

# GROWING FOOD - HOW SAFE IS YOUR LAND?

How to Assess and Deal with  
Potential Land Contamination



Guidance for Communities and  
Individuals Involved in Food Growing

# **GUIDANCE FOR THE ASSESSMENT OF LAND CONTAMINATION FOR COMMUNITIES AND INDIVIDUALS INVOLVED IN GROWING FOOD**

## **INTRODUCTION**

These notes have been prepared to offer assistance and guidance to communities and individuals in England and Wales, who are planning or are involved in food growing activities in areas where an assessment of potential land or soil contamination may be necessary.

The guidance is presented in the form of frequently asked questions (FAQs) and answers. We hope that the most important points have been covered; however this should not be regarded as a comprehensive assessment document. This is an area which is controlled by regulations, and solutions often involve the application of specialised techniques. We have therefore, in relevant parts, gone into some detail of the rules and regulations and the technical aspects of contaminated land control. If in doubt, further advice should be sought from your local authority.

The questions we have attempted to address are:

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## ➤ Q1. What is contaminated land and why is it important to our project?

**Answer.** When choosing a site for your project, there are a number of factors that need to be considered. One of the most important of these is the historical use of the land. If your site or project is situated on land that in the past was used for industrial activities, or is in the immediate vicinity of past or current industrial activities, there may be a possibility that it could be contaminated.

The Environment Agency has estimated that there may be some 300,000 hectares of land in the UK affected, to some extent, by industrial or natural contamination. The true extent of land affected by contamination is not known, but it is expected that only a small proportion of potentially contaminated sites pose an immediate threat to human health and the environment.

This will directly be of concern to you if: -

- you plan to keep livestock and consume, donate or sell your own produce.
- you plan to grow and consume the produce from your own site or project.

## ➤ Q2. How is contaminated land identified?

**Answer.** All local authorities are required by the Environmental Protection Act (EPA) 1990, amended by section 57 of the Environment Act, 1995 to identify contaminated land.

In the United Kingdom, land affected by contamination is normally subject to a risk assessment to determine whether there is significant risk to human health, the environment, water bodies or property.

This is done by considering three key factors:

1. Is there a **source** of contamination - i.e. are hazardous substances present?

2. Is there a **receptor** on the site that could be affected by these substances - such as human beings, rivers, streams and groundwater used for drinking ("controlled waters") and property including crops, produce, animals, and buildings?

3. Is there a **pathway** from the source to the receptor?

This could be through consuming contaminated food grown on the site, breathing in contaminated dust or drinking water contaminated by the source.

A risk to human health only exists if **all three** factors are present and the link is significant. If there is a source of contamination, but no pathway to a receptor, there is no risk of contamination.



## ➤ Q3. How can we tell if our site is contaminated?

**Answer.** There are four ways in which you can obtain information regarding potential contamination at your site:

### 1) Contact the local authority

Since April 2000 local authorities in England have had a duty to identify potentially contaminated land in their areas and by July 2001, have been required to produce a Contaminated Land Inspection Strategy.

As a result, many Councils are currently in the process of gathering information to identify land, which requires further investigation. Whilst a lot of the information will be drawn from publicly available sources, your local council is a good place to start your enquiries. The department with responsibility for dealing with contaminated land will vary from council to council. However, it is more than likely to be either the Environmental Health or Planning Departments.

Whilst many Councils provide environmental information, they may charge for the service. If you are currently using a site and are concerned that it may be contaminated, it may be beneficial for you to approach the council for advice, as this will minimise any cost you may incur. Alternatively, if you are thinking about future use of a site, then asking if the council is aware of any reason why the land would not be suitable for growing vegetables and fruit for human consumption, may also avoid a charge. In either case it would be better if you had a reason for your concern e.g. the appearance of the site or some knowledge of a previous industrial use.

It is also worthwhile finding out if there are or have been any businesses close by that are or were allowed to discharge polluting substances into the air or local streams, lakes or ponds, as this may also affect the safety and quality of your produce. You can do this by approaching your local authority, which should be able to tell you about any processes for which they have enforcement responsibility and which are the responsibility of the Environment Agency. Your local authority will also be aware of previous pollution incidents in the area and how they were dealt with.

