

# A Guide for the Redevelopment of Land Affected by Contamination in Staffordshire

(3rd Edition)



Endorsed by Staffordshire Local Authorities





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## **1.0 Introduction**

1.1 The aim of this guide is to outline the information that Staffordshire Local Authorities require during an assessment of an application for planning consent on land that may be affected by contamination. This document has two purposes:

- to explain to developers and land owners why the contaminated land conditions have been applied to a planning application and the background to this legislation (**Sections 1-5**); and,
- to inform consultants of the requirements of the Local Authority in terms of site investigation (**Sections 5-8**).

This information is required in order to satisfy the Local Authorities statutory responsibilities at the initial planning application stage, for building regulation approval and to deal with any environmental health issues that may occur.

1.2 In common with the rest of the UK, the industrial history of Staffordshire has resulted in the potential for some sites, particularly those that have been used for industrial processes, to be affected by contamination.

1.3 The planning departments at authorities throughout Staffordshire are increasingly dealing with applications for developments on land that may be affected by contamination. An appropriate assessment of the risks posed by these potentially contaminated sites and the subsequent provisions for agreed remediation and validation is now a fundamental aspect of the development control process. There are now liabilities arising from the final condition of the site to consider in order to prevent it from being designated as contaminated land (as defined by Part 2a of the Environmental Protection Act 1990) in the future.

1.4 **It should also be noted that a full warranty from the NHBC or other approved inspectors will be withheld, mortgage funds will not be released and legal completion or sign-off will be prevented until the provision of sufficient information which demonstrates that a risk to health, property of the environment does not exist.**

This Guidance Note is intended as an informative and helpful source of advice. Readers must note that legislation; guidance and practical methods may be subject to change. Whilst all reasonable precautions have been taken to ensure that the information above is correct, the Local Authority, its officers, servants or agents, will not 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.

## **2.0 What is Contaminated Land?**

2.1 Local Authorities are responsible for addressing contaminated land issues within two separate regimes:

- the Contaminated Land regime (commonly known as “Part 2a”); and,
- the Planning regime (Development Control).

### ***Definition under the Contaminated Land Regime***

2.2 Part 2a of the Environmental Protection Act 1990 details the legislative framework for dealing with contaminated land. This statutory guidance was brought into force in England on 1st April 2000 and defines contaminated land as:

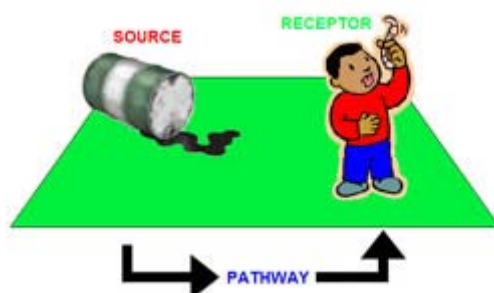
Any land, which appears to the Local Authority in whose area it is situated, to be in such a condition, by reason of substances either in, on or under the land, that:

1. significant harm is being caused or there is the significant possibility of such harm being caused; or,
2. pollution of controlled waters is being, or is likely, to be caused.

2.3 This guidance goes on to define harm as “harm to the health of living organisms or other interference with the ecological systems of which they form part and, in the case of man, also includes harm to his property”

2.3 In order for contaminated land to exist, the Local Authority must satisfy itself that a POLLUTION LINKAGE exists in relation to the land. A pollution linkage comprises three separate components:

- a SOURCE of contamination;
- a RECEPTOR for that contamination to affect; and,
- a PATHWAY capable of exposing a receptor to the contaminant source.



2.5 The Local Authority must then satisfy itself that the pollution linkage is SIGNIFICANT and must consider the degree of possibility or likelihood of significant harm, pollution of controlled waters or harm (where attributable to radioactivity). Unless all three elements of a pollutant linkage are identified, land cannot be declared contaminated.

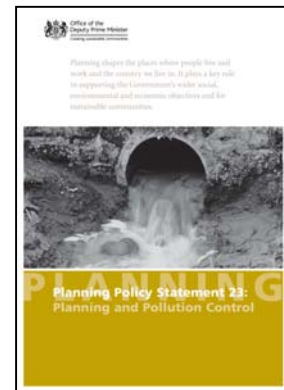
2.6 Consequently, under Part 2a, land can only be designated as contaminated where it is causing an unacceptable risk to human health or other specific receptors under its current use.

### **Definition under the Planning Regime**

- 2.7 Contamination is also a consideration under the Local Authority planning regime however, the main difference between Part 2a and planning is that under the latter, risks have to be assessed in relation to the proposed future use of land rather than the existing use which is the criterion of Part 2a.
- 2.8 To avoid confusion with the statutory definition of contaminated land, the planning regime uses the term "land affected by contamination" which is intended to cover cases where:

The actual or suspected presence of substances in, on or under the land may cause risks to people, human activities, or the environment regardless of whether or not the land meets the statutory definition of Part 2a

- 2.9 Annex 2 of Planning Policy Statement 23, launched in November 2004, provides more detailed guidance about development on land which may be affected by contamination. This states that the actual or possible presence of contamination is a material planning consideration. As a precaution, the possibility of contamination is always assumed when considering planning application sites on or near former industrial land or where the proposed end use are particularly sensitive to contamination such as, housing, schools or children's play areas.



- 2.10 Planning approvals on brownfield sites will usually have conditions attached requiring an assessment of land contamination. It is the responsibility of the developer to ensure that the land following development will be safe and fit for purpose.
- 2.11 As such, where planning permission is sought for a site which is considered to be potentially affected by contamination, the Local Authority will require site investigation, risk assessment and remediation to be carried out (a flow chart identifying the Contaminated Land Planning and Site Assessment Procedure is presented in *Appendix 1*). The results of this work must then be submitted to the Local Authority for approval that the site is suitable for its proposed end use.

### **3.0 Roles in the Development Process**

#### ***The Local Planning Authority***

- 3.1 Local Planning Authorities (LPA) have a duty to take account of all material planning considerations, including contamination, and to ensure that the developer undertakes this assessment and implements any remedial requirements in a responsible and effective manner. Often this will involve application and enforcement of any necessary conditions.
- 3.2 The Environmental Health Department of the Local Authority and Environment Agency will act as consultees regarding risks to human health and to controlled waters, respectively. Other statutory bodies and relevant Local Authority departments may also be consulted as necessary, including English Nature, English Heritage and the departments for Building Control, Conservation, Archaeology and Engineering.
- 3.3 The Building Control Department (together with private sector approved inspectors) are responsible for the operation and enforcement of the Building Regulations 2000 (as amended). These give Building Control Officers the authority to address contamination and land gas issues within the "footprint" of the property. The developer must demonstrate when requesting Building Control approval that hazards from contaminants or elevated ground gases have been properly assessed and measures have been put in place to address all identified risks.
- 3.4 Many of the decisions made by the Local Authority will be made on the basis of the information that has been provided. However, in addition to acting as a consultee, the Environmental Health Department of the Local Authority can provide the information it possesses in relation to contamination on a particular site however, a standard fee will be charged for this service. Further information can be obtained from [www.newcastle-staffs.gov.uk/contaminatedland](http://www.newcastle-staffs.gov.uk/contaminatedland) under the request for environmental information tab.

