Clackmannanshire Council
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Clackmannanshire Council Contaminated Land Strategy

September 2012

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Executive Summary

The Environmental Protection Act 1990(EPA), Part IIA (as amended), imposed a statutory duty on all local authorities to write a strategy on how it would identify and deal with contaminated land within its area of control. This came into force in July 2000.

The main objective underlying the introduction of Part IIA of the EPA 1990 is to provide an improved system of identifying and remediating land where contamination is, or there is a possibility of, causing significant harm to living organisms or the wider environment or to property.

Clackmannanshire Council have adopted the 'suitable for use' approach. This approach ensures that land is assessed on the current use and circumstances of the land taking in to account such factors as underlying geology, the type of receptors and potential exposure to harmful substances.

Where any land is statistically proven to be causing 'unacceptable' risks to health and the environment, it will be returned to a state where such risks no longer arise (remediating the land); the Part IIA regime provides the general machinery to achieve this.

Clackmannanshire Council will ensure that land is also made suitable for any proposed use by assessing the potential risks from contamination, before official permission is given for the development by ensuring land is remediated before the new use commences; this is the role of the Development Planning and Building Standards regimes.

The Council will actively seek voluntary remediation of contaminated land sites, wherever possible. Where such options are not available, statutory powers will be used to secure remediation of the contamination. It should also be noted that on many occasions, land may be found to contain contamination but it does not fall within the definition of contaminated land as defined. These sites will be risk assessed to identify if remediation or monitoring is needed.

In January 2000 Clackmannanshire Council published 'Contaminated land strategy' which outlined how the Council intended to implement the statutory regime, since that time Clackmannanshire Council has been progressing to implement the strategy This document reviews and updates the original strategy taking into consideration new responsibilities placed upon local authorities from amendments to Part IIA.

Clackmannanshire Council's priorities in dealing with contaminated land have not changed and are:

- To protect human health
- To protect the water environment
- To protect designated ecosystems
- To prevent further damage to property
- To encourage re-use of brownfield sites

Some sites have and will continue to be identified outside of the general approach to inspection that require urgent attention. These maybe sites that are brought to the Council's attention outside of the strategy, ie. by the public via a smell complaint or a planning violation. These sites will be dealt with as they arise inline with the statutory guidance which states that the

Council must always be dealing with the highest priority sites first, that is sites where there is the greatest likelihood of finding contamination and therefore pose the greatest potential risk to receptors.

The Council will always encourage voluntary remediation through the re-development of contaminated land. The Council recognises that liaison and communication with other services within the Council and other external services such as the Scottish Environmental Protection Agency (SEPA) is essential for delivering the best service to the inhabitants of Clackmannanshire.

The legislation and guidance provided by the Scottish Government details procedures that must be followed and criteria that must be when formerly identifying land as contaminated.

Chapter 1

Introduction

Part IIA of the Environmental Protection Act 1990 (EPA1990) introduced a legislative framework for the identification and remediation of contaminated land. This framework places a duty on local authorities to "cause its area to be inspected from time to time for the purposes of identifying contaminated land".

As part of this framework local authorities are required to develop a strategic approach to that inspection and each authority is required to adopt and publish a contaminated land strategy.

In 2002, Clackmannanshire Council published 'Contaminated Land Strategy' which outlined how it would implement the statutory regime. Since that time the Council has made significant progress. This document is a review and update of that strategy taking into account changes in the statutory regime and responsibilities since the publication of the original strategy. It also outlines the implementation of the statutory duties in the future.

This document is prepared with reference to 'Contaminated Land Inspection Strategies: Advice for local Authorities, July 2001', published by the Scottish Executive Environmental Group.

1.1 Clackmannanshire Council Corporate Priorities

Clackmannanshire Council's corporate priorities are built around objectives.

Key Objectives

- The area has a positive image and attracts people and businesses
- Our communities are more cohesive and inclusive
- People are better skilled, trained and ready for learning & employment
- Our communities are safer
- Vulnerable people and families are supported
- Substance misuse and its affects are reduced
- Health is improving and health inequalities are reducing
- The environment is protected and enhanced for all
- The Council is effective, efficient and recognised for excellence

Clackmannanshire Corporate Plan can be viewed ***here***

To support this plan, Clackmannanshire Council aims

"To work towards sustainable development in Clackmannanshire through policies and the provision of services that facilitates positive social and economic development whilst maintaining and enhancing environmental quality"

The key themes to this approach are:

- Caring for the Environment
- Enriching Peoples Lives
- Promoting Sustainable Development

The strategy is therefore written with Clackmannanshire's commitment to sustainable regeneration and development but also to enhance the health and quality of life for those who live, learn, work and play within Clackmannanshire.

Clackmannanshire Council's Sustainability strategy/policy can be viewed ***here***

Community and Regulatory Services within Clackmannanshire Council, will be responsible for the enforcement of Part IIA of the Environmental Protection Act 1990 (EPA 1990) unless land is designated as a 'Special Site' where enforcement will fall to the Scottish Environmental Protection Agency (SEPA).

Where Clackmannanshire Council is the enforcing authority, it will actively seek remediation. However, remediation notices, specifying action required, will be employed where necessary

1.2 Review and Update of Contaminated Land Strategy

This strategy marks a review of the original document and has been reviewed in order to reflect the changes that have taken place within the Council, changes in legislation and progress made since the original document was published. It is strongly recommended that the original document is read in conjunction with this one in order to measure how the Council has progressed in carrying out it's obligations under Part IIA.

This document aims to meet the requirements of the statutory guidance in that it sets out how the Council will investigate potentially contaminated land and how it deals with contaminated land in general. The statutory guidance puts an obligation to local authorities to review its strategy, this document is aimed at satisfying that obligation.

1.3 Development of Review System

The strategy been created in consultation with all relevant services in both the development of this strategy and with its implementation. The strategy was reviewed by all relevant services before publication.

The final published strategy was circulated widely to all interested parties and stakeholders

The strategy will continue to be reviewed and revised as necessary in the future. It is intended it will be reviewed annually and an update report published to exist along side the main strategy document. The updated report will include details of progress, examples of work undertaken and details of any changes in legislation or Council policy.

1.4 Roles and Responsibilities

Environmental Health has been delegated the statutory responsibility within the Council to undertake the implementation of the provisions of the EPA 1990. The Environmental Health Team and in particular the Contaminated Land Officer will have this responsibility working in partnership with other services within the Council and outside agencies when appropriate.

Chapter 2

Regulatory Context

2.1 Regulatory Role of Clackmannanshire Council

The Environmental Health Unit as part of Community and Regulatory Services of Clackmannanshire Council having been given delegated authority for the statutory responsibilities of Part IIA of the EPA 1990 and will lead on the delivery of the strategy. To achieve effective implementation of the strategy Environmental Health will work in partnership and with the cooperation of other services and agencies as appropriate.

The provisions of Part IIA came into effect in Scotland on 14th July 2000.

Part IIA of the EPA - which was inserted into that Act by Section 57 of the Environment Act 1995, provides a regulatory regime for the identification and remediation of contaminated land. There are regulations and statutory guidance which support the primary legislation: The Contaminated land (Scotland) Regulations 2000 as amended and Circular 1/2000 environmental protection Act 1990: Part IIA Contaminated land (as amended).

Prior to the introduction of Part IIA, the regulatory regimes concentrated on the prevention of new contamination and the remediation of sites, which were being re-developed through the planning process. The new regime is intended to focus on land which is already contaminated due to past activity and it's current use is causing or has the potential to cause significant harm to the health of living organisms or to the wider environment or to property.

The primary regulatory role under Part IIA rests with the Scottish Local Authorities. Therefore each local authority has a statutory duty to fulfil a number of requirements set out in the legislation. These powers and duties include:

a) to cause their areas to be inspected to identify contaminated land (EPA 1990 S78B (1)(a)

b) If the local authority identifies contaminated land, it requires to give notice of the fact to SEPA, the land owner, the occupier of the land and any other appropriate person (EPA 1990 S78B (3)

c) to act as enforcing authority for all contaminated land in its area which is not designated as a 'Special Site' (EPA 1990 S78B (4) (SEPA will be the enforcing authority for 'Special Sites')

d) to require remediation of contaminated land (EPA 1990 S78E

e) to keep a public register of land determined as contaminated land

2.2 Regulatory Role of Scottish Environmental Protection Agency

SEPA has four main roles:

a) to provide advice on request in relation to the identification and designation as special sites.

b) to provide site specific advice to local authorities on contaminated land

c) to act as 'enforcing authority' for any land designated as a 'Special Site'

d) to publish periodic reports on the state of contaminated land

2.3 Definition of Contaminated Land

For the purposes of Part IIA, contaminated land is defined as:

Any land which appears to the local authority whose area it is situated to be in such a condition by substances in, on or under the land that

a) significant harm is being caused or there is significant possibility of such harm being caused (SPOSH) or

b) significant pollution of the water environment is being caused or there is significant possibility of such pollution being caused

2.4 What is Significant Harm?

Section 78A(4) defines 'harm' as meaning 'harm to the health of living organisms or other interference with ecological systems of which they form part and, in the case of man, includes harm to his property'. Section 78A(5) sets out the guidance as to what harm is to be regarded as 'significant' and whether the possibility of significant harm being caused is significant shall be determined in accordance with the guidance issued for the purpose by the Scottish Government in accordance with S 78YA of EPA 1990 (S78 A (5) EPA 1990):

The local authority should have regard as significant only harm which is both

a) to a receptor of a type listed in Table A and

b) within the description of harm specified for that type of receptor in that table

The definition of 'The significant possibility of significant harm' is found in Appendix 2

2.5 What is Significant Pollution to the Water Environment?

Section 78A(9) defines pollution of the water environment in terms of the direct or indirect introduction into the water environment of substances which may give rise to harm to human health or the quality of aquatic ecosystems or terrestrial ecosystems directly depending on aquatic ecosystems, result in damage to material property or impair or interfere with amenities and other legitimate uses of the water environment.

