This Guide has been compiled by The Grow Your Own Working Group, with support from:

Central Scotland Green Network Trust, the Federation of City Farms and Community Gardens, Scottish Natural Heritage, Scottish Allotments and Gardens Society. James Hutton Institute, Scottish Government, greenspace scotland, Nourish, Lochend Community Growing project, Concrete Garden, Greenlink Allotments, Motherwell, and Renfrew Association of Growers and Gardeners.

Central Scotland Green Network

Federation of City Farms & Community Gardens

Scottish Natural Heritage
Dualchas Nàdair na h-Alba
All of nature for all of Scotland
Nàdar air fad airson Alba air fad

Scottish Allotments & Gardens Society

Grow Your Own SCOTLAND

The Scottish Government
Riaghaltas na h-Alba

greenspace scotland

The James Hutton Institute

Guide for growing

on land which may be contaminated

Contents

Introduction

The aim of this guide is to provide expert, technical information to help community groups who want to grow food to assess and tackle the issue of soil contamination. The information in this guide will also be useful to landowners, local authority officers and people who are supporting community groups who want to grow on potentially contaminated land.

Community gardens, allotments and other types of community growing are beneficial to people's health, local environment and community development, and community growing is becoming increasingly popular. Wherever this takes place, however, the probability is someone has occupied the land beforehand. In many cases previous activities were benign. However, in some cases previous activities (e.g. industrial activities) will require community groups to take action before starting to grow food crops.

The issue of soil contamination in relation to food growing is complex. Levels of contamination that are safe for other land uses, such as ornamental gardening, public parks or community woodlands are not necessarily safe for growing food for consumption. To add further complexity there are also some sites where it is safe to eat some types of vegetables grown there but not others. This guide aims to help community groups decide if their land has the potential to be contaminated, how to test for contamination, and how to deal with the different levels of contamination and still grow food. It gives community groups advice on how to carry out some of this work themselves, although some landowners or Local Authorities will require independent and/or professional assessments to be done as well. This can cost a group anything from a few hundred pounds up to a few thousand, depending on the level of detail needed. Seeking professional advice is recommended, though if your own initial investigations suggest contamination is likely, it might be quicker, easier and cheaper simply to plan to use Level 3 Action (see Page 15) rather than go through a soil testing process.

This guide will help you take the first steps yourself and then decide if it is worth spending the money getting professional surveys done – you may decide to try a different site, or simply use containers and raised beds. Environmental consultants, soil contamination specialists, and soil testing laboratories can all provide advice and undertake work on behalf of your group. They will charge a fee for this, and how much depends on the level of work or analysis you ask them to undertake. If you have any concerns over making decisions yourself, we always recommend contacting a suitably qualified individual for advice.

A word of caution:

Please remember that this is a guide only, and expert advice should be sought when looking into soil investigation, soil testing and interpreting the results.

It is not always possible to trace who has caused soil contamination on any site. For example, the contamination could have taken place decades or even centuries ago. The responsibility for addressing soil contamination also varies from site to site, but usually falls to the landowner or in some cases the leaseholder. Any community group wishing to purchase or lease a particular piece of land must check their position carefully before committing. A landowner who has suspicions that their land may be contaminated may refuse to allow investigation to take place. It may, therefore, be worth looking straight into Level 3 Action growing techniques. The responsibility for ensuring that food grown on a site is fit for human consumption lies with the food grower. It is therefore important that groups looking to grow food are aware of, and consider, soil contamination.

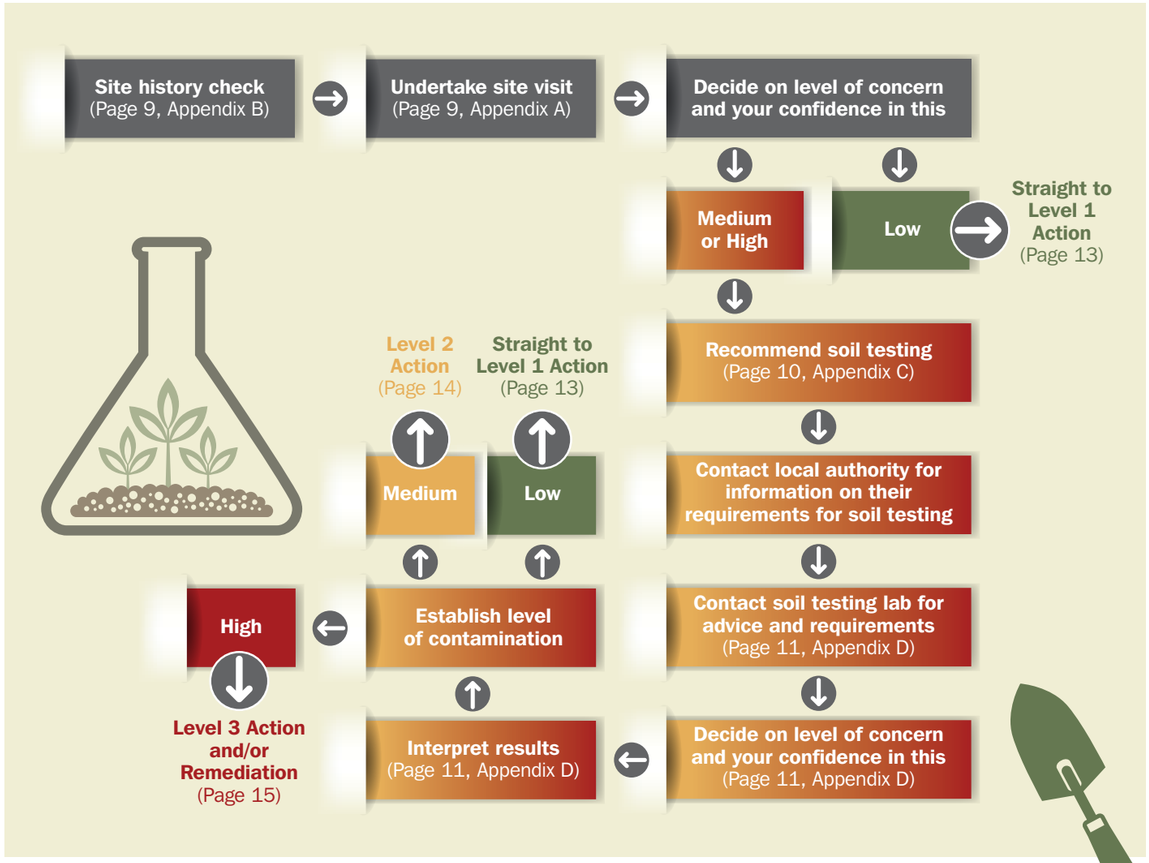
The information in this Guide has been drawn from reliable sources and best practice on soil contamination however the guide does not constitute legal or professional advice and the authors cannot accept any liability for decisions arising from its use.

How to use this guide

The guide follows three basic steps:

1. **Establishing the level of concern (i.e. potential for contamination)**
2. **Testing the soil and interpreting the results**
3. **Deciding on mitigation and remediation methods to allow food growing on site.**

Flow chart for establishing the contamination & appropriate mitigation or mediation for food growing



The flow chart above represents the processes for any community group to go through when taking on a new piece of land. More details on each step are given in the relevant page of the guide. There are also four case studies of groups who have tackled the issue of soil contamination on their site and have taken the necessary steps to enable them to use the site for food growing.

Acknowledgments

Much of this guide is based on information from the Toronto Public Health: Guide for Soil Testing in Urban Gardens and the Environment Agency: Growing Food – How safe is your land?

Invaluable advice has been provided by The Food Standards Agency Scotland, BGS, SEPA and the Scottish Government.

Thanks also go to the contributors for the case studies.

