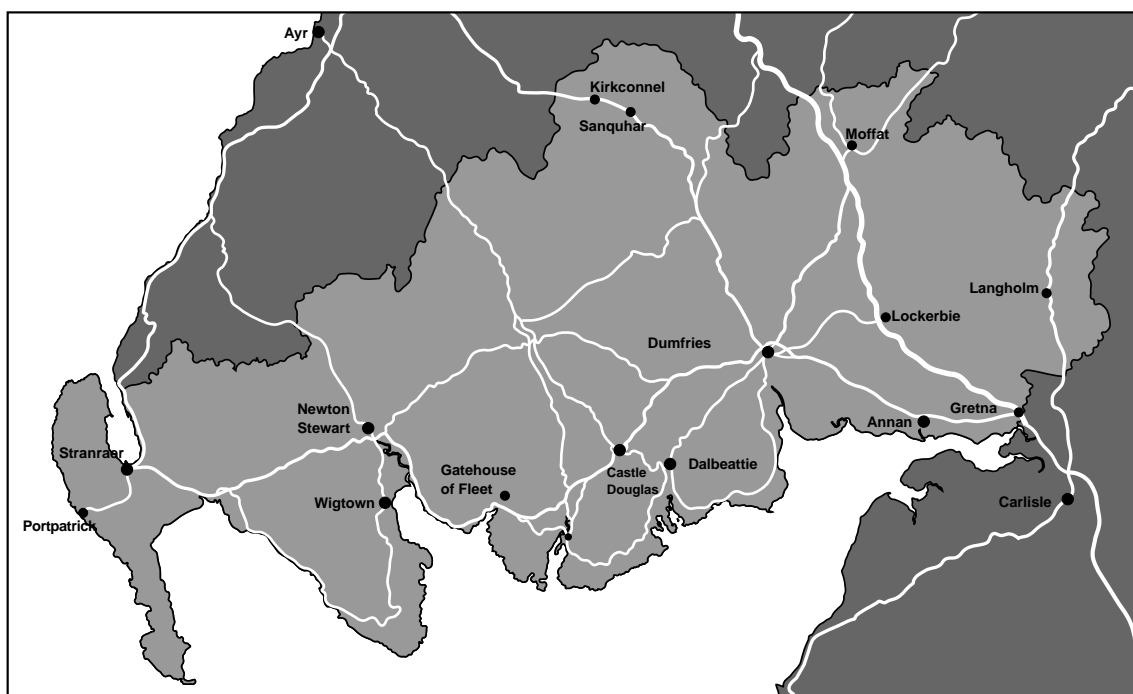


Dumfries and Galloway Contaminated Land Inspection and Assessment Strategy

October 2001



Environment & Infrastructure

Dumfries and Galloway Council

Contaminated Land Inspection and Assessment Strategy

**Dumfries & Galloway Council
Environment & Infrastructure**

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1. Introduction

1.1 Contaminated Land remains a major environmental issue and is particularly problematic because,

- often it is not evident, it has to be researched and located,
- it is usually present indefinitely, it will not go away and
- the source of the pollution may have ceased before the contamination is discovered.

There is therefore a need for an assessment to be made of the extent and location of contaminated land and sites within Dumfries and Galloway.

1.2 The development of the Contaminated Land Inspection and Assessment Strategy will help to:-

- ensure protection of the environment
- encourage the re-use of "brownfield" sites
- support the regeneration of towns and vacant and derelict sites
- encourage the improvement of the amenity value of land

1.3 Provisions to identify and address contaminated land have been introduced under the Environmental Protection Act 1990 (Part IIA) through the Contaminated Land (Scotland) Regulations, which came into force on the 14th July 2000. Further guidance on the identification and remediation of contaminated land is provided in Scottish Executive Environment and Rural Affairs Department Circular 1/2000. The Act and the Regulations places a duty on Dumfries and Galloway Council to survey its area and designate land in accordance with the following definition :

Contaminated land is any land which appears to the local authority in whose area it is situated to be in such a condition, by reasons of substances in, on or under the land that, **significant harm** is being caused or there is a **significant possibility of such harm** being caused, or, pollution of controlled waters is being, or is likely to be, caused.

Harm means harm to the health of living organisms or other interference with the ecological systems of which they form part and, in the case of man, includes harm to his property. This Circular defines what is meant by significant harm and significant possibility of significant harm. These are set out in Appendix 1.

1.4 This circular sets out the process for the identification of contaminated land.

1. It requires the identification of a significant pollutant linkage. This means that each of the following must be identified with respect to that land - contaminant, pathway and receptor (there may be multiple contaminants, pathways and receptors).

- **Contaminant** is a substance which is in, on or under the land and which has the potential to cause harm or to cause pollution of controlled waters.
- **Receptor** is either a living organism, a group of living organisms, an ecological system or a piece of property which is being, or could be, harmed by a contaminant, or controlled waters which are being or could be, polluted by a contaminant.
- **Pathway** is one or more routes or means by, or through, which a receptor is being exposed to, or affected by, a contaminant, or could be so exposed or affected.

2. To define the site as contaminated land the local authority has to satisfy itself that both:

- a) such a pollutant linkage exists in respect of a piece of land and
- b) that the pollutant linkage :
 - i) is resulting in significant harm being caused to the receptor in the pollutant linkage,
 - ii) presents a significant possibility of significant harm being caused to that receptor
 - iii) is resulting in the pollution of the controlled waters which constitute the receptor or
 - iv) is likely to result in such pollution.

1.5 Under this Act the Council is obliged:

- a) to cause its area to be inspected to identify contaminated land;
- b) to determine whether any particular site is contaminated land,
- c) to act as enforcing authority for all contaminated land which is not designated as a special site [Scottish Environmental Protection Agency (SEPA) will be the enforcing authority for special sites].

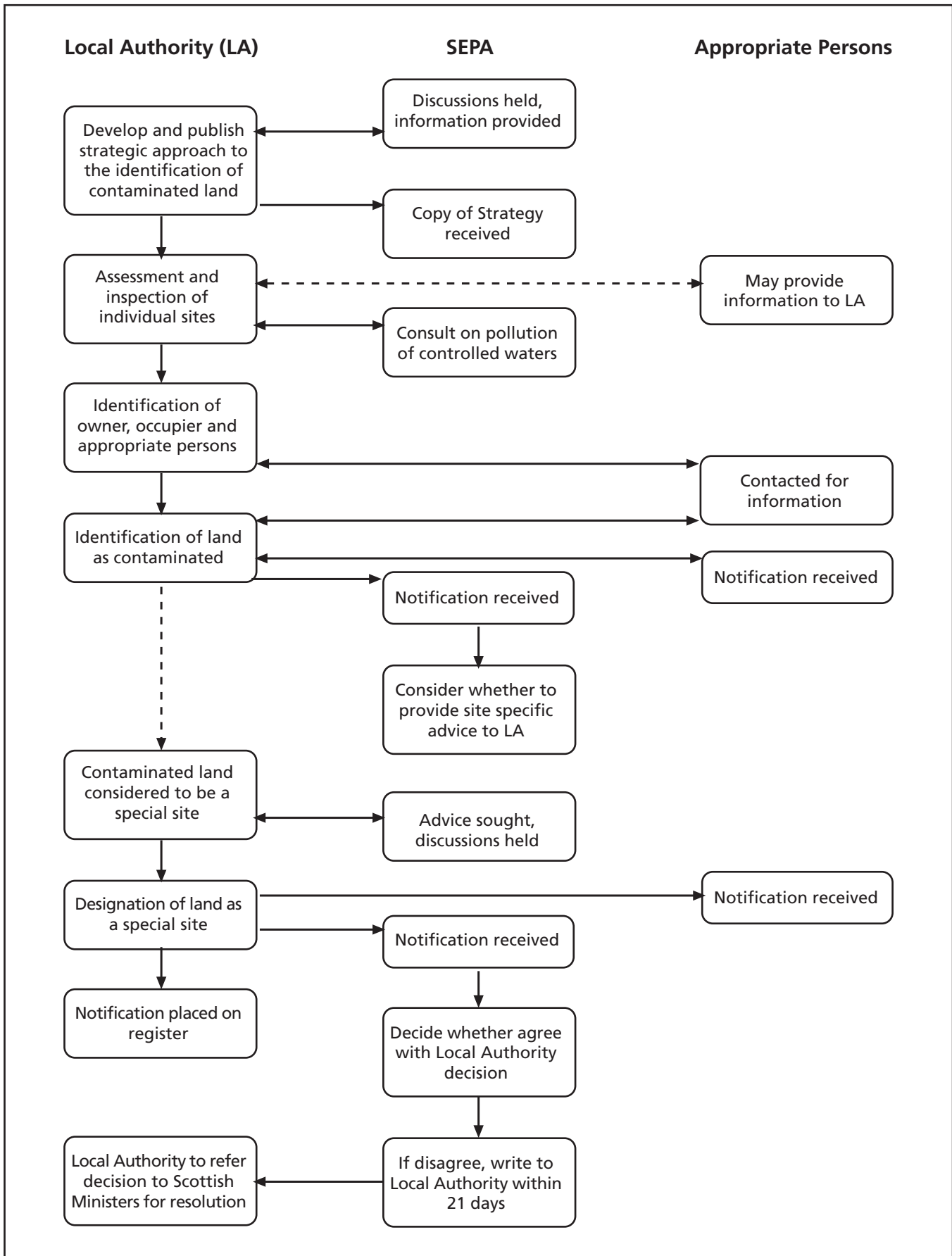
The enforcing authorities (the Council or SEPA) will have four main tasks:

- a) to establish who should bear responsibility for the remediation of the land (the appropriate person or persons);
- b) to decide, after consultation, what remediation is required in any individual case and to ensure that such remediation takes place, either through agreement with the appropriate person, or by serving a remediation notice on the appropriate person if agreement is not possible or, in certain circumstances, through carrying out the work themselves;
- c) where a remediation notice is served, or the authority itself carries out the work, to determine who should bear what proportion of the liability for meeting the costs of the work; and
- d) to record certain prescribed information about their regulatory actions on a public register. This comprises identification notices and remediation notices. Under this regime only contaminated land which currently represents an unacceptable risk to human health or the wider environment will be identified and remediated.

- 1.6 Under this Act the SEPA have the following roles :
- a) it will provide advice on request in relation to the identification and designation of special sites;
 - b) it may issue site-specific advice to local authorities on contaminated land;
 - c) it will act as the enforcing authority for any land designated as a special site (the descriptions of land which are required to be designated in this way are prescribed in the regulations); and
 - d) it will publish periodic reports on contaminated land.
- 1.7 This document sets out the approach which Dumfries and Galloway Council proposes to adopt to address points a) to d) (para 1.5). The contribution which agencies such as SEPA and Scottish Natural Heritage (SNH) can make in the identification and remediation of contaminated land is described in sections 5 and 7. The Council is required to prepare, consult and publish this Strategy by 14 October 2001. The process involved in the identification of contaminated land is set out in (Fig. 1)
- 1.8 Within Dumfries and Galloway there may be other sites which contain contaminants but which are not likely to cause significant harm or a significant possibility of harm in their current use. However if a different use were proposed then there will be a need to reassess the level of contamination in relation to the proposed new use. To address this issue separate guidance (Planning Advice Note 33 Development of Contaminated Land) has been issued to the Council, as Planning Authority. This sets out how the Council should address contaminated land through the planning system.
- 1.9 The consideration of contaminated land, as set out in the Regulations, places new duties and responsibilities on the Council. This Strategy is the Council's first attempt at setting out the systems and processes that it will use to address this issue. The implementation of the Strategy will be monitored and it will be kept under review.

Alistair M Speedie, Accountable Officer,
Infrastructure, Waste Management,
Environmental Services, Finance.

Figure 1 Identification of Contaminated Land



Source - Reference No 20

2. Aims and Objectives of the Strategy

2.1 The quality of the environment is one of Dumfries and Galloway's greatest assets, making an important contribution to the local economy. This is recognised in a number of important strategy and policy documents including :

- Dumfries and Galloway Council Corporate Plan 2000 - Objective Two Economic Regeneration and Objective Three Quality of Life
- Dumfries and Galloway Joint Economic Strategy 1999 - Priorities for Action on Quality of Life and Infrastructure
- Dumfries and Galloway Community Plan 2000 - supporting sustainable development and developing the Theme of Action "Safe and Healthy Communities"
- Dumfries and Galloway Structure Plan 1999 - Guiding Principle "to encourage the growth and development of sustainable communities in Dumfries and Galloway"

Aims

2.2 Taking these documents into account the following aims for the Strategy have been developed :

1. To identify and assess the extent of contaminated land and sites in Dumfries and Galloway.
2. To encourage the remediation of contaminated land to support economic development and to maintain and improve the quality of life and the natural and built environment in Dumfries and Galloway.

Objectives

2.3 Building on the Strategy aims the following objectives have been identified :

1. Adopt and publish the Strategy by October 2001.
2. Identify priorities for the inspection of land and sites in Dumfries and Galloway.
3. Indicate a time scale for the completion of the investigation and assessment of contaminated land and sites and the production of a Contaminated Land Register.
4. To identify special sites where responsibility for ensuring remediation would transfer to SEPA.
5. Indicate the methods to be used for the assessment and inspection of particular areas of land or sites.
6. To involve businesses and landowners in the evaluation of sites and any detailed site inspections
7. To work with public agencies and communities during the implementation of the Strategy and when undertaking site inspections and assessments
8. To maintain a record of sites identified and any testing and remediation undertaken.
9. To monitor and evaluate progress on the implementation of the Strategy.

