Noise risk assessment process

Amendment record

This Annex has been reviewed by the Directorate of Defence Safety (DDS) together with relevant subject matter experts and key safety stakeholders. Any suggestions for amendments **should** in the first instance be directed to the Defence organisation's Safety Centre/Team Group Mailbox and with their approval, sent to COO-DDS-GroupMailbox@mod.gov.uk.

Version No	Date published	Text Affected	Authority
1.2	Oct 20	Interim update post-handover of policy from DSA to D HS&EP.	D HS&EP
1.3	Sep 22	Release of two-part chapter structure.	D HS&EP
1.4	02 Apr 25	Revised to provide closer alignment with the legislation that Defence **must** comply with.	DDS

1. The following sections present a process for undertaking an initial noise risk assessment and a detailed assessment if it is found to be required. The acoustic source-path-receiver model is used in the detailed assessment to make sure it is suitable and sufficient.

Noise Hazard Check Questionnaire (NHCQ)

2. The first step is to ascertain whether a potentially hazardous exposure to noise problem is present. This is determined by completing the Noise Hazard Check Questionnaire (NHCQ) in Annex C of this chapter. The results of the NHCQ will determine whether a detailed noise risk assessment is required. The NHCQ can be carried out by a commander, manager or accountable person in conjunction with / or by personnel familiar with the work environments and processes that generate noise. Formal noise risk assessor training is not required to undertake an NHCQ.

3. If the NHCQ indicates that there is a potentially hazardous exposure to noise, a noise risk assessment **must** be carried out by a competent person using an appropriate sound level meter (SLM). Further details on undertaking a noise risk assessment are set out later in this annex and details on the competency required for undertaking a noise risk assessment are set out in Annex D to this chapter. The noise risk assessment **must** support the overarching risk assessment for the activity which **must** be carried out in accordance with Chapter 8 (Safety risk assessment and safe systems of work) of JSP 375, Volume 1. The overarching risk assessment **should** be recorded on the MOD Form 5010 (and guidance notes) and if the noise risk assessment is required it **should** be recorded on MOD Form 5017, each form **should** reference the other in the appropriate text field.

Assess the levels of noise

4. The noise risk assessment **must** contain an assessment of the noise levels to which personnel are exposed. The noise level will be combined with the duration to give an exposure suitable for comparison with the EAVs. Where exposure varies from day to day the various daily exposures will need to be assessed, taking into account both a typical day and a worst-case day. If variations are marked, weekly averaging of the exposures can be used.

5. A highly precise or definitive assessment of an individual's noise exposure, such as would be obtained by making detailed measurements is not required, however the assessment of exposure **must** be a reliable estimate with sufficient precision to show whether EAVs are likely to be exceeded. The assessment of exposure will only be reliable if it uses data which is reasonably representative of an individual's exposure. Data from measurements of noise **should** be used where other sources cannot provide reliable and representative data.

6. Uncertainties in an assessment of exposure to noise can arise from variability in the level of noise and in the duration of exposure. If the exposure level is assessed as being close to an EAV then it **should** be taken as that the EAV has been exceeded, or the assessment **should** be sufficiently precise to demonstrate that exposure is below the EAV.

Measurement of the level of noise

7. Where personnel are likely to be exposed to noise at or above a lower EAV and no reliable noise information is available then in accordance with CNAWR measurements **should** be carried out. Where this is the case a sound level meter **must** be used to measure the level of noise personnel are likely to be exposed to.

8. Class 2 sound level meters are used for general purpose noise surveys and environmental noise measurements across Defence. If a more accurate instrument is required for measuring impulse noise, laboratory use and calibration purposes then a Class 1 integrating sound level meter **should** be used. These meters are usually hand-held and are suitable for measurements made at work locations where it is possible to follow the operator sufficiently closely to get a representative sample of the noise.

9. Integrating sound level meters provide information on the noise level over a measurement period and may also feature facilities such as data logging for long-term measurements at a location. Further advice on what type and where to get an SLM, **should** be sought from the Institute of Naval Medicine at NAVYINM-AVS@mod.gov.uk**,** or from the RAF Centre of Aviation Medicine (CAM) at Air-Support-CAM-Adm-iHub@mod.gov.uk or from the HQ Field Army Environmental Monitoring Team at FdArmy-Sp-EMT@mod.gov.uk.

