

# Good practice guidance for the management of contaminated land on nuclear and defence sites

*The SAFEGROUNDS Learning Network has issued good practice guidance for the management of contaminated land on nuclear and defence sites. This followed a two-year consultative process that included stakeholder workshops, questionnaires and one-to-one discussions. It is a living document that will grow with experience, and SAFEGROUNDS is continuing to encourage all stakeholders to participate in its development.*

The SAFEGROUNDS website is a forum for developing and making available good practice guidance on the management of radioactively and chemically contaminated land on nuclear and defence sites in the UK. The SAFEGROUNDS Learning Network:

- issues, maintains and improves guidance
- promotes awareness and the use of guidance
- endeavours to build trust between stakeholder groups
- provides information on policy, regulation and technical issues, and a forum for their debate
- identifies and fills gaps in knowledge
- develops new guidance as required.

SAFEGROUNDS is open to all stakeholders and encourages feedback, discussion and the sharing of experience. The project is managed by CIRIA, with support from The Environment Council. Its activities are defined by a steering group, on which owners and operators of nuclear and defence sites, government departments, regulators and non-governmental organisations are all represented.

In the SAFEGROUNDS guidance the term *management of contaminated land* means the taking of any actions to control, monitor or remove (wholly or partially) contamination once it has been discovered, and the associated decision-making processes. Prevention of contamination is outside the scope of SAFEGROUNDS. The guidance applies to all nuclear-licensed sites and to defence sites for which a change of use and/or ownership

is planned. There is separate SAFEGROUNDS guidance on site characterisation.

The guidance is aimed at organisations that are responsible for managing contaminated land, but will also inform other stakeholders (eg local community groups). It presents key principles and a recommended approach for managing contaminated land. This approach is broadly applicable, and could be used for other types of site. Detailed technical information is not included, as there are references to other documents, where necessary.

The guidance is not binding; it supplements regulations and associated guidance but has no legal standing. Participation (by organisations or individuals) in the SAFEGROUNDS project should not be taken as an indication of either support for, or disagreement with, the content of the guidance in its entirety.

SAFEGROUNDS identified five key principles for the management of contaminated land on nuclear and defence sites.

## **Principle 1: Protection of people and the environment**

The fundamental objective of managing contaminated land on nuclear-licensed sites and defence sites should be to achieve a high level of protection of people and the environment, now and in the future.

## **Principle 2: Stakeholder involvement**

Site owners/operators should develop and use stakeholder involvement strategies in the management of contaminated land. In general, a broad range of stakeholders should be invited to participate in decision-making.

## **Principle 3: Identifying the preferred land management option**

Site owners/operators should identify their preferred management option by carrying out a systematic and consultative assessment of all possible options. The assessment should be based on a range of factors that are of concern to stakeholders, including health, safety and environmental impacts, and technical, social and financial factors.

## **Principle 4: Immediate action**

Site owners/operators should take measures immediately to monitor and control all known (or suspected) contamination and continue such measures until an acceptable management option has been identified and implemented.

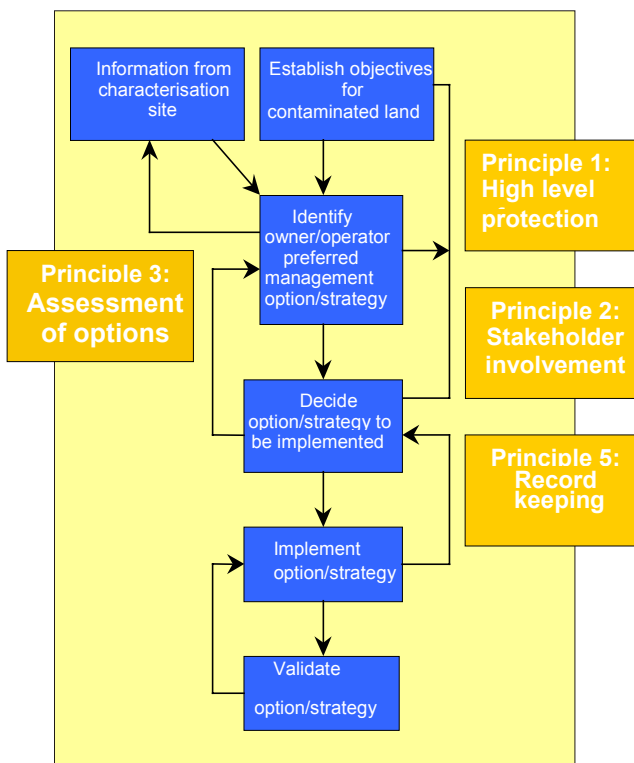
## **Principle 5: Record-keeping**

Site owners/operators should make comprehensive records of the nature and extent of contamination, the process of deciding on the management option for the contaminated land and the findings during the implementation and validation of the option. All records should be kept and

updated as necessary.

The guidance expands on these principles and indicates how they can be put into practice with a structured approach to managing contaminated land.