Figure 2 Main Settlements with Population over 500 people

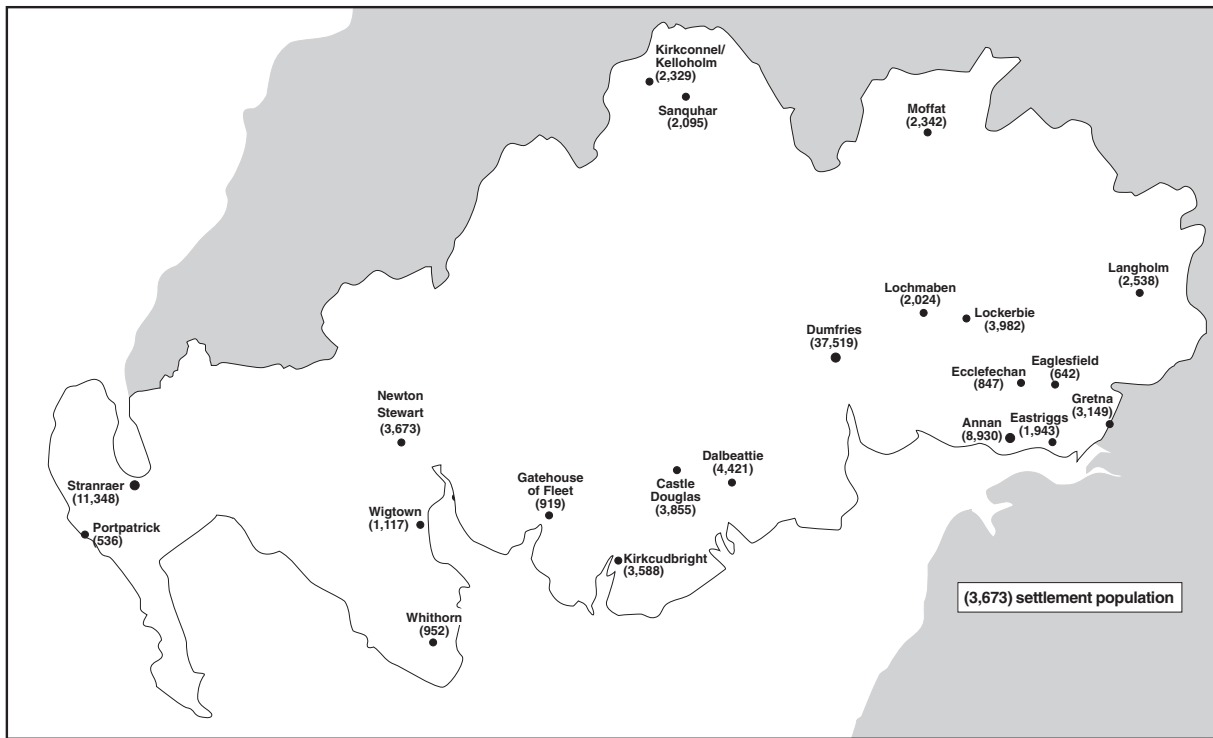
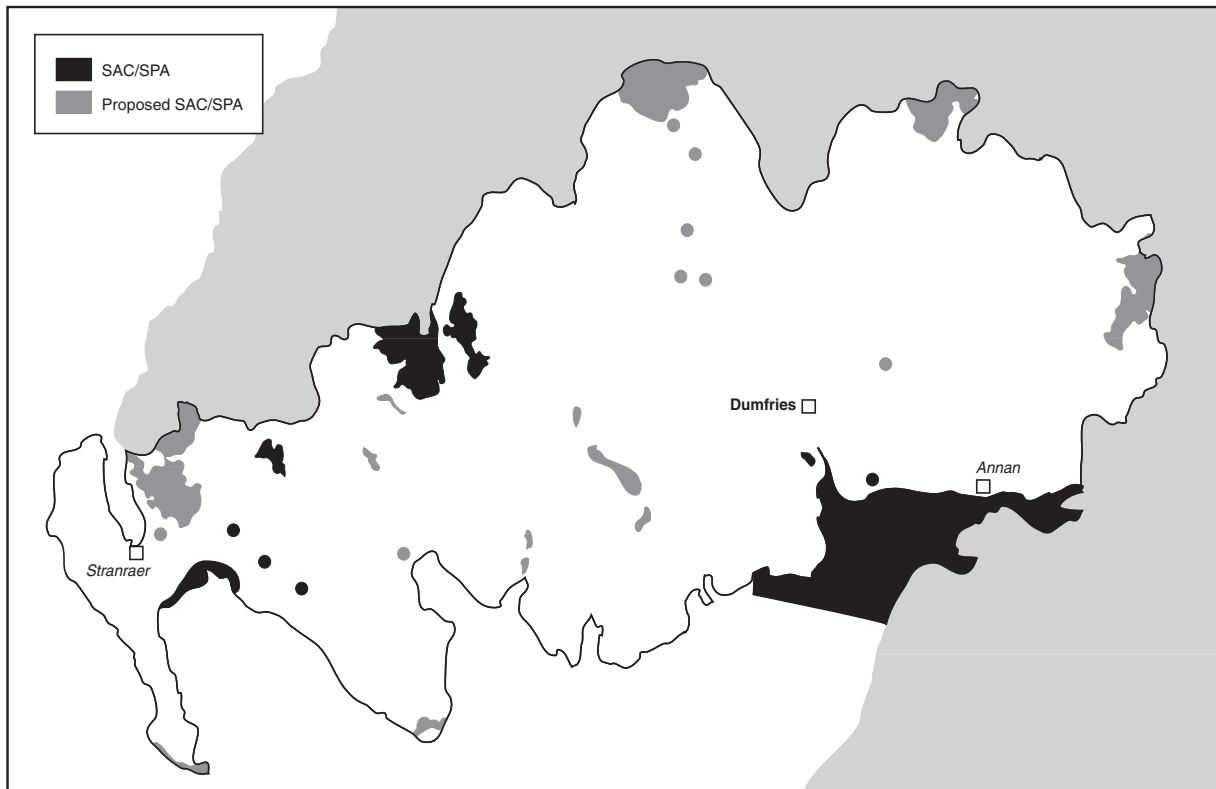


Figure 3 International Nature Conservation Areas



3. Characteristics of Dumfries and Galloway

Population and Settlements

- 3.1 Dumfries and Galloway is a large rural area covering 6,396,000 hectares forming the southern-most point of Scotland. In 2001 population projections indicated that the area had a population of 146,809 and a population density of approximately 23 persons per square kilometre. The largest town is Dumfries 37,500, other main settlements are much smaller:-

Stranraer 11,300
Annan 8,900
Dalbeattie 4,400
Castle Douglas 3,900
Lockerbie 4,000
Newton Stewart 3,700
Kirkcudbright 3,600
Gretna 3,100
Langholm 2,500
Moffat 2,300
Kirkconnel / Kelloholm 2,300
Sanquhar 2,100
Lochmaben 2,000

The region's main towns and many villages are concentrated in river valleys and along the coastal fringes (Fig 2) with a sparse rural population elsewhere.

Land Use

- 3.2 Dumfries and Galloway has limited development pressures, partly as a result of its peripherality in the United Kingdom and Europe. Further development and inward investment is encouraged to improve the region's economic base. The eastern half of the region has been subject to greater development pressure than the west, due in part to the better communications with England and the rest of Scotland. In the west, the ferry link with Northern Ireland is strategically important for British and European freight haulage, and for its business/ tourist passenger service.
- 3.3 Within such a large rural area, agriculture (73%) and forestry (25%) continue to be the dominant land uses. The level of afforestation which has taken place in Dumfries and Galloway over the last 50 years makes it one of the most afforested areas in the UK.

Protected Locations

Built Environment

- 3.4 The long history of human occupation in the region is demonstrated by the region's wide range of archaeological sites which include 820 Scheduled Ancient Monuments and 32 Archaeologically Sensitive Areas. In total there are 12700 Sites included on the Archaeology Sites and Monuments Record system. In addition there are approximately 3500 Listed Buildings in Dumfries and Galloway.

Figure 4 National and Local Nature Conservation Sites

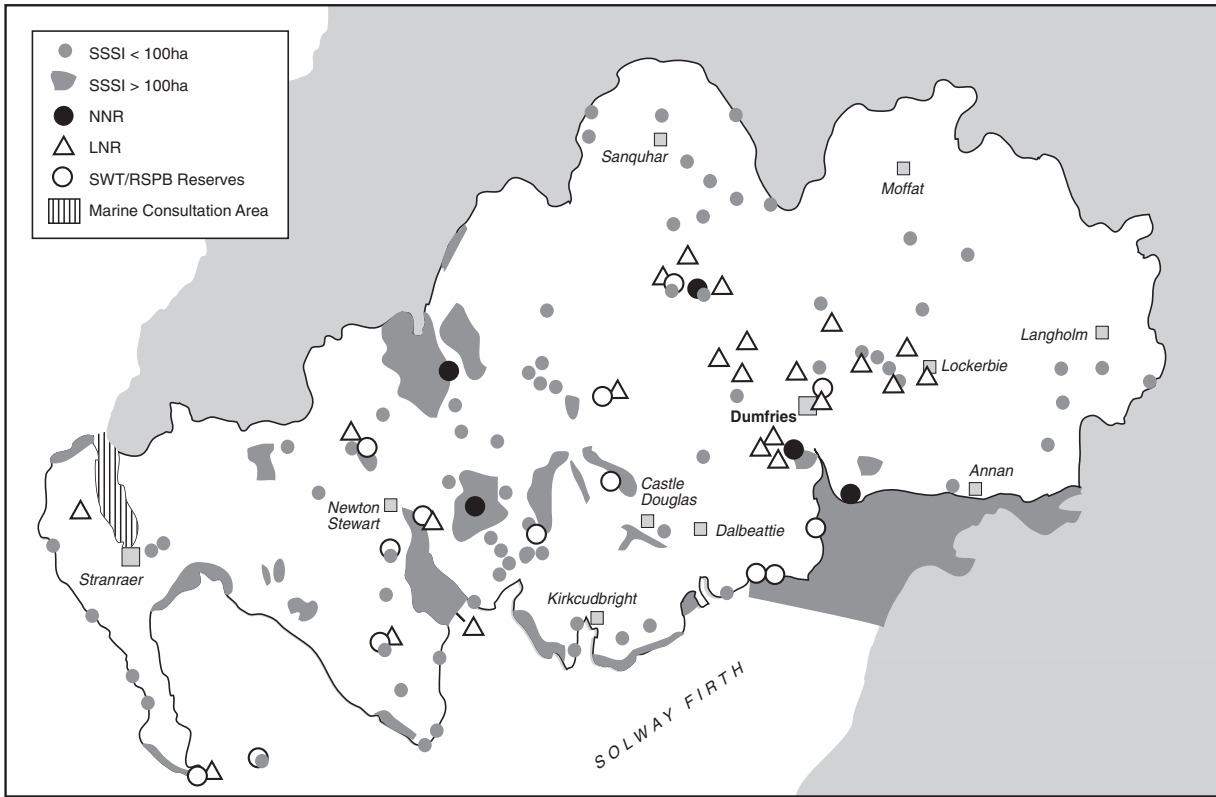
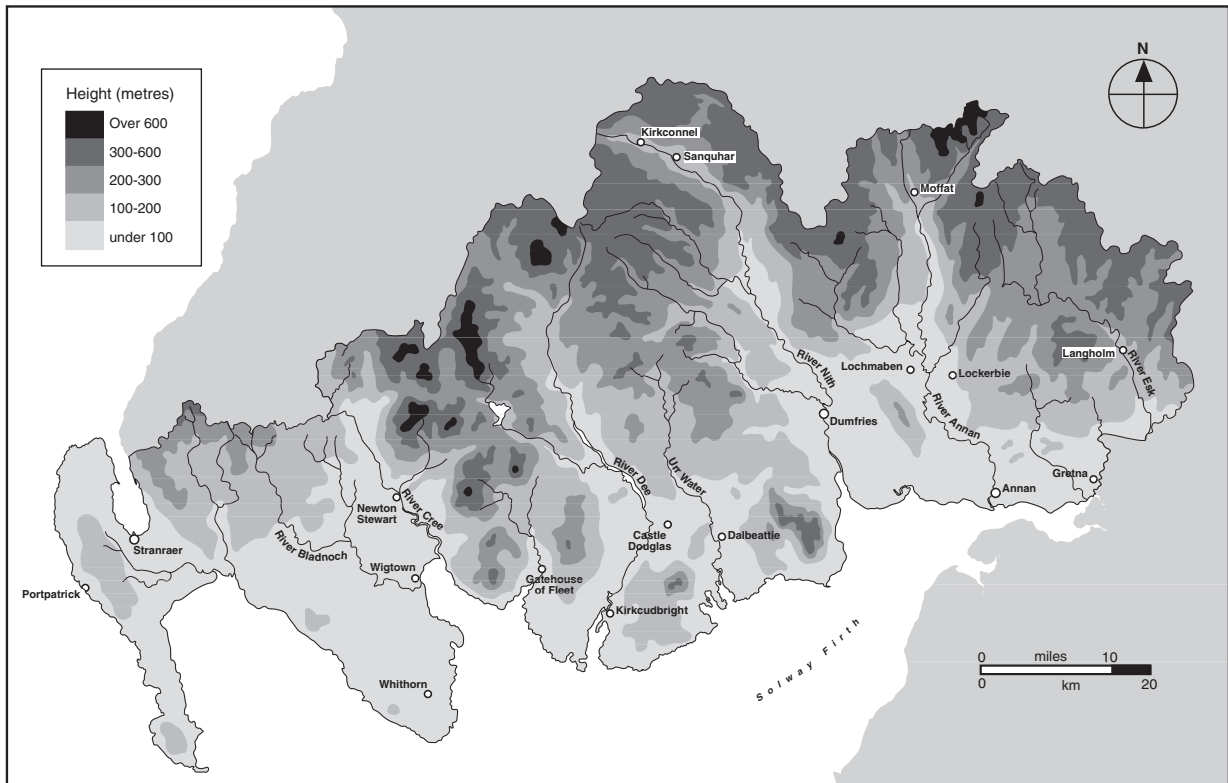


Figure 5 Topography and Hydrology



Nature Conservation

3.5 The region is an important area for wildlife habitats having a number of internationally recognised sites and areas. The range of designated sites in Dumfries and Galloway is highlighted in Table 1, and (Figs. 3,4)

Table 1 Designated Nature Conservation Sites

| DESIGNATION | NUMBER |
|--|-----------------|
| Biosphere Site | 2 |
| Ramsar/ Special Protection Area | 4 |
| Possible Special Protection Area | 2 |
| Ramsar | 1 |
| Candidate Special Area of Conservation | 15 |
| Possible Special Area of Conservation | 1 |
| Site of Special Scientific Interest (SSSI) | 97 (66928.4 ha) |
| National Nature Reserve (NNR) | 5 (10415 ha) |
| Local Nature Reserve | 1 |
| Candidate Local Nature Reserve | 1 |

Controlled Waters

3.6 Controlled waters include territorial waters up to the three mile limit, coastal waters, inland waters and ground waters. Dumfries and Galloway is dissected by river courses running north-south into the Solway Firth (Fig. 5). In addition to the main river systems, there are approximately 26km² of lochs within the region. The coastline of Dumfries and Galloway comprises some 370km and can be split into a the following distinctive areas : Loch Ryan, the Irish Sea and the Solway Firth with its six estuaries. A number of water courses are important for both public and private water supplies and for recreational use including game fishing. Most of the area’s rivers are generally of an excellent to high quality. A number of watercourses west of the River Dee are affected by acidification.