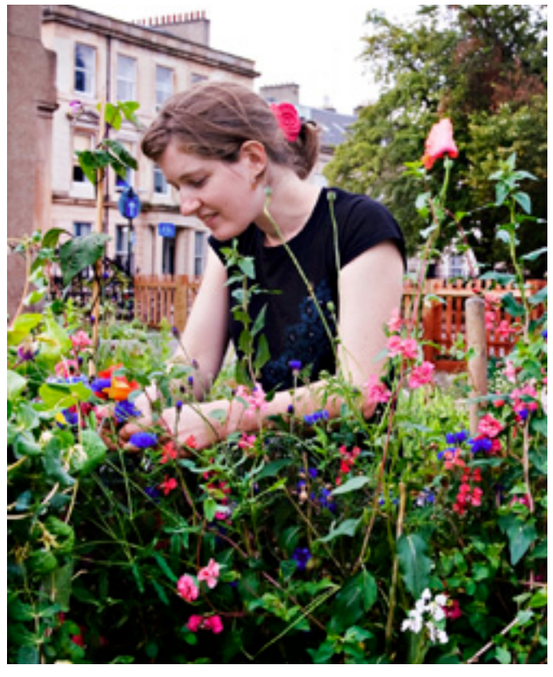
What is contaminated land and why is it important to our project?

'Contaminated land' is sometimes used in general terms to describe land polluted by historic contaminative activities. Contaminants include (but are not limited to) heavy metals (e.g. arsenic, cadmium, lead), oils and tars, chemical substances (e.g. solvents), gases, asbestos, etc.

'Contaminated land' also has a very specific statutory definition as 'any land which appears to the Local Authority, in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:

- **Significant harm is being caused or there is significant possibility of such harm being caused; or**
- **Significant pollution of the water environment is being caused or there is a significant possibility of such pollution being caused.**

This definition tends to refer to contamination caused by past uses of a site, such as former factories, mines, steelworks, refineries and landfills.



Land becomes identified as 'contaminated land' under this definition using a process known as Risk Assessment; carried out in a series of stages to determine if there is any potential harm to receptors (i.e. people, terrestrial or aquatic ecosystems, material property, protected species or the water environment) depending on the current or planned use of the site. If the first stage of Risk Assessment does not identify any significant contamination risks on or in the vicinity of the site, then no further works will be required.

For a risk to occur there must be a pathway of exposure linking the contamination (the 'Source') with one or more receptors (Fig. 1). You must have all three for there to be any risk. Pathways might include the eating of vegetables or fruit grown in contaminated soil, direct contact with contaminated soil during digging, direct ingestion (eating) of contaminated soil by eating sandwiches with soil-stained hands or inhalation of contaminated dust. If the pathway is removed, there is no risk.

There are also laws and regulations governing acceptable levels of contamination, so you may not get permission to develop a contaminated site without undertaking some sort of remediation. Each Local

Fig 1: Source-Pathway-Receptor linkages

Authority is different, but most will approve planning permission for a food growing space on a contaminated site, providing that appropriate mitigation steps are taken to break any Source-Pathway-Receptor linkages (e.g. removing the contaminated soils, providing a capping layer, importing clean topsoil, etc).

The Environment Agency has estimated that there may be some 300,000 hectares of land in the UK which is 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.

In Scotland, the 2012 Derelict and Urban Vacant Land survey recorded 10,984 hectares of derelict and urban vacant land. Amongst the previous uses of this land there is: manufacturing and general industry (2,437 ha, 23%), mineral activity (2,038, 20%), transport (405 ha, 4%), defence (2,034, 20%) and housing (523 ha, 5%) (Scottish Government, January 2012). This suggests that at least 70% of vacant land in Scotland has a previous use known to produce soil contaminants.

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.

What are the main contaminants and what hazard do they pose?

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.

Table 1: Example of the types of previous land uses which could indicate contamination, the associated contaminants with those land uses and some of the related health issues.
More advice can be found on the website of the Department of the Environment, Industry Profiles page: https://www.gov.uk/government/publications/department-of-environment-industry-profiles

Previous land use	Examples of potential contaminants	Examples of related issues or health impacts
Metal mining, treating and refining, engineering works, scrap yards and ship breaking sites	Metals e.g. cadmium, arsenic, lead, mercury, copper, nickel, and zinc	• Inhalation of contaminated dusts • Ingestion of contaminated crops • Plant growth may be restricted if the roots take up metals
Chemical works and refineries, tar distilleries	Hydrocarbons, Oily and tarry substances, phenols	• Skin irritation may be caused by contact • Organic vapours may cause respiratory complaints • Pollution of water supplies, streams and groundwater
Made ground, including blast furnace slags	Sulphates, chlorides, acids	• Building materials, e.g. concrete foundations, weakened by chemical attack
Gasworks, power stations, railway land	Coal and coke dust	• Ignition in the ground
Construction and waste disposal sites	Asbestos	• Release of airborne fibres • Asbestos related diseases
Old waste tips and in-filled dock basins	Landfill gases, e.g. methane and carbon dioxide	• Plant dieback • Accumulation to hazardous concentrations in confined spaces
Agriculture	Agricultural chemicals e.g. pesticides, Biological contamination e.g. *e-coli*	• Pollution of water supplies, streams and groundwater
Landfill	Landfill Gases (some of the above mentioned contaminants may also be present, depending on the type of landfill)	• Plant dieback • Accumulation to hazardous concentrations in confined spaces
Military Use	Radium from aircraft dial, heavy metals, arsenic, PAHs, PCBs and dioxins (dependent on previous use)	• Inhalation of contaminated dusts • Ingestion of contaminated crops • Direct contact with contaminated soils

What to do if you think you might have contamination on your site

Step 1 Establish the level of concern

Step 2 Test the soil

Step 3 Take actions to reduce risks

1 Establish the Level of Concern

The initial step is to assess whether the soil may be contaminated by past activities on the land. This is done by inspecting the site and researching the history of the site.

- A site visit involves walking through the area and inspecting the site thoroughly. Appendix A, Site Visit Checklist provides more information on conducting a site visit.
- A site history involves searching local authority archives, historical maps (obtained from Libraries, Ordnance Survey, etc.), and asking neighbours for information about the past and current use of the site and surrounding properties. Appendix B, Site History Search Checklist, provides more information on site history searches.

This can help you decide what Level of Concern your garden site might be: **Low**, **Medium** and **High**.

Low Concern Site

- The site has no evidence of current or historical usage that would suggest possible contamination pathway, i.e. always been residential, parkland, child care centre or school.
- If your site is a Low Concern site then it may not need soil testing, depending on the requirements of the Local Authority.

Medium Concern Site

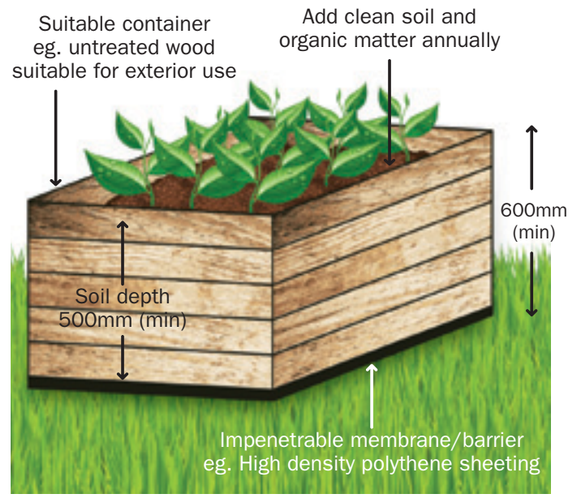
- The site has evidence of current or historical usage that could be associated with contamination pathways but would be considered medium risk. i.e. municipal park, orchard, infill area, commercial land (excluding petrol station, dry cleaner, printing and automobile garage.
- The site is located within: a former landfill; former lead reduction zone; or 30 metres from a rail line or a major arterial road.

