



Development of Potentially Contaminated Land
and Sensitive End Uses

An Essential Guide for Developers



CONTENTS

This Guide is aimed at developers, site owners and consultants involved in the management and assessment of contaminated land and/or where a sensitive end use is proposed. The government's planning guidance on contaminated land is set out in Planning Policy Statement 23 (PPS23). The actual or possible presence of contamination is a material planning consideration.

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

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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 legislation, guidance and practical methods are adhered to as they may be subject to change.

Contaminated Land: The Legal Definition

Part 2A of the Environmental Protection Act 1990, as inserted by section 57 of the Environment Act 1995, places a statutory duty on Local Authorities' to inspect their areas to identify contaminated land and if necessary, ensure that land is remediated.

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”.

Before the Local Authority can make the judgement that any land appears to be contaminated land on the basis that significant harm is being caused, or that there is a significant possibility of such harm being caused, the authority must therefore identify a **significant pollutant linkage**. This means that each of the following has to be identified:

*(a) a **contaminant**;*

*(b) a relevant **receptor**; and*

*(c) a **pathway** by means of which either:*

(i) that contaminant is causing significant harm to that receptor, or

(ii) there is a significant possibility of such harm being caused by that contaminant to that receptor

In technical literature, the pollutant linkage is sometimes referred to as source-pathway-target or source-pathway-receptor, and without clear identification of all 3 elements, land cannot be identified as contaminated land under the regime.

Planning Definition: Planning Policy Statement 23 (PPS23)

THE PLANNING SYSTEM

The full text of PPS23 and Annex 2 can be found here:

<http://www.communities.gov.uk/planningandbuilding/planning/planningpolicyguidance/planningpolicystatements/planningpolicystatements/pps23/>

The planning system “aims to control development and land use in the future; consequently, for planning purposes, the assessment of risks arising from contamination and remediation requirements should be considered on the basis of both the current use and circumstances and its proposed new use. In most other respects, however, the underlying approach to identifying and dealing with risk, and the overall policy objective of safeguarding human health and the environment, are similar. A wider range of contamination and receptors is relevant to planning because of its wider spatial perspective but the degree of harm or pollution relevant to planning and the approach to remediation are essentially the same, i.e. unacceptable risk in planning terms includes the risks addressed by Part 2A of the EPA 1990.”

Annex 2 uses the wider term – “**land affected by contamination**”. This is intended to cover all cases where the actual or suspected presence of substances in, on or under the land may cause risks to people, property, human activities or the environment, regardless of whether or not the land meets the statutory definition in Part 2A.

DEVELOPERS RESPONSIBILITY

Annex 2 states the Role of the Owner/Developer:

“Where development is proposed, the developer is responsible for ensuring that development is safe and suitable for use for the purpose for which it is intended. The developer is thus responsible for determining whether land is suitable for a particular development or can be made so by remedial action. In particular, the developer should carry out an adequate investigation to inform a risk assessment to determine:

- whether the land in question is already affected by contamination through **source – pathway – receptor** pollutant linkages and how those linkages are represented in a **conceptual model**;
- whether the development proposed will create new linkages, e.g. new pathways by which existing contaminants might reach existing or proposed receptors and whether it will introduce new vulnerable receptors; and
- what action is needed to break those linkages and avoid new ones, deal with any **unacceptable risks** and **enable safe development** and **future occupancy of the site and neighbouring land.**”

WHEN TO CONSIDER CONTAMINATION

On a precautionary basis, the possibility of contamination should be assumed when considering individual planning applications.

Annex 2 states that:

“The possibility of contamination should be assumed when considering both development plans and 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**”.

POTENTIALLY CONTAMINATING LAND USES

(PPS23, TABLE 2.1)

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

OVERVIEW

- 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

SENSITIVE END USES

Where development is proposed on the following sensitive end uses, a contamination assessment is required:

- Housing
- Schools
- Nurseries
- Children's Play Areas
- Public Open Space
- Allotments

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.