Noise risk assessment

10. The noise risk assessment **must** be carried out by a competent person (CP). Expertise can be sought from specialist advisers, for example engineers, building surveyors and plant maintainers, as necessary.

11. If a suitable 'in-house' CP (see Annex D, paragraph 6) is not immediately available, then urgent action is required to source an external CP to carry out the noise risk assessment.

12. Evaluation of noise exposure risks **should** not be due to CP availability. Such delays are both harming to individuals and damage the capabilities of Defence and **must** be limited SFAIRP.

13. The noise risk assessment **must** be developed in consultation with the personnel concerned and where appropriate Trade Union appointed and / or employee safety representatives.

14. The noise risk assessment **must**:

a. fully identify the work activity and identify all the noise sources to which personnel are exposed;

b. identify where the risk is, for example noise from a single unit of machinery and / or an activity;

c. identify which personnel are likely to be affected;

d. identify what engineering and management control measures need to be taken to control the immediate risk;

e. identify, detail, and prioritise the long-term engineering and management controls;

f. contain a reliable estimate of the noise levels and personal noise exposures;

g. record the time exposed to such noise levels;

h. include an assessment of the predicted or measured noise levels against the EAVs and ELVs in the legislation set out in Annex A to this chapter; and

i. recommend the type of instruction, information, and training, needed to educate personnel on the dangers of noise exposure.

15. The noise risk assessment **must** be based on:

a. reliable relevant information, for example measurements from equipment or activity used in the workplace;

b. if such information is not available, information from similar workplaces, or data from suppliers of the equipment;

c. consideration that differences may exist due to the particulars of equipment installation and usage; and

d. estimations of personal exposures from the noise sources.

16. A timetable **should** be established for the completion of the assessment and the implementation of the subsequent engineering and management control measures.

Factors to consider when assessing noise risks

Level, type and duration of exposure

17. The factors which govern a person's daily noise exposure are the level of noise and the length of time they are exposed to it. The greater the noise level or the longer the duration of exposure, the greater the person's noise exposure will be. Other characteristics of noise, such as the frequency content and whether the noise is continuous or characterised by high levels of short duration, may also affect the risk.

Personnel whose health is at particular risk

18. Some personnel **must** be given particular consideration within the risk assessment, for example people with a pre-existing hearing condition, those with a family history of deafness (if known), pregnant women and young people. The Management of Health and Safety at Work Regulations 1999 place certain prohibitions on employing anyone under 18 where there is a risk to health from noise, further details on the health and safety considerations of managing young persons in the workplace are set out in Chapter 19 (Young Persons) of JSP 375 Volume 1.

The effects of interaction between noise and the use of ototoxic substances, or between noise and vibration

19. HSE reference studies suggest that there is a link between exposure to hand-transmitted vibration and hearing loss, meaning that personnel may be more vulnerable to noise-induced hearing loss (NIHL) if they are also exposed to hand-transmitted vibration. Other studies have suggested that some substances, referred to as ototoxic substances[1], can act in combination with noise to cause further damage to hearing than the noise or chemical exposures alone. Examples of ototoxic substances include, but are not limited to, some solvents, including industrial cleaning chemicals, and some medications, including high-dose aspirin, aminoglycoside antibiotics and some chemotherapy agents. Information about ototoxic substances can be found in chemical Safety Data Sheets, or from medical personnel in the case of medication.

20. Examples of ototoxic substances [2]include, but are not limited to:

a. Solvents
   (1) Styrene, xylene, toluene
   (2) Trichloroethylene
   (3) Ethylbenzene
   (4) Carbon disulphide

b. Asphyxiants
   (1) Hydrogen Cyanide
   (2) Carbon monoxide

c. Nitriles
   (1) Acrylonitrile

d. Metals and compounds
   (1) Lead
   (2) Mercury

[1] Ototoxic drugs or chemicals (prescribed or over the counter) are those that are toxic to the ear and can cause damage to the inner ear and / or interact with noise to exacerbate hearing damage.

[2] See the UK Hearing Conservation Association for further information.

e. Medication

(1) Aminoglycoside antibiotics (e.g. streptomycin, gentamycin)

(2) Analgesics and antipyretics (e.g. quinine and salicylates)

(3) Loop diuretics (e.g. furosemide)

(4) Chemotherapy agents (e.g. cisplatin, bleomycin, and carboplatin)

21. Where there are likely to be such mixed exposures this **should** be noted in the risk assessment and **should** be monitored for any further developments. If it is suspected that the use of chemicals or vibrating equipment might increase the risk of hearing damage to any personnel, the commander, manager or accountable person **should**:

a. consider eliminating the use of the chemicals or vibrating equipment or substitute less harmful chemicals or lower vibration equipment;

b. consider whether you can further limit their exposure by, for example, reducing the time spent on particular tasks; and

c. increase the frequency of health surveillance for those workers.

