
Planning Guidance for the Redevelopment of Land Potentially Affected by Contamination

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Elmbridge
Borough Council

Local Responsibilities and Commitment

This Planning Guidance was prepared by the Planning and Environmental Health Department of Elmbridge Borough Council (EBC) with the support and agreement of officers within that team, together with those of associated EBC teams and other Surrey Contaminated Land Officers. The Guidance has also been peer reviewed by Hugh Mallett, Technical Director at BuroHappold Engineering and a leading authority in brownfield redevelopment and land contamination.

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- Cllr Robin Stevens, Portfolio Holder for Planning, Enterprise and Local Economy. Cllr Stevens approved the planning guidance for public consultation at Individual Cabinet Member Decision Making (ICMDM) Meeting on 6 March 2024.
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Foreword

The redevelopment of land potentially affected by contamination is an important component of sustainable development. A successful redevelopment project can bring derelict / despoiled land back into beneficial use, delivering much needed homes, infrastructure and green space. Approached in the right way, such projects can be successfully delivered to the benefit of the developer, the people who live on and around the site, and provide environmental betterment / gains in biodiversity. Things go wrong when due process is not followed, resulting in unexpected delays, additional costs and potential blight.

This guidance has been written by the local authority to set out their expectations of this due process. The phased approach described, is consistent with central government and Environment Agency advice, relevant British Standards and industry good practice and is also reflected in relevant local authority planning conditions.

At each phase of this work, it is important to involve people who are competent and experienced in the investigation, risk assessment and remediation of land affected by contamination. Reports prepared under the National Quality Mark Scheme (NQMS) will assist in the demonstration of competence. Whilst it is often said that “*this is not rocket science*”, all too commonly there is a failure to follow the basic principles involved in the development of land affected by contamination. There is always an expectation of “innovation” when frequently what is more valuable is the rigorous adoption of standard good practice and doing the simple things well.

Delays caused by less than adequate submissions are frustrating and costly to the developer, their professional advisors and the local authority. Reading, understanding and implementing the guidance set out here will assist developers in getting it right “first time”. This will be to the benefit of all parties: to the developer and local authority, to the people who will safely enjoy the site and its new surroundings, and to the new and improved local environment.

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1 Introduction and Purpose

Introduction

1.1 Land may be affected by contamination if substances present in, on or under the land have the potential to pose (or are already posing) harm to people and/or the environment or other identified receptors.

1.2 Much of today's land contamination originates from industrial processes from the 19th and 20th centuries and landfilling activities (for example mineral extraction, waste disposal, landfilling, industrial manufacturing processes, petrol stations and fuel storage, chemical storage and use, vehicle repair/servicing, etc.). Even land which does not have such an industrial past may still be affected by contamination as a result of Made Ground (fill) laid down or accumulated as a result of previous developments of the site or imported for the 'improvement' of the site or raising of the land. A site may also be affected by ground contamination due to its proximity to another site where contamination has migrated to surrounding areas. In some cases, ground contamination can be caused by agricultural activities or by naturally occurring sources (for example radon gas from underlying rock or ground gases from peat deposits).

1.3 Elmbridge Borough Council recognises that ground contamination is a material planning consideration, and that redevelopment is often the most effective way to deal with problems associated with previous industrial usage. In such redevelopment, the "suitable for use" approach should be followed. This approach (which is both national and local policy) means dealing with any unacceptable risk to health or the environment based on the actual or intended land use, in order that the site in question can be used safely. In other words, sites should be remediated so that risks to people and the environment are at acceptably low levels. It does not mean that all contamination on a redevelopment site must be removed.

1.4 The onus is placed on the developer/landowner to disclose all relevant information and to undertake thorough investigation, assessment and appropriate remedial action in order to render the land suitable for the intended use. Failing to deal adequately with contamination before / during redevelopment can cause harm

to human health, property and the wider environment and result in the additional post construction remedial work being required with substantial implications for cost, programme and liability.

1.5 Where a proposed development introduces a vulnerable end use¹ and/or the development site could be affected by a former potentially contaminative land use², the possibility of land contamination should always be considered.

1.6 The presence of contamination does not necessarily always give rise to an unacceptable level of risk and the definition of an accurate conceptual site model (CSM) is required to determine the level of likelihood and severity of risk posed to each receptor. Typically, the CSM is updated from an initial desk-based description as additional information is obtained by investigation and monitoring.

1.7 The term “risk” is interpreted in several ways in common language. When discussing land affected by contamination, risk is present when a source (a contaminant) and a receptor (for example, people, groundwater, rivers or the wider environment) both exist at a site with a pathway linking the two. This is known as a contaminant linkage. The level of risk is assessed by considering the combination of (i) the likelihood of a hazard being realised and (ii) the severity of that consequence. Development can create risks by introducing new receptors (for example, by introducing residents to a site affected by contamination) and by creating new exposure pathways (for example, piled foundations could link near surface contamination to underlying groundwater).

¹ Examples of vulnerable end uses with respect to human health receptors. This list is not exhaustive. If you are in doubt about the vulnerability of an end use, please contact the Council’s Contaminated Land Officer:

- All residential developments (houses, flats, nursing homes etc).
- Allotments.
- Schools.
- Nurseries and crèches.
- Children’s play areas.
- Playing fields, including sports fields
- Mixed use developments including vulnerable end uses.

² Examples of potentially contaminating land uses are available in the Department of the Environment Industry Profiles (DoE, 1995), which are available to download free of charge from the GOV.UK website.

Purpose

1.8 The purpose of this guidance is to promote consistency and good practice for development on land affected by contamination, employing a reasonable, proportionate approach. It has been prepared to assist developers, landowners and consultants who intend to redevelop or significantly change the use of land/buildings which could be potentially contaminated.

1.9 This Guidance sets out the approach required and the information that must be submitted to the Local Planning Authority in order to fulfil the terms of and demonstrate compliance with, a land contamination related planning condition. Responsibility for ensuring a development is safe for its intended new use, and corrections where it is not, lies with developer, landowner and their consultants. The Council cannot and does not provide the role of an Environmental Consultant. All aspects of investigations into possible land contamination should be in line with current good practice and should follow the guidelines within 'Land Contamination Risk Management (LCRM)'.³

1.10 Failure to comply with this guidance may result in delays in the planning application being processed or in the planning application being refused, or, where permission has been granted, cause delay to the progress, completion and occupation of the development. It is strongly advised that the possibility of land contamination be considered at the earliest stage of a project. This will ensure appropriate investigation, assessment and remedial design / action (if appropriate) and avoid delay and / or unnecessary work.

National and Local Planning Policies

1.11 The role of the planning process is to ensure that land is made suitable for its proposed new use and to prevent unacceptable risk from pollution. The National Planning Policy Framework (NPPF) aims to encourage sustainable development and

³ Land Contamination Risk Management, Environment Agency, 2020 (and subsequent updates)

the reuse of brownfield land. Paragraph 183 of the NPPF⁴ states that planning policies and decisions should ensure that:

- a) a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);
- b) after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and
- c) adequate site investigation information, prepared by a competent person, is available to inform these assessments.

1.12 Ground conditions and pollution, including potential land contamination issues, is a material consideration under the NPPF for all planning applications (including prior approval applications).

Policy DM5 – Pollution, Development Management Plan (2015)

1.13 The Council's development plan policy states:

"Development affecting contaminated land will be permitted provided that the site is remediated to ensure it is suitable for the proposed use, taking into account the sensitivity of future occupants/users to pollutants, and that remedial decontamination measures are sufficient to prevent harm to living conditions, biodiversity or the buildings themselves. All works, including investigation of the nature of any contamination, should be undertaken without escape of contaminants that could cause risk to health or the environment."

⁴ National Planning Policy Framework, Ministry of Housing, Communities and Local Government, 2021.

Policy ENV7 - Environmental Quality of the draft Local Plan (2022)

1.14 At the time of issue of this guidance document, the Local Plan had not been adopted. This reference is included as an emerging policy to provide the Council perspective in this regard. With respect to land affected by contamination it states:

1. Development must minimise exposure to, and the emission of, pollutants including noise, odour, light, contamination and water quality. Proposals must:
 - a) Incorporate site zoning of pollution sources and receptors to ensure that existing and future occupiers are not subject to unacceptable level of odour pollution, noise, vibration or light disturbance, both within buildings and externally;
3. The re-use of land suspected to be contaminated will be supported where the land can be made safe for the proposed use. Proposals should:
 - a) Investigate the nature of the contamination, taking care to avoid the escape of contaminants which could present an environmental risk;
 - b) Make provision for remediation measures; and
 - c) Take account of ground conditions and land instability.
4. Proposals should seek to improve the quality of watercourses, groundwater and drinking water supplies, and should ensure that any contaminated run-off is prevented. Development proposals must be designed and/ or located to prevent the input of pollutants into water bodies and groundwater.
5. Schemes where adverse impacts cannot be overcome by mitigation will be refused permission.