The need to provide an adequate assessment of land contamination is outlined in Planning Policy Statement 23 and advice for developers on the steps they should take to identify whether there is a risk of contamination is contained in Annex 2. 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: <input type="text"/>	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.
Is the site currently vacant? <input type="checkbox"/> Yes <input type="checkbox"/> No	When answering whether the site is currently vacant, this means whether the site is currently not in active use.
If Yes, please describe the last use of the site: <input type="text"/>	
When did this use end (if known)? DD/MM/YYYY <input type="text"/> (date where known may be approximate)	
Does the proposal involve any of the following:	
Land which is known to be contaminated? <input type="checkbox"/> Yes <input type="checkbox"/> No	Development on land which has known contamination or known to be affected by contamination
Land where contamination is suspected for all or part of the site? <input type="checkbox"/> Yes <input type="checkbox"/> No	Development on or in close proximity to potentially contaminative uses.
A proposed use that would be particularly vulnerable to the presence of contamination? <input type="checkbox"/> Yes <input type="checkbox"/> No	Undeveloped sites may still be contaminated - it is not restricted to brownfield sites. Please state if the proposed use is sensitive.
If you have answered Yes to any of the above, you will need to submit an appropriate contamination assessment.	

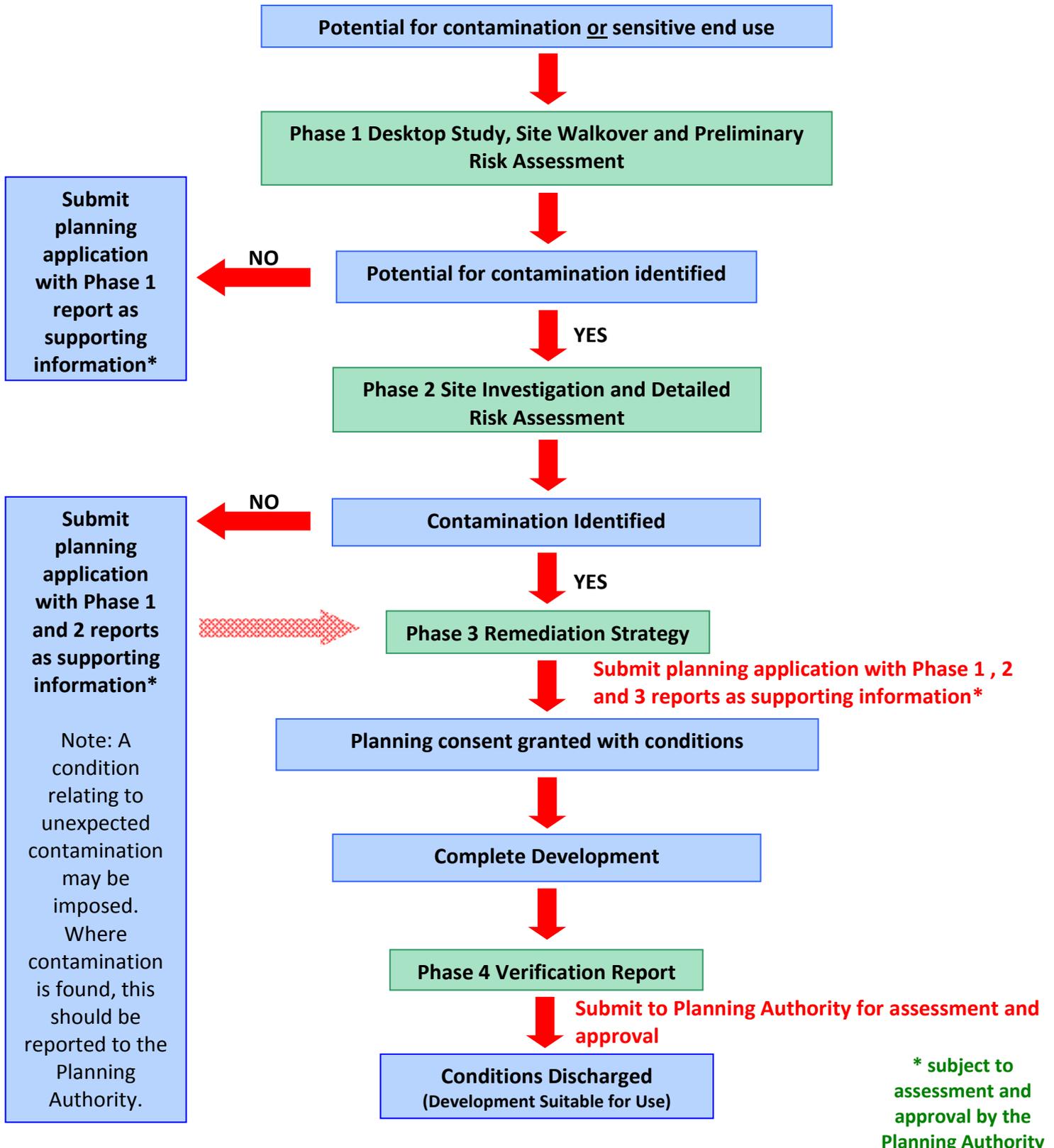
We would recommend the use of pre-application discussions so that there is a mutual understanding of objectives and constraints that may exist. Before an application is determined, Environmental Protection Units would prefer Phase 1,2 and 3 Reports to be submitted with the application. However, it is understood that permission for some developments may be uncertain and therefore advise you to speak to your LPA to establish if, as a minimum, a Phase 1 report would be accepted and conditions imposed for further investigation, if necessary.