#### ***The Environment Agency***

- 3.5 Under the planning process, the Environment Agency is a statutory consultee in England and Wales on the matters for which it has regulatory responsibility. As such they will be consulted on applications where pollution of surface water or groundwater is involved, or where the water environment might be at risk of pollution as a result of the development. The Environment Agency also provides advice on applications for development close to or on landfill sites and within floodplain areas.
- 3.6 In addition to the planning permission normally required for new buildings or changes of use, other projects involving contaminated land may also require planning permission and/or Environment Agency approvals if any of the following conditions apply:
  - there is on-site disposal of controlled waste;
  - there is proposed on-site remedial treatment;
  - engineering works are to be carried out as part of the remedial treatment; or,
  - treatment is part of a development for which planning permission is required.

### ***The Applicant/Developer***

- 3.7 Before an application is made, proposers of development on potentially contaminated sites should arrange pre-application discussions with the LPA, particularly if the development involves the introduction of a sensitive land use such as residential housing with gardens. It is advisable to consider the potential for contamination at an early stage as such discussions can help to identify the potential extent and nature of contamination, its implications for the development being considered and may save both time and money.
- 3.8 Where development is proposed, the applicant is responsible for:
- (i) Deciding whether the land in question has the potential to be affected by contamination before the application is determined;
  - (ii) The provision of sufficiently comprehensive and accurate information to allow the Local Authority to establish whether contamination exists and whether the site has been remediated to an acceptable standard; and,
  - (iii) Ensuring that development is safe and suitable for use for the purpose for which it is intended.
- 3.9 Prior to determination of the application, the minimum that should be provided by the applicant is the report of a desk study and site reconnaissance (Refer to Section 6.0). This will either demonstrate that the risk from contamination is acceptable or will assist in determining the need and scope of further investigation.

**NOTE:** PPS23 states that where there is a suspicion or knowledge of contamination at a site, a planning application **must** be accompanied by the minimum of a desk study, site walkover and a preliminary risk assessment, including a conceptual model.

- 3.10 The developer is also responsible for ensuring that site workers and members of the public are protected from the potential effects of contamination during the entire process. Enforcement for health and safety matters on construction sites is the responsibility of the Health and Safety Executive (HSE).
- 3.11 Failure to appropriately address risks from land affected by contamination at the time of development may result in the site being entered upon the Local Authority Part II(a) list of potentially contaminated sites and action being taken under Part II(a) of the Environmental Protection Act 1990. All Local Authorities have a duty under this legislation to identify contaminated sites that pose a risk to health or the environment. Where such risks are identified the Local Authority has a duty to either bring about voluntary clean-up of the site or enforce the clean-up through service of notices and, possibly, prosecution.
- 3.12 Should a development site fail to be remediated to the point where the risks that should have been identified in any investigation are removed, then remediation may be enforced post-development at the expense of the persons deemed "appropriate" at that time. "Appropriate persons" are defined by the Environmental Protection Act 1990 as those who have caused or knowingly permitted a pollutant to be in, or under the land. These persons may be liable for the remediation of the site if it is subsequently determined as contaminated land by the Local Authority

however, there are also circumstances under which the current owner or occupier of the land in question could be classified as an appropriate person.

3.13 The subject of contaminated land is complex and it is required that a suitably qualified and experienced environmental professional is commissioned to carry out all aspects of the investigation. Many individuals or organisations may feel competent to complete various aspects of the assessment however, the Local Authority will have regard to their;

- Experience;
- Technical expertise;
- Familiarity with UK legislation, guidance and legal framework associated with contaminated land;
- Knowledge in the use and application of best practice; and,
- Full quality assurance and quality control.



## **4.0 The Process of Risk Assessment**

- 4.1 The procedure for investigating a potentially contaminated sites is based upon the assessment of risk and should meet the criteria outlined in DEFRA & the Environment Agency's Model Procedures for the Management of Land Contamination (CLR11) and British Standards (BS:10175) Investigation of Potentially Contaminated Sites – Code of Practice.
- 4.2 The requirement for investigation is based upon the likely presence of contamination, the usual indicators of which are either sites with a past industrial use (as identified within the DOE Industry Profiles or CLR3 – documentary research on industrial sites) or those located within proximity to a landfill. If the need for an investigation is identified, the site must enter a staged or tiered risk assessment process which includes:
- Preliminary Risk Assessment;
  - Generic Quantitative Risk Assessment (GQRA); and (if necessary),
  - Detailed Quantitative Risk Assessment (DQRA)
- 4.3 The objective of the risk assessment is to enable the applicant and the regulators to clearly define the risk of harm to existing and proposed end users and other environmental receptors from contamination. All identified risks must be evaluated fully to ensure that justifiable and accountable conclusions about the level and nature of risk have been reached. Failure to demonstrate this could result in the Local Planning Authority refusing an application, as important information could be overlooked.
- 4.4 Risk assessment should be considered an iterative process and, at any point, it may be necessary to revise assumptions made in the early stages of the assessment and further examine or remove different aspects of the investigation as more information becomes available (Refer to Contaminated Land Planning and Site Assessment Procedure presented in *Appendix 1*). However, progression will always depend upon the findings of the earlier stages.
- 4.5 The applicant/developer must engage an appropriately experienced environmental consultant to undertake site assessment. The Local Authority will require that the objectives, scope and execution of such assessments are agreed in advance and the resulting report/s are provided in full. As such, it is expected that initial contact will be made with the Contaminated Land Officer of the Local Authority during the preliminary risk assessment stage

## **5.0 Report Requirements**

- 5.1 Information submitted in support of planning applications must be of an acceptable minimum standard in order to satisfy the Local Authority. If contaminated land conditions have been applied to a planning application, reports submitted in respect of this must be tailored to allow the discharge of the conditions.
- 5.2 Site investigations are inherently site specific and ultimately dynamic as they are based on this staged risk assessment process (Refer to Section 4.0) which allows the results of each stage to be scrutinised and utilised to devise the next phase of work in order to reach a final conclusion. The complex nature of this work requires that suitably qualified and experienced environmental consultants or specialists are commissioned to carry out the elements of the site characterisation. These persons must be familiar with all elements of current UK policy, the contaminated land legislative framework and modern risk assessment and site investigation techniques in order to satisfy the requirements of the Local Authority.
- 5.3 Reports submitted to the Local Authority must be clear, rational, ordered and comprehensive to demonstrate a logical progression of the assessment procedure. Local Authorities will initially screen site investigation reports against the “Minimum Contents of Reports Submitted in Support of Planning Applications” checklist (presented in *Appendix 2*) which offers a broad overview of the minimum contents of site investigation reports submitted to the Local Authorities.
- 5.4 A copy of the full suite of the standard contaminated land conditions in use at the Local Authority is presented in *Appendix 3* and a detailed technical framework for investigating and dealing with land affected by contamination is contained within the document ‘Model Procedures for the Management of Land Contamination, CLR 11’.
- 5.5 It should be noted that site investigation reports which do not meet the minimum requirements and which fail to adhere to current legislation and guidance will be rejected. This may subsequently lead to significant delays in the planning process or planning permission being refused by the LPA. The potential for this will be reduced through early consultation with the Contaminated Land Officer of the Local Authority (contact details presented in *Appendix 5*).
- 5.6 The developer is encouraged to submit each phase to the Local Authority at the earliest opportunity for approval (**the Contaminated Land Officer is willing to review and agree draft copies of reports prior to final submission**). This will prevent delays and will avoid insufficient or unnecessary works and costs.
- 5.7 Where significant contamination issues are anticipated on a development, developers and their appointed consultants are encouraged to undertake pre-application consultation with the Local Authority and/or the Environment Agency.

