

Land Contamination: A Guide for Developers



**This guidance is the result of work jointly carried out by the
Welsh Local Government Association, Welsh Assembly Government
& Environment Agency
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CONTEXT

The Production of this Guidance has been prepared as a reference document for Developers and their advisers who may be involved in the assessment and management of land contamination. It details the type of information required by the Local Planning Authority (LPA) in order for them to assess an application for planning permission on brownfield land, in particular, where contamination may be present. The Guidance represents the culmination of an extensive co-operative effort involving the Welsh Local Government Association, Welsh Assembly Government and Environment Agency.

Land contamination has the potential to cause significant harm to ecosystems, humans, property and pollution of controlled waters (including groundwater, lakes, ponds, coastal waters and surface watercourses) because of the presence of particular substances in, on, or under the ground.

In undertaking the development of brownfield land, it is important to ensure that all risks associated with potential land contamination have been addressed so that the land is suitable for use.

The UK policy for the control and treatment of existing contamination is based on the suitable for use principle. This means land contamination is treated to deal with unacceptable actual or perceived threats to health, safety or the environment, taking account of the actual or intended use of the site and where practical, such land should be brought back into beneficial use.

Failure to provide adequate supporting information with the planning application may result in significant delays in the planning process or planning permission being refused by the LPA.

THE LOCAL AUTHORITY'S ROLE

Government guidance recognises that 'land affected by contamination' is a fundamental planning consideration and that the development phase is the most pragmatic and cost-effective time to deal with the problem.

Planning legislation and guidance places the responsibility on owners and developers to determine the extent of any contamination on their site. The LPA's duty is to ensure that owners and developers carry out the necessary investigations and proposals for dealing with any land contamination in a responsible and effective manner.

Local Authorities are in the process of identifying potentially contaminated sites in their areas as part of their inspection strategies, which they had a duty to produce under Part IIA of the Environmental Protection Act 1990. Where significant risks of contamination are found upon subsequent inspection, then the local authority must take steps to remove or reduce the risk to statutory receptors, such as people and the environment. Copies of individual local authority strategies are available on request.

Any development site that is not remediated to an appropriate standard may be inspected and subsequently determined by the local authority as Contaminated Land under Part IIA of the Environmental Protection Act 1990.

INTRODUCTION

This guidance follows a risk-based framework, in line with the Model Procedures for the Management of Land Contamination CLR 11(Defra & Environment Agency 2004) document.

A brief description of each key activity stage is provided below and checklists to help determine if the reporting requirements have been met at each stage are appended.

STAGE 1 - RISK ASSESSMENT

Phase 1: Preliminary Risk Assessment (Desk Study)

See checklist 1

Risk assessment is an iterative process, which should be carried out within a tiered framework. Hence it may become necessary to revise assumptions made in the early stages of the assessment as more information becomes available about the site (see Box 1).

Box 1	<u>RISK ASSESSMENT</u>
Each tier of the risk assessment process should follow these four basic steps:	
1) Hazard Identification -	establishing potential contaminant sources
2) Hazard Assessment -	analysing the potential for unacceptable risks (what receptors and pathways could be present, what pollutant linkages could result and what the effects could be)
3) Risk Estimation -	predicting the magnitude and probability of the possible consequences (what degree of harm or pollution might result to what receptors and how likely it is) that may arise as a result of a hazard
4) Risk Evaluation -	deciding whether a risk is unacceptable

The purpose of the **preliminary risk assessment** is to develop an outline conceptual model (see Box 2) and establish whether or not there are any potentially unacceptable risks to human health, ecosystems, property or controlled waters, arising from potential contamination at the site.

The main activity at this stage is the collection of information required to identify all possible pollutant linkages at the site and prepare the outline conceptual model. This stage is often referred to as the 'desk study', although a site walkover survey may also be undertaken to verify data and obtain additional information such as anecdotal evidence from employees etc.

A list of potentially contaminative uses has been produced by the former Department of Environment and is presented within the CLR8 document 'Potential Contaminants for

the Assessment of Land'. The list is not exhaustive but may prove useful in designing site investigations, assessing risks and remediation requirements. Some examples of potentially contaminative uses include petrol stations, factories, colliery spoil tips, gasworks, coke works and railway land.