The structured approach aims to give clarity and consistency to the process of managing contaminated land, and provide a framework in which the key principles can be applied. The general approach needs to be refined for particular situations to reflect the complexity and level of detail that is required. The degree of flexibility means that it can be used for situations ranging from a small patch of contamination to all the contaminated land on a nuclear site.

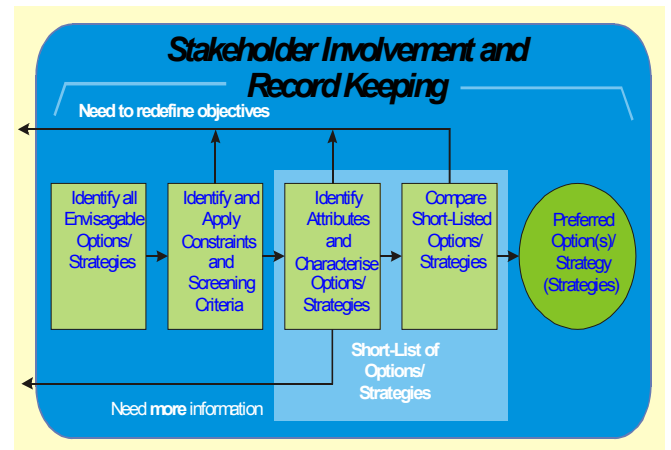


The guidance presents general themes, issues to consider and approaches to use for the various stages of the approach shown above. More detailed information on its application to nuclear and defence sites is included in separate appendices.

Site characterisation activities provide the information necessary to begin identifying an option or strategy for managing contaminated land. Accordingly, SAFEGROUNDS has developed guidance on site characterisation [1]. Sufficient information should be available to enable decisions on the management of the land to be made. Ideally monitoring data, a conceptual model and a risk assessment will be available. However, limited information does not necessarily mean that the process of identifying and applying a management option should not be started.

Setting out the objectives helps to focus the process, although very specific or constraining objectives can cause problems unless all stakeholders agree on them. Objectives could be based on government policy, corporate policy and the views of various stakeholders. Safety and environmental objectives should be separate from commercial objectives. The objectives can always be reviewed.

The recommended way of identifying a preferred option or strategy has five steps, as shown below.



### **Identify all the options**

The first step is to identify all the options that could be applied – these will probably include technologies for the removal, immobilisation or isolation of the contamination. Financial or technical constraints should not be used to rule any options out, and at least one should be capable of reducing contamination to levels indistinguishable from background. Specific guidance on technical options is available from SAFEGROUNDS.

### **Identify and apply constraints and screening criteria**

Constraints and screening criteria should be used to rule out some options and reduce the number to be considered in detail. They should reflect fundamental requirements, and can be derived from key principles, legislation or specific objectives. All stakeholders should agree with the constraints/criteria, and consequently financial criteria should not be generally be used. When options are rejected, the reasons should be properly recorded.

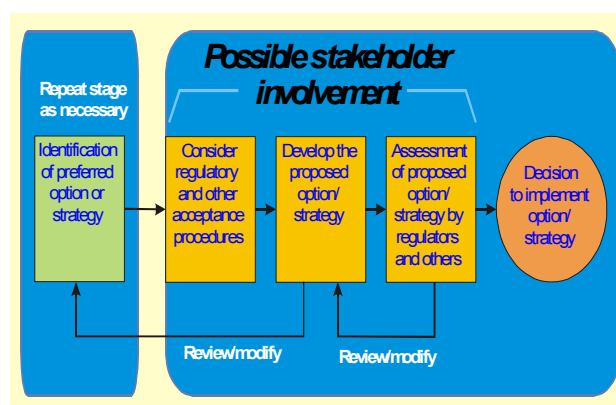
### **Identify attributes and detailed options/strategies**

The remaining options should then be assessed by comparing their performance for a number of key issues (attributes). There is no fixed list of attributes, but factors related to impacts on human health and the environment, technical performance, social and economic factors

should always be included. Stakeholders should be involved in identifying attributes. During option assessment it may be necessary to return to the characterisation stage if there is not enough information on the performance of options for the identified attributes.

## Comparing options/strategies

There are various ways to compare options – from a simple logical argument to mathematical scoring and weighting. The best approach depends on the complexity of the problem. Whichever method is selected, the aim is to compare the options on a common basis for all the key issues. The results should give a measure of the relative advantages and disadvantages of each option. In some cases no single option will stand out as the best. The overall robustness of the analysis should be tested. Ideally stakeholders should be involved in the comparison.



## Acceptance procedures

Having compared options and identified the front-runner(s), the next stage is for the site owner/operator to submit a proposed option to regulators and decision-makers. Various regulatory regimes may apply, including those under the Environmental Protection Act (EPA), Nuclear Installations Act (NIA) and Radioactive Substances Act (RSA). Most require some form of consultation with external stakeholders.

## Develop the proposed option/strategy

You will need to show that the proposed option meets regulatory and other requirements. A robust case may require more than one iteration of the structured approach. For nuclear-licensed sites, regulatory submissions are required under the NIA and EPA. At defence sites submissions may only be required by Ministry of Defence departments. Some regulatory assessments entail public consultations. It is good practice to make the documentation supporting the proposed option publicly available.