Validation Requirements

1.15 The Council's Local Validation Requirements state that planning applications where new, or redevelopment is proposed or on land that is known to be, or suspected to be, affected by contamination may require a contaminated land assessment.

1.16 An assessment is always required for any new residential development. It may also be required for:

- Prior Notification for change of use from office to residential
- Extensions on or close to landfill
- Developments where the end use of the site has changed.

Consultation Process

1.17 The Planning Officer will consult with the Council's Contaminated Land Officer on any site where there is the potential for ground contamination to affect the site, or where the proposed development is deemed vulnerable or sensitive. The Contaminated Land Officer will then assess the application and may recommend that further information be submitted or planning conditions be imposed upon the development, to ensure that the site will be suitable and safe for the end users, the wider environment and the public.

The Developer's Responsibility

1.18 The NPPF (paragraph 184) states that "responsibility for securing a safe development rests with the developer and/or landowner."

1.19 Accordingly, where a development is proposed, it is the responsibility of the developer to ensure that issues of land contamination are appropriately considered, that investigation, assessment and (where necessary) remediation takes place so that the land is safe and suitable for its new use.

1.20 It is also the developer's responsibility to ensure that these investigations, assessments and remediation are carried out by competent persons, defined in the NPPF (paragraph 183) as: "A person with a recognised relevant qualification, sufficient experience in dealing with the type(s) of pollution or land instability, and membership of a relevant professional organisation."

1.21 Carrying out unacceptable or insufficient work or submitting unsuitable or incomplete reports to the Local Planning Authority may lead to delays and additional costs. Anonymous and/or draft reports will not be accepted.

1.22 Developers should be aware that this process of investigation and assessment is sequential and that each phase of the work, including the Local Planning Authority's review of each report and subsequent approval, may take considerable

time to complete. These timescales should be factored into the developer's overall project plan.

1.23 Developers should also be aware that investigation and remediation work can sometimes require permits or consents from the Environment Agency or the Local Planning Authority.

2 Planning conditions

2.1 Where the potential for land contamination exists and the proposed development may result in unacceptable risk, a planning condition requiring its consideration will be included in a grant of planning. This condition can take a number of formats, depending on the estimated potential magnitude of a risk and, in some cases, the type of potential risk.

2.2 The conditions are largely laid out to follow national good practice guidance⁵. Usually, the condition uses a series of stages to achieve the following:

- A Preliminary Risk Assessment (PRA) with Conceptual Site Model (CSM) and risk assessment (often qualitative at this stage) to characterise the site. This stage is always required.
- Intrusive ground investigation to obtain site specific data, to refine the CSM and undertake a Quantitative Risk Assessment validate the CSM and identify the need for and scope of remedial design or action.
- Where necessary, a Remediation Strategy to remove identified unacceptable risks will be devised (including a Verification Plan).
- Verification of the efficacy of the remediation measures will be carried out, and a Verification Report prepared.

2.3 Each stage requires the submission and approval of an appropriate written report and/or plan for further works. Evidence must be provided to support all statements and conclusions.

2.4 The condition typically contains distinct pre-commencement and pre-occupation portions. It is recognised that in some large-scale developments, the schedule and sequencing of works may be phased for defined areas, which may bring the development into breach of the condition. Where this is likely to happen, the Developer must work with the Local Planning Authority to agree a suitable way forward as early as possible, preferably from the outset.

⁵ Land contamination risk management (LCRM), Environment Agency, 19 April 2021

2.5 Typical planning conditions relevant to land affected by contamination are presented in Appendix A. Advice can be sought from the Council's Planning and Environmental Health teams with regards to specific site concerns by contacting your Planning Case Officer.

3 Compliance with the Planning Condition

Phase 1 Preliminary Risk Assessment

3.1 For larger scale developments or developments on land known or suspected to have a contaminative history, it is strongly encouraged that the Phase 1 assessment be submitted at the application stage.

3.2 This phase of investigation corresponds to **a) Preliminary Investigation of the Site** of the typical standard planning condition (or similar) where potential for land contamination to be present is a concern. It is often known as a Phase 1 Assessment, a Preliminary Risk Assessment, or a Desk Study

3.3 The purpose of a Preliminary Investigation is to characterise the site, obtain a good understanding of a site's history, its setting and its potential to be affected by contamination. Failure to undertake an adequate, thorough Preliminary Investigation may result in the Local Planning Authority refusing a planning application or delay in progressing the development. The Developer should be aware of EBC expectations when commissioning a Preliminary Investigation report.

3.4 A Preliminary Investigation typically comprises a desk study of multiple sources of information, records and maps providing a detailed site history and site setting, observations from a site walkover, the description of an initial conceptual site model and a qualitative risk assessment. The findings are presented in a Phase 1 Preliminary Risk Assessment (PRA), the results of which determining if further investigation and assessment is required.

3.5 The submission of an environmental search report alone is not sufficient to meet the above requirements. Such reports contribute useful factual information about the site but do not provide a substantial amount of relevant factual data, site observations or any interpretation and assessment.

3.6 At a **minimum**, the Phase 1 Preliminary Risk Assessment should include;

- i. A desk study element (including of UXO)
- ii. A site walkover survey

- iii. The description of an initial conceptual site model and a Preliminary Risk Assessment

(i) Desk Study

3.7 A desk study is a detailed search of available historical and current records and maps to identify potential on-site and off-site sources of contamination. It should include information on:

- Site location and setting (including a site plan).
- Current land uses on and in the vicinity of the site, with reference to current potential sources of contamination and neighbouring sensitive land uses
- Past land uses on and in the vicinity of the site obtained from various sources, for example historical maps, site plans, planning records and historical directories.
- Potential historical storage tanks, above ground and below ground, and chemical storage and use.
- Mining or quarrying activities.
- Licensed, unlicensed and exempt waste sites (landfill sites).
- Possible infilled areas.
- Details of spillages or pollution incidents.
- Environmental Permits and licences.
- Previous investigations.
- Types of contamination that may be present
- Potential ground gas regime in the area (including radon).
- Unexploded Ordnance (UXO)
- Soils and underlying geology, with geological cross sections where appropriate.
- Groundwater and surface water, including abstraction and discharge licences.
- Ecology, where applicable.

3.8 This list is not exhaustive and will depend on the specific site and reasonably available sources of information.

3.9 Key information with regards to the potential for land contamination to be present can be obtained through a thorough understanding of the site's history. The required

detailed understanding of previous site uses and estimation of risk is unlikely to be achieved using commercially available map/database package reports alone, and it is recommended that the investigator look to access other reasonably available sources of historical information on the subject site to provide an adequate understanding (e.g. historical street and trade directories, historical maps, period photographs, fire insurance maps) plus anecdotal evidence from persons familiar with the site. Historical planning records and property deeds can also provide details on previous trades, uses and layout.

3.10 Local studies sections of reference libraries, local history museums and the Public Records office are useful sources of historical information, plus local history websites. The Council may also hold useful additional information about a site not available from other sources. A record search can be requested by contacting the Council's Contaminated Land Officer; please note a charge is applicable to cover the cost of conducting the search.

(ii) Site Walkover Survey

3.11 A site walkover survey shall be undertaken to confirm and build upon the information gathered by the desk study. **The Phase 1 report will not be accepted without a recent site walkover and visual inspection.**

3.12 In the majority of cases, the site visit is limited to a visual inspection of the site carried out as a walkover exercise. During the walkover a site plan should be drawn up and annotated, and photographs taken. Where possible, inspection should also be carried out on land directly outside the site boundaries. The site visit may be used to assist in the planning of any intrusive investigation which may be required.

3.13 Observations should be made relating to:

- The site's layout, nature and setting (including information on the presence and condition of above-ground fuel tanks and manholes, deposits of waste material and asbestos, and the storage of hazardous chemicals).
- The condition of the site and structures (including the condition of suspected asbestos containing material).
- Visual or odorous evidence of contamination and/or historical release.
- Signs of vegetation distress.

