

# **Contaminated land risk assessment**

## **A guide to good practice**

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*sharing knowledge ■ building best practice*

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# Summary

CIRIA Research Project 599 reviews the current state of good practice in contaminated land risk assessment, both in the UK and elsewhere. The outcome has been to produce a guidance document and a training pack.

The book sets the context of the risk assessment process within an overall risk management approach. The overall risk management process involves identifying and making decisions concerning risks and subsequent implementation of these decisions. The report describes the stages involved in identifying risks and assessing their significance but stops short of describing remedial actions that might be taken to manage the risk.

The report, and the accompanying training pack (C553) is intended to take the user through the various stages of the assessment process thereby providing guidance to good practice.

The training pack, in seven modules and a workshop study, is primarily intended to be used in a group learning environment, but may also benefit individuals working on their own.

## **Contaminated land risk assessment. A guide to good practice**

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*Construction Industry Research and Information Association*

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# Executive summary

Contaminated land has been one of the last major environmental concerns to be taken seriously in the UK and in much of the rest of Europe. It lags far behind air and water quality in terms of statutory and technical approach to control. Until now, contaminated land has been considered mainly in connection with redevelopment of abandoned and derelict land. However, as new UK environmental considerations and related issues such as urban regeneration have come to the fore, this has encouraged consideration of land contamination at times other than redevelopment.

When land is contaminated it can affect human health, the environment and buildings and structures. Contamination affects the uses to which a site can be put and its value. In its worse state, contaminated land can cause unacceptable risk to human health and the environment. Good practice in the management of contaminated land involves assessment of the risk that the contamination might be posing. The history of systematic and consistent risk assessment procedures in the UK is not extensive and is a reflection of both the focus of the legislative regime and the diverse demands of the risk assessment process. This document examines risk assessment and explains the key elements of risk assessment practices and procedures.

## PURPOSE AND SCOPE

It is intended that this guidance will be of assistance primarily to those within the construction industry who carry out contaminated land risk assessments on a practical basis with the intention of assisting all practitioners to align their abilities at a common level, in order to promote industry-wide consistency. It will also be of assistance to those who need to know the processes and procedures by which contamination risk assessments are conducted to determine that good practice has been followed.

To prepare this guidance, the practice of contaminated land risk assessment both in the UK and overseas has been reviewed. It is not intended that the document should be used as a comprehensive manual for carrying out risk assessment. Rather, the reader is directed to sources of further information and guidance, which will assist when developing a risk assessment strategy.

The report:

- aims to ensure consistent approach to risk assessment, reflecting current “good practice” and taking into account the development of UK government policy and the rapidly changing legislative regime
- will enable all the interested parties to appreciate the basic processes and procedures involved in risk assessment
- will be applicable to a range of different objectives and types of contaminated sites particularly those being proposed within the construction industry for redevelopment.

Although the procedures and processes are intended to address all types of contaminated land there are instances where specialised approaches may be adopted. Within the report there are sections covering risk assessment of sites with particular types of contamination, such as risk assessment of sites affected by soil gases and radiation.

## STRUCTURE AND CONTENT

The report sets the context of the risk assessment process within an overall risk management approach. The overall risk management process involves identifying and making decisions concerning risks and subsequent implementation of these decisions. This report describes the stages involved in identifying risks and assessing their significance, but stops short of describing remedial actions that might be taken to manage the risk.

The outline structure of this report is shown below:

- Chapter 1 *Introduction*. Describes the importance of risk assessment, statutory and practical motivation for conducting assessments and the parties involved.
- Chapter 2 *The basic framework for the assessment*. The risk-based approach in the UK, and the conceptual stages.
- Chapter 3 *Defining risk assessment objectives*. Setting the context and objectives of the assessment.
- Chapter 4 *Gathering information for Phase 1 assessment*. Describes the information that it is necessary to gather for Phase 1 assessment and how to apply this to create a conceptual model.
- Chapter 5 *Site investigations to acquire data*. Provides an overview of the site investigation data collection process. This topic is well covered by several recent publications, including those by the British Standards Institution, and the reader is directed to these for detailed information.
- Chapter 6 *Phase 2 estimation and evaluation – the significance of risk*. Describes how all the data is assessed to determine the significance of the risk.
- Chapter 7 *Risk communication*. The situations and methods by which risk is communicated to interested parties.

