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Environment Agency

Guidance

LCRM: Before you start

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Contents

This publication is available at https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm/lcrm-before-you-start

The Environment Agency, Northern Ireland Environment Agency (NIEA), Scottish Environment Protection Agency (SEPA) and Natural Resources Wales expect you to follow land contamination risk management (LCRM) if you are managing the risks from historic land contamination.

Local authorities are the lead regulators for the planning system and the contaminated land Part 2A regime. These regimes underpin most use of LCRM. They may decide to use or direct you to use LCRM. Where the word ‘regulator’ is used it can also mean local authorities or other regulators such as Natural England.

You must always check with the local authority and other regulators that the use of this guidance is acceptable. Local authorities and other regulators may also provide additional guidance.

Land contamination can harm:

- human health
- drinking water supplies, groundwater and surface water
- soils
- ecosystems including wildlife, animals and wetlands
- property

It can also affect the current and future land use.

Dealing with land contamination helps make the environment clean and safe. Through regeneration it can:

- enhance the health and wellbeing of all
- add to the economic, ecological and amenity value of the area

Use LCRM to:

- identify and assess if there is an unacceptable risk
- assess what remediation options are suitable to manage the risk
- plan and carry out remediation
- verify that remediation has worked

You can use LCRM in a range of regulatory and management contexts. For example, voluntary remediation, planning, assessing liabilities or under the Part 2A contaminated land regime.

The Environment Agency, Natural Resources Wales, SEPA and the Society of Brownfield Risk Assessment (SoBRA) accreditation scheme support the use of the National Quality Mark Scheme (NQMS).

You can use it for any type of land contamination report.

Using the NQMS:

- will make sure all legislative requirements and necessary standards related to managing land contamination are met
- can provide increased confidence by submitting reports of the quality are expected
- can result in cost and time savings by ‘getting it right first time’

The NQMS does not currently apply in Northern Ireland.

Using the LCRM guides

LCRM is made up of 4 guides.

1. LCRM: Before you start.
2. LCRM: Risk assessment.
3. LCRM: Options appraisal.
4. LCRM: Remediation and verification.

LCRM uses a staged risk based approach. There are 3 stages and each stage is broken down into tiers or steps.

Stage 1: Risk assessment

You will use a tiered approach to risk assessment. The 3 tiers are:

1. Preliminary risk assessment.
2. Generic quantitative risk assessment.
3. Detailed quantitative risk assessment.

Stage 1 includes information for intrusive site investigations.

Stage 2: Options appraisal

There are 3 steps to follow.

1. Identify feasible remediation options.
2. Do a detailed evaluation of options.
3. Select the final remediation option.

Stage 3: Remediation and verification

There are 4 steps to follow.

1. Develop a remediation strategy.
2. Remediate.
3. Produce a verification report.
4. Do long term monitoring and maintenance, if required.

Overview of LCRM

You must always start with a preliminary risk assessment.

The risk assessment stage is an iterative process. You can do the 3 tiers in order or progress from a preliminary risk assessment to a detailed quantitative risk assessment. As part of a generic or detailed quantitative risk assessment you will need to collect detailed information about the site. This is usually through an intrusive site investigation.

Depending on the level of risk or regulatory requirements, you can proceed from a preliminary risk assessment to the options appraisal stage. If you proceed direct to the options appraisal stage, you still need to collect the detailed site investigation information required by the generic and detailed quantitative risk assessments. This is to confirm that your approach is viable and acceptable.

Following the risk assessment stage, if you conclude that the risks are acceptable, with agreement from the regulator, you can end the process.

If there are unacceptable risks then remediation or mitigation is required. Follow stages 2 and 3 in order.

In stage 2 options appraisal, you will:

- look at the most feasible options
- produce a shortlist of options
- use evaluation criteria to assess them
- select which ones are the most suitable to take forward to stage 3

In stage 3 remediation and verification, you will produce a remediation strategy, do the remediation and then produce a verification report.

You will decide at the options appraisal stage if long term monitoring and maintenance is the remediation option. You may need to do post-remediation monitoring for further verification.

You can use the checklists provided at the end of stage to help you to include the required reporting information.

You may need to go back to a previous stage or section as you progress through LCRM. For example, changes in the remediation design may result in a need to go back to the risk assessment stage.

