Contaminated Land Guidance

The route to sustainable economic solutions

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Third edition

Jo Strange, Nick Langdon and Alex Large

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Preface

As pressure on land resources and from current statutory guidance increases, especially within an urban context, society and professional ethics demand sustainable solutions of engineers. Contaminated land, therefore, has become the subject of some importance to civil engineers looking to maximise developable space by reclaiming and recycling land.

Since the launch of the first edition in 1994, and the subsequent second edition in 2007, which set out the underlying risk assessment principles around which contaminated land issues can be assessed and mitigated, the available science has developed, and with it the detail of good practice. The 2012 Contaminated Land Statutory Guidance, along with government agency published risk assessment tools, have resulted in a framework of risk definitions and assessment methods which have revised the perception of acceptable risk. Further changes in European and UK Legislation, including health and safety regulations, have also impacted on how contamination is managed and can be economically remediated. In the context of this guide, the focus is on land contamination, which includes the water environment, but excludes air pollution, with sources of contamination being in solid, liquid or gaseous form.

It is important that professionals working in this subject area appreciate at the outset the necessity of involving experts in several different disciplines, since resolving contamination issues involves many technical and non-technical issues. In addition to civil and geotechnical engineering, expertise may be required in chemistry, environmental science, geology, hydrogeology, industrial archaeology and project management, and may also be needed in other subjects such as chemical or process engineering, ecology, biology, valuation and other financial matters, and legislation. No one civil or geotechnical engineer can have the breadth of expertise that will allow them to address all aspects of a contaminated land project.

Certain aspects of land contamination are particularly specialised, such as radioactivity or some forms of military contamination such as explosives or chemical/biological weapons. These subjects are not addressed in the guide and expert advice must always be sought in this respect.

ICE Design and Practice Guides

This document is the third edition of the ICE guide, first published in 1994. The purpose of the guide, as with the previous editions, is to provide an introduction to the main principles and important aspects of contaminated land as it affects the construction industry and associated professionals. It offers guidance to the non-specialist as to appropriate procedures and sources for more detailed information. The aim is to summarise the key elements of current regulations and good practice as published in existing authoritative guidance documents prepared by key organisations such as central government, the Environment Agency, the Construction Industry Research and Information Association and the Building Research Establishment. It recognises that the whole area of contaminated land investigation and remediation has undergone significant changes since 1994 and the subsequent second edition in 2007 and will continue to do so for the foreseeable future.

The ICE continues to target as its principal audience of practising engineers who are not expert in or familiar with the subject matter. This group includes recently graduated engineers who are undergoing their professional training and more experienced engineers whose work experience has not previously led them into the subject area in any detail. In an environment where new regulation and its interpretation is the norm, those professionals who are more familiar with the subject may also find the guide of value as a handy overview or summary of the principal issues.

As before, the guide features *aide-memoires* on major aspects of the subject and refers to references and bibliographies, and guidance on authoritative, relevant and up-to-date published documents. Recognising the evolving nature of guidance and legislation, web references are provided where appropriate to keep the document as live and relevant as possible.

About the authors

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Jo is a Technical Director at Card Geotechnics Limited (CGL), and she is particularly skilled in the design, implementation and interpretation of geoenvironmental site investigations, remediation design and validation.

Her expertise includes quantitative risk assessment for soils, groundwater and ground gases, and the provision of specialist waste management advice with respect to contaminated soils. She is a registered Specialist in Land Condition (SiLC), a registered environmental auditor with IEMA, and a registered Qualified Person with Contaminated Land: Applications in Real Environments (CL:AIRE).

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Alex's professional experience includes managing and directing environmental site investigations, earthworks and multi-million-pound remediation contracts. Alex also has extensive experience in environmental management and auditing projects, along with the provision of sustainability due diligence services considering environment, health and safety, and social impacts and risks across a broad spectrum of sectors.

About the book

This guide can only provide an overview of this very complex subject, and draws heavily on authoritative and comprehensive technical guidance documents prepared by other bodies.

The knowledge and practical experience of contaminated land has further matured and developed in the UK, with less reliance on international standards and more specific UK guidance having been published. Although legislation puts the onus on landowners and developers to address issues associated with contamination, the role of regulators has become key in maintaining basic standards, but is facing the constant challenge of budget cuts and skills shortages. There are several professional bodies looking at registration schemes to certify qualified experienced individuals such that regulators can have a degree of confidence in the quality of deliverables from such individuals, for example the existing Specialist in Land Condition scheme and the proposed National Quality Mark Scheme. These schemes are based on individuals being professionally committed to implementing adequate and appropriate risk management protocols.

This guide uses a systematic approach following sequential steps to a logical conclusion in accordance with current UK guidance. This approach takes the assessment from defining a basic conceptual site model based on anticipated hazards and risks to the next step of intrusive investigation. Beyond that, qualitative and quantitative risk assessment is used to support subsequent remediation design as appropriate to address the identified risks, taking account of the site use and client objectives. More so than ever, dealing with contaminated land requires a multidisciplinary approach. The use of appropriately experienced specialists is vital to achieving sustainable and technically sufficient investigation, assessment and remediation. Use of technical guidance documents such as this are no substitute for specialist expertise.

