



Development of Potentially Contaminated Land  
and Sensitive End Uses

# An Essential Guide for Developers



# CONTENTS

	Page
<b>INTRODUCTION</b>	<b>1</b>
<b>OVERVIEW</b>	<b>2</b>
Contaminated Land	
National Planning Policy Framework	
- Planning System	
- When to Consider Contamination	
- Developers Responsibility	
<b>SUBMITTING AN APPLICATION</b>	<b>5</b>
Full and Outline Planning Consent	
Building Regulations	
<b>INVESTIGATION PROCEDURE</b>	<b>6</b>
Summary	
Preliminary Investigation (desk study, site reconnaissance and preliminary risk assessment)	
Field Investigation and Risk Assessment	
Remediation Scheme	
Verification Reporting and Monitoring	
<b>USEFUL INFORMATION</b>	<b>12</b>
Cover Systems	
Verification of Cover Systems	
Websites	
References	

## **DISCLAIMER**

This document is written to serve as an informative and helpful source of advice, based on guidance and legislation at the time of publication. The Cumbria Contaminated Land Officer Group has taken all reasonable precautions to ensure the information is correct and we cannot accept any liability for loss or damage caused by any person relying on this information, or for any errors or omissions in the information provided. It is the reader's responsibility to ensure that current legislation, guidance and practical methods are adhered to as they may be subject to change.

January 2013 (Rev. C)

# INTRODUCTION

The Government's planning guidance on contaminated land is set out in the National Planning Policy Framework (NPPF). Development of contaminated land is material planning consideration and the actual or possible presence of contamination and associated risks should be established.

Paragraph 109 of the NPPF states the Planning System should contribute to and enhance the natural and local environment by: ‘...preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil pollution or land instability; and remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate’.

The purpose of this guide is to assist developers and site owners involved in the management and assessment of contaminated land and/or where development proposals include sensitive end uses, such as housing. All investigations should be carried out in accordance with the **Investigation of Potentially Contaminated Site – Code of Practice** (British Standard 10175 (2011)) and by a competent person. **Reports may be rejected if this is not met.** The NPPF states a competent person is ‘a person with a recognised relevant qualification, sufficient experience in dealing with the type(s) of pollution or land instability, and membership of a relevant professional organisation.’

This guide has been produced by members of the Cumbria Contaminated Land Officer Group to support a consistent approach throughout the County.

## Contacts

Local Authority/Agency	Email	Telephone
Allerdale	<a href="mailto:environmental.health@allerdale.gov.uk">environmental.health@allerdale.gov.uk</a>	01900 702580
Barrow-in-Furness -Environmental Protection Officer	<a href="mailto:environment@barrowbc.gov.uk">environment@barrowbc.gov.uk</a>	01229 876543
Carlisle	<a href="mailto:environmentalhealth@carlisle.gov.uk">environmentalhealth@carlisle.gov.uk</a>	01228 817559
Copeland	<a href="mailto:envhealth@copeland.gov.uk">envhealth@copeland.gov.uk</a>	01946 598336
Eden -Contaminated Land Officer	<a href="mailto:pollution@eden.gov.uk">pollution@eden.gov.uk</a>	01768 212490
South Lakeland	<a href="mailto:deh@southlakeland.gov.uk">deh@southlakeland.gov.uk</a>	0845 050 4434
Environment Agency	<a href="mailto:penrith.planning@environment-agency.gov.uk">penrith.planning@environment-agency.gov.uk</a>	01768 215798
Natural England	<a href="mailto:northwest@naturalengland.org.uk">northwest@naturalengland.org.uk</a>	0300 060 2122

## Contaminated Land

Where land is affected by contamination or land stability issues, under the planning system, it is the developers responsibility for securing safe development. As a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990.

### Part 2A - The Legal Definition

Section 78A(2) defines Contaminated Land for the purposes of Part 2A as:

*'any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that –*

*(a) Significant harm is being caused or there is a significant possibility of such harm being caused; or*

*(b) Pollution of controlled waters is being, or is likely to be, caused'.*

Under Part 2A, for a relevant risk to exist there needs to be at least one **'contaminant linkage'**. This is the term used which identifies the relationship between a contaminant, a pathway and a receptor.