Building Control 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 investigation procedure when dealing with potentially contaminated land; it is recommended that a tiered approach be adopted. This flow chart outlines how this process interacts with the planning regime.



INVESTIGATION PROCEDURE

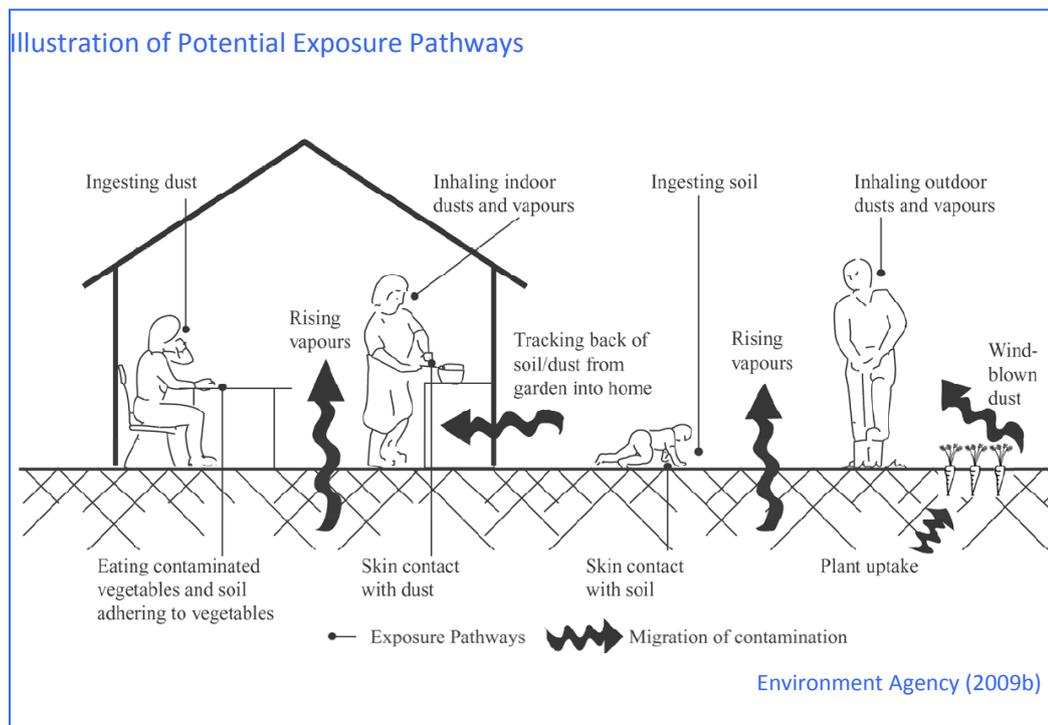
Phase 1 Desk Study, Site Walkover and Preliminary Risk Assessment