Who should use LCRM

LCRM is relevant to all those involved in or responsible for managing historic land contamination. These include:

- landowners
- regulators
- developers
- planners
- an ‘appropriate person’ under Part 2A
- consultants
- professional advisors such as a financial service provider
- remediation contractors

The person responsible for applying LCRM is expected to be appropriately competent in the tasks they are doing for each stage.

Competent person

For England, for you must use and meet the definition of a competent person given in Annex 2 of the National Planning Policy Framework (https://www.gov.uk/guidance/national-planning-policy-framework/annex-2-glossary).

For Scotland, you can use the definition given in Annex 2 of the National Planning Policy Framework (https://www.gov.uk/guidance/national-planning-policy-framework/annex-2-glossary). You are expected to be familiar with the current regulatory requirements for site assessment in Scotland.

For Northern Ireland, you must meet the professional skills and competencies given in section 4.0 in the Practice guide: redeveloping land affected by contamination (http://www.daera-ni.gov.uk/sites/default/files/publications/daera/Practice%20Guide%20-%20Redeveloping%20Land%20Affected%20by%20Contamination%20April%202019.pdf) on the Department of Agriculture, Environment and Rural Affairs website.

For Wales, see section 1.4 Choosing a competent consultant in Land Contamination: a guide for developers, Welsh Local Government Association (https://www.claire.co.uk/component/phocadownload/category/27walldocuments?%20download=960:developmentoflandaffectedbycontaminationdevelopersguidewlganrwandwelshgovernmentv4september2023).

For all other regimes, it is expected that you have appropriate knowledge, skills, experience and qualifications in the:

- specific area of LCRM you are doing
- type of contamination you are dealing with

You may demonstrate this with qualifications and experience in a specific technical or scientific discipline or application, or by multidisciplinary qualifications. These include for example:

- a Suitably Qualified Person (SQP) registered under the NQMS
- the SoBRA (https://sobra.org.uk/resources/reports/) accreditation scheme
- a Specialist in Land Condition (SiLC) (https://www.silc.org.uk/)
- chartered membership of a professional organisation such as a chartered geologist or scientist with sufficient experience of dealing with land contamination
- a specialist in the gas protection verification accreditation scheme (GPVS) (https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm/lcrm-before-you-start#GPVS)
- a consultant or regulator with relevant scientific qualifications and sufficient experience of dealing with land contamination

National Quality Mark Scheme

You can decide to use the National Quality Mark Scheme (NQMS) for reporting requirements. This is a voluntary scheme set up by the National Brownfield Forum and administered by CL:AIRE.

The Environment Agency, Natural Resources Wales, SEPA and the SoBRA accreditation scheme support its use.

The NQMS does not currently apply in Northern Ireland.

The scheme can provide increased confidence and ensure that the submitted reports are of the quality is expected.

You can use the NQMS for any type of land contamination report you produce.

The NQMS uses a SQP (https://www.claire.co.uk/projects-and-initiatives/nqms/83-supporting-sqp-process/271-what-is-a-suitable-qualified-person) who is an experienced professional in the field of land contamination.

The registered SQP will quality check your land contamination reports. They will:

- verify that all factual and interpretative information meets the required technical and regulatory standards
- provide a declaration that the reports have been checked and verified under the scheme

If you decide to use the NQMS you will:

- still need to get your reports reviewed by the relevant regulator
- have to pay a small administration fee

You can find more details about the NQMS on the CL:AIRE website.

For England, see position statement J9: NQMS for land contamination in the Environment Agency's approach to groundwater protection (https://www.gov.uk/government/publications/groundwater-protection-position-statements).

For Scotland, see the information note on the use of LCRM guidance in Scotland (https://www.sepa.org.uk/regulations/land/contaminated-land/technical-concepts/).

For Wales, see NQMS in Development of Land Affected by Contamination: A Guide for Developers (https://www.caerphilly.gov.uk/caerphillydocs/pollution/wlga_land_contamination_guide_for_developers.aspx).

Gas protection verification accreditation scheme

For ground gas membrane inspection, verification and reporting, you can use the Gas protection verification accreditation scheme (GPVS). This is a voluntary scheme administered by CL:AIRE. It applies to the practical installation of the gas mitigation measures and to the verification reporting process.

You can use the GPVS to:

- help you meet the technical and regulatory requirements
- provide confidence that you have managed any risks

You can find more details about the GPVS on the CL:AIRE website (https://www.claire.co.uk/projects-and-initiatives/gpvs).

Sustainability

The Environment Agency, Natural Resources Wales, NIEA and SEPA support a sustainable approach to land contamination risk management.

