

# Guidance for developing on land affected by contamination

East London Contaminated Land Group



## Contents

Introduction .....	3
Phase 1 – Preliminary Risk Assessment Report .....	4
Phase 2 - Site Investigation Report .....	5
Phase 3 – Remediation and Verification Strategy Report .....	7
Phase 4 - Verification Report .....	8
Further Details .....	9
References and Standards: .....	11

### Disclaimer:

This guidance is intended to serve as an informative source of advice only and must not be relied upon as authoritative interpretation. The person/company involved in the assessment of the land should apply up-to-date working practices and be aware of current UK policy.

## Introduction

Land contamination may arise because of the historical or current industrial land use of the site, pollution incidents. Land contamination may also arise from the natural geology, for example radon gas and methane from peat.

The National Planning Policy Framework stipulates it is the developer's responsibility to ensure that the land is suitable for use.

This document has been developed to assist Developers, Architects, Environmental Consultants and other stakeholders regarding what information is required to be submitted to the Planning Department on land that may be affected by contamination.

The Contaminated Land process is based on a Phased Approach with emphasis on the development of a conceptual site model. This comprises four main steps:

- Phase I – Desk top study and preliminary risk assessment;
- Phase II – Site Investigation;
- Phase III- Remediation and Verification Strategy;
- Phase IV – Verification Report.

All reports should have the following:

- Be signed and dated by the author and reviewer;
- Provide details confirming that the author and reviewer are suitably qualified professionals;
- PDF format which can be highlighted.

The following tables provide a checklist of requirements for each of the reports. To avoid unnecessary delays in the planning process, this checklist should be consulted and the reports submitted should demonstrate adherence to this.

Further technical details are provided at the end of the report regarding the conceptual site model, underground storage tanks and vapour risk assessments.

## Phase 1 – Preliminary Risk Assessment Report

	Y/N
<b>Desktop study</b>	
Site Area	
Description of the site and surroundings	
Site History <ul style="list-style-type: none"> <li>• Historical maps;</li> <li>• Details of any pollution incidents, spillages.</li> </ul>	
Environmental setting <ul style="list-style-type: none"> <li>• Geology, geochemistry;</li> <li>• BGS borehole data;</li> <li>• Hydrogeology: source protection zones, groundwater vulnerability, likely direction of groundwater flow;</li> <li>• Hydrology: water abstractions, surface water bodies and flooding.</li> <li>• Ecology</li> </ul>	
Environmental Data: IPC, IPPC, LAPPC sites, Licenced Waste COMAH and NIHHS sites WFD operation (Waste Framework Directive), Historical Landfills, risks from unexploded ordnance, radon	
<b>Site Walkover</b>	
Walkover details to include: <ul style="list-style-type: none"> <li>• Current site use; any evidence of contamination from fly tipping;</li> <li>• Evidence of historic uses;</li> <li>• Surfaces ;</li> <li>• Vegetation;</li> <li>• Topography;</li> <li>• Drainage, underground services and identification of other man-made pollution pathways;</li> <li>• Neighbouring land uses;</li> <li>• Asbestos containing materials within the building.</li> <li>• Identification of any man-made pollution pathways – site drainage and underground services.</li> </ul>	
<b>Consultations</b>	
Planning and Environmental Health Departments: Details regarding any site investigations undertaken at the site or in the vicinity (to include report titles, dates and relevant site investigation findings)	
Environment Agency: Where controlled waters may be affected by contamination	
London Fire Brigade : if the potential for underground storage tanks (UGST) exists at the site in view of its former use or land uses identified within the site vicinity (former petrol filling station, car wash and car maintenance garages)	
<b>Site Conceptual Model</b>	
Potential sources, pathways and receptors are clearly defined. Risk ranking of pollutant linkages in line with CIRIA C552.	

Conclusions and recommendations. Details regarding the uncertainties and proposals for further work to address these.	
<b>Site Investigation Proposals</b>	
Outline of the soil, groundwater and ground gas sampling strategy, contaminant testing.	

