

The Delivery hub health, safety and environment
Raising the bar 19
Noise

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Objective

The objective of this document is to detail the minimum requirements for delivery partners working on Highways England projects and highlight additional desirable/ good practice, noise monitoring and other sources of information.

Background

Work related noise induced hearing loss (NIHL) is a long term latency disease that is difficult to estimate accurately about 20,000 cases estimated annually. More statistics on NIHL can be found on the HSE web site at www.hse.gov.uk/statistics/causdis/deafness/index.htm

Noise at work can cause hearing loss that can be temporary or permanent, hearing damage can be caused immediately by sudden, extremely loud, explosive noises. But hearing loss is usually gradual because of prolonged exposure to noise. It may only be when damage caused by noise over the years combines with hearing loss due to ageing that people realise how deaf they have become.

Whilst exposure to excessive noise both at work and in the environment can cause hearing loss; it can also causes fatigue and may as a direct result or induced condition such as tinnitus lead to sleep problems.

General background noise working on highways can be seen from the sample figures given in Appendix 1 of this document to be either close or above the exposure limit level and in some circumstance above the exposure action level.

Minimum requirements

The expectation is that all the guidance contained within should be considered as minimum requirements.

Plan/organise

At all times, all reasonable steps are taken to reduce noise at source. Efforts need to be concentrated on the noisiest operations. Consideration must be given to simple methods to reduce noise levels, e.g.

- Avoiding the operation, [e.g. care with shuttering to avoid cutting back or scabbling, shop-made steel components to avoid the need to burn and grind on site].
- Doing the job another way, [e.g. retard construction joints and jet wash to avoid scabbling, hydraulic bursting or chemical methods to avoid breaking down piles to cut-off level].
- Locating noisy operations away from other work areas [e.g. offsite]
- Using super-silenced plant and equipment
- Screening static and noisy operations
- Turning off plant when not in use
- Routing access ways around noisy operations
- Employing job rotation to reduce the time operatives are exposed to noise

Where noisy operations are unavoidable a detailed noise assessment is required. Examples of these are;

- Piling operations
- Concrete drilling, cutting, sawing or breakout [both using hand tools and machine mounted breakers]
- Rock drilling
- Grinding or de scaling of steelwork
- Rivet busting
- Shotblasting
- Concrete spraying
- Operation of an abrasive wheel
- Operation of a bench saw
- Operation of rollers and compactors
- Operation of any tools or plant in confined areas

Where activities that result in intrusive noise where normal conversation is only just possible or where activities when the assessed noise source is expected to continue for a duration in excess of that given in the table below.

Assessed noise level [dB(A)]	Duration of noise
80	6 hours
85	2 hours
90	45 minutes
95	11 minutes
100	2 minutes
105	1 minute
110	20 seconds

Control measure must be introduced to reduce the exposure of personnel to the source of noise (whilst ensuring not to over protect – see next page). Full details of the exposure action levels are detailed on the HSE web site and within the Control of Noise at Work Regulations 2005

The HSE provide a calculator on line that will help assess exposure limits this can be found at <http://www.hse.gov.uk/noise/calculator.htm>

Consideration should also be given to reducing noise to the local environment in particular sensitive areas such as housing, schools, hospitals etc. Where such areas are likely to be exposed to higher than normal background level the local authority must be contacted and exposure levels times and durations agreed prior to works commencing. Some typical noise values from highway operations can be found in appendix 1 of this document.

Control

Contractors must assess and identify control measures to either eliminate or reduce risks from exposure to noise to protect the workforce and local environment.

Control measures should follow the principle of the hierarchy of control: Elimination of noise at source:

The elimination of a source of noise is the most effective way to prevent risks to the workforce, and should always be considered when new work equipment or activities are planned.

Control of noise at source

The reduction of noise, either at its source or in its path should be a major focus of reducing noise; engineering controls such as the following can assist in reducing noise.