Significant pollution is determined by assessing the potential for the impact/harm/ damage associated with the substance in the water environment. The pollution needs to be attributable to the pollutant linkage (see 2.6 below) on its own, or where it contributes to significant pollution in conjunction with other sources, the land in question must be a material contributor to the resultant pollution of the water environment.

In determining whether pollution of the water environment is 'significant pollution of the water environment' for the purposes of section 78A(2)(b), the local authority shall have regard to the following.

2.6 Principles of Pollutant Linkages

Within the context of contaminated land, there are three essential elements to any risk:

A Contaminant - A substance that is in on or under the land and has the potential to cause harm or to receptors such as humans and the water environment

A Receptor - Something that could be adversely affected by a contaminant, such as people, an ecological system, property or a water body; and

A Pathway - A route or other means by which the receptor can be exposed to, or affected by, a contaminant.

Each of the above elements can exist independently, but they only create a risk when they are linked together, so that a particular contaminant affects a particular pathway. This kind of linked combination of contaminant-pathway-receptor is described as a **Pollutant Linkage**.

On any given site, there may be only a single pollutant linkage or there maybe several. Different pollutant linkages may well be related that is, the same contaminant may be linked to multiple receptors via different pathways, or different contaminants and /or pathways may affect the same receptor. It could be the case that not all receptors are relevant in every context, and new pollutant linkages may be created by changes over a period of time. Each pollutant linkage needs to be separately identified, understood and dealt with if appropriate.

2.7 Principles of Risk Assessment

The term is widely used in different context's and circumstances and often with different definitions. The government has used the following definition in it's publications about the environment.

Risk is a combination of the probability, or the frequency of occurrence of a defined hazard and the magnitude of the consequences of the occurrence.

The principles of “suitable for use” should be applied in Part IIA and it aims to ensure that any contamination issues are assessed against the lands current use and to ensure that any remediation ends up with land that is suitable for it’s current purpose.

In using the suitable for use approach the principles of risk assessment will be used to determine the source, pathway receptor concept and the risk associated with each individual site. Both quantitative and qualitative risk assessment will be used to assess sites.

2.8 Water Framework Directive

The European Community (EC) Water Framework Directive which came into force in 2002 establishes a new integrated approach to the protection of Europe’s waters. This has been transposed into the ‘Water Environment and Water Services (Scotland) Act, 2003’.

The main objectives to be achieved by this act are:

- Prevent deterioration in the status of water bodies
- Protect, enhance and restore all bodies of surface water with the aim of achieving good surface water status by 2015
- Prevent the deterioration of the status of groundwater bodies
- Protect, enhance and restore all bodies of groundwater with the aim of reaching good status by 2015
- Prevent or limit the input of pollutants to groundwater and reverse any significant and sustained upward trend in concentration of pollutants in groundwater.
- Comply with Europe wide measures for dangerous substances; and
- Achieve compliance with any relevant standards and objectives for protected areas.

Clackmannanshire Council will continue to work closely with SEPA on sites where contamination may be affecting the water environment. The prioritisation process takes cognisance of water bodies and groundwater and will always be considered in environmental risk assessments.

Chapter 3

Characteristics of Clackmanannshire

3.1 Brief Description and History

Clackmannanshire District lies in the centre of Scotland and is the smallest mainland authority in Scotland with a population of 48,900. It is situated on the north of the river Forth and borders the Councils of Stirling, Perth and Kinross and Falkirk. Bounded by the Ochil hills to the north it comprises a number of small towns and villages.

The area comprises 15,864 hectares and has a population density of 3.08 persons per hectare (159sq km/307 persons per sq km). Alloa with a population of 18,623 (Alloa & Sauchie), remains the largest town in the district.

Settlement Population Estimates

Settlement	Population	Percentage of Total Population (%)
Alloa & Sauchie	18,623	38.06
Alva	4,880	10.55
Clackmannan	3,383	7.08
Devon Village	97	0.17
Dollar	2,275	5.18
Fishcross	466	1.02
Forestmill	51	0.09
Glenochil	273	0.59
Kennet	53	0.11%
Menstrie	2,334	4.22%
Pool of Muckhart	321	0.46%
Tillicoultry, Devonside & Coalsnaughton	6,181	13.35%
Tullibody & Cambus	7,790	15.59%
Glenochil Prison	524	1.12%
Rural Remainder	1,150	1.77%

[1].

[1] The table above gives the population of Clackmannanshire broken down by settlement. Due to rounding error, the sum of each settlement may not mirror the exact total given.

The district has a considerable industrial heritage which bounds a number of traditional industries – mining, shipbuilding, textile manufacture, engineering, food production, brewing and agriculture.

At this time, many of the traditional industries are being replaced and newer service orientated businesses are appearing within the boundaries of Clackmannanshire. There remain however, industries linked to the industrial heritage of the district which continue to thrive. The district can be seen in a transitional economic phase but with heritage which indicates previous contaminative use throughout the various towns and villages that make up Clackmannanshire.

3.2 Geological, Hydrogeological and Hydrology

The geological, hydrogeological and hydrological status of the region provide the pathways by which potential contamination can migrate. Both ground water and surface water as well as being pathways, can also be key receptors in their own right. The following is a description of the ground conditions and potential pathways within Clackmannanshire.

The broad geological characteristics of the area reflects the geographical location of Clackmannanshire. Bordered on the northern side by the Ochil Hills, the area lies within the Kincardine Basin. The Ochil's are the oldest strata in Clackmannanshire consisting of mainly andesite and basaltic volcanic rocks. The Kincardine basin, in which the rest of the district lies, has solid geology which exhibits the varied marine conditions which existed throughout much of Europe during earlier epochs. The lower strata consists of coarse sandstones, mudstones and siltstones. Above this, the passage group consisting of coarse grained sandstones and clayrocks have been deposited. The passage group outcrops in two significant areas – in the west from Menstrie to Alloa and the east from Dollar to the boundary of Clackmannanshire.

Through the North South intersection of the district there has been considerable depositions of coal measures, Upper – Middle and Lower. These measures dominate in the Sauchie and Coalsnaughton area of the district and have been widely exploited throughout Clackmannanshire's history.

These carboniferous rocks have, however, been intruded throughout the geological history of the district. Earth movements culminated in the folding and faulting towards the end of the Carboniferous period with the largest fault running through the Ochil's – the Ochil fault. Numerous other smaller west east faults were also cut through the solid geology and in some cases resulted in the uplifting of the Carboniferous rocks with subsequent reddening and oxidation.

The drift geology also exhibits a considerable distinction between the Ochil hills and the rest of the district. The Ochil's consist mainly of bedrock with small regions of peat found at higher elevations. Glacial drainage channels can mainly be found on the northern faces of the hills.

The remainder of the district exhibits evidence of coastal and marine sedimentation and erosion. The western part of the district carries a heavy band of post glacial beach deposits and alluvium which travels along the border of the Ochil's encompassing Alva. This broad band also travels across the Forth Estuary on the Clackmannanshire

boundary providing similar drift characteristics in Alloa. Intersecting this band of alluvium is a large band of boulder clay which reaches from the far west of the district and encompasses areas such as Sauchie and parts of Tullibody. Whilst these two bands of differing geology cover the most land areas of the district, there are areas of river terrace alluvium, sands and gravels particularly in the Dollar and Tillicoultry areas of the district.

Given the relative scale of both drift and solid geology and taking into account the brewing history of Clackmannanshire, it is clear that there are suitable hydrogeological conditions for the extraction of water for various uses. The drift geological conditions provide the potential pathways for any contamination to migrate from its original source, the boulder clays providing a more impermeable barrier against contaminant migration and the sands and silts of alluvium often providing ideal conditions for migration.

3.3 Protected Locations

Although small in size, Clackmannanshire contains a wide variety of protected locations. These include Ancient woodland, Areas of Great Landscape Value, Local Nature Reserves, SSSI's and other wildlife sites. These are recognised in the Council development plans and structural and local plans. Significant development control exists on any activities that may undermine the value of these sites.

The Council also has a number of key property types including scheduled ancient monuments, outstanding conservation areas and listed buildings. These properties are located in both the urban and rural parts of the district and are also subject to strict controls when involved in the development process.

The prioritisation model takes all of these receptors into account when according a risk ranking order to the sites. All receptors are ranked according to the guidance. The following are the main drivers in Part IIA in accordance to importance.

1. Human Health
2. The Water Environment
3. Designated Ecosystems
4. Buildings and Property

Chapter 4

Overall Aims and Implementation of the Strategy

4.1 Statutory Guidance

The statutory guidance (edition 2), published by the Scottish Government sets out how local authorities inspect land, to identify if it may be potentially contaminated.

The Guidance sets out the underlying principles to be applied to the development of a strategic approach to land inspection. It states:

In carrying out its inspection duty under section 78B(1), the local authority should take a strategic approach to the identification of land which merits detailed individual inspection. This approach should:

- be rational, ordered and efficient;
- be proportionate to the seriousness of any actual potential risk;
- seek to ensure that the most pressing and serious problems are identified first;
- ensure that resources are prioritised on investigating areas where the authority is most likely to identify contaminated land; and
- ensure that the local authority efficiently identifies requirements for the detailed inspection of particular areas of land

4.2 Clackmannanshire Council Aims

Clackmannanshire Council aims to meet the requirements of the Statutory guidance set out in the Scottish Government Environmental Protection Act 1990:Part IIA, Statutory Guidance: Edition 2, 2006.

The Council through the strategy aims to ensure that the above approach is followed and has a strategic approach to identifying contaminated land within Clackmannanshire. The strategy allows for all interested individuals, groups and organisations to observe in a clear and transparent manner the approach that will be taken by Clackmannanshire Council.