The appendices provide additional background information on particular topics and provide references for further reading. Some case studies are also presented.

## THE USERS OF THIS REPORT

Decisions involving potentially contaminated land tend to involve a diverse range of interested parties. At one end of the scale there are regulators and planners, each with the objective of protecting the environment. At the other end are pressure groups and members of the public who will have limited experience of the technical issues of contaminated land but nevertheless will have their own perceptions of the problems involved. Landowners, developers and their financial backers aim to complete the development mindful of costs versus benefits. Consultants may provide advice to all groups, who nevertheless will require sufficient understanding to be able to make informed decisions. These parties will have a broad range of interests, understanding and technical ability, and may enter the decision process at different stages.

It is against this background that the guidance is intended to assist all these parties to be able to contribute to the consultation and agreement through to the remedial design and validation stages that are commonly involved in contaminated land assessment and development. It is assumed that users of this report will have had some involvement in contaminated land assessment and will most probably be planning to carry out their own risk assessments. Alternatively the user may be required to review and assess the results of another's assessment.

## **RELATIONSHIP TO OTHER DOCUMENTS**

This report is intended to take the user through the various stages of the assessment process, identifying the key stages and providing pointers towards best practice. The volume is self-contained to some extent, but where further reading is recommended the user will be directed to other documents that will provide them with the specialist background in the subject of concern. Some of these will discuss detailed scientific and technical aspects whilst others will discuss procedural approaches. The report draws particularly upon contemporary guidance that is produced in a regulatory context. In particular the report draws upon the UK Department of the Environment, Transport and the Regions' document *Handbook of Model Procedures for the Management of Contaminated Land* (Contaminated Land Research Report CLR11).

The accompanying Training Pack has been designed to help those involved in the management of contaminated land understand the procedures involved in assessing risks due to contamination in a variety of contexts.

## **THE NEED FOR SPECIALIST ADVICE**

The assessment of contaminated land is a specialist activity that is likely to involve at some stage a significant technical input. It is not uncommon for decisions involving contaminated land to require specialist technical advice from biologists, chemists, engineers, environmental scientists, toxicologists and others. The guidance will not be a substitute for the professional advice that will be required in many cases, particular where specialist technical skills are required.

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# Glossary

<b>acceptable daily intake (ADI)</b>	An estimate of the daily exposure dose that is likely to have no harmful effect even if continued exposure occurs over a lifetime
<b>acceptance test</b>	A statistical test used to decide how a set of soil analytical data compares with a generic (or comparable) site-specific assessment value
<b>aromatic</b>	A hydrocarbon compound containing a benzene ring structure
<b>assessor</b>	An individual, or in some cases a team, instructed to carry out the risk assessment for a site or number of sites.
<b>attenuation</b>	The process by which a compound (or pollutant) is reduced in concentration over time, through absorption, adsorption, degradation, dilution, and/or transformation.
<b>autocorrelation</b>	Extent to which contaminant concentrations in soils appear spatially related, as opposed to randomly distributed
<b>averaging area</b>	An area within which a human receptor may be exposed to hazardous substances; the size of the area depends on the actual or intended use of the site
<b>brownfield sites</b>	Any land that has been previously developed or requires work done to it to bring it into use
<b>cancer potency factor</b>	See <i>slope factor</i>
<b>chronic risk</b>	The probability that an adverse effect will occur as a result of long-term exposure to, or contact with, a hazardous substance or as a result of a long-term hazardous condition
<b>clarity</b>	Extent to which the available information presents a clear and unambiguous account of the situation being assessed
<b>completeness</b>	Extent to which the available information adequately describes the characteristics of contaminants, pathways and receptors
<b>conceptual model</b>	A textual or graphical representation of the relationship(s) between contaminant(s), pathway(s) and receptor(s) developed on the basis of Phase 1a risk assessment findings, and refined during subsequent phases of assessment
<b>conservatism</b>	Extent to which risk assessment models and assumptions take a precautionary approach to human health and environmental protection
<b>contaminant</b>	See <i>source</i>