- A **'contaminant'** is a substance which is in, on or under the land and which has the potential to cause significant harm to a relevant receptor, or to cause significant pollution of controlled waters.
- A **'receptor'** is something that could be adversely affected by a contaminant, for example a person, an organism, an ecosystem, property, or controlled waters. The various types of receptors that are relevant under the Part 2A regime are explained in later sections.
- A **'pathway'** is a route by which a receptor is or might be affected by a contaminant.

All three elements of a contaminant linkage must exist in relation to particular land before the land can be considered potentially to be contaminated land under Part2A, including evidence of the actual presence of contaminants.

The term **'significant contaminant linkage'**, as used in the Statutory Guidance (DEFRA, 2012), means a contaminant linkage which gives rise to a level of risk sufficient to justify a piece of land being determined as contaminated land. The term **'significant contaminant'** means the contaminant which forms part of a significant contaminant linkage.

## National Planning Policy Framework

### The Planning System

The [National Planning Policy Framework](#) (NPPF) (DCLG, 2012) seeks to prevent unacceptable risks from pollution and land instability, and planning decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account.

Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.

Paragraph 121 of the NPPF (DCLG, 2012) states that planning decisions should ensure that:

- the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;
- after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and
- adequate site investigation information, prepared by a competent person, is presented.

### When to consider contamination

On a precautionary basis, the possibility of contamination should be assumed when considering individual planning applications in relation to all land subject to or adjacent to previous industrial use and also where uses are being considered that are particularly sensitive to contamination – e.g. housing, schools, hospitals, children’s play areas.

#### Sensitive End Uses

Where development includes any of the following sensitive end uses, a contamination assessment is required:

- Housing
- Schools
- Nurseries
- Children’s Play Areas
- Public Open Space
- Allotments
- Highly sensitive groundwater used for potable supply

# OVERVIEW

## Potentially contaminating land uses

A wide range of industries may historically have contaminated, or have the potential to contaminate the land they are sited upon (and neighbouring land) — The [DOE Industry Profiles](#) give further details.

- Smelters, foundries, steel works, metal processing & finishing works
- Coal & mineral mining & processing, both deep mines and opencast
- Heavy engineering & engineering works, e.g. car manufacture, shipbuilding
- Military/defence related activities
- Electrical & electronic equipment manufacture & repair
- Gasworks, coal carbonisation plants, power stations
- Oil refineries, petroleum storage & distribution sites
- Manufacture & use of asbestos, cement, lime & gypsum
- Manufacture of organic & inorganic chemicals, including pesticides, acids/alkalis, pharmaceuticals, solvents, paints, detergents and cosmetics
- Rubber industry, including tyre manufacture
- Munitions & explosives production, testing & storage sites
- Glass making & ceramics manufacture
- Textile industry, including tanning & dyestuffs
- Paper & pulp manufacture, printing works & photographic processing
- Timber Treatment
- Food processing industry & catering establishments
- Railway depots, dockyards (including filled dock basins), garages, road haulage depots, Airports
- Landfill, storage & incineration of waste
- Sewage works, farms, stables & kennels
- Abattoirs, animal waste processing & burial of diseased livestock
- Scrap yards
- Dry cleaning premises
- All types of laboratories

### Other uses & types of land that might be contaminated include:

- Radioactive substances used in industrial activities not mentioned above – e.g. gas mantle production, luminising works
- Burial sites & graveyards
- Agriculture – excessive use or spills of pesticides, herbicides, fungicides, sewage sludge & farm waste disposal
- Naturally-occurring radioactivity, including radon
- Naturally-occurring elevated concentrations of metals and other substances
- Methane & carbon dioxide production & emissions in coal mining areas, wetlands, peat moors or former wetlands

# OVERVIEW

## **Developers Responsibility**

It is the developers responsibility to secure safe development and provide the necessary information. The minimum information that should be provided by an applicant is the report of a Preliminary Investigation (desk study, site reconnaissance and preliminary risk assessment).

All investigations of land potentially affected by contamination should be carried out in accordance with established procedures (such as British Standard 10175 (2011) Investigation of Potentially Contaminated Sites – Code of Practice).