3.14 This list is not exhaustive and should be site specific. A useful checklist / pro forma for site walkover surveys is presented in R&D 66.⁶

3.15 On some sites it may be appropriate or necessary (e.g., on operational sites) to be accompanied by the site owner, occupier or another representative during the reconnaissance. Such persons should be interviewed as they may be able to provide additional pertinent information and, if necessary, to discuss access issues and practicalities for potential future intrusive site investigation.

3.16 Either as part of the site walk-over or on a scheduled subsequent visit, it may be beneficial to conduct sampling of site soils, surface waters (on-site or adjacent) or groundwater / ground gas from existing wells.

3.17 A preliminary assessment of the potential risks associated with unexploded ordnance (UXO) should be carried out in accordance with the good practice guidance presented in CIRIA C681.⁷

(iii) Conceptual Site Model and Preliminary Risk Assessment

3.18 After carrying out a desk study and site walkover survey, an initial conceptual site model (CSM) must be developed. A CSM can take a number of forms, a text description, a diagram or a table that defines all of the potential contaminant linkages at a site (where identified *receptor(s)* may be exposed to a *source* of contamination, by means of a viable *pathway*). In the case of a development site, the possible contaminant linkages relevant to both existing and future receptors must be considered.

3.19 The CSM must identify and consider each of the following, together with details of limitations, assumptions and uncertainties:

Sources of any potentially significant contamination, for example historical industrial activity, tanks or nearby landfill sites.

⁶ R & D Publication 66: Guidance for the Safe Development of Housing on Land Affected by Contamination. National House Building Council NHBC, Environment Agency & CIEH, 2008.

⁷ C681: Unexploded ordnance (UXO) – a guide for the construction industry, CIRIA, 2009.

Pathways through which contaminants can travel, for example direct contact or gas/vapour migration.

Receptors that ultimately can be affected by the contamination, for example future residents or groundwater.

3.20 At Phase 1 stage, in the absence of site-specific quantitative data, each identified contaminant linkage must be qualitatively assessed to determine the potential risk. The qualitative risk assessment should be based on the potential severity that the hazard poses to the receptors against the likelihood of it happening. The use of a risk classification matrix, such as that presented in *CIRIA C552*,⁸ is recommended.

3.21 The conceptual site model and preliminary risk assessment will indicate whether a Phase 2 investigation is required and the nature and scope of such an investigation. The Phase 1 report must include conclusions about the identified risks and present recommendations for filling any data gaps and / or areas of uncertainty.

3.22 A written Phase 1 Preliminary Risk Assessment report must be submitted to, and approved in writing by, the Local Planning Authority BEFORE proceeding to the next phase.

3.23 If you have any queries on this please contact your Planning Case Officer, who, where necessary, may forward you to the Councils Contaminated Land Officer.

Phase 2 Intrusive site investigation

3.24 If Phase 1 indicates that there is a potential for contamination to pose a risk to the development, a Phase 2 intrusive ground investigation will be required. The first step in Phase 2 is to define the objectives and scope of the ground investigation necessary to fill the gaps, resolve the uncertainties and obtain quantitative data relevant to the conceptual site model. Investigations should, wherever possible, combine geotechnical and geoenvironmental objectives (the geoenvironmental objectives being informed by the Preliminary Risk Assessment and the geotechnical

⁸ CIRIA C552: Contaminated Land Risk Assessment: A Guide to Good Practice, Construction Industry Research and Information Association (2001).

objectives by the development plan). When appropriate, ground investigation should also consider the interests of other relevant disciplines (for example, archaeology, flood protection, water resources, ecology etc).

3.25 The intrusive site investigation will involve sampling, in situ and ex situ testing and monitoring of soils, water and gas/ vapour. It may involve, both intrusive and non-intrusive techniques including for example, the excavation of trial pits, the drilling of boreholes, the installation of monitoring wells or other monitoring devices to allow the sampling and testing of gases, soils and water. The nature and scope of the investigation is determined on a site-specific basis and is designed specifically for the characterisation of a given site. The work should be undertaken in a manner that ensures no further harm or pollution is caused by the investigation itself. The results of the intrusive investigation will enable better definition of the potentially significant contaminant linkages identified in the Preliminary Risk Assessment.

3.26 This phase of investigation corresponds to **b) Site Investigation, Risk Assessment and Remediation Strategy** parts i) and ii) of the typical standard planning condition (or similar) where potential for land contamination to be present is a concern.

Site Investigation Plan

3.27 A site investigation should be designed to determine the nature and extent of contamination where it is present/suspected and also delineate areas where it is absent. It is important to refer to the conceptual site model completed in Phase 1, as this will ensure that all possible contaminant linkages are investigated. Investigations should be carried out in accordance with current, relevant UK standards and guidance⁹ and should achieve an accurate, robust and defensible characterisation of site conditions.

3.28 A written scope of works shall be submitted to, and agreed in writing by, the Local Planning Authority before the commencement of site investigation works. Early consultation with the Local Planning Authority is particularly encouraged for large or

⁹ For example: BS 10175:2011+A2:2017, BS 5930:2015, BS 8576:2013, BS 8485:2015+A1:2019 and Land contamination risk management (LCRM), Environment Agency, 19 April 2021.

complex sites with significant contamination issues, where achieving appropriate and adequate investigation can be more complicated.

3.29 The proposed site investigation works should be detailed in a scoping document or report and should include the following information:

- The purpose and objectives of the investigation formulated based on the conceptual site model and the information gaps highlighted during Phase 1.
- Overview of the intended sampling strategy – including information and justification of sample locations, depths, patterns and numbers and the frequency and duration of sampling or monitoring to be undertaken.
- 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, consider the presence of asbestos containing material and summarise the steps that will be taken to prevent contamination of the soil.
- Proposed changes to ground level associated with the development.
- Sampling and/or monitoring methods to be used.
- The contaminants and parameters that will be measured / analysed for. This must be site specific; in addition to common contaminants, the site history may identify previous activities which can result in less common contaminants such as perfluoroalkyl and polyfluoroalkyl substances (PFAS), vinyl chloride etc.
- The methodology and criteria to be employed in the assessment of the data obtained from the investigation.
- The use of in-situ testing and rapid field measurement techniques [Ref Environment Agency Position Statement 307_03, 2016]
- The likely number of samples (e.g., soil, water, leachate, ground gas/vapour) that will be taken for subsequent laboratory analysis.
- The analytical methods and associated limits of detection that will be used. Accredited laboratories and analytical methods should be used (for example UKAS, MCERTS).

Phase 2 risk assessment and report

3.30 After approval of the investigation plan and completion of all the site investigation works (including receipt of all data from in-situ, ex-situ testing, analysis and monitoring), the preliminary conceptual site model developed in Phase 1 should be reviewed and updated. It is important to consider each potential contaminant linkage during the risk assessment and decide whether it is active at the site and whether it has the potential to harm the receptor before and after mitigation measures.

Assessing Risk to Human Health

3.31 In line with LCRM, a tiered approach to estimating risk should be followed involving the direct comparison between recorded levels of contamination and firstly Generic Assessment Criteria (GAC), followed by Site Specific Assessment Criteria (SSAC) as necessary. The assessment against both GACs and SSACs should reflect the conceptual site model and the statistical distribution of the data.¹⁰

3.32 GACs must be derived from current and authoritative published sources. If other values are used, they must be adapted to ensure that they are relevant to UK policy and the environment. Justification of their use must also be provided and agreed by the Local Planning Authority.

3.33 Where recorded concentrations of determinands exceed GACs, a detailed site-specific risk assessment may be required. This involves the formulation of SSAC using risk-modelling. The Contaminated Land Exposure Assessment (CLEA) model is a government supported method that can be used to estimate the risks to people from contaminants in soil (current version 1.071).¹¹ A number of alternative risk assessment models are also available, but all such models should be checked to determine they are in line with UK policy and include all relevant site-specific contaminant linkages. All risk-modelling assumptions and uncertainties must also be presented and referenced.

¹⁰ Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration, CL:AIRE, 2020

¹¹ [gov.uk/government/publications/contaminated-land-exposure-assessment-clea-tool](https://www.gov.uk/government/publications/contaminated-land-exposure-assessment-clea-tool)

3.34 Where there is a potential for hazardous ground gas a risk assessment should be carried out in accordance with current good practice [BS 8485:2015+A1:2019¹² and NHBC 2023].