<b>contaminated land (for the purposes of Part IIA of the Environmental Protection Act 1990)</b>	Any land that 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: <ul style="list-style-type: none"> <li>a) significant harm is being caused or there is a significant possibility of such harm being caused, or</li> <li>b) pollution of controlled waters is being, or is likely to be caused</li> </ul>
<b>contaminated land in assessment of land contamination effects</b>	Land that represents an actual or potential hazard to health or the environment as a result of a current or previous use
<b>contaminated site</b>	Any site that, as a result of activities either previously or currently carried out on it, contains concentrations of substances or pathogens high enough to be a hazard to health or the environment either in the current use of the site or if it is used for a different purpose (Royal Commission on Environmental Pollution 1996 Sustainable use of Soil 19th report)
<b>critical soil concentration value (<math>C_{crit}</math>)</b>	The unknown soil concentration value, usually designated as the site-specific assessment criteria. This value is calculated during the site specific assessment criteria generation process
<b>decision criteria</b>	Factors taken into account when arriving at particular decisions or judgements
<b>decision summary sheet</b>	A summary record of the decisions made at key stages of risk assessment and of the level of information on which the decisions have been made
<b>desk study</b>	Interpretation of historical, archival and current information to establish where previous activities of the land were located, and where areas or zones containing distinct and different types of soil contamination can be expected to occur, and to understand the environmental setting of the site in terms of pathways and receptors
<b>detailed investigation</b>	Main stage of on-site investigation involving sampling and analysis to characterise ground conditions for a specified purpose; may be undertaken in a single or a number (eg Stages 1 and 2) of successive stages
<b>effective concentration</b>	Concentration of a substance that causes a defined magnitude of response in a given system. EC50 is the median concentration that causes 50 per cent of maximal response.
<b>estimated daily intake (EDI)</b>	The intake, or dose, of a contaminant from a site for a relevant pathway
<b>excess cancer risk</b>	The additional risk an individual has of developing cancer in addition to other non-specified causes
<b>exploratory investigation</b>	Limited intrusive/analytical work carried out to provide preliminary information on the condition of the land

<b>exposure dose</b>	Amount of a substance (chemical, radiological or physical agent) that is available for absorption and is absorbed into the body
<b>flora and fauna</b>	Plants and animals including livestock (agricultural and game species), crops and plants used for landscape and amenity
<b>generic assessment criteria</b>	Criteria derived and published by an authoritative body which take into account generic assumptions about the characteristics of contaminants, pathways and receptors and which are designed to be protective in a range of defined conditions
<b>genotoxic</b>	See <i>mutagen</i>
<b>greenfield site</b>	An area previously undeveloped and therefore undisturbed with a predominantly consistent subsurface
<b>harm</b>	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, includes harm to their property (Section 78A of the Environmental Protection Act 1990)
<b>hazard</b>	A property (of a substance) or situation with the potential to cause harm
<b>hazard assessment</b>	Consideration of the plausibility of pollutant linkages and determination of the potential for risks to human health and the environment
<b>hazard identification</b>	Identification of contaminant contaminants, pathways and receptors taking into account the actual or intended use of the site and its environmental setting
<b>hazard index</b>	The sum of hazard quotients. Represents the effects of projected intakes of chemicals by comparing to toxicity values (reference doses)
<b>hazard quotient</b>	Ratio of chronic daily intake to a reference dose (a ratio of <1 means that the systemic effects are assumed not to be of concern, >1 means that they are assumed to be of concern)
<b>hotspot</b>	A defined area or volume of ground containing elevated concentrations of hazardous substances
<b>leachate</b>	Liquid that has percolated through solid waste and has extracted, dissolved or suspended materials from it
<b>lethal dose</b>	When noted as, say, LD <sub>50</sub> , indicates the lethal dose required to kill 50 per cent of exposed organisms
<b>made ground</b>	Material artificially in place comprising a wide range of materials such as, concrete, tarmacadam, brick materials
<b>maximum contaminant level</b>	The maximum permissible level of a contaminant in water delivered to any user of a public system