High Concern Site

- The site has evidence of current or historical usage that could be associated with contamination pathways that would typically be considered associated with significant contamination, i.e. petrol station, dry cleaner, print shop, automobile garage, rail line or rail yard.
- Is, or has once been industrial land. (The site should be considered a Medium Concern site if the industrial land has been remediated and is currently residential or commercial land).
- The site reveals indications of dumping or burning, smells or staining in the soil.

Food growers should use raised bed gardens or container gardens on High Concern sites, and unless remediation of the soil is undertaken, should not grow food directly in the soil on the site. The recommended minimum standard for a raised bed on contaminated land is for > 600 mm certified clean top soil on top of an impenetrable layer. Containers are also ideal, as they create the impenetrable barrier themselves and are mobile, so can be used on temporary sites. Wooden raised beds made should be of wood suitable for exterior use (e.g. kiln dried) and not treated with chemical preservatives which may leach into the soil. Other materials may be used, but should also be checked for their ability to leach contaminants into the soil in the bed.

Diagram of a "perfect" raised bed



What to do if you think you might have contaminated soil on your site?

2 Test the Soil

It is recommended that all sites regardless of size have soil tests if they are of a 'medium' concern. Note with decreasing site size, test costs may be prohibitive (less expensive to do large batches). It may be more cost effective in such circumstances to go straight to ***Level 3 Action*** *without testing*

- 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.
- It is important to seek expert advice on planning a site investigation and sampling strategy. Soil contamination can be very patchy across a site, so it is important that any samples collected for testing give a realistic picture of the contamination across the whole site. It is important that the parts that may be affected by contamination are included in the testing, and that the samples reflect the diversity of the soil and the vegetation condition of the site. For advice can be found in Appendix C, but in any doubt, seek expert opinion.
- Testing should be carried out by organisations with relevant experience and expertise, preferably ones that are accredited for this type of work. Laboratories work to a variety of accreditation standards. Before submitting samples to a laboratory it is good practice to enquire as to which standards they adhere to and for what methods. Typical accreditation schemes might be ISO 17025, ISO 9001 or MCERTS, depending on the laboratory and technique requested (see

Glossary for more information). The laboratory ought to be able to answer any questions that you have on their accreditation and techniques used. Appendix D, Soil Analysis Checklist discusses contacting laboratories and analysis in more detail.

- It might be 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.
- If the land is currently in use for a food growing project (e.g. an allotment or community garden), it may also be necessary to test foods from the site 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.

Appendix C, Soil Sampling, provides more information on soil sampling.

Send the Soil to the Laboratory to be Analysed

The most common contaminants have been identified (see Table 2), though you must be aware that there may be other contaminants present in soil. There is a higher likelihood that other contaminants are present in the soil of High Concern sites. It is not economically feasible to test for all the possible soil contaminants. Therefore, we recommend that raised bed or container gardens are used at these sites. See Appendix D, Soil Analysis Checklist for more information on analysing soil.

Interpret the Soil Tests, Confirm the Level of Concern and Take Appropriate Action

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 as per the definition in section 1. Therefore, the land may be determined to be not contaminated.

To be determined as contaminated, evidence is required 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 (see section 1).

You should have your results interpreted by a professional – some testing labs can offer this, though you may need the services of an experienced environmental consultant. You can then use this interpretation to decide on the relevant Level of Concern.

Table 2: Most common soil contaminants

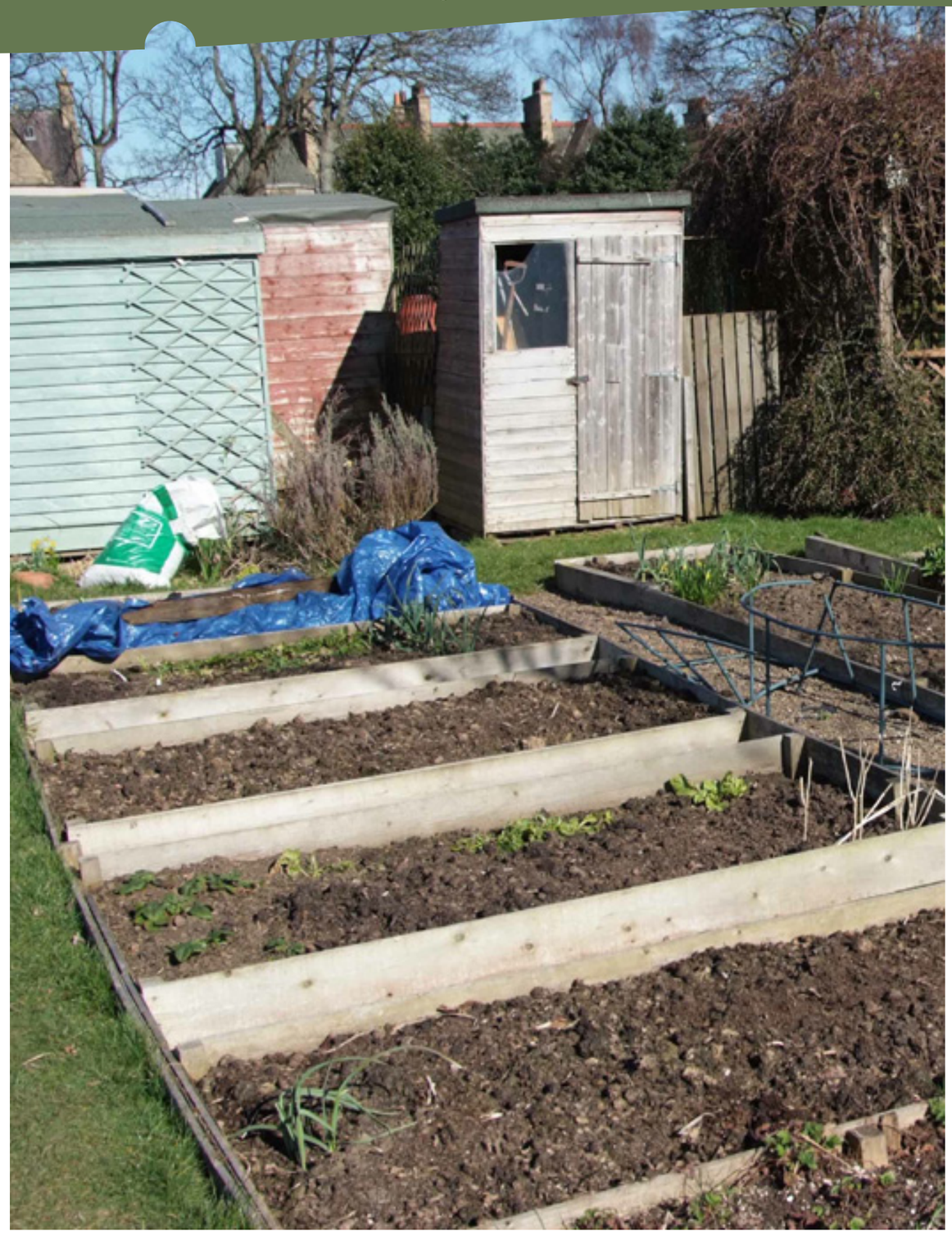
Metals	PAHs
Inorganic Arsenic (As)	Acenaphthene
Cadmium (Cd)	Acenaphthylene
Cobalt (Co)	Anthracene
Chromium, total (Cr)	Benz(a)anthracene
Chromium, VI (CrVI)	Benzene
Copper (Cu)	Benzo(a)pyrene
Elemental Mercury (Hg)	Benzo(b)fluoranthene
Inorganic Mercury	Benzo(g,h,i)perylene
Methyl	Benzo(k)fluoranthene
Molybdenum (Mo)	Chrysene
Nickel (Ni)	Dibenz(a,h)anthracene
Lead (Pb)	Dioxins (PCDDs, PCDFs, PCBs)
Selenium (Se)	Ethylbenzene
Zinc (Zn)	Fluoranthene
	Fluorene
	Indeno(1,2,3-c,d)pyrene
	Phenanthrene
	Pyrene
	Oxylene
	m-xylene
	p-xylene
	Phenol

If the site is Low Concern:
Level 1 Action Recommended

If the site is Medium Concern:
Level 2 Action Recommended

If the site is High Concern:
Level 3 Action Recommended

Depending on the Level of Concern for your site and the results of the soil sampling, there are different levels of intensity of recommended actions to reduce your exposure to soil contaminants (Table 3- action levels). There are also methods which will remediate the soil on your site so that you can use a lower action level, but these are often very expensive and time consuming.