3.7 Water supplies for human consumption are obtained from surface and ground water catchments, (Fig. 6). Approximately 13% of groundwater sources are used for the public water supply. The Dumfries aquifer is recognised as one of the most important in Scotland. Consultative Draft Local Plans identify protection zones for public water supply boreholes. There are also many private water sources supplying properties not connected to the public water supply.

Geology and Topography

3.8 Dumfries and Galloway stretches eastwards from the Irish Sea along the flat coastal plains of the Solway coast and northwards into the extensive hill masses of the Southern Uplands. A series of deep river valleys drain southwards into the Solway Firth (Fig. 5). The region’s topography is very much a representation of the area’s geological formation (Fig. 7) The Southern Uplands are mainly formed from the Lower Palaeozoic bedrock

Figure 6 Public Water Supply

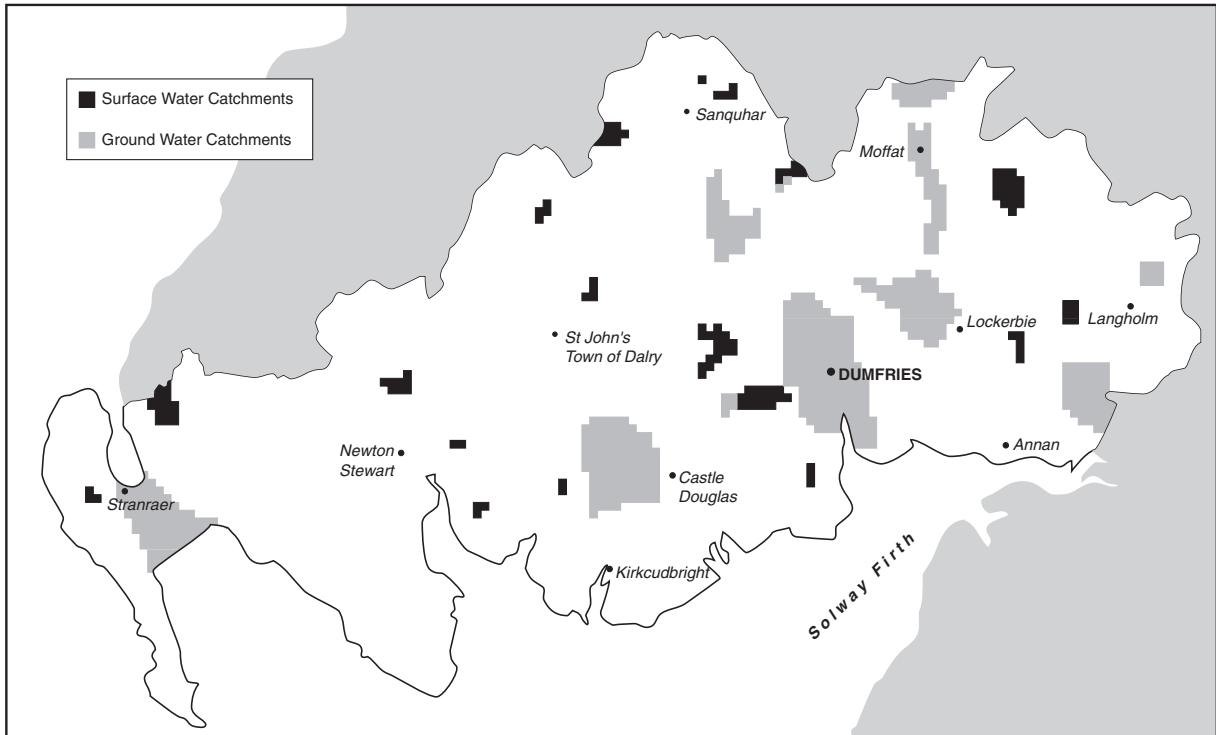
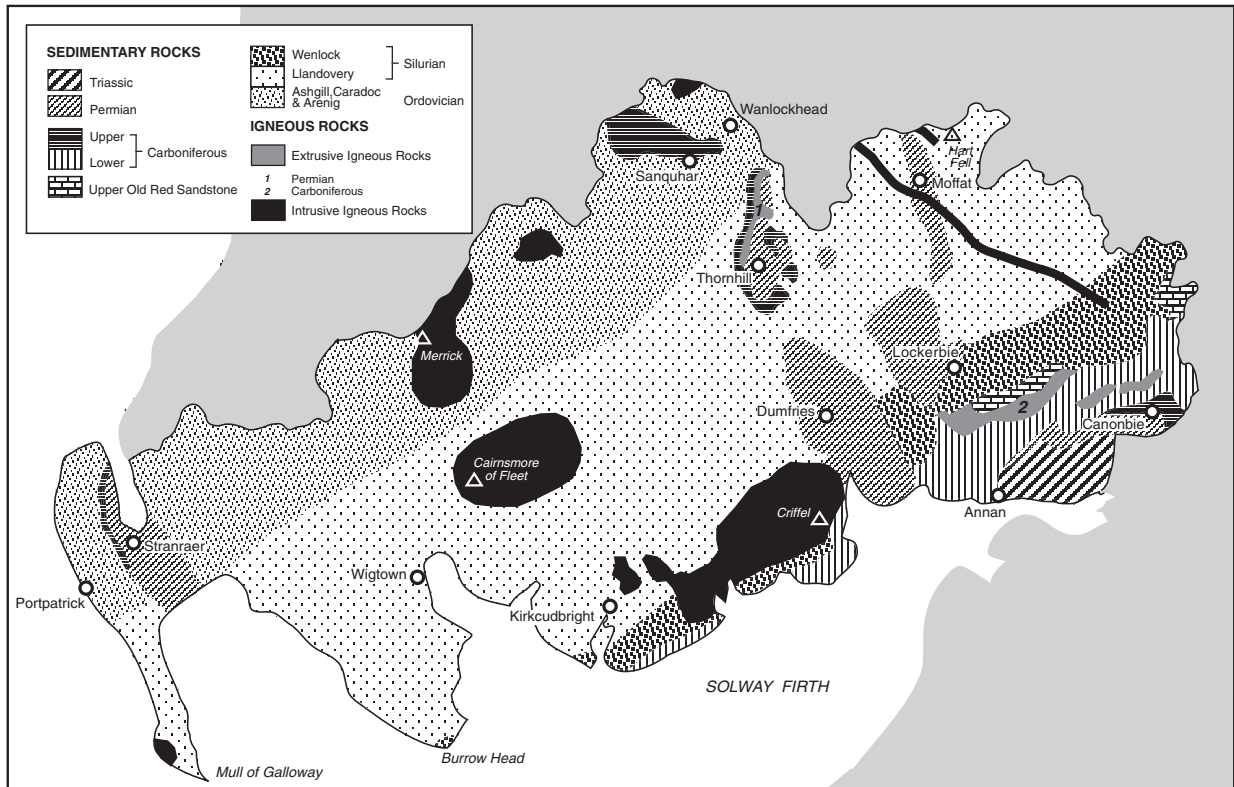


Figure 7 Geology



into which local granite intrusions around Loch Doon where the Merrick (842m) and the Rhins of Kells (813m) form the highest and third highest summits in the region. Similar intrusions at Criffel (588m) link up to give the Stewartry area its distinctive scenic appearance. Glacial action created the main river valleys and was responsible for the extensive sand and gravel deposits. As highlighted in Figure 6 many of these deposits are now important groundwater sources providing public water supplies.

- 3.9 The Dumfries and Galloway Landscape Assessment includes a useful summary (Appendix 2) of Solid Geology, Drift Geology, Topography, Soils and Hydrology.

Dumfries and Galloway Council Owned Land

- 3.10 The Council's landholdings are dispersed throughout the region and include schools, recreational and sports facilities, offices, workshops and houses. The Council is currently investigating the voluntary transfer of its housing stock, of approximately 13,000 houses, to a new body.

Current and Past Industrial History

- 3.11 An important consideration in determining the Council's strategy for the inspection and assessment of contaminated land is the extent and type of industrial activity which has taken place in the area.

- 3.12 In the late 18th century the local economy was influenced by the development of manufacturing industry and improvements in transport links. Early industrialisation was small scale and linked to agriculture or the exploitation of mineral resources.

Notable industries included:

- animal processing
- tanning
- milling
- dairies and creameries
- brewing and distilling
- textiles
- extraction and some processing of mineral ores including lead, iron, copper and barytes;
- stone for construction purposes
- brick and tile manufacture
- coal mining

These developments were mainly located in existing settlements although a number of new settlements such as Gatehouse of Fleet and Castle Douglas were developed as a result of the introduction of these industries.

- 3.13 During the 19th century improvements in transport infrastructure, notably rail links, facilitated the development of larger manufacturing industries. As towns and villages expanded other services were provided such as local gas and electricity services and

municipal waste collection and disposal. By the end of the 19th century few of the earlier manufacturing enterprises survived and most manufacturing activity was concentrated in the main towns.

3.14 During the 20th century the economy of the area was influenced by the First and Second World wars, introduction of new industries and regional economic assistance. This led to further diversification of the economy associated with:

- engineering
- manufacture of chemicals, munitions and explosives, plastics, rubber
- electricity generation.

3.15 At this time military activity affected many parts of Dumfries and Galloway and included the:

- construction of airfields
- munitions storage
- development of military ports
- weapons testing
- military training and target practice areas

Due to the nature of these activities they were often located some distance from towns and villages. In some case quite remote rural locations were used. After the war munitions and other materials were disposed of in the Beauforts Dyke in the North Channel, between Scotland and Northern Ireland, from the harbour at Cairnryan. Coastal areas in Dumfries and Galloway have been affected by munitions being washed up on the shore. Cairnryan harbour was also used for ship breaking (mainly naval vessels) during the 1970s and 1980s.

3.16 After the Second World War, several new industries have been established or have developed within the area including:

- expansion of timber processing
- rubber manufacture
- pharmaceuticals
- electricity generation using nuclear power
- fish processing, and
- other food processing

3.17 There has also been a corresponding increase in the range and diversity of service industries related to:

- transport public and private (fuel, supply, repair and maintenance);
- recycling of plastics;
- recycling of electrical equipment;
- ship breaking;
- scrap metal and cars.

A number of agencies including the council have been involved in the provision of mainly greenfield industrial/business sites since the 1950's.

Known Information on Contamination

- 3.18 Settlements in Dumfries and Galloway do not have the urban environmental problems associated with the larger towns and cities in the United Kingdom. There are however 461 hectares of vacant and derelict land in the region, which represents 0.04% of the total area. The majority of this land is associated with former military sites, including former munitions factories at Edingham, Dalbeattie and Powfoot, Annan; the former airfield at Heathhall, Dumfries and the former military port facilities at Cairnryan, Stranraer.

Redevelopment History and Action Taken to Deal With Land Contamination.

- 3.19 The development of vacant and derelict sites in built up areas has been encouraged by the Planning Authority. Several former industrial, railway and storage sites have been redeveloped. Land contamination issues have been dealt with during the planning process or as part of environmental improvements. A recent example of this is the creation of the Bowman Edgar Park, Kirkconnel which required the remediation of a former gasworks site.

Specific Local Features

- 3.20 There is evidence of Radon gas in Dumfries and Galloway but it is not at a level where Radon Affected Areas have been identified. There are a number of these areas in Scotland where home owners qualify for free radon measurements to be carried out. Radon gas is not considered under the Act.
- 3.21 The area is affected by acidification caused by airborne pollution from outwith the area, particularly acidic precipitation in the uplands. As a result the critical loads for acidity and sulphur of soils are exceeded over some upland area. Critical loads tend to be higher where the local geology and conifer plantations reduce the natural buffering capacity. Some watercourses have concentrations of lead in stream sediments.

4.0 The Strategy

- 4.1 The aims and objectives of the Strategy will be achieved by taking a strategic approach to the investigation and assessment of contaminated land.

Preliminary Work.

- 4.2 During 1999 the Council contributed to work commissioned by the former Department of the Environment Transport and the Regions, to assist the production of technical guidance on the preparation of contaminated land inspection strategies. The work undertaken for this project together with recently published technical guidance has supported the preparation of this Strategy.
- 4.3 As part of the work on this Strategy six pilot sites were used to assist in the assessment of data sources, the design of information systems and the use of a Geographical Information System (GIS). Meetings have also been held with SEPA, SNH and the Council's service departments.

The Council's Priorities.