## **6.0 PHASE I: Desk Study** **(Preliminary Risk Assessment)**

- 6.1 The aim of the preliminary risk assessment is to collate information pertaining to the site from various sources, interpret this information and make an initial hazard assessment. This will establish whether or not there are any potentially unacceptable risks arising from contamination and will identify whether further assessment is required.
- 6.2 This stage is often referred to as the 'desk study' and comprises a search of available information about the site and its immediate environment. This should include, but not be restricted to:

- A map of the site showing its location in relation to its wider surrounds (including grid reference and address), as well as details of the current and planned layouts of the site;
- Details of site history;
- Information obtained from an environmental database report;
- Information regarding the geology, hydrogeology and hydrology;
- Information on ecosystems, heritage and other interests;
- A review of any previous studies, ongoing monitoring, remediation work etc. for both the site and any adjacent sites; and,
- Any existing documented records relating to the sites condition.



All collected information should be supported by documentary evidence (such as historical maps, photographs and former site layouts etc.) and should be appended to any report.

- 6.3 The desk study must also include a reconnaissance of the site and its surroundings. The site walkover should confirm the information in the desktop study, locate and record condition of features and plan further site investigation works (if appropriate). Anecdotal evidence from local interviews may provide additional useful information. Further information regarding site inspection is presented in CLR2 Guidance on Preliminary Inspection of Contaminated Land.
- 6.4 An initial "Conceptual Model" must then be produced from the findings of the study which will adequately reflect the conditions on site and any relevant uncertainties. The conceptual model should clearly identify, through text and graphics:
- any potentially significant **sources** of contamination and the principle contaminants associated with these sources;
  - the **pathways** through which contaminants can travel; and,
  - the **receptors** that can ultimately be affected.
- 6.5 The key to a robust conceptual model is identifying the potential linkages between the sources-pathways-receptors. Without all three components being present, there is no risk. The conceptual model should consider both current and future site uses when determining all plausible pollutant linkages.

- 6.6 The desk study should conclude with a risk assessment derived from the conceptual model which will identify whether any plausible pollutant linkages exist. The conceptual model underpins the risk assessment as during the process, each pollutant linkage is refined and investigated for its significance. If this preliminary assessment clearly demonstrates that no plausible pollutant linkages exist, then further assessments may not be required.

Levels of Risk		Potential Severity			
		Severe	Medium	Mild	Minor
Probability of Risk	High Likelihood	Very High	High	Moderate	Low/Moderate
	Likely	High	Moderate	Low/Moderate	Low
	Low Likelihood	Moderate	Low/Moderate	Low	Very Low
	Unlikely	Low/Moderate	Low	Very Low	Very Low

*The risk assessment should be carried out in accordance with the guidance presented in "CIRIA552: Risk Assessment – a guide to good practice"*

A broad overview of the minimum contents of a desk study is outlined in Section 1 of the "Minimum Contents of Reports Submitted in Support of Planning Applications" (presented in *Appendix 2*).

- 6.7 The desktop study must then be submitted to the Local Authority as a written report with a proposed scope of further works (if required) which can be agreed in principle at this stage. This work must be submitted **prior** to the commencement of further works to ensure that the Local Authority is satisfied with the content, conclusions and recommendations made. At this stage, the Local Authority or Environment Agency may request further information or clarification of points.

## **7.0 PHASE II: Intrusive Investigation** **(Generic/Detailed Quantitative Risk Assessment)**

- 7.1 If the Preliminary Risk Assessment indicates that there is a potential risk of harm from contamination, an intrusive investigation must be undertaken. The aim of the Phase 2 investigation is to reduce the uncertainties identified in the Preliminary Risk Assessment by quantifying the risk associated with the identified pollution linkages. The investigation should:
- confirm site specific conditions, such as geology and hydrogeology;
  - confirm pollutant linkages;
  - refine and update the conceptual model;
  - evaluate whether the significant possibility of significant harm (SPOSH) exists for the identified pollution linkages; and,
  - provide the basis for identifying suitable remediation options when unacceptable risks are identified at the site.
- 7.2 The intrusive investigation must be undertaken by suitably qualified and experienced consultants or specialists and it is recommended that the scope of this work is pre-agreed with the Local Authority prior to works being undertaken. This will allow appropriate, targeted investigations to be undertaken and will avoid insufficient or excessive works, saving both time and money.
- 7.3 There may also be the need to monitor off site in order to assess the impact of migrating contaminants. As such, and in order to ensure confidence in the decisions made, it is essential that the soil sampling strategy is appropriate and that the data is adequately analysed and evaluated. It is recommended that the sampling strategy is agreed in principle with the Contaminated Land Officer prior to works being undertaken.

### **Site Sampling**

- 7.4 The sampling strategy must be designed in accordance with current, recognised sample collection methodologies and guidance (such as BS10175:2001, CLR11 and R&D Technical Report P5-066/TR) whilst being developed with reference to information collected during the Preliminary Risk Assessment (e.g. site history and conceptual model) in order to target potential sources of contamination.



- 7.5 The design of a sampling plan typically combines two elements:
- targeted sampling – focussed upon suspected sources of contamination; and,
  - non targeted sampling – sampling carried out upon a systematically on a grid defined in terms of pattern and spacing.

The decision on whether to employ one or both of these elements within the sampling strategy is based, most importantly, upon an understanding of the conceptual model but also the site ground conditions, the averaging areas, the requirements of the risk assessment and the development plan itself. These elements will also inform the density of the sampling required

e.g. an exploratory level of investigation will utilise a lower density than a detailed investigation

- 7.6 The strategy should be designed to provide data that is representative of the site conditions as a whole and such that appropriate statistical analysis can be used to examine and interpret the data. The report must include full justification of the adopted sampling strategy, including a detailed scale plan showing the location of sampling points, description of zoning/phasing utilised, its limitations and methods used to collect the samples.

- 7.7 Every precaution must be taken to ensure that site investigations do not introduce or mobilise contaminants or create new pathways. If any visibly contaminated or odorous material is encountered at any time during site investigations, it must be reported immediately to the Local Authority and appropriate investigation and risk assessment undertaken.