In implementing of Part IIA, the Council will adopt the following priorities:

- To protect human health
- To protect the water environment
- To protect designated ecosystems
- To prevent further damage to property
- To encourage re-use-of brownfield sites

The priorities listed above have been derived in accordance with Contaminated Land Report 6 ‘Prioritisation and Categorisation Procedure for Sites Which May Be Contaminated’. This process is based on the Hazard-Pathway-Target approach. Sites will be assessed on the severity of contamination, the efficiency of the pathway and the sensitivity of the receptor. In some cases it will be necessary to decide priorities between sites within the same risk category, ie. a surface water feature and human receptor both categorise as high risk. Clackmannanshire Council will always consult with SEPA and other agencies in making decisions of this nature. Wherever and whenever possible, Clackmannanshire Council will seek to secure remediation on a voluntary basis in compliance with guidance. However its priority will remain the protection of human health and enforcement action will be taken where necessary in order to meet that priority.

The Council encourages the re-development of brownfield land in line with the Government’s policy on sustainable development. Wherever possible contractors and consultants will be used with a compliant sustainability policy. The Council will encourage wherever possible the use of materials for remediation that are locally sourced.

Consultation and engineering contracts will be advertised on Scotland's National Advertising Portal as well as the Council's website in order to give local companies an equal chance of submitting a tender. All tenders and contracts awarded will be in accordance with Council contract standing orders. Best value for the Council tax payer, the Council and the environment as a whole are priorities.

The majority of contaminated land issues are currently addressed through the Development Control regime where contamination is a material consideration. This means that the planning system requires to consider contamination for strategic planning purposes (local and structure plans) and where granting planning permission for proposed development.

It is anticipated that the redevelopment of brownfield sites under the development control regime will be a key method of addressing contamination. It should not be possible for land addressed through the planning regime to be 'contaminated land' within the meaning of Part IIA.

There will be a number of areas where Part IIA interacts with the planning regime:-

- where land undergoing or about to undergo redevelopment could be defined as contaminated land under Part IIA;

- where contaminated land has been identified but is already subject to redevelopment proposals, or the appropriate person brings forward proposals to remediate the land;

- where remediation is carried out and the works themselves could be constituted 'development' and consequently require planning permission;

- where remediation works have been carried out in context of redevelopment of the site.

Where such land is designated as contaminated land under Part IIA and is subject to a planning application for re-development, the required remediation will be agreed as part of the planning process.

4.3 Operational Approach

In order to meet the requirements of the statutory guidance, to investigate potentially contaminated land in an ordered and efficient manner always dealing with the highest priority sites first, the Council has developed an approach which encompasses all the guidance set out by the government.

The approach allows for an accurate identification of all potentially contaminated sites using up to date technology and adhering to guidance.

1. Location of Potentially Contaminated Sites
Clackmannanshire Council has completed work on the identification of potentially contaminated sites using a GIS system based on the historical use of land. Work will continue to identify further sites through the planning process and through local development.

2. Prioritisation of Sites

In order to meet our defined priorities and to investigate land in an ordered and efficient manner, GIS based software has been procured. Many packages are available and were reviewed before a final decision was made. The alternative to a GIS prioritisation software package is to prioritise sites manually. This would involve the scrutiny of historic ordinance survey maps which would be very time intensive and potentially not as accurate and uniform as a software model.

3. Detailed Inspection of Sites

The S57 Prioritisation software model will identify the highest priority sites. These sites will then be subject to walkover surveys by the Council and/or an appointed suitably qualified consultant/s. A walkover survey rarely provides enough quantitative data to downgrade the risk ranking of the site, and so a Preliminary Risk Assessment will be needed. In these cases, a walkover survey will be carried out in conjunction with a preliminary risk assessment.

Site investigations will be undertaken in a staged approach based on the output of the S57 model. Sites will initially be walked over and the data and information gained will be entered into the Land Quality Management Database (LQMD), part of the model. Based on this information, certain sites will be put forward for Phase 1 Preliminary Risk Assessments (desk study) and then intrusive investigations if needed.

4. The Use of Statutory Powers

Statutory designation of sites as contaminated land will be made as and when required. This will only happen when all avenues of voluntary remediation have been explored. The Council will have followed the Statutory guidance and thoroughly investigated and carried out a risk assessment before determination is considered. Only when the test of significant harm has been met (or on the balance of probabilities would be met) will a determination be made.

5. The Interface with Planning in Relation to Brownfield Site Development

Environmental health will consult and liaise with the Planning Service on planning applications and recommend conditions to be attached to any grant of planning permission to ensure that land is suitable for its proposed use. To assist developers who wish to develop on previously used land a guidance document has been produced, which is free to download from the Council's website, 'Clacksweb'.

6. Sites with Imminent Risks

Any sites which require to be dealt with urgently due to imminent risks will be considered at any stage. The Council will always be working on the sites that are the highest priority first. Any site can be moved up or down the priority ladder if needed.

7. The Public Register and Public Access to Contaminated Land Information

A public register will be developed as required by the legislation. Environmental Health will continue to look at ways of sharing information held on the LQMD with the public.

Chapter 5

5.1 Implementation Milestones/Progress

As can be seen from the charts below, Clackmannanshire Council have some 906 sites prioritised for inspection. The highest risk sites will always be investigated first. The Council will endeavour to adhere to the timescales indicated in the tables below however, there are some factors which may inhibit progress in moving the strategy forward. Some sites can be very complicated and problematic and therefore take many months to complete, others may need remediation which can be a lengthy process and taking enforcement action can be legally complicated. Where contaminated land is identified at domestic properties, consultation and risk assessment can be very complicated and time consuming, thus extending the amount of time needed to bring the site to a satisfactory state.

The Scottish Government (formerly Scottish Executive) has provided funds to Local Authorities in the form of capital Consents to assist them with the contaminated land regime.

Environmental Health has over a number of years, gathered significant detail on a number of sites, which are potentially, subject to contamination through historic use. These sites are all contained within the S57 model and LQMD attached to the GIS system and have the potential to be designated as contaminated land under Part IIA and are likely to feature in any primary investigations on contaminated land in Clackmannanshire.

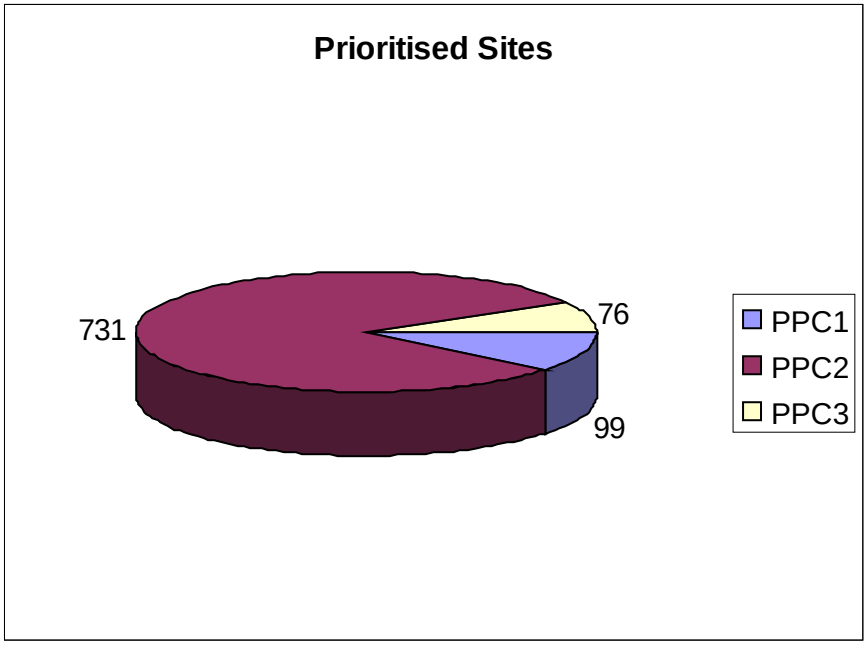
Some of the Now Scottish government funds have therefore been recently employed to progress more detailed investigations of these sites. Six sites have had quantitative risk assessments carried out including intrusive investigations and three of these have been remediated.

5.2 Walkover Reconnaissance

A total of 906 sites have been prioritised as having a previous land use that may have led to contamination within Clackmannanshire. These sites are broken down into the following Preliminary Priority Categories (PPC's):

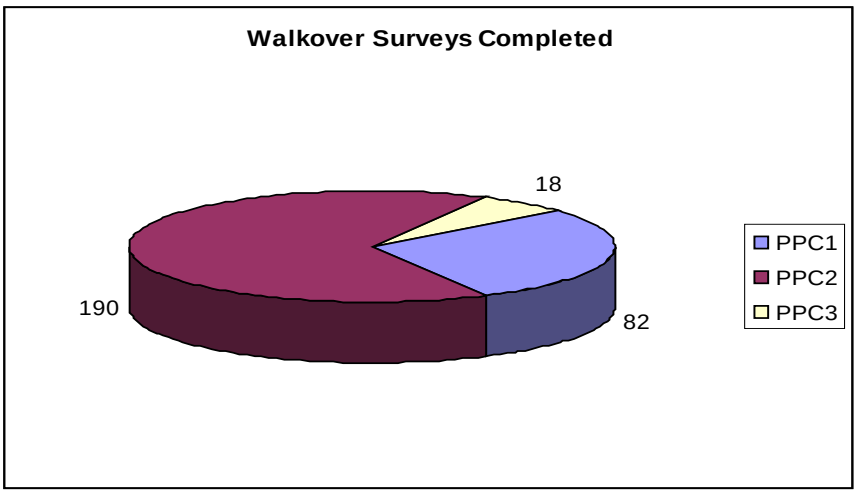
- 99 PPC1's
- 731 PPC2's
- 76 PPC3's

More details on the above can be viewed in Appendix 4 and in the graph pie chart below.