- 4.4 The main aim is to develop and implement a strategy which identifies and, where necessary, achieves the remediation of contaminated land. To prioritise this work and ensure that sites with most potential to cause contamination are identified quickly industries will be grouped in terms of potential to cause contamination. Work on site assessment and inspection will take into account the need to:
1. Protect human health
 2. Protect controlled waters
 3. Protect designated ecosystems
 4. Prevent damage to property
 5. Prevent any further contamination of land
- This will ensure that work, on the collection and analysis of information, is directed towards the early identification of sites where there could be a high risk of contamination and potential significant impact on receptors.

Industrial Activities

- 4.5 This Strategy deals with any contamination which may have taken place due to past industrial business activities. A number of industrial activities have been identified which can be placed into a high, medium or low category depending upon their potential to cause contamination (see Appendix 3). The inclusion of an activity within a particular category at this stage does not imply that there are contamination issues linked to the location of an industry and the past use of a particular site.

Town and Villages

- 4.6 The first phase of survey work will be concentrated in and around towns and villages, which have historically been the location for much of the region's business and industrial activity. Survey work will begin with the main towns and proceed to smaller settlements. The site assessment will also take into account threats to controlled waters, designated environmental sites and property. Development sites, identified in Local Plans, will be taken into account as part of the inspection process. When this work is completed survey work will then be directed to the less populated parts of the region.

Dealing With Urgent Sites

- 4.7 One of the priorities of the Strategy is to highlight at an early stage sites where there may be significant contamination problems. However this process will not prevent the early consideration of other sites, where there is verifiable evidence that significant harm is being caused or there is a significant possibility of significant harm being caused to receptors. Any such sites will be fast tracked through the site inspection process.

Council Owned land

- 4.8 The Council's land holdings are limited and are mainly confined to settlements. These land holdings will therefore be assessed as part of the survey and inspection work for towns and villages. An assessment is being carried out into the viability of transferring responsibility for the Council's housing stock to some other body. Part of this work will involve an environmental assessment which will consider contaminated land. The results of this inspection will be fed into the overall Strategy and provide an early indication of any issues related to contamination for a large part of the Council's land holdings.

The Strategy

- 4.9 The Draft Strategy was considered by the Environment and Infrastructure Committee at its meeting in June 2001. Following consultation, during July to August 2001, comments received were considered by the Environment and Infrastructure committee at its meeting in October 2001. The finalised strategy, approved by the committee in October 2001, takes into account comments received and will now guide the council's work on the identification, inspection and assessment of contaminated land.

Staff Resources.

- 4.10 The nature of the project will require specialist knowledge and skills at various stages. To support the implementation of this Strategy further training of staff will be required, to provide them with the specialist skills and knowledge required to undertake site inspections and risk assessments. Environment and Infrastructure has already started a programme of staff training which will be developed further over the next two years.

Work Programme

4.11 Site assessment and inspection will involve five main stages. The work programme is:

Preparation of Strategy

- October 2000 to October 2001.

Stage 1

Identification of Industrial Activities with Potential to Cause High to Medium Risk Contamination - August 2001 to March 2002.

Stage 2

Identification of Potentially Contaminated Areas and Receptors - March 2002 to October 2002.

Stage 3

Identification of Potentially Contaminated Sites - The timescale for completion of this work is dependent upon the number of sites that are identified in stage 2. October 2002 onwards.

Stage 4

Detailed Site Inspections and Preparation of the Contaminated Land Register. Work on the register will not commence until 2003, with the exception of urgent sites.

Stage 5

Identification of Industrial Activities with Potential to Cause Low Risk Contamination - The start date for this work is dependent on the number of sites which need to be assessed and investigated in stages 1 to 4.

The site inspection methodology to be used in the Strategy is described in more detail in Section 5.

5. Site Inspection Methodology

- 5.1 Procedures have been drawn up to describe how contaminated land issues will be handled within the Council. This section also sets out how potentially contaminated sites will be evaluated and assessed.

Internal Management Arrangements for Inspection and Identification

- 5.2 Within the Council Environment and Infrastructure will be the lead department for contaminated land, and will be responsible for consultation with internal and external agencies and implementation of the Strategy. It will also be responsible for preparation and maintenance of the Contaminated Land Register and for procuring exploratory surveys or more detailed site inspection.

- 5.3 There will be a requirement for close interdepartmental liason with Environmental Health, Legal Services, Community Resources, Housing Services, Property Services and Trading Standards. The Council's Legal Services section will be consulted for legal advice in relation to the inclusion of sites on the Contaminated Land Register, responsibility for remediation, and the content of notices.

Considering Council Interests in Land

- 5.4 Land which has a Council interest will be inspected in line with the priorities identified in the Strategy. This includes Council owned or leased land and other land holdings where the Council may be the "appropriate person".

Information Collection

- 5.5 A range of information sources will be used to identify potentially contaminated sites and assist in the assessment and inspection of sites. The main sources of information already identified are detailed in Table 2. The Council may use additional sources of information if these are identified during the implementation of this strategy. Information collected will be held in individual site files.

Table 2 Information Sources for the Strategy

| Source | Information | Use |
|-------------------------------------|---|--|
| British Geological Survey | Geochemical Baseline Survey S Scotland & Part of N England | To provide baseline environmental data |
| | Geological Maps | To characterise sources and pathways |
| | Hydrology Survey Dumfries & Galloway (East) Borehole data | To characterise receptors and pathways |
| Dumfries and Galloway Council (DGC) | Planning Records & Site Reports, Environmental Health records of complaints and investigations Library Service Pigot & Slater Trade Directories 1825-26,1837-38, 1852 and other Trade Directories, Valuation Rolls for Dumfries and Galloway 1870 onwards, DGC Archive Centre, Commercial records, photographs and other material Local Plans, Listed Buildings, Scheduled Ancient Monuments, Private Water Supplies, Scottish Vacant and Derelict Land Survey, Petrol Filling Stations Records of DGC sites and property | To identify known information on contamination. To identify sources of contamination and/or receptors To identify Council owned land and property |
| | Industry Profiles | To provide details of processes the and potential contaminants by industry |
| Department of Environment | Landuse database covering Dumfries, part of Annandale & Eskdale and Stewartry | To identify sources of contamination |
| Landmark | Soil maps | To characterise sources, pathways and receptors |
| Macaulay Institute | Maps first edition to mid 1950s. | To identify sources of contamination |
| Ordnance Survey | Geographical Information System basemaps. | To identify controlled waters receptors |
| | SEPA | <p>Flooding 1 in 100 year information</p> <p>West Region Water Quality Review</p> <p>Waste Management Licences</p> <p>Local authority public water supply data Five year record of pollution of controlled water incidents. List of sites which had an Integrated Pollution Control authorisation; public register for the Groundwater Regulations 1998 – disposal of listed substances to land; public register for the Environmental Protection Act 1990 Part II waste management licensing; public register for the Environmental Protection Act 1990 Part I – prescribed processes and substances; public register for the Environmental Protection Act 1990 Part I – prescribed processes and substances; public register for the Control of Major Accident Hazard Regulations 1999; register for the Special Waste Regulations 1996.</p> |
| Solway Heritage | Aerial photographs and habitat data | To provides information on receptors |

Site Assessment and Inspections

- 5.5 The approach to be used by the Council involves the collection of information and its analysis in relation to individual sites. The key sources of information to be used have been highlighted in Table 2. To support this work and speed up the process the Council's GIS system, which already stores many of the information sources, will be used extensively. The approach to be used is described in more detail below :

Stage 1 – Identification of Industrial Activities.

- 5.6 Areas of historical industrial activity will be identified using historical records and maps. Work will concentrate on high and medium risk industrial activities at this stage, see Fig.8, Appendix 2.

Stage 2 – Identification of Contaminated Areas and Receptors

- 5.7 Around the areas identified in Stage 1 land use, surface water and ground water will be plotted .The following assessments will be undertaken for each site:

- development, see Fig. 9
- surface water, see Fig. 10
- groundwater, see Fig. 11

Each site will be placed into a group A,B,or C; based on the results of these three assessments. This provides an initial priority grouping for Stage 3 of the assessment. Sites which should be fast tracked through the inspection process may be identified at this stage. At the present time guidance for groundwater assessment will use English and Welsh guidance.

Stage 3 – Identification of Potentially Contaminated Sites

- 5.8 Group A areas will be given first priority. Individual sites will be assessed in respect of the significance of contaminants or potential contaminants present and the possible impact on land uses, surface water and groundwater. The following assessments will be undertaken for each site:

- Development Land - Residential, Allotments, Agricultural Land, Commercial or Industrial Use, Public Open Spaces or Amenity Areas; see Fig. 12.
- Development - Unoccupied Land and Protected Habitats, see Fig. 13.
- Surface Water, see Fig. 14.
- Groundwater, see Fig. 15.

This work will involve a desk top study, site walkover, information collection and, where necessary, an exploratory site investigation. At this stage it is likely that the Council will contact various groups to ensure that all available information is considered and to assess the risks to receptors. These groups include businesses, landowners and key agencies such as SEPA, SNH, Environment Agency, Historic Scotland and adjoining local authorities. Sites will be placed into priority categories 1 to 4. The assessments in Stage 3 are discussed in more detail in Appendix 4.

Stage 4 : Detailed Site Inspections and Preparation of Contaminated Land Register.

- 5.9 Work will concentrate on priority category 1 sites as the first priority. At this Stage it may be necessary to undertake intrusive investigations over a period of time. The Council will only carry out these where it does not have sufficient information on a site to -
- Determine whether that land appears to be contaminated land.
 - Decide whether such land is a special site.

A special site can be designated due to certain water pollution cases, certain industrial cases or certain cases related to defence. Special site designation is the responsibility of the Council who are required to seek advice from SEPA. Once a special site has been designated SEPA becomes the enforcing authority.

If a private site investigation is in progress or is planned it may be appropriate to delay further assessment of the site until further information becomes available from the site investigation. For those sites where it is necessary to carry out an intrusive investigation proposals and costs will be developed. Requests for Scottish Executive funding for intrusive investigations will be made using the site priority categories derived from the Stage 3 assessment. The sites will be inspected in accordance with the prepared proposals and the data obtained used to repeat the Stage 3 assessment.

The arrangements for carrying out detailed inspection will be based on the advice given in the Regulations, the Circular and Contaminated Land Research Reports one and four. The Council will follow its Health and Safety procedures when it carries out intrusive investigations.

The Council will work closely with site owners, appropriate persons, SEPA, SNH and/or Historic Scotland during this stage. It will protect natural resources or features of nature conservation, historical or archaeological interest and it will obtain the necessary specialist site specific information. When the Council carries out an intrusive investigation it will take all reasonable precautions to avoid harm, or water pollution or damage to these interests and where necessary divert public access routes.

Stage 5 Identification of Industrial Activities with Potential to Cause Low Risk Contamination.

- 5.10 The assessment of these sites will follow the procedure outlined in stages one to four.

Information Evaluation

5.11 Government Guidelines

The Council will evaluate all information on substances in, on or under the ground that may cause significant harm or presents a significant possibility of significant harm being caused to a receptor using government guidelines. There is no single source of

information to assist in this assessment. For this evaluation the Council will use the most relevant datasets to assess the risk for the receptor identified. Examples of the datasets and models which will be used as appropriate include:

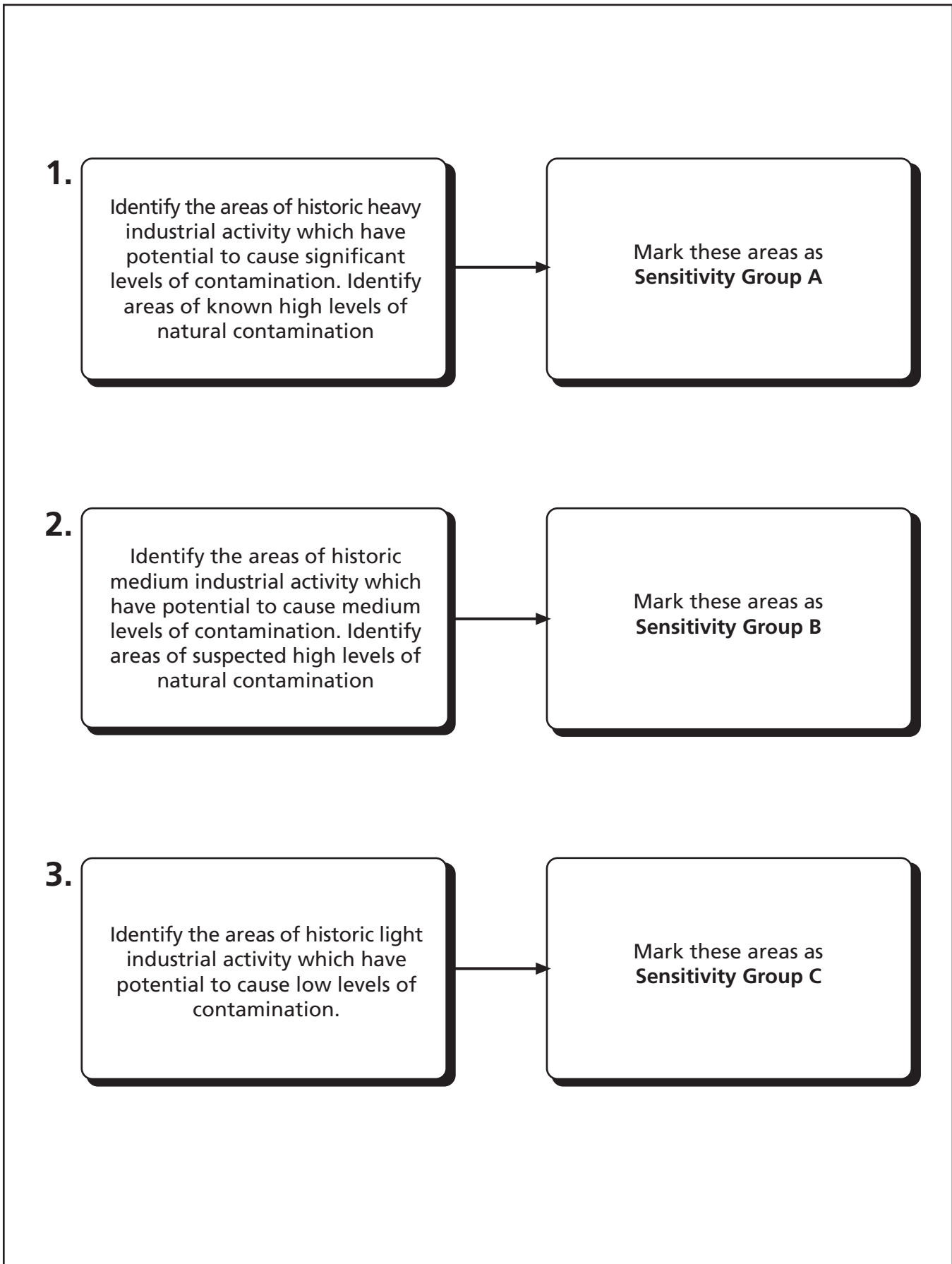
- for human health: Interdepartmental Committee on Redevelopment of Contaminated Land (ICRCL), Contaminated Land Exposure Assessment (CLEA), Scotland and Northern Ireland Forum For Environmental Research (SNIFFER).
- for controlled waters: drinking water standards, fish water environmental quality standards, bathing water standards.