# SUBMITTING AN APPLICATION

## Full and Outline Planning Consent

**Section 15** on the national planning application form (1APP) relates to land contamination. It states that if you answer **YES** to any these questions, then you **MUST SUBMIT** an appropriate contamination assessment. You are advised to speak to **Environmental Protection Units/Planning Authority** before submitting an application.

The need to provide an adequate assessment of land contamination is outlined in the National Planning Policy Framework. The developer should be aware that failure or omissions on his part could lead to liability under Part 2A in addition to planning enforcement.

**15. Existing Use**  
Please describe the current use of the site:

Is the site currently vacant?  Yes  No

If Yes, please describe the last use of the site:

When did this use end (if known)? DD/MM/YYYY (date where known may be approximate)

Does the proposal involve any of the following:

- Land which is known to be contaminated?  Yes  No
- Land where contamination is suspected for all or part of the site?  Yes  No
- A proposed use that would be particularly vulnerable to the presence of contamination?  Yes  No

If you have answered Yes to any of the above, you will need to submit an appropriate contamination assessment.

When describing the current use of the site please also include any details of the part(s) of any listed building(s)/structure(s) being affected.

When answering whether the site is currently vacant, this means whether the site is currently not in active use, including waste/derelict land.

Development on land which has known contamination or known to be affected by contamination. (see page 4).

Development on or in close proximity to potentially contaminative uses. (see page 4)

Undeveloped sites may still be contaminated - it is not restricted to brownfield sites. Please state if the proposed use is sensitive. (see page 3)

Reports [1](#), [2](#) and [3](#), (see page 7) where required, should be submitted with the application. However, it is understood that permission for some developments may be uncertain and therefore advise you to speak to your Local Planning Authority/Environmental Protection Unit to establish if, as a minimum, a Preliminary Investigation would be accepted and conditions imposed for further investigation, if necessary.