<b>maximum exposure level</b>	Legally enforceable limits acting as safety factors for general exposure indicating the point beyond which exposure will cause harm to human health
<b>mean daily intake (MDI)</b>	A measure of the background intake (in $\mu\text{g d}^{-1}$ ) of a contaminant from ambient concentrations in food, water and air for the UK population.
<b>minimum reporting requirements</b>	Minimum amount of information it is considered reasonable to provide when describing the rationale for, conduct of and findings at each stage of risk assessment
<b>model procedures</b>	DETR handbook of model procedures for the management of contaminated land (CLR11)
<b>modifying factor</b>	Applied to the safety factor (when deriving reference doses) to account for quality of data
<b>mutagen</b>	A carcinogen that can induce a genetic alteration in a single cell which may lead eventually to tumour initiation
<b>NOEC/NOAEL</b>	A dose below which no adverse effect is observed, and/or an estimate of the dose level below which there is no adverse effect
<b>occupational exposure standards</b>	Legally enforceable limits related to occupational exposure via the inhalation pathway only
<b>pathway</b>	The means by which a hazardous substance or agent comes into contact with, or otherwise affects a receptor
<b>Phase 1a risk assessment</b>	A discrete phase of risk assessment that incorporates the conceptual stage of hazard identification
<b>Phase 1b risk assessment</b>	A discrete phase of risk assessment that builds on Phase 1a risk assessment findings and incorporates the conceptual stage of hazard assessment
<b>phase 2 risk assessment</b>	A discrete phase of risk assessment which builds on Phase 1a and Phase 1b risk assessment and incorporates the conceptual stages of risk estimation and risk evaluation
<b>pica child</b>	A child who deliberately and habitually ingests soil, or who frequently mouths soil contaminated toys etc
<b>pollutant linkage</b>	The contaminant pathway receptor relationship
<b>polycyclic aromatic hydrocarbon</b>	A hydrocarbon compound containing a fused benzene ring structure
<b>potency slope</b>	See <i>slope factor</i>
<b>potentially contaminated land sites</b>	Sites identified (while undertaking desk studies/site investigations) as having been or are subject to a land use that may give rise to contamination).



<b>probability</b>	The likelihood of an event occurring, expressed as a numerical ratio, frequency or per cent
<b>RAMSAR site</b>	Wetland of international importance, especially as waterfowl habitat. Designated under the Ramsar Convention on Wetlands of Importance 1971 (Ramsar Convention), which places general and special obligations on contracting parties relating to the conservation of wetlands throughout their territory
<b>Risk-based corrective action (RBCA)</b>	Derived by ASTM Standard Provisional Guide for RBCA PS104-98 and Standard Guide for RBCA Applied at Petroleum Release Sites E1739-95. Uses a three-stage procedure for dealing specifically with petroleum-contaminated sites
<b>reasonable minimum information requirements</b>	Minimum amount of information it is considered reasonable to obtain to make the relevant (technical) judgements at each stage of risk assessment
<b>reasonably practicable</b>	Reasonably practicable taking into account technical feasibility, increased risk, cost and/or time and whether these are proportionate to anticipated benefit
<b>Rebecca</b>	Jargon for RBCA (see Risk-Based Corrective Action)
<b>receptor</b>	The entity (eg human, animal, water, vegetation, building services etc) which is vulnerable to the adverse effects of the hazardous substance or agent. May also be called the “target”
<b>reference concentration (inhalation exposure)</b>	An estimate (with uncertainty spanning perhaps an order of magnitude or greater) of an exposure level for the human population, including sensitive sub-populations, that is likely to be without an appreciable risk of deleterious effects during a lifetime or prolonged period. Expressed in mg/m <sup>3</sup> (USEPA)
<b>reference dose (oral or dermal exposure)</b>	An estimate (with uncertainty spanning perhaps an order of magnitude or greater) of an exposure level for the human population, including sensitive sub-populations, that is likely to be without an appreciable risk of deleterious effects during a lifetime or prolonged period. Expressed in mg/kg/day (USEPA)
<b>relevance</b>	Extent to which the available information is relevant to the contaminants, pathways and receptors being assessed
<b>reliability</b>	Extent to which measurements or observations accurately reflect the true or likely site conditions taking into account the implications of any gaps in the information
<b>risk</b>	The probability that due to a hazard an adverse effect due to a hazard will occur under defined conditions
<b>risk assessment</b>	Identification, estimation and evaluation of risks
<b>risk estimation</b>	Estimation of the risk(s) that identified receptor(s) will suffer adverse effects if they come into contact with, or are otherwise affected by, contaminant sources under defined conditions