- Isolation of the source via location, enclosure or damping vibration
- Reduction at the source or its path by the provision of silencers, acoustic screens
- Preventive maintenance and or alteration/substitution of equipment e.g. battery lighting as opposed to lighting run off a generator.
- Active noise reduction such ('anti-noise') may also be an option

Collective control measures:

Where noise cannot be adequately controlled at source, further steps should be taken to reduce the exposure to noise such as:

- Provision of sound proof welfare/office accommodation
- Change in working methods
- Arrangement of the sources of noise and other adjacent operations to be programmed for differing time periods.

Personal protective equipment

Personal protective equipment (PPE), such as earplugs and earmuffs, should be used as a last resort after all efforts to eliminate or reduce the source of the noise have been exhausted.

Over-protection

Hearing protection that reduces the level at the ear to below 70dB should be avoided; this over-protection may cause difficulties with communications and hearing warning signals. Users may become isolated from their environment, leading to risks.

Information and training:

All personnel exposed to noise related risks must be made aware of the hazards, the results of the risk assessment and an explanation of the control measures. Should PPE be required training in the use and maintenance must also be provided along with suitable storage.

Personnel must also be made aware of how to detect and report the signs of hearing damage.

The results of noise surveys undertaken on projects should be communicated to the workforce and posted on site notice boards.

The HSE have a link on their web site to educational video on hearing this can be found at www.hse.gov.uk/noise/video/hearingvideo.htm

Monitor

Control measures should be monitored on a regular basis to ensure that they remain suitable and sufficient to afford the protection required.

Highways England Raising the Bar B12 Occupational Health gives details on the requirements for monitoring health.

Desirable

The following should be considered when planning work which may produce excessive noise

Ear plug fit testing:

Ear plug fit testing will help determine that ear plugs have it has been fitted correctly by the user and the level of attenuation provided.

Several manufacturers have systems that will provide this service and readily available via suppliers. The benefits of completing these tests help to demonstrate training and will provide records of the levels of attenuation reached with each type of plug for individuals.

An article on ear fit testing can be found at the following link [www.hearforever.org/ valueoffittesting](http://www.hearforever.org/valueoffittesting)

Acoustic screens



Floor sawing behind acoustic screen

Noise monitoring in front of screen

These curtains are designed to provide temporary, lightweight acoustic screening. They are quick and easy to install, therefore suitable for short-term as well as longer- term applications. They can be attached to Heras fencing panels or scaffolding (subject to appropriate temporary works design).

It should be noted that whilst the noise may be screened from a neighbour, this can increase the deflected noise in the work area. In a similar way panel vans parked adjacent to work areas on the motorway can work in a similar way reflecting the noise rather than allowing it to disperse. Each activity must be risk assessed in order to balance and control disruption to the public and noise exposure to the workforce.

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Benefits

- Reduced noise levels. Results from floor sawing test pictured above (left):
 without screening = 95.7 dB
 with screening = 83.0 dB
- Velcro strips allow easy interconnection
- Fence or scaffold fitting therefore suitable for various activities and work settings

Communication within noisy environments:

The use of full duplex radios is an ideal way to perform safety critical communications between personnel such as machine operatives/drivers and slingers/signallers/banksmen within noisy environments. Many systems are available utilising over or in ear pieces and boom or throat mikes.

Some industry sectors mandate the use of such communications systems examples can be found via the following link

<https://safety.networkrail.co.uk/safety/on-track-plant-safety/rrv-communication/>

Personal noise level indicator:

Personal noise level indicators are readily available and are particularly useful for personnel who move around site and are likely to encounter vastly differing noise levels. The noise Indicator alerts users to potentially harmful noise levels, helping identify areas where hearing protection may need to be worn. Users simply clip the Noise Indicator to a shirt or jacket and the LED Light indicates when noise levels exceed a potentially hazardous threshold.

Red Flashing LED: Noise levels are above 85 dB(A) -

Hearing protection must be worn

Green Flashing LED: Noise levels are below 85 dB(A) -

Hearing protection may be required



Custom Moulded Ear Plugs:

These are individually fitted to each wearer's ear canal, do not interfere with eye or head personal protective equipment. They are comfortable to wear and can allow the wearer to hear conversations etc up to a given level before it is suppressed dependent upon what filters are required. The initial cost outlay is high but the life expectancy of the plugs delivers a good business case for their use.

Several manufacturers supply these and they are widely available through the usual supply chain.