The investigation should be carried out in accordance with *BS 10175:2001, Investigation of potentially contaminated sites – code of practice* and *Contaminated Land Report 11. (CLR11)*

The preliminary risk assessment facilitates the development of a Conceptual Site Model (CSM) establishes whether or not there are any potential unacceptable risks. The CSM is a representation of possible pollutant linkages.

Source → Pathway → Receptor

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.



There are additional exposure pathways such as the examples provided below:

- inhalation of vapours (indoors and outdoors) volatilised from shallow groundwater;
- dermal contact with shallow groundwater;

INVESTIGATION PROCEDURE

- 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 risk assessment will then determine if further investigation is necessary.

A checklist can be found in the useful information section on Page 12 of this document.

Phase 2 Site Investigation and Detailed Risk Assessment

Phase 2 involves an intrusive investigation to determine the nature and extent of contamination. A suitable sampling and analytical strategy should be undertaken to address the potential risks identified in the Phase 1 desk study. 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 CSM developed at the desk study stage. This is an iterative process and it is expected that the CSM and potential pollutant linkages will be revised as a result of the site 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 pollutant linkage is confirmed and the risk assessment demonstrates that there are unacceptable risks associated with the site, then progression to Phase 3 will be necessary.

INVESTIGATION PROCEDURE

Phase 3 Remediation Strategy

A remediation strategy should be submitted where a site investigation identifies levels of contamination that would result in unacceptable risks to end users or without appropriate remediation on the site.

An options appraisal should be undertaken to identify and evaluate feasible remediation options for dealing with any unacceptable risks. All identified options should be combined into a remediation strategy 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.

The remediation strategy 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 pollutant linkages. The standard of remediation work should comply with current good practice and guidance. This must be approved by the LPA 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.

As a minimum, the following should be documented:

- Conceptual Site Model/Description of Site/Proposed Development
- Remediation 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 LPA.

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, a statement should be drawn up for future purchases and a copy sent to the LPA 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.

Phase 4 Verification Report

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 LPA 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 LPA.

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

NB. Verification and Validation are two terms often used. For clarification, these mean:

- Verification - confirmation that predicted levels of performance have been achieved, for example that a particular level of risk management for a site has taken place.
- Validation - confirmation of the likely performance of a particular remedial approach, for example that a geomembrane has successfully been installed.

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 has received and approved a satisfactory Verification Report.

Phase 1 Checklist

Typical Report Contents

1.1 Aims and objectives of study

1.2 Credentials of person or organisation undertaking the study

1.3 Site location and current layout plans including NGR and service plans

1.4 Appraisal of site and vicinity of development and land-use history:

- Review historical maps, trade directories, deeds and planning records

1.5 Walkover survey to include:

- Observations of actual site layout
- Condition of soil and vegetation
- Condition of structures
- Location and use of buildings
- Description of surface material e.g. concrete, tarmac, gravel
- Identification of likely areas of contamination
- Photographs of the site
- Consideration of design of future intrusive investigations
- Proximity to surface water, including culverts, surface waters, drains, gas pipes and electricity cables
- Location of all manhole covers
- Presence of underground voids, structures or vessels

