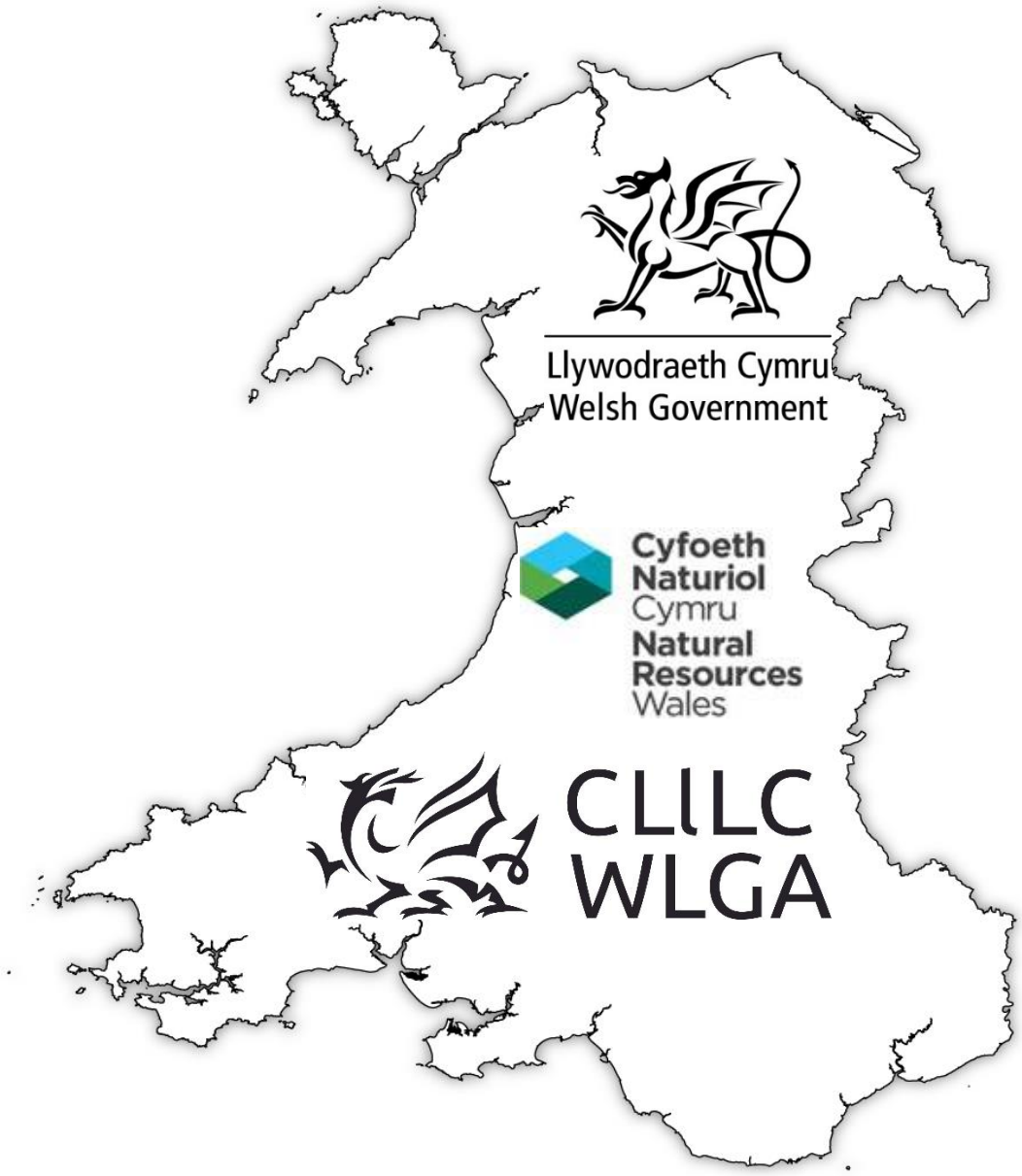
# Development of Land Affected by Contamination: A Guide for Developers

**Version 4 September 2023**




**This guidance has been prepared by the Welsh Land Contamination Working Group**

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## APPENDICIES

## INTRODUCTION

Land contamination may arise from a previous use of a site, or an adjacent site, that has had an industrial, commercial or landfilling activity. Land contamination can have significant adverse effects on human health, property, ecosystems and water quality (e.g. streams, rivers, lakes and groundwater) and needs to be managed appropriately.

This guidance document has been prepared for developers and their agents/advisers who may be involved in assessing and managing land contamination in Wales. It aims to outline the information required by Local Planning Authorities (LPA) in order for them to determine planning applications and then the subsequent discharge of associated land contamination conditions. This guidance document provides an overview of good practice for land contamination management procedures which, if followed, will help meet the information requirements of the LPA during development of that land.

At all times, it is the responsibility of the developer to follow good practice and identify the nature, scale and extent of land affected by contamination, and if required, undertake remediation work to ensure suitability of the land for the proposed development. The LPA does not have a duty of care to the landowner.

This guidance represents the culmination of a co-operative effort involving the Welsh Local Government Association (WLGA) and Natural Resources Wales* (NRW). *This document updates the group's previous guidance documents 'Land Contamination: A Guide for Developers' 2012 and 2017.*

This update reflects the updated foundation guidance from the Environment Agency from CLR11 to LCRM (land contamination risk management). This guidance has been adopted by NRW and therefore should form the basis of any approach taken by developers to the risk posed by potentially contaminated land.

## 1. LOCAL PLANNING AUTHORITY CONSULTATION PROCESS

### 1.1. General Approach

Planning Policy Wales (PPW) states that planning decisions need to take into account the potential hazard that contamination presents to the development itself, its occupants and the local environment. As such, the potential for land contamination is a material planning consideration when a new planning application is assessed by the LPA, but it is the developer's responsibility to ensure that development of the site is suitable for its proposed use.

The LPA has a duty to consider potential land contamination when determining individual planning applications and is responsible for decisions made under the planning system. However, the LPA is minded to consult statutory consultees, including the Local Authority's Contaminated Land Officer / Environmental Health department (CLO/EH) for advice on applications where land contamination is a reasonable possibility. In addition, the LPA may consult relevant external bodies such as NRW. The LPA can consult NRW and CLO/EH about work

that is intended to be undertaken at all stages of the application process, including the recommendation and subsequently discharge of planning conditions for the permission.