As can be seen from the chart above, the greater number of sites lies within the PPC2 range. These sites still have a 'High Risk' rating and need action within the medium term.

The first stage of investigation for these sites is a walkover survey or 'site reconnaissance'. The walkover surveys will initially be carried out on the PPC1 sites as they hold the greatest chance of having contamination on site with potentially unacceptable risks to key target receptors. As Planning applications are received or queries are made, it may be that other sites with lower initial potential risk are investigated first, because of a complaint or due to information contrary to the sites low initial priority status.



5.3 Phase One Studies Under Part IIA

A total of thirty phase one studies have been carried out under Part IIA. These investigations were all PPC1s and held a high risk status due to the key target receptors being humans. The Phase Ones included a former foundry, three former town gasworks, a large area of former coal mining, a Council yard and the site of a gasometer.

5.4 Phase One Studies under Town and Country Planning

A total of forty-eight sites within Clackmannanshire have been investigated under Town and Country Planning. Many of these sites were investigated because Environmental Health applied planning conditions to the developer's application requiring them to carry out an Environmental Risk Assessment as detailed in section 4.6 of this document.

5.5 Intrusive Investigations Under Part IIA

Intrusive investigations took place on six sites within Clackmannanshire after Phase One studies and detailed quantitative risk assessment identified potentially significant pollutant linkages. One of these sites was a former Council yard, which had both ground contamination and mining issues. This site was remediated and is detailed in Appendix 1 of this document. A second site was a former foundry in which after investigation, no significant risks were identified. The third site is a former gasworks site where significant risks were identified. This site has undergone remediation as this document is published.

5.6 Intrusive Investigations Under Town and Country Planning

A total of 31 sites have been investigated under Town and Country Planning. It should be noted that not all of these sites will have had restrictive planning conditions applied and that it is often the case that developers voluntarily investigate these sites before an application is received by the Council. It should also be noted that not all sites investigated under Town and Country Planning relate strictly to land prioritised by the Council. These areas maybe within 250m of a prioritised site and thus have been investigated as a precautionary measure, thus the main prioritised site will still need to be investigated under Part IIA and in accordance with the strategy.

5.7 Remediation Under Part IIA

Only two sites have been remediated under Part IIA. One of these sites is a former gasworks site and the other the former Bankhead Council Yard described in Appendix 1.

5.8 Remediation Under Town and Country Planning

A total of eight sites have been remediated through Town and Country Planning to date. These sites include a housing estate on a former foundry, two large supermarkets on an old brewery site, parts of the new Alloa rail link and a former petrol filling station.

5.9 Previous Timescales

Phase One Assessment	Oct 2001 - Oct 2002
Review Process	Nov 2002 - Dec 2002
Phase Two Detailed Assessment	Jan 2003 - Dec 2003
Phase Three- Inspection	Jan 2004 - Jan 2006

5.10 Revised Timescales

Phase One Assessment/Review	Completed
Phase Two Assessment/Review	Completed
Walkover Surveys Remaining PPC1's	Ongoing
Preliminary Risk Assessment of PPC1's	Ongoing
Walkover of Remaining Prioritised Sites	Ongoing

5.11 Detailed Inspection Criteria

The contents and format of the various stages of risk assessment are set out in government guidance. This guidance will be strictly adhered to when investigating/risk assessing potentially contaminated land. It is to be noted that every site is different and although a basic format will be used on every site, details will differ widely between sites. More details can be found in Appendix Five

5.12 Consultants and Outside Assistance

The Council will be carrying out much of the investigation work including intrusive investigations and risk assessment itself and with the help of members of the Closer Working Resource Sharing Group. On occasions it may be that the Council commissions the help of environmental consultants and solicitors for specific cases to make sure that the Council is in strict accordance with all environmental legislation.

5.13 Triggers for Inspection

Clackmannanshire Council will be required to undertake inspections of sites outwith the program of investigations detailed within this strategy. It is likely that it will be because of one of the following triggers:

- Unplanned events eg. localised flooding or reports of spillages.
- Complaints from residents or companies on the possible presence of contamination eg. bad smells, discoloured water etc
- To support voluntary remediation
- Identification of localised health effects
- As a response from other statutory bodies.

5.14 Performance Management

The Environmental Health Team undertake a system of performance management that includes both internal and external audits. Clackmannanshire Council also benchmarks its contaminated land functions against other appropriate Councils in Scotland.

Clackmannanshire Council also actively participate in the Central Scotland Contaminated land Sub-Group, and the Scottish Contaminated land Forum (SCLF) in order to ensure that it is up to date with best practice, changes in legislation and new training opportunities.

5.15 Resource Sharing & Closer Working Group

Clackmannanshire Council along with a number of other Councils has entered an informal closer working relationship and resource sharing scheme. This relationship is reducing the costs of investigation work under Part IIA but is also reducing the time taken to bring sites to a decision on whether they need further action. It is hoped that this group will increase in size and function allowing for further efficiencies to be made and increased knowledge and expertise of Clackmannanshire Council officers.

Chapter 6 Procedures

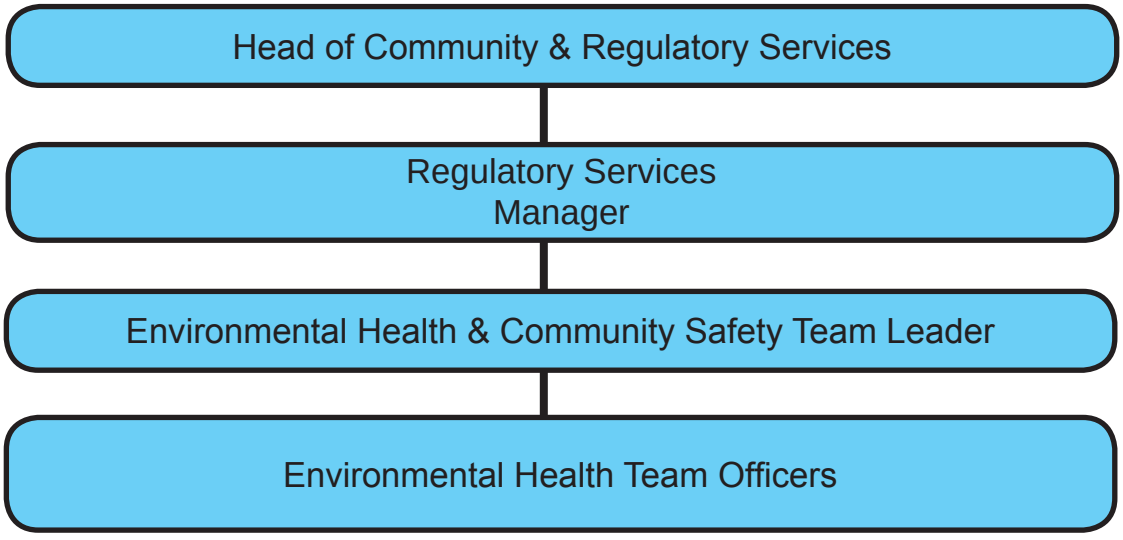
6.1 Relevant Internal Structure within Community and Regulatory Services

This section gives details of the responsible persons in Clackmannanshire Council and sets out the structure for addressing Part IIA activities

Community and Regulatory Services

Responsibility for work relating to the contaminated land regime under Part IIA of the Environmental Protection Act 1990 lies primarily with Community and Regulatory Services. The structure chart below details the management structure.

Relevant Internal Structure within Community & Regulatory Services



6.2 Sources of Information

In undertaking work to not only locate potentially contaminated sites, but also to allow the S57 model to prioritise them, it is important to consider all relevant sources of information and existing knowledge. There are many ways in which the Council collect and receive information:

Internal Sources
Many different sources of information are held on various databases within the Council and have been used in prioritising sites. This information will be updated on a regular basis.

6.3 Evaluation of information

When evaluating the above sources of information to identify the potential for contamination, one of the key issues will be pollutant linkages and the source-pathway-receptor concept. All three of these elements must be in place for land to be identified as contaminated land, if any of these three are missing, then that piece of land will not be identified as contaminated.

6.4 Management of Information

The aim of this section is to demonstrate how Clackmannanshire Council will manage information relating to contaminated land in an efficient manner and provide appropriate access to this information, including arrangements for the maintenance of any necessary confidentiality.

There is a clear need to collate information on potentially contaminated land in Clackmannanshire to be available to numerous agencies and stakeholders. These will include various services of the Council along with outside agencies such as the Scottish Environmental Protection Agency (SEPA) and Scottish Natural Heritage (SNH), consultancies, developers and members of the public.

Clackmannanshire Council holds a large amount of data on individual sites within Clackmannanshire and this has been brought together in a format that allows potentially contaminated land to be readily identified and prioritised in order that those with the receptors facing the greatest risk, are given the appropriate attention. Sources of information available to the Council are outlined in section 5.2 above.

6.5 Storage of and Access to Information

Information acquired during Clackmannanshire Council's Part IIA work relating to contaminated land will be stored securely, where possible on the Land Quality Management Database (LQMD). The LQMD has the capacity to store in digital form, investigation reports, maps, drawings, correspondence, photographs etc. Many reports will be presented to the Council by the way of a cd. This digital information will be entered onto the LQMD and the cd stored as a backup.

Paper files of correspondence such as letters from the public, private business and other regulatory agencies such as the SEPA, will also be kept within the Environmental Health Service. At a later date these will be digitised and stored on the LQMD.

More information on the LQMD and the S57 Model can be seen in Appendix 4 of this document.

Files within Environmental Health are accessed by other officers of Environmental Health and are also available to other services within the Council on request, this is normally in relation to specific site information requests but can also be as a result

of working groups etc. Access to such information will only be permitted where it is deemed appropriate to the aims and objectives of any work undertaken.

