity of the equipment. Construction noise is a nuisance and is a hazard to neighbours and passers-by.

Hearing damage is irreversible and can be compounded with the natural loss of hearing due to ageing.

Noise from construction activities has the potential to cause permanent damage to hearing in the form of hearing loss and tinnitus. Noise can affect safety on site by interfering with spoken communications and auditory warnings, increasing the risk of accidents.
Noise has an impact on the environment and can result in annoyance to and complaints from neighbours. The impacts are related to the nature of the noise generated as well as its intensity and duration, for instance intermittent noise can be more disruptive than a continuous noise and high pitched sounds are more disturbing than low frequency ones. The time of day and weather conditions are important factors in whether noise causes nuisance.
Noise engineering and organisational control measures should be applied before resorting to personal hearing protection.

Noise from a cement mixer is reduced by keeping the cover closed and fastened.

CONTROL OF NOISE AT WORK REGULATIONS (2005)

The Control of Noise at Work Regulations place duties on restoration groups and volunteers. In respect of the regulations the restoration group take on the duties of the employer and volunteers that of employee.

The requirements of the regulations are triggered at two action levels:

1. **Exposure action values** – Lower exposure action values (LEAV) set at daily or weekly personal noise exposure of 80 dB(A) and peak sound pressure of 135 dB(C). Upper exposure action values (UEAV) set at daily or weekly personal noise exposure of 85 dB(A) and peak sound pressure of 137 dB(C).
2. **Exposure limit values (ELVs)** – daily or weekly personal exposure of 87 dB(A) and peak sound pressure of 149 dB(C). ELVs take into account the personal hearing protection being worn.

Where volunteers are likely to be exposed to noise at or above the LEAV, the UEAV or the ELV then the restoration group is required to carry out a suitable and sufficient assessment of the risk.

Rules of thumb for noise assessment:

1. If two people, not wearing hearing protection, standing 1 metre apart have to raise their voices to hear each other the noise level is approximately 90 dB. Hearing protection must be worn or the noise level reduced to the ELV by other means. The reason why the ELV has been breached must be identified and the organisation and technical measures modified.
2. If two people standing two metres apart have to raise their voices to hear each other the noise level is around 85 dB and hearing protection must be worn.
3. If there is any doubt about the noise level, those affected by it should be wearing hearing protection.

The regulations require that risk assessment must identify the measures to be taken to effectively manage the noise and take into account the following circumstances:

1. The level, type and duration of exposure, including any exposure to peak sound pressure, the maximum sound pressure to which a volunteer is exposed.
2. The effects of exposure to noise on employees or groups of volunteers whose health is at particular risk from such exposure.
3. So far as is practicable, any effects on the health and safety of volunteers resulting from the interaction between noise and the use of substances toxic to the ear at work, or between noise and vibration.
4. The risk to health and safety if audible warning signals cannot be heard.
5. Any information provided by the manufacturers of work equipment.

6. The availability of alternative equipment designed to reduce the emission of noise.

7. Any extension of exposure to noise in the workplace beyond normal working hours, including exposure in rest facilities supervised by the restoration group.

8. Appropriate information obtained following health surveillance, including, where possible, published information.

9. The availability of personal hearing protectors with adequate attenuation characteristics.

Where the risk assessment identifies that volunteers are at risk of exposure to noise at or above the UEAV the restoration group must either eliminate or reduce exposure to as low a level as is reasonably practicable by means other than using personal hearing protection.

Exposure to noise can be reduced by choosing work equipment that emits the least possible noise for the task to be undertaken. The working methods could be changed or using screens, or other technical means, could reduce noise exposure. Properly maintained work equipment reduces the risk of noise generation from worn parts.

Set work schedules with adequate rest periods that limit the duration and intensity of exposure to noise. Where possible locate noisy operations away from other activities, rest areas and public places. Provide suitable and sufficient information, training and supervision to volunteers so that work equipment is used correctly in order to minimise their exposure to noise.

If the exposure to noise cannot be eliminated or reduced below an UEAV, suitable hearing protection must be provided. The area where a volunteer is likely to be exposed to noise at or above an UEAV must be designated as a hearing protection zone and identified by means of signs indicating that hearing protection must be worn.

The mobile nature of construction sites make it impractical to demarcate hearing protection zones and the whole site may be designated as a zone for particular activities. This blanket application of hearing protection zones can be hazardous as it prevents volunteers perceiving other hazards, such as site traffic. You must assess this risk when carrying out your project planning.

If an ELV is exceeded, the restoration group must reduce the exposure below the ELV as soon as possible and identify the reason for it being exceeded and modify the organisational and technical measures accordingly.

Restoration groups who provide any noise reducing equipment, except personal hearing protection, must ensure that it is used properly and maintained in a good state of repair. Volunteers must make proper use of any personal hearing protection and equipment provided and report any defect that is discovered.

The regulations include a requirement for the provision of health surveillance for those at risk from noise. Those regularly exposed to noise at or above the UAEV should receive regular health surveillance and it should be extended to those volunteers who have a particular sensitivity, family history of hearing problems, existing hearing damage or previous history at high noise levels.