Indirect effects from the interaction between noise and audible warning signals

22. Noise can mask important warning signals and messages, leading to potential safety issues. Commanders, managers, or accountable persons **should** take account of the possible masking effects of the general noise environment and of any hearing protection worn when audible warning and information signals are used in the workplace under their area of responsibility. Where this is the case then visual warnings, or the use of hearing protection with communication functionality **should** be considered. Further information on safety signs is set out in Chapter 6 (Safety signs) of JSP 375 Volume 1.

Information provided by the manufacturers of work equipment

23. Manufacturers of machinery are legally required to provide information on the noise from their machinery if it exceeds certain levels. It may be possible to use manufacturers and suppliers information to identify quieter products or processes. If noise exposure from equipment usage is to be assessed based on information that has been provided then this **should** be checked with the manufacturers and suppliers to make sure that the noise information is a reliable guide for the intended use of the equipment.

Observation of specific working practices

24. The commander, manager, or accountable person (or the competent person on their behalf) **should** find out what the sources of noise are and how, why and when personnel are exposed to them. This **should** help to identify the sources that contribute most to their noise exposure. Personnel may not be exposed to the same noise levels throughout the day, and they may only spend part of their time in noisy areas.

25. Plan a thorough walk-around where personnel **should** be observed to make sure they carry out their activities in the way that was assumed or expected. It is vital to have good knowledge of the time spent in noisy areas in order to make a reliable estimate of noise exposure. Note all areas and work activities where personnel are exposed to the noise emissions.

26. During the walk-around, list all possible proportionate engineering and management control measures which could minimise the exposure of noise. Consider whether such control measures are compatible with the working methods of the work activity.

27. Where a noise risk assessment indicates a risk to health, the hierarchy of risk control measures[3] **must** be used. The hierarchy of risk controls is illustrated in Figure B-1 below and **must** guide the development of the noise risk assessment and it may be that action is necessary in more than one area to create a safe working environment.

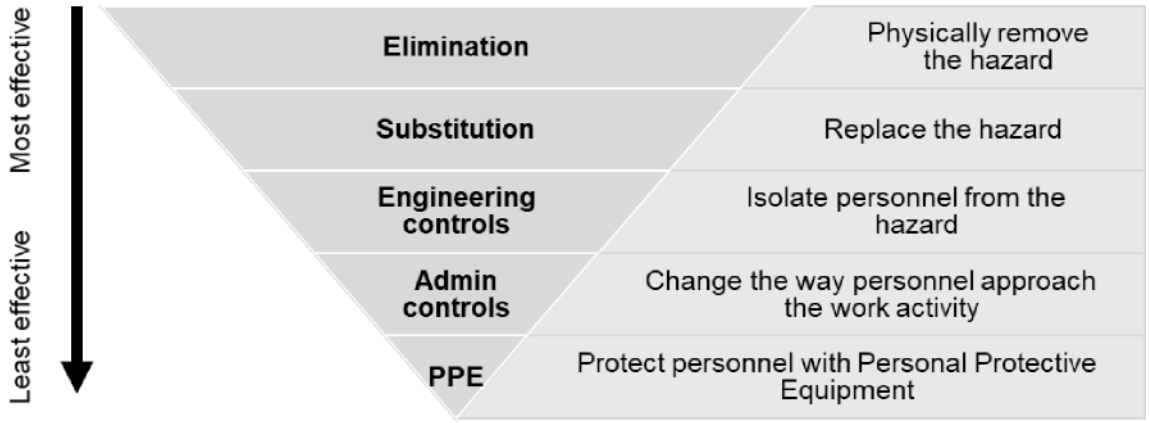

Figure B-1 The hierarchy of risk controls

The noise source

28. When planning the assessment, consider whether the noise can be reduced 'at source'. For example:

a. can the source be eliminated?
b. can the number of sources be reduced?
c. can the sources be segregated?
d. can the sources be moved away from personnel or vice versa?
e. can the sources be enclosed?