Agencies outwith the Council along with members of the public can access information by request. This will primarily be in relation to specific sites. An example of this would be a developer requesting information concerning an area of land on which there may be proposals to develop, or a member of the public concerned about land on which he/she may live or reside. Information held on the GIS system may often be sufficient to satisfy queries.

Requests for information currently made for commercial reasons are subject to a charge. Environmental Health currently have a service called 'Basic Land Quality Report'. This service currently costs £52inc vat and includes information on prioritised sites within 500m of a particular site, current or closed Landfills, mine entries, pollution incidents, discharge consents, and outline details of investigations carried out. A more in depth product is available at a charge of £74 inc vat which also includes summaries of previous reports and risk assessments and copies of materials' from the LQMD specific to a particular site.

Certain types of information are available to the public and outside agencies which fall under the Freedom of Information Act and the Environmental Information Act 1992.

Information may be offered to the Council belonging to a third party and may afford good background data on a site and may be kept on file. If future investigations or enquiries require this third party information to be released, permission from the provider will be sought.

Some information requests may be subject to issues of confidentiality such as commercially sensitivity, national defence and public security. These pieces of information may require restrictions in distribution.

6.6 Public Register

Under Part IIA, the Council if it formerly identifies land as contaminated land, it must record the details in a register freely available for the public to view. The Council's obligations on this matter are set out in section 78R(1). The register will hold information of designated contaminated land, remediation notices, appeals against remediation, remediation statements, designation of special site, notification of claimed remediation and guidance under section 78V(1).

6.7 Complaints/Service Requests

Any complaint received regarding contaminated land will be dealt with according to procedures currently established within the service.

All complaints can expect

- Their complaint to be logged and recorded
- To be kept informed of progress
- To be contacted by an officer within one working day of receipt.
- To have their details kept confidential

Every effort will be made to resolve complaints quickly. There are, however, a number of issues that may need addressing prior to resolution and accordingly the timescale involved could be protracted. This will be explained to the complainant on initial contact, assessed on an individual basis.

The complaint will be logged in the computer system (FLARE) used by the service. The complaint will be attached to the site address in question and through that to the GIS location. If necessary this information can be entered on to the LQMD to form a complaints record for that site.

The Council will accept anonymously supplied information but will only act on this information where a significant issue has been identified. In this case, the suggestion of physical contamination causing harm, new receptors or the suggestion of a direct pollution linkage previously unknown are liable to instigate an investigation.

In general, the Council will only act in relation to contaminated land where robust scientific evidence is available. In many cases, this will rely on the knowledge and experience of the individual officer concerned where information is supplied.

6.8 Development Services

The majority of contaminated land issues are currently addressed through the planning system where contaminated land is a material consideration.

This means that the planning system requires to consider contamination for strategic planning purposes.

The contaminated land regime and the planning system to some extent run in parallel and the manner in which such issues are addressed within the planning system is an important element in ensuring the protection of public health. There is an important distinction that exists between the issues of land contamination raised in terms of Part IIA contaminated land regime and those associated with the planning process. It is the responsibility of the planning authority to consider the ‘potential’ risks associated with any development. The contaminated land regime only considers contamination within the context of existing land use. There is the likelihood where land contamination issues on a site fall outwith the contaminated land regime, by virtue of the statutory definition of contaminated land, yet also remain issues within development control.

There will be a number of areas where Part IIA interacts with the planning regime:-

- where land undergoing or about to undergo redevelopment could be defined as contaminated land under Part IIA.

- Where contaminated land has been identified but is already subject to redevelopment proposals, or the appropriate person decides to bring forward proposals to remediate land.

- Where remediation is carried out and the works themselves could be constituted as ‘development’ and consequently require planning permission.

- Where remediation works have been carried out in context of redevelopment of a site.

6.9 Building Standards

Where a proposed development comes within the remit of the Building control process, issues relative to contamination shall be addressed in terms of the Building (Scotland) Regulations 2004 as amneded. Technical standards made under these regulations ensure that measures are taken to protect people and buildings from harm, which could be caused by site conditions.

Whilst Part IIA places a duty on local authorities to address the issues of land contamination, it is anticipated that the redevelopment of brownfield sites under the development control regime will remain the key method of addressing land contamination. It should not be possible for land addressed through the planning regime to be 'contaminated land' within the meaning of Part IIA.

Chapter 7

General Liaison and Communication Procedures

The Council realises that without effective liaison and communication with all relevant stakeholders for any given site, effective progress on moving the strategy forward can not be achieved.

Clackmannanshire Council aims to maintain a high level of interaction with all stakeholders and be proactive in keeping all relevant parties abreast of the status of any particular site or the strategy as a whole.

The Council aims through effective communication to progress all investigation work in a timely and efficient manner in order to lessen any disturbance or stress to any resident stakeholders and to reduce the chances of environmental impacts

7.1 Interaction with Clackmannanshire Council

Apart from regular communication between officers within Environmental Health and Development Services, there are regular meetings of the Enviromental Health Team. Contaminated land matters are discussed then amongst all team members.

7.2 Interaction with Statutory Consultees and Others

The guidance identifies statutory consultees as the Scottish Government, SEPA, Scottish Natural Heritage (SNH), Natural Scotland, Food Standards Agency in Scotland (FSAS) and other appropriate public authorities.

Regular communication occurs between local authorities within the central belt of Scotland and SEPA through a network of contaminated land meetings and pollution group meetings. The Scottish Contaminated Land Forum (SCLF) meet on a quarterly basis to discuss changes in legislation, best practice and also to hold training events.

SEPA has a published framework for Local Authority/SEPA liaison under Part IIA. Consultation will follow this format but will also continue to be made informally where required for specific projects.

Consultation will be sought with SNH with regard to Sites of Special Scientific Interest (SSSI). Clackmannanshire Council will consult with SNH with respect to actions undertaken under Part IIA on any land within Clackmannanshire designated as a SSSI which, if carried out by the owner or occupier would require consent of SNH under section 28 of The Wildlife and Countryside Act 1981.

The finalised version of this investigation strategy has been circulated as widely as possible and will ensure that members of the public can access it if desired. It will be made available on the Council's website.

7.3 Communicating with Owners, Occupiers and other Interested Parties

Clackmannanshire Council will keep parties fully informed of the various stages in the investigation of sites in which they may have an interest.

Where potentially contaminated land is to be inspected, the Council will initiate communication with the landowner or other appropriate person responsible for that land. The Council will always encourage voluntary remediation wherever possible, correct communication with appropriate parties is essential to this process.

7.4 Communication of Risk

Contaminated land is a term that has the potential to cause concern amongst most individuals and over a wide range of issues which fall into one of the following categories:

Health Considerations
Environmental Impact
Economic Impact
Social Impact
Visual Impact

The nature of contaminated land or potentially contaminated land risk does not lend itself to easy explanation to the layperson. Clackmannanshire Council realise that concerns raised by the public and other parties need to be treated as legitimate concerns.

Through experience, Clackmannanshire Council understands that the public's perception of risk may not always match that of the statutory regime. In all instances the Council will recognise and try to overcome the critical barriers to effective risk communication:

Familiarity - Increased concern about unfamiliar issues

Control - increased concern if the individual is unable to exert any control over events

Proximity in space - Increased concerns about nearby events

Proximity in time - Increased concern about immediate consequences rather than long term effects

Scale - Particularly in terms of media coverage, where a large incident appears much worse than several smaller incidents

Dread Factor - Lack of understanding can lead to stress and make further explanation more difficult.

A risk communication strategy will be constructed with cognisance to the Health Protection Scotland (HPS), 'Communicating with the Public About Health Risks' document and the Scotland & Northern Ireland Forum For Environmental Research (SNIFFER) guidance document ' Communicating Understanding of Contaminated Land Risks'.

The strategy will incorporate the following components (summarised by the acronym **DISSECT**)

Define - The issue or the problem
Identify - The stakeholders and the target audience
Set - The aim and detailed objectives
Select - The key messages
Engage - Partners who will be involved in managing the incident and who need to contribute to key message development
Choose - The communication channels, methods, tools and processes)
Track - And evaluate the impact

Approach to Enforcement
Enforcement will always be a last resort and will not be considered until all other avenues of progression have been exhausted. If enforcement is taken, it will be in strict accordance with the statutory guidance and will follow the 'Better Regulation' principles set down by the government.

Because a large amount of potentially contaminated sites will be dealt with through the planning service, it is with the planning service where enforcement is most likely to take place as a result of failure to discharge planning conditions.

7.5 Powers of Entry

Section 108 and schedule 18 of the Environment Act 1995 grants the Council powers of entry. The Council will undertake to consult with the owner occupier wherever possible prior to entry of the premises.

In an emergency these powers of entry can be exercised forthwith if this is necessary. For these purposes a case is an emergency if it appears to the authorised person -

a) that there is an immediate risk of serious pollution of the environment or serious harm to human health, or

b) that circumstances exist that are likely to endanger life or health and that immediate entry to any premises is necessary to verify the existence of that risk or those circumstances or to ascertain the cause of that risk or those circumstances or to effect a remedy (section 108(15) Environment Act 1995)

7.6 Remediation Notices

The statutory guidance sets out how the Council goes about making remediation notices and the Council will always comply with this. The Council will always, wherever possible seek remediation through agreed voluntary action.