<b>risk evaluation</b>	Evaluation of the need for risk management action having regard to the nature and scale of risk estimates, any uncertainties associated with the assessment process and cost/benefit
<b>risk management</b>	The decision-making process to decide the most appropriate form of remedial or risk management action to control or reduce unacceptable risks, including the choosing of the actions, implementation, testing and monitoring to validate effectiveness
<b>safety factor</b>	An application factor applied for determining ecotoxicological criteria (thresholds or safe levels of pollutants in organisms)
<b>slope factor</b>	An indication of how powerful a chemical is in causing cancer expressed as the cancer risk per unit of dose (risk per mg/kg/day) (USEPA)
<b>source</b>	The hazardous substance/agent
<b>soil allocation factor (SAF)</b>	The proportion of TDSI that can be allocated to a site
<b>soil concentration factor (<math>C_s</math>)</b>	The unknown soil concentration value.
<b>target</b>	See <i>receptor</i>
<b>tolerable daily intake (TDI)</b>	An estimate of the average daily intake of a contaminant, expressed in terms of $\mu\text{g d}^{-1}$ , that can be ingested over a lifetime without appreciable health risk. This is the UK terminology similar, but not identical in definition to, the US reference dose (RfD – a threshold dose for non-genotoxics and non-carcinogens)
<b>total estimated daily intake (<math>\text{TEDI}_{\text{SS}}</math>)</b>	The intake, or dose, of a contaminant from a site for all relevant pathways.
<b>tolerable daily soil intake (TDSI)</b>	The maximum intake of a substance that can be allocated to a contaminated soil.
<b>uncertainty factor</b>	Applied to the safety factor (when deriving RfDs and RfCs) to account for interspecies variability (USEPA)
<b>upper confidence limit</b>	A sample based estimate of the upper limit below which the true mean of the population will be located. A useful descriptor for testing whether the samples taken from a site are below or above a threshold value
<b>volatilisation</b>	The conversion of a chemical substance from a liquid or solid state to a gaseous or vapour state by the application of heat, by reducing pressure, or by a combination of these processes

# Abbreviations

<b>ADI</b>	acceptable daily intake
<b>ASTM</b>	American Society for Testing and Materials
<b>BI</b>	background Intake
<b>BRE</b>	Building Research Establishment
<b>CBI</b>	Confederation of British Industry
<b>CDM</b>	Construction Design and Management Regulations 1994
<b>CLRAM</b>	Contaminated Land Risk Assessment Model
<b>COC</b>	UK Committee on Carcinogenicity in Food, Consumer Products and the Environment; some publications use this abbreviation for contaminant of concern
<b>COSHH</b>	Control of Substances Hazardous to Health Regulations 1999
<b>CS</b>	soil concentration factor
<b>C<sub>crit</sub></b>	critical soil concentration value
<b>DETR</b>	Department of the Environment, Transport and the Regions
<b>DNAPL</b>	Dense Non Aqueous Phase Liquid
<b>DoE</b>	Department of Environment (now DETR)
<b>EA</b>	Environment Agency
<b>EC</b>	effective concentration
<b>EDI</b>	estimated daily intake
<b>EOD</b>	explosive ordnance detection
<b>EU</b>	European Union
<b>ERA</b>	ecological risk assessment
<b>HEAST</b>	health effects assessment summary tables
<b>HSE</b>	Health and Safety Executive
<b>GLC</b>	Greater London Council
<b>ICRCL</b>	Interdepartmental Committee on the Redevelopment of Contaminated Land
<b>IPC/IPPC</b>	integrated pollution (prevention) control
<b>IRIS</b>	Integrated Risk Information System
<b>LC</b>	lethal concentration
<b>LD</b>	lethal dose
<b>MAFF</b>	Ministry of Agriculture, Fisheries and Food
<b>MCL</b>	maximum contaminant level
<b>MDI</b>	mean daily intake