Planning policy and advice in Wales requires a precautionary approach to be adopted when considering the development of land. This is particularly important where the end uses being considered are sensitive to contamination, e.g. housing, schools, hospitals and children's play areas.

The Assembly Government's Policy and Advice is contained within Planning Policy Wales, March 2002, and Welsh Office Circular 22/87. In the absence of a contaminated land Technical Advice Note (TAN) in Wales, further information can be found within Planning Policy Statement (PPS) 23 'Planning and Pollution Control', issued by the Office of the Deputy Prime Minister.

A **preliminary risk assessment** is the minimum submission required for a planning application for redevelopment on a brownfield site where land contamination may be present. The preliminary risk assessment may include some site investigation or monitoring data collected to help outline the need or otherwise of a quantitative risk assessment.

The LPA will need to have enough information to be confident that the site can be reasonably remediated before planning permission is granted. Pre-planning discussions with the LPA is considered good practice and encouraged in order to provide advice to applicants on the minimum requirements for each site, which will be specific to the conceptual model.

Box 2

CONCEPTUAL MODEL

The conceptual model is a representation of the three-dimensional site characteristics and interaction with the surrounding environment, which identifies all possible **receptors**, potential **contamination** and contaminant migration **pathways**, and shows the possible relationships between them (**potential pollutant linkages**), taking into account the current and proposed uses of the site.

The conceptual model can be expressed in a visual, written or tabular format or, preferably, a combination of all three. Vertical cross-sections are recommended.

What is required next will depend on the outcome of the **preliminary risk assessment**. Further action will be required if there are any gaps in information or potentially unacceptable risks are identified at the site.

Phase 2: Quantitative Risk Assessment (Site Investigation)

See Checklist 2

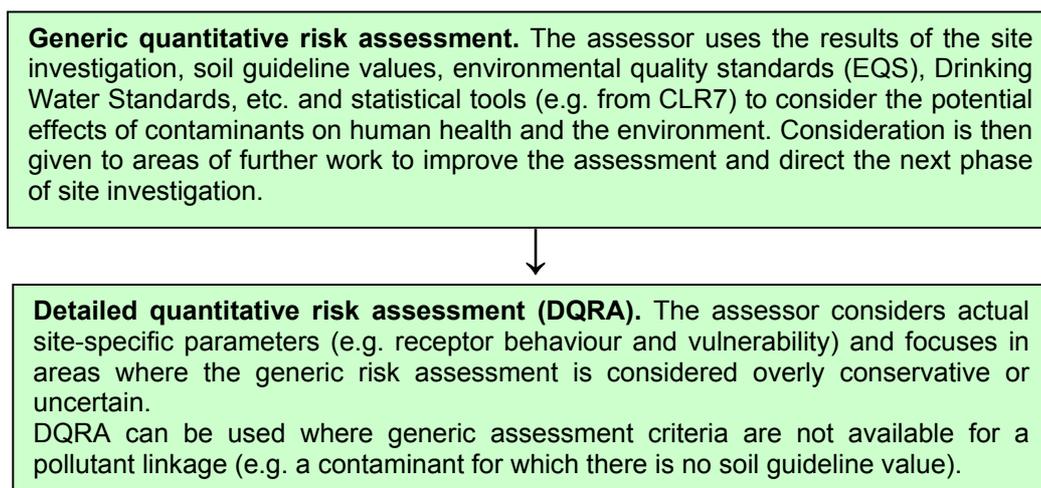
This phase should be undertaken when the preliminary risk assessment identifies potentially unacceptable risks at the site. It is anticipated that a preliminary risk

assessment will be required for most cases of development on brownfield land and site investigation will be required in most cases where the potential for contamination is identified by the preliminary risk assessment. A high degree of confidence in the preliminary risk assessment findings is usually required to demonstrate that any other outcome is acceptable.