## **2) Contact the Environment Agency**

The local authorities are the primary source of information on land contamination as they will be gathering and updating information on local sites. However, the Environment Agency's website at [www.environment-agency.gov.uk](http://www.environment-agency.gov.uk) contains a section called "What's in your backyard". This section will tell you if there are any process industries or landfills in the immediate vicinity of your site. If you contact



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the Environment Agency's Customer Services in writing and include the grid reference for your site, they will inform you of any records of pollution incidents or discharge consents at or in the immediate vicinity of your site. You will be informed if there are any charges for providing this information. Requests should be made to your local Environment Agency area office. The regional offices will be able to tell you which area office to contact. Contact details for regional offices are provided at the end of this document.

## **3) Desk research - Find out the history of the site**

Some desk-based research may well identify changes in land use for your site. Central libraries often have a Local History section, which should contain historical Ordnance Survey maps. These date back to the 1850's and are a useful source of information, often naming the types of industry present at that time. Pay particular attention to where old quarries, sand, gravel and clay pits, and stream valleys are mentioned as these may have been used as tips for domestic or industrial waste and may be cause for concern. Local trade directories and other records may also be useful, as could talking to people who have lived in the area for a long time. The Internet is also worth exploring and your local library should have an access point. However any information found on the Internet should be verified with a reliable source.

#### 4) Visual assessment

Having identified potential areas or sources of contamination, a visual assessment may identify potential problem areas on the ground. The presence of groundwater, building rubble, old foundations, backfilled areas and subsidence, all indicate areas potentially requiring further assessment (and testing).

### ➤ Q4. What are the main contaminants and what hazard do they pose?

**Answer.** Once you have some indication of the nature of the previous use of the land, it is possible to obtain an idea of the potential contaminants. Different industries produce specific kinds of contaminants. The table below gives a guide to the types of land uses, associated contaminants and some of the problems they can pose.

Previous industrial land use	Examples of contaminants present	Potential problems
Metal mining, treating and refining, engineering works, scrap yards and ship breaking sites	Metals e.g. cadmium, arsenic, lead, mercury, copper, nickel, and zinc	<ul style="list-style-type: none"><li>• Inhalation of contaminated dusts</li><li>• Ingestion of contaminated crops</li><li>• Plant growth may be restricted if the roots take up metals</li></ul>
Chemical works and refineries, tar distilleries	Oily and tarry substances, phenols	<ul style="list-style-type: none"><li>• Skin irritation may be caused by contact</li><li>• Organic vapours may cause respiratory complaints</li><li>• Pollution of water supplies, streams and groundwater</li></ul>
Made ground, including blast furnace slags	Sulphates, chlorides, acids	<ul style="list-style-type: none"><li>• Building materials, e.g. concrete foundations, weakened by chemical attack</li></ul>
Gasworks, power stations, railway land	Coal and coke dust	<ul style="list-style-type: none"><li>• Ignition in the ground</li></ul>
Construction and waste disposal sites	Asbestos	<ul style="list-style-type: none"><li>• Release of airborne fibres</li></ul>
Old waste tips and in-filled dock basins	Landfill gases, e.g. methane and carbon dioxide	<ul style="list-style-type: none"><li>• Plant dieback</li><li>• Accumulation to hazardous concentrations in confined spaces</li></ul>
Agriculture	Biological contamination, pesticides etc	<ul style="list-style-type: none"><li>• Pollution of water supplies, streams and groundwater</li></ul>
Landfill	Landfill Gases (some of the above mentioned contaminants may also be present, depending on the type of landfill)	<ul style="list-style-type: none"><li>• Plant dieback</li><li>• Accumulation to hazardous concentrations in confined spaces</li></ul>

Many of these substances accumulate or persist in the soil and may then enter the human food chain when we consume plants grown on the soil, when we eat food from animals that have grazed on the site or have consumed feed that has been grown on it. People can also be exposed to these substances by direct contact with the soil itself, by inhalation of dust or gases at the site, or by directly ingesting soil by hand-to-mouth contact.