Health surveillance is a programme of systematic health checks to identify early signs of hearing loss and is useful for monitoring the effectiveness of the noise reduction controls. Audiometry is the name given to hearing checks.

Any volunteers exposed to noise at or above the LEAV must be provided with sufficient information, instruction and training to include the following:

1. The nature of risks from exposure to noise.
2. The organisational and technical measures taken in order to reduce the risk from noise.
3. The exposure limit values and upper and lower exposure action values set out in the regulations.
4. The significant findings of the risk assessment, including any measurements taken, with an explanation of those findings.
5. The provision of personal hearing protectors and their correct use.
6. Why and how to detect and report signs of hearing damage.
7. The entitlement to health surveillance and its purposes.
8. Safe working practices to minimise exposure to noise.
9. The collective results of any health surveillance in a form that does not identify a particular person.

EFFECTS OF NOISE

The most common effect of excessive noise at work is noise-induced hearing loss. The occurrence and amount of loss is related to the noise dose. Noise-induced hearing loss affects frequencies around 4000Hz, which causes ‘t’, ‘d’ and ‘s’ sounds to become indistinguishable. Tinnitus is associated with noise-induced hearing loss and the sufferer experiences a ringing, buzzing, whistling or other noises in one or both ears. It can cause sleep interference and often distress.

Construction noise can create a nuisance and cause disruption and distress without being at a level which is damaging to health. The local authority has powers to deal with noise nuisance under the Environmental Protection Act 1990 and construction noise in particular under the Control of Pollution Act.

The local authority may specify the plant and machinery that can or cannot be used or the level of noise that may be emitted. For some areas the working hours and work days may be specified.

MANAGING NOISE LEVELS DURING CONSTRUCTION

The hierarchy for occupational and environmental noise control should be:

SOURCE

PATH

RECEIVER

1. BUY QUIET

Specify low-noise equipment to effectively reduce noise at source. Manufacturers are required to provide noise emission data that allow a comparison to be made between different tools and equipment. The HSE has launched an initiative called Buy Quiet to encourage manufacturers, importers, suppliers and users to work together to reduce the risk of noise-induced hearing loss in the workplace.

Use work methods that are inherently quieter or the noise source is further away from the operative, such as:

1. Using a rotary diamond core drill to cut holes in brickwork rather than chain drilling with a tungsten drill bit.
2. Using an excavator mounted breaker rather than a hand-held breaker.
3. Specify pre-fabricated components to avoid the need for on-site adjustment and reduce the time spend on noisy operations.
4. Using equipment that is powerful enough for the job.

Maintaining equipment to the manufacturer's instructions and maintenance schedules will help prevent high noise levels and ensure efficient operation and reduce wear.

Maintenance includes:

1. Keep cutting tools sharp.
2. Correctly fit and use abrasive wheels.
3. Replace worn parts.
4. Check and replace worn vibration dampers, bearings and gears.
5. Sharpen chainsaw teeth and keep correct chain tension.
6. Keep tools and equipment well-lubricated.
7. Tune and adjust engines.

2. CONTROL IN THE SOUND PATH (this is the next best option)

Sound levels reduce rapidly with distance. Position equipment as far away from receivers as possible, ***such as:***

1. Siting the source of noise as far from the sensitive environmental receiver as possible.
2. Orienting the plant to direct the noise away from the work area or sensitive environmental receiver.
3. Place site buildings, stores and so on between the noise source and the sensitive environmental receiver.

The use of barriers and enclosures can reduce the noise levels significantly. It is not always practical but spoil heaps can be used to create a noise bund or housing static plant in a soundproof enclosure can reduce noise. Noise nuisance to neighbours can be reduced by using continuously boarded hoardings without gaps or openings in preference to open fencing panels.

The sound path can be affected by site activities, such as removing vegetation or using stockpiled materials that form a barrier.

3. CONTROL AT THE RECEIVER

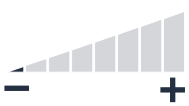
The least preferred option and refers to the use of hearing protection to control exposure to noise.

It requires management to include the following:

1. Careful selection of hearing protection equipment.
2. Training of volunteers on the use of the equipment.
3. Supervision to ensure the equipment is used correctly.

DEFINITIONS

Acoustics is the branch of physics that deals with sound and noise. Knowing the basic definitions will help to understand the concepts.

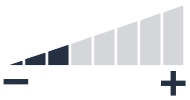


Sound

The sensation caused by rapid pressure variations in the ear. The variations are converted to nerve signals sent to the brain to interpret them into what we hear.

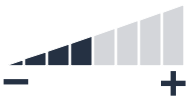
Noise

Unwanted sound, the perception of noise varies from person to person.



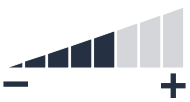
Decibel (dB)

Measurement unit of sound, a logarithmic unit which means a small increase in decibels indicates a large increase of sound energy.