3 Take Action to Reduce The Risks

Dealing with land contamination is a complex topic. The prime objective will be to ensure that your land is suitable for the use you intend to apply. This will not always mean that it will be completely remediated. Gardeners can take many simple and inexpensive actions to reduce their exposure to urban soil contaminants.

Depending on the Level of Concern for your site and the results of the soil sampling, there are different levels of intensity of recommended actions to reduce your exposure to soil contaminants (Table 2). There are also methods which will remediate the soil on your site so that you can use a lower action level, but these are often very expensive and time consuming.

Tables 3-5: Levels of concern and recommended actions to reduce gardeners exposure to soil contaminants

Low Concern sites Level 1 Action

Use good gardening practices:

- Wash your hands after gardening and always before eating
- Wash produce thoroughly with water. For many contaminants, including 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
- 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 manufacturer's 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 you use manures or organic matter, be aware that they may contain harmful micro-organisms such as Salmonella and E. coli 0157. 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
- Try to prevent further contamination taking place. 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

What to do if you think you might have contaminated soil on your site? (Continued)

Medium Concern Level 2 Action

Plant species differ in their susceptibility to taking up contaminants. It is important to understand if contaminants will get into the edible portion of the crop you want to grow. Be aware that inedible portions of the crop may have to be disposed of rather than composted and returned to the soil. More advice on the specific actions for your site should be sought from an expert before being relied upon.

Use good gardening practices and further reduce your exposure to contaminants in the following ways:

- Lower the concentrations of contaminants by adding clean soil and organic matter (compost and manure) to the existing soil. Altering the pH of the soil can also help: adding organic matter can lower the pH, whilst applying lime can raise the pH. The pH of the soil has been shown to influence to uptake of some metals by plants and the availability of some other contaminants. The usefulness of this will depend on the types of contamination present. For example, a higher pH will decrease the availability of cadmium, zinc, copper and lead but increase the availability of selinium and magnesium. Be aware that when a pH soil has been altered to grow food, it must be maintained at that level.
- Reduce dust by covering bare soil with ground cover or mulch, which will reduce the impact of air-borne contamination.
- Use good gardening practices. Wash all produce well with water. Peel root vegetables before you eat or cook them.
- Avoid growing the types of produce that accumulate soil contaminants. 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.
- Eat only the fruit, seed or grain (not the leaves, root, or shoot) from the following plants: tomato, corn, barley, oat, rice, rye, wheat, soybean, and sunflower.
- Grow these plants in a raised bed or container gardens: alfalfa, amaranth, brassicas (broccoli, brussel sprouts, cabbage, cauliflower, kale, kohlrabi, mustard greens, canola, turnip), beets, carrots, chicory, dandelion, endive, garden pea, lettuce, radish, rice (wild), sorghum, sorrel, spinach and mushrooms.

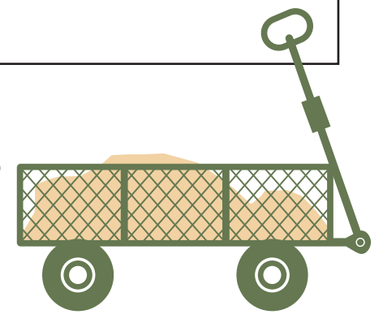
Level 2 Action measures **<u>may</u>** reduce the concentration of soil contaminants over time. Thus, after two years of implementing **Level 2 Action** measures, you may wish to consider retesting the soil of Medium Concern sites to see if it has reduced to Low Concern. Bear in mind, however, that contamination might be patchy, so it could be better to test the produce.

High Concern Level 3 Action

Unless you want, or have been advised to remediate the soil completely (see paragraphs 1-8 below), you may be able to grow food on your site by using good gardening practices. This includes reducing dust by covering bare soil surrounding the garden with ground cover or mulch, and minimising your exposure to contaminants in the following ways:

- Build raised bed gardens (minimum of 600 mm depth over a geotextile barrier on the soil), or grow food in containers. 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. Refer back to diagram of a raised bed
- Add clean soil and organic matter annually (compost and manure) to the raised bed or containers
- Consider creating a non-food growing community garden rather than food growing space. Trees, shrubs and plants that benefit wildlife and the environment could be planted and enjoyed in a community space. For example, birch, rowan, hawthorn, whitebeam, aspen, hazel and blackthorn could be used, though the produce from the plants shouldn't be consumed

Treatment methods to remediate the soil for high levels of contamination



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 to lower contamination levels to safe values. Your group may also prefer to explore removal of the contamination so that you don't have to grow in raised bed or containers. That is entirely up to you, and the approach taken to remediate the soil will be site-specific and 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.

1. **"Dig and dump"** - the contamination is excavated and removed to a licensed landfill site. Clean soil may then be brought in.
2. **Barrier methods** - the source of contamination can be sealed using barrier walls and coverings made of clay-like materials and special fabrics.
3. **Biological treatments** - these include:
   - Biodegradation - bugs (bacteria) in the soil break down the contaminants to less harmful substances
   - The bugs are either naturally present in the soil or can be added especially to carry out the remediation
   - Specifically designed common reed beds can be used for effluent polishing
4. **Chemical treatments** - these work by adding chemicals to the soil to destroy, stabilise or concentrate toxic compounds.
5. **Physical treatments** - these include washing the soil to remove soluble contamination and removing hazardous vapours within the soil.
6. **Thermal treatments** - use heat such as incineration and thermal desorption to remove, destroy or immobilise soil contaminants.
7. **Stabilisation treatments** - chemicals are added which react with the soil contaminants, converting them to a less toxic and more stable form.
8. **Solidification treatments** - chemical reagents are mixed with the soil which then sets as a firm mass, immobilising contaminants.

The last five techniques (number 4 – 8) are more likely to be cost effective on sites that are heavily contaminated as they are very expensive and time consuming.

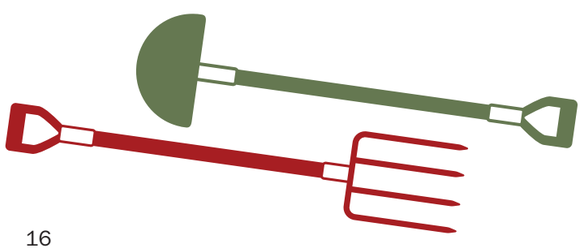
Responsibilities

From October 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 causing off site contamination, 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 standard remediation is required and ensure that it takes place. This will be done in consultation with other relevant organisations such as the Scottish Environment Protection Agency and Food Standards Agency as necessary. Remediation of the contamination may not be required, depending on the planned use of the land. For example, a non-food growing community or wildlife garden, or container growing of food may not need any form of soil remediation.

Under Part IIA of the Environmental Protection Act 1990, Each Local Authority is required to maintain a public register of formally identified "contaminated land" as defined by the legislation and ensure that it is publicly accessible. This will be kept by the local authority and



will be available for public inspection. You should contact your Local Authority in the first instance.

General Food Law covers the EC and UK legislation on food imports and exports, safety, traceability, labelling and product withdrawals and recalls. The General Food Law Regulations 178/2002 focuses specifically on food safety. Article 14 prohibits food being placed on the market if it is unsafe. To be unsafe, food must be considered injurious to health, or unfit for human consumption. The regulations apply to food being sold or supplied, and includes one-off sales and supplies free of charge. The regulations above also apply to everyone who supplies food, including any individual who provides food free of charge to a charity or similar event. It is important that you are aware of this if you intend to sell or supply food grown on your site to others, as the onus is on the supplier to make sure the food is safe.