Further information on the presence and extent of contaminants, pathways and receptors, may be gathered through **intrusive site investigations**. The scope of the site investigation should be designed around the conceptual model and meet the requirements of British Standards BS 10175, the code of practice for investigation of potentially contaminated sites. It is recommended that the scope of the proposed site investigation be agreed with the LPA prior to undertaking the works.

The risks associated with the relevant pollutant linkages identified within the conceptual model should then be evaluated using either generic or site-specific assessment criteria, or a combination of both.

The site investigation may be undertaken in several phases depending on the requirements for refining the risk assessment from a generic quantitative risk assessment up to and including a detailed quantitative risk assessment:



It is recommended that the scope of the proposed site investigation be agreed with the LPA prior to undertaking the works at all key stages of the process. Similarly, prior to running a DQRA model or using the P20 Methodology (Environment Agency document 1999, 'Methodology for the Derivation of Remedial Targets for Soil and Groundwater to Protect Water Resources'), the key parameters should be agreed with the LPA. Any deviation from the UK recommended approach must be robustly and scientifically justified to the LPA.

In summary, the purpose of undertaking a site investigation and risk assessment can be as follows:

- To refine and update the conceptual model.
- To confirm relevant pollutant linkages.
- To evaluate potentially unacceptable risks associated with the site.

- When unacceptable risks are identified – to further characterise the site conditions and provide the basis for the Remediation Options Appraisal.

Note: When commissioning laboratories and reporting on the results of chemical analyses, soils testing should be undertaken in accordance with the MCERTS performance standard.

STAGE 2 – REMEDIATION STRATEGY OPTIONS APPRAISAL

See Checklist 3

The aim of the **Options Appraisal** stage is to establish which remediation option, or combination of options, provides the best approach to remediating all pollutant linkages that present an unacceptable risk at the site (i.e. relevant pollutant linkages). The options will vary depending on the nature of contamination and proposed end use.

The LPA's main concerns at this stage will be to ensure that:

- the remediation criteria selected for the site are suitable for protecting the identified receptors and are in line with the UK framework
- appropriate remediation options have been selected for each relevant pollutant linkage

Site specific sensitivities are taken into account e.g. proximity to residential housing, schools etc. with respect to issues such as dust, odours, traffic, noise. The requirement for waste management licences, environmental permits, discharge consents etc. issued by both the local authority and Environment Agency should also be taken into account at an early stage when deciding how to remediate the site.

Identification of Feasible Remediation Options and Detailed Evaluation

Site-specific remediation objectives should be identified and **remediation criteria** for measuring compliance against these objectives should be derived at this stage.

A short-list of feasible **remediation options**, i.e. options that are capable of achieving the remediation criteria derived for the site given site-specific constraints, should then be identified and be taken forward for detailed evaluation to determine which are the most appropriate for addressing each relevant pollutant linkage.

Detailed information on the technical attributes of each option will be required and evaluation criteria will need to be developed for assessing the relative merits of each option. Proposals for combining options should be included where more than one option is required.

The evaluation should also take account of Best Practicable Environmental Option (BPEO), cost benefit, environmental outcomes and appropriate timescales for remediation, including obtaining likely regulatory requirements and permits.

Developing the Remediation Strategy

The **Remediation Strategy** sets out how the remediation options selected for each relevant pollutant linkage, or combination of options, will be put into place at the site. It should provide a clear picture of how relevant pollutant linkages will be remediated and the remedial works verified.

Practical issues such as zoning and phasing of remediation and proposals for obtaining the appropriate environmental licences, permits etc. should be addressed within the Remediation Strategy.

STAGE 3 - REMEDIATION STRATEGY

The main aims of the implementation stage are to ensure that the remedial works deliver the site remediation criteria without causing harm to the environment and that there is an accurate and permanent record of the works.

Preparation of Implementation Plan

See Checklist 4

The **Implementation Plan** translates the **Remediation Strategy** into a clear set of remediation activities for the site. It should set out all aspects of the design, preparation, implementation, verification and long-term monitoring and maintenance of remediation.