Under the Planning system in Wales, NRW are the body responsible for commenting on risks that land affected by contamination poses to controlled waters*. Failing to deal adequately with contamination can undermine compliance with the Water Environment Regulations 2017.

**Controlled Waters are fully **defined** in Section 104 of the **Water** Resources Act 1991, as follows*

*(a) relevant territorial waters, that is to say, subject to subsection (4) below, the waters which extend seaward for three miles from the baselines from which the breadth of the territorial sea adjacent to England and Wales is measured;*

*(b) coastal waters, that is to say, any waters which are within the area which extends landward from those baselines as far as—*

*(i) the limit of the highest tide; or*

*(ii) in the case of the waters of any relevant river or watercourse, the fresh-water limit of the river or watercourse, together with the waters of any enclosed dock which adjoins waters within that area;*

*(iii) inland freshwaters, that is to say, the waters of any relevant lake or pond or of so much of any relevant river or watercourse as is above the fresh-water limit;*

*(iv) ground waters, that is to say, any waters contained in underground strata;*

NRW are consulted to ensure that risks to controlled waters are understood and if necessary, risk assessed and mitigated. NRW review information based on the sensitivity of the site in relation to controlled waters.

When considering planning applications on sites where land contamination is a reasonable possibility, or known to exist, CLO/EH has to be satisfied that the development will remove existing unacceptable risks to human health, property, ecosystems and water quality and will not introduce new risks.

In doing this, CLO/EH will consider the historical and existing use, the current circumstances of the land, the proposed end use and the potential for contamination to be encountered during development works. CLO/EH will ensure the developer undertakes the appropriate assessment and remediation of land contamination in line with good practice procedures and guidance.

**An Example of the land contamination decision framework as part of the Planning Process in presented in Appendix A as a detailed flow chart.**

The assessment and remediation of land affected by contamination through the granting of planning permission (with the attachment of associated land contamination conditions) should ensure removal of any unacceptable risks, including those covered by the Contaminated Land regime under Part 2A of the Environmental Protection Act 1990, and make the site suitable for its new use as per PPW. **As a minimum, after the new development has been completed, the land should be suitable for its new use and not meet the legal definition of Contaminated Land under the Part 2A regime**.

### 1.2. Early Consultations

The developer should contact CLO/EH for early discussions, preferably at the pre-planning stage, to ensure that minimum information requirements and the land contamination assessment and remediation procedures, are fully understood. In addition, CLO/EH may wish to visit the site, and this will present an opportunity for further discussions to take place.

CLO/EH may recommend the applicant contacts other formal LPA consultees (for example NRW) for early discussions if there are relevant considerations.

### 1.3. Information Submissions

As a minimum, it is recommended that the developer submits a Preliminary Risk Assessment (see Box 1) for the site with their initial planning application. **In some cases, the LPA may expect more information, such as a Detailed Risk Assessment to be submitted in support of a planning application.** This will assist with consideration of the application, without unnecessary objections or delays. It is **possible** that for land where one or more former uses may have given rise to land contamination, planning permission will be granted *subject to conditions*.

The LPA will need enough information to be confident that the site can be reasonably remediated *before* planning permission is granted. Where *significant* contamination issues are known or suspected, the LPA may require subsequent stages of the contamination assessment procedure to be completed *before* the application is determined (see Box 1). In such circumstances a conditional grant of planning permission will not be appropriate.

Land contamination conditions are pre-construction phase conditions (*'conditions precedent'*) which seek to ensure that all of stages of the land contamination assessment and remediation process (see Box 1) for the site are undertaken prior to the commencement of construction works at the site. It may be necessary for the developer to submit information at key stages, in order to progress to the next. Information should be submitted in a timely manner to ensure LPA consultees have sufficient time to review and agree a way forward. These timescales should be agreed as part of conditions compliance.

Unfortunately, the LPAs still receive submissions that do not comply with the LCRM and as such the LPA may not undertake a detailed review of the submissions if it is clear from the outset that the LCRM has not been followed. It is strongly recommended that the Developer ensures all relevant elements of the checklists in the Appendices within this Guide are adhered to to reduce this risk.

**The developer should be mindful that failure to provide sufficient information in a timely manner during the planning process may results in significant delays and increased expense for the developer.**

The land contamination condition(s) may include, but not be limited to; site characterisation and risk assessment, remediation strategy, unexpected contamination, gas monitoring and protection, imported materials, verification reporting and long-term monitoring. CLO/EH may

recommend amendments to standard land contamination conditions, depending on the individual circumstances of the site.