- 7.8 With regard to groundwater sampling, cleaning and development of newly installed wells may be required and sampling should not be carried out until the aquifer, the groundwater and the gravel pack are in equilibrium (up to 14 days). When sampling dissolved contaminants, the sample must only be obtained after purging of the well (3x well volume) as standing water may become stagnant which may affect its oxidation state and volatile content.

### ***Sample Analysis***

- 7.9 Once collected, it is essential that appropriate sample handling procedures are employed so as to ensure that the analytical results are not invalidated. Cross contamination of samples should be avoided and all samples should be packed in a cold cool box, with frozen ice packs, in a manner sufficient to survive transport and then kept cool and in the dark. The samples should then be despatched to a laboratory that holds a relevant accreditation for each contaminant as soon as possible.

**NOTE:** Samples which have not been obtained or stored correctly will have the relevant accreditation removed by the laboratory. It is therefore essential that appropriate sample handling procedures are employed.

- 7.10 In addition to site observations, reference to the historical site information and the initial conceptual model should be used in order to ensure that analysis for appropriate contaminants is conducted. The report should include full justification for the chosen analysis together with summary tables of results. A full set of results including, where appropriate, location of samples, borehole logs, and accreditation details of the analytical technique used, including limits of detection, should be appended to the report.

- 7.11 It should be noted that, in line with current guidance, the Local Authority requires analysis for polycyclic aromatic hydrocarbons and petroleum

hydrocarbons to be speciated and speciated according to TPHCWG approach respectively. In addition to this, and when assessing the risk from organic compounds, it is important to request soil organic matter content (SOM) within the analytical schedule as this affects the mobility of these compounds by binding them to the soil.

- 7.12 Where available, laboratory analysis of chemical samples shall be by methods accredited to the Environment Agency Monitoring Certification Scheme (MCERTS) standard. Further details on MCERTS are available on the Environment Agency's website.



### **Data Evaluation**

- 7.13 To obtain an accurate assessment of the sources, distribution and concentration of contaminants across the site, it is essential that data obtained from an intrusive investigation are assessed correctly. A statistical approach to sampling and data analysis offers a powerful way of supporting decisions about the condition of the land and how it should be regarded in both technical and legal terms.

- 7.14 DEFRA and the Environment Agency have withdrawn the previous statistical guidance (CLR7) as this no longer fully reflects their current approach. Statistical analysis should therefore be undertaken in accordance with the current CIEH/CL:aire Guidance on Comparing Soil Contamination Data with a Critical Concentration which is intended to be used in the place of Annex A of CLR7. Staffordshire Local Authorities therefore require statistical tests presented in investigations to adhere to this approach (available from [www.cieh.org](http://www.cieh.org) or [www.claire.co.uk](http://www.claire.co.uk))

- 7.15 Any intention to use a statistical approach to data analysis must be established **prior** to sample collection. Consideration must also be given to the relevant averaging area and to the most appropriate method of grouping the data, both of which must relate to the conceptual model e.g. data may be grouped spatially across a site (individual zones of the site) or by particular strata (such as made ground).

- 7.16 Assuming that an appropriate sampling strategy has been developed and implemented, statistical analysis can help by providing a systematic and objective way of examining, presenting and interpreting data. Reports should include information to show:

- that data is relevant, sufficient, reliable and transparent;
- sample data is unbiased; and,
- that assumptions regarding the normality of the data have been tested and statistical outliers identified.

If this cannot be demonstrated, it is recommended that the range of values are reported.

- 7.17 It should be remembered that hydrocarbons, VOC's and SVOC's are generally targeted with respect to potential identified sources on site and hence, it is not considered appropriate to statistically analyse the results. Again, the range of values measured should be reported.

### **Generic Quantitative Risk Assessment (GQRA)**

7.18 Generic Quantitative Assessment is the process of determining whether pollutant linkages from the conceptual model can be screened out using generic assumptions about the behaviour of contaminants and receptors on site. The primary screening is undertaken through comparing representative contaminant concentrations against relevant screening criteria. It should be demonstrated within the report that the screening criteria utilised conform to current UK Government policy objectives, guidance and legislation.

7.19 The Contaminated Land Exposure Assessment (CLEA) Model has been designed specifically to assess the risk to long term human health from contaminants in soil and has generated Soil Guideline Values (SGV's) for three typical land uses;

- residential;
- allotments; and,
- commercial/industrial.

In the first instance, exposure to human health must be assessed with reference to the current Soil Guideline Values (SGVs) however, there are only a limited number of SGV's have been determined for a few key contaminants.

7.20 Where an SGV is unavailable for a particular substance or land use, the Local Authority will accept the use of:

- the current CIEH/LQM Generic Assessment Criteria for Human Health Risk Assessment;
- the current Atkins AtRisk Values;
- the current EIC/CL:aire values; and,
- the ICRCCL values for phytotoxic contaminants.

However, the use of these values must be justified and appropriate for the situation/land use that is being presented. Where a substance is not covered by the above, screening values derived in house using an appropriate model (see DQRA) will also be accepted however, these must be fully justified and the input values must be clearly referenced.

During 2008, DEFRA and the Environment Agency withdrew the CLR 7-10 documents since these no longer reflected their approach. The generic assumptions utilised in the approach to deriving toxicological data, the technical background to the CLEA model and associated software handbook have been updated and are detailed within Environment Agency "SR" range of documentation.

7.21 The direct application of non-UK derived generic assessment criteria will not be accepted as some degree of modification would always be required to ensure suitability of the UK context. Such modifications are considered to constitute a Tier 3 DQRA.

7.22 Following the initial assessment against appropriate screening values, a decision must be taken about the next course of action. Where the representative contaminant concentration or range of reported values fall below the appropriate screening value for that contaminant, these can be considered as not posing an unacceptable risk to human health. Where concentrations exceed the screening value, the presumption is that there is sufficient evidence for potentially unacceptable risk to human health to warrant further consideration. This may involve the implementation of a

remediation strategy on the basis of the available data, further investigation or more comprehensive site-specific risk assessment using an industry standard model.