If you have medium levels of contamination on your site, and are growing using medium level concern actions, it is worth testing some of your produce to make sure it adheres to the law before supplying it.

Glossary

Agricultural Contaminant – a contaminant left in the soil following agricultural practices, such as using pesticides and fertilizers. For example, Nitrogen, Phosphorus and metals.

Biological Contaminant - Living organisms (such as bacteria, enzymes, fungi, viruses) or their products that can be hazardous to animal or human health if absorbed into the body

Metals – a group of naturally occurring metals and metalloid chemicals with an atomic density of more than 4g/cm3 which accumulate in soils and sediments. Man-made industry can increase their levels in the soil to dangerous levels

ISO 17025 – General requirements for the competence of testing and calibration laboratories. For more information: http://www.iso.org/iso/catalogue_detail.htm?csnumber=39883

ISO 9001 – Quality Management certification. For more information: http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=46486

MCERTS – Monitoring Certification Scheme – certification scheme for chemical analysis laboratories, amongst others, run by the Environment Agency. For more information: http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=46486

PAH – Polycyclic aromatic hydrocarbon

Pathway – the route by which a contaminant reaches a receptor, for example the eating of raw root vegetables grown in contaminated land

PCDD – Polychlorinated dibenzodioxin, known as dioxin

PCDF – Polychlorinated dibenzofurans

PCB – Polychlorinated biphenyl

Receptor – anything that can be harmed or damaged by the contaminant, for example, humans, materials property or the environment

Remediate – to remove the contaminant from the soil, or reduce it to levels that it no longer poses a risk

Risk Assessment – method by which any potential harm to receptors from the contamination is assessed

SGV - Soil Guideline Value

SOM – Soil organic matter

Source – the contaminated zone

TPH – Total Petroleum Hydrocarbon

UKAS – United Kingdom Accreditation Service: http://www.ukas.com/about-accreditation/about-ukas/

Case Study 1
Lochend Community Growing Project

A site with high contamination of a few contaminants which has been dealt with it by using ***Level 3 Action*** *and some soil remediation (number 2 of page 15)*

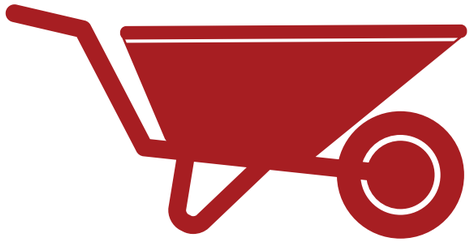
Background of Site

The Lochend Community Growing Project began in 2010 when a group of local people came together to develop a community greenspace on an unused piece of land owned by the City of Edinburgh Council's Housing Department. A common picture in East Edinburgh's social housing schemes is to see large areas of public land encircled by the back greens of flats, and this plot is one of many in the area. Up to the point of developing the community garden, the land had never been built on, but was used at various times as a play park and generally a place for flytipping, illegal bonfires and some antisocial behaviour. We were completely unaware of any contamination and didn't suspect that there would be any problems with growing in the soil.

The problem emerged when we were told that to develop a garden we would need planning permission as the garden would be on public land, and needed a 'change of use' permission. Later in the process, the planners requested that we do an environmental analysis because the garden is near to an electrical substation and there was a fear of PCB contaminants from the oil used by some electrical substations. Luckily, there were none of those in our soil, but the analysis did find 'higher than recommended' levels of Polycyclic aromatic hydrocarbons (PAHs) and lead, which apparently accumulate in the soil through rain! Burning of fossil fuels elsewhere can cause this to happen.

Challenges & how we overcame them

We were asked to show how we would avoid any risk to our gardeners from growing in the soil and the solutions that we came up with were to not grow in it at all. We capped our soil with a thick membrane and imported over 100 tonnes of soil to grow in raised beds to satisfy the planning department. This added a huge cost and a lot of time and physical effort onto our project. Part of the problem is that there isn't sound evidence to show if it is dangerous to grow food in soil with these compounds in them, and the Local Authority didn't have a standard in place already, so they were very cautious. Given our time constraints and lack of knowledge about the subject, we overcame the challenges by avoiding the problem altogether, but a lot of the gardeners still think they would prefer to grow in the ground than on top of it.



Where for help and advice

We had a lot of contact with the Local Authority's Environmental Health Department who advised us, but don't have specific knowledge about the health risks of growing food in contaminated land i.e. if the compounds actually travel into the vegetables and are passed onto us or not.

Tips or tricks to pass on to others

We learned for future projects to factor in the possibility of contaminated land from the beginning. I would recommend budgeting for a soil analysis before you begin and make allowances for a possible change of design or plan. If you do find contamination, it might not mean the end of a project, just a different approach, so don't be disheartened!

Case Study 2
Greenlink Allotment, Forgewood, Motherwell: Development of a community growing site

*A site with low contamination which was able to proceed to grow food using **Level 1 Action***

Background to the Site

The Greenlink project is a hugely successful community regeneration project based on involvement in environmental actions. The community expressed an interest in an allotment site and after several years of abortive development work on an alternative site, this site was suggested as there was no known history of industrial use. Site use had been farmland then public open space.

Challenges we faced

The previous use of the site was established from a desk-top study carried out by the allotment group and the belief was that soil analysis would only be needed to confirm soil fertility and soil structure. However, the general industrial history of the area (coal mining and iron smelting) resulted in the Contaminated Land Officer requiring the testing of the soil to confirm the absence of airborne sources (known as PAH and TPH that could have been carried onto the site from activities off-site) as well as the absence of ground sourced substances that could adversely affect human health.

A number of other issues also needed dealing with as part of the process of securing planning consent and general site accommodation:

- Confirmation that there were no contaminants on site from ground of airborne sources
- Ensuring general planning matters were met such as car parking and site access
- Securing a cost-effective and sustainable water supply

How we overcame them

- A number of tests were subsequently carried out on the site:
  - Standard soil test (pH, NPK, heavy metals)
  - Desk based assessment of the site from historic maps etc to report on the site history. Although this had initially been carried out by the allotment group, it had to be repeated by an accredited professional to satisfy the Local Authority's requirements
  - Full suite of analysis testing for a range of potential soil and airborne sourced contaminants (PAH / TPH)
  - Risk assessment carried out by a contaminated land specialist based on a site specific exposure model, in this case for vanadium as this was flagged as being the one contaminant requiring further investigation
- The model demonstrated that the exposure risk for vanadium was not enough to consider further action.
- The cost of the analysis in total was just under £3,000
- Other planning matters were resolved through ongoing dialogue with the appropriate officers.
- No 'on-tap' water supply was available and allocating a water use charge across plotholders was considered too problematic. Therefore a ground source water pump was installed

Where to go for help or advice

The main source of advice, especially in the early stages, was through Scotland's Rural University and College (SRUC). They were able to deal with all the soil testing and advice up to the point where airborne contaminants were to be tested for. Further analysis for airborne contaminants was done under the supervision of consultants McKay Environmental.

Tips or tricks to pass on to others

- Begin a dialogue with the local planning department at the outset and have them confirm in writing what level of analysis would be required. The planning department was the allotment group's main contact, although this led to conversations with other departments (eg: contaminated land officer)
- Budget for the worst case for analysis at the outset (allow £4,000 – £5,000 to be absolutely sure)
- Consider the implication of finding contamination that would mean raised beds or importing soil was essential – could the project afford this?

Case Study 3
RAGG Renfrew Association of Growers and Gardeners

A site with high levels of many contaminants. The group also didn't want to grow in raised beds, so remediated the whole sites using barrier remediation (number 2, table 3).