Assessing Risk to Controlled Waters

3.35 The developer/applicant should provide sufficient information to assess the risks to controlled waters. This includes data on groundwater, surface water, soil and leachate. Initially, the recorded levels of contaminants should be compared to the most relevant water quality standards, for example environmental quality standards (EQS)¹³ or drinking water standards (DWS)¹⁴. Risk assessment using the Environment Agency's Remedial Targets Methodology may also be required.¹⁵

3.36 The Local Planning Authority may ask the Environment Agency to act as a consultee and provide advice on risks to controlled waters. One of the Environment Agency's main aims is to protect and improve controlled waters. Please note that the Environment Agency offer a chargeable pre-application service, which is recommended where potentially significant controlled waters issues are present.

Assessing Risk to Other Receptors

3.37 Other receptors may include, for example, buildings, structures, crops, livestock or ecological systems. In situations where such receptors have been identified in contaminant linkages, early consultation with the appropriate authoritative body (for example Natural England, Historic England) is advised.

Phase 2 Investigation Report

3.38 A satisfactory Phase 2 report must, at a **minimum**, include:

- Objectives
- Site setting, including site history and previous investigations
- Investigation rationale

¹² BS8485:2015 + A1:2019 Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings, British Standards Institute, 2015

¹³ The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015

¹⁴ The Water Supply (Water Quality) Regulations 2016

¹⁵ Remedial Targets Methodology: Hydrogeological Risk Assessment for land Contamination, Environment Agency, 2006

- Intended Scope of Works (in accordance with the Site Investigation Plan)
- Actual Site works undertaken, constraints, observations (e.g., of suspect contamination, obstructions etc) including site drawing(s). Records of observations / precautions related to UXO.
- Sampling and analysis results
- Revised Conceptual Site Model
- Human Health Risk Assessment (as appropriate)
- Controlled Waters Risk Assessment (as appropriate)
- Ground Gas Risk Assessment (as appropriate)
- Findings and Conclusions
- Adequacy and limitations
- Recommendations
- The following information must also be included: Exploratory logs and sampling records; analytical laboratory certificates (geotechnical and geoenvironmental as appropriate); photographic records; figures and drawings to effectively describe the investigation; selection or derivation of assessment criteria; plus any other pertinent information specific to the investigation of the site.

3.39 On completion of the risk assessment process, a recommendation should be made regarding the need for and scope of any additional work necessary to reduce uncertainty and on the need for and scope of remedial design / action necessary to mitigate unacceptable risks and to make the site 'suitable for its new use'.

3.40 Investigation and the collation of investigation information is an iterative process of data gathering and evaluation, often conducted in a number of stages. Each stage of investigation may identify the need to acquire further information. This may mean going back to undertake further desk-based research or subsequent stages of intrusive site investigation. The investigation process only ends when sufficient information has been gathered to determine whether complete contaminant linkages exist or will exist at the site under the proposed development, and whether they present an unacceptable risk.

3.41 The written Phase 2 report must be submitted to, and approved in writing by, the Local Planning Authority BEFORE proceeding to the next phase. If you have any

queries on this please contact your Planning Case Officer, who, where necessary, may forward you to the Councils Contaminated Land Officer.

Phase 3 Remediation

3.42 If Phase 2 identifies any unacceptable risks, then remedial design / action (Phase 3) will be required to mitigate those risks to an acceptably low level. The objective of any remediation measures implemented is to ensure that the finished development is 'suitable for its new use'. Remediation can take many forms (for example removal of the source, breaking a pathway or changing the nature of the receptor) and should be site specific, designed to ultimately achieve mitigation of the identified unacceptable risks. This phase corresponds to **b) Site Investigation, Risk Assessment and Remediation Strategy** part iii) of the typical standard planning condition.

3.43 A written Remediation Strategy document must be produced and submitted to the Local Planning Authority for written approval prior to commencement of any development or remediation work. Generic recommendations in a Site Investigation Report would not meet this requirement. The Strategy should be informed by, the site development proposals, any proposed changes to existing ground levels and the layout of buildings, roads and garden areas. (For small sites, a letter report outlining the method and validation requirements may be sufficient.) If necessary, clarity can be sought from the Contaminated Land officer.

3.44 If all the remediation details are not known at this stage, then an undertaking must be provided within the Remediation Strategy to submit these details to the Local Authority for approval in sufficient time prior to installation.

3.45 The Remediation Strategy shall, at a **minimum**, contain the following.

Statement of Remediation Objective(s)

3.46 The objective is ultimately to render the site suitable for its new use and to prevent unacceptable risk from pollution with respect to land contamination. This may be achieved by the application of one or more remediation techniques to sever identified significant risk pathways.

Options Appraisal

3.47 An options appraisal considers the advantages and disadvantages of different remediation techniques, to establish the best overall approach to remediate a site. It is important to ensure that the chosen remediation option is sustainable and that it breaks all the contaminant linkages that have been shown through the risk assessment to present unacceptable risks. A variety of remediation techniques may be required to address all the contaminant linkages on a site. Justification as to why a particular remediation technique has been chosen should be included in the Remediation Strategy. Often, due to the proposed development. The number of plausible remedial options is limited, perhaps to a single option. In such circumstances, LCRM advises that you can proceed directly to the preparation of the Remediation Strategy.

Remediation Strategy

3.48 A detailed explanation of the works to be undertaken must be laid out in the Remediation Strategy, along with the methods of the processes and installations to be used. This should include site plans and drawings indicating the areas to be remediated. The roles and responsibilities of the various parties involved in the implementation and verification of the remediation works should be identified. The findings of the site investigation(s), describing the nature and extent of the contamination found, which are to be addressed through the remedial works, should be included and reference made to the Conceptual Site Model to demonstrate how all the relevant contaminant linkages will be addressed. The Strategy should also address UXO as appropriate.

3.49 In cases of impacted soil materials, the anticipated depths and volumes of the impacted material involved; volume and quality of site-won material to be re-used on site; the source, volume and quality of any imported material; and any off-site waste disposal locations must be included in the Remediation Strategy as appropriate.

3.50 Mitigation measures may have to be incorporated within the development itself to protect future users from any potential contamination, for example gas protection systems, engineered clean cover systems and specific types/construction of potable

water pipes. All such requirements should be clearly detailed in the Remediation Strategy.

3.51 Details of the permits and consents/licences required for the remedial undertakings should be included in the Remediation Strategy for example waste management, mobile treatment, abstraction/discharge.

3.52 Due regard must also be paid to health and safety requirements; consideration should be given to dust, noise and odour controls and the control of any surface run-off from wheel washes, stockpiles etc.

Verification Plan

3.53 A Verification Plan must be included in the Remediation Strategy. It provides details of how the remediation works will be verified to demonstrate that they have been successful, and the objectives set out in the Remediation Strategy have been met.

3.54 Where remedial target criteria are required to state what levels of individual contaminants can remain on site without posing an unacceptable risk to identified receptors, the model used must be aligned to UK policy and appropriate for the site.

3.55 Details of soil verification samples, if required, must be included in the verification plan, including type, number/sampling rate and location. Independently accredited laboratories and analytical methods should be used (for example UKAS, MCERTS).

3.56 If a gas protection system is required, the Remediation Strategy shall explain how many points each component will provide in order to achieve the total gas protection score required in accordance with BS 8485:2015+A1:2019. Details of how the gas protection system will be installed and verified must also be included within the remediation strategy.

3.57 Where ground or surface waters are to be monitored, the number and locations of sampling points, frequency and duration of sampling and analytical parameters must be clearly stated. The Environment Agency may be involved when agreeing compliance and assessment points.

3.58 Some sites may require long term verification monitoring and management, for example long term groundwater, surface water or gas monitoring. The details and timescales for achieving the remediation objectives must be clearly stated in the Remediation Strategy, together with a schedule of interim reports to provide an assessment of the progress including interim verification criteria.

Contingency Plan for Unsuspected Contamination

3.59 Contingency measures will be required if remediation is unsuccessful or if unexpected contamination is found during the works. The Remediation Strategy should include a Discovery Strategy and an undertaking detailing that if such circumstances arise, written details of the further works required and the timescale for implementation will be submitted to the Local Planning Authority. On encountering any unforeseen contamination, a record should be made, appropriate action determined (and recorded) by appropriately competent persons and the Local Planning Authority notified. In the event the scale / nature of the contamination is such that the measures in the Remediation Strategy are inadequate, the Local Authority should be consulted, and appropriate measures agreed before remedial action is undertaken.