More specific details and technical advice on contamination associated with different industries is available in a series of Industry Profiles publications. These are available from the Department of Transport, Local Government and the Regions, Publication Sales Centre, Camber Town House, Goldthorpe Industrial Estate, Goldthorpe, Rotherham, S63 9BL (Tel: 01709 891 318), at a cost of £10 each. Copies may also be held at your local university library.

The Code of Good Agricultural Practice for the Protection of Soil (also known as The Soil Code), contains a useful section on soil contamination and is available FREE from DEFRA publications, Admail 6000, London SW1A 2XX (08459 556 000, quote reference PB0617).

## ➤ Q5. What about carrying out tests?

**Answer.** Having gathered all this information, you may want to consider whether tests need to be carried out to check whether contaminants are present and the level of contamination.

Testing soils, food and other materials for contaminants is complex and good quality sampling and analysis is essential. Testing should be carried out by organisations with relevant experience and expertise, preferably one that is accredited for this type of work (such as UKAS / NAMAS\*). The first step is to seek expert advice from your local authority. They may have already tested the site, or may have plans to do so. If not, they might consider testing in light of information from your investigation. Your local authority Environmental Health Department should know of accredited laboratories where soil or food can be tested. Failing this, look in the Yellow Pages under Soil, Site Investigation, Laboratory Facilities and Science and Research Consultants.

It is important to note that testing can be costly, therefore to make best use of your resources, consider carefully how you approach the issue of testing, and whether other interested parties might be prepared to contribute to the costs or carry tests out themselves. For example, it is worth approaching a local university, which may have soil testing laboratories and may be interested in the tests as part of a student research project. If your food-growing project is still at the planning stage, it is advised that costs of testing are built into your project proposal.

Another question to consider is what to test. Soil contamination can be very patchy, so it is important that any samples collected for testing give a realistic picture of the contamination across the site or the parts that may be affected. Testing representative samples of the soil, prior to conducting more comprehensive testing, may be more cost effective as a first step, because if the results show that levels of contamination are not high enough to pose a risk, then no further testing may be required.



\* UKAS - United Kingdom Accreditation Service  
NAMAS - National Accreditation of Measurement and Sampling

However, if soil tests or other information does suggest that significant levels of contamination are present, then it may be necessary to test foods from the site as well, in order to allow an accurate assessment of any potential risks from potentially contaminated food. Sampling soils and foods at the same time can be cheaper overall. It should be noted that if soil tests do show significant risks due to contamination, you should contact your local authority, as they may wish to take on further testing and investigation under their Contaminated Land Inspection Strategy.

## ➤ Q6. How to interpret the findings

**Answer.** The chemical analysis of your soil samples may indicate the presence of contamination. However, the levels found may not be high enough to cause harm. Therefore, the land may not be determined to be contaminated land. In other words, there is a difference between land that is impacted by contamination and the legal definition of "Contaminated Land". Land is only defined as contaminated if there is a "significant pollutant linkage". This requires evidence of not only the contaminant being present but also of a receptor and an exposure pathway. In addition, the type of harm that the receptor (e.g. humans) could suffer must meet the descriptions of "significant" given in the statutory guidance.

Although the contamination at the site may not be obviously causing harm to humans there may still be a possibility that the contaminants present could, in the long term, pose a risk of significant harm to humans. To determine if this is the case, a site-specific risk assessment should be carried out. A qualified professional in the area of human health risk assessment should carry out this type of assessment. The risk assessment will involve the use of contaminant levels found at your site in conjunction with published toxicity data for those contaminants and exposure pathway data (e.g. contact rate to contaminants in soil during digging etc.) to evaluate the significance of any levels of contaminants found.

The Environment Agency is in the process of producing guideline values for a number of priority contaminants. The contaminant levels found at your site can be compared to those which will be published by the Agency to determine if a potential problem exists. If the contaminant levels found at your site are higher than the guideline values then a more detailed site-specific risk assessment for your site may need to be carried out to determine the extent of the problem.