The industry-led Sustainable Remediation Forum UK (SuRF-UK) has produced a framework for assessing the sustainability of soil and groundwater remediation (https://www.claire.co.uk/projects-and-initiatives/surf-uk/20-framework-and-guidance/89-framework-document).

This framework complements LCRM's risk based approach.

It sets out why sustainability issues associated with remediation need to be factored in from the start of a project. This means from the preliminary risk assessment stage through to completion.

You can use the framework and supporting materials to help you to:

- identify at an early stage how you can embed sustainability at a number of key points in a site's redevelopment or risk management process
- make sure the process balances the environmental, social and economic impacts and generates maximum overall benefit
- factor in climate change impacts, including extreme weather events to ensure site works and any long term remediation is sustainably robust

Find more information on SuRF UK (https://www.claire.co.uk/projects-and-initiatives/surf-uk) on the CL:AIRE website.

You can also use BS ISO 18504: Soil quality – sustainable remediation (https://shop.bsigroup.com/ProductDetail?pid=000000000030275832). You will need to pay for this.

Defining the term 'land contamination'

The term 'land contamination' used in this guidance applies to:

- all land affected by contamination – land that might have contamination present which may, or may not, meet the statutory definition of contaminated land
- land determined as contaminated land under Part 2A of the Environmental Protection Act 1990

Causes of land contamination

Land contamination can be caused for example, by:

- historical pollution incidents such as accidents, spills, deposits from the air
- contamination from historical industrial land use
- historical mine workings
- contaminant migration overland or by infiltration into the ground
- high levels of naturally occurring substances
- historical waste deposits such as former landfills

You may need to manage potential land contamination:

- as part of a planning application for redevelopment
- as a Part 2A obligation
- as voluntary remediation
- as a regulatory requirement such as compliance with an anti-pollution works notice
- for building regulations
- for the purchase, transfer or sale of the land or property or to support funding decisions
- for valuation or insurance purposes
- where a decision has been made to deal with historic contamination identified through environmental permitting site condition reporting

If you are dealing with historic contamination identified through site condition reporting you can use the risk based approach set out in LCRM. See the section 'Do I need to remediate' in Environmental permitting: H5 Site condition report. (https://www.gov.uk/government/publications/environmental-permitting-h5-site-condition-report)

For new pollution caused by permitted activities you must follow the requirements in the section on 'Dealing with new pollution to soil and groundwater'.

You may need to address liabilities under the:

- Environmental Damage (Prevention and Remediation) (Prevention and Remediation) (England) Regulations
- Environmental Liability (Prevention and Remediation) Regulations (Northern Ireland)
- Environmental Liability (Scotland) Regulations
- Environmental Damage (Prevention and Remediation) (amendment) (Wales) Regulations

Developers, operators and landowners are expected to:

- prevent new pollution and if it occurs, clean it up quickly
- manage existing land contamination using the principles in this guidance
- seek specialist advice, if required

Dealing with new pollution to soil and groundwater

This section applies to England, Northern Ireland and Wales. For Scotland you must check with the SEPA (https://www.sepa.org.uk/) for their requirements.

Pollution is when any substance that harms or could harm people or the environment gets into the air, water or the ground.

Pollution of soil and groundwater can result from:

- an incident or accident
- spills and leaks
- poor handling and management of polluting substances
- breach of an environmental permit condition, other regulatory control such as a waste exemption or regulatory position statement

Pollution can harm these receptors:

- human health
- soil health
- groundwater, surface water and the environment
- animals and ecosystems
- buildings, services, equipment and assets on and off-site
- third party property

Your responsibilities

If you cause new soil or groundwater pollution, you must manage it promptly and effectively.

For England and Wales, see position statement J1: Promptly clean up new contamination in the Environment Agency's approach to groundwater protection (https://www.gov.uk/government/publications/groundwater-protection-position-statements).

If you are dealing with a pollution incident, it is expected that you are a suitably experienced and qualified contractor. For example. an accredited spill responder (https://isasaccreditation.org/) listed on the International Spill Accreditation Scheme website.

If you have caused the pollution, you must:

- identify the source of the pollution and prevent further harm to receptors
- remediate the pollution and any effects it has caused
- put measures in place to prevent it happening again
- comply with other legislation where applicable (for example, environmental permitting (https://www.gov.uk/guidance/check-if-you-need-an-environmental-permit) and environmental damage (https://www.gov.uk/government/publications/environmental-damage-prevention-and-remediation-regulations-2009-guidance-for-england-and-wales) requirements)

Report a pollution incident

You must report an incident immediately if polluting substances have entered or could enter a watercourse or soak into the ground. For example, from a ruptured tank, leaking pipe or uncontained spill.