Phase 4 Verification

3.60 Phase 4, Verification (or validation), is undertaken in parallel with and/or following remediation. The purpose is to determine the success, or otherwise, of the remediation works and identify whether any further remediation or risk management measures are necessary. Verification that the remediation measures have been implemented as planned and are effective is a critical step in ensuring that the site is suitable for its intended new use.

3.61 This phase of investigation corresponds to part **g) Completion of Remediation and Verification Report** of the typical standard planning condition for Potential Land Contamination and, in typical cases, successful compliance with this final part of the condition enables full discharge of the condition.

3.62 The verification works should be undertaken in accordance with the Verification Plan, previously prepared and agreed with the LPA. A suitably qualified, competent person is required to carry out the verification process. Good records must be kept

throughout the remediation and verification works in order to achieve final compliance with the condition.

3.63 On completion of the remediation and verification works a written Verification Report must be prepared submitted to the LPA for written approval. Responsibility rests with the developer/applicant to submit the written Verification Report to the LPA to complete the process and discharge the relevant planning condition PRIOR TO occupation of any part of the site by any end user.

3.64 The report will describe all remediation measures implemented and verify the successful application of those measures as previously agreed with the LPA. Evidence is required to demonstrate that the remediation objectives have been achieved and to confirm all statements made. Evidence may be in the form of photographs, transfer documents, laboratory test results etc. Supporting evidence and raw data should be submitted as appendices to the report and be provided in an organised, legible condition. Interpretation of the evidence shall be presented in the main body of the report.

3.65 Where the site's remediation criteria have not been met details of the contingency work must be included, these might comprise further detailed quantitative risk assessment, additional remediation works or other mitigation measures etc. Discussions should be held with the LPA as soon as possible once it is known that the remediation works have not met the targets, to agree the extent of work required to make the site suitable for its intended use.

3.66 Where a phased occupation of a development is sought and the phasing of the Verification Report(s), this must be previously agreed by the LPA in writing.

3.67 The Verification Report should be prepared in accordance with the relevant guidance and must include the following:

- Statement of the verification objectives
- Detailed description of the works (supported by drawings, site diaries, photographs etc)
- Description of unsuspected contamination encountered and actions taken.

- Details and justifications of any deviation from the agreed Remediation Strategy
- Verification data (verification samples, locations and testing results etc),
- Comparison and interpretation with agreed remediation criteria,
- Details of capping/site won material/imported topsoil, including volumes and test results,
- Verification of gas protection system (if applicable),
- Monitoring results for groundwater and gases,
- Evidence of appropriate drinking water pipe installation,

3.68 The report must conclude whether the remediation objectives have been met, all contaminant linkages have been broken or effectively controlled and whether the site is suitable for its intended use.

4 Uncertainty

4.1 The risk assessment process gauges the likelihood and potential severity of harm to a reasonable degree of confidence. It is understood that any investigation is unlikely to identify all contamination, environmental constraints or liabilities associated with a site, and a risk assessment is based on applying reasonable effort, skill and diligence in the execution of the investigation and assessment process.

4.2 Throughout the process, it is essential to identify all uncertainties and limitations, and recognise possible consequences of these to gauge the reliability and robustness of the findings.

4.3 Data collection from intrusive site investigation, sampling, analysis and the use of models or other tools to estimate risk will have limitations and result in uncertainty.

4.4 At each stage of the process, it may be necessary to reduce or clarify some uncertainties. For example:

- Carry out an exploratory, detailed or supplementary investigation
- define identified contaminant sources in more detail
- undertake model calibration, derive statistical confidence limits and a sensitivity analysis
- consider treatability studies or pilot trials

5 Discharge of Planning Conditions

5.1 To achieve compliance with and discharge of land contamination conditions the Local Planning Authority must be satisfied, at all the relevant stages, that adequate reports have been submitted to demonstrate that the development is suitable for its new use. Failure to appropriately resolve planning conditions can lead to delays in the construction, sale and use of developments.

5.2 Application for confirmation of compliance must be made through the LPA (a fee is payable)¹⁶. All specified reports and supporting evidence must be submitted with the application for consideration. Depending on the land contamination condition included in the grant of planning, application for discharge may be required at several stages (as laid out in the condition) of the process, for example actions required pre-commencement of construction and pre-occupation of the development.

¹⁶ elmsbridge.gov.uk/planning/planning-permission-and-applications/planning-applications-developers-and-businesses-0

6 Sustainable Approach

6.1 We support a sustainable approach to land contamination risk management and this should be considered from the outset.

6.2 Sustainable remediation, which optimises the use of resources and avoids the waste of materials and energy, is encouraged. The appropriate and rational use of detailed quantitative risk assessment can help to ensure that remediation takes place only where it is necessary.

6.3 Key to a sustainable approach is the appropriate use and good design tailored to the condition of the land, which will minimise the necessity to remediate using unsustainable means, for example removal of excessive impacted soils and import of new soils.

6.4 The industry-led Sustainable Remediation Forum UK (SuRF-UK) has produced a framework for assessing the sustainability of soil and groundwater remediation.

6.5 Find more information on SuRF-UK on the CL:AIRE website.

6.6 You can also use BS ISO 18504: Soil quality – sustainable remediation

7 Quality

7.1 All reports undertaken for the purpose of land contamination risk management must be completed by a suitably qualified, “competent” person. A competent person being someone ‘with a recognised relevant qualification, sufficient experience in dealing with the type(s) of pollution or land instability, and membership of a relevant professional organisation.’

7.2 This might include:

- a Suitably Qualified Person (SQP) registered under the NQMS
- a risk assessor registered under the Society of Brownfield Risk Assessment (SoBRA) accreditation scheme
- a registered Specialist in Land Contamination (SiLC)
- chartered membership of a professional organisation relevant to land contamination
- a specialist in the gas protection verification accreditation scheme (GPVS)
- a proven track record of dealing with land contamination, who regularly deals with the technical aspects of land contamination.

7.3 We support the use of the National Quality Mark Scheme (NQMS). For further information visit claire.co.uk/projects-and-initiatives/nqms

7.4 Inadequate work or work not undertaken by a competent person will not be accepted and will likely lead to delays in discharge of planning conditions and the completion of the development.

References

A useful source of references can be found within Land Contamination Risk Management, Environment Agency, 2021, which is available on the GOV.UK website [gov.uk/government/collections/land-contamination-technical-guidance](https://www.gov.uk/government/collections/land-contamination-technical-guidance). At the time of writing this guidance, the following references were appropriate. They may have been superseded since then and the Developer should check for current relevant guidance. **Please note that this list is not exclusive or exhaustive.**

- National Planning Policy Framework, Ministry of Housing, Communities and Local Government, 2021.
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- CIRIA C773: A Guide to Small Brownfield Sites and Land Contamination, Construction Industry Research and Information Association CIRIA, 2018.
- CIRIA C552: Contaminated Land Risk Assessment: A Guide to Good Practice, Construction Industry Research and Information Association (2001).
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- CIRIA 665: Assessing Risks Posed by Hazardous Ground Gases to Buildings, CIRIA, 2007.
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- Report Edition Number 4. Guidance on Evaluation of Development Proposals where Methane and Carbon Dioxide are Present, NHBC, 2007.
- A Pragmatic Approach to Ground Gas Risk Assessment, CL:AIRE Research Bulletin 17, November 2012.
- BS8485:2015 + A1:2019 Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings, British Standards Institute, 2015.
- BS 8576:2013: Guidance on Investigations for Ground Gas – Permanent Gases and Volatile Organic Compounds (VOCs), British Standards Institution, 2013.
- Hazardous ground gas – an essential guide for householders, NHBC Foundation, NF94, April 2023