The **Implementation Plan** should be capable of demonstrating to the LPA that remediation criteria will be achieved, appropriate permits, licences etc. will be obtained, activities will be protective of third parties and the environment, contingency plans are in place and mitigation measures will be implemented if there are significant variations from the Remediation Strategy.

Design, Implementation and Verification

See Checklist 5

The detailed designs for the remediation activities are unlikely to be of direct interest to the LPA. The LPA's main concern at this stage will be to ensure that the site remediation is completed in accordance with the Remediation Strategy.

Once the detailed remediation design is complete, a **Verification Plan** should be prepared detailing the data gathering requirements necessary to demonstrate that the remediation meets the site remediation criteria.

A **Monitoring and Maintenance Plan** will also be required if the remediation is to include permanent structures that require maintenance and or if there will be a need for monitoring to demonstrate the continuing effectiveness of the site remediation following substantial completion of the site works.

Once the site remediation is complete, a **Verification Report** will be required to demonstrate that the agreed site remediation criteria have been achieved. This report

should provide a full record of all remediation activities carried out at the site and data collected in accordance with the requirements of the Verification Plan.

Long-Term Monitoring and Maintenance

Long-term monitoring and/ or maintenance will only be necessary if a Monitoring and Maintenance Plan was prepared for the site. The LPA may need to review **Monitoring Reports** until the end point for the long-term site-monitoring programme has been achieved.

SUBMISSION OF REPORTS TO THE LPA

A **preliminary risk assessment** (desk study) is the minimum submission required for a planning application for redevelopment on a brownfield site where land contamination may be present. The LPA will need to have enough information to be confident that the site can be reasonably remediated before planning permission is granted. Pre-planning discussions with the LPA is considered good practice and encouraged in order to provide advice to applicants on the minimum requirements for each site, which will be specific to the conceptual model.

For each site, the following reporting stages that should then be completed will depend on the outcome of the preliminary risk assessment.

The reporting requirements provided in the checklists may prove useful. They represent good practice but are not exhaustive. Depending on site-specific factors, further work and reporting may be required.

All reports should be prepared by suitably qualified professionals. The reports should be submitted in hard copy and if possible, a CD-ROM or disk containing complete reports, CAD plans should also be supplied.

Combining Reports

Repetition can be minimised if reports are combined or cross-referenced properly. In particular, the site investigation and quantitative risk assessment reports should be combined or submitted together as the LPA will not assess the site investigation report without a risk assessment to explain the significance of the investigation findings. Both factual and interpretative reports should be supplied.

Reporting requirements for all three elements of the Options Appraisal are combined into one checklist as it is anticipated that they will be included in one submission to the LPA in most cases. If the Remediation Strategy is submitted separately, it should clearly cross-reference or summarise the findings of earlier Options Appraisal reports.

The Verification and Monitoring and Maintenance Plans may be submitted as part of, or appendices to, the Implementation Plan.

The reports should be provided to the LPA in a timely manner at each of the key stages of the development, to ensure the regulators have sufficient time to review, consult and finalise an agreed way forward.

CHECKLIST 1

<p>Stage 1 - Phase 1 Preliminary Risk Assessment / Desk Study</p> <p>Objective: to obtain a good understanding of site history, setting, current and proposed use. Draw up an outline conceptual model to establish any relevant pollutant linkages in the source-pathway-receptor human health and environmental risk assessment. Identify if further investigation and or remediation is required.</p> <p>Reporting requirements:</p>	<p>Provided?</p>
<p>➤ purpose and aims of the study</p>	
<p>➤ credentials of person undertaking the study</p>	
<p>➤ site location and current layout plans (appropriately scaled and annotated with north point, National Grid Reference (minimum 6 figures) and site area in hectares)</p>	
<p>➤ description of site and surrounding land uses</p>	
<p>➤ appraisal of site walkover survey</p>	
<p>➤ review of site history including appropriately scaled and annotated historical maps and aerial photographs where available</p>	
<p>➤ details of current and proposed site use</p>	
<p>➤ assessment of the environmental setting including the interpretation and implications of:</p> <ul style="list-style-type: none"> • the geology, hydrogeology and hydrology of the area • information from the Environment Agency on abstractions, pollution incidents, water quality classification, landfill sites within 250 metres and flood risk • whether there are any archaeological or ecological considerations 	
<p>➤ review of any previous site contamination studies (desk based, intrusive, or IPPC investigations where relevant) and remediation works</p>	
<p>➤ review of local authority planning records, building control records, drainage and service plans</p>	
<p>➤ identification of potential contaminants of concern and source areas</p>	
<p>➤ preliminary (qualitative) assessment of risks, to include:</p> <ul style="list-style-type: none"> • outline conceptual model to show the nature and extent of the potential contamination and • an appraisal of the potential relevant pollutant linkages (contaminant sources, pathways and receptors) 	
<p>➤ identification of information gaps and uncertainties, recommendations for intrusive contamination investigations (if necessary) to include the identification and justification of target areas for more detailed investigation</p>	