In some cases reference may be made to occupational exposure levels, issued by the Health and Safety Executive, or other authoritative sources of information, such as guidelines adopted in other countries. If guidelines from other countries are referred to account will be taken of the significant differences in remediation standards between the UK and other countries.

Risks to controlled waters need to be considered separately as this may have some bearing on whether or not the land is designated a special site. Advice will be sought from SEPA on risk assessment if controlled waters are the receptor.

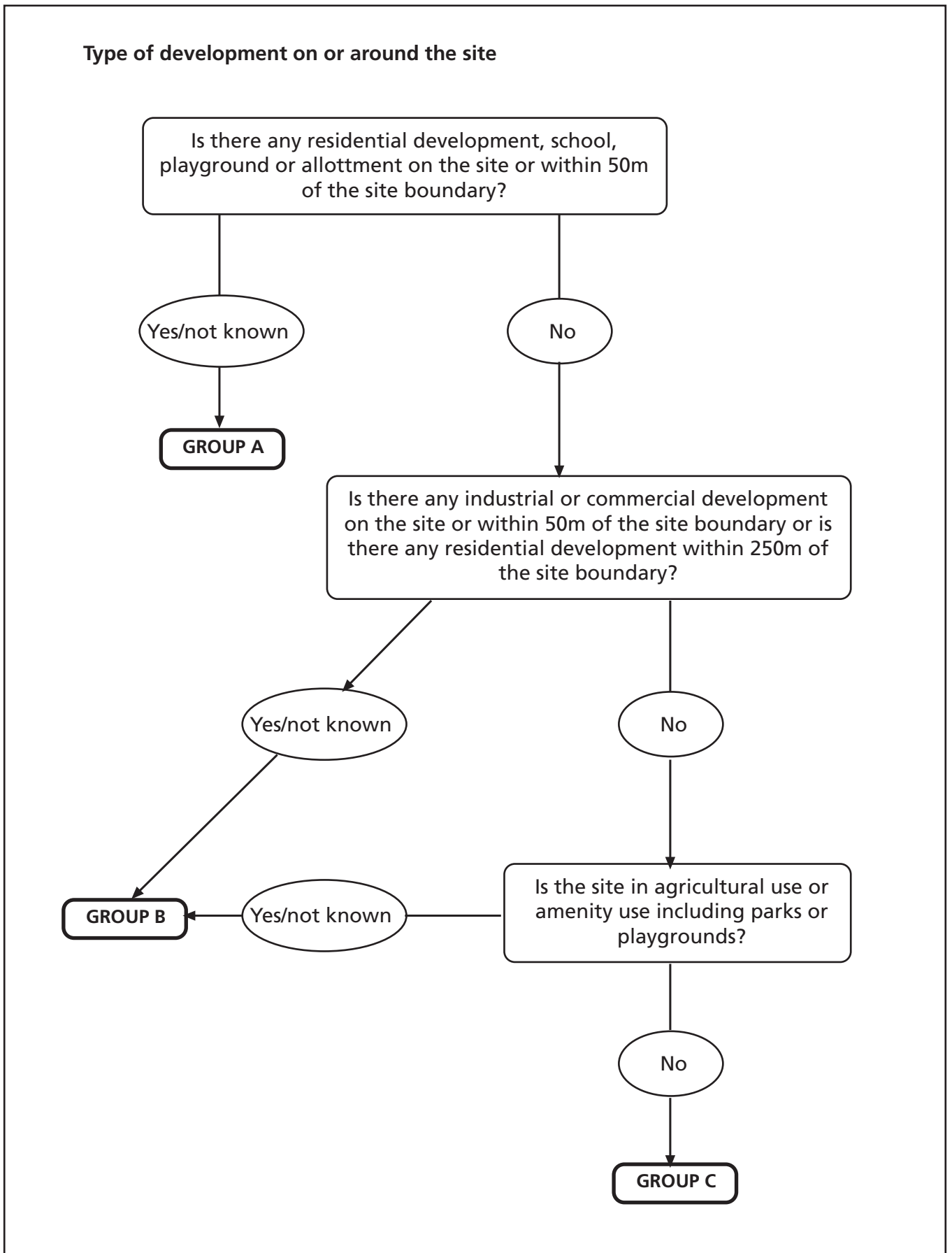
The Contaminated Land Exposure Assessment (CLEA) guidelines are due to be produced in 2001. These will also be used once they have been published.

Figure 8 Stage One Assessment of Land Contamination



Source: Reference No. 18

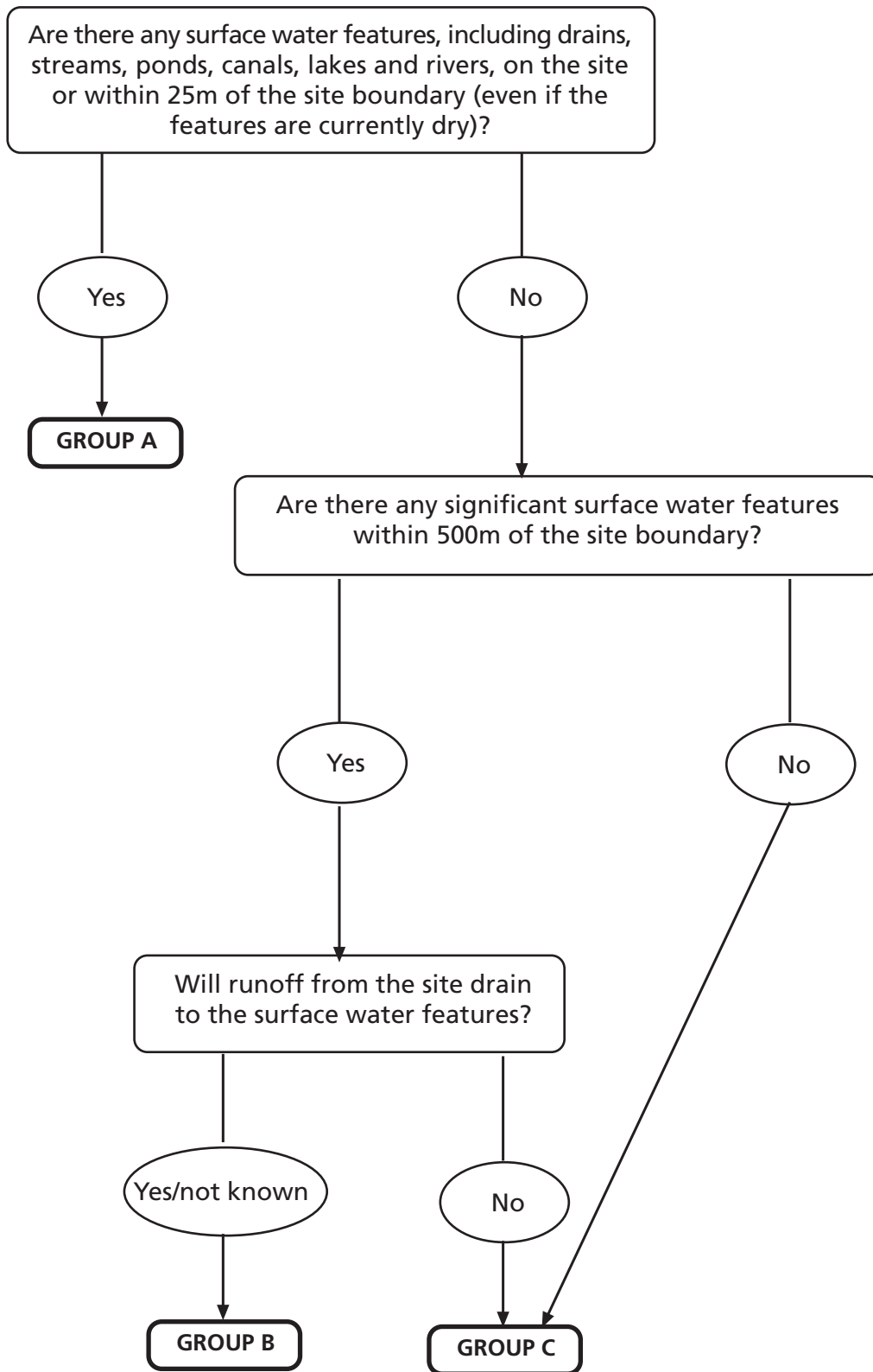
Figure 9 Stage Two Assessment of Development



Source: Reference No. 6

Figure 10 Stage Two Assessment of Surface Water

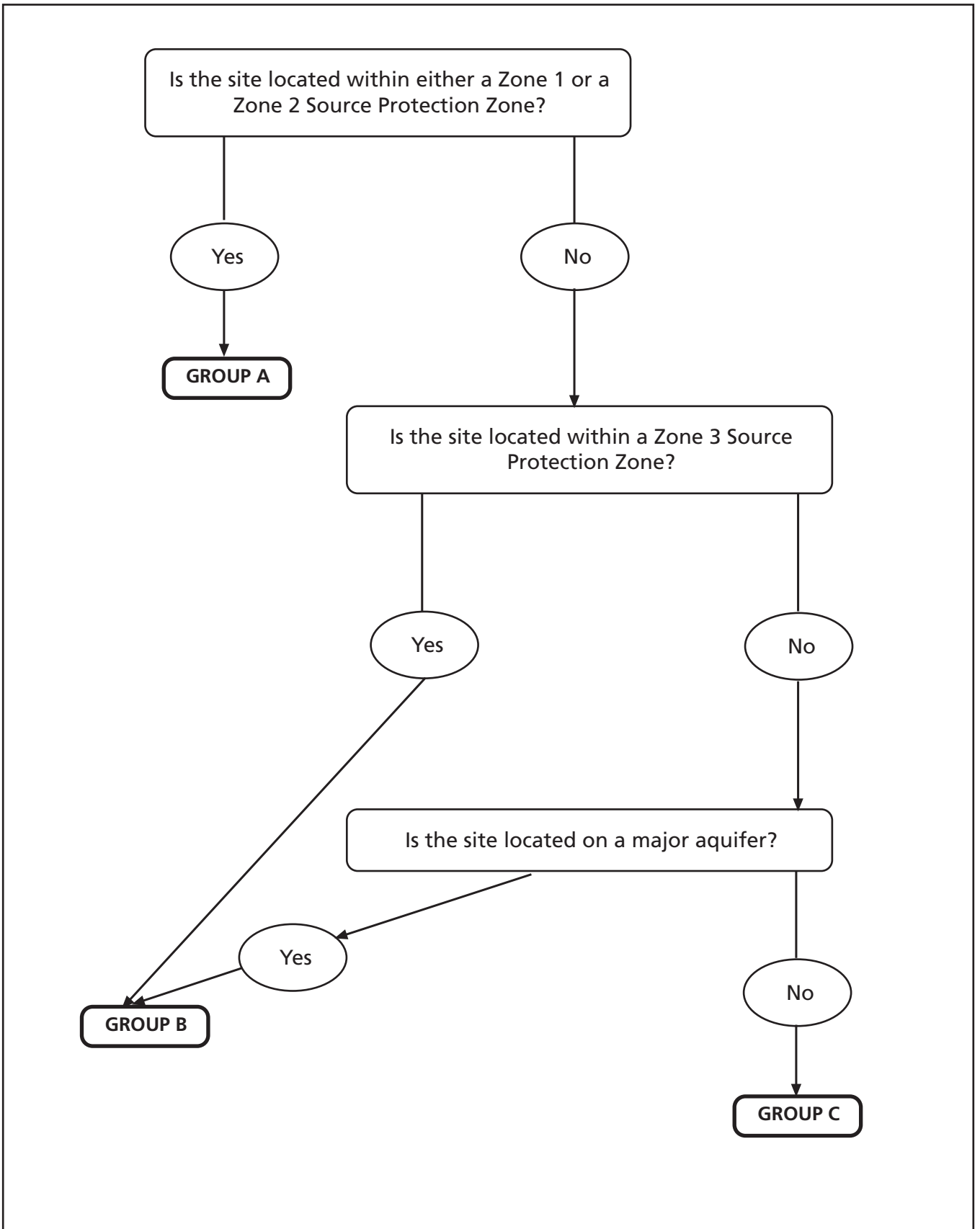
Surface water features on or around the site