## ➤ Q7. What if our land is contaminated?

**Answer.** Dealing with land contamination is a complex topic. The prime objective will be to ensure that your land is suitable for use. This will not always mean that it will be cleaned-up. The possible options that might be considered are:

- The contamination (source) will be removed e.g. the land will be remediated sufficiently to remove the risk of harm and ensure the land is suitable for use.
- The receptor is protected from exposure to contamination by restricting or modifying behaviour e.g. use of the land is stopped or changed.
- The pathway will be broken or intercepted as a means of restricting contamination movement along the pathway e.g. the use of a barrier such as a thick layer of clean soil will be laid across the site. The actual method selected will depend on the particular case in hand.

## ➤ Q8. Who pays?

**Answer.** From July 2001, all local authorities were required by the Government to have a Contaminated Land Inspection Strategy in place. This will ensure that formal notice of any contaminated sites is given and appropriate person(s) with responsibility for any remediation are identified. Responsibility is determined as follows:-

- If you have caused or permitted the contamination, then you will be liable to remediate the land as part of the “polluter pays” principle.
- If you have not caused the contamination, but your project owns the site, you may be liable if the person who caused the pollution cannot be identified.
- If your project does not own the land, but already occupies it as a tenant or licensee, you may still be liable if the polluter cannot be identified.
- If you take on a site that is found to be contaminating, or subsequently proves to be contaminating, you or your group may have a liability. (This includes leachate from your site contaminating water supplies.)

The local authority will decide what remediation is required and ensure that it takes place. This will be done in consultation with other relevant organisations such as the Environment Agency and Food Standards Agency as necessary.

Details of the site and its contamination, along with any remediation action taken will be entered onto a Public Register. This will be kept by the local authority or the local Environment Agency and will be available for public inspection.

## ➤ Q9. How may the land or site be treated?

**Answer.** Certain levels of contamination may require remediation, while for lower levels of some substances, a change of use or change of techniques used on the site may be enough. The approach taken will be site-specific and will depend on factors such as the nature of the contamination, volume of material affected and the site conditions. Some of the different clean up techniques are described below.

**“Dig and dump”** - the contamination is excavated and removed to a licensed landfill site. Clean soil may then be brought in.

**Biological treatments** - these include:

- Biodegradation - bugs (bacteria) in the soil break down the contaminant to less harmful substances. The bugs are either naturally present in the soil or can be added especially to carry out the remediation.
- Phytoremediation - use of green plants that take up the contamination, are then harvested and disposed of. Indian mustard (*Brassica juncea*) has been shown to be an efficient plant for this purpose. Specifically designed common reed beds can be used for effluent polishing.

**Barrier methods** - the source of contamination can be sealed using barrier walls and coverings made of clay-like materials and special fabrics.

**Chemical treatments** - these work by adding chemicals to the soil to destroy, stabilise or concentrate toxic compounds.

**Physical treatments** - these include washing the soil to remove soluble contamination and removing hazardous vapours within the soil.

**Thermal treatments** - use heat such as incineration and thermal desorption to remove, destroy or immobilise soil contaminants.

**Stabilisation treatments** - chemicals are added which react with the soil contaminants, converting them to a less toxic and more stable form.

**Solidification treatments** - chemical reagents are mixed with the soil which then sets as a firm mass, immobilising contaminants.

These last five techniques are more likely to be used on sites that are heavily contaminated and are expensive.

### ➤ **Case Study - Halliwell Food Plot, Bolton**

The Halliwell Food Plot is a community food growing scheme in a deprived area of Bolton. It has been running for nearly four years with help from the Wildlife Trust for Lancashire, Manchester and North Merseyside.

Before any growing or recycling could begin, there was the small matter of the soil, or rather the toxic waste left behind by two centuries of mining and industry. Arsenic and lead were found in significant quantities and a major exercise in research and remediation began. With help from Manchester Metropolitan University, it was discovered that relatively small amounts of heavy metals were getting into the food grown. To reduce this even more, the worst soil was scraped to one side and planted up as a wildlife haven, the remaining soil was mixed with compost and imported soil to reduce metal levels by 75% and provide an excellent growing medium.

The soil is regularly tested to see what the current situation is.

The biggest problem during the whole process was getting access to information. There seemed to be no central point and the information available was often confusing and conflicting.