### 1.4. Choosing a Competent Consultant

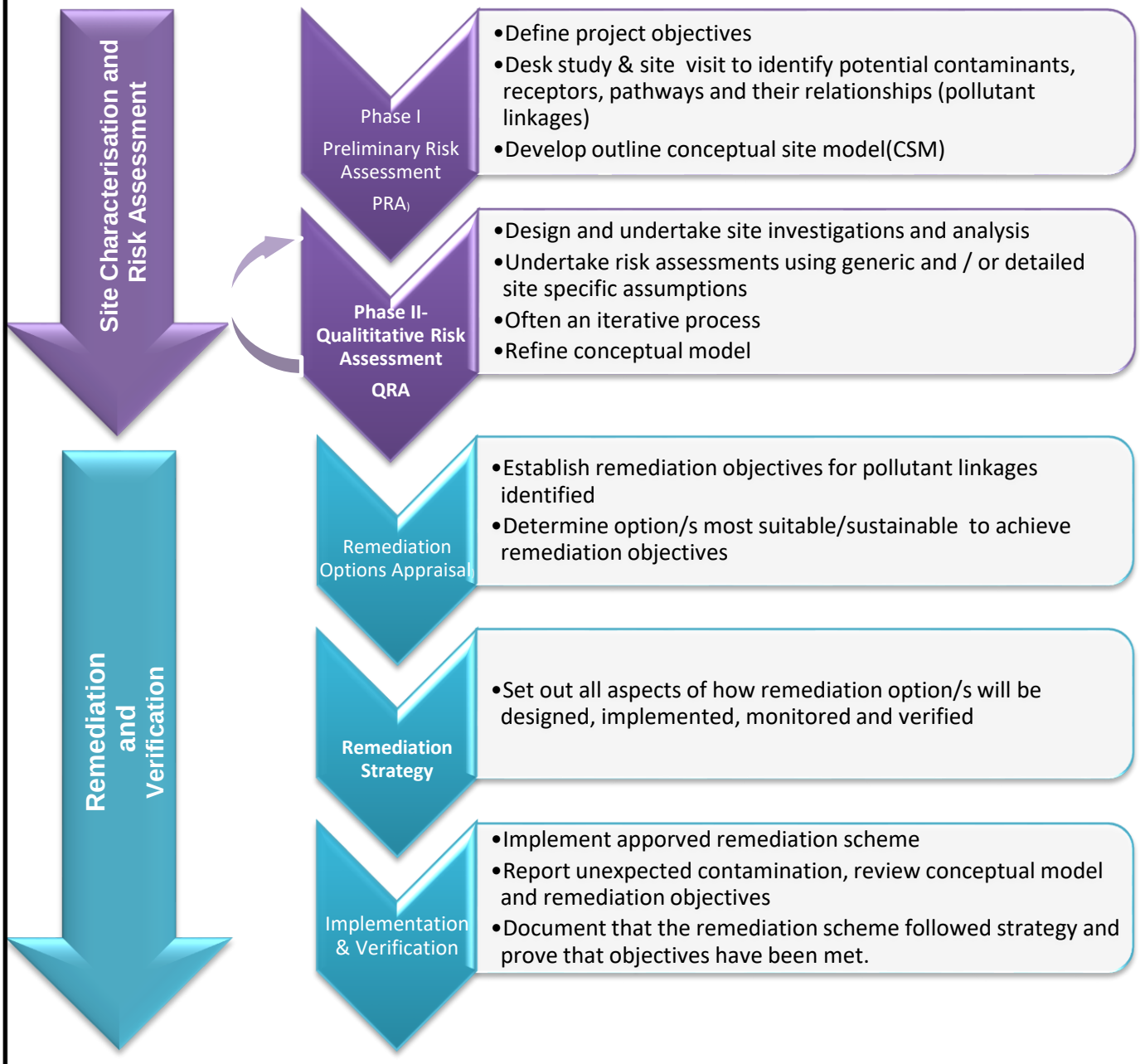
Many stages in the assessment and remediation process require input from experts and specialists who are appropriately qualified competent professionals. The developer should think about the full range of technical expertise that is likely to be required, when sourcing consultants or advisors to provide advice on the assessment, management and remediation of the site. The selected consultants should have an appropriate level of professional indemnity insurance. The WLGA and NRW do not make official approval or recommendation for any consultancy. However some useful contacts can be found at www.endsdirectory.com or via searching online. PPW also refers to the National Quality Mark Scheme (NQMS) as another means of ensuring competency, Section 5 below covers this in more detail. The appointed consultant should be able to demonstrate that their work meets the requirements of best practice and as a minimum they should be able to demonstrate that they have followed the principles set out in LCRM.

**A development project is more likely to be successful, and considerable effort and expense spared, if appropriately qualified experts with relevant environmental experience are used at appropriate stages.**

## 2. LAND CONTAMINATION MANAGEMENT PROCEDURE

This section aims to give an overview of the risk assessment and remediation process required for effective land contamination management. The land contamination management process presented in this guidance document is consistent with current best practice guidance documents, for example; Land Contamination Risk Management (LCRM) (Environment Agency 2020) and Guidance for the Safe Development of Housing on Land Affected by Contamination R&D 66 (NHBC and Environment Agency 2008). Despite parts 1 and 3 being archived, GPLC Parts 1 - 3 Guiding principles for land contamination (Environment Agency 2010) are also still useful reference documents. It is recommended that developers and their consultants refer to these documents for more detailed advice and guidance.

**Box 1** **Land Contamination Management Procedure**



A useful resource for information / documents to ensure compliance with the above Land Contamination Management Procedure can be found on the CL:AIRE website www.claire.co.uk

### 2.1. Risk Assessment

#### 2.1.1. Phase I - Preliminary Risk Assessment

Risk assessments help you decide whether land contamination is currently a problem, and/or is likely to be a problem during and/or following development of the site. Understanding the risks is the first step in the process of managing land contamination.

The purpose of the preliminary risk assessment is to develop an outline conceptual site model (see Box 2) and identify all plausible contaminant-pathway-receptor pollutant linkages at the site. This will be a qualitative (descriptive) assessment of risk.

The main activity at this stage is a 'desk study', comprising the collection of all readily available historic and environmental information. A site walkover survey is also usually undertaken, to verify the desk based information and observe any visual signs for contamination. It may also aid design of the subsequent investigation by providing information that may limit or restrict the initial scope (for example access restrictions, services, location of concrete structures that may need penetrating).

**Box 2 Conceptual Site Model**

The conceptual site model is an understanding of the three-dimensional site characteristics (usually expressed through visual representation), which identifies potential sources of **contamination**, **receptors**, contaminant migration or exposure **pathways**, and shows the possible interaction between them (**potential pollutant linkages**), taking into account the current and proposed uses of the site.

The development of the conceptual model is an iterative process, which should be re-addressed and refined with each subsequent phase of assessment.

It is anticipated that a preliminary risk assessment will be required for most cases of development on brownfield land, and further assessment is required if there are any gaps in the preliminary risk assessment, or if the preliminary risk assessment identifies any potential unacceptable risks. A high degree of confidence in the preliminary risk assessment findings is usually required to demonstrate that any other outcome is acceptable.

**Refer to Checklist 1 in Appendix B when submitting information in regards to a Phase 1 Preliminary Risk Assessment**

### 2.1.2. Phase II - Quantitative Risk Assessment

Phase II site investigation and risk assessment should be undertaken where the preliminary risk assessment identifies any potential unacceptable risks, or to reduce uncertainty in the initial conceptual model. The investigations should aim to provide information to refine and update the outline conceptual model, confirm and evaluate the significance of the identified potential pollutant linkages.

The scope of the site investigation should be designed around the preliminary conceptual model and should be agreed with CLO/EH prior to undertaking the works. The site investigation should meet the requirements of the Code of Practice for Land Contamination of Potentially Contaminated Land BS10175 and an MCERTS accredited laboratory must be used for analysis of soil samples.