Source: Reference No. 6

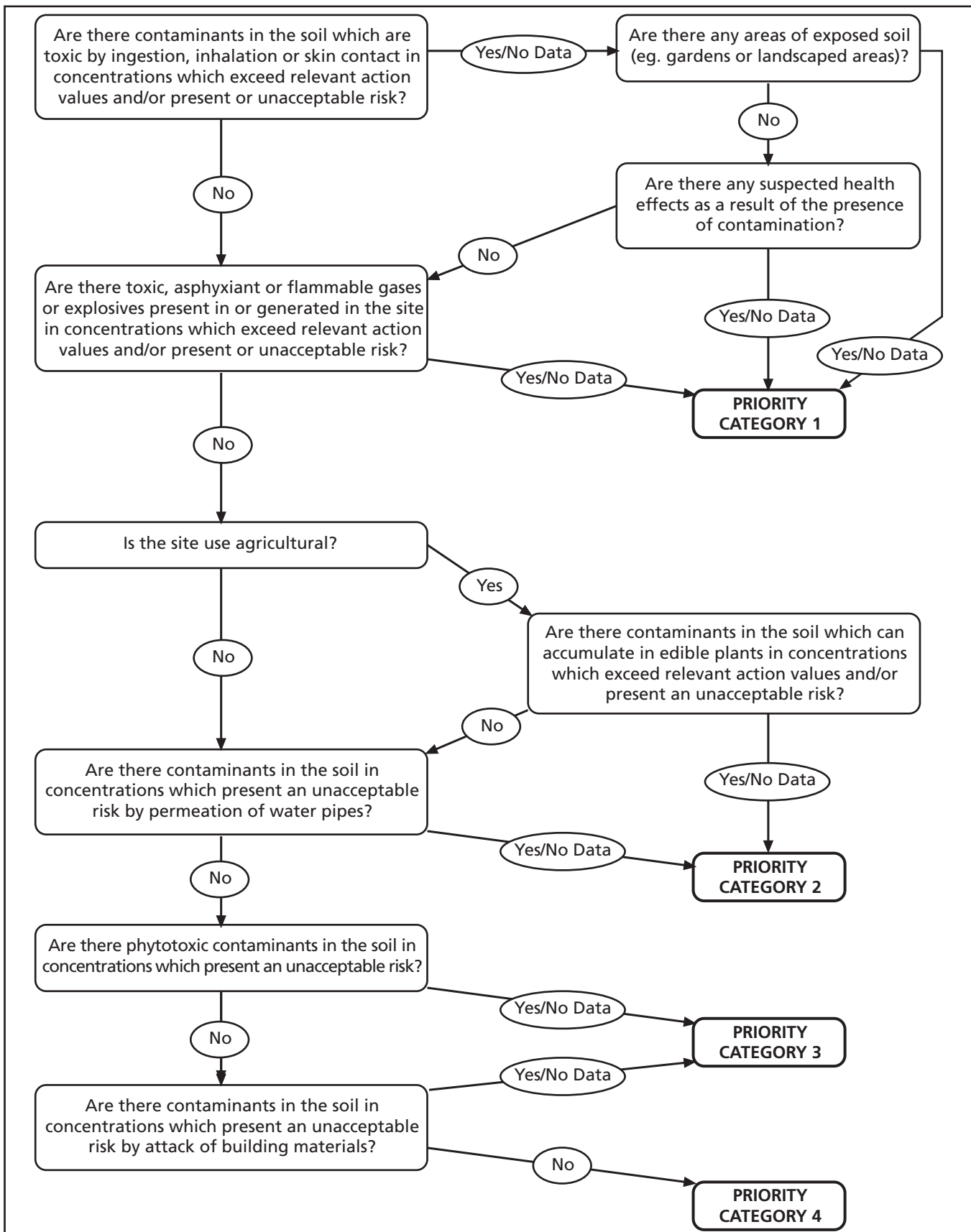
Figure 11 Stage Two Assessment of Groundwater

This is English and Welsh Guidance because there is no comparable guidance for Scotland.



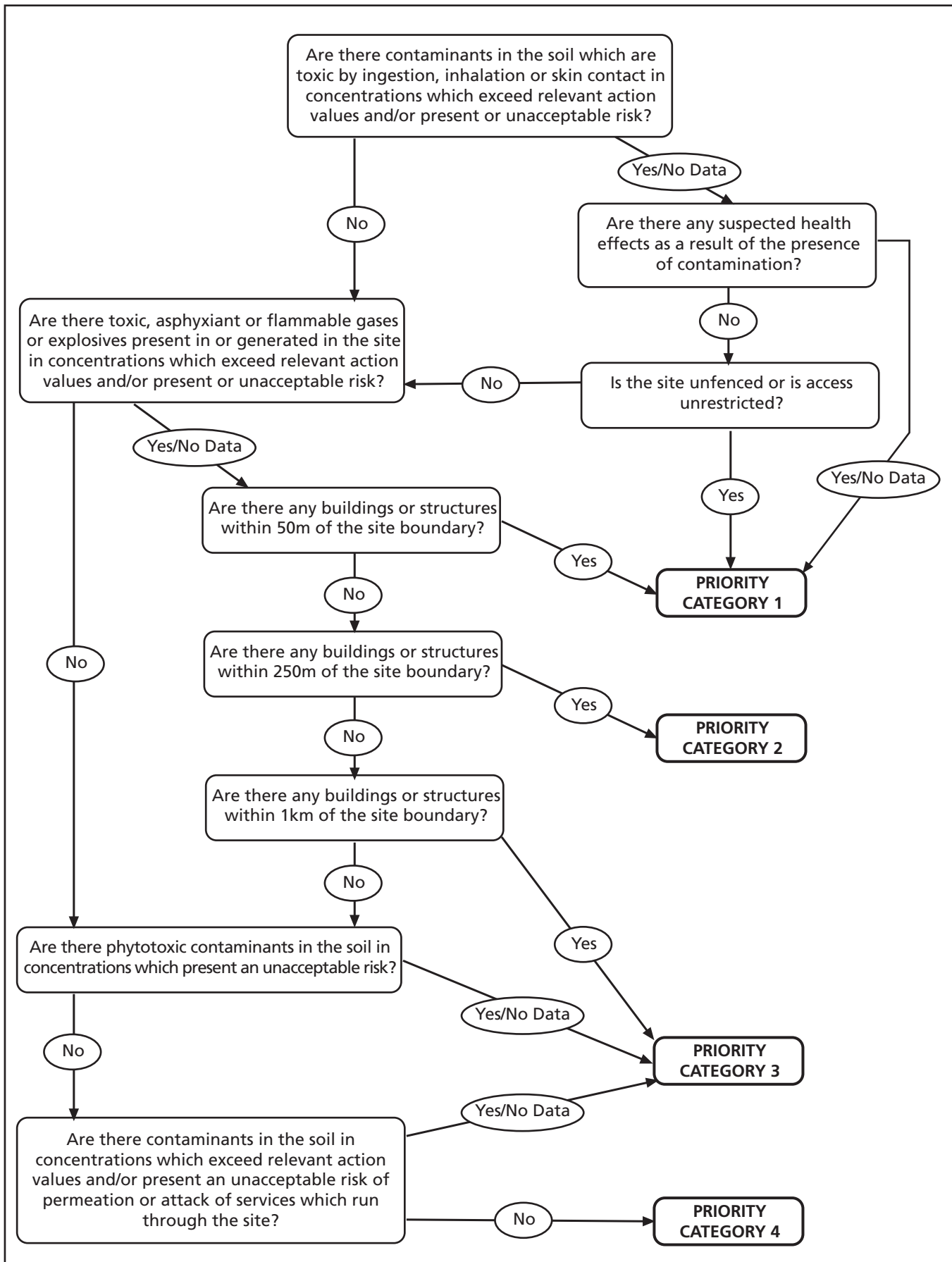
Source: Reference No. 6

Figure 12 Stage Three Assessment of Development Land, Residential, Allotments, Agricultural Land, Commercial or Industrial Use, Public Open Spaces and Amenity Areas



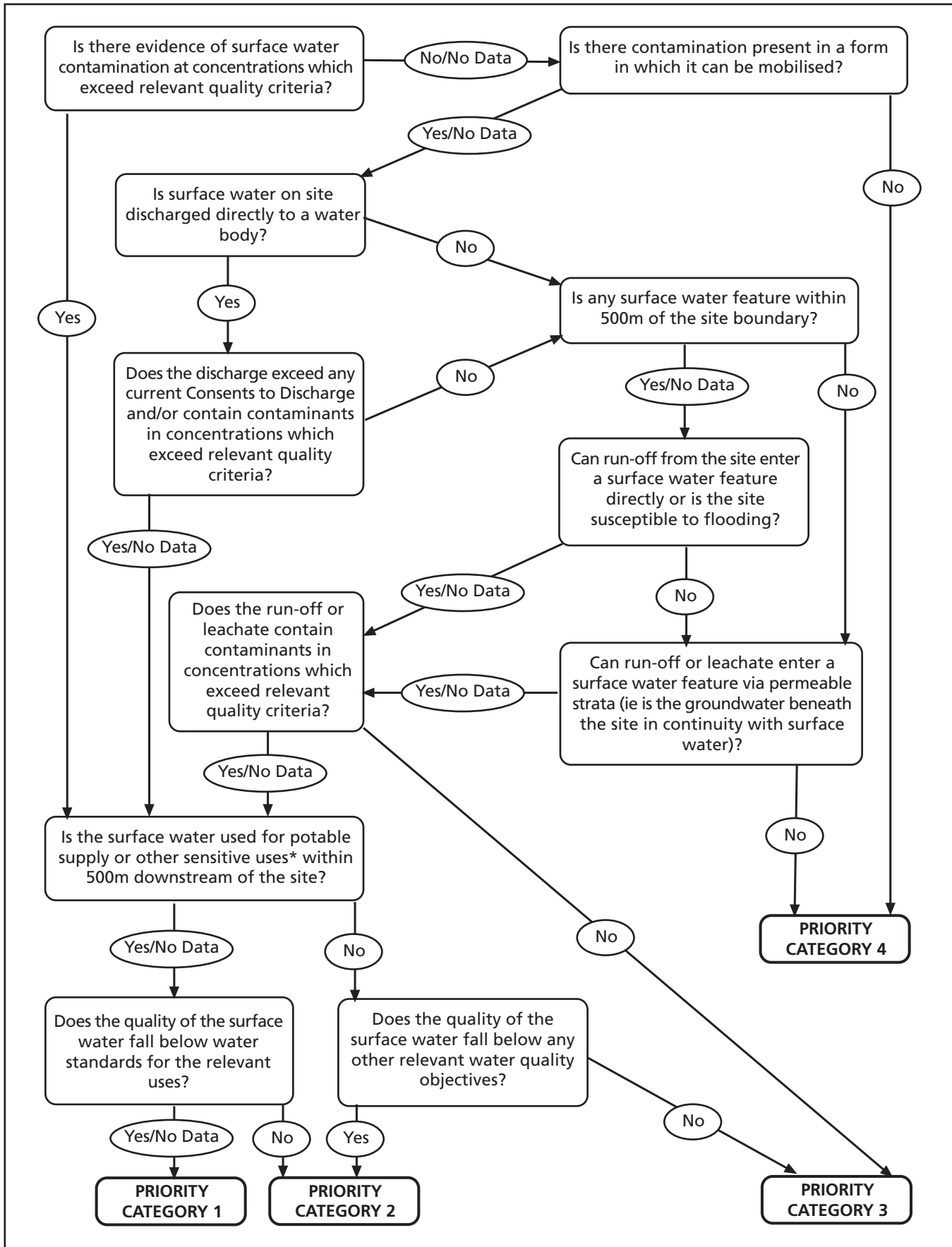
Source: Reference No. 6

Figure 13 Stage Three Assessment of Unoccupied Land and Protected Habitats



Source: Reference No. 6

Figure 14 Stage Three Assessment of Surface Water

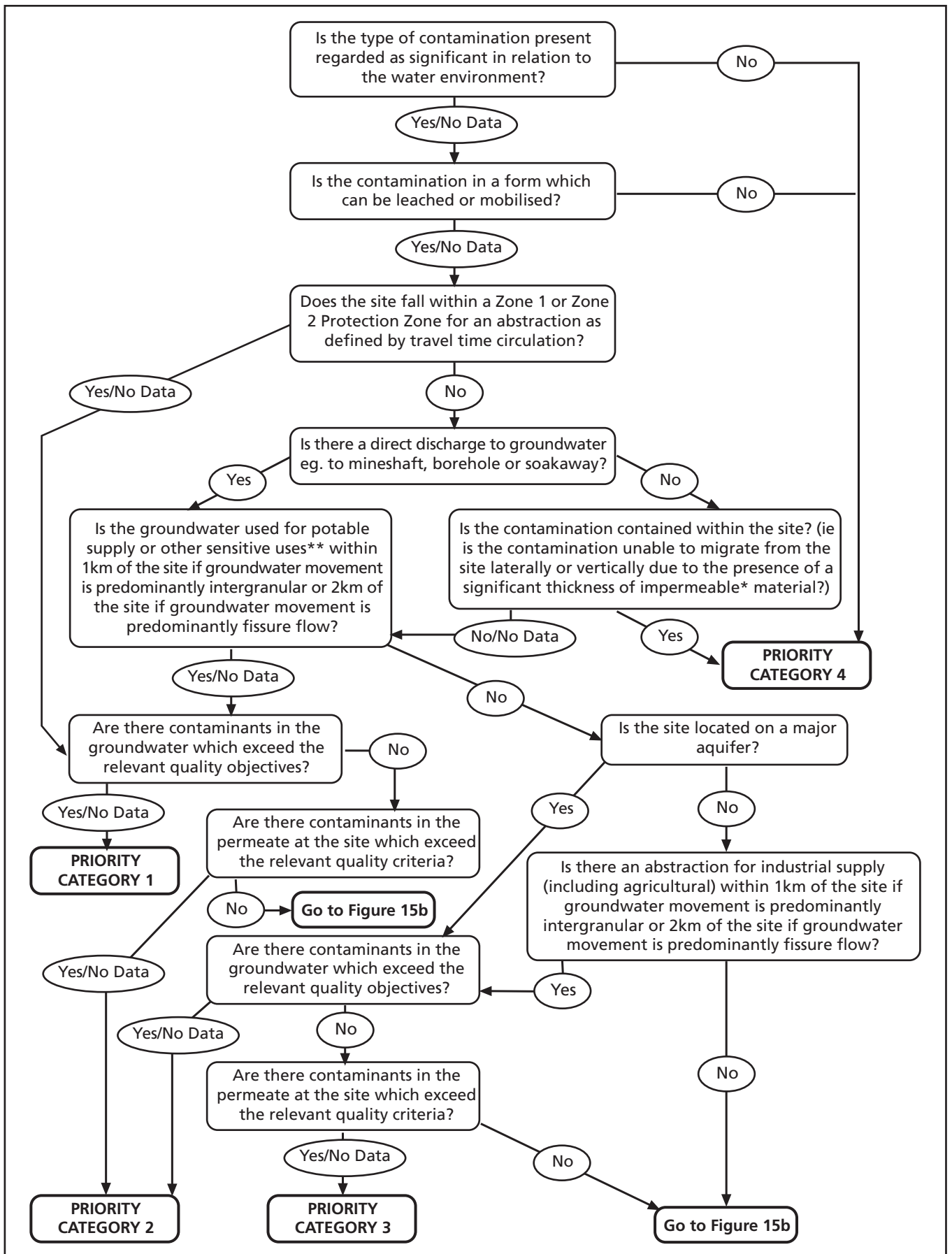


* Other sensitive uses of surface water include recreation (bathing/canoeing)