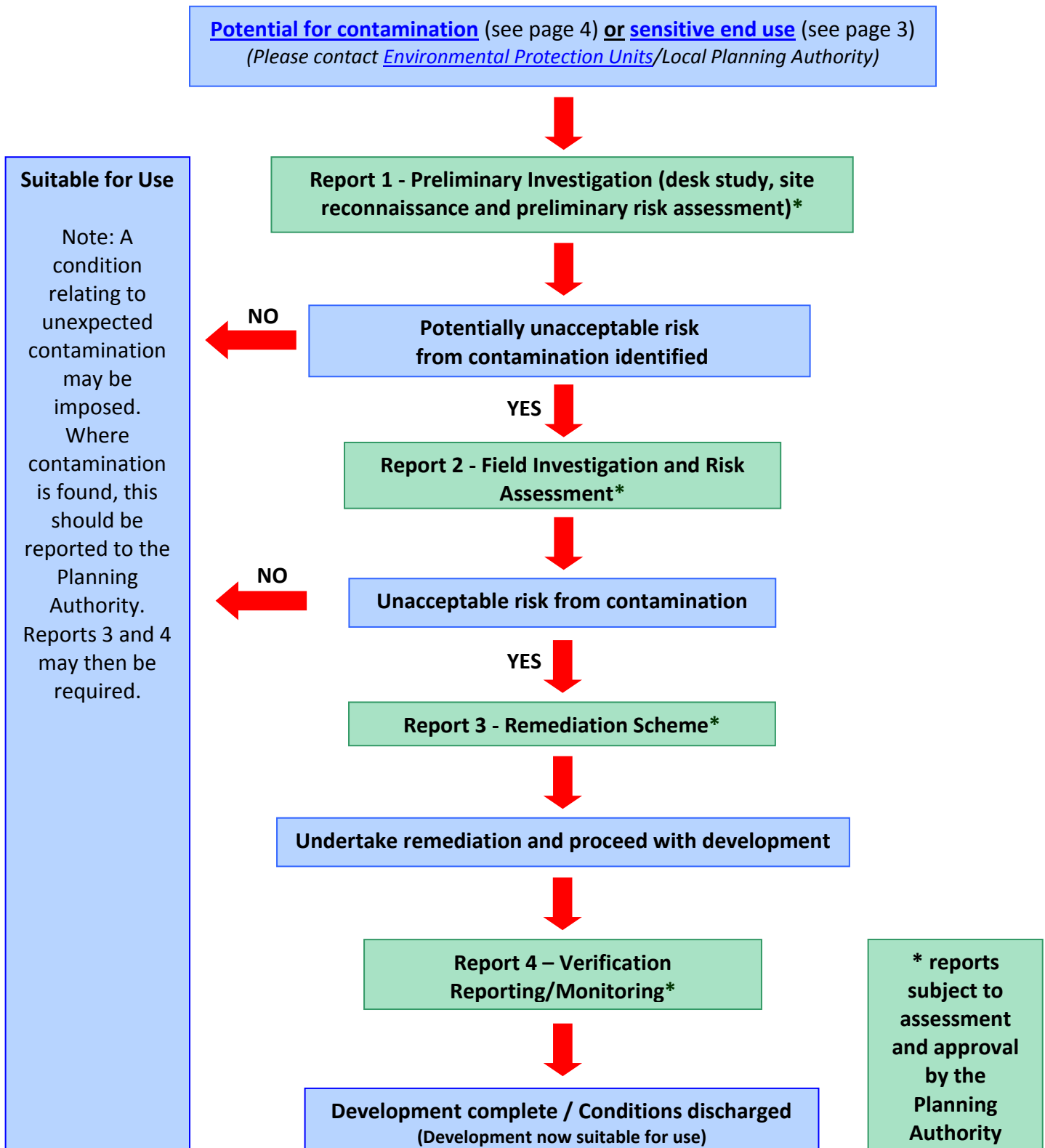
## Building Regulations

Compliance with the [Building Regulations](#) is a separate issue and approval may also be required. The developer/applicant must ensure that the Building Control Officer is aware of any contamination issues and that the appropriate requirements are met.



# INVESTIGATION PROCEDURE

The **Model Procedures for the Management of Land Contamination (CLR11)** explains the risk assessment procedure when dealing with potentially contaminated land; it is recommended that a tiered approach be adopted and investigations should be undertaken in accordance with **BS10175 (2011) Investigation of Potentially Contaminated Sites – Code of Practice** ([available here](#)). This flow chart outlines how this process interacts with the planning regime.



# INVESTIGATION PROCEDURE

## Preliminary Investigation

(desk study, site reconnaissance and preliminary risk assessment)

The investigation should be carried out in accordance with *British Standard 10175 (2011), Investigation of potentially contaminated sites – Code of Practice* and *Contaminated Land Report 11 (CLR11)*.

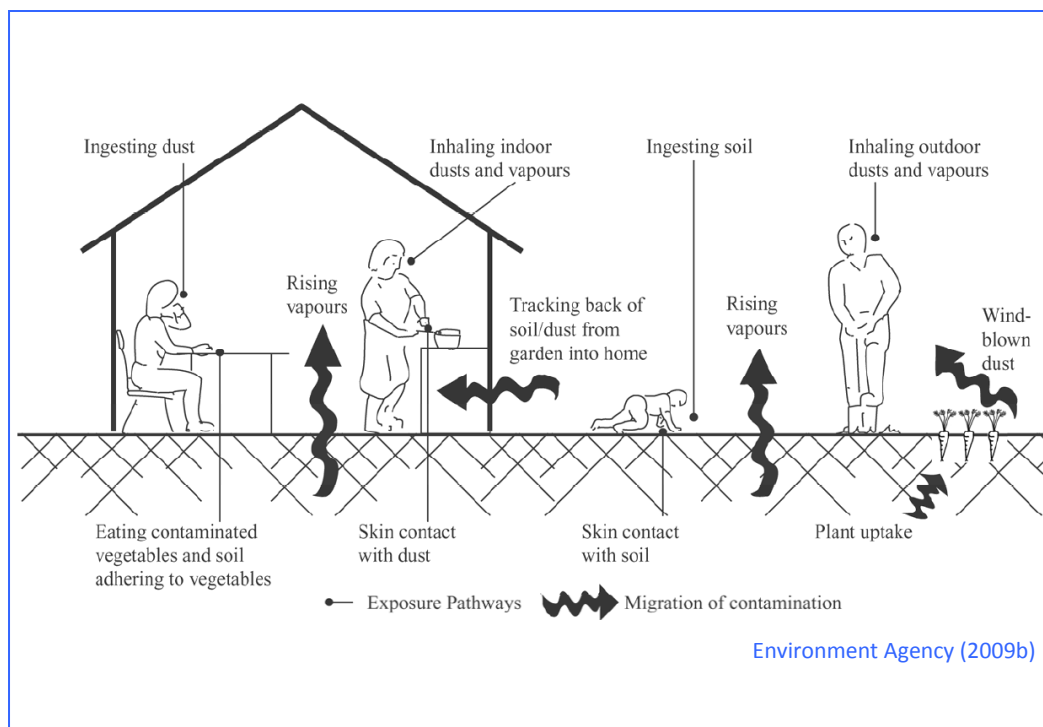
The approach to undertaking a Preliminary Investigation is provided in BS 10175, section 10.2. Guidance on carrying out the formal risk assessment and interpretation of the information is provided in CLR11.