<b>MHSPE</b>	Ministry of Housing, Spatial Planning and the Environment (Holland)
<b>NAMAS</b>	National Measurement Accreditation Scheme
<b>NOEL</b>	no observed effect level
<b>NRA</b>	National Rivers Authority (now EA)
<b>NRPB</b>	National Radiological Protection Board
<b>OPC</b>	ordinary Portland cement
<b>OS</b>	Ordnance Survey
<b>PAH</b>	polycyclic aromatic hydrocarbon
<b>PPC</b>	pollution prevention control
<b>QA/QC</b>	quality assurance/quality control
<b>RAGS</b>	Risk Assessment Guidance for Superfund
<b>RBCA</b>	risk-based corrective action
<b>RfC</b>	reference concentration (inhalation exposure)
<b>RfD</b>	reference dose (oral or dermal exposure)
<b>RME</b>	reasonable maximum exposure
<b>SAF</b>	soil allocation factor
<b>SSSI</b>	Site of Special Scientific Interest
<b>TDI</b>	tolerable daily intake
<b>TDSI</b>	tolerable daily soil intake
<b>TEDISS</b>	total estimated daily intake
<b>TPH</b>	total petroleum hydrocarbons
<b>TSA</b>	thaumasite sulphate attack
<b>UKAS</b>	United Kingdom Accreditation Service
<b>USEPA</b>	United States Environmental Protection Agency
<b>WHO</b>	World Health Organisation

# 1 Introduction

## 1.1 WHAT IS CONTAMINATED LAND?

“Contaminated land” generally refers to land that contains elevated concentrations of potentially hazardous substances. These concentrations may be present naturally, but more commonly, contamination is the legacy of the industrialisation of Britain over the past 200 years. The industries and processes that have been a feature of the landscape during this time have often caused the ground to become contaminated with the substances once handled at these sites. In many cases, the substances may be harmful to human health or the environment. More recently our understanding of the effects of these materials has developed. This increased knowledge has been accompanied by efforts to reduce or curtail their release into the environment and to manage and minimise their effects. The term “contaminated land” has a specific statutory meaning in the context of the regulatory regime under Part IIA of the Environmental Protection Act 1990. However, in this report the term is used in its wider, general sense.

## 1.2 WHY IS CONTAMINATED LAND IMPORTANT?

When land is contaminated it can affect human health, the environment (that is animals, livestock, plants, other organisms and micro-organisms, air, soil, the subsurface, groundwater and surface water), buildings and structures. The effects are not just toxicological; the value of land may be adversely affected by contamination. Contamination affects the uses to which land can be put. Put simply, there are many potential problems associated with contaminated sites that do not apply to uncontaminated sites.

## 1.3 WHY THEN CONSIDER CONTAMINATED SITES AT ALL?

The concept of urban decay, abandoned derelict sites within or on the edge of towns, is familiar. Central government policy is to encourage the reuse of derelict, or “brownfield”, sites. The policy demands that 60 per cent of new housing be constructed on brownfield sites to relieve pressure to develop “greenfield” sites, to aid preservation of the countryside and to encourage urban regeneration. Some brownfield sites may be within locations that have become prime development sites. So although there might be extra costs associated with the redevelopment of these sites, this is often offset by an increase in the value of the land after the contamination issues have been addressed. There are thus economic reasons to consider selecting contaminated sites for redevelopment or ownership.

There are also statutory reasons why attention is given to contaminated land. Contaminated land is controlled by various legislative provisions, for example, those related to planning, waste management and water resources, and most recently Part IIA of the Environmental Protection Act 1990 and the Pollution Prevention Control Act 1999. Contaminated land is also associated with issues of liability in connection with civil law. In English law, for example, the principle of “caveat emptor” or “buyer beware” holds. Property transactions have always held an element of document search and interpretation and this may involve enquiries to identify contamination. A discussion of the legislative and regulatory regime appears in Appendix 2.