### ***Detailed Quantitative Risk Assessment (DQRA)***

- 7.23 In some instances, generic quantitative assessment criteria are either unsuitable, unavailable or exceeded. In these cases, it is necessary either to use other generic criteria or to calculate site specific assessment criteria based upon toxicity data and calculated exposure. This must be undertaken by a specialist risk assessor in accordance with the guidance presented in CLR11.
- 7.24 Values derived from DQRA must be able to demonstrate transparency in the procedures used, evidence of sound science and clarity in the assumptions made whilst conforming to current UK Policy. When deriving a guideline value for a substance for which there is no published TOX report, reference should be made to the approach outlined in Environment Agency report SC050021/SR2. Where available, UK data should be used; otherwise, international data or data from another country may be referred to however, if non-UK data are used, consideration should be given to the likely extent to which they reflect the current UK situation.
- 7.25 Detailed site specific criteria may also be required where the conceptual model differs from the standard land uses. This may involve changes to one or more parts of the conceptual model such as (for example):
- the Source            Combinations of contaminants may have additive, synergistic or antagonistic effects;
  - the Pathway           Changes to dermal contact or soil and dust ingestion rate (e.g. on a sports pitch), differences in building characteristics or the introduction/removal of pathways; and,
  - the Receptor           Changes in exposure time or age classes
- 7.26 This assessment is usually undertaken using one of a number of commercially available risk assessment tools. The CLEA UK model assesses the risks to human health and has been developed specifically for to take into account UK conditions. The following alternative risk assessment tools are also currently available:
- Risk Based Corrective Action Toolkit (RBCA)
  - RISC Human
  - Scotland and Northern Ireland Forum For Environmental Research (SNIFFER) *Framework for Deriving Site-Specific Human Health Assessment Criteria for use in the Assessment and Management of Contaminants in Soil*
  - LandSim
- 7.27 Whichever model is utilised, it is important to justify their use within the report by demonstrating that they are relevant to the pollution link in question and that the assumptions underlying the derivation of any numerical values (e.g. assumptions regarding the behaviour of potential pollutants, toxicological data and the availability of receptors) are relevant to the circumstances of the pollution linkage in question or appropriate adjustments have been made to allow for these differences. The report should clearly reference and justify each of the user dependant input

parameters, particularly highlighting sensitive parameters that may greatly affect model output. Local Authorities will require further information where confidence about the assumptions and conclusions within the report cannot be reached.

### **Ground & Surface Waters**

7.28 Risks to ground and surface waters should be assessed using the Environment Agency's *Methodology for the Derivation of Remedial Targets for Soil and Groundwater to Protect Water Resources* in the first instance. This tiered methodology which, although primarily aimed at deriving remedial targets for site remediation, also predicts the impact on water receptors for a given set of site conditions and so can be used to determine whether remedial action is required. Other models such as Consim and RBCA, may also be acceptable. Consultation should be undertaken with the Environment Agency on matters relating to controlled waters.

### **Ground Gas**

7.29 If development is situated within <250m of a landfill or the potential for the presence or migration of hazardous ground gases or vapours has been identified, further investigations will be required in order to assess the potential risk and, if required, to incorporate appropriate gas protection measures into the development design. These investigations should be carried out in accordance with the following guidance;

- Assessing risks posed by hazardous ground gases to buildings (CIRIA, C665);
- Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present (NHBC, RSK Group);
- Code of practice for the characterisation and remediation of ground gas in affected developments (British Standards, BS8485); and,
- Local authority guide to ground gas (CIEH).

7.30 As with any investigation of contaminated land, the purpose underlying site investigation and monitoring related to ground gas or vapours is to identify, or rule out, potential *source – pathway – receptor* pollutant linkages and to develop a conceptual risk model. All investigations should be phased, beginning with gathering existing information on the site (the desk study).

7.31 Where the desk study identifies a potential ground gas risk, gas monitoring will be required, the actions of which (e.g. number and spacing of wells, response zones, length and frequency of monitoring) must be clearly justified within the report. It is strongly recommended that the Local Authority is contacted in the first instance in order to agree a proposed scope of works in principle, prior to any gas investigations being undertaken.



7.32 Where ground gas monitoring is required, preference is given to the use of continuous ground gas monitoring data (Gasclam®). Should this be unavailable, periodic monitoring data will be accepted however, this should, as far as practicable, include at least two rounds of low and falling atmospheric pressure and different weather conditions to ensure that data

is acquired during worst case conditions. Measurements must be taken from suitably installed and equipped boreholes, the details and locations of which should be supplied. Spike testing and data obtained from trial pit installations is not considered acceptable for gas risk assessment.

7.33 As a minimum, presentation of gas data in reports should include:

- Site plans (showing monitoring locations, site zones, source areas);
- Raw data (in proforma such as that presented in Appendix A3 of C665);
- Summarised data (set out in tables/charts)
- Current calibration certificates of the monitoring equipment

Once sufficient gas monitoring data has been obtained, appropriate ground gas risk assessment should be carried out to determine if gas protection measures are required.

7.34 If installed, validation of gas protection measures should be carried out by an independent consultant in addition to any quality assurance undertaken by the installation contractor. Important items that require validation include membrane installations, floor slab construction, under floor venting and in-ground gas venting and barriers. It is easy for gas mitigation measures to be installed incorrectly and therefore, independent inspection and quality assurance are vital.

### **Reporting**

7.35 Upon completion of the intrusive investigation, a comprehensive report detailing and justifying the methodologies used in the investigation, the results, conclusions and recommendations must be submitted to the Local Authority prior to any further site works proceeding to ensure that it is satisfied with the content, conclusions and recommendations made. A broad overview of the minimum contents of a Phase II investigation is outlined in Section 2 of the "Minimum Contents of Reports Submitted in Support of Planning Applications" (presented in *Appendix 2*).

7.36 The report should conclude with the refinement of the initial conceptual model, highlighting all relevant pollutant linkages that have been identified during the risk assessment stage that may constitute a significant possibility of significant harm and so represent an unacceptable risk to human health or the environment. If unacceptable risks are identified, the report should then seek to establish which remedial option, or combination of options, provides the best approach to breaking all of the relevant pollutant linkages.

This department is willing to review draft copies of reports prior to final submission in order to ensure that the reports are sufficient for the purposes of the Local Authority and to expedite the release of conditions.

7.37 In some cases, the report may identify the potential for acute risks to human health from short term exposure to contaminants (e.g. inhalation of site derived dusts or vapours). The CLEA model is not designed to consider exposure periods of less than 1 year. Where such risks are identified, exposure will initially be to the developers workforce and therefore, the report should detail appropriate health and safety advice and risk mitigation measures

- 7.38 If, at any time during investigation, unsuspected contamination is identified then the Local Authority must be contacted immediately, in order to discuss a strategy for the treatment or removal of the contaminated material. The risk assessment must also be reviewed in the light of this.

## **8.0 PHASE III: Remediation**

8.1 Where unacceptable risks to human health, property or the environment have been identified and once the Phase II report has been formally agreed with the Local Authority, a remediation strategy which identifies how the identified risks in light of the proposed land use will be managed should be produced. CLR11 defines a remediation strategy as "*a plan that involves one or more remediation options to reduce or control the risks from all the relevant pollution linkages associated with a site*". This is known as Phase III works and should comprise:

- definition of the remediation objectives;
- appraisal of the options for remediation and selection of preferred strategy;
- planning and implementation of the remediation strategy;
- long term monitoring and maintenance; and,
- preparation of a validation report

The refined conceptual model plays a crucial role in the identification and eventual selection of the preferred remediation scheme. As such, site specific **remediation objectives** must ensure that all relevant pollutant linkages, identified in the conceptual model, are considered and must manage the risk associated with each. These objectives may be qualitative or quantitative, but must always relate to the risk assessment. Once the remediation objectives have been defined, site specific remediation criteria for measuring compliance against these objectives must be derived. These criteria should provide the measure against which compliance with the remediation objectives will be assessed during and after the implementation of the remediation strategy.