Background to the Site

The BIG Lottery prioritised an area of Renfrew as one of their six 'Our Place' programme areas. Local consultation carried out by BIG identified projects including a local need for opportunities for gardening. Williamsburgh Housing Association led on the establishment of Renfrew Association of Growers and Gardeners (RAGG) a community growing project in West Renfrew. No strategic evaluation of the current condition or contamination of existing open spaces was available, though local knowledge and old maps suggested that contamination was likely across the area.

Detailed appraisal of preferred sites, including initial analysis of contamination, was planned and planning permission and leases were applied for 3 sites:

- **Cockelshill Park** – The preferred site. A large under used informal open space area next to a newly built care home and day centre and bounded by the M8.

Two smaller reserve sites that could be used together to provide sufficient area:

- **Broadloan** - Grass area between a community centre and housing.
- **Friendship Way** - Grass area between a primary school, supermarket car park and housing.

The Planning Department advised that the Local Authority would be unlikely to support the use of these sites for the purposes of growing vegetables due to the potential risk to health due to a history of contamination.

Challenges we faced and how we overcame them

- **Cockelshill Park:** It was established that ferric cyanide 'Blue Billy" had been dumped within the park, though the Local Authority had buried, capped and bunded this material in 1996 to make adjacent land available for an adjacent sports complex. We attempted to revise plans but the Local Authority would not give consent to use any part of this site.
- **Friendship Way:** Neighbour objection and issues around a footpath forced us to withdraw the application for Friendship Way
- **Broadloan:** At the Local Authority's request we commissioned a Site Investigation. The Initial desktop study cost £1,250 and the full study £3,500. The Broadloan site is close to the old Renfrew Airport and a former garage, and the desktop study indicated former uses included allotments and a rifle range. The full report revealed the presence of significant levels of arsenic, cadmium, copper, lead, zinc, petroleum hydrocarbons and aromatic hydrocarbons. The report received was structured in relation to more usual development proposals and there were no specific recommendations about growing or remediation through cultivation.

Environmental Health recommended that the Broadloan project could only proceed if all planting was within raised beds, lined with a robust membrane, with a gap under the raised bed planters so that the membrane could be inspected. All growing medium must be imported from a verifiable source. RAGG were also encouraged by the Local Authority to mount the raised beds on concrete slabs as an additional barrier in preventing pathways between the raised bed planters and the underlying site soils.

However, RAGG negotiated with the Local Authority to remove the requirement for raised table planters by capping and raising the whole site with a perimeter retaining wall. Remediation in relation to possible contamination increased the capital costs of developing the site from £186,000 to £458,000.

The Broadloan project was successful in obtaining planning permission and consent to proceed with a lease. However, because of the increase in costs relating to remediation BIG required the lease to be extended from 10 to 20 years. Negotiations with the Local Authority for a longer lease and in relation to risk associated with the project have delayed works and the project is not yet complete.

Tips or tricks to pass on to others

- Talk to Local Authority officers across all departments to gather information and opinions before proceeding.
- Try to gain Local Authority support for your project not just at departmental or officer level, but from Chief Executive at a political level. Without this, each department may look after their own interests, rather than responding to a wider agenda.
- Be aware that Local Authorities are obliged to realise development value for 'clean' attractive sites, so they are unlikely to be available for community growing.
- Find sympathetic contaminated land consultants who can work with you to develop remediation solutions specific to using land for growing.
- Be aware that Local Authorities can be very risk averse.

Sian James Landscape Consultant
Sian.e.james@gmail.com
(consultant working with RAGG to develop the project and secure land).

Case Study 4
Concrete Garden, Possil Park

*A site with high and medium levels of various contaminants. The soil, was already "capped" by the concrete, so **Level 3 Action** was used with no need for further remediation.*

Background to the Site

The Concrete Garden was originally developed as part of the SAGE initiative (Sow and Grow Everywhere). The St Matthews Centre and Depot Arts who work adjacent to the space had been keen to develop the neglected piece of land for community growing and in discussion with SAGE it was decided that the site would be ideal to pilot their new modular growing system. The growing toolkit of raised beds, constructed from recycled materials, was developed to allow stalled spaces to be transformed into temporary community growing spaces. The kit was installed in 2010 and the garden is now a thriving hub for local growing activities.

The site, which had been derelict for over a decade, is predominantly concrete. From old images of the area we know this was carried out circa 1950, though don't know for what purpose. The raised beds were installed onto the concreted area and filled with soil which was brought onto the site for the purpose of food growing. Whilst there are some areas of the site where we can grow directly in the ground we only grow non-edible crops in these spaces due to wide spread soil contamination in the Possilpark area.

Challenges we faced and how we overcame them

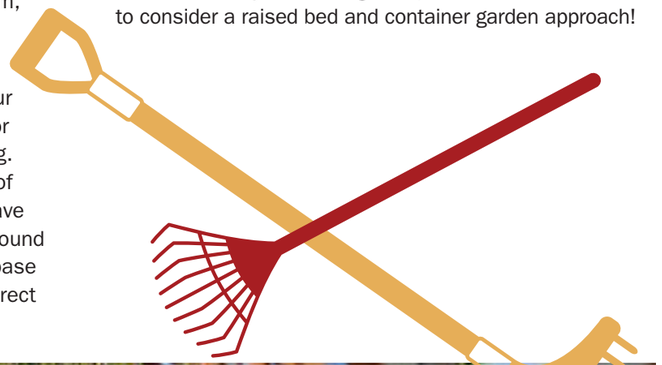
Historically, Possilpark and its surrounds was the site of chemical works, paint works, munitions factories, tram-works and six foundries and iron works. Much of the landscape was also marshland and had been used as landfill for these industries, leading to a risk of contaminating leachate.

As a result of the historical land use there is a wide range of both phytotoxic and zootoxic (toxic to plants and animals/people) contaminants that have been identified in the soil locally. Soil testing carried out in 2006 by Glasgow City Local Authority found arsenic, cadmium, lead and mercury amongst other contaminants at various local testing points.

Other than sourcing safe topsoil with which to fill our raised beds, we avoided any need to carry out major works to ensure the site is suitable for food growing. Were we to have installed the beds directly on top of contaminated soil, a specialist membrane would have been required to prevent contamination from the ground affecting soil in the raised beds. Alternatively, the base of the beds would need to be raised to avoid any direct contact with the ground below.

Tips or tricks to pass on to others

Our raised beds have been a fantastic way to grow lots of food without the need to develop a more traditional allotment style garden directly on soil. We have also increased our growing space by constructing extra planters using pallet wood and tyres which can be often be sourced for free. The soil in the raised beds and planters warms up faster in spring which is an added bonus. They can be constructed at a comfortable height to avoid lots of bending and also lend themselves well to 'no-dig' and 'square foot' gardening methods. We would absolutely recommend anyone dealing with potential contamination to consider a raised bed and container garden approach!



Appendix A
Site Visit Checklist

Purpose:
Inspect the site for risk indicators that will help you determine the *Level of Concern*.

Please make sure you have permission from the landowner to do the survey before you enter the site.

You can do the site visit at any time of the year, but do bare in mind that during winter, the types and health of the vegetation can't be determined, and that during the summer, the vegetation might hide stains, piles of rubbish and dumped material.

Materials needed

Work boots
Work gloves
Spade
Notebook & pencils
Camera

Make a site diagram

- Include the date and time of the survey
- Sketch a quick diagram of the site, showing its size, location and surroundings. Take as many photographs as you can, noting down where on the site they are.
- Look around, and note on your diagram:
  - Land use of site (residential, commercial, industrial, school, park, etc.)
  - Neighbouring land uses (immediately next to the site)
  - Estimated distances to main roads or railway lines.