There are also several good practice information sheets are available on the Highways England web site at:

<http://www.highwaysafetyhub.com/hs-toolkit-good-practice-examples.html>

Legislation and additional information

The Control of Noise at Work Regulations 2005

<http://www.hse.gov.uk/noise/regulations.htm>

INDG 362 Noise at work: A brief guide to controlling the risks

www.hse.gov.uk/pubns/indg362.pdf

Appendix 1 - Typical Noise Levels Working On Highways

Work Activity	Minimum Requirements	Desirable elements
Plan		
Design	Plan the works to design out where possible the need to undertake operations which could create noise.	
Design	Use the right size of building materials so less cutting or preparation is needed.	
Manufacturing		Where possible off site manufacturing of elements of the works should be used
Demolition	Consider methods of demolition/removal that reduce the possible levels of noise caused by the operation	
Maintenance	Have planned preventative maintenance schemes for plant and equipment	
Site set up	Locate noisy operations away from other operations and neighbours	
Site set up	General site traffic to be routed away from neighbouring sensitive areas such as schools and housing	Introduction of acoustic screens/bunds during the construction phase of works
Organise		
Equipment use	Equipment likely to generate excessive noise to be enclosed or shielded if possible	
Haul roads and access	Access and haul roads to be maintained on a regular basis to keep an even surface and help prevent excessive noise from plant and vehicle movements.	Access roads to be paved to help prevent noise from vehicle movements over uneven road surfaces
Unpaved roads and verges	Should be compacted	
Vehicle recovery crew standby accommodation	Positioned to minimise exposure of personnel on standby to traffic noise	Locate standby accommodation for recovery crews away from passing traffic/ noise
Crushing and screening	All concrete crushers and aggregate screeners to be positioned or shielded to reduce noise to other operations or neighbours	

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Crushing and screening	All concrete crushers and aggregate screeners to be positioned or shielded to reduce noise to other operations or neighbours	
Work Activity	Minimum Requirements	Desirable elements
Activity enclosures	Provision of Screens or enclosures used for activities that can reasonably and safely be enclosed without introduced	
Training and Awareness	Workforce should receive appropriate training and awareness of the occupational health and environmental issues associated with noise exposure.	
PPE	Ear plug fit testing as part of the awareness training and records	
Control		
Tools & Equipment	Silencers must be used when supplied with tools and equipment.	
	All tools and equipment must me regularly maintained in good working order	

Appendix 2: Typical noise levels working on highway

Data collected on a Highways maintenance contract predominately on days in dry conditions with the exception of Motorway TM installation conducted on nights. Sound readings were collected via personal dosimeter over an 8-hour reference period. These are provided as an example, designers and contractors should collect their own data to assess the risk in their working environment and protect their workforce from excessive noise levels

Task	Persumed noise dose (dB(A)) after exposure duration								Sample L _{Peak}
	Sample L _{eq}	0.25 hr	0.5 hr	1 hr	2 hr	4 hr	6 hr	8 hr	
Ambient Noise									
Motorway - General	89	74	77	80	83	86	88	89	121
Motorway – beneath bridge	93	78	81	84	87	90	92	93	118
Dual Carriageway < 50mph – General	79	64	67	70	73	76	78	79	112
Dual Carriageway > 50mph – General	86	71	74	77	80	83	85	86	115
Urban Single Carriageway – General	76	61	64	67	70	73	75	76	118
Rural Single Carriageway - General	79	64	67	70	73	76	78	79	109
Traffic Management									
Driver – Dual >50mph	80	65	68	71	74	77	79	80	114
Vehicle Bed – Dual >50mph	90	75	78	81	84	87	89	90	114
On the Ground – Dual >50mph	84	69	72	75	78	81	83	84	116
Cone Well – Dual >50mph	91	76	79	82	85	88	90	91	133
Structural Maintenance									
Vegetation Management - Strimmer	98	83	86	89	92	95	97	98	118
Safety Fence Repairs									
Dismantle/Assemble - 0.5inch air drive	95	80	83	86	89	92	94	95	125
Post Extraction – Hi-ab	99	84	87	90	93	96	98	99	128
Post Driving	112	97	100	103	106	109	111	112	138
Post/beam cutting – Stihl saw	102	87	90	93	96	99	101	102	126
Tensioning – 0.5 inch air drive	101	86	89	92	95	98	100	101	124