The Preliminary Investigation involves the development of a Conceptual Site Model (CSM) to establish whether or not there are any potential unacceptable risks. The CSM is a representation of possible contaminant linkages.



The CSM is based on information from a desk study and site walkover. The desk study involves a detailed search of historic maps, aerial photographs and both current and historic records to identify potential contaminative uses of the land and adjacent areas. A site walkover is necessary to observe the condition of the site (soils, surface materials and vegetation) and identify any structures such as pipe work, storage tanks etc.

### Illustration of Potential Exposure Pathways



# INVESTIGATION PROCEDURE

There are also other exposure pathways such as the examples provided below:

- inhalation of vapours (indoors and outdoors) volatilised from shallow groundwater;
- dermal contact with shallow groundwater;
- ingestion of shallow groundwater;
- inhalation of vapours when bathing/showering either directly with groundwater obtained from an on-site source or following permeation of plastic pipes;
- dermal contact when using water obtained from an on-site source or following permeation of plastic pipes;
- ingestion of drinking water from an on-site source or following permeation of plastic pipes;
- consumption of crops irrigated with an on-site source or following permeation of plastic pipes;
- dermal contact with water from a sprinkler;
- consumption of homegrown foodstuffs other than fruit and vegetables (for example poultry, meat, eggs, shellfish, fish);
- ingestion of water and/or sediment while swimming in a contaminated source;
- dermal contact with water or sediment while swimming in a contaminated source.

The findings of the Preliminary Investigation will then determine if further investigation is necessary.

## Field Investigation and Risk Assessment

The Field investigation is undertaken to determine the presence or absence of contamination and where found, the nature and extent. A suitable sampling and analytical strategy should be undertaken to address the potential risks identified in the Preliminary Investigation. Data needs to be collected from the right locations and at the right time using the appropriate collections methods in order to estimate and evaluate the risks. The factual information should then be collated and interpreted with reference to the Conceptual Site Model (CSM). This is an iterative process and it is expected that the CSM and potential contaminant linkages will be revised as a result of the field investigation as part of the risk assessment process. This risk assessment is split into 2 tiers:

- **Generic Quantitative Risk Assessment (GQRA)** - involves the comparison of contaminant concentrations at a site with generic assessment criteria. These relate to the following land uses:
  - Residential
  - Allotment
  - Commercial
- **Detailed Quantitative Risk Assessment (DQRA)** - makes greater use of site-specific data to conduct a more accurate assessment of risks. This may involve the derivation of site specific assessment criteria (SSAC) that are then compared with contaminant concentrations.

If a contaminant linkage is confirmed and the risk assessment demonstrates that there are unacceptable risks associated with the site, then progression to the next phase will be necessary.

N.B. There are three phases of field investigation (exploratory, main and supplementary). Please consult BS10175 (2011) for further information.

The typical contents of a Field Investigation are also provided in BS10175 (2011), section 10.3. In summary, the report will include factual information based on the field investigation, followed by an interpretive section on the assessment of the results and an updated conceptual site model.

# INVESTIGATION PROCEDURE

## Remediation Scheme

A Remediation Scheme should be submitted where a Field Investigation and Risk Assessment has identified levels of contamination that would result in unacceptable risks to end users without appropriate remediation on the site.

The Remediation Scheme is action to be carried out so that contamination no longer presents an unacceptable risk to human health or the environment. It may include measures such as the removal of contamination, encapsulation of the contaminants, treatment of the contaminants or measures to break the contaminant linkages. The standard of remediation work should comply with current good practice and guidance. This must be approved by the Local Planning Authority before any remedial actions at the site commence. You should also state if you intend to undertake works in phases and seek progressive discharge of conditions on larger developments.