Where this is not possible, the Council will serve a remediation notice following an official determination of contaminated land, on the appropriate persons. Except in the most urgent of cases the Council is required to allow three months to elapse between the date of notification to the person concerned and the service of a remediation notice on that person

Chapter 8

Clackmannanshire Council Contact

8.1 Contacts Within the Council

For day-to-day contact with the Council on all Part IIA contaminated land issues contact should be made with Environmental Health Unit within Development Services:

Environmental Health
Community & Regulatory Services
Clackmannanshire Council
Room 6a
Kilncraigs
Greenside Street
Alloa
FK10 1EB
Telephone 01259 452553 fax 01259 727450
Email ehealth@lacks.gov.uk

8.2 Other Lines of Contact

Whilst local authorities primarily enforce the contaminated land regime, SEPA are also regulators for special sites and collate information regarding the state of contaminated land in Scotland.

SEPA may be contacted at:

Scottish Environmental protection Agency (SEPA)
Corporate Office
Erskine Court
Castle Business Park
Stirling
FK9 4TR
Tel 01786 457700
Fax 01786 446885

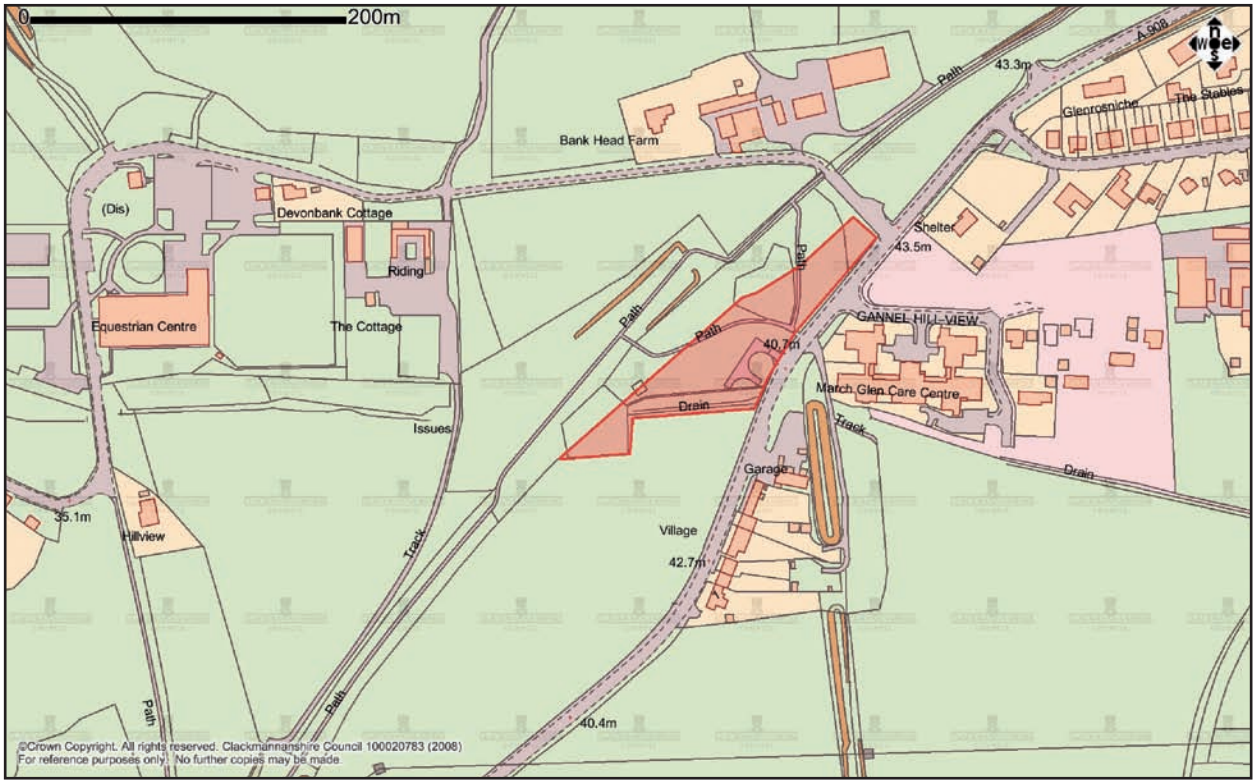
Appendix 1

Investigation Case Study/Remediation Case study

Bankhead Council Yard, Fishcross

The site occupies a 1.6 hectares rectangular shape parcel of land orientated northeast to southwest with a small triangular spur in the southwest corner. The site layout is shown in Figure 1 below. The sight topography slopes gently to the southwest corner of the site. The site is bounded to the east by the A908, from which vehicular access to the site is gained at the southern end of the eastern boundary. At the site entrance is a small tarmac car park and a piece of tended grass. On the grass at the entrance are several manhole covers and Scottish Water pumping station control box.

Figure 1



Before remediation a mineshaft was present which was fenced off and is located at the centre of the site. The site was bisected laterally by a wooden stake and wire fence, which relates to the historic use and along which runs an 11,000-volt power line on wooden pylons. In the northeast corner was a concrete pad surrounded by a high wire mesh fence. The remainder of the site was soft landscaping with occasional piles of rubble and fly tipped materials.

Adjacent to the southern boundary of the site is a ditch around 2m deep, with a small water course running southeast to northwest along the southern boundary. This watercourse is culverted prior to entering the site and again two thirds of the way across the site.

Various trees grow along the banks of the watercourse and along the southern boundary was a stand of Japanese Knotweed. Please refer to Figure 2 for site details.

Previous investigations had highlighted that there was a possibility that contamination was present on site and that there was a need for an environmental and human health risk assessment. Clackmannanshire Council applied to and was successful in obtaining funds from the as then Scottish Executive for funds to investigate and if need be remediate the site.

Environ UK were commissioned to undertake a preliminary risk assessment (desk study) and then a detailed quantitative risk assessment involving an intrusive investigation to determine if there was a significant risk of significant harm on the site for both human health and other receptors.

The investigation incorporated the drilling of 20 boreholes with10 of these being utilised for groundwater monitoring and gas measuring. A wide range of contaminants were tested for with relevance to the past use of the land (mining, railway land and Council roads depot. The site was split into two distinct averaging areas due to the differences in depth to groundwater and the local geology and ground conditions.

The results were then put through a quantitative risk assessment based on the most conservative criteria of houses with gardens. This criteria was used because of the sensitive nature of the proposed use, namely that children would have access to the site and have contact with the land and possibly eat wild fruit and berries from the local vegetation.

Soil Contamination
Heavy metals on the site did not pose a significant risk to human receptors. Poly Aromatic Hydrocarbons (PAH's) were found site wide with no exception. Most samples failed assessment criteria across the site. The main contaminants of concern were Benzo(a)pyrene, Benzo(a)anthracene and Benzo(b)fluoranthene recording some of the highest amounts. All of the PAH's apart from a few posed a significant risk to human health.

Contamination of the Water Environment
The controlled water risk assessment (Water Environment) identified Cyanide, Nickel and PAH's at concentrations greater than the recommended level for potable drinking water, above which ingestion of the contaminated water could cause harm to human health. The burn on the southern site boundary did not contain elevated Cyanide, Nickel or PAH's concentrations although it was noted that the groundwater flow was almost perpendicular to the river.

The contaminated groundwater was perched in the made ground and was considered unlikely to migrate both laterally and vertically. Migration could however occur during winter months when high rainfall is experienced thus elevating the groundwater level and possibly reaching the surface.

The burn was deemed to be highly unlikely to be impacted by the perched groundwater due to likely dilution.

It was thought that the mineshaft on site might have been acting as a preferential pathway for perched contaminated water causing the groundwater to bypass the impermeable strata and contaminate the water table.

Land Gas
All land gas measurements were below screening criteria for Carbon Dioxide (CO2), Methane (CH4) and hydrogen sulphide (HSO4) apart from one sample. The carbon dioxide in this one sample was just below the Waste management Paper guideline criterion, but because no buildings were planned and no positive flow was detected, it was not considered to be a significant threat to future site users.

Mining instability
This site was within an area, which historically was heavily mined. A number of coal seams including the Cherry Coal, the Two-foot Coal, Diamond Coal and the Nine Foot coal seams were worked. As a result of this, many mineshafts exist within the surrounding area. One of these mineshafts is the Thompsons mineshaft, which was used to exploit the Cherry Coal Seam.

Aside from the exploitation of the Cherry Coal Seam there are possibly many unrecorded workings beneath the site at shallow depth. The Two Foot coal seam lies at a shallow depth and its position runs across the south western boundary of the site and across the main road

Source-Pathway-Receptor Pollutant Linkages
With the information gained from the intrusive investigation and the quantitative risk assessment, the following significant pollutant linkages were identified on site:

Source	Pathway	Receptor
PAH's inc benzo(a)pyrene, benzo(a) anthracene and benzo(b) fluoranthene	Dermal contact of surface soils, ingestion of soils and vegetation after uptake of contamination, inhalation of contaminated dust	Site users, children etc
PAH's inc benzo(a)pyrene, benzo(a) anthracene and benzo(b) fluoranthene	Dermal contact, ingestion, and inhalation from rising contaminated perched groundwater	Site users, children etc

Remediation
Remediation of the land had to make certain that the land was made suitable for its proposed use as open amenity land. This meant that dermal and ingestion pathways needed to be eliminated. Time and economical constraints were such that insitu remediation of the contamination was either too expensive or would take too long.

Whatever remediation solution was selected, it needed to be developed with the mining instability issues in mind. To this end the following remedial solutions were developed:

Soil Remediation
An engineered cap layer of clean inert soil was installed with a depth of 500mm to break the dermal contact, ingestion and volatile pathways. Normally a 1000mm depth of capping layer is needed in these situations but part of the remedial solution for the potential mining subsidence is the laying of a geomembrane. This membrane would prevent a certain amount of upward migration of contamination allowing for a lesser depth of cap.

The capping layer was engineered to allow not only for site drainage, but for a sufficient depth to allow for root ball growth of trees. The grade of soil was selected to allow the growth of open wild flower meadow and small trees and shrubs that would form a site boundary.