A broad overview of the minimum contents of a remediation strategy is outlined in Section 3 of the "Minimum Contents of Reports Submitted in Support of Planning Applications" (presented in *Appendix 2*).

8.2 Having identified the remediation objectives, an appraisal of the potentially suitable **remediation options** must be carried out with clarity and transparency so as to enable the Local Authority to understand the various considerations and priorities that have informed the determination of the preferred strategy. This assessment may be undertaken on a qualitative or quantitative basis and involves breaking the pollution linkage(s) through control of either the source (e.g. removal of), the pathway (e.g. through inhibition or control) or the receptor (e.g. altering behaviour or removal) or a combination of all three. The techniques effectiveness in dealing with the contamination and site specific issues (e.g. cost benefit, regulatory requirements, operational issues, environmental effects) should also be considered as part of this. A **preferred remediation strategy** should then be established from this detailed analysis.

8.3 The remediation strategy must then be submitted to the relevant regulatory bodies (Local Authority, Environment Agency) prior to any further site works proceeding so as to ensure that they are satisfied with the strategies content, conclusions and recommendations. In addition to the standard regulatory controls such as planning consent, building control approval, CDM regulation and health and safety legislation, other regulatory requirements (e.g. waste management licensing, hazardous waste regulations, PPC regulations, groundwater regulations) may need to be considered. Early consultation with the relevant regulators is recommended as this will avoid either excessive or insufficient works and will minimise the potential for delays.

8.4 Having determined and agreed the preferred remediation strategy, the **implementation of the strategy** on site must be planned and developed. This should set out the design and specification of the remedial works and technical issues.

8.5 The remedial strategy may highlight that off-site disposal of contaminated soils and waters is necessary however, the Local Authority will have preference to the use of alternative, more sustainable remediation techniques such as:



- In-situ and ex-situ bioremediation of soils;
- Solid Phase Biopiles
- Soil Washing;
- Thermal desorption;
- Air Sparging;
- Monitored natural attenuation;
- Permeable Reactive Barriers; and,
- In-situ enhanced natural attenuation of groundwater.

Although these may initially take more time, there is often a cost benefit associated with them. The Environment Agency should be consulted where such techniques are proposed as they may require mobile plant or waste management licences.

8.6 The Local Authority will require that an appropriately qualified and experienced project manager supervise any agreed required remediation, and that any remediation works are carried out by a contractor/sub contractor with appropriate experience and/or expertise particular to the techniques being adopted. The appointed persons or organisations will be responsible for the documentation and certification of the site remediation work and for its compliance with the agreed remediation strategy, the recommendations of the consultant, and the requirements of other regulatory agencies. They shall also be responsible for the safety of site workers and the public.

Where remediation includes importation of soils onto the site, either for gardens or soft landscaping purposes, these must be suitable for the proposed development and must not cause harm to human health, property, the environment or controlled waters. The Local Authority will require the provision of documentation prior to the importation of such soils in order to demonstrate this. This should include details of the source, the supplier and appropriate chemical analysis. The Local Authority should be contacted prior to the importation of soils so that a suitable methodology can be agreed in principle. Points to consider include:

- Soils must not contain foreign materials such as plastics, glass, metals, tarmac etc
- The schedule of analysis must be appropriate: a minimum of metals, speciated PAH, total TPH plus additional substances i.e. pesticide suite for agricultural soils
- Analysis must take place at independent accredited laboratories
- The analytical results must be compared to screening values previously agreed with the Local Authority
- The Local Authority must approve the results of the analysis prior to the soils being imported to site.

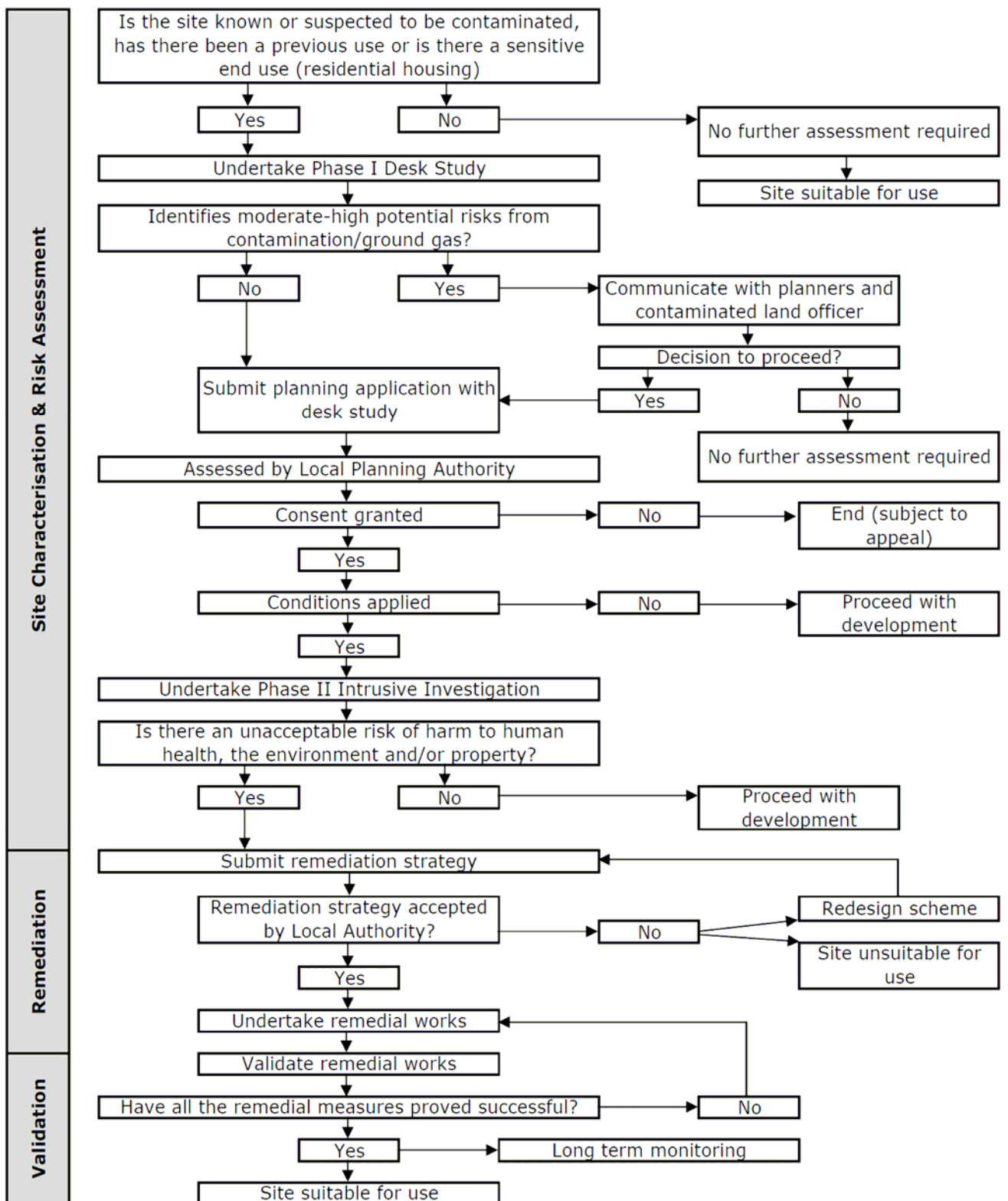
- 8.7 **Long term monitoring** and/or maintenance will not be required on sites where the remediation scheme has been designed to avoid this or where verification demonstrates that the remediation objectives have been met within appropriate timescales. Where long term monitoring is required a monitoring/maintenance plan describing the scope, context and specification of monitoring works, roles and responsibilities, frequency and duration of monitoring, evaluation criteria etc. will be required. The plan should also set out the appropriate response actions to a failure being identified during monitoring. The objective of maintenance is to ensure that the remedial structure continues to function and operate as designed. This may include periodic inspection and servicing at recommended intervals, all of which should be detailed in the remediation strategy.
- 8.8 The overall objective of **validation** is to demonstrate the achievement of the remediation objectives set out in the remediation strategy and to document all aspects of the remediation work undertaken at the site. It is important that accurate documentary evidence is maintained so that it can be summarised as part of a validation report which should provide a full record of all remediation activities carried out at the site.