We have now learnt that by keeping the soil well limed, well drained and planted up we can avoid any problems and eat tasty, high quality, safe food for centuries to come. This research will be useful for other groups reclaiming other derelict urban sites for years to come.

### ➤ **Q10. Is there anything we can do ourselves?**

**Answer.** A number of measures can be taken to reduce the transfer pathways and so mitigate the problem of soil contamination. Whatever action you decide to take should be done in consultation with the relevant experts and authorities.

**Good basic hygiene** - including washing hands after working at the site, washing produce thoroughly and avoiding carrying dirt and soil from the site into the home - will help to reduce exposure to any contaminants in soil. This is good practice whether the site is contaminated or not!

Below are some fairly simple measures that may be helpful depending on the situation of your site. Not all methods will be suitable for all cases and



appropriate options will depend on the contaminants present and the particular situation at the site. It is important to get expert advice on which measures may be appropriate or helpful.

Application of lime to **raise the pH** of the soil has been shown to decrease the availability of some heavy metals for uptake by plants (especially cadmium, also zinc, copper and lead). However, it can increase the availability of other contaminants so its usefulness will depend on the types of contaminants present.

**Addition of manure** to the soil can also decrease the availability of some metals.

In general "leafier" crops such as lettuce may take up certain contaminants to a greater degree, whereas seeds, beans, peas, melons, tomatoes and peppers show low uptake of some contaminants.

For many contaminants, including heavy metals, soil and dirt on the outer surfaces of fruit and vegetables - particularly leafy and root vegetables - makes a significant contribution to overall levels of contamination of the crop, often more than from uptake of the contaminants from the soil into the plant. **Thorough washing** of fruit and vegetables to remove soil and dirt will reduce surface contamination and is good hygienic practice. Peeling produce such as root vegetables is very effective in further reducing contamination.

Some contaminants can be taken up by animals when they eat (either on their food or in soil they take up as they feed) and which can then be transferred into their meat, milk or eggs. Contamination of meat and animal produce may be reduced by measures such as preventing animals from gaining access to contaminated areas, providing 'clean' feed supplies for animals or avoiding grazing animals where grass is sparse or bare to avoid excessive ingestion of soil by the animals.

It is not adequate simply to put a layer of clean soil on the top of contaminated soil, as the layers will eventually mix. If this approach is taken, put a barrier such as a layer of plastic sheeting between the contaminated and clean soil layers. Other barriers include high-density polyethylene sheet (which is robust) and natural clay. The clean soil layer should be at least 0.5m deep or grow very shallow rooted plants.

Vegetables can be grown in raised beds filled with clean soil with a net in the bottom to allow water and worms to circulate. The raised beds should be at least 0.5m deep.

If you are worried about air-borne pollution contaminating your soil or crops, keep the soil covered with mulch and try to erect a barrier, such as a substantial hedge between your site and the source of pollution.



### ➤ **Q11. Are our children safe, playing or digging in the soil?**

**Answer.** Children, especially young children, tend to have more hand to mouth contact than adults and therefore can be exposed to contaminants in soil by direct ingestion of and contact with soil. Irrespective of any contamination, it is important that before eating or undertaking other activities, hand washing is strictly and effectively carried out. Children should be encouraged to understand the need for basic hygiene. Adults should set the example.

## ➤ Q12. What can we do to prevent the site from becoming contaminated?

**Answer.** If you think that a nearby activity or industry may present a risk of contamination to your site, you should contact the local authority, which will decide whether the site should be inspected. People using the site can also help to ensure they do not cause contamination themselves, by using the site responsibly and by following basic good agricultural practice and common sense. For example:-

- consider using organic production methods, which do not use artificial pesticides or fertilisers;
- if you use pesticides or other crop treatments, only use products that are approved for the intended use and follow the manufacturers instructions on storage, use and disposal;
- do not dispose of waste or rubbish carelessly on the site;
- do not burn dangerous materials like plastics and metals at the site;
- if fertilisers are used, use products that are suitable for the intended use and follow any instructions on storage, use and disposal;
- if you use manures or organic matter, be aware that they may contain harmful micro-organisms such as *Salmonella* and *E. coli* O157. Follow good agricultural practice to minimise any risks of produce being contaminated, particularly when ready to eat crops are being grown e.g. salads, fruits and some vegetables.