<b>Phase 2 - Site Investigation Report</b>	
	Y/N
Review and summary of the previous report	
<b>Proposals</b>	
Objectives of the Site Investigation.	
Identification of access constraints: i.e. the presence of buildings onsite and provide details of additional sampling which will be carried out when access is available (i.e. post demolition).	
If demolition is required prior to redevelopment, consideration of the presence of asbestos containing material and summary of steps that will be taken to prevent contamination of the soil.	
Review of identified pollutant linkages.	
Sampling strategy and justification: <ul style="list-style-type: none"> <li>• Zoning of the site</li> <li>• Targeted or non-targeted</li> <li>• Sampling density</li> <li>• Number of samples and depths-to reflect the receptors of concern and sources of potential concern (i.e. UGST).</li> </ul>	
Analysis Strategy: <ul style="list-style-type: none"> <li>• Suite of contaminants to be tested and justification.</li> <li>• Details of proposals for any WAC testing.</li> </ul>	
Ground gas and groundwater – description and explanation of monitoring and sampling programmes to include frequency and duration.	
Testing to be undertaken by a UKAS and MCERTS accredited laboratory.	
<b>Presentation and Analysis of results</b>	
Description of ground conditions encountered at the site.	
Details regarding adopted generic and/or site specific assessment criteria with justification: Input parameters Assumptions With CLEA – datasheets should be included <i>Please ensure that all models are in line with UK policy and include all relevant site-specific pollutant linkages. All risk-modelling assumptions and uncertainties must also be presented and referenced.</i>	
Summary tables of results against the adopted screening criteria for each of the receptors (this should be provided even if no exceedances have been identified at the site)	

Description of type, nature and spatial distribution of contaminants, with plans where appropriate.	
Results of statistical analysis of soil contamination data for substances where any sample has exceeded the site-specific assessment criteria. This analysis must include the calculated true mean concentrations of the contaminant at the 95% confidence level.	
<b>Conceptual Site Model</b>	
Review of the Phase 1 CSM and Identification of significant pollutant linkages.	
Recommendations for further work.	
<b>Appendices</b>	
Appropriately scaled and annotated plan showing exploration locations	
Construction details for monitoring boreholes (response zone)	
Ground gas monitoring results- recording sheet should include the following information: <ul style="list-style-type: none"> <li>• Weather conditions</li> <li>• Ground conditions</li> <li>• Barometric pressure trend (24hr)</li> <li>• Depth to the base of the well</li> <li>• Depth to water</li> <li>• Date the instrument was last calibrated.</li> </ul>	
Groundwater results	
Analytical results shown on laboratory data sheets in accordance with MCERTS performance standard for soils.	
Laboratory quality assurance and control data sheets	

If no significant pollutant linkages have been identified, yet further groundworks will be undertaken at the site, then the Phase 2 report should provide additional details regarding a discovery strategy and watching brief.

If topsoil or other material is to be imported as part of the development, regardless of whether remediation is required, then the material must be “suitable for use” and ensure that it does not contain unacceptable levels of contamination.

## Phase 3 – Remediation and Verification Strategy Report

	Y/N
Review and summary of previous reports (to include references), site investigation findings and CSM	
<b>Options appraisal</b>	
Appraisal of remedial options for each pollutant linkages that require remediation.	
Identification of the most appropriate option for each relevant pollutant linkage and justification to include expected durability of the proposed remediation and limitations to any of the remedial works.	
<b>Proposed remediation strategy</b>	
Proposed site zoning and phasing of remediation	
Plans showing: <ul style="list-style-type: none"> <li>• Proposed locations and phasing of remediation works.</li> <li>• Areas to be used for stockpiling contaminated and imported materials.</li> <li>• Proposed monitoring locations</li> </ul>	
Timescales for the remedial works	
Remediation criteria for the relevant pollution linkages.	
Discussion of permitting requirements and proposals for obtaining any appropriate permits: PPC permit Waste management site license Exemption from waste management licensing Mobile plant license EA Hazardous soils treatment facility - mobile plant deployment permit Abstraction licence or consent Discharge consent Groundwater regulations authorisation Flood defence consent	
Building Construction details (f relevant to limiting pollutant pathways) e.g. Pile foundation depths	
Where ground gas protection measures are required details should be provided in line with CIRIA C735 and BS 8485: <ul style="list-style-type: none"> <li>• Gas verification plan</li> <li>• Membrane specification – the manufacturer should be contacted where necessary to confirm protection against ingress of hazardous gas of concern.</li> <li>• Design drawings, including other pertinent details including Flood risk height.</li> </ul>	
<b>Monitoring, Maintenance and Verification Plan</b>	
Scope of site monitoring and /or maintenance work required	
Where the importing of subsoil and topsoil and or site derived soils are proposed: <ul style="list-style-type: none"> <li>• Details of expected chemical quality standard of Imported subsoil and topsoil in line with approved guideline values.</li> <li>• Depths of both layers.</li> <li>• Sampling requirements and frequency</li> </ul>	