The validation report should be submitted to the Local Authority at the end of the remediation work. The Local Authority may require reports on the validation works to be phased in order to monitor progress. This would be an additional reporting requirement and would not replace the need for a final completed version of the report. Subject to the findings of the validation report, the Local Authority may require further works, including sampling and remediation to be undertaken. Recommendations to the LPA to discharge contaminated land conditions will only be made once the Local Authority is satisfied that the site has been remediated to an acceptable standard and is suitable for use

A broad overview of the minimum contents of a validation report is outlined in Section 4 of the "Minimum Contents of Reports Submitted in Support of Planning Applications" (presented in *Appendix 2*).

- 8.9 If, at any time during remediation, unsuspected contamination is identified then the Local Authority must be contacted immediately, in order to discuss a strategy for the treatment or removal of the contaminated material. The risk assessment must also be reviewed in the light of this.

## Appendix 1: Contaminated Land Planning and Site Assessment Procedure





### **Appendix 3: Standard Contaminated Land Planning Conditions**

Development should not commence until an investigation and risk assessment, in addition to any assessment provided with the planning application, is completed in accordance with a scheme to assess the nature and extent of any contamination on the site, whether or not it originates on the site. The contents of the scheme are subject to the approval in writing of the Local Planning Authority. The investigation and risk assessment must be undertaken by competent persons and a written report of the findings must be produced. The written report is subject to the approval in writing of the Local Planning Authority. The report of the findings must include:

#### **1. Site Characterisation**

Development should not commence until a further investigation and risk assessment has been completed in accordance with a scheme to be agreed by the Local Planning Authority to assess the nature and extent of any contamination on the site. The investigation and risk assessment shall be undertaken by competent persons and a written report of the findings shall be submitted and agreed in writing with the Local Planning Authority prior to the commencement of the development. The report of the findings shall include:

(i) A survey of the extent, scale and nature of any contamination;

(ii) An assessment of the potential risks to:

- Human health;
- Property (existing or proposed) including buildings, crops, livestock, pets, woodland, service lines and pipes;
- Adjoining land;
- Ground and surface waters;
- Ecological systems; and,
- Archaeological sites and ancient monuments.

(iii) An appraisal of remedial options, and proposal of the preferred option(s).

This must be conducted in accordance with DEFRA and the Environment Agency's 'Model Procedures for the Management of Land Contamination, CLR 11'.

#### **2. Submission of a Remediation Statement**

Development shall not commence until a detailed remediation scheme to bring the site to a condition suitable for the intended use by removing unacceptable risks to human health, buildings and other property and the natural and historical environment has been prepared, and is subject to the approval in writing of the Local Planning Authority. The scheme must include all works to be undertaken, proposed remediation objectives and remediation criteria, timetable of works and site management procedures. The scheme must ensure that the site will not qualify as contaminated land under Part of the Environmental Protection Act 1990 in relation to the intended use of the land after remediation.

#### **3. Implementation of Agreed Remediation Scheme**

The approved remediation scheme must be carried out in accordance with its terms prior to the commencement of development other than that required to carry out remediation, unless otherwise agreed in writing by the Local Planning Authority. The Local Planning Authority must be given two weeks written notification of commencement of the remediation scheme works.

Following completion of measures identified in the approved remediation scheme, a verification report (referred to in PPS23 as a validation report) that demonstrates the effectiveness of the remediation carried out must be produced, and is subject to the approval in writing of the Local Planning Authority.

#### **4. Report of Unexpected Contamination**

In the event that contamination is found at any time when carrying out the approved development that was not previously identified it must be reported in writing immediately to the Local Planning Authority. An investigation and risk assessment must be undertaken in accordance with the requirements of condition 1, and where remediation is necessary a remediation scheme must be prepared in accordance with the requirements of condition 2, which is subject to the approval in writing of the Local Planning Authority.

Following completion of measures identified in the approved remediation scheme a verification report must be prepared, which is subject to the approval in writing of the Local Planning Authority in accordance with condition

#### **5. Importation of Soil/Material**

No top soil is to be imported to the site until it has been tested for contamination and assessed for its suitability for the proposed development, a suitable methodology for testing this material should be submitted to and agreed by the Local Planning Authority prior to the soils being imported onto site. The methodology should include the sampling frequency, testing schedules, criteria against which the analytical results will be assessed (as determined by the risk assessment) and source material information. The analysis shall then be carried out and validatory evidence submitted to and approved in writing to by the Local Planning Authority.

**Reason (common to all):** To ensure that risks from land contamination to the future users of the land and neighbouring land are minimised, together with those to controlled waters, property and ecological systems, and to ensure that the development can be carried out safely without unacceptable risks to workers, neighbours and other offsite receptors [in accordance with PPS23].

#### **Advisory Notes**

The site is known to be/suspected to be contaminated. Please be aware that the responsibility for safe development and secure occupancy of the site rests with the developer.

- a) Tiered risk assessment shall be carried out in accordance with UK policy and with the procedural guidance relating to the contaminated land regime, and should be in accordance with Planning Policy Statement 23 and the CLR Report Series 1-12.