Walk the site

- Walk each section. Note on your diagram and take photos of any signs of:
  - Stained soil
  - Unusual odours
  - Rubbish, flytipping or debris
  - Burned patches
  - Old equipment, pipes or tanks
  - Dead or dying plants
  - The presence of groundwater, building rubble, old foundations, backfilled areas and subsidence, all indicate areas potentially requiring further assessment (and testing).
- Pick a few random spots and dig into the soil to about 50cms where possible. Look out for all of the risk factors identified in the list above. Take photos of each soil pit.

Talk to the neighbours

- Ask what the site was used for in the past
- Ask about any dumping or burning on the site that they have noticed
- Make notes of your conversations, marking the activities and locations on your diagram

Frequently Asked Questions:

Q: How long should the visit last?

A: A site visit can take 0.5 to 1 hours to complete, but allowing half a day would be sensible, depending on the size of the site.

Q: What types of rubbish or debris am I looking for?

A: Make note of the following if you find them:

- Household rubbish
- Litter (in unusual quantities) and flytipping
- Old tanks and pipes
- Construction/demolition debris, including:
  - Potentially Asbestos-containing Materials (e.g., drywall joint compound, mechanical insulation, roofing materials, floor and ceiling tiles, fire doors)
  - Potentially Lead-Containing Material (paint chips, plumbing solder, old pipes)
  - Potentially PCB-Containing Material (old electrical equipment such as transformers, fluorescent lamp ballasts, capacitors)

Appendix B
Site History Search Checklist

Purpose:
Determine the *Level of Concern* for your site by learning about its past use.

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.

1) Contact the local authority

- Legislative provision for the contaminated land regime came into force in Scotland in 2000. The legislation and statutory guidance define contaminated land and require local authorities to inspect their areas from time to time for the purpose of identifying contaminated land. They are also obliged to hold a publicly accessible register of designated contaminated land in their area. The majority of Scottish Local Authorities have this information on their websites.
- Whilst a lot of the information will be drawn from publicly available sources, your Local Authority is a good place to start your enquiries. The department with responsibility for dealing with contaminated land will vary from Local Authority to Local Authority. However, it is more than likely to be either the Environmental Health or Planning Departments.
- Whilst many Local Authorities 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 Local Authority 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 Local Authority 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 SEPA. Your local authority will also be aware of previous pollution incidents in the area and how they were dealt with.

2) Contact SEPA

- The local authorities are the primary source of information on land contamination as they will be gathering and updating information on local sites. However, SEPAs website at http://www.sepa.org.uk/land/contaminated_land.aspx also has information on contaminated land areas in Scotland. Additionally, under certain circumstances contaminated land may be designated as a 'special site' whereby SEPA becomes the enforcing authority. SEPA is responsible for remediation of such sites and for maintaining a public register.
- Information on these special sites can be found on the SEPA website above, along with contact details for officers involved with them.

3) Desk research - find out the history of the site

- Some desk-based research may well identify changes in land use for your site. The online property history information portal, Scotlandsplaces.gov.uk is a good starting point; new types of record are being added to this site all the time. The site gives online access to historic Ordnance Survey maps from the 1850s onward. The six inch to one mile scale mapping known as the "County Series" (on http://www.scotlandsplaces.gov.uk/ordnance-survey-map-series/county-list#6inch1st) is particularly useful for showing how the use of a site has changed over the years. Public libraries often also have copies of historic maps and may have a Local History section. Where old aerial photography is available, it is also useful to look at this. Where the site has an industrial past, if you can establish the name of the business who used it (for example the North British Rubber Company), this can assist in searching (either on paper or online) for details of the industrial processes which took place in the past.
- 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.

Appendix B
Site History Search Checklist (continued)

Q: What am I looking for?

A: Previous land uses which may indicate a Level of Concern (see table below for examples).

Low Concern	Current or historical land uses indicating **Low Concern**: • The site has always been residential, parkland, farmland, child care centre or school
Medium Concern	Current or historical land uses indicating **Medium Concern**: • The site is or has once been a municipal park, orchard, infill area, or had commercial land uses (excluding petrol station, dry cleaner, printing and auto body shop) • The site is located within: a former landfill; or 30 metres from a rail line or a major arterial road
High Concern	Current or historical land uses indicating **High Concern**: • The site is or has once been a petrol station, dry cleaner, print shop, auto body shop, rail line or rail yard • Is or has once been industrial land[1] • The site reveals indications of dumping, burning, smells or staining in the soil

[1] The site should be considered a Medium Concern site if the industrial land has been remediated and is currently residential or commercial land.

Appendix C
Soil Sampling Checklist

Purpose:

Collect a representative soil sample of the site. A composite soil sample is made up of two or more combined sub-samples to represent an area of the garden.

Materials needed

- Work boots
- Trowel
- Spade
- 2 Clean Plastic Buckets (9L each)
- Resealable Bags (3.7L)
- Cooler & Ice packs
- Notebook & pencils
- Large black permanent marker
- Work gloves
- Measuring tape (25 m or longer)
- Tape or rope and pegs (Something to mark boundary of proposed garden site)

What to do

- **Create a diagram of the site, showing:**
  - Name and address of the property including the postcode or a grid reference if possible.
  - Proposed food growing site (draw a line around your site using pegs, tape or rope). Starting at one corner of the garden, walk diagonally to the far corner and repeat, making an "X" pattern across the garden. Mark the location of a sub-sample approximately every 2.5 metres using a peg or marker)
  - Note the location of the sub-samples on your diagram
- **Sample the soil:**
  - Using gloves, strip off turf or other vegetation from the sub-sample spot
  - Take spade and dig into soil down to 40 cm. Place soil into Bucket 1
  - Break up and mix the soil in Bucket 1
  - Remove stones and visible debris
  - Note the presence and type(s) of debris, smells, and staining in your field notes
  - Transfer a trowelful of the mixed soil from Bucket 1 to Bucket 2. This is your sub-sample.
  - Refill the hole with the remainder of the soil in Bucket 1, and replace the turf
  - Repeat until 9 sub-samples have been collected in Bucket 2
- **Create composite soil sample:**
  - Mix the combined subsamples in Bucket 2
  - Label sample bag with:
    - name of site
    - sample number
    - sampling date
    - name(s) of person(s) doing the sampling
  - Transfer 2 trowels full of the mixed soil from Bucket 2 to the labelled sample bag
  - Seal the sample bag and place it in a cooler with ice packs

Note: If you are taking more than one composite sample, or individual soil samples from each soil pit, all equipment should be washed with soap and water between sampling.

Soil contamination can be very patchy across a site, so it is important that any samples collected for testing give a realistic picture of the contamination across the whole site. It is important that the parts that may be affected by contamination are included in the testing, and that the samples reflect the diversity of the soil and the vegetation condition of the site. For example, a large uniform site will need fewer samples than a small site with a range of different habitats, slopes and ground conditions. One sample should be taken per ground cover type (e.g. bare ground, mossy mat, clay soil etc.) that can be seen, and 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. Expect an average sampling density of one sample per 10x10m2 for a full analysis comprising multiple sub samples across the area. If there is an obvious boundary between soil layers within the upper 40cm, consider taking a sample from each layer.

Frequently Asked Questions:

Q: Where should I take the samples?

A: Divide the site into 10 to 15 by 10 to 15 metres sections. Each section is one composite sample area. Plot an "X" over the sample area. Take 9 sub-samples evenly spaced along this "X."

Alternatively, if you have a small site, you could take random samples from different areas of the site, for example, areas without vegetation and with; showing staining and not.

Q: How much soil do I need In each sample?

A: The laboratory will tell you how much soil you need. Typically, each soil sample is approximately 2 small trowels of soil.

Q: How much will it cost?

A: Each laboratory is different and prices change over time. You should expect to pay between £150 to £300 for each soil sample, depending on the types of analysis needed.

Appendix D
Soil analysis Checklist

Purpose:

Select a laboratory for the soil analysis and tell the lab staff what analyses you would like them to do.