The site investigation may be an iterative process, undertaken in several phases depending on the requirements for further reducing uncertainty in the conceptual model and refining the risk assessment from a generic quantitative risk assessment to a detailed quantitative risk assessment using site specific assessment criteria. Additional site investigation may also be required to provide data to inform the Remediation Options Appraisal.

**In order to avoid delay and additional expense for the developer, it is recommended that prior to running risk assessment model (for example CLEA v1.06 and Remedial Target Methodology Spreadsheet), key input parameters area agreed with the LPA consultees in advance.**

### 2.1.3. Human Health Assessment

The EA Science Report SCO50021 series of documents, SR2 to SR7 listed below, provides guidance on assessing the risks to human health. The SR documents are authoritative and have a published scientific basis, and therefore meet the requirements of the risk assessment framework set out in DETR (2000). The SR guidance is currently considered 'best practice' in the assessment of contaminated land in the UK.

*SR2 - Human Health Toxicological Assessment of Contaminants in Soil*
*SR3 – Updated Technical Background to the CLEA Model*
*SR4 - CLEA Software Handbook (V 1.05)* *CLEA Software Version 1.071*
*SR7 - Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values*

**Category 4 Screening Levels (C4SLs)**
The Statutory Guidance has a four category system for classifying land as contaminated under Part 2A of the Environmental Protection Act 1990.

This category system ranges from Category 4, where the level of risk posed to human health or the environment is acceptably low, to Category 1, where the level of risk is clearly unacceptable.

To help regulators determine whether land is suitable for use and definitely not contaminated, a project research group was established to define the screening levels for Category 4. A total of nine C4SLs have been published to date, six in Phase 1 (the most commonly identified in

contaminated land risk assessments) and three in Phase 2. A further 16 are in development as part of the Phase 2 work.

These are:

- Cadmium
- benzo(a)pyrene
- benzene
- arsenic
- lead
- chromium VI
- Chloroethene (vinyl chloride)
- Trichloroethene
- Tetrachloroethene

The work and background information for Phase 1 is available within the research report SP1010 which can be found on the Department for Environment, Food and Rural Affairs website. Phase 2 reports are available via the CL:aire website www.claire.co.uk.

There was some debate in the land contamination community as to whether C4SLs are suitable for use as screening criteria within the planning regime. In order to provide clarity on the use of the C4SLs, the Welsh Government produced a statement which stated that where the site conditions are applicable to the land use scenarios presented in SP1010, then the C4SLs can be used as screening tool for development sites.

Further information on the use of C4SLs is available from the Welsh Government website.

### 2.1.4. Controlled Waters Assessment

There are many methods and tools available, but you should choose ones that are appropriate for the UK risk management framework. EA documents that describe approaches or tools for water risk assessment include:
*The Environment Agency's Approach to Groundwater Protection (2018)*
*Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination (2006)*

Further information and links relating to controlled water risk assessments can found on the CL:AIRE website

http://www.claire.co.uk/useful-government-legislation-and-guidance-by-country/77-risk-assessment-info-ra/208-assessing-risks-to-the-water-environment-info-ra2-3

**Refer to Checklist 2 in Appendix B when submitting information in regards to a Phase II Preliminary Risk Assessment**

## 2.2. Remediation

### 2.2.1. Remediation Options Appraisal

Where the quantitative risk assessment identifies that the nature and extent of land contamination is unacceptable for its intended end use, then remediation works will be required. The first stage is to establish the site specific remediation objective(s) that are required to address each pollutant linkage. Remediation criteria should be derived for measuring compliance against, which must be agreed with CLO/EH and NRW as appropriate.

**In order to avoid delays and additional expense for the developer, it is recommended that site specific remediation objective(s) and remediation criteria are agreed in advance by the LPA consultees.**

A list of feasible remediation options should be produced for appraisal in order to establish which are most appropriate for addressing each pollutant linkage. The merits of each option should be assessed by compiling detailed technical information. The evaluation should also take account of the best practicable environmental option, cost benefit, environmental outcomes, site specific constraints and appropriate timescales for remediation, including obtaining likely regulatory requirements and permits.

The options appraisal should establish which option or combination of options will most effectively achieve the remediation objective(s).

**Refer to Checklist 3 in Appendix B when submitting information in regard of a Remediation Options Appraisal**

### 2.2.2. Remediation Strategy

The remediation strategy sets out how the remediation option or combination of options, will address pollutant linkages and agreed remediation criteria. The strategy should provide a clear picture of how remediation activities will be planned for, implemented, monitored and verified. Practical issues such as phasing of activities, plans for obtaining appropriate environmental permits, compliance monitoring, contingency plans and mitigation measures etc. should be all addressed within the remediation strategy.

It is essential for the developer to demonstrate to the LPA that the remediation activities will be capable of achieving the agreed remediation criteria, without posing unacceptable risk to third parties or the environment, that appropriate permits will be obtained, contingency plans are in place and mitigation measures will be implemented if there are significant variations from the remediation strategy.

**Refer to Checklist 4 in Appendix B when submitting information in regard of a Remediation Strategy**

### 2.2.3. Remediation Scheme

During development, CLO/EH should be notified immediately under circumstances where contamination not previously identified is found to be present at the site. No further development (unless otherwise agreed in writing) shall be carried out until the developer has submitted, and obtained written approval from the LPA for a remediation strategy detailing how this unsuspected contamination shall be dealt with.

### 2.2.4. Verification Report

Upon completion of the remediation works, a verification report must be submitted to the LPA consultees for review and approval. The verification report should provide a full record of all remediation activities carried out at the site and demonstrate that the agreed remediation criteria and objectives have been achieved. Occupation / use of the development will not be possible until approval of the verification report has been granted.

**Refer to Checklist 5 in Appendix B when submitting information in regard of a Verification Report**

## 2.3. Long Term Monitoring and Maintenance

Following completion of remediation works, where there is a requirement for long term maintenance and/or continued monitoring to demonstrate the effectiveness of those works, a separate 'Monitoring and Maintenance Plan' should be produced and submitted to CLO/EH for approval by the LPA.

## 3. DEALING WITH GROUND GAS

### 3.1. Assessment

Ground gas is a contaminant and should be considered as a potential contaminant source in the preliminary risk assessment on sites where gas generation and/or on site migration is suspected.

The first stage is to provide the LPA with a preliminary risk assessment (as detailed in Section 2.1.1.). This should enable an appropriate site investigation and monitoring programme to be designed should a potential pollutant linkage be identified.