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Glossary of abbreviations

AGS	Association of Geotechnical and Geoenvironmental Specialists	A trade organisation established to improve the profile and quality of geotechnical and geoenvironmental engineering.
BGS	British Geological Survey	A world-leading geological survey that focuses on public-good science for government, and research to understand earth and environmental processes.
BSI	British Standards Institution	A services provider the principal activities of which are the production of standards and the supply of standards-related services.
C4SL	Category 4 Screening Level	Generic screening level defined by Defra in 2014 for evaluating risks to human health from contaminants in soil.
CCME	Le conseil canadien des ministres de l'environnement	Produces the Canadian intervention values.
CDM 2015	Construction (Design & Management) Regulations 2015	Regulations governing the safe planning and implementation of construction projects.
CIEH	Chartered Institute of Environmental Health	An independent professional organisation that represents the interests of the environmental health profession.
CIRIA	Construction Industry Research and Information Association	A research organisation dedicated to improving the performance of all those involved in construction and the environment.
CL:AIRE	Contaminated Land: Applications in Real Environments	An independent body promoting sustainable remediation of contaminated land and groundwater.
CLARINET	Contaminated Land Rehabilitation Network for Environmental Technologies	From 1998 to 2002, a body that developed technical recommendations and identified R&D needs for the rehabilitation of contaminated sites in Europe.
CLEA	Contaminated land exposure assessment	A tool developed by the Environment Agency to facilitate the evaluation of risks to human health from contaminants in soil.
CLO	Contaminated land officer	A local authority employee with a specific focus on contaminated land.
CLR	Contaminated Land Report	Series of guidance reports produced by the Environment Agency.
CP	Cable percussive	Drilling technique, also known as shell and auger.
CSM	Conceptual site model	The fundamental basis of any site assessment may be in tabular, graphical or text format.
Defra	Department for Environment, Food and Rural Affairs	Government department with environmental responsibilities.
EA	Environment Agency	A non-departmental UK public body with responsibilities relating to the protection and enhancement of the environment in England.
EHO	Environmental health officer	Local authority employee with a remit covering a range of environmental issues, often including contaminated land.
EPA	Environmental Protection Act 1990	Integrated act covering emissions to the environment and waste management.
GAC	Generic assessment criteria	Conservative assessment criteria used to establish actual or potentially unacceptable risks from contaminants on a site. Typically, GACs are based on largely generic assumptions regarding the characteristics and behaviours of sources, pathways and receptors, within defined ranges of conditions.
GPR	Ground penetrating radar	Geophysical technique that uses radar pulses to map the subsurface.
GSV	Gas screening value	A function of the gas flow and concentration, used to evaluate potential risks from ground gases.
HSE	Health and Safety Executive	UK body responsible for work-related health and safety.
JIWG	Joint Industry Working Group (Asbestos in Soil and Construction & Demolition Materials)	Working group currently focused on coordinating asbestos management, occupational hygiene and brownfield management sectors, including the development of a harmonised approach.
LLTC	Low level of toxicological concern	Health criteria value based on low, as opposed to minimal, risk.

LNAPL	Light non-aqueous phase liquid	A liquid that floats on water.
LQM	Land Quality Management Ltd	Environmental protection consultants.
MCERTS	Monitoring Certification Scheme	An EA quality management scheme to provide the agency with confidence in the monitoring of emissions to the environment.
NICOLE	Network for Industrially Contaminated Sites in Europe	European contaminated land management forum, promoting cooperation between industry, academia and service providers on the development and application of sustainable technologies.
NPPF	National Planning Policy Framework 2012	UK planning guidance document.
Part IIA	Part IIA of the EPA 1990	Primary regulatory mechanism used for the identification and remediation of a site in its current condition. Includes statutory definition of 'contaminated land'.
PDL	Previously developed land	Also referred to as 'brownfield land', refers to land that has been used for a previous purpose or occupied by a structure.
Phase 1	Phase 1 Assessment	A Phase 1 (also regularly referred to as a 'desk study', despite commonly including a site walkover) is the first tier of site assessment.
Phase 2	Phase 2 Assessment	Phase 2 is commonly used to describe the intrusive investigation of a site (e.g. obtaining soil, groundwater, soil gas, etc. samples).
PPE	Personal protective equipment	Protective clothing and equipment used by an individual.
QA/QC	Quality assurance/quality control	Actions and procedures to maintain a desired standard.
QMLC	NQMS for Land Affected by Contamination	Proposed scheme developed by the Land Forum to provide visible identification of documents that have been checked for quality by a suitably qualified and experienced person.
QP	Qualified person	A specially trained, chartered individual registered with CL:AIRE, who is able to undertake the review of materials management plans and associated documents.
RCL	Relevant contaminant linkage	Pollutant linkages that have been identified through the risk assessment process to represent unacceptable risks.
RPE	Respiratory protective equipment	Specific form of PPE used to protect the user.
S4UL	Suitable for use level	Generic assessment criteria developed by LQM/CIEH used for evaluating risks to human health from soil contamination.
SGV	Soil guideline value	Generic assessment criteria developed by the EA used for evaluating risks to human health from soil contamination.
SiLC	Specialist in Land Condition	A senior geoenvironmental practitioner with a high level of understanding of land contamination issues, and significant professional experience.
SoBRA	Society of Brownfield Risk Assessment	A learned society established to support the growing number of professionals working in land contamination risk assessment.
SQP	Suitably qualified person	An approved, registered individual who has the capacity to sign a declaration form for contaminated land reports under the QMLC.
SuRF-UK	UK Sustainable Remediation Forum	An initiative set up to progress the UK understanding of sustainable remediation.
UKAS	United Kingdom Accreditation Service	Quality assurance system for laboratories.
UXO	Unexploded ordnance	Explosive weapons that did not explode when they were detonated and may still pose a risk of detonation.
WAC	Waste acceptance criteria	A minimum testing requirement that needs to be met for the disposal of hazardous and non-hazardous waste. The WAC limits must not be used to decide whether or not a waste is hazardous.