## Assessing the proposed option

Following the SAFEGROUNDS guidance should make it more likely that regulators and other stakeholders will approve the proposed option, but there can be no guarantees. Regulators assess each case on its merits and they, and other stakeholders, may require modifications or further work.

## Planning the implementation

Detailed planning should be undertaken before practical implementation work starts. A lot of guidance on this topic is available in other publications. Issues to consider include interactions with other activities on the site, performance measures, roles and responsibilities, financial resources, waste disposal, quality assurance and contingencies. Waste disposal will be an important issue if contaminated material is to be excavated, and disposal methods should have been identified and assessed during the process of deciding on the option to be implemented.

## Contract strategy and management

Nuclear site licensees should have arrangements in place that enable contractors to assist in the implementation of the option, but this might not be the case for defence sites. It is important to define the responsibilities and contingency arrangements when setting up such contracts, as well as defining key milestones and targets, addressing health and safety requirements, and setting out monitoring requirements. On nuclear licensed sites responsibility remains with the licensee. Adversarial forms of contract should be avoided.

## Monitoring

A sampling, monitoring and testing programme will be needed in order to provide evidence that the option has been properly implemented. The SAFEGROUNDS *Site characterisation guidance* identifies the main elements of a monitoring programme.

## Health, safety and environmental protection

All actions must be carried out in conformance with regulations under the Health and Safety at Work etc Act. Nuclear-licensed sites are required to have suitable procedures in place. However, at defence sites it may be necessary to establish procedures (beginning with the appointment of a radiation protection adviser). Environmental protection procedures may also need to be defined.

## **Reporting progress and updating plans**

It is good practice to keep stakeholders, such as local authorities and local people, informed of progress. At nuclear-licensed sites, regular progress reports to local liaison committees provide one means of doing this. Such facilities may not be available at defence sites, so an appropriate forum may need to be established.

## **Record keeping**

It is essential to keep records throughout implementation. Owners/operators should consider keeping a range of information including surveys, working methods and operational records. Records of residual contaminant concentrations in soil and/or groundwater, the physical characteristics of the site, and any waste removed will also be relevant. Regulators specify a minimum amount of information to be kept, especially at nuclear-licensed sites.

## **Monitoring and surveys**

Monitoring is usually required after the option has been implemented, for regulatory and contractual reasons. Records of these activities should be available to stakeholders if possible.

## **Evaluation of results**

The results of validation monitoring will need to be evaluated by the site owner/operator and provided to regulators, and perhaps other stakeholders. An analysis of the data will either show the option has been satisfactorily implemented, or that more work is needed.

## **Record keeping**

It is particularly important to keep records of validation monitoring and surveys and of the evaluation of results. Each organisation should keep their own records, although it is useful for one organisation to have a full set. The site owner/ operator is usually best placed to do this. At nuclear-licensed sites the licensee has a legal duty to keep records of validation.

## **Nuclear-licensed sites**

These sites have processes, procedures and infrastructure that assist the application of the guidance. Regulatory processes are established and regulatory guidance on contaminated land is available. The SAFEGROUNDS guidance is particularly relevant to strategic planning for the overall management of contaminated land on a site, but can also be applied to specific situations or cases.

## **Defence sites**

Defence sites present a different challenge to nuclear sites. The historic use of radioactive materials, namely for luminous markings on dials, has created a legacy of contamination that must be managed. In order to do this; the MoD has initiated a programme of land quality assessment (LQA) for all relevant sites, within which the SAFEGROUNDS guidance can be applied. Where necessary this is being augmented by the development of the infrastructure and procedures for applying the guidance (eg contracts, waste management, some aspects of health and safety). The Environment Agency has issued regulatory guidance for radioactive contamination that is relevant to defence sites.

## **General**

Applying the key principles is more important than adhering to the more detailed aspects of the guidance. The theme running through several of the key principles is openness and transparency. If they are applied as intended, then a wide range of stakeholders will know what is being done and the reasons behind it, and both people and the environment will be protected.

For the full guidance and further information see [www.safegrounds.com/main\\_guidance](http://www.safegrounds.com/main_guidance) and the following references.

Baker A J, Darwin C J, Jefferies N L, Towler PA and Wade DI (2000) *SAFEGROUNDS Best practice guidance for site characterisation*. CIRIA, London.

Hill M D (2002) *The Regulatory framework for contaminated land on nuclear-licensed sites and defence sites*. [www.safegrounds.com/other\\_guidance](http://www.safegrounds.com/other_guidance)

Mallett H (2002) *Technical options for managing contaminated land*. [www.safegrounds.com/other\\_guidance](http://www.safegrounds.com/other_guidance)

Department of the Environment, Transport and the Regions (2000) *Model procedures for the management of contaminated land*.

Health and Safety Executive (2001) *Guidance for inspectors on the management of radioactive materials and radioactive waste on nuclear licensed sites*. [www.hse.gov.uk/nsd](http://www.hse.gov.uk/nsd)

Environment Agency (2002) *Guidance on the characterisation and remediation of radioactively contaminated land*. Environment Agency, Bristol.