The gas monitoring programme should be designed to enable data to be gathered over a sufficient period of time with a suitable number of monitoring visits and at periods of varying atmospheric pressure. In addition, the numbers and position of monitoring locations, response zones and type of gas should be justified. CIRIA Report 150 provides guidance in relation to the position and selection of appropriate grid patterns. Further BS8485:2015+A1:2019 provides as code of practice for the characterisation of ground gas from affected developments. It is recommended that the gas monitoring programme is undertaken as outlined in Tables 5.5a and 5.5b of CIRIA 665 (p.60). The monitoring programme must be agreed in advance with CLO/EH.

Where comprehensive characterisation of soil and/or groundwater contamination has identified a vapour risk, then appropriate risk assessment is required. The monitoring of vapours should be carried out in accordance to guidance within the CIRIA Reports C665 and C682, and British Standards 8576:2013.

**In order to avoid delays and additional expense for the developer, it is important that the gas monitoring programme is agreed in advance by CLO/EH.**

Following the completion of the agreed monitoring programme, an appropriate report must be forwarded to CLO/EH, detailing the results of the monitoring, appropriate gas/vapour risk assessments and recommendations for protection measures, if required. Guidance is provided in CIRIA C665 for assessing gas data and CIRIA C682 for assessing vapour data.

### 3.2. Remediation and Verification

A variety of gas/vapour protection measures are available and it is commonplace to use a combination of measures for a development (as no one single measure may adequately protect the development). It is essential to provide CLO/EH with details and justification of the proposed gas protection measures in advance of installation. Developers are minded to refer to BS 8485:2015 Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings. Once approved by CLO/EH, the gas protection measures can be installed, but will require Building Control inspection to ensure satisfactory standard of installation as per Building Regulations (2010) (in which gas protection is included), and possibly NHBC sign off. CLO/EH will require the developer to verify that the gas protection measures have

been satisfactorily installed as per the agreed designs. In addition, written approval of the satisfactory installation from the Building Control Officer should also be provided.

Developers are minded to refer to CIRIA (C735) Good Practice on the Testing and Verification of Protection Systems for Buildings Against Hazardous Ground Gases. This document provides good practice guidance for the designer, installer, verifier and regulator on the verification and integrity testing of gas protection systems. It sets out a flexible, risk based and practicable framework that can be adapted to provide site specific advice on the need for and scope of verification activities (including any integrity testing).

A dedicated verification requirements guidance document is in production by the WLGA to support the Developers Guide. It is intended to expand further on the verification of gas protection systems to ensure consistency and quality across the development sector.

### 3.3. Mine Gases

A well-publicised incident in Gorebridge (Midlothian, Scotland) in 2013/14 highlighted that in certain circumstances, gas ingress to residential buildings from mine workings can occur and potentially pose risks to human health. The risk posed by mine gases should always be considered when in a current or historic mining area. The Gorebridge incident highlighted the need to include reasonably foreseeable change into the mine gas risk assessment. Developers are minded to refer to the CL:AIRE guidance on Good Practice for Risk Assessment for Coal Mine Gas Emissions (2021).

**In order to avoid delays and additional expense for the developer, it is important that CLO/EH is contacted for approvals in advance of other key stages of work.**

## 4. REUSE AND IMPORTATION OF MATERIALS

The following section is applicable for developments where the importation of material is required for the purposes of garden, landscape or engineered cover systems. This also covers any site won materials which are to be reused on site.

For cover systems to protect end users, it is typical that a minimum 600mm cover will be required. In circumstances where the proposed depth is less than 600mm, the developer should demonstrate that receptors are protected with this shallower cover system by submitting an appropriate risk assessment. The proposals can only be undertaken with written approval from CLO/EH via the LPA.

### 4.1. Reuse of Site Won Materials

The CL:AIRE Definition of Waste: Code of Practice (DoW CoP) must be referred to if the developer intends to reuse site won materials. The DoW CoP provides a clear, consistent and streamlined process which enables the legitimate re-use of materials on site with a significantly reduced regulatory burden

The DoW CoP enables:

- the direct transfer and reuse of clean naturally occurring soil materials between sites;
- the conditions to support the establishment/operation of fixed soil treatment facilities; and
- the reuse of both contaminated/uncontaminated materials on their site of origin and between sites within defined Cluster projects.

Please refer to the CL:AIRE website for further information on the DoW CoP and to submit your declarations. www.claire.co.uk/projects-and initiatives/dowcop/

### 4.2. Importation of materials

Topsoils to be imported should comply with British Standards Institution Code of Practice BS3882: 2015, Specification for topsoil and requirements for use.

Details regarding the source material to be imported, must be provided in writing to CLO/EH via the LPA in advance of importation. Details should include sampling frequency, analytical results with full rationale and justification. The developer should refer to the WLGA guidance document 'Requirements for the Chemical Testing of Materials for Various End Uses' (2012), which presents the specific sampling frequencies for imported materials, dependent upon the quantities to be imported and their proposed use at a development. The document outlines the process for ensuring all information is submitted in relation to the relevant planning condition in a series of step by step actions. All verification reports should contain trial pit log details and photographic evidence of the capping depth.

**The declaration form within the WLGA guidance document should be completed and returned to the CLO/EH. Adherence to the step by step actions in the document will ensure that risks associated with imported materials are avoided and greatly assist CLO/EH to make a recommendation for discharge of the condition.**

**Under no circumstances** should controlled waste be imported. It is an offence under Section 33 of the Environmental Protection Act 1990 to deposit controlled waste on a site which does not benefit from an appropriate environmental permit. The following must not be imported to a development site;

- Unprocessed / unsorted demolition wastes.
- Any material originating from a site confirmed as being contaminated or potentially contaminated by chemical or radioactive substances.
- Japanese Knotweed stems, leaves and rhizome infested soils. In addition to section 33 above, it is also an offence under the Wildlife and Countryside Act 1981 to spread this invasive weed.

**Should the developer introduce a receptor (e.g. residential houses/ human receptors) without undertaking necessary remedial work, then they may find themselves as appropriate person and liable for subsequent remedial costs should the Local Authority determine the site as Statutory Contaminated Land under the Part 2A Regime .**

## 5. SUBMISSION OF REPORTS AND DISCHARGE OF CONDITIONS

All formal submissions of reports and/or supporting information should be sent to the LPA, as original and complete versions of reports. In addition, electronic copies of reports and any supporting information is requested, for distribution to consultees.