29. When planning the assessment, consider the acoustic characteristics of the noise sources. For example:

a. are the noise levels steady?
b. are the noise levels cyclic?
c. are the noise levels random?
d. is the noise high pitched?
e. is the noise low pitched?
f. is the noise tonal?
g. Is the noise impulsive?

[3] The Management of Health and Safety at Work Regulations 1999, Schedule

30. Implement an appropriate selection of engineering and management control measures at the noise source. This includes, but is not limited to:

a. elimination. For example, remove the equipment or activity entirely or switching off equipment when not in use;

b. activity substitution. For example, replace the activity with a quieter one, for example welding instead riveting. Note that substitution can introduce different risks into the workplace and these risks **must** also be considered; and

c. equipment replacement. For example, replace noisy equipment / components with quieter alternatives.

The noise path

31. When planning the assessment, consider all relevant routes of exposure. For example:

a. what path does the noise take to get from its source to the affected personnel?

b. is there a direct line-of-sight from the source to the receiver?

c. is a reverberant environment exacerbating the noise?

32. Implement an appropriate selection of engineering and management controls at the noise path. This includes, but is not limited to:

a. insulation. For example, erect a barrier for example a brick wall, erect an enclosure, or provide a quiet control / rest room for personnel;

b. absorption. For example, fix sound deadening material to appropriate surfaces to minimise the reflected noise;

c. isolation. For example, install equipment, or even internal components of equipment, on vibration isolating mounts to minimise the transfer of vibration from a source to a structure where it can radiate as noise; and

d. rearrangement. For example, avoid placing equipment where noise levels may be increased by reflected sound, such as in corners. Consider the summation of noise from multiple noise sources at work locations. Consider spacing noise sources out.

The noise receiver

33. When planning the assessment, consider the receivers who are exposed to the noise. For example, by:

a. identifying **all** exposed groups. This can include, for example:

(1) cleaners;

(2) maintenance personnel;

(3) commanders, managers or accountable persons; and

(4) workshop assistants.

b. identifying all personnel whose health may be at particular risk from the noise. This can include:

(1) pregnant women;

(2) personnel with pre-existing hearing loss;

(3) personnel with a family history of hearing loss;

(4) young persons;

(5) personnel at risk from the interaction of noise and ototoxic substances;

(6) personnel working with certain substances or gases which may have a synergistic effect on hearing impairment; and

(7) personnel working with or on vibrating equipment where there is a synergistic effect between noise and vibration.

34. When planning the assessment, consider whether the work activity can be modified. For example:

a. can fewer personnel be involved with the work activity?

b. can personnel be rotated on the activity throughout the working day?

35. When planning the assessment consider:

a. exposure resulting from accidents, incidents and emergencies;

b. whether the characteristics of the noise pose specific challenges for example, tonal noise; and

c. whether the personnel require audiometric health surveillance.

36. If adequate control of exposure cannot be put in place by other means, during the assessment, consider if PPE is required, in combination with other control measures. Consider:

a. whether the PPE is compatible with the work activity;

b. the performance specifications and where its required;

c. the impact of the work environment on the choice of PPE;

d. how to train personnel on correctly fitting, maintaining and storing such PPE;

e. where the PPE will be safely stored; and

f. personnel who will be responsible for checking and maintaining the PPE.

37. Implement the planned most effective and reliable engineering and management control measures required to control both the immediate risk to personnel and in the long term. These may be controlled at the noise source, path and / or receiver.

38. Implement an appropriate selection of the following engineering and management control measures:

a. elimination - for example, remove the person from the activity entirely. For example, use cameras or sensors to monitor equipment or spaces with high noise levels;

b. distance - for example, move personnel away from noise source by rest breaks or alternative work in quiet zones to spend time away from the noise source whenever possible. This can also provide breaks for personnel to limit the continuous wearing of hearing protection which may lead to incorrect use of the equipment;

c. time - for example, design the process to limit personal exposure or implement job rotation;

d. PPE - for example, if required provide suitable hearing protection;

e. discipline - for example, provide appropriate training and make sure that all control measures are complied with including wearing of PPE. All PPE equipment **must** be maintained correctly; and

f. surveillance - for example, make sure that the audiometric health surveillance is provided for all personnel who are likely to be regularly exposed to noise levels above the EAV, or if they are at risk due to a pre-existing condition such as tinnitus or particularly sensitive to hearing damage. The results of the health surveillance for personnel **must** be monitored, and appropriate follow-up action is taken.