Task	Persumed noise dose (dB(A)) after exposure duration								
	Sample L_{eq}	0.25 hr	0.5 hr	1 hr	2 hr	4 hr	6 hr	8 hr	Sample L_{Peak}
Ironwork/Precast concrete units									
Break out – Pneumatic Breaker	99	84	87	90	93	96	98	99	125
Cutting – Stihl saw	102	87	90	93	96	99	101	102	126
Cyclic Maintenance									
Sweeping – Road sweeper	87	72	75	78	81	84	86	87	-
Gully emptying – Gully emptier	87	72	75	78	81	84	86	87	118
Winter Maintenance									
Loading – Ministry loader	84	69	72	75	78	81	83	84	110
Loading – Telehandler	77	62	65	68	71	74	76	77	128
Spreading	78	63	66	69	72	75	77	78	108
Off loading	81	66	69	72	75	78	80	81	109
Street Lighting and Sign Works									
Cutting – Stihl saw	102	87	90	93	96	99	101	102	126
Removal / installation – Hi-ab	91	76	79	82	85	88	90	91	121
Excavation									
Break out – Pneumatic Breaker	99	84	87	90	93	96	98	99	125
Cutting – Stihl saw	102	87	90	93	96	99	101	102	126



Indicates exposure limit value exceeded



Indicates upper exposure action level exceeded

Typical Noise reduction

Distance Attenuation Reduction		Hearing Protection Requirements					
		Source	1m	2m	4m	8m	16m
		N/A	-6dB	-12dB	-18dB	-24dB	-30dB
Operation	dB(a)						
Ambient Noise							
Motorway - General	89	89	83	77	71	65	59
Motorway – beneath underbridge	93	93	87	81	75	69	63
Dual Carriageway < 50mph – General	79	79	73	67	61	55	49
Dual Carriageway > 50mph – General	86	86	80	74	68	62	56
Urban Single Carriageway – General	76	76	70	64	58	52	46
Rural Single Carriageway - General	79	79	73	67	61	55	49
Traffic Management							
Driver – Dual >50mph	80	80	74	68	62	56	50
Vehicle Bed – Dual >50mph	90	90	84	78	72	66	60
On the Ground – Dual >50mph	84	84	78	72	66	60	54
Cone Well – Dual >50mph	91	91	85	79	73	67	61
Structural Maintenance							
Vegetation Management – Strimmer	98	98	92	86	80	74	68
Safety Fence Repair							
Dismantle/Assemble – ½” air drive	95	95	89	83	77	71	65
Post Extraction – Hi-ab	99	99	93	87	81	75	69
Post Driving	112	112	106	100	94	88	82
Post/beam cutting – Stihl saw	102	102	96	90	84	78	72
Tensioning – 0.5 inch air drive	101	101	95	89	83	77	71
Ironwork/Precast Concrete Units							
Break out – Pneumatic Breaker	99	99	93	87	81	75	69
Cutting – Stihl saw	102	102	96	90	84	78	72

Distance Attenuation Reduction		Hearing Protection Requirements					
		Source N/A	1m -6dB	2m -12dB	4m -18dB	8m -24dB	16m -30dB
Operation	dB(a)						
Ambient Noise							
Motorway - General	89	89	83	77	71	65	59
Motorway – beneath underbridge	93	93	87	81	75	69	63
Dual Carriageway < 50mph – General	79	79	73	67	61	55	49
Dual Carriageway > 50mph – General	86	86	80	74	68	62	56
Urban Single Carriageway – General	76	76	70	64	58	52	46
Rural Single Carriageway - General	79	79	73	67	61	55	49
Traffic Management							
Driver – Dual >50mph	80	80	74	68	62	56	50
Vehicle Bed – Dual >50mph	90	90	84	78	72	66	60
On the Ground – Dual >50mph	84	84	78	72	66	60	54



Hearing Protection available



Hearing Protection MUST be worn

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