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- The Water Framework Directive (Standards and Classification) Directions (England and Wales), “Environmental Quality Standards (EQS),” 2015.
- UK Drinking Water Inspectorate, “UK Drinking Water Standards (UK DWS),” 2000.
- World Health Organisation, Guidelines for drinking water quality, 2017.
- Development of Generic Assessment Criteria for Assessing Vapour Risks to Human Health from Volatile Contaminants in Groundwater, Version 1.0, SoBRA, 2017.
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- Control of Asbestos Regulations 2012: Interpretation for Managing and Working with Asbestos in Soil and Construction & Demolition Materials, Industry guidance (CAR-SOIL), Joint Industry Working Group (JIWG), CL:AIRE, 2016.
- CIRIA C733: Asbestos in Soil and Made Ground: A Guide to Understanding and Managing Risks, Construction Industry Research and Information Association CIRIA, 2014.
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Appendix A Example Conditions

Example Standard Full Condition

Potential Land Contamination

To ensure the potential for contamination has been investigated and the necessary action taken to make the development site suitable for its proposed use, the following steps must be completed to the satisfaction of the Council. No demolition or construction shall be commenced until step (a) has been completed by a competent person and been submitted to, and approved in writing by, the local planning authority. If step (a) identifies the need for step (b) then this shall also be completed and approved before any demolition or construction commences. There shall be no occupation of any part of the site by any end user prior to meeting the terms of this condition in full.

a) Preliminary Investigation of the Site

A preliminary investigation (often called a desk study) shall be carried out by a competent person prior to any site clearance or demolition, to assess the condition of the land to be re-developed, with respect to contamination. The preliminary investigation must, as a minimum, include a detailed site history, site walkover, desk-based evaluation and the initial description of a Conceptual Site Model. It may include some sampling / testing. A written report of the investigation shall be submitted to the Council for written approval.

If the Council are satisfied that there is a significant possibility that the site could pose a significant risk to future occupiers under its proposed redevelopment use as a result of contamination, then the following additional steps shall also be carried out.

b) Ground Investigation, Risk Assessment and Remediation Strategy

(i) A written site-specific investigation plan using the information obtained from the preliminary investigation, providing details of the investigation for soil, gas and controlled waters where appropriate, shall be submitted to, and approved in writing by, the Council. The investigation should be designed to provide sufficient,

appropriate, and reliable information to enable assessment of the risk to all identified receptors that may be affected, including those off site.

(ii) The site investigation shall be undertaken in accordance with the scheme agreed by the Council. A report presenting; the results of the site investigation, a risk assessment of any contamination found and refined Conceptual Site Model and quantitative risk assessment shall be submitted in writing to, and approved by, the Council.

(iii) A written Remediation Strategy, including an options appraisal (if appropriate) and a Verification Plan shall be prepared. This will detail site-specific remediation measures required, how they will be undertaken and how successful implementation of these requirements will be verified. The report shall be submitted in writing to, and approved by, the Council.

Where applicable, the Remediation Strategy shall include details of how redundant boreholes, installed for investigative purposes, are to be decommissioned and how any boreholes that need to be retained, post-development, for monitoring purposes will be secured, protected and inspected.

c) Development in accordance with the Remediation Strategy

The development of the site shall be carried out in accordance with the approved Remediation Strategy, and any proposed addenda shall be submitted in writing to, and approved by, the Council prior to implementation of the amended scheme. Any post remediation monitoring identified in the Remediation Strategy, shall be installed by the developer within the timescales identified in the Remediation Strategy and maintained and operated for as long as identified by the Remediation Strategy.

d) Previously Unsuspected Contamination

If, during development, contamination not previously identified, is found to be present at the site then no further development of the relevant area(s) shall be carried out until the developer has submitted, and had approved in writing by the Council, a written remediation strategy (or addendum to) detailing how the unsuspected contamination shall be dealt with and any resulting post remediation monitoring.

e) Piling

This condition seeks to ensure that the proposed foundations do not create risks, for example through mobilisation of contamination and/or creation of preferential pathways. Development approved by this permission shall not commence unless a Foundation Works Risk Assessment[Ref XXX] for piling foundations (if piling and/or other foundation techniques using penetrative methods is to be used on site) has been submitted to, and agreed in writing, by the Council. The piling shall be undertaken only in accordance with the method outlined in the approved Foundation Works Risk Assessment.

f) Imported material

NOTE any import of material must comply with current waste permitting regulations

Clean, uncontaminated rock, soil, brick rubble, crushed concrete or ceramic only shall be permitted as infill material. Imported materials should be sourced from authorised facilities and comply with relevant permits, exemptions, quality protocols or quality soil frameworks. The developer shall not import any material until a sampling program, including appropriate import criteria for the proposed end use and frequency of sampling, has been submitted to, and approved in writing by, the Council. The developer shall carry out the approved sampling program to check that all imported material conforms to the agreed criteria. Where the permitted end use is residential, the sampling program shall also include samples taken from the imported material after final placement. Written confirmation of the suitability of all imported materials shall be provided to the Council as part of step (g). This shall include both the results of the sampling program and also details of the origin, transport, final deposition and any temporary stockpiling of the imported materials. If imported materials do not meet the agreed quality or are not suitable for the intended use, the developer must remove these materials from the development site. Materials used inappropriately on this site may be subject to relevant taxes, payable by all involved parties.

g) Completion of Remediation and Verification Report

Verification by an independent, competent person must be carried out prior to occupation of any part of the site by any end user.

Upon completion of the remediation measures detailed in the approved Remediation Strategy, and any addenda thereto, and before the development being brought into use or occupation of any part of the site by any end user, a written Verification Report shall be submitted to, and agreed in writing by, the Council demonstrating the completion of works as set out in the approved Remediation Strategy and verifying the effectiveness of that remediation in accordance with the agreed Verification Plan, and confirming installation of any post remediation monitoring. The Verification Report shall also provide confirmation, with appropriate evidence where applicable, that all remaining terms of this condition have been met.

Example Ground Gas Migration Condition

Potential for Ground Gas Migration

Prior to commencing any development on site, the developer must either demonstrate the building footprint is not at risk from ground gas migration through a site-specific Preliminary Risk Assessment or the following additional steps shall be undertaken in accordance with current best practice guidance:

- (i) Appropriately designed and implemented programme of investigation, monitoring and gas risk assessment should be carried out by a competent person(s). This will determine the presence and resulting risk posed by any ground gas on site with the potential to impact sensitive receptors on and off-site. The investigation and monitoring must comply with current relevant guidance [Ref BS and NHBC] and reflect the risk of the gas regime and the sensitivity of site's proposed use. The results of the investigation and risk assessment shall be submitted to and approved by the Local Planning Authority; and
- (ii) If ground gas is found to present unacceptable risks, a detailed site-specific scheme of risk management measures shall be designed and submitted in writing to the Local Planning Authority for written approval.

Prior to occupation, the developer must:

- (iii) Install the approved risk management measures using a suitably qualified, competent person in accordance with current good practice guidance.

(iv) Verify the successful installation of the approved risk management measures using a suitably qualified, competent person in accordance with current best practice guidance. A Verification report, providing evidence that the risk management measures have been installed in compliance with the agreed scheme and verifying the effectiveness of those measures, shall be submitted in writing to the Council for written approval prior to occupation of any part of the site.

Appendix B Supplementary Information

Appendix B1 Ground Gas Migration

There are numerous sources of ground gases (permanent gases and soil vapours) derived from both natural and human activities. Buried organic matter has the potential to generate methane and carbon dioxide, so sites located in the vicinity of landfill sites may be at risk from ground or landfill gases. Where there is a reasonable probability that risk from ground gas migration could exist, this must be considered. EBC looks for a site specific, proportionate and reasonable approach in line with BS8485:2015+A1:2019 Code of Practice and NHBC 2023.

A Phase 1 Preliminary Risk Assessment should be conducted prior to intrusive investigation to consult all reasonably available records and documents to establish whether a realistic source of ground gas exists with the potential for migration and inform any intrusive investigation and sampling strategy.

The investigation design should be site specific and employ the most appropriate scientific approach for the development, to ensure the data obtained accurately characterises the local ground gas regime and risks to receptors. It is necessary to understand both how the ground gas regime will impact the proposed development and how the proposed development will impact the existing ground gas regime potentially affecting existing neighbouring receptors. The requirements in terms of site investigation for ground gas migration can be costly and lengthy, therefore it is vital that this aspect of a development is addressed at the outset and options discussed with LPA to prevent significant delays in the final delivery of the development/compliance with condition.