Use the service for where the incident took place:

- England: report an environmental incident (https://www.gov.uk/report-environmental-incident)
- Wales: report an incident (https://naturalresources.wales/about-us/contact-us/report-an-incident)
- Scotland: report pollution (https://beta.sepa.scot/about-sepa/contact-us/)
- Northern Ireland: report polluted land and water (https://www.nidirect.gov.uk/articles/report-polluted-land-and-water)

Using LCRM

LCRM allows a risk based approach to assess and manage the risks from historic land contamination.

If you are dealing with a new pollution incident you can use some parts of LCRM.

These are:

- parts of the preliminary risk assessment in stage 1
- stage 2 options appraisal – to establish an appropriate remediation option
- stage 3 remediation and verification – to develop a remediation strategy, implement it and verify remediation has worked

The parts of the preliminary risk assessment stage you can use are:

- desk study and site walkover
- unexploded ordnance, ground gases and vapours
- identification of potential pollutant linkages
- conceptual site model
- intrusive site investigation
- chemical testing of soils
- rapid measurement techniques protocol

You are expected to be a competent person (https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm/lcrm-before-you-start#competent) to use LCRM.

These parts of LCRM allow a risk-based approach to establish if the risks from historic contamination are unacceptable:

- qualitative assessment of risks in the preliminary risk assessment
- generic quantitative risk assessment
- detailed quantitative risk assessment

You must only use these parts of LCRM when you are dealing with new pollution in exceptional circumstances.

Remedial works after a pollution incident

Unless there are exceptional circumstances the aim of remediation after a pollution incident is to make all reasonable efforts to:

- remove the pollution as far as is practical
- return the site to its original condition

In some cases, it may not be possible to remove all the pollution. For example, it may have migrated:

- beneath a building
- to a sensitive or ecological receptor
- along service or utility routes

Where removal is not practical, for any remaining residual pollution, you must:

- treat or immobilise it
- put right any harm the pollution may have caused
- mitigate the effects of any harm

In such cases, you can use the risk-based approach outlined in LCRM to assess if any residual pollution causes an unacceptable risk.

You must be able to justify leaving residual pollution in situ with the your regulator.

To remediate pollution, you can use the options appraisal and remediation and verification stages of LCRM.

You must have the relevant regulatory controls in place:

- for England, you must follow the types of regulatory controls (https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm/lcrm-stage-2-options-appraisal#types-of-regulatory-controls) given in the LCRM guidance, and check if you can use treating small volumes of contaminated soil and groundwater: RPS 215 (https://www.gov.uk/government/publications/land-contamination-pilot-trials-and-small-scale-remediation-schemes-rps-215) to remediate a pollution incident
- For Wales contact Natural Resources Wales (https://naturalresources.wales/about-us/contact-us/?lang=en) to find out if you can use their equivalent regulatory decision RD 073.
- For Northern Ireland contact the Northern Ireland Environment Agency (https://www.daera-ni.gov.uk/contacts/northern-ireland-environment-agency-contact) to find out the requirements.

Dealing with historic contamination

The land may already be contaminated from historical sources. Consider if the condition of the land could benefit from further remediation. This is to avoid any possible future requirements under other environmental protection legislation such as the Part 2A Contaminated land regime.

Dealing with historic contamination at the same time could save future cost, inconvenience and address other liabilities.

You can find out more on the ways of dealing with historic land contamination in LCRM: Before you start (https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm/lcrm-before-you-start) .

Using the National Quality Mark Scheme

If you are required to submit a report after remediating a pollution incident, you can decide to use the National Quality Mark Scheme. (https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm/lcrm-before-you-start#NQMS)

Keep records

Keep records of the pollution incident and the steps you took to deal with it.

Remedial works for permitted activities and pollution incidents

For some sites permitted under the Environmental Permitting (England and Wales) Regulations you must meet the requirements of Environmental permitting: Site condition report (https://www.gov.uk/government/publications/environmental-permitting-h5-site-condition-report).

If you need to remediate pollution caused by your permitted activities or for a pollution incident you must follow the guidance on dealing with new pollution to soil and groundwater.

Check with other regulators for their requirements.