## 1.4 HOW MUCH CONTAMINATED LAND IS THERE?

The precise figure is not known. There is as yet no central record. Estimates vary from 50 000 ha to 200 000 ha (CBI, 1993). The Environment Agency (1999) estimates that some 300 000 ha of land across Britain may be affected either by industrial or “natural” contamination. Although not all these sites will pose immediate concerns, the Agency estimates that there may be between 5000 and 20 000 “problem sites”.

## 1.5 WHY IS CONTAMINATED LAND RISK ASSESSMENT IMPORTANT?

Land that is contaminated can cause an unacceptable risk to human health and the environment. Sometimes it is not known whether contamination exists or whether the contamination that is present is likely to be hazardous to health or the environment. A need exists for a technique that identifies and considers the risks associated with such land, determines whether the risks are significant and whether action needs to be taken to reduce or control detrimental effects. This technique is called risk assessment.

A question frequently asked is “Is the contaminated site safe, are the levels of contamination acceptable?” The purpose of risk assessment is to provide an answer to the question:

**“Is this site or area of land posing, or likely to pose, unacceptable risks to health or the environment?”**

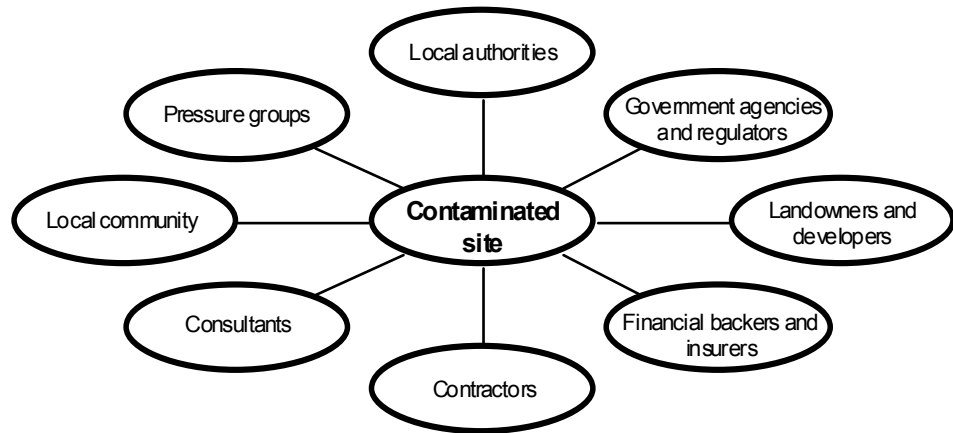
## 1.6 THE PURPOSE OF THIS REPORT – WHO SHOULD BE INTERESTED IN THE GUIDANCE?

This report is directed at those who have to consider the risks posed to human health, the environment and the structure and fabric of buildings and infrastructure by land contamination (stakeholders, see Figure 1.1), who may then have to make decisions about what the contamination means to them based on their understanding of the assessment process.

Often the persons making the decisions are not technically qualified or specialists in the field of land contamination. These people, as well as those with more specialist knowledge of contaminated land risk assessment, need to understand the process involved so that they can make the most appropriate decisions. Because of the wide range of abilities and interest in detail that parties involved in risk assessment have, this guidance is designed to be of use to all those with an interest in risk assessment.

In general the report should be of interest to the following groups:

- those that specify and commission (or have an interest in) contaminated land risk assessment (*clients*)
- those that practice contaminated land risk assessment (*practitioners*); and those that regulate contaminated land (*regulators*).



**Figure 1.1** *Contaminated land stakeholders*

For each of these groups the objective is to raise awareness of the need for and the processes involved in carrying out risk assessment, and for those who practice, to raise levels of understanding of the procedures and technical guidance available in the UK. The report outlines good practice in the approach to assessment and provides technical and non-technical advice at each step with tips for good practice. The report also aims to raise awareness of how risk assessment fits in with issues such as contaminated land remediation and health and safety practices.