If a gas protection system is required, a written Remediation Strategy (with Verification Plan) is required to be submitted to the LPA for written approval prior to installation. The Strategy will provide detailed design of a gas protection system that achieves the total gas protection score calculated and required for the development based on the findings of the investigation and the development design, as set out in BS 8485:2015+A1:2019. The gas protection system must include more than one design element to provide redundancy should part of the system fail. The gas

protection system must be installed appropriately and details of how the gas protection system will be installed, the installer and verified as effective must also be included within the Remediation Strategy and Verification Plan.

Verification of the appropriate, effective installation of the gas protection system must be undertaken by an independent, suitably qualified person. A written Verification Report providing robust evidence of the correct installation of the gas protection system must be submitted to, and approved in writing by, the Local Planning Authority PRIOR TO occupation of any part of the site by any end user, to verify compliance and provide confidence that future residents will be adequately protected.

Further guidance on all the specific details required to be submitted can be found in References.

Appendix B2 Asbestos Containing Materials and Asbestos in Soil

The possibility that asbestos containing materials and free fibres may be present in a soil or fill material must always be considered. Free fibres of asbestos cannot be seen, so the absence of visible asbestos containing material (ACM) does not necessarily mean that asbestos is not present in the soil.

Sampling for asbestos is required, on all sites where a potential contaminant linkage has been identified. Any laboratory undertaking asbestos identification must be UKAS accredited. If asbestos is qualitatively identified as present, the asbestos type(s) must be identified and quantified individually in mg/kg. Additional information may be required to support a risk assessment.

If asbestos has been identified as a contaminant of concern, the requirements of the Control of Asbestos Regulations (CAR) 2012 must be fully complied with. The Joint Industry Working Group (JIWG) has produced guidance, CAR-SOIL™ (CL:AIRE, 2016) to assist when working with asbestos contaminated soils (see claire.co.uk/projects-and-initiatives/asbestos-in-soil). Guidance is also available in CIRIA document C733 Asbestos in Soil and Made Ground: A Guide to Understanding and Managing Risks (2014).

Asbestos poses a health risk to people when it is airborne and the fibres inhaled. Currently there are no agreed air quality guidelines to assess potential risks from exposure to soils by the general population or agreed good practice for the assessment of risks from asbestos in soil, which may be released to the air and subsequently inhaled. However, in some circumstances, quantitative risk assessment based on realistic worst-case scenario may be an option. This should be undertaken utilising a rigorous, scientific approach. Guidance in undertaking asbestos in soil human health risk assessments to assist suitably qualified and experienced risk assessors is available, including the SoBRA Asbestos Air Guidelines White Paper¹⁷ and Asbestos in Soil Human Health Risk Assessment Toolbox ¹⁸, see sobra.org.uk/resources/reports/

Any mitigation measures required to prevent exposure of current and future receptors to asbestos contamination in soils must be clearly detailed in the Remediation Strategy, together with how evidence of the successful implementation of these measures will be gathered in the Verification Plan. If asbestos containing material is to be retained on site and encapsulated beneath buildings or cover systems, this should also be recorded in the site maintenance and management plan.

A written Verification Report providing evidence of the successful implementation of these mitigation measures must be submitted to, and approved in writing by, the Local Planning Authority PRIOR TO occupation of any part of the site by any end user.

Appendix B3 Waste Material Reuse/Import/Removal

All wastes need to be properly handled and disposed of whilst ensuring strict compliance with all relevant waste management legislation. If soil materials are to be re-used on site, then there will need to be an Environmental Permit in place or an Exemption. Alternatively, there will need to be a Materials Management Plan

¹⁷ Discussion Paper on Guidelines for Airborne Concentrations of Asbestos Fibres in Ambient Air: Implications for Quantitative Risk Assessment, The Society of Brownfield Risk Assessment (SoBRA) White Paper, Updated January 2021

¹⁸ SoBRA Asbestos in Soil Human health Risk Assessment (AiSHHRA) Toolbox, The Society of Brownfield Risk Assessment (SoBRA) asbestos sub-group, December 2021

approved by a Qualified Person in accordance with the CL:AIRE Definition of Waste: Development Industry Code of Practice (DoWCoP).¹⁹

Any wastes removed from site should be properly loaded onto vehicles operating with an appropriate and valid waste carriers' licence and transported to licensed/permitted facilities. Imported materials should be sourced from authorised facilities and comply with relevant permits, exemptions, quality protocols or quality soil frameworks. All details should be documented and reported with verification reporting.

Materials illegally deposited at inappropriate sites or used inappropriately on a site may be subject to relevant taxes, payable by all involved parties. Only robust due diligence is a defence against joint liability. HMRC may pursue any evasion of landfill tax for up to several years after the event. The Environment Agency and Surrey County Council may pursue any breaches of waste management legislation. Materials records and contact documents must therefore be maintained for inspection and audit by enforcing authorities for relevant time periods after the works are completed.

Appendix B4 Cover Systems and Imported Materials

There are two broad categories of cover system available for use in the remediation of contaminated land:

- Engineered cover systems: Designed to provide the complete separation of the receptor from the source. They perform a number of functions including limiting upward migration of contaminants and controlling the downward infiltration of water.
- Simple cover systems: Designed to provide a reduction of risk to human health, and to provide a suitable medium for plant growth.

A simple cover system alone is not considered sufficiently durable for the long-term reduction of risk for the protection of human health. The Council will always seek a complete prevention of exposure in any cover system design. Therefore, the second

¹⁹ claire.co.uk/projects-and-initiatives/dow-cop

system is only accepted as a clean cover layer in cases where ground contamination has been excavated and removed or was not present (i.e., it was installed for purposes other than the protection of human health, such as landscaping).

The Council encourages the characterisation and delineation of contamination through sampling and chemical testing, before deciding that a cover system is the appropriate form of remediation. Where a cover or containment system is selected as an appropriate remediation measure, its design must be agreed with the LPA in the Remediation Strategy and should include at a **minimum**:

- Purpose of the cover system;
- Whether impacted material will be excavated and removed prior to installation of the cover system and if so the extent of excavation;
- Design of the component layers describing nature and purpose;
- Thickness of component layers;
- Any other separation layers for example geotextile membrane, capillary break layer, hard to dig barrier or visual warning/marker membrane (Note, if a geotextile separator is to be used as a visual warning between contaminated made ground and the suitable for use cover system, it must be highly visible and should be a bright colour);
- Description of source and quality of materials to be imported/used;
- Import and re-use criteria; and
- What evidence will be obtained to verify the successful installation and performance of the system, ensuring the site is 'suitable for its intended use'.

As a rule, the **minimum** standard adopted by the Council for cover system depth on sites including gardens is 600mm (minimum 150mm topsoil). However, site specific circumstances will dictate the actual requirements of the cover system. As a rule, where the development does not include private garden areas, or areas where vegetable growth will not be possible, then a minimum cover system layer of 450mm may be applied. Careful consideration should be given to the how the site is to be used. Cover systems may need to be deeper/thicker in areas where, for example, trees are proposed. In addition, where garden activities involve digging at depth, for example, to install a pond, consideration should be given to the appropriateness of the cover and its durability.

Materials for the cover systems can either be sourced from site-won material or imported from external sources. The Council promotes the use of site-won material, where determined to be suitable for its intended use, as it provides the more sustainable approach. For all material used in the development, regardless of whether it forms part of a remediation scheme or to be used in other situations, for example landscaping or flood prevention, it is imperative to ensure that the material is 'suitable for its intended use', inert and does not contain unacceptable levels of contamination.

A written Verification Report providing evidence of the successful installation of the cover system must be submitted to, and approved in writing by, the Local Planning Authority **PRIOR TO** occupation of any part of the site by any end user. Detailed guidance is available. A suitably qualified, competent person is required to carry out the verification process and prepare the Verification Report. The following points describe the **minimum** evidence required in undertaking the verification works to confirm appropriate installation of a cover system and the suitability for use of imported materials.

- The competent person must visit the site during and after the remediation process to observe and check the process is in line with the agreed Strategy and keep a record of observations onsite.
- A visual inspection of imported soil material should be made on delivery to the site to ensure it visually compares with that described on the supplier's test report. Material should be free from obvious contamination, invasive or injurious plants, not odorous, free from unsuitable materials for example bricks, tiles, timber glass, no visible signs of asbestos containing materials.
- All imported capping materials (including manufactured soils) must possess a copy of the supplier's routine chemical test certificate(s), chain of custody and the delivery tickets to site. These should be included in the remediation Verification Report. All test certificates should be current, not more than three months old, and representative of the material actually being used on site.