An options appraisal should be undertaken to identify and evaluate feasible remedial options for dealing with unacceptable risks. All identified options should be combined into a scheme that is capable of achieving overall remediation. Please note that Government policy encourages sustainable methods of remediation. It is important to note that re-use of materials on site, treatment of land and/or groundwater may require a permit (or an exemption) from the Environment Agency.

As a minimum, the following should be documented:

- Conceptual Site Model/Description of Site/Proposed Development
- Remedial Objectives
- Remediation Criteria
- Verification Plan (to include sampling and analytical strategies)

It should be noted that no assessment can inspect every section of the site and therefore should any unsuspected contamination be found, immediate contact should be made with the Local Planning Authority.

Once the site has been remediated, a Verification report will be required. This should demonstrate that the remedial objectives have been met and carried out in accordance with the verification plan.

Where remediation on a housing development is achieved by a cover system or encapsulation of contamination, a statement should be drawn up for future purchases and a copy sent to the Local Planning Authority as part of the validation process. This statement should advise on permitted development (where planning permission would not be required) or on the type of development that would be suitable, i.e. depth of foundations, water pipes/ponds, etc.

## Verification Reporting and Monitoring

Where contamination has been found and remediated, the developer will be required to submit a Verification Report. In certain circumstances it may be necessary for the developer to conduct post-completion monitoring. This should be undertaken to the approval of the Local Planning Authority and results of the monitoring should be submitted for review.

For limited remediation works or protective works, a verification statement alone may be acceptable, but prior confirmation of this should be obtained from the Local Planning Authority.

The verification report should provide confirmation that all measures outlined in the approved remediation scheme have been successfully completed including, where appropriate, validation testing.

NB. Verification and Validation are two terms often used quality management standards for the evaluation of a product, service, or system. BS EN ISO 9000:2005 provides the following definitions:

- Quality – degree to which a set of inherent characteristics fulfils requirements;
- Verification – confirmation through the provision of objective evidence that specified requirements have been fulfilled; and
- Validation – confirmation through the provision of objective evidence that the requirements for a specific intended use have been fulfilled.

Key aspects of both verification and validation are setting pre-defined requirements and the collection of evidence to show that those requirements have been met. This is also the case where evidence is needed to show that remediation of land contamination has met defined objectives, usually to ensure that risks to human health and the environment are insignificant. For the purpose of remediation, CLR 11 defines verification as ‘the process of demonstrating that the risks have been reduced to meet remediation criteria and objectives based on a quantitative assessment of remediation performance’. (EA, 2010)

On large schemes where development may be phased, progressive discharge of conditions may be possible provided a satisfactory verification report is received for each phase.

Recommendations to discharge contaminated land conditions will only be made once the Contaminated Land Officer/Environmental Protection Officer has received and approved a satisfactory Verification Report.

## Cover Systems

The overall design, depth and specification of the cover system will be based upon the findings of the risk assessment and whether an identification/break layer/'hard to dig' layer/geomembrane is required.

Where a cover system is employed to break the contaminant linkage in garden or landscaped areas, a minimum depth of 600mm should be used. This would typically consist of:

- 150mm of uncontaminated topsoil
- 450mm of uncontaminated subsoil
- granular capillary break layer (100mm hardcore) and/or
- a suitable geotextile membrane

Where it is required to reduce infiltration, impervious or low permeability designs will be needed.

## Verification of Cover Systems

Imported material should be clean and suitable for its intended purpose. Analytical results should be provided to demonstrate its suitability along with justification for sampling densities, analytical suite and criteria used for assessment. This should be agreed as part of the remediation scheme/verification plan.