CHECKLIST 2

<p><u>Stage 1 - Phase 2</u> Quantitative Risk Assessment / Site Investigation</p> <p>Objective: to refine and update the conceptual model, provide detailed site-specific information on substances in, on or under the ground, geology and groundwater, confirm relevant pollutant linkages, evaluate potentially unacceptable risks through generic or detailed quantitative risk assessment and provide the basis for the Options Appraisal.</p> <p>Reporting requirements:</p>	<p>Provided?</p>
<p>➤ purpose and aims of the study</p>	
<p>➤ credentials of person undertaking the study</p>	
<p>➤ site location and current layout plans (appropriately scaled and annotated, with north point, National Grid Reference (minimum 6 figures) and site area in hectares)</p>	
<p>➤ review and summary of any previous reports with references</p>	
<p>➤ results of preliminary risk assessment and summary of outline conceptual model</p>	
<p>➤ liaison with the Local Authority Contaminated Land Officer</p>	
<p>➤ site investigation methodology to include:</p> <ul style="list-style-type: none"> • any preparatory enabling works e.g. breaking out concrete and demolition • an appropriately scaled and annotated plan showing exploration locations, sample points, site structures, above/below ground storage tanks and existing services, infrastructure etc. 	
<p>➤ justification of both targeted and grid-based sampling strategies, including the location, depth and number of samples taken</p> <ul style="list-style-type: none"> • method of forming exploratory holes e.g. boreholes/trial pits and borehole/trial pit logs, showing water strikes and installation details as appropriate. • details of surface/groundwater monitoring programmes according to relevant Environment Agency methodology • methods of collecting, storing and transporting samples to laboratory • description of site works and observations 	
<p>➤ justification of analytical strategies, including the selection of parameters and the selection of samples for additional tests such as leachability</p>	
<p>➤ analysis of samples to be carried out by an MCERTS accredited laboratory for soils and must include:</p> <ul style="list-style-type: none"> • all contaminants of concern identified in preliminary risk assessment • where relevant, the speciation for grouped determinands to allow for quantitative risk assessment e.g. polyaromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPH), polychlorinated biphenyls (PCBs) 	
<p>➤ results and findings of investigation to include:</p>	

<ul style="list-style-type: none"> • description of ground conditions (made ground / soil and perched / groundwater regimes, including interactions between them) • flood risk • discussion of nature and extent of contamination - sensory field evidence and analytical, a summary of the phases (solid, dissolved, free and the potential mobility and leachability of contamination) • meaningful comparison (i.e. to include statistical tests as per UK guidance) of the analytical results to appropriate standards, with full justification of the standards chosen • to include consideration of ground gas and the presence of asbestos 	
<p>➤ evaluation of site investigation results against conceptual model</p>	
<p>➤ site specific risk assessments for both health and environmental receptors. To include:</p> <ul style="list-style-type: none"> • objectives and details of proposed site use • details of the models selected and justification of choice for the site • justification for input parameters, with source reference for literature values and additional calculations for field derived parameters, assumptions, safety factors • any model printouts that have been generated (e.g. with the Contaminated Land Exposure Assessment Model CLEA and P20, the data worksheets should be included) • parameter sensitivity analysis and validation reports to show that the model is performing accurately • note, where non-UK models are used, it will be important to make modifications to them ensuring compliance with UK policy. DEFRA publishes relevant guidance in CLR 7 to 11 	
<p>➤ an interpretation and discussion of the findings of the investigation and risk assessment with identification of pollutant linkages that present unacceptable risk and discussion of uncertainties</p>	
<p>➤ recommendations, description and uncertainties for further investigations or next steps as appropriate</p>	