Verification plan - outline of supporting documents that will be provided at the verification stages. <ul style="list-style-type: none"> <li>• Chemical test results</li> <li>• Duty of care and waste management documents.</li> <li>• Photographs</li> </ul>	
Details of the watching brief to be maintained.	

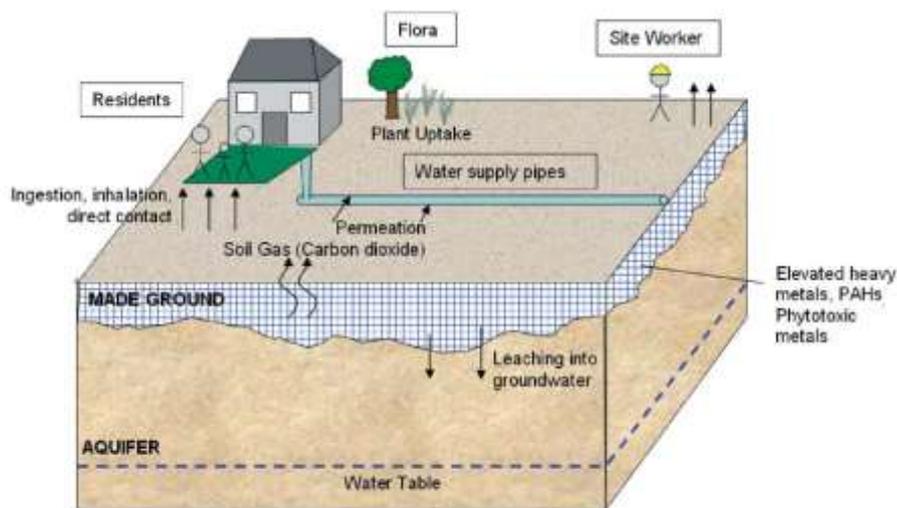
<b>Phase 4 - Verification Report</b>	
	Y/N
Verification work objectives	
Review and summary of previous reports, with references	
Review of pollutant linkages and remedial works undertaken to address these.	
Details regarding variations in the remedial strategy (to include justifications).	
Plans showing remediated areas.	
Results of validation and performance testing. Comparison and interpretation with remediation criteria. Monitoring results for groundwater and gases.	
Photographic evidence (depths of cover systems, installed gas membranes).	
Details of permits, licences and authorisations and consents obtained. Soils import and export docket /waste transfer notes.	
Confirmation that remediation objectives have been achieved (with reference to the conceptual site model).	

## Further Details

### 1. Conceptual site model:

The conceptual site model should clearly identify the potential sources, pathways and receptors and possible pollutant linkages.

Example of possible pollutant linkages are illustrated below:



Reference: Guidance for the safe development of housing on Land Affected by contamination R&D66: 2008 Volume 1

Additional pathways to be considered include the following:

- Inhalation of vapours (indoors and outdoors) volatilised from shallow groundwater;
- Dermal contact with shallow groundwater;
- Inhalation of vapours when bathing/showering either directly with groundwater obtained from an on-site source or following permeation with a plastic pipe;
- Dermal contact when using water obtained from an on-site source or following permeation of a plastic pipe;
- Ingestion of drinking water from an on-site source or following permeation of plastic pipes;
- Consumption of crops irrigated with an on-site or following permeation of plastic pipes;
- Dermal contact with water from a sprinkler;
- Consumption of home-grown foodstuffs (for example, poultry, meat, eggs shellfish);
- Creation of pathways to deeper aquifers from piled foundations.