Testing rates and suites depend on the soil source but as a guide, a minimum of 3 samples from any one source are required and sampling rates of:

- 1 sample per 150m<sup>3</sup> - Greenfield/Virgin
- 1 sample per 50m<sup>3</sup> - Mixed/Unknown

**Testing should be undertaken both at source and once laid, and is required for each individual soil type imported. Both analytical test results and delivery notes should be presented in the Verification Report.**

Further guidance and good practice on the Verification of Cover Systems, published by the NHBC, can be found on page 10 at:

<http://www.nhbc.co.uk/NHBCPublications/LiteratureLibrary/Technical/TechnicalExtra/filedownload,48980,en.pdf>



# USEFUL INFORMATION

## Websites

You may also find the following websites informative and up-to-date:

**Environment Agency:**

<http://www.environment-agency.gov.uk/research/planning/33706.aspx>

**Department for Environment, Food and Rural Affairs:**

<http://www.defra.gov.uk/environment/quality/land/>

**Department for Communities and Local Government:**

<https://www.gov.uk/government/organisations/department-for-communities-and-local-government>

## References

- British Standards Institution (2011) BS 10175:2011: Investigation of Potentially Contaminated Sites – Code of Practice. London: BSI  
Online: <http://shop.bsigroup.com/en/ProductDetail/?pid=00000000030205349>
- British Standards Institution (2004) BS EN 1997-1:2004 Geotechnical design. General rules. London: BSI
- British Standards Institution (2007) BS EN 1997-2:2007 Eurocode 7. Geotechnical design. Ground investigation and testing. London: BSI
- CIRIA (2009) The VOC Handbook. London: Ciria
- CIRIA (2007) C665 Assessing risks posed by hazardous ground gases to buildings. London: Ciria
- CLAIRE/CIEH (2008) Guidance on Comparing Soil Contamination Data with a Critical Concentration. London: CIEH  
Online: [http://www.cieh.org/uploadedFiles/Core/Policy/Publications\\_and\\_information\\_services/Policy\\_publications/Publications/Statistics\\_guidance\\_contaminated\\_2008.pdf](http://www.cieh.org/uploadedFiles/Core/Policy/Publications_and_information_services/Policy_publications/Publications/Statistics_guidance_contaminated_2008.pdf)
- DEFRA (2012) Contaminated Land Statutory Guidance. London: HM Government  
Online: <http://www.defra.gov.uk/publications/files/pb13735cont-land-guidance.pdf>
- Department for Communities and Local Government (DCLG) (2012) National Planning Policy Framework. London: DCLG  
Online: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/6077/2116950.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf)
- Department of the Environment (1995) DoE Industry Profiles. EA.  
Online: <http://www.environment-agency.gov.uk/research/planning/33708.aspx>
- Environment Agency (2010) Verification of remediation of land Contamination. EA  
Online: <http://publications.environment-agency.gov.uk/pdf/SCHO0210BRXF-e-e.pdf>
- Environment Agency (2010) Guiding Principles on Land Contamination  
Online: <http://publications.environment-agency.gov.uk/pdf/GEHO1109BRGY-e-e.pdf>
- Environment Agency (2009a) Human Health Toxicological Assessment of Contaminants in Soil. Bristol: EA  
Online: [http://www.grdp.org/static/documents/Research/TOX\\_guidance\\_report\\_-\\_final.pdf](http://www.grdp.org/static/documents/Research/TOX_guidance_report_-_final.pdf)

# USEFUL INFORMATION

- Environment Agency (2009b) Updated Technical Background to the CLEA Model. Bristol: EA  
Online: [http://www.grdp.org/static/documents/Research/CLEA\\_Report\\_-\\_final.pdf](http://www.grdp.org/static/documents/Research/CLEA_Report_-_final.pdf)
- Environment Agency (2004) CLR11: Model Procedures for the Management of Land Contamination. Bristol: EA  
Online: <http://publications.environment-agency.gov.uk/pdf/SCHO0804BIBR-e-e.pdf>
- NHBC/Environment Agency (2008) Guidance for the Safe Development of Housing on Land Affected by Contamination, R&D66: 2008. NHBC/EA.  
Online: <http://www.environment-agency.gov.uk/static/documents/Leisure/SR-DPUB66-e-e.pdf>
- Office of the Deputy Prime Minister (2006) Approved Document C - Site preparation and resistance to contaminants and moisture (Updated 2004). London: ODPM  
Online: [http://www.planningportal.gov.uk/uploads/br/BR\\_PDFs\\_ADC\\_2004.pdf](http://www.planningportal.gov.uk/uploads/br/BR_PDFs_ADC_2004.pdf)