1.6 Assessment of environmental setting, to include:

- Geology, hydrogeology and hydrology including, for example, orientation & direction of surface water flow, groundwater gradient and hydraulic continuity of surface/groundwater catchments
- Information on coal workings and other mining or quarrying activity (if appropriate)
- Information from Environment Agency e.g. licensed abstractions, pollution incidents, water quality classification, landfill sites within 250m
- Information from Local Authority on former landfill sites, private water supplies, historic land-uses, pollution incidents etc within 250m
- Information on any ecological and archaeological features

1.7 Provide details of any previous site contamination studies (desk based or intrusive), remediation works and civil engineering assessments

1.8 Preliminary (qualitative) assessment of risks, to include:

- An appraisal of potential contaminant sources, pathways and receptors (pollutant linkages)
- An initial 'conceptual site model'
- Health and safety issues

1.9 Recommendations for intrusive contamination investigation, if necessary, detailing rationale behind proposed design of investigation

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 pollutant 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

Validating Imported Material

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 strategy/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 150m³ - Greenfield/Virgin
- 1 sample per 50m³ - Mixed/Unknown

Testing should be undertaken both at source and once laid, and is required for each individual soil type imported.

USEFUL INFORMATION

Contacts

Local Authority/Agency	Email	Telephone
Allerdale	environmental.health@allerdale.gov.uk	01900 702580
Barrow -Environmental Protection Officer	environment@barrowbc.gov.uk	01229 876382
Carlisle	eps@carlisle.gov.uk	01228 817329
Copeland	envhealth@copeland.gov.uk	01946 598336
Eden -Contaminated Land Officer	pollution@eden.gov.uk	01768 212490
South Lakeland	deh@soutlakeland.gov.uk	0845 050 4434
Environment Agency	penrith.planning@environment-agency.gov.uk	01768 215798
Natural England	northwest@naturalengland.org.uk	0300 060 2122

Websites

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

[Environment Agency](#)

[Department for Environment, Food and Rural Affairs](#)

[Department for Communities and Local Government](#)

References

- British Standards Institution (2001) BS 10175:2001: Investigation of Potentially Contaminated Sites – Code of Practice. BSI, London.
- British Standards Institution (2004) BS EN 1997-1:2004 Geotechnical design. General rules. BSI, London.
- British Standards Institution (2007) BS EN 1997-2:2007 Eurocode 7. Geotechnical design. Ground investigation and testing. BSI, London.
- CIRIA (2009) The VOC Handbook. Ciria, London
- CIRIA (2007) C665 Assessing risks posed by hazardous ground gases to buildings. Ciria, London.
- CLAIRE/CIEH (2008) Guidance on Comparing Soil Contamination Data with a Critical Concentration. CIEH, London.
Online:
http://www.cieh.org/uploadedFiles/Core/Policy/Publications_and_information_services/Policy_publications/Publications/Statistics_guidance_contaminated_2008.pdf
- Department of the Environment (1995) DoE Industry Profiles. EA.
Online: <http://www.environment-agency.gov.uk/research/planning/33708.aspx>
- 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. EA. Bristol.
Online: http://www.grdp.org/static/documents/Research/TOX_guidance_report_-_final.pdf
- Environment Agency (2009b) Updated Technical Background to the CLEA Model. EA. Bristol
Online: http://www.grdp.org/static/documents/Research/CLEA_Report_-_final.pdf
- Environment Agency (2004) CLR11: Model Procedures for the Management of Land Contamination. EA. Bristol.
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) ODPM. London
Online: http://www.planningportal.gov.uk/uploads/br/BR_PDFs_ADC_2004.pdf
- Office of the Deputy Prime Minister (2004) Planning Policy Statement 23. ODPM. London
Online:
<http://www.communities.gov.uk/documents/planningandbuilding/pdf/planningpolicystatement23.pdf>
- Office of the Deputy Prime Minister (2004) Planning and Pollution Control (PPS23) Annex 2: Development on Land Affected by Contamination. ODPM. London
Online:
<http://www.communities.gov.uk/documents/planningandbuilding/pdf/pps2annex2.pdf>