Manage historic contamination

To manage historic contamination:

- identify the type and extent of contamination
- develop an initial conceptual site model
- assess the level of risk to receptors
- decide if that risk is unacceptable

If the risk is unacceptable you must:

- assess what remediation options are suitable
- plan and carry out remediation
- verify that remediation has been, and will continue to be, effective

If you need to remediate, consider:

- any regulatory and legal requirements such as fulfilling a planning condition, a Part 2A obligation or a wider water resources protection requirement
- the overall site objectives – which you will define in the preliminary risk assessment
- reasonableness of remediation – how practicable, effective and durable it is
- how technically feasible it will be
- the costs and time involved
- the views of stakeholders
- any uncertainties or limitations such as unexpected contamination, unknown sub-surface processes, complex hydrogeology or contamination, long-term changes in groundwater levels
- contaminant mobility due to climate change
- a sustainable approach

Consider the potential long term effects of climate change on the remediation. Some remedial techniques such as stabilisation may not be as durable if groundwater levels increase and the stabilised material becomes saturated.

Manage land contamination through the planning regime

For England see the:

- revised National Planning Policy Framework (https://www.gov.uk/government/collections/revised-national-planning-policy-framework)
- planning practice guidance (https://www.gov.uk/government/collections/planning-practice-guidance) which includes a guide on land affected by contamination (https://www.gov.uk/guidance/land-affected-by-contamination)

For Northern Ireland see Planning and land contamination (https://www.daera-ni.gov.uk/articles/planning-and-land-contamination).

For Scotland see:

- National Planning Framework 4 (https://www.gov.scot/publications/national-planning-framework-4/pages/3/)
- Planning Advice Note 33: Development of contaminated land (https://www.gov.scot/publications/pan-33-development-of-contaminated-land/)

For Wales see Planning Policy Wales edition 11 (https://www.gov.wales/planning-policy-wales).

Manage land contamination through Part 2A

For Part 2A in England you will need to evaluate if the presence of a substance (a contaminant) which is in or under the land has the potential to cause significant:

- harm or the significant possibility of significant harm to human health
- pollution or the significant possibility of significant pollution to controlled waters

In England, you must refer to the contaminated land statutory guidance (https://www.gov.uk/government/publications/contaminated-land-statutory-guidance).

Scotland has a different definition of contaminated land, where substances in, on or under the land have the potential to cause:

- significant harm or the significant possibility of significant harm (to the health of living organisms, ecosystems or to human property)
- significant pollution or the significant possibility of significant pollution to the water environment.

For Scotland, you must refer to SEPA's contaminated land (https://www.sepa.org.uk/regulations/land/contaminated-land/) page.

In Wales you must refer to contaminated land: guidance for local authorities (https://gov.wales/contaminated-land-guidance-local-authorities)

Local authorities and other regulators may also provide additional guidance.

Part 2A does not apply in Northern Ireland. See DAERA's guidance on contaminated land (https://www.daera-ni.gov.uk/articles/contaminated-land).

Manage radioactive contaminated land

In England and Wales, local authorities have a duty to inspect land under the Part 2A regime and have the power to determine land as radioactive contaminated land. Once local authorities determine a site as radioactive contaminated land other regulators can become involved.

If you suspect radioactive contamination, you must contact your local authority.

In Northern Ireland, NIEA are the main regulator for radioactive contaminated land. See DAERA's guidance on radiation (https://www.daera-ni.gov.uk/articles/radiation-overview).

In Scotland, SEPA are the main regulator for [radioactive contaminated land (https://www.sepa.org.uk/regulations/land/contaminated-land/#four)](https://www.sepa.org.uk/regulations/land/contaminated-land/#four). If you suspect radioactive contamination, you must contact them.

Quality of information and degree of confidence

As you progress through LCRM, the range and level of information you collect will need to meet appropriate quality criteria. It must be:

- relevant to the stage, tier or step you are doing
- reliable in reflecting true or likely conditions
- transparent in meaning and origin
- sufficient for the required degree of confidence
- robust for decision making

You must understand the degree of confidence needed for each decision. For example, regulatory decisions will need a high level of certainty to ensure compliance and that risks have been satisfactorily assessed.

The degree of confidence required will be site-specific. Greater hazards or more sensitive receptors will need a high degree of confidence. The quality of data you collect will affect later stages of LCRM.

Uncertainties and limitations

Land contamination is often not visible. In many cases you will have to base your assessment on the prediction of risk. When you collect data and analyse it, you must identify any uncertainties and limitations of that data and any possible consequences.