- b) Submission of reports should also be made to the Environment Agency for comment with regard to their remit to protect ground and surface waters from pollution and their obligations relating to contaminated land.
- c) The Local Planning Authority will determine the application on the basis of the information made available to it. Please be aware that should a risk of harm from contamination remain post development, where the applicant had prior knowledge of the contamination, the applicant is likely to be liable under Part II(a) of the Environmental Protection Act 1990 and as such become an "appropriate person". In this event the applicant will be lawfully responsible to remove the risk posed by the contamination.
- d) Equally if during any site works a pathway for any contaminant on site is created and humans, waters, property or ecological systems are exposed to this, the applicant or those acting on behalf of the applicant will be liable under part II(a) of the Environmental Protection Act 1990 if the risks are not adequately addressed during the site redevelopment.
- e) During investigation and remediation works the applicant and those acting on behalf of the applicant must ensure that site workers, public property and the environment are protected against noise, dust, odour and fumes
- f) The applicant is advised that should there be a requirement as part of the Remediation Strategy to treat, reuse or remove contaminated material on the site, the Environment Agency must be consulted, as these activities may need to be licensed or permitted. Contaminated materials identified for removal off site must be disposed of in an appropriately licensed landfill site.
- g) Newcastle under Lyme Borough Council is keen to liaise with all stakeholders involved in this application. As such, we recommend that a proposed scope of works is forwarded to the Environmental Protection Department and agreed in principle prior to site investigation works being undertaken. The Environmental Protection Department is also prepared to review draft copies of reports prior to final submission to the Planning Department in order to ensure that works undertaken are sufficient to discharge the contaminated land conditions. Further information regarding the requirements of Newcastle under Lyme Borough Council can be obtained from <http://www.newcastle-staffs.gov.uk/contaminatedland> or 01782 742 595

#### **Appendix 4: Sources of Information**

- British Standards Institution, 1999. BS5930: Code of Practice for Site Investigation
- British Standards Institution, 2007. BS8485: Code of Practice for the Characterisation and Remediation of Ground Gas in Brownfield Developments.
- British Standards Institution, 2001. BS10175: Investigation of potentially contaminated sites. Code of practice
- British Standards Institution, 2007. BS17924: Assessment Of Human Exposure From Ingestion Of Soil And Soil Material - Guidance On The Application And Selection Of Physiologically Based Extraction Methods For The Estimation Of Human Bioaccessibility/Bioavailability Of Metals In Soil.
- British Standards Institution, 2007. BS18512: Guidance on long and short term storage of soil samples
- CIEH/LQM, 2009. Generic Assessment Criteria for Human Health Risk Assessment (2<sup>nd</sup> Edition).
- CIEH/CL:aire, 2008. Guidance on Comparing Soil Contamination Data with a Critical Concentration
- CIEH, 2008. Ground Gas Handbook.
- CIEH/EA, 2008. Guidance for the Safe Development of Housing on Land Affected by Contamination. Environment Agency R&D Technical Report 66:2008
- CIRIA. Comprehensive guidance on all aspects of developing contaminated land, SP101-SP112, SP119, R131, R149-R152. CIRIA, London
- CIRIA, 2001. C552. Contaminated Land Risk Assessment – A Guide to Good Practice.
- CIRIA, 2007. C665. Assessing Risks Posed by Hazardous Ground Gases to Buildings, London
- CIRIA 2009. C682. The VOCs Handbook. Investigating, assessing and managing risks from inhalation of VOCs at land affected by contamination.
- DEFRA, 2006. Circular 01/2006 - Environmental Protection Act 1990: Part .
- Department of the Environment, 1992. Waste Management Paper No. 27. Landfill Gas: A Technical Memorandum Providing Guidance on the Monitoring and Control of Landfill Gas
- Department of the Environment, 1995/96. DOE Industry Profile Series
- Department of the Environment, CLR Series: 1-6
- DETR, 2000. The Contaminated Land (England) Regulations 2000
- DETR, 1999. PPG10 Planning and Waste Management
- Environment Agency, 2000. Secondary Model Procedures for the Development of Appropriate Soil Sampling Strategies for Land Contamination. Environment Agency R&D Technical Report P5-066/TR
- Environment Agency, 2001. Technical aspects of site investigation. Environment Agency R&D Technical Report P5-065/TR

- EA/DEFRA, 2002. CLR11 Model Procedures for the Management of Land Contamination
- Environment Agency, 2005. Guidance on Requirements for Land Contamination Reports Version 1.
- Environment Agency, 2006. Remedial Targets Methodology and Worksheet.
- Environment Agency & NHBC, 2008. R&D Publication 66. Guidance for the Safe Development of Housing on Land Affected by Contamination
- Environment Agency, DRAFT. Verification of Remediation of Land Contamination (NC/00/38/SR)
- Environment Agency, 2008. Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values (SCO50021/SR7)
- Environment Agency, 2009. A review of body weight and height data used within the Contaminated Land Exposure Assessment Model (SCO50021/Technical Review 1)
- Environment Agency, 2009. Human Health Toxicological Assessment of Contaminants in Soil (SCO50021/SR2)
- Environment Agency, 2009. Updated Technical Background to the CLEA Model (SCO50021/SR3)
- Environment Agency, 2009. CLEA Software Handbook (SCO50021/SR4)
- Environment Agency, "SGV" Series. Soil Guideline Values and Supplementary Information for the Derivation of SGVs for [name of contaminant] (SCO50021)
- Health Protection Agency, 2009. Land Contamination and Public Health
- Health & Safety Executive, 2007. Construction (Design and Management) Regulations
- NHBC/RSK, 2007. Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present.
- NETREGS, 2008. Site Waste Management Plans
- Office of the Deputy Prime Minister, 2004: Planning Policy Statement 23: Planning and Pollution Control: Annex 2, Development on Land Affected by Contamination.
- Office of the Deputy Prime Minister. The Building Regulations 2000, Site Preparation and Resistance to Contaminants and Moisture, Approved Document C

### **Websites**

These websites contain many useful resources:

- Atkins AtRisk:  
[www.atrisksoil.co.uk](http://www.atrisksoil.co.uk)
- British Standards Online:  
[www.bsi-global.com](http://www.bsi-global.com)
- Chartered Institute of Environmental Health:  
[www.cieh.org](http://www.cieh.org)

- CIRIA contaminated land website:  
[www.contaminated-land.org](http://www.contaminated-land.org)
- Communities and Local Government (formerly Office of the Deputy Prime Minister)  
[www.communities.gov.uk](http://www.communities.gov.uk)
- Contaminated Land Applications in Real Environments:  
[www.claire.co.uk/](http://www.claire.co.uk/)
- Contamlinks:  
[www.contamlinks.co.uk](http://www.contamlinks.co.uk)
- Department of the Environment, Food and Rural Affairs:  
[www.defra.gov.uk](http://www.defra.gov.uk)
- Environment Agency:  
[www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)
- Environment Knowledge Transfer Network:  
<http://ipmnet.globalwatchonline.com>
- EUGRIS:  
[www.eugris.info/](http://www.eugris.info/)
- Health & Safety Executive:  
[www.hse.gov.uk/](http://www.hse.gov.uk/)
- National House Building Council:  
[www.nhbc.co.uk](http://www.nhbc.co.uk)
- NETREGS:  
[www.netregs.gov.uk](http://www.netregs.gov.uk)
- Newcastle under Lyme Borough Council  
[www.newcastle-staffs.gov.uk/contaminatedland](http://www.newcastle-staffs.gov.uk/contaminatedland)

## **Appendix 5: Contact Details**

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