salmonid fishery, SSSI and Natura 2000 designation

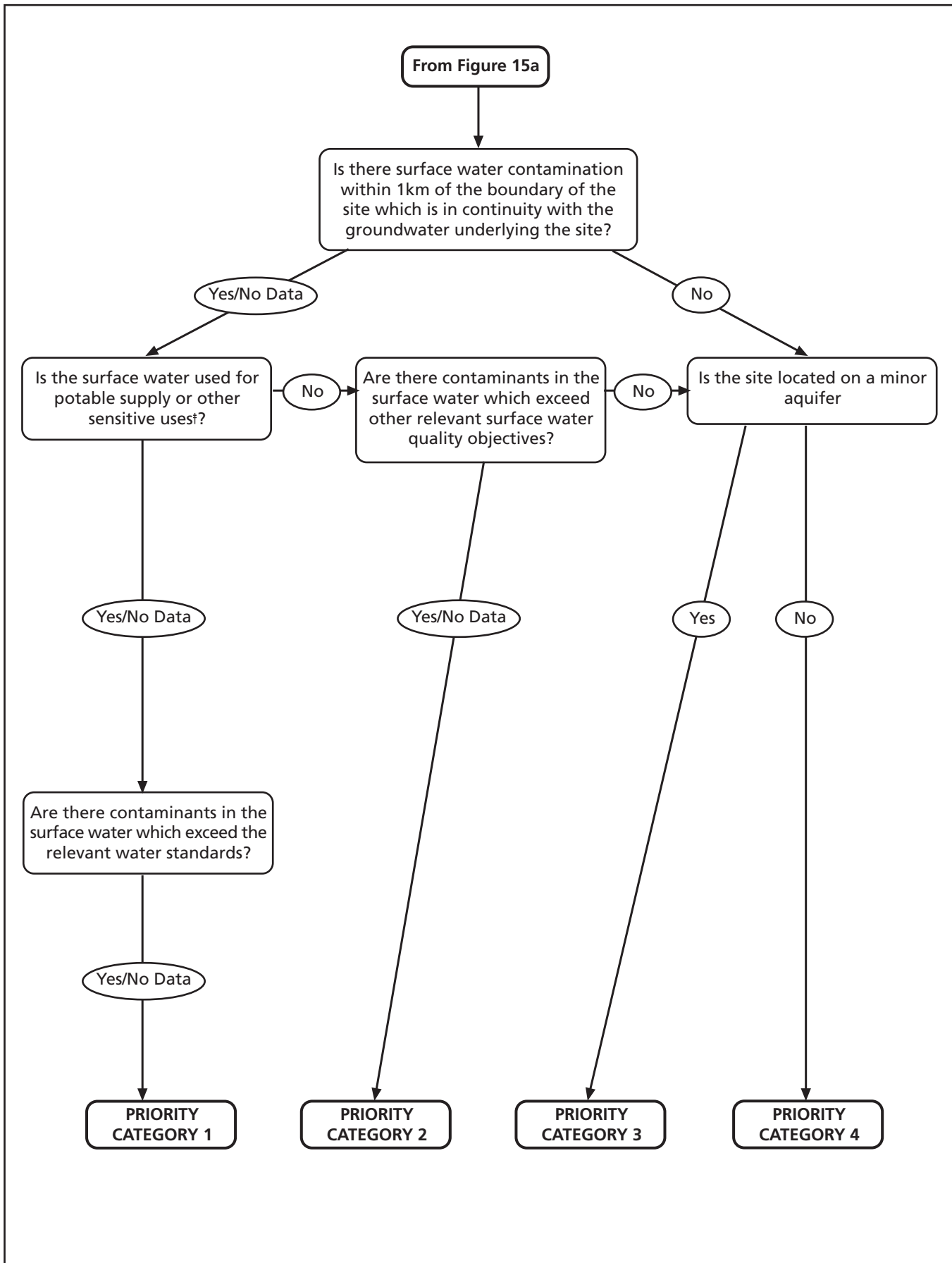
Source: Reference No. 6

Figure 15a Stage Three Assessment of Groundwater



Source: Reference No. 6

Figure 15b Stage Three Assessment of Groundwater



Source: Reference No. 6

6. Information and Record Management

- 6.1 It is important that all information collected during the preparation of a Contaminated Land Register is collated and managed efficiently. It will be necessary at all stages to be able to demonstrate the source or sources of information that lead to the designation of the site as potentially contaminated. With the exception of sites entered into the Contaminated Site Register the information collected, subject to the Environmental Information Regulations 1992 relating to commercial confidentiality, national defence and public security, will not be publicly available.
- 6.2 The records that must be kept will include:
- relevant information sources and records identified
 - relevant information sources and records reviewed
 - decisions made following the review of information and records
 - liaison with other Council departments, external agencies and individuals and
 - responses made to information provided by members of the public
- 6.3 The information and management system selected will need to provide the following features:
- transparency of operation
 - security of access and editing
 - systems to record details of information providers and reviewers
 - a clear audit trail for quality assurance purposes
 - methods of ensuring that there is no duplication of information and
 - check systems that ensure that all relevant information is reviewed for all areas
- 6.4 As the Council will have to examine its geographical area the use of a GIS will facilitate the collation and management of information. The use of a GIS based system represents a cost-effective approach to information management. An area and site referencing system will be used to facilitate cross checking of information.
- 6.5 A central database of potentially contaminated land, which is largely locational, will provide a mechanism to register information from any data source.
The database will :
- be the key source for the production of register information
 - allow flexible identification, reviewing and reporting of information
 - provide a direct link to the GIS
 - allow the information to be readily available to all appropriate staff via the Council's intranet
- 6.7 The GIS will allow the contaminated land data and other data sets to be viewed together, including nature conservation sites, listed buildings, residential areas, archaeological sites and eventually environmental land use and planning application data.

- 6.8 To support work on site assessment and inspection Map Info, a GIS system, has been purchased.

Enquiries from the Public

- 6.9 The Council may receive enquiries regarding contaminated land from members of the public, businesses or community groups. Interested residents may also voluntarily supply information relating to land contamination that is not directly affecting themselves, their families or their property. The approach to inspection may be affected by these enquiries or acts of information provision. The procedures to be adopted are detailed below:

Enquiries

- 6.10 An enquiry regarding contaminated land will be dealt with under the following procedure :
- Enquiry will be logged and recorded
 - The person will be contacted with regard to their enquiry
 - The person will be kept informed of progress towards resolution of the enquiry.

Confidentiality

- 6.11 All persons will be asked to supply their names and addresses and the address or location to which their enquiry relates. This information will remain confidential.

Companies may provide the Council with confidential information relating to a potentially contaminated site. If the Council receives an enquiry on a site such as this it will supply the relevant company's name and address. It will not give out any other information supplied by the company.

Voluntary Provision of Information

- 6.12 If a person or organisation provides information on a voluntary basis relating to contaminated land this will be recorded and may be acted upon.

Anonymously Supplied Information

- 6.13 The Council does not normally undertake any investigation based on anonymously supplied information, and this general policy will be adopted for contaminated land issues. This policy does not, however, preclude investigation in exceptional circumstances.

Anecdotal Evidence

- 6.14 Any anecdotal evidence provided to the Council relating to contaminated land will be noted, but no designation of contaminated land will occur without robust scientific evidence. In all cases the Council will use knowledge and experience to decide what, if any, further investigation is required following a complaint or a provision of information.

Complaints

6.15 If complaints are received in relation to contaminated land they will be considered under Environment and Infrastructure's complaints procedure.

The following process will be followed :

- The complaint will be logged and recorded.
- The complainant will be contacted by staff from Environment and Infrastructure.
- The complainant will be kept informed of progress.

7. Consultation and Communication

- 7.1 Much of the work proposed in this Strategy will be collaborative and require effective liaison with other bodies.

Consultees

- 7.2 To develop the Strategy the following consultees are being consulted.

Carlisle City Council
Community Councils
Cumbria County Council
East Ayrshire Council
Food Standards Agency
Forestry Authority
Historic Scotland
Scottish Borders Council
Scottish Enterprise – Dumfries and Galloway
Scottish Environment and Rural Affairs Department
SEPA
SNH
South Ayrshire Council
South Lanarkshire Council.

Communicating with Owners, Occupiers and Other Interested Parties

- 7.3 The Council's approach to its regulatory duties under the contaminated land regulations will be to seek voluntary action before taking enforcement action. This approach recognises that in many cases it should be possible to achieve more effective remediation by agreement than by enforcement.

This approach requires effective communication with owners, occupiers and other interested parties. The Council's central contact point on contaminated land issues will be Environment and Infrastructure. The Council will contact businesses and landowners at an early stage in the site investigation process to ensure available information is considered at an early stage. The Council will keep owners, occupiers and other interested parties informed at each stage of an investigation, regardless of whether there is a formal designation of contaminated land or not.

Register

- 7.4 The Council is required to maintain a public register in relation to contaminated land. This will include:

1. Identification notices.

The Council is required to prepare a written record or any determination that particular land is contaminated land.

The issue of this notice has the effect of starting the process of consultation on remediation of the site.

2. Remediation Notice.

Where any land has been identified as being contaminated land under the terms of the Regulations the Council has a duty to require appropriate remediation. (Fig.16) Where a special site has been identified responsibility for remediation passes to SEPA. Wherever practicable the Council will seek to agree by mutual consent with the persons involved the voluntary application of appropriate remediation actions. These will be published in a remediation statement, remediation declarations and notifications of claimed remediations. However where this is not possible the Council will serve a remediation notice specifying the actions to be carried out and the terms with in which they must be carried out.

The register will be held in the Council's offices and will be available on request during office hours, Monday to Friday.

Powers of Entry

- 7.5 The Council will seek the permission of landowners and occupiers before any site inspection is carried out. It will give at least seven days notice, unless there is an immediate risk to human health or the environment. Where it is not possible to obtain the consent of the owner the Council will seek to obtain a warrant from a sheriff to obtain entry to the site.

Risk Communication

- 7.6 The complex nature of contaminated land issues do not lend themselves to easy explanation to the lay person. Development of effective methods of risk communication is therefore essential.

The Council will treat any concerns raised by a member of the public seriously and with respect, recognising the importance of the issue to the individual.

In common with many other countries Scotland has a legacy of land contamination. Much land contamination has been present for long periods of time and may only be of concern if the land is used for particular purposes.

- 7.7 A risk-based approach is being used to identify and manage contaminated land. This approach involves the following:
- Risk Assessment: Risks are identified, estimated and evaluated through the carrying out of desk studies, site investigations and interpretation of data to reach decisions on unacceptable risks.
 - Risk Management: Involves evaluating and selecting suitable remedial measures to reduce or control risks identified as being unacceptable and then implementation on site of the selected remediation action.

Where a site is so contaminated that it poses a possibility of significant harm or a significant possibility or significant harm being caused the site will be placed on the Contaminated Land Register. The identification of any such sites would have wider community implications. The Council will seek to inform communities of such sites as early as practicable in the site assessment process.