Select a Laboratory able to do the analysis

- Find qualified labs in your area through
  - United Kingdom Accreditation Service (UKAS) http://www.ukas.com/) or National Accreditation of Measuring and Sampling (NAMAS http://www.ribaproductselector.com/ukas-namas-testing-laboratories/cisfb/3/2010002/all.aspx)
  - Yellow Pages (heading: Laboratories–Analytical & Testing)
  - Internet search (example keywords: environmental analytical laboratory Scotland, soil contamination testing)
- Laboratories work to a variety of accreditation standards. Before submitting samples to a laboratory it is good practice to enquire as to which standards they adhere and for what methods? Typical accreditation schemes might be ISO 17025, ISO 9001 or MCERTS, depending on the laboratory and technique requested.

Contact the Laboratory

- Get in contact with your chosen lab several days before you take the samples to:
  - Confirm price and turnaround time
  - Confirm their requirements for samples and any forms you will need to fill in

Appendix D
Soil analysis Checklist (continued)

  – Tell the lab when you expect to deliver the samples
  – Obtain instructions for handling the samples and delivering them to the lab

Fill out a Chain of Custody Form

- Fill out the chain of custody form provided by the lab, and keep the required copies with the samples. The chain of custody form provides information on you (the client), the samples, and the analyses you want.
- Every laboratory's form differs, but you will have to indicate that you want the soil tested for pH values, metals and PAHs (please include the full list of metals and PAHs that you want analysed. Write out the name of each one. See table 2 for the list of most common contaminants).
- If you have any difficulty with the form, contact the lab for advice.
- Soil interpretation: Some labs will offer this, but you may need to employ an environmental consultant to help you.

Deliver Samples to the Lab

- The laboratory will provide instructions.
- Deliver or ship samples to lab within 1 day of sampling. Some laboratories will pick up the soil sample.
- Keep samples refrigerated between the time you take them and the time you deliver or send them to the lab.

Photo Credits

Contents page – Lochend Community Growing Project; Page 6 – SNH and CSGNT; Page 10 – SNH and Almond; Page 12 – Almond; Page 13 – Almond; Page 14 - Almond; Page 16 – Almond; Page 17 – CSGNT; All case study images were provided by the groups.

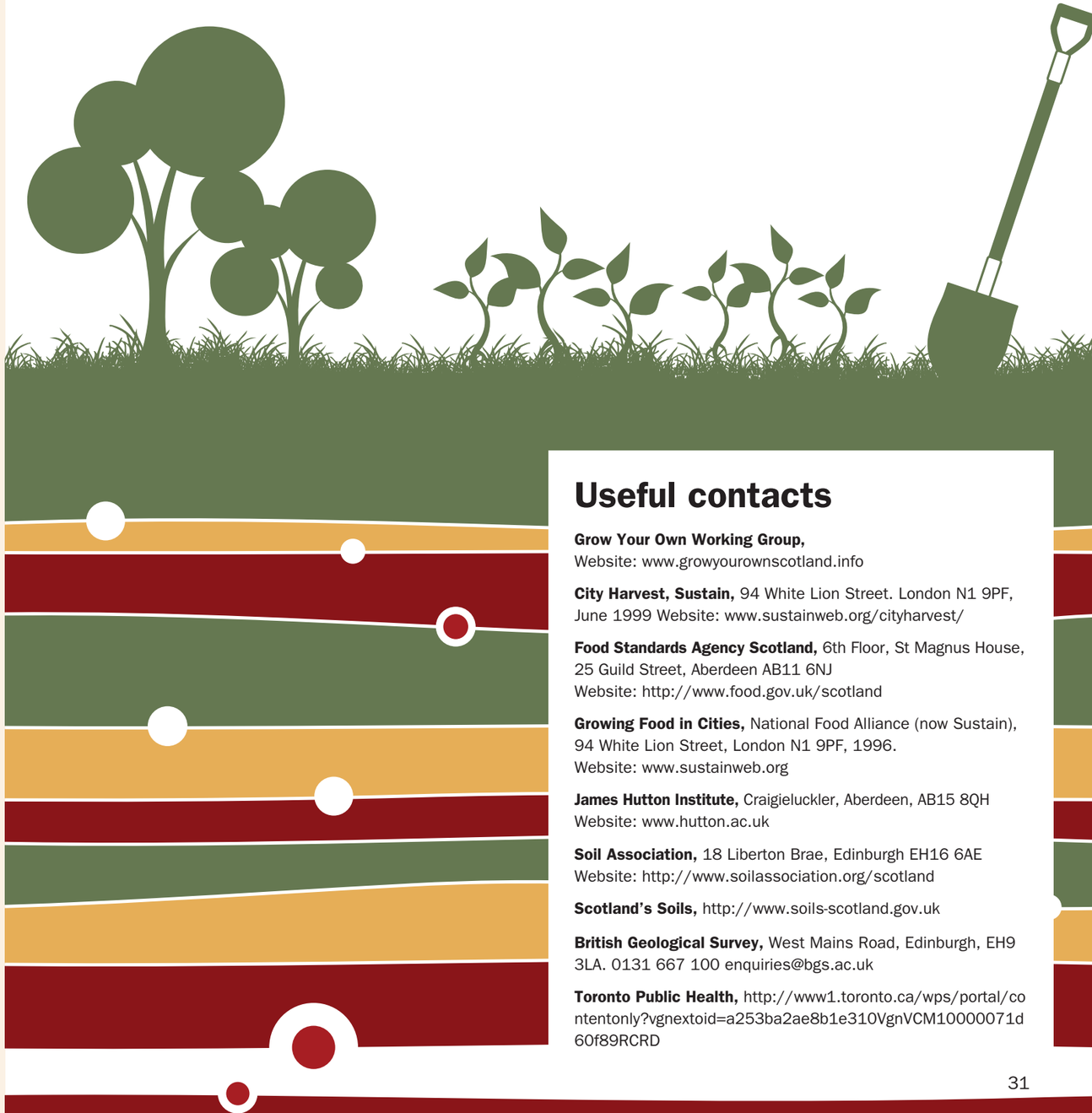
Further information

More specific details and technical advice on contamination associated with different industries is available in a series of Industry Profiles publications from the Environment Agency. These are available from the EA website (http://www.environment-agency.gov.uk/research/planning/33708.aspx). They are not definitive studies but they introduce some of the technical considerations that need to be borne in mind at the start of an investigation for possible contamination. You can also download the CLEA 1.06 software from the Environment Agency website (http://www.environment-agency.gov.uk/research/planning/33732.aspx)

There is also an array of guidance for good agricultural practice to prevent pollution and contamination on the SEPA website: http://www.sepa.org.uk/land/agriculture/agricultural_guidance.aspx and 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 from DEFRA website: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69344/pb13558-cogap-090202.pdf.

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

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



Useful contacts

Grow Your Own Working Group,
Website: www.growyourownscotland.info

City Harvest, Sustain, 94 White Lion Street. London N1 9PF, June 1999 Website: www.sustainweb.org/cityharvest/

Food Standards Agency Scotland, 6th Floor, St Magnus House, 25 Guild Street, Aberdeen AB11 6NJ
Website: http://www.food.gov.uk/scotland

Growing Food in Cities, National Food Alliance (now Sustain), 94 White Lion Street, London N1 9PF, 1996.
Website: www.sustainweb.org

James Hutton Institute, Craigieluckler, Aberdeen, AB15 8QH
Website: www.hutton.ac.uk

Soil Association, 18 Liberton Brae, Edinburgh EH16 6AE
Website: http://www.soilassociation.org/scotland

Scotland's Soils, http://www.soils-scotland.gov.uk

British Geological Survey, West Mains Road, Edinburgh, EH9 3LA. 0131 667 100 enquiries@bgs.ac.uk

Toronto Public Health, http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=a253ba2ae8b1e310VgnVCM10000071d60f89RCRD