CLO/EH will make a recommendation to the LPA to discharge relevant condition(s) **only upon receipt and approval of a satisfactory verification report**. If at any stage of reporting, should CLO/EH consider the assessment or findings of the report to be unsatisfactory then CLO/EH is likely to reject the report and make a request for further information.

On those sites where a phased remediation approach of the site is proposed, it may be acceptable to provide verification reports to the LPA for each phase of remedial work at the site provided that a phased approach has been agreed in advance with the LPA.

**National Quality Mark Scheme (NQMS)**
The NQMS is a system designed by the industry led Land Forum to ensure that land contamination management work meets the necessary technical and regulatory standards. It applies in particular to the presentation of environmental information to the regulator in the form of reports, setting out both factual and interpretative information.

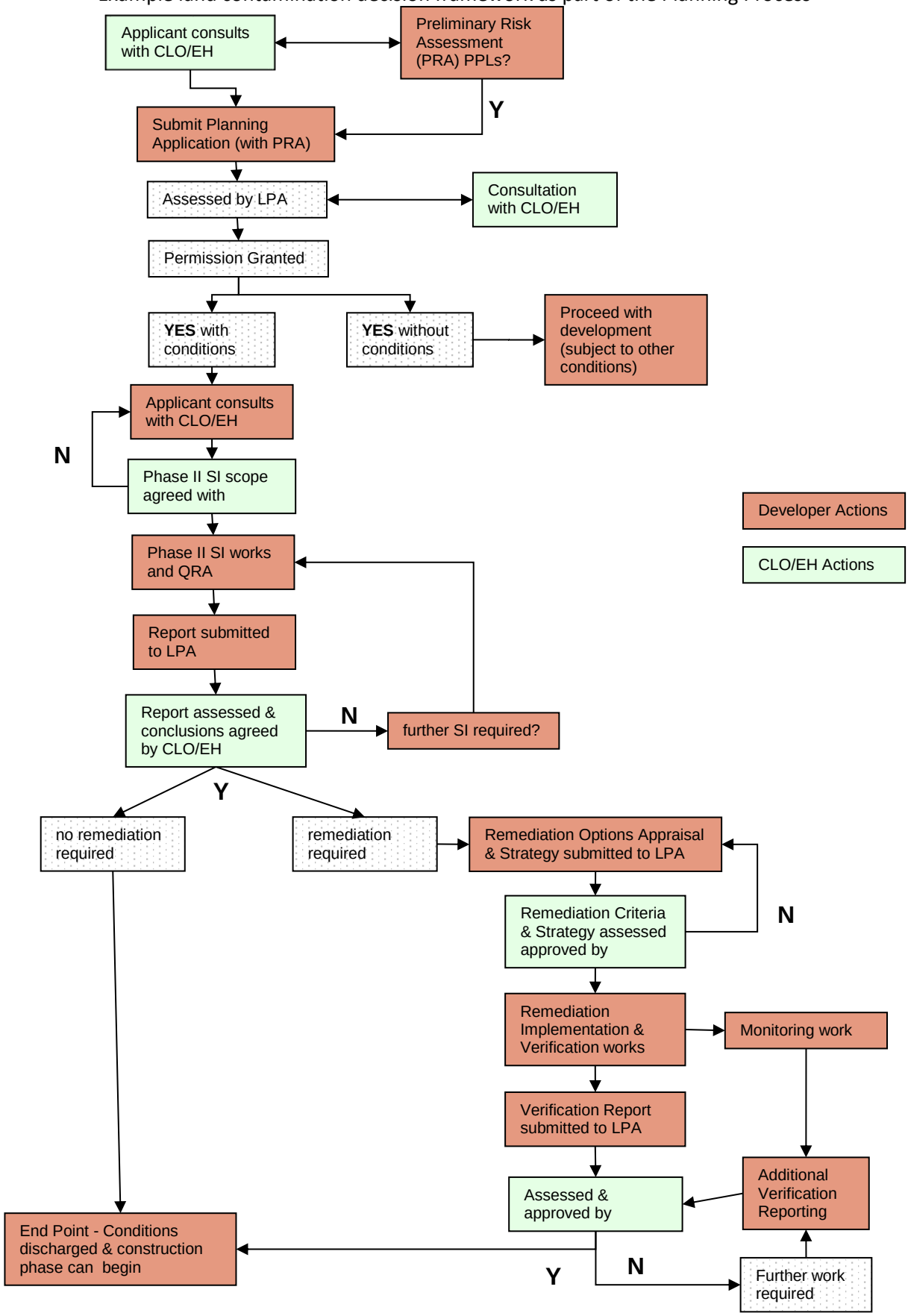
Reports are prepared in line with good practice and signed off by a suitably qualified and experienced person (SQP) registered under the NQMS.It is hoped that the use of the NQMS will assist in the prompt discharge of subsequent planning conditions.

**However, individual local authorities will need to establish, how reports submitted as part of the NQMS are assessed. Reports submitted as part of the NQMS may still be reviewed / commented on by CLO / EH officers, and as such the scheme does not guarantee an automatic discharge of planning conditions.**

**Natural Resources Wales (NRW) is generally supportive of the use of NQMS and recognises it's benefits in terms of assuring quality of land contamination reports. However, NRW reserve the right to continue to review land contamination reports in accordance with their environmental sensitivity priority matrix.**