CHECKLIST 3

<p><u>Stage 2</u> Remediation Strategy Options Appraisal</p> <p>Objective: to establish which remediation option, or combination of options, provides the best approach to remediating all pollutant linkages that present an unacceptable risk at the site, whilst meeting best practice and current technical guidance.</p> <p>Reporting requirements:</p>	<p>Provided?</p>
<p>➤ purpose and aims of the report</p>	
<p>➤ credentials of person compiling the report</p>	
<p>➤ site location and current layout plans (scaled and annotated, with north arrow, National Grid Reference (minimum 6 figures), site area in hectares)</p>	
<p>➤ review and summary of all previous reports with references</p>	
<p>➤ results of site investigation and quantitative risk assessment report and summary of conceptual model</p>	
<p>➤ liaison with the Local Authority Contaminated Land Officer</p>	
<p>➤ summary of relevant pollutant linkages that require remediation</p>	
<p>➤ outline of remediation objectives - what remediation needs to achieve for each pollutant linkage</p>	
<p>➤ outline of remediation criteria - against which compliance for each pollutant linkage can be measured and statement of overall site remediation criteria</p>	
<p>➤ identification of feasible remediation options</p>	
<p>➤ detailed evaluation of remediation options</p>	
<p>➤ description of remediation strategy, including:</p> <ul style="list-style-type: none"> • justification for selection and how remediation strategy will deliver overall site remediation criteria • technical and scientific basis, effectiveness of combining remedial options, constraints and limitations, expected durability • site plan/drawings (appropriately scaled and annotated) • preparatory works, phasing of remedial works and timescales • consents and licenses (e.g. discharge consents, part B authorisation for mobile plant, waste management licences/exemptions, asbestos waste removal licence) • site management measures to protect neighbours, environment and amenity during works, including where appropriate: health and safety procedures, discharges to air, land and water including dust, noise, odour, surface water run off, discharges to groundwater with environmental controls and monitoring 	
<p>➤ outline of how remedial strategy will be verified and future monitoring requirements</p>	
<p>➤ details on the lifespan of the remediation strategy</p>	
<p>➤ note: If changes are made to the remediation strategy they must be agreed with the local planning authority before they are implemented, justification will be required, with description of how the amended strategy will meet the agreed remediation criteria</p>	

CHECKLIST 4

<p><u>Stage 3</u> Remediation Strategy Implementation Plan</p> <p>Objective: to clearly translate the remediation strategy into a clear set of remediation activities for the site. It should set out all aspects of the design, preparation, implementation, verification and long-term monitoring and maintenance of the remediation strategy.</p> <p>Reporting Requirements:</p>	<p>Provided?</p>
<p><u>Implementation Plan:</u></p>	
<p>➤ purpose and aims of the report</p>	
<p>➤ credentials of person compiling the report</p>	
<p>➤ site location and current layout plans (appropriately scaled and annotated, with north point, National Grid Reference (minimum 6 figures) and site area in hectares)</p>	
<p>➤ review and summary of all previous reports with references</p>	
<p>➤ liaison with the Local Authority Contaminated Land Officer</p>	
<p>➤ description of ground conditions including geology, hydrology and hydrogeology</p>	
<p>➤ remediation objectives; criteria for relevant pollutant linkages and overall site criteria</p>	
<p>➤ remediation methodology</p>	
<p>➤ site zoning and phasing with approximate timescales</p>	
<p>➤ preparation works and operational constraints</p>	
<p>➤ specific site management procedures and emergency contingency plans</p> <p>➤ site management measures to protect neighbours, environment and amenity during works, including where appropriate: health and safety procedures, discharges to air, land and water including dust, noise, odour, surface water runoff, discharges to groundwater with environmental controls and monitoring</p>	
<p>➤ location and construction details of monitoring activities eg. dust gauges, vapour monitoring, groundwater boreholes</p>	
<p>➤ details of permits and licences in place and how compliance will be demonstrated</p>	
<p>➤ detailed site plans/drawings (appropriately scaled and annotated) showing areas requiring remediation, locations and phasing of works, stockpiling, monitoring and sampling points</p>	
<p>➤ details of what constitutes completion of remedial works and how completion will be verified</p>	
<p><u>Verification Plan:</u></p>	
<p>➤ details of the Verification Plan in order to demonstrate that the remediation criteria has been met for each relevant pollutant linkage, including details of :</p> <ul style="list-style-type: none"> • the sampling and monitoring strategy, methods and frequency • validation testing of excavations to remove material, treated material, imported material, effectiveness of gas management systems etc. 	