The landscape was to be varied in line with the mining instability management solution explained below. This included varied areas of wild flower meadow, broadleaf and conifer woodland and the construction of a multi-user pathway.

Mining Instability Remediation/Management Solution
The mining issues on site were complex and in order to fully characterise the site, would need extensive investigation. This investigation work would prove to be disproportionately expensive and time-consuming taking in to account the end use of the site. To this end, the environmental consultants came up with a risk management plan as a ways of remediation for the mining instability issues.

Ground instability will increase and decrease the closer or further away from mine workings a particular feature or area of land is. More would need to be done in high-risk areas with less in low or no risk areas. With this in mind, four distinct zones of risk and associated management solutions were developed

A Green Zone - In which based on the information available, there appeared to be no risk to public health and safety from mining subsidence and a 'do nothing' approach was possible albeit with the acceptance that some surface movement was possible. In these areas only the chemical contamination was remediated with a clean cap of up to 1m of inert soil.

A Blue Zone - In which there is unlikely to be risk to public health and safety from mining subsidence, but in which more significant surface movement was possible. The use of a geotextile membrane was lain under 500mm of inert capping material which limits the amount of surface movement.

A Red Zone - Where significant ground movement is possible that may effect the surface and existing infrastructure, and which could possibly pose a risk to health and safety. A much stronger grade of geotextile membrane was lain under an inert capping layer of 500mm. This would limit surface movements to a 'gradual' rather than catastrophic movement. This area is mostly where the conjectured workings of the 'near surface coal seams have been worked.

A Sterile Zone - This includes two areas, the mine shaft and the area where near surface voids were identified. This area would be fenced off and intensively planted with species of plants, trees and shrubs in order to 'deter' man entry to these areas.

The mineshaft lies within the sterile zone and this was 'double layered' with the highest grade geotextile membrane after infilling of the void space with soil from the site. This along with the intensive planting and fence to discourage man entry affords a sufficient management of the risk of subsidence.

Figure 2
Fly tipping on site

Japanese Knot Weed

Post Remediation, Multi user Path

Post Remediation, Planting in the ‘Red Zone’

Post Remediation ‘Planting in the ‘Sterile Zone’

Post Remediation, Wild Flowers

Appendix 2

Categories of Significant Harm

Type of Receptor	Description of harm to that type of receptor that is to be regarded as significant harm
1. Human Beings	**Death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.** For these purposes, disease is to be taken to mean an unhealthy condition of the body or part of it and can include, for example, cancer, liver dysfunction or extensive skin ailments. Mental dysfunction is included only insofar as it is attributable to the effects of a pollutant on the body of the person concerned. In this chapter, the description of significant harm is referred to as a 'Human health effect'
2. Any ecological system, or living organism forming part of such a system, within a location which is: • An area notified as an area of special scientific interest (SSSI) under section 28 of the Wildlife and Countryside Act 1981; • Any land declared a national nature reserve under Section 35 of that Act; • Any area designated as a marine nature reserve under section 36 of that ACT; • An area of Special Protection for Birds established under Section 3 of that Act; • Any European Site within the meaning of Regulation 10 of the Conservation (Natural Habitats etc) Regulations 1994 (ie. Special Protection Areas); • Any candidate Special Areas of conservation (see Scottish office circular 6/1995) or potential Special Protection areas given equivalent protection; • Any habitat or site afforded policy protection (ie. candidate special areas of conservation, potential special protection areas and listed Ramsar sites) • Any nature reserve established under section 21 of the National Parks and Access to the Countryside Act 1949 or • Any candidate National Park to be designated under the proposed National Parks Act.	For any protected location • Harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of the location; or • Harm which effects any species of special interest within that location and which endangers the long term maintenance of the population of that species at that location. In addition, in the case of a protected location which is a European Site (or a candidate Special Area of Conservation or a potential Special Protection Area), harm which is incompatible with the favourable conservation status of natural habitats at the location or species typically found there. In determining what constitutes such harm, the Local Authority should have regard to the advice of the Scottish Natural Heritage and to the requirements of the Conservation (Natural Habitats etc) Regulations 1994. In this chapter, this description of significant harm is referred to as an 'ecological effect'

3. Property in the form of: • Crops including timber; • Produce gown domestically, or on Allotments, for consumption; • Livestock; • Other owned or domesticated animals; • Wild animals which are the subject of shooting or fishing rights.	For crops, a substantial diminution in yield or other substantial loss in their value resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in it's value resulting from death, disease or other serious physical damage. The Local Authority should regard a substantial loss in value as occurring only when a substantial proportion of the animals or crops are dead or otherwise no longer fit for their intended purpose. Food should be regarded as no longer fit for purpose when it fails to comply with the provisions of the Food Safety Act 1990. Where a diminution in yield or loss in value is caused by a pollutant linkage, a 20% diminution or loss should be regarded as a benchmark for what constitutes a substantial diminution or loss In this chapter, this description of significant harm is referred to as an 'animal or crop effect'.
4. Property in the form of buildings For this purpose 'buildings' means 'any structure or erection and any part of a building including any part below ground level, but does not include plant or machinery comprised in a building.	Structural failure, substantial damage or substantial interference with any right of occupation. For this purpose, the Local Authority should regard substantial damage or substantial interference as occurring when any part of the building ceases to be capable of being used for the purpose for which it was intended. Additionally, in the case of a scheduled Ancient Monument, substantial damage should be regarded as occurring when the damage significantly impairs the historic architectural, traditional, artistic or archaeological interest by reason of which the monument was scheduled. In this chapter, this description of significant harm is referred to as a 'building effect'.

Appendix 3

Significant Possibility of Significant Harm

Description of Signficant Harm (As defined in Appendix 2)	Condition of There Being A Significant Possibility of Significant Harm
1. Human health effects arising from • The intake of contaminant, or • Other direct bodily contact with a contaminant (exposure)	If the amount of the pollutant in the pollutant linkage in question: • which a human receptor in that linkage might take in, or • to, which such a human might otherwise be exposed, as a result of the pathway in that linkage, would represent an unacceptable intake or exposure, assessed on the basis of relevant information on the toxicological properties of that pollutant. Such an assessment should take into account: • the likely intake of, or exposure to, the substance or substances which form the pollutant from all sources including that from the pollutant linkage in question. • The relative contribution of the pollutant linkage in question to the likely aggregate intake of, or exposure to, the relevant substance or substances; and, • the duration of intake or exposure resulting from the pollutant linkage in question; • the question of whether an intake or exposure is unacceptable is independent of the number of people who might experience or might be affected by that intake or exposure. • Toxicological properties should be taken to include, carcinogenic, mutagenic, teratogenic, pathogenic, endocrine disrupting and other similar properties.
2. All other human health effects (particularly by way of explosion or fire)	If the probability, or frequency, or occurrence of significant harm of that description is unacceptable , assessed on the basis of relevant information concerning: • The type of pollutant linkage • that type of significant harm arising from other causes Such an assessment should take into account the levels of risk which have been judged unacceptable in other similar contexts.
3. All ecological system effects	If significant harm of that description is more likely than not to result from the pollutant linkage in question, taking into account relevant information for that type of pollutant linkage, particularly in relation to the ecotoxicological effects of the pollutant.
4. All animal and crop effects.	If significant harm of that description is more likely than not to result from the pollutant linkage in question, taking into account relevant information for that type of pollutant linkage, particularly in relation to the ecotoxicological effects of the pollutant.
5. All building effects.	If significant harm of that description is more likely than not to result from the pollutant linkage in question during the expected economic life of the building (or in the case of a scheduled Ancient Monument, the foreseeable future), taking into account relevant information for that type of pollutant linkage.

Appendix 4

Prioritisation Model Information

The regulatory regime for ‘Contaminated land’ as defined under Part IIA of the Environmental Protection Act 1990, introduces a statutory obligation on all Local Authorities to prepare, adopt and publish written strategy for the identification and remediation of such land.

The Contaminated Land (Scotland) Regulations require the approach to be “rational, ordered and efficient” and one which attaches the greatest priority to those potentially contaminated areas of land considered to have the greatest potential to cause ‘significant harm’ or ‘significant harm’ to the water environment.

The Scottish Environmental protection Agency in their guidance document ‘Contaminated Land Inspection Strategies -Technical Advice For Local Authorities (April 2000), state that Local Authorities should employ a methodology which begins ‘by comparing the location of potential areas of contamination with areas where there are sensitive receptors’ and having established their geographical coincidence and therefore two parts of a potential pollutant linkage this will allow the authority to define ‘inspection areas or sub-areas’.

The S57 inspection approach methodology developed by Jacobs (as then the Babtie group) was aligned to these fundamental principles to enable the Council to move efficiently from consideration of the whole region to a situation where smaller ‘sub-areas’ of land and eventually individual sites within these sub-areas could be appraised.

Clackmannanshire Council decided to use a GIS for the visual representation of potentially contaminated sub-areas and the analytical assessment of land quality. The GIS provides a flexible tool in the identification process, allowing potentially contaminated sub-areas to be spatially assessed against the most up to date mapping available. The consistency of this information and the adopted methodology ensures that all strategy decisions by the Council are properly informed in a consistent and auditable manner.

Having identified the requirements for a GIS, the geo-datasets required to assess land quality issues within the region were incorporated into the ArcView GIS platform. In order to provide long term storage of Authority wide information relating to potentially contaminated sub-areas, a Land Quality Management Database (LQMD) was implemented within MS Access and coupled directly to the GIS. As explained in chapter 5 a large number of information packages were needed in order to assess potentially contaminated sub-areas, these were incorporated into the GIS system as ‘geo datasets.

Source geo-datasets were obtained from the Landmark Group, SEPA and from within Clackmannanshire Council. Source datasets represent the identification of potentially contaminated sub-areas determined from the examination of past industrial uses.