39. Plans, policy documents and risk assessments **must** be periodically reviewed (see guidance below) in an endeavour to achieve continual improvement in the reduction of risk to personnel.

40. The implementation of the engineering and management control measures determined by the noise risk assessment **must** be reviewed by the CP. This is to determine whether the control measures have been adequately implemented. Each review **should** include the commander's, manager's or accountable person's assessment of the effectiveness of the control measures, and any further control measures that may be required, in conjunction with the CP.

41. If any review indicates that a noise exposure issue remains which is impacting personnel, then this is indicative of a failure to implement the findings of the noise risk assessment in a timely manner, or an incorrect selection of the engineering and management control measures. This will cause further harm to personnel and damage to Defence capabilities.

42. The following guidance can be used to determine that noise exposure control measures have been both implemented, and that they are proving effective.

Record the significant findings of the risk assessment and the necessary control measures

43. Commanders, managers, and accountable persons **must** make a record of the noise risk assessment in the MOD Form 5017 covering:

a. the major findings, including which personnel are at risk, the level of risk and exposure, and under what circumstances the risks occur;

b. the action that has been taken, or is intended to be taken, in compliance with the requirements to eliminate or control exposure to noise and provide hearing protection as well as information, instruction and training.

Initial review

44. An initial review **must** take place shortly after the noise risk assessment is carried out. This is to assess the immediate effectiveness of the implemented controls. It is recommended the initial review takes place no longer than 3 months after the noise risk assessment is carried out.

Periodic review

45. The control measures **must** be reviewed periodically by the CP at a frequency that is appropriate to the level of risk of the particular activity (for example, high risk - potentially each time the activity is to be conducted or at least 6 monthly; medium risk - review control measures and improve if reasonably practicable to do so, 6 monthly or at least annually; low risk - annually).

46. The periodic review **should** assess the effectiveness of the control measures and whether a safe working environment is being achieved. In some circumstances formal audits may be useful.

Change in work activity review

47. Additionally, the control measures **must** also be reviewed by the CP where there is a change or event in the work activity. For example:

a. there is any reason to think that it does not reflect the current noise risk in the workplace. For example, if there have been changes to the work activities or processes, new machinery is used, older machinery is no longer used, or there are changes to the working hours/shift patterns;

b. it becomes apparent (through trade journals, industry groups or HSE publications) that there are new ways of working or improved noise-control techniques that could be applied to the workplace;

c. health surveillance shows that the hearing of personnel is being damaged, suggesting that noise risks are not being properly controlled;

d. after an accident or near-miss where noise could have been a contributory factor to the accident;

e. a change in location or duration of exposure;

f. control measures that could not be justified when the original risk assessment was carried out (probably on the grounds of costs) become reasonably practicable, for example because of changes in technology or a reduction in costs; and

g. if there is **any** reason to suspect that current noise risk assessment is no longer valid.

48. It is imperative that personnel at all levels of Defence learn from any accidents or incidents, ill health data, errors or relevant experience gained in the discharge of their duties. Such incidents **must** be documented in the relevant risk assessment and mitigated through the adoption of engineering and management control measures.

49. If a commander, manager or accountable person has been informed that personnel have likely suffered harm as a result of noise exposure, the commander, manager or accountable person **must** take action to review the noise risk assessment to determine if it has adequately captured the risks and identified suitable risk controls and additionally they **must**:

a. review the exposure of all other personnel exposed to similar noise doses and determine if they require referring to Occupational Health or Service Health units;

b. make sure that personnel working practices are monitored, for example that equipment is being used properly and that PPE (if required) is being worn correctly;

c. make sure that all equipment / platforms are regularly maintained / repaired as appropriate and in line with manufacturers' instructions, to minimise the noise produced and / or maximise the effect of control measures.

d. keep records of such maintenance and repair which **must** be kept up to date. All noise control measures (for example acoustic insulation) on equipment and platforms **must** be regularly inspected, and any deficiencies **must** be promptly rectified. All maintenance and repair records **must** be kept up to date and retained, as set out in Chapter 39 - Retention of Records of JSP 375, Volume 1;

e. carefully assess the potential non-personal exposure risks and impacts associated with noise in an appropriate Hazard Assessment or Safety Case; and

f. carefully assess the potential risks and impacts in an environment where noise may interfere with communications in an appropriate hazard assessment or safety case. Consider alternative means of communicating instructions and / or warnings to personnel, for example the use of a flashing light where a horn or siren may not be heard.