## APPENDIX A

Example land contamination decision framework as part of the Planning Process



**APPENDIX A**

**CHECK LIST 1**

| **Phase I: Preliminary Risk Assessment / Desk Study**<br>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 contaminant-pathway-receptor human health and environmental risk assessment. Identify if further investigation and or remediation is required.<br><br>Reporting requirements: | Date Provided |
|---|---|
| ➢ purpose and aims of the study | |
| ➢ credentials of person undertaking the study | |
| ➢ site location and current layout plans (appropriately scaled and annotated with north point, National Grid Reference (minimum 6 figures) and site area in hectares) | |
| ➢ description of site and surrounding land uses | |
| ➢ appraisal of site walkover survey | |
| ➢ review of site history including appropriately scaled and annotated historical maps and aerial photographs where available | |
| ➢ details of current and proposed site use | |
| ➢ assessment of the environmental setting including the interpretation and implications of:<br>• the geology, hydrogeology and hydrology of the area<br>• information from the Environment Agency on abstractions, pollution incidents, water quality classification, landfill sites within 250 metres and flood risk<br>• whether there are any archaeological or ecological considerations | |
| ➢ review of any previous site contamination studies (desk based, intrusive, or IPPC investigations where relevant) and remediation works | |
| ➢ review of local authority planning records, building control records, drainage and service plans | |
| ➢ identification of potential contaminants of concern and source areas | |
| ➢ preliminary (qualitative) assessment of risks, to include:<br>• outline conceptual model to show the nature and extent of the potential contamination and<br>• an appraisal of the potential relevant pollutant linkages (contaminants, pathways and receptors) | |
| ➢ 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 | |

**CHECK LIST 2**

| **Phase II: Quantitative Risk Assessment / Site Investigation**<br>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.<br>Reporting requirements: | Date Provided |
|---|---|
| ➢ purpose and aims of the study | |
| ➢ credentials of person undertaking the study | |
| ➢ site location and current layout plans (appropriately scaled and annotated, with north point, National Grid Reference (minimum 6 figures) and site area in hectares) | |
| ➢ review and summary of any previous reports with references | |
| ➢ results of preliminary risk assessment and summary of outline conceptual model | |
| ➢ liaison with the Local Authority CLO/EH | |
| ➢ site investigation methodology to include:<br>• any preparatory enabling works e.g. breaking out concrete and demolition<br>• an appropriately scaled and annotated plan showing exploration locations, sample points, site structures, above/below ground storage tanks and existing services, infrastructure etc. | |
| ➢ justification of both targeted and grid-based sampling strategies, including the location, depth and number of samples taken<br>• method of forming exploratory holes e.g. boreholes/trial pits and borehole/trial pit logs, showing water strikes and installation details as appropriate.<br>• details of surface/groundwater monitoring programmes according to relevant Environment Agency methodology<br>• methods of collecting, storing and transporting samples to laboratory<br>• description of site works and observations | |
| ➢ justification of analytical strategies, including the selection of parameters and the selection of samples for additional tests such as leachability | |
| ➢ analysis of samples to be carried out by an MCERTS accredited laboratory for soils and must include:<br>• all contaminants of concern identified in preliminary risk assessment<br>• 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) | |
| ➢ results and findings of investigation to include:<br>• description of ground conditions (made ground / soil and perched / groundwater regimes, including interactions between them)<br>• 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)<br>• 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<br>• to include consideration of ground gas and the presence of asbestos | |
| ➢ evaluation of site investigation results against conceptual model | |
| ➢ site specific risk assessments for both health and environmental receptors. To include:<br>• objectives and details of proposed site use<br>• details of the models selected and justification of choice for the site<br>• justification for input parameters, with source reference for literature values and additional calculations for field derived parameters, assumptions, safety factors<br>• any model printouts that have been generated (e.g. with the Contaminated Land Exposure Assessment Model CLEA and Remedial Targets Methodology, the data worksheets should be included)<br>• parameter sensitivity analysis and validation reports to show that the model is performing accurately<br>• note, where non-UK models are used, it will be important to make modifications to them ensuring compliance with UK policy. Relevant guidance can be found on the SGV pages of the CL:AIRE website | |
| ➢ 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 | |
| ➢ recommendations, description and uncertainties for further investigations or next steps as appropriate | |

**CHECK LIST 3**

| **Remediation Options Appraisal**<br>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.<br><br>Reporting requirements: | Date Provided |
|---|---|
| ➢ purpose and aims of the report | |
| ➢ credentials of person compiling the report | |
| ➢ site location and current layout plans (scaled and annotated, with north arrow, National Grid Reference (minimum 6 figures), site area in hectares) | |
| ➢ review and summary of all previous reports with references | |
| ➢ results of site investigation and quantitative risk assessment report and summary of conceptual model | |
| ➢ liaison with the Local Authority CLO/EH | |
| ➢ summary of relevant pollutant linkages that require remediation | |
| ➢ outline of remediation objectives - what remediation needs to achieve for each pollutant linkage | |
| ➢ outline of remediation criteria - against which compliance for each pollutant linkage can be measured and statement of overall site remediation criteria | |
| ➢ identification of feasible remediation options | |
| ➢ detailed evaluation of remediation options including assessment of the sustainability of each option. | |
| ➢ description of remediation strategy, including:<br>• justification for selection and how remediation strategy will deliver overall site remediation criteria<br>• technical and scientific basis, effectiveness of combining remedial options, constraints and limitations, expected durability<br>• site plan/drawings (appropriately scaled and annotated)<br>• preparatory works, phasing of remedial works and timescales<br>• Environmental Permits and licenses (e.g. water discharge permits mobile plant permits, waste management permits exemptions, asbestos waste removal licence)<br>• site management measures to protect neighbours, environment and amenity during works, including where appropriate:<br>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 | |
| ➢ outline of how remedial strategy will be verified and future monitoring requirements | |
| ➢ details on the lifespan of the remediation strategy | |
| ➢ 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 | |

**CHECK LIST 4**

| **Remediation Strategy**<br>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.<br>Reporting Requirements: | Date Provided |
|---|---|
| **Implementation Plan:** | |
| ➢ purpose and aims of the report | |
| ➢ credentials of person compiling the report | |
| ➢ site location and current layout plans (appropriately scaled and annotated, with north point, National Grid Reference (minimum 6 figures) and site area in hectares) | |
| ➢ review and summary of all previous reports with references | |
| ➢ liaison with the Local Authority CLO/EH | |
| ➢ description of ground conditions including geology, hydrology and hydrogeology | |
| ➢ remediation objectives; criteria for relevant pollutant linkages and overall site criteria | |
| ➢ remediation methodology | |
| ➢ site zoning and phasing with approximate timescales | |
| ➢ preparation works and operational constraints | |
| ➢ specific site management procedures and emergency contingency plans<br>➢ 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 | |
| ➢ location and construction details of monitoring activities eg. dust gauges, vapour monitoring, groundwater boreholes | |
| ➢ details of permits and licences in place and how compliance will be demonstrated | |
| ➢ detailed site plans/drawings (appropriately scaled and annotated) showing areas requiring remediation, locations and phasing of works, stockpiling, monitoring and sampling points | |
| ➢ details of what constitutes completion of remedial works and how completion will be verified | |
| **Verification Plan:** | |
| ➢ details of the Verification Plan in order to demonstrate that the remediation criteria has been met for each relevant pollutant linkage, including details of :<br>• the sampling and monitoring strategy, methods and frequency<br>• validation testing of excavations to remove material, treated material, imported material, effectiveness of gas management systems etc. | |