## **2. Underground Storage Tanks**

Underground storage tanks (UGST) can be found at sites with former industrial land use including petrol filling stations, car wash and vehicle maintenance garages. On redevelopment sites, decommissioning and removal will be required to satisfy the Council requirements.

Following confirmation of the presence of underground storage tanks at a site, the Petroleum Enforcement Authority, in this case the London Fire Brigade, should be contacted as soon as possible to ensure safe methods of working are established for tank decommissioning and removal.

Contact details: [Petroleum@london-fire.gov.uk](mailto:Petroleum@london-fire.gov.uk).

Disused tanks petroleum officer: Neil Roberts 07827896163.

Under the Public Health Act 1961, it is the responsibility of the owner of the site to ensure that disused petrol tanks are made safe. To satisfy the requirements of this Department, waste documentation confirming that the tank no longer poses a risk of fire and explosion will be required at the Verification Stages for reporting.

Following tank removal, an assessment for leakages, risks and appropriate validation sampling beneath the tanks will be required to be undertaken.

## **3. Risks from Volatile Organic Compounds**

Where the potential for volatile organic compounds to be present at a site has been identified, the site investigation should include sampling and assessment of vapour risks from both soil and groundwater sources and supported by monitoring.

Commonly occurring vapours include benzene, toluene, xylene, naphthalene, tetrachloroethene (PCE), trichloroethene (TCE) and vinyl chloride. Other sources include petrol range organic hydrocarbons.

Where trace gases and vapours are found to be present, a health risk assessment will need to be undertaken in line with the latest government CLEA assessment model and Environment Agency guidance. Whilst common protection methods include in-structure pathway management, decisions should be made on a site-specific basis given VOCs are usually found in as a mixture of different compounds and degradation can occur over a prolonged period of exposure. Reference should be made to CIRIA C716.

For groundwater sources the Society of Brownfield Risk Assessment (SoBRA) has published generic assessment criteria for assessing vapour risks to human health.

## References and Standards:

Department for Environment Food and Rural Affairs and Environment Agency – Model Procedures for the Management of Contaminated Land (CLR11) (2004).

British Standards Institution (2011) BS 10175:2011 +A1:2017 Code of practice for the investigation of potentially contaminated sites. Milton Keynes: BSI.

CIEH/CL:AIRE (2008) Guidance on Comparing Soil Contamination Data with a Critical Concentration

Department of the Environment (1995). Industry Profiles (Various Titles). DoE, London (available from: <https://www.claire.co.uk/useful-government-legislation-and-guidance-by-country/198-doe-industry-profiles>).

Environment Agency and NHBC (2008) 'Guidance for the Safe Development of Housing on Land Affected by Contamination' R & D Publication 66. Environment Agency.

British Standards Institute - Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings (BS8485:2015).

British Standards Institute - Guidance on investigations for ground gas. Permanent gases and Volatile Organic Compounds (VOCs) (BS8576:2013).

British Standards Institute - Specification for Topsoil and Requirements for Use (BS3882:2015).

Construction Industry Research and Information Association - Assessing risks posed by hazardous ground gases to buildings (C665) (2007).

Construction Industry Research and Information Association CIRIA, C716, Remediating and mitigating risks from volatile organic compound (VOC) vapours from land affected by contamination, Welburn, P, Baker, K, Borthwick, K, MacLeod, C, 2012.

Environment Agency (2005) 'The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbons in Soils' Science Report P5-080/TR3.

CL:AIRE (2007) Petroleum Hydrocarbons in Groundwater; guidance on assessing petroleum hydrocarbons using existing hydrogeological risk assessment methodologies.

SoBRA - Development of Generic Assessment Criteria for Assessing Vapour Risks to Human Health from Volatile Contaminants in Groundwater,

### Website

WALL is a freely available, extensive list of links to past and present water and land references published by the Environment Agency, AGS, BRE, CIRIA and other useful industry publishers.

<https://www.claire.co.uk/information-centre/water-and-land-library-wall>