Frequency

The rate of variation of the pressure waves in air. Humans perceive from around 20 Hz to 20,000 Hz.

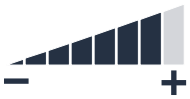


Sound intensity

A function of the sound pressure. Hearing damage is related to intensity and duration of sound. A doubling of sound intensity relates to a 3 dB increase.

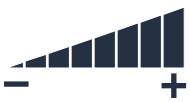
Loudness

Perception of sound level, not directly related to sound intensity. A doubling of perceived loudness is around 10 dB, but this is ten times sound intensity.



Weighting

Adjustment made to measured sound levels for various reasons. 'A' weighting mimics the human response to sound, 'C' weighting is a linear measurement used for peak sound measurements from impulsive noises, such as cartridge and hammer tools. Expressed as dB(A) and dB(C).



Daily dose ($L_{EP,d}$)

The equivalent continuous noise level over an eight hour period. It allows noise exposures of different intensities and durations to be directly compared.

SUMMARY OF REQUIREMENTS OF THE CONTROL OF NOISE AT WORK REGULATIONS (SOURCE CITB)

Restoration group duties	Where exposure is below the lower exposure action value of 80 dB(A)	Where exposure levels are likely to be at or above		
		Lower exposure action value of 80 dB(A) or peak sound pressure of 135 dB(C)	Upper exposure action value of 85 dB(A) or peak sound pressure of 137 dB(C)	Exposure limit value of 87 dB(A) or peak sound pressure of 140 dB(C)
Assessment of noise exposure Risk assessment to be carried out and reviewed as necessary.		✔	✔	✔
Record of significant findings and control measures put in place.		✔	✔	✔
Risk assessment to include extra considerations in higher risk situations.			✔	✔
General duty to reduce risk Risk of hearing damage to be eliminated or reduced to the lowest level reasonably practicable.		✔	✔	✔
Implement organisational and technical control measures, excluding issue of personal hearing protection.			✔	✔
Reduce exposure below limit value (ELV); if ELV breached, identify why and modify organisational and technical measures.				✔
Ensure noise exposure in rest facilities is kept to acceptable level.		✔	✔	✔
Adapt control measures as necessary to take account of volunteers who may be particularly at risk from exposure to noise.		✔	✔	✔
Consult with volunteers on protective measures taken.		✔	✔	✔

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Provision of hearing protection Ensure that personal hearing protectors are: • Provided to volunteers who ask for them.		✔		
• Provided to all those exposed.			✔	✔
• Used by all those exposed.			✔	✔
Create hearing protection zones, designated by appropriate signs and: • Restrict access if justified by the level of risk.			✔	✔
• Ensure as far as reasonably practicable that all who go into a marked hearing protection zone use hearing protection.			✔	✔
Maintenance & use of equipment Ensure so far as reasonably practicable that: • All equipment provided under the regulations, except personal hearing protectors, are fully and properly used.			✔	✔
• All equipment is maintained in an efficient state and good working order.	✔	✔	✔	✔
Information instruction & training Provide adequate information, instruction and training and update it as necessary, on: • The nature of the risks to hearing from noise.		✔	✔	✔

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• The organisational and technical measures taken.		✔	✔	✔
• The action and limit values.		✔	✔	✔
• The significant findings of the risk assessment.		✔	✔	✔
• How to obtain a personal hearing protector.		✔	✔	✔
• How to detect and report signs of hearing damage.		✔	✔	✔
• The entitlement to health surveillance.		✔	✔	✔
• The results of any collective health surveillance.		✔	✔	✔
Provide information, instruction and training for anyone who has responsibilities for ensuring the employer's legal duties are carried out.		✔	✔	✔
Health surveillance Provide as appropriate if the risk assessment indicates there to be a risk to volunteers health resulting from noise at work.		✔	✔	✔
Keep and maintain records of health surveillance and enable volunteers access to their own health surveillance records and allow the HSE to access records as necessary.		✔	✔	✔
Where volunteers are found to have hearing damage: • Ensure the volunteer is informed by a suitably qualified person.		✔	✔	✔
• Review the risk assessment and control measures.		✔	✔	✔

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• Consider assigning the volunteer to alternative (non-noisy) work.		✔	✔	✔
• Continue with health surveillance.		✔	✔	✔
Volunteers duties				
Use of equipment Volunteers must: • Make full and proper use of personal hearing protectors.			✔	✔
• Use any other control measures provided by the restoration group.		✔	✔	✔
• Report any defects discovered in the protective measures to the restoration group.	✔	✔	✔	✔
Health surveillance Attend health surveillance procedures as required by the restoration group at the cost of the restoration group.		✔	✔	✔

USEFUL RESOURCES:

HSE guidance on noise at work

Control of Noise at Work Regulations

Environmental protection act

Control of pollution act

Sign up to read the full Practical Restoration Handbook and supporting resources here: waterways.org.uk/practicalrestorationhandbook

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INLAND WATERWAYS ASSOCIATION

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