Pathway datasets were obtained from the British Geological Survey (BGS) 1:50,000 for artificial, drift and solid geological maps. These were incorporated into the GIS. BGS data represents the ground conditions under Clackmannanshire including soil conditions, rock conditions and where geological faults lie. This allows for the determination of how contamination will flow or move through the ground/rock profile.

Receptor datasets are split into Human receptors, Water Environment receptors, Ecological receptors and Heritage receptors.

Sub areas are prioritised according to the methodology based on the Department of the Environment (DoE) Research Report No6 'Prioritisation and categorisation Procedure for sub-Areas Which May Be Contaminated (DoE 1995). Initial prioritisations were determined on the basis of proximity of each potentially contaminated sub-area to any identified target receptors where a target receptor comprises of any of the following types:

- Current development (humans, plants, buildings)
- Surface Waters
- Ground Water

The sub areas were then categorised for their probable impact on development, surface and ground water and to place these potentially contaminated sub areas into one of four Priority Categories (PC) relating to the seriousness of the potential impact and the urgency of the action required. A weighted scoring system was applied to each sub area taking into account the potential seriousness of the contamination (ie. source severity), the ability of the migration pathway to transport contaminants (ie. Pathway Efficiency) and the sensitivity of the receiving environment (ie. receptor sensitivity)

The risk ranking system places all potentially contaminated sub areas in order of their relative potential risk (based on source-pathway-receptor data) and therefore provides a system which enables the authority to address sub-areas of potential contamination in a logical and ordered manner.

The previously mentioned four priority categories are based on suitable for current use and environmental setting, the likely impact on the key targets of development, groundwater and surface water and the urgency with which action might be necessary. The guidance for the prioritisation calls for extensive quantitative data and strict numerical boundaries on each sub area (ie. statistically valid data), this is fundamentally impossible especially when dealing with large geographical areas. Because of this the ranking scores have been normalised and the priority category status turned into a 'Preliminary Priority Category (PPC) site. The descriptions assigned to each of these priority categories for sub-areas of potential contamination are detailed in the table below and are as follows:

PPC and PC Categories and Ranking Factors

Category		**Linkage Element Risk Ranking Factors**		
Preliminary Priority Category (PPC)	**CLR6 Part II Priority Category (PC) Definitions**	**Source**	**Pathway**	**Receptor (Target)**
PPC1	PC1 Site probably or certainly not suitable for present use and environmental setting Contaminants probably or certainly present and very likely to have an unacceptable impact on key targets. Urgent action needed in the short-term	High Contaminating Usage	High Permeability	Human, Groundwater. Surface Water

Preliminary Priority Category (PPC)	CLR6 Part II Priority Category (PC) Definitions	Source	Pathway	Receptor (Target)
PPC2	PC2 Site may not be suitable for present use or environmental setting. Contaminants probably or certainly present and likely to have an unacceptable impact on key targets. Action may be needed in the medium term	High-Moderate Contaminating Usage	High-Moderate Permeability	Humans, Ground and Surface water
PPC3	PC3 Site considered suitable for present use and environmental setting. Contaminants may be present but unlikely to have an unacceptable impact on key targets. Action unlikely to be needed whilst site remains in present use or undisturbed	Moderate-Low Contaminating Usage	Moderate Permeability	Humans Ground and Surface water
PPC4	PC4 Site considered suitable for present use and environmental setting. Contaminants may be present but very unlikely to have an unacceptable impact on key targets. No action needed whilst site remains in present use or undisturbed.	Low Contaminating Usage	Low Permeability	Humans, Surface and Groundwater

Appendix 5

Detailed Inspection Criteria

Phase one, desk top study/Preliminary Risk Assessment
The first step in the investigation process will always be a preliminary investigation or ‘desk study‘, and will always be carried out before any systematic sampling or analysis takes place. The main aims of the desk study should be to obtain information in order to:

1. Provide information on past and current uses of the site and surrounding area, and the nature of any hazards and physical constraints.

2. To identify sources of contamination, migration pathways and potential receptors.

3. To produce relevant data for the development of an initial conceptual site model. This can be said to be a visual, textual or diagrammatic display of the on site conditions. Pollutant linkages can be highlighted and displayed to show the nature and extent of any contamination and migration pathways to key target receptors.

4. To provide data for a preliminary qualitative risk assessment of potential risks present on the site.

5. To provide data to assist the design of exploratory and main investigations and to give an early indication of possible remedial requirements.

A walkover survey or ‘site reconnaissance is an integral part of the desk study and will be carried out and the results included in the desk study report.

Intrusive Investigation/Generic Risk Assessment
The preliminary risk assessment may show that no further action needs to be taken. If however there are uncertainties or potential risks are identified, it may be necessary to carry out a ‘generic risk assessment’.

The purpose of a generic quantitative risk assessment is to establish whether generic assessment criteria and assumptions are appropriate for assessing the risks and if so, to apply them to establish whether there are actual or potential unacceptable risks. It also determines whether further detailed assessment is required.

> Generic assessment criteria are criteria derived using largely generic assumptions about the characteristics and behaviour of sources, pathways and receptors. These assumptions will be conservative in a defined range of conditions.

During this stage of the investigation the Council will consider the availability and appropriateness of generic assessment criteria to simplify the assessment of the site. If generic assessment criteria can be used for some or all of the pollutant linkages on the site, it will be determined what information (eg about contaminants, pathways and

receptors and other properties of the site and its setting) is needed to apply the criteria in an appropriate way.

Further information will then be collected about the site and its surrounding area through intrusive investigations. These investigations may take the form of trial pits, bore holes, surface sampling or a combination of all of these. This will include information on the actual presence and extent of contamination on, pathways and receptors that may give rise to unacceptable risks.

At the end of this process, the conceptual model will be updated and pollution linkages will be conformed for evaluation. If it is appropriate the generic assessment criteria will be used to assess the pollutant linkages.

The final part of this stage is the consideration of the next steps, this may include further work to complete the generic assessment, movement on to a detailed quantitative risk assessment, appraisal of remediation options or where no potential health and environmental risks are identified, to an exit from the process.

Detailed Quantitative Risk Assessment

The purpose of the detailed quantitative risk assessment (DQRA) is to establish and use more detailed 'site specific' information and criteria to establish whether there are unacceptable risks. This stage may be used as the sole method for quantitative risk assessment or to refine earlier assessments using generic assessment criteria.

At the beginning of this stage the Council will have an outline conceptual model, updated from the preliminary and generic risk assessment stages, and will know the context of the risk assessment. Pollutant linkages have also been identified that require further detailed assessment.

The Council or its agents will identify or develop Tools and criteria to estimate and evaluate the risk present on site, this may include the development of 'Site Specific Assessment Criteria' or SSAC.

> Site specific assessment criteria are values for concentrations of contaminants that have been derived using detailed site-specific information on the characteristics and behaviour of contaminants, pathways, and receptors, and that correspond to relevant criteria in relation to harm or pollution for deciding whether there is an unacceptable risk.

Appendix 6

Glossary of Terms

Appropriate person(s)

After land is confirmed as being Contaminated Land, the regulatory bodies have to determine who was responsible for the contaminants being present. Those identified are then the Appropriate Persons responsible for Remediation. In cases where these persons cannot be identified, or no longer exist (for legal purposes), the site owners become the appropriate persons.

Borehole

A generalised term for a long narrow shaft drilled in the ground for the purpose of sampling the soil, groundwater or ground gas.

Contamination

The deposit, absorption, or absorption of chemical agents on or by structures, areas, personnel or objects. A Substance that is in, on or under the land that has the potential to cause significant harm or significant pollution of the water environment.

Development Plan

The statutory land use plan (comprising structure and local plans), prepared by each local authority.

Ecosystem

A notionally discrete suite of interacting organisms relating to a particular habitat. For the purposes of Part IIA, only organisms or habitats located within designated sites such as nature reserves SSSI's are taken into consideration.

GIS (Geographical Information System)

A method by which geographically dependant data can be displayed in an easily understandable visual format to simplify the process of decision making.

Geology

Pertaining to the rocks, soils and other deposits making up the earths crust.

Hydrogeology

Area of geology that deals with the distribution and movement of groundwater in soil, rocks and the earths crust.

Hydrology

The study of water on earth and in the atmosphere, its distribution and uses.

Japanese Knotweed

Japanese knotweed (Fallopia japonica) is a large herbaceous perennial plant, native to East Asia in Japan, China and Korea. In North America and Europe the species is very successful and has been classified as invasive in many countries.

Remediation

In general terms and with relation to contaminated land, remediation is the removal, making safe or management of contamination to remove or reduce the risk to human health or the wider environment. Remediation is normally subject to a number of regulatory requirements and can also be based on human health or ecological risks where no legislative standards exist or where standards are advisory.

Significant/Significance

Significant harm is defined by reference to tables in a guidance Circular, eg. significant harm to a person can range from an ‘unhealthy condition of the body or part of it’ to death. The Council’s judgement as to the significant possibility of significant harm occurring is much more subjective, but is still one test of contaminated land.

Special Sites

Sites found by the local authority to be contaminated land, but which then become the responsibility of SEPA for the purposes of the remediation procedures and process.

Statutory Nuisance

Nuisance such as smell, possibly arising from the presence of contamination, but not causing significant harm, may be subject to Council action under the Environmental Protection Act 1990, but not Part IIA

Trial Pits

A trial pit is an excavation of ground in order to study or sample and study and/or sample the composition and structure of the sub-surface, usually dug during a site investigation, a soil survey or archaeological dig. Trial puts are usually between 1-4 metres deep and are dug by hand or by mechanical digger.

Validation

A process whereby checks are made to make sure that the implemented remediation scheme has indeed severed all of the significant pollutant linkages

A more comprehensive glossary of terms can be found in Annex 6 of Part IIA Statutory Guidance and R&D 66