<ul style="list-style-type: none"> • water quality testing of background groundwater and proximal surface waters, plus treated waters • the use of on-site observations, visual/olfactory evidence • schedule of chemical analysis, demonstrating accordance with MCERTS for soils and laboratory QA/QC • performance testing methods e.g. for containment barrier (cut off wall, gas membrane) and capping layer • confirmation by independent consultant that remedial measures proposed ie for gas, soil or water contaminants are incorporated into the design as planned or as per manufacturers specification. Any deviation to this being justified. • proposed actions in the event that verification shows failure of remediation criteria 	
Monitoring and Maintenance Plan:	
<ul style="list-style-type: none"> ➤ details of future monitoring and or maintenance requirements in a Monitoring and Maintenance Plan (where necessary) once remediation has been completed, including details of : <ul style="list-style-type: none"> • explanation as to why work is required • scope of sampling and monitoring and / or maintenance, methods, frequency and type of equipment to be used • statement and justification for end-point for monitoring programme • proposed assessment criteria and justifications for selection • schedule of chemical analysis, demonstrating accordance with MCERTS for soils and laboratory QA/QC • measures for ensuring required monitoring / maintenance is undertaken 	

CHECKLIST 5

<p><u>Stage 3</u> Verification of Completion</p> <p>Objective: to clearly demonstrate that the remediation activities have been completed satisfactorily, have not caused harm to third parties and the environment and that the remediation criteria for each of the relevant pollutant linkages have been met.</p> <p>The <u>Verification Report</u> should include:</p>	<p>Provided?</p>
<p>➤ purpose and aims of the report</p>	
<p>➤ credentials of person compiling the report</p>	
<p>➤ site location and current layout plans (appropriately scaled and annotated, with north point, National Grid Reference (minimum 6 figures) and site area in hectares)</p>	
<p>➤ review and summary of all previous reports with references</p>	
<p>➤ liaison with the Local Authority Contaminated Land Officer</p>	
<p>➤ information as detailed in the remediation strategy including description of relevant pollutant linkages assessed, i.e;</p> <ul style="list-style-type: none"> • description of ground conditions including geology, hydrology and hydrogeology • remediation objectives; criteria for relevant pollutant linkages and overall site criteria • remediation methodology 	
<p>➤ details of remedial work undertaken and by whom, with justification for any changes from the original remediation strategy</p>	
<p>➤ results of verification, validation, performance testing and monitoring as specified in the <u>Verification Plan</u>: to include substantiating data:</p> <ul style="list-style-type: none"> • laboratory and in-situ test results, monitoring results for groundwater and gases during remediation • summary data plots and tables relating to remedial criteria • plans showing treatment areas and details of any differences from the original remediation strategy • details of permits, licences, waste management documentation etc. and demonstration of compliance 	
<p>➤ description of reinstatement works</p>	
<p>➤ description of final site conditions at completion with details of any permanent installations that form part of the remedial strategy and are to be left intact</p>	
<p>➤ confirmation that remediation objectives have been met and confirmation of post-completion monitoring/ maintenance requirements</p>	

FREQUENTLY ASKED QUESTIONS

What will happen if I do not submit a preliminary risk assessment (desk study) with my planning application?