- Transfer documents and disposal locations for material taken offsite should be obtained and included in the Verification Report. In large scale developments where large volumes of material are removed, it may be pragmatic to provide a sample of transfer documents.
- The depth and horizontal extent of any excavations for removal of contaminated soils must be verified as in accordance with the Strategy design. Photographs must include a tape or staff clearly showing the hole depth. Locations should be included on a site plan. Samples should be taken from the faces of the excavation for testing to ensure sufficient contaminated material has been removed.
- Samples of all imported materials should be collected by a suitably qualified and experienced environmental consultant. It is recommended that samples are collected from the stockpile(s) of imported material prior to its placement to reduce the possibility of having to remove unsuitable material once placed and introducing cross contamination.
- Sampling of surface/near surface soils, including clean cover systems, is required in-situ after placement for vulnerable and sensitive end use, for example residential use.
- Chemical validation of imported soils should be undertaken at a rate of:
 - ❖ 1 test per 100 m³ for topsoil and subsoils, increasing to a rate of 1 per 50 m³ for brownfield, remediated or unknown source, where there is poor confidence in the quality. A **minimum** of 3 samples per batch and type.
 - ❖ 1 test per 250 m³ fill soil materials. A **minimum** of 3 samples per batch and type.
 - ❖ 1 test per 500m³ of recycled aggregate engineering fill (e.g. Type 1/6F5/6F2 etc). A **minimum** of 2 samples per batch and type.
 - ❖ 1 test per 1000m³ or 2 per source for aggregate from natural sources, e.g. virgin quarried material (for metals/metalloids and asbestos).

- In-situ sampling frequency and testing requirements for the clean cover system should be identified in the Verification Plan. The rate of sampling may be dependent on the origin of the material, for example virgin, manufactured or recycled, and confidence in its quality. The following frequency of testing is required:

Frequency testing rate for chemical analysis of capping materials for each separate soil source used (NHBC recommendation for soil capping systems²⁰)

Site Size	Nominal Sampling Frequency (Subject to minimum totals)	Minimal total number of tests per site of each material used within the capping layer
1 to 5 plots	1 test per plot	3
6 to 20 plots	1 test per 2 plots	5
21 to 30 plots	1 test per 3 plots	7
Over 30 plots	1 test per 4 plots	10

Materials recycled from demolition or skip waste is not recommended for use due to the high level of uncertainty with regards to the presence of contaminants and poor confidence that the materials will be suitable for their intended use or achieve betterment of the soils environment objective.

- Import acceptance criteria should be submitted in the Remediation Strategy detailing the maximum contaminant concentrations accepted for the site for metals/metalloids, PAH, asbestos and any other key contaminants of concern. Where material is imported from brownfield sources TPH (CWG banded) and any additional analysis dependant on the history (or lack of) of the donor site is required. Ideally, the objective of any remediation should be the betterment of the soils environment and therefore concentrations lower than the selected Generic Assessment Criteria (GAC), for example Category 4 Screening Levels (C4SLs) / Suitable for use levels (S4ULs), are recommended for use.
- Asbestos Containing Materials (ACMs) are not permitted in a clean cover system. Soil analysis must achieve below the accepted analytical method detection limit levels for asbestos, i.e. not detected.

²⁰ NHBC Technical Extra Guidance Issue 8, November 2012, Verification of cover systems – testing criteria for subsoil and topsoil

- Independently accredited laboratories and analytical methods must be used (for example UKAS, MCERTS) for analysis of all soil samples. All laboratory test results should be submitted with the Verification report.
- Verification of the design and thickness of the clean cover system, typically via trial pit with photographs and logs. Photographs must include a tape or staff clearly showing the hole depth. Locations should be included on a site plan. Typical inspection frequency accepted:

Frequency testing rate for thickness of capping materials
(NHBC requirements for soil capping systems)

Number of Plots	Inspection frequency
1 to 5	Each plot
6 to 20	1 in 2
20 to 30	1 in 3
Over 30	1 in 4

- The Verification report must include a photographic evidence record, at a minimum containing:
 - ❖ Stockpiles and quarantined areas.
 - ❖ Depth and extent of excavations (with appropriate tape/depth measurements).
 - ❖ Depth of cover system (with appropriate tape/depth measurements) and presence of required component layers, trial pit logs should also be included.
 - ❖ Presence of marker, break and/or barrier components of the design, for example geotextile separator providing visual warning between contaminated made ground and suitable for use cover system.
 - ❖ Completed project.

Photographs should include site identification boards with the date, site name, position taken and scale (where appropriate).

- The Verification Report should include any measures required to maintain the cover system integrity in the future.

In some extreme cases, informatives can be added on to the deeds or the lease of the new build to advise owners/occupiers of the potential risk of breaching a cover system. However, the Council strongly discourages such an approach, as the principle of 'suitable for use' can be questioned in such circumstances.

Appendix B5 Landscaping Considerations

Contaminated land issues should be referenced in any landscaping plan (and landscaping in the Remediation Strategy). Landscaping is usually done after placement of the imported soils and therefore the landscapers have the potential to compromise the integrity of the capping layer in the tree pits and generally across the soft landscaping (by reusing the arisings elsewhere at the site) and creating both health and safety issues for themselves and waste management issues in terms of disposal of arisings.

The subsoils/ topsoils imported to form all the landscaping and cover systems should be clean, inert soil from a known and reputable source. Any imported topsoil needs to conform to British Standard BS3882:2015²¹ as well as chemical standards, and subsoils should conform to the British Standard for subsoils, BS 8601:2013.²² Topsoil is an important component of gardens where it provides the function of supporting the growth of vegetation. The British Standard on topsoil specification stipulates that a minimum rooting depth of 450mm should be provided for grassed landscaping, 600mm for shrubs and 900mm for trees.

NOTE this guidance does not cover geotechnical suitability of soil/materials, importing soils containing invasive species or chemical suitability not directly related to human health, for example sulphates. However, it is recommended that these factors are considered in any development and appropriate guidance sought.

Appendix B6 Piling

Piling and penetrative ground improvement methods have the potential to produce adverse environmental impacts when utilized on land affected by contamination, in particular potential for pollution of groundwater. It can result in risks to potable supplies from, for example, pollution/turbidity, risk of mobilising contamination,

²¹ BS3881:2015 – Specification for Topsoil

²² BS8601:2013 – Specification for Subsoil

drilling through different aquifers and creating preferential pathways. The Environment Agency have published technical guidance regarding the assessment of risks associated with, and preventing pollution from, piling and penetrative ground improvement methods that outlines a process to allow designers to select an appropriate piling method and any mitigation and monitoring measures required.²³ A foundation works risk assessment prepared in accordance with this technical guidance may be required where land contamination has been identified and piling or penetrating foundation methods have been selected. The risk assessment must be submitted to, and approved in writing by, the LPA prior to commencement. The development shall be carried out in accordance with the approved details.

Appendix B7 Potable Water Supply

Where land is affected by contamination (either potential or proven) or ground conditions are unsuitable for underground services, protection of those services should be considered to prevent introducing a complete contaminant pathway. With respect to potable water, an assessment of risk must be undertaken in line with current guidance^{24, 25} and, where necessary, adequate mitigation measures installed for the protection of the supply. Confirmation that the action taken is appropriate should be sought from the utility supplier. Evidence that these actions have been taken must be submitted to the LPA in order to achieve confirmation of compliance.

Appendix B8 Poly- and Perfluorinated Alkyl Substances (PFAS)

PFAS are a large, complex group of manufactured organofluorine chemicals that have been widely used in numerous, various everyday products since the 1940's. They have a very wide range of consumer and industrial applications, for example, they are used as non-stick packaging and cookware, water resistant clothing and carpets resistant to stains, and create firefighting foam that is more effective. PFAS are used in industries such as aerospace, automotive, construction, and electronics. These chemicals do not degrade easily in the environment and persist for an

²³ Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention, Environment Agency, 2001, NC/99/73

²⁴ Guidance for the selection of water supply pipes to be used in brownfield sites, UKWIR, 2010

²⁵ New water supply connection, Thames Water, 2015 (or appropriate local supplier)

unknown period of time, because of which they have been referred to as 'forever chemicals'.

Where the site history identifies the possibility of use or potential release of these substances on a site, or a vulnerable receptor exists or will be introduced as a result of a proposed development, then sampling and laboratory analysis for these substances should be included in the site investigation.