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

You may find uncertainties about:

- the presence or extent of the contamination
- subsurface geology and groundwater conditions
- analytical and sampling results
- how realistic model results are
- the potential impacts of extreme weather events and climate change
- if in practice, a particular treatment option will reduce or control risks to the required level

You may be able to reduce or clarify some uncertainties. For example, you can:

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

Other uncertainties may only need a qualitative characterisation such as setting high, medium or low degrees of confidence on information or judgements.

You must record all uncertainties and limitations and identify the possible consequences of these throughout the risk management process.

Communicate the risk

The potential or actual presence of contamination may have consequences for a wide range of people. This includes the local community, residents, organisations and businesses.

They may have concerns about:

- the potential risk to human health, animals and the environment
- the impact on property values
- possible short and long term disruption

Keep these parties informed of any risks and proposed works throughout each stage.

You may need to develop a risk communication strategy. For guidance see INFO PM3: communication (https://www.claire.co.uk/useful-government-legislation-and-guidance-by-country/203-communication-info-pm3) on the CL:AIRE Water and Land Library.

British Standards and other guidance you can use

British Standards and the Construction Industry Research and Information Association (CIRIA) guidance have been referenced where their use is relevant. You may have to purchase British Standards and CIRIA guidance. There may be other standards and guidance you can use.

The general investigation standards are:

- BS 10175: Investigation of potentially contaminated sites – code of practice (https://shop.bsigroup.com/ProductDetail?pid=000000000030362551)
- BS 5930: Code of practice for ground investigations (https://knowledge.bsigroup.com/products/code-of-practice-for-ground-investigations)

For conceptual site models see BS EN ISO 21365: Soil quality – Conceptual site models for potentially contaminated sites (https://shop.bsigroup.com/ProductDetail?pid=000000000030364954).

Soil quality standards include:

- BS EN ISO 15175: Soil quality – characterisation of contaminated soil related to groundwater protection (https://shop.bsigroup.com/ProductDetail?pid=000000000030338450)
- BS EN ISO 16133: Soil quality – guidance on the establishment and maintenance of monitoring programmes (https://shop.bsigroup.com/ProductDetail?pid=000000000030352176)
- BS ISO 18400 series – Soil quality sampling series (https://landingpage.bsigroup.com/LandingPage/Series?UPI=BS%20ISO%2018400)
- BS ISO 15800: Soil quality – characterisation of soil with respect to human exposure (https://shop.bsigroup.com/ProductDetail?pid=000000000030368502)
- BS ISO 18504: Soil quality – sustainable remediation (https://shop.bsigroup.com/ProductDetail?pid=000000000030275832)

Water quality sampling standards include the documents under BS 5667. This is a multipart document and includes for example:

- BS ISO 5667-11: Water Quality, Sampling – Guidance on sampling of groundwaters (https://shop.bsigroup.com/ProductDetail?pid=000000000030152313)
- BS ISO 5667-22: Water Quality, Sampling – Guidance on the design and installation of groundwater monitoring points (https://knowledge.bsigroup.com/products/water-quality-sampling-guidance-on-the-design-and-installation-of-groundwater-monitoring-points/standard)
- BS EN ISO 5667-6: Water Quality, Sampling – Guidance on sampling of rivers and streams (https://knowledge.bsigroup.com/products/water-quality-sampling-guidance-on-sampling-of-rivers-and-streams/standard)

Ground gas standards and guidance include:

- BS 8485: Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings (https://shop.bsigroup.com/ProductDetail?pid=000000000030377237)
- BS 8576: Guidance on investigations for ground gas – permanent gases and volatile organic compounds (https://shop.bsigroup.com/ProductDetail?pid=000000000030248027)
- CIRIA C665: assessing risks posed by hazardous ground gases to buildings (https://www.ciria.org/ItemDetail?iProductCode=C665&Category=BOOK&WebsiteKey=3f18c87a-d62b-4eca-8ef4-9b09309c1c91)
- CIRIA C735: good practice on the testing and verification of protection systems for buildings against hazardous ground gases (https://www.ciria.org/ItemDetail?iProductcode=C735&Category=BOOK)

For unexploded ordnance you can use CIRIA C681: Unexploded ordnance (UXO) – a guide for the construction industry (https://www.ciria.org/ItemDetail?iProductcode=C681&Category=BOOK).

For England, you can also refer to the land contamination: technical guidance (https://www.gov.uk/government/collections/land-contamination-technical-guidance).