Your planning application may be delayed or refused on the grounds of insufficient information. The LPA must be satisfied that issues related to contamination can be satisfactorily addressed.

What is a planning condition and when is it issued?

A planning condition is a requirement contained in a planning consent. Planning conditions control a wide variety of matters when a proposed development has a planning or environmental impact. When contamination risks are known and viable remediation options established before the LPA grant planning permission, conditions may be used to require further site characterisation and secure remediation of the site.

Who should carry out the site investigation?

The person or organisation carrying out the work must have the experience, qualifications and skills to do so and must meet the following criteria:

- they should be a competent person – such as an environmental scientist, chemist or hydrogeologist
- they should belong to an accredited body or be able to demonstrate that they operate within a quality assurance system
- they must use an MCERTS (where possible) accredited and quality assured laboratory to analyse samples and prepare conclusive reports
- they must be aware of current legislative requirements including health and safety and the relevant codes of practice
- they must be able to carry out risk management assessments and produce clear reports on the findings
- they must have, and maintain appropriate, professional indemnity insurance

Who else should be consulted?

The LPA and the developer may consult the Environment Agency when development is proposed on land affected by contamination. The Environment Agency may provide advice if:

- there is potential for pollution of surface or groundwater
- a licence, consent, permit or authorisation is required for a regime that the Environment Agency regulates, e.g. waste management licence, discharge consent, abstraction licence.

The Environment Agency has other areas of interest when development is proposed, e.g. water resources, waste management and flood risk management, which are not addressed here.

It may also be appropriate for the planning authority and developer to consult with Welsh Water or the Countryside Council for Wales.

Further Reading

This is a basic list for the reader's interest. A more comprehensive up to date list of relevant key references is provided in the Environment Agency (2004) Model Procedures for the Management of Land Contamination (CLR11) document.

Published Guidance

- British Standards Institution (2001) Investigation of Potentially Contaminated Sites, Code of Practice, BS: 10175.
- CIRIA (1996) Report 149: Protecting Development from Methane.
- CIRIA (1995) Report 151: Interpreting Measurements of Gas in the Ground.
- Construction Industry Research and Information Association (1995-1998) Special Publications 101-112, Remedial Treatment for Contaminated Land, Volumes I to XII.
- Department of the Environment (1994) Sampling Strategies for Contaminated Land (CLR4).
- Department of the Environment (1994) Information Systems for Land Contamination (CLR5).
- Department of the Environment (1995) Industry Profiles.
- Department of the Environment, Food and Rural Affairs and Environment Agency (2002) Overview of the Development of Guideline Values and Related Research (CLR7).
- Department of the Environment, Food and Rural Affairs and Environment Agency (2002) Potential Contaminants for the Assessment of Land (CLR 8).
- Department of the Environment, Food and Rural Affairs and Environment Agency (2002) Contaminants in Soils: Collation of Toxicological Data and Intake Values for Humans (CLR9).
- Department of the Environment, Food and Rural Affairs and Environment Agency (2002) the Contaminated Land Exposure Assessment Model (CLEA): Technical Basis and Algorithms (CLR10).
- Department of the Environment, Food and Rural Affairs and Environment Agency (2002) Contaminants in Soils: Collation of Toxicological Data and Intake Values for Humans, TOX series.
- Department of the Environment, Food and Rural Affairs and Environment Agency (2002) Guideline Values for Contaminants in Soils, SGV series.
- Department of the Environment, Food and Rural Affairs and Environment Agency (2002) Measurement of Bioaccessibility of Arsenic in UK Soils (P5-62/TR02).
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- Office of the Deputy Prime Minister (2004) Planning Policy Statement 23: Planning and Pollution Control.

Websites

These websites contain many useful references:

- British Standards Online at www.bsi-global.com
- Construction Industry and Research and Information Association website at www.ciria.org.uk
- Welsh Assembly website at www.wales.gov.uk
- DEFRA website at www.defra.gov.uk
- Environment Agency website at www.environment-agency.gov.uk

**Welsh Local Government Association, Welsh Assembly Government
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