| | |
|---|---|
| • water quality testing of background groundwater and proximal surface waters, plus treated waters<br>• the use of on-site observations, visual/olfactory evidence<br>• schedule of chemical analysis, demonstrating accordance with MCERTS for soils and laboratory QA/QC<br>• performance testing methods e.g. for containment barrier (cut off wall, gas membrane) and capping layer<br>• 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.<br>• proposed actions in the event that verification shows failure of remediation criteria | |
| **Monitoring and Maintenance Plan:** | |
| ➢ details of future monitoring and or maintenance requirements in a Monitoring and Maintenance Plan (where necessary) once remediation has been completed, including details of :<br>• explanation as to why work is required<br>• scope of sampling and monitoring and / or maintenance, methods, frequency and type of equipment to be used<br>• statement and justification for end-point for monitoring programme<br>• proposed assessment criteria and justifications for selection<br>• schedule of chemical analysis, demonstrating accordance with MCERTS for soils and laboratory QA/QC<br>• measures for ensuring required monitoring / maintenance is undertaken | |

**CHECK LIST 5**

| **Verification of Completion**<br>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.<br>The Verification Report should include: | Date Provided |
|---|---|
| ➢ purpose and aims of the report | |
| ➢ credentials of person compiling the report | |
| ➢ site location and current layout plans (appropriately scaled and annotated, with north point, National Grid Reference (minimum 6 figures) and site area in hectares) | |
| ➢ review and summary of all previous reports with references | |
| ➢ liaison with the Local Authority CLO/EH | |
| ➢ information as detailed in the remediation strategy including description of relevant pollutant linkages assessed, i.e;<br>• description of ground conditions including geology, hydrology and hydrogeology<br>• remediation objectives; criteria for relevant pollutant linkages and overall site criteria<br>• remediation methodology | |
| ➢ details of remedial work undertaken and by whom, with justification for any changes from the original remediation strategy | |
| ➢ results of verification, validation, performance testing and monitoring as specified in the Verification Plan: to include substantiating data:<br>• laboratory and in-situ test results, monitoring results for groundwater and gases during remediation<br>• summary data plots and tables relating to remedial criteria<br>• plans showing treatment areas and details of any differences from the original remediation strategy<br>• details of permits, licences, waste management documentation, including Hazardous Waste Transfer Notes and Duty of Care Notes and demonstration of compliance | |
| ➢ description of reinstatement works | |
| ➢ 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 | |
| ➢ confirmation that remediation objectives have been met and confirmation of post-completion monitoring/ maintenance requirements | |

**APPENDIX B**

- British Standards Institution Investigation of Potentially Contaminated Sites, Code of Practice, BS: 10175 (this must be the current version)
- British Standards Institution (2020) Amendment 2: Code of Practice for Site Investigation, BS5930:2015+A1:2020
- British Standards Institution (2015) Specification for Topsoil and Requirements for Use, Code of Practice, BS: 3882:2015
- British Standards Institution (2018) Soil quality. Sampling. Guidance on sampling standards Series, BS ISO: 10400:100-107 and 201-206
- British Standards Institution (2019) Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings, BS:8485:2015+A1:2019
- British Standards Institution (2013) Guidance on Investigations for Ground Gas. Permanent Gases and Volatile Organic Compounds (VOCs), BS: 8576:2013
- CIRIA Report C665 (2007) Assessing Risks Posed by Hazardous Ground Gases to Buildings
- CIRIA Report C682 (2009) The VOCs Handbook, Investigating, assessing and managing risks from inhalation of VOCs at land affected by contamination
- CIRIA Report C735 (2014) Good practice on the testing and verification of protection systems for buildings against hazardous ground gases
- CL:AIRE (2020) Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration
- CL:AIRE (2011) Definition of Waste: Development Industry Code of Practice Version 2.
- CL:AIRE (2017) Petroleum Hydrocarbons in Groundwater: Guidance on assessing petroleum hydrocarbons using existing hydrogeological risk assessment methodologies
- CL:AIRE (2021) Good Practice for Risk Assessment for Coal Mine Gas Emissions
- Department of the Environment (1995) Industry Profiles
- Environment Agency (2010) Guiding Principles for Land Contamination
- Environment Agency (2021) Land Contamination Risk Management (LCRM)
- Environment Agency (2004) Guidance on the management of landfill gas
- Environment Agency (2006) Remedial Targets Methodology, Hydrogeological Risk Assessment for Land Contamination
- Environment Agency (2002) Technical Advice to Third Parties on Pollution of Controlled Waters for Part IIA EPA 1990 (archived)
- Environment Agency (2005) Science Report P5-080/TR3, The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbons for Soil
- Environment Agency (2018) MCERTS Performance Standard for Laboratories Undertaking Chemical Testing of Soil

- Environment Agency (2009) Science Report SC050021/SR2, Human Health Toxicological Assessment of Contaminants in Soil, Background to the CLEA Model
- Environment Agency (2009) Science Report SC050021/SR3, Updated technical background to the CLEA model
- Environment Agency (2009) CLEA Software Handbook version 1.05
- Health and Safety Executive (1991) Protection of Workers and the General Public during the Development of Contaminated Land
- Raybould JG, Rowan DL & Barry DL, 1995, CIRIA Report R150, Methane Investigation Strategies
- Welsh Government (2012) Statutory Guidance on Contaminated Land
- Welsh Government (2021) Planning Policy Wales edition 11
- Welsh Local Government Association (2012) Requirements for Chemical Testing of Imported Materials for Various End Uses

Note: This list is not exhaustive but summaries some of the key reference and guidance documents that the developer and their advisors should refer to.

Please also refer to the CL:AIRE Water and Land Library (WALL) which has an extensive list of links to past and present water and land references published by the Environment Agency, AGS, BRE, CIRIA and other useful industry publishers.

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