## ➤ Q13. Where can I obtain further information?

**Answer.** We have already referred to some publications and contacts. Others that may be helpful include:-

**City Harvest**, Sustain, 94 White Lion Street. London N1 9PF, June 1999

Website: [www.sustainweb.org](http://www.sustainweb.org)

**Growing Food in Cities**, National Food Alliance (now Sustain), 94 White Lion Street, London N1 9PF, 1996

**Contaminated Soil in Cities**, Programme for Nutrition Policy, Infant Feeding and Food Security, World Health Organisation Regional Office for Europe, Scherfigsvej 8, 2100 Copenhagen, Denmark. Copies available at [www.who.dk/nutrition/Documents.htm](http://www.who.dk/nutrition/Documents.htm)

**Contaminated Soil in Gardens**, Programme for Nutrition Policy, Infant Feeding and Food Security, World Health Organization Regional Office for Europe, Scherfigsvej 8, 2100 Copenhagen, Denmark. Copies available at [www.who.dk/nutrition/Documents.htm](http://www.who.dk/nutrition/Documents.htm)

**Food Standards Agency**, Chemical Contaminants & Animal Feed Division, Room 703, Aviation House, 125 Kingsway, London, WC2B 6NH

Tel. 020 7276 8000

Website: [www.food.gov.uk](http://www.food.gov.uk)

**Soil Association**, Bristol House, 40 - 56 Victoria Street, Bristol BS1 6BY

Tel: 0117 929 0661

e-mail: [info@soilassociation.org](mailto:info@soilassociation.org) Website: [www.soilassociation.org](http://www.soilassociation.org)

## ➤ **Q14. What sources of support are available to help groups like ours?**

**Answer.** You may be able to get a grant to help with your site assessment and testing. Possible sources of support include:-

- Your local authority
- Landfill Tax Credit Scheme

Contact Entrust on 0161 972 0044 ([www.entrust.org.uk](http://www.entrust.org.uk)) for criteria and eligibility.

**REMEMBER THESE ARE GUIDANCE NOTES ONLY AND IF IN DOUBT SEEK EXPERT ADVICE.**

## APPENDIX 1

### ENVIRONMENT AGENCY REGIONAL OFFICES IN ENGLAND

<b>Anglian Regional Office</b>	Kingfisher House Tel: 01733 371811 Goldhay Way Fax: 01733 231840 Orton Golhay Peterborough PE2 5ZR	Tel: 01733 371811 Fax: 01733 231840
<b>Midlands Regional Office</b>	Rivers House 21 Park Square South Leeds West Yorkshire LS1 2QG	Tel: 0121 7112324 Tel: 0121 7115824
<b>North East Regional Office</b>	Rivers House 21 Park Square South Leeds West Yorkshire LS1 2QG	Tel: 0113 2440191 Tel: 0113 24618890
<b>North West Regional Office</b>	PO Box 12 Richard Fairclough House Knutsford Road Latchford Warrington Cheshire WA4 1LD	Tel: 01925 653999 Fax: 01925 415961
<b>Southern Regional Office</b>	Guildbourne House Chatsworth Road Worthing Sussex N11 1LD	Tel: 01903 832000 Fax: 01903 821832
<b>South West Regional Office</b>	Manley House Kestrel Way Exeter Devon EX2 7LQ	Tel: 01392 444000 Fax: 01392 444238
<b>Thames Regional Office</b>	Kings Meadow House Kings Meadow Road Reading Berkshire RG1 8DQ	Tel: 0118 9535000 Fax: 0118 9500388



COMPILED BY THE NORTH WEST FOOD & HEALTH TASK FORCE WITH HELP  
AND ASSISTANCE FROM THE FOLLOWING ORGANISATIONS AND INDIVIDUALS:-  
Environment Agency, Food Standards Agency, Federation of City Farms and Community Gardens,  
Stockport Metropolitan Borough Council, Chemical Incident Response Service and Mandy Oliver

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