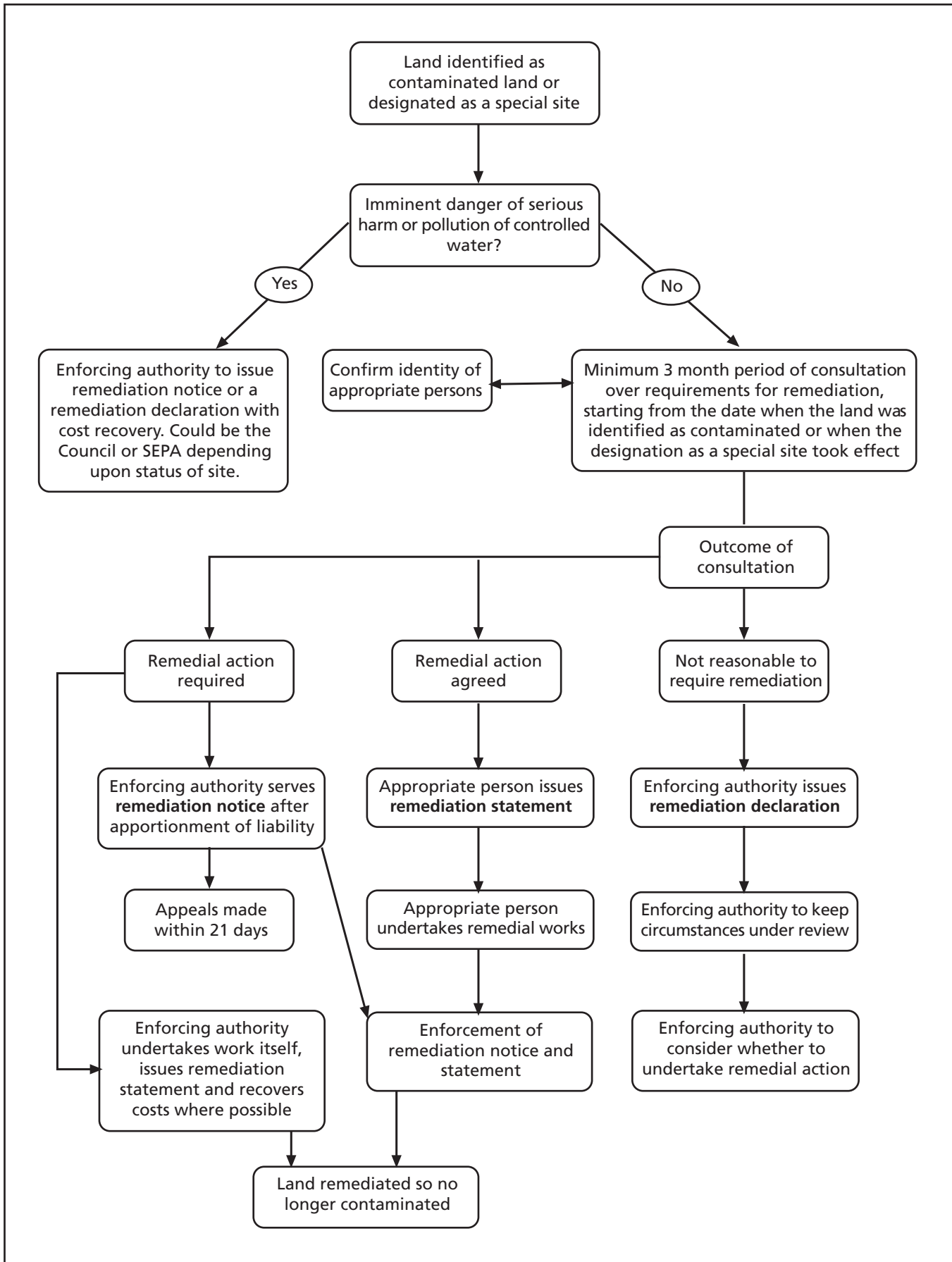
Key Agencies

- 7.8 The implementation of this Strategy will require the support and assistance of a number of agencies, in particular SEPA and SNH. Discussions have taken place with both of these agencies. SEPA and Scottish local authorities have reached agreement on the exchange of information.

SEPA rely on information provided by local authorities, the lead regulators on contaminated land, for the national survey. SEPA only regulate some categories of sites. The Council must provide the following information to SEPA :

- Sites designated as contaminated land and special sites,
- Remediation notices, statements or declarations.

Figure 16 Remediation of Contaminated Land



Source: Reference No. 20

8. Monitoring and Review

- 8.1 This Strategy outlines the general approach to inspecting land in the region for contamination. This section will describe instances when inspections will occur outside this general inspection framework, circumstances under which previous inspection decisions should be reviewed and measures to be taken to ensure the Strategy remains effective and up to date.

Triggers for undertaking Inspection

- 8.2 The Strategy has already recognised there may be occasions where inspections may have to be carried out outwith the general inspection framework.

Triggers for undertaking non routine inspection will include :

- Unplanned events – eg if an incident such as a spill has occurred
- Introduction of new receptors – designation of a new protected ecosystem, persistent trespass onto a site by young people.
- Supporting voluntary remediation- eg a potentially liable party wishing to undertake clean up before their land has been inspected by the local authority.
- Identification of localised health effects which appear to relate to a particular area of land
- Responding to information from other statutory bodies, owners, occupiers or other interested parties.

While these occurrences may trigger non routine inspections, if this Strategy is to prove effective, they must not be allowed to significantly interfere with the milestones laid down in the general inspection framework. It will be important to consider this issue in all Strategy reviews.

Triggers for Reviewing Inspection Decisions.

- 8.3 In addition there may be occasions where the findings of the Strategy should be reviewed. This might occur, for example if there were
- Significant changes in legislation
 - Establishment of significant case law or other precedent
 - Revision of guideline values for exposure assessment

It is important therefore that all decisions are made and recorded in a consistent manner that will allow efficient review.

Reviewing the Strategy

- 8.4 As part of the overall quality management of this work, it is important to consider the need to review the Strategy from time to time.

The Strategy was finalised in October 2001 following consultation, during July/ August 2001. It will be appropriate to review the milestones in light of progress after the first full year of operation. This review will therefore take place in October 2002 and the findings will be reported to the Council. If there are significant changes to the Strategy, it may be appropriate to carry out further annual reviews in the following years.

If the Strategy is found to be operating satisfactorily throughout the period of the five year work plan, the next review date will be October 2006.

Appendix 1

a) 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 | <p>Death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.</p> <p>For these purposes, disease is to be taken to mean an unhealthy condition of the body or a 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.</p> <p>In this chapter, this description of significant harm is referred to as a "human health effect".</p> |
| 2 | <p>Any ecological system, or living organism forming part of such a system, within a location which is:</p> <ul style="list-style-type: none"> • an area notified as an area of special scientific interest (commonly called a site 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; • any 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 Areas of Conservation and 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); | <p>For any protected location:</p> <ul style="list-style-type: none"> • 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 that location; or • harm which affects any species of special interest within that location and which endangers the long-term maintenance of the population of that species at that location. <p>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 that location or species typically found there.</p> <p>In determining what constitutes such harm, the local authority should have regard to the advice of Scottish Natural Heritage and to the requirements of the Conservation (Natural Habitats etc) Regulations 1994.</p> <p>In this Chapter, this description of significant harm is referred to as an "ecological system effect".</p> |

| | Type of Receptor | Description of harm to that type of receptor that is to be regarded as significant harm |
|---|---|--|
| | <ul style="list-style-type: none"> • 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 proposed National Parks Act. | |
| 3 | <p>Property in form of:</p> <ul style="list-style-type: none"> • crops, including timber; • produce grown domestically, or on allotments, for consumption; • livestock; • other owned or domesticated animals; • wild animals which are the subject of shooting or fishing rights. | <p>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 its value resulting from death, disease or other serious physical damage.</p> <p>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 being 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.</p> <p>In this Chapter, this description of significant harm is referred to as an “animal or crop effect”.</p> |
| 4 | <p>Property in the form of buildings:</p> <p>For this purpose, “building” 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 the building”.</p> | <p>Structural failure, substantial damage or substantial interference with any right of occupation.</p> <p>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 is or was intended.</p> <p>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.</p> <p>In this Chapter, this description of significant harm is referred to as a “building effect”.</p> |

b) Categories of Significant Possibilities of Significant Harm

| | Descriptions of Significant Harm (As defined in table A) | Conditions for there being a significant possibility of significant harm |
|---|---|--|
| 1 | <p>Human health effects arising from:</p> <ul style="list-style-type: none"> • the intake of a contaminant, or • other direct bodily contact with a contaminant (exposure). | <p>If the amount of the pollutant in the pollutant linkage in question:</p> <ul style="list-style-type: none"> • 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. <p>Such an assessment should take into account:</p> <ul style="list-style-type: none"> • the likely total 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 substance; 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 be affected by that intake or exposure. <p>Toxicological properties should be taken to include carcinogenic, mutagenic, teratogenic, pathogenic, endocrine-disrupting and other similar properties.</p> |
| 2 | <p>All other human health effects (particularly by way of explosion or fire).</p> | <p>If the probability, or frequency, of occurrence of significant harm of that description is unacceptable, assessed on the basis of relevant information concerning;</p> <ul style="list-style-type: none"> • that type of pollutant linkage, or • that type of significant harm arising from other causes. <p>Such an assessment should take into account the levels of risk which have been judged unacceptable in other similar contexts.</p> |
| 3 | <p>All ecological system effects.</p> | <p>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.</p> |

| | Descriptions of Significant Harm (As defined in table A) | Conditions for there being a significant possibility of significant harm |
|---|---|--|
| 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 2 Dumfries and Galloway Landscape Assessment (Section 2) (Source: Reference No. 21)

2.0: FORCES THAT HAVE SHAPED THE LANDSCAPE

2.1 PHYSICAL FORCES

Solid Geology

- 2.1.1 The solid geology of the region is composed mainly of sedimentary greywackes and shales of the Ordovician/Silurian period, with areas of new red sandstone and the major intrusive granite masses of Criffel, Cairnsmore of Fleet and Loch Doon. Granite is also found around Dalbeattie. The sedimentary bands are oriented north east to south west. Basins of coal measures also exist, predominantly around Sanquhar in the north of the region. In the south east, sandstones and limestones occur (Figure 1).
- 2.1.2 The younger, softer sandstones are more easily eroded than older, harder granite and basalt, and have influenced the evolution of the drainage pattern. For example, the course of the Nith has been largely determined by the presence of basins of younger rocks, especially the Permian sandstones. Dumfries is located in the centre of the largest of these basins which is also a topographic hollow. Loch Ryan, the Stranraer lowlands and much of Luce Bay have been carved from a partly submerged basin of Permian sandstone. The course of the Esk carves through harder basalt and andesites and so remains narrow. Sediments have provided excellent building stone, and their colours and textures are distinctive features of the built environment.
- 2.1.3 The harder Ordovician and Silurian sediments have been more resistant to erosion remaining as the extensive Southern Uplands range. This is typified by conical domed peaks incised by deep valleys in many areas. In contrast, the granite intrusions have created a more rugged landscape with more obvious outcrops in both the granite and its metamorphosed rim. The main granite peaks (Cairnsmore of Fleet, Criffel and Cairnsmore of Carsphairn) are essentially domed masses, but the exposure of white/grey granite on their flanks, and its use in drystone walling, is distinct from the predominant greywackes and shales.
- 2.1.4 The region has also been effected by volcanic intrusions in the form of basaltic sills and dykes. These are limited in extent, but have been quarried as hard building stones in certain areas and have influenced the formation of minerals in the surrounding sediments.

Drift Geology

- 2.1.5 The solid geology of Dumfries and Galloway has been modified by glacial action. During the last main glacial, the region was covered by the southern upland ice sheet, with the Merrick and Cairnsmore being a major source of valley glaciers. Glacial action has tended to have a rounding effect on the topography, for example in the deepened valley of the Devils Beef Tub north of Moffat, and the wide dome of the summit of Broad Law. The signs of glacial activity are most numerous around the Merrick and Rhinns of Kells. Loch Doon occupies a glacially-overdeepened trough, and Loch Trool infills a u-shaped valley. The mountainous heartland is, therefore, very rugged, reminiscent in places such as Merrick of the western Highlands. However, the coastal fringes were not subject to intensive erosive powers of ice and there are extensive spreads of glacial detritus. Within these areas of deposited material are the distinct drumlin landforms. These were created as an ice sheet carrying till at its base crossed an obstacle such as a boulder which would not be dislodged, or a particularly porous section of rock which trapped the basal material, obstructing the smooth flow of the glacier. Till became lodged around such obstacles and was streamlined in the direction of glacier flow as the ice moved over the obstacle, creating the distinct landforms still evident today.
- 2.1.6 Around 12,000BP, there was climatic improvement and widespread deglaciation of the area. Glacial conditions returned c10, 800BP with ice gaps on high ground feeling valley glaciers. This re-advance was limited and is shown by recessional moraine ridges. Sea level rise which accompanied deglaciation, along with isostatic recovery, caused major fluctuating adjustments between land and sea. The results are raised beaches along much of the coastline and estuarine areas, and incised valleys inland. The importance of post glacial raised beaches in the landscape here, lies in their effect on coastal settlement and land use, as the raised shoreline added many square miles of low marsh to the coastal fringe. For example, on the west shore of the Nith estuary are wide expanses of raised beach deposits, stretching from Dumfries to Southwick Water. Here, mounds of glacial drift rise above the saline soils and have been improved to give fertile farmlands.
- 2.1.7 At the coast, old hard rock headlands are separated by bays of softer rock. In more detail, however, it is the drift deposits of both glacial and post glacial derivation which largely shape this landscape: the lowlands of Wigtownshire provide contrast to the moorland landscape of Carrick and the Stewartry. Rolling drift-covered landscape has uniform colour, and is pastoral in appearance. The Machars area for example is formed on thick glacial drift. The Rhins promontory was probably an island in late glacial times. Along the Luce Bay coast is the most extensive sand dune system in Galloway with some dunes over 15m high.

Appendix 3 - Industrial Activities (Source: Reference No.18)

A) Industrial activities which have the potential to cause significant levels of contamination

Animal and animal products processing works
Chemical works: coatings (paints and printing inks) manufacturing works
Chemical works: explosives, propellants and pyrotechnics manufacturing works
Chemical works: fine chemicals manufacturing works
Chemical works: inorganic chemicals manufacturing works
Chemical works: organic chemicals manufacturing works
Chemical works: pesticides manufacturing works
Chemical works: pharmaceuticals manufacturing works
Gas works, coke works and other coal carbonisation plants
Metal manufacturing, refining and finishing works: electroplating and other metal finishing works
Metal manufacturing, refining and finishing works: iron and steelworks
Metal manufacturing, refining and finishing works: lead works
Metal manufacturing, refining and finishing works: non-ferrous metal works (excluding lead works)
Bulk storage of crude oil and petroleum products
Road vehicle fuelling, service and repair: garage and filling stations
Textile works and dye works
Timber treatment works
Waste recycling, treatment and disposal sites: landfills and other waste treatment or waste disposal sites
Waste recycling, treatment and disposal sites: metal recycling sites

B) Industrial activities which have the potential to cause medium levels of contamination

Chemical works: cosmetics and toiletries manufacturing works etc.
Chemical works: disinfectants manufacturing works
Chemical works: rubber processing works (including works manufacturing tyres or other rubber products)
Engineering works: electrical and electronic equipment manufacturing works (including works manufacturing equipment containing PCBs)
Engineering works: mechanical engineering and ordnance works
Engineering works: railway engineering works
Engineering works: shipbuilding, repair and ship breaking (including naval shipyards)
Road vehicle fuelling, service and repair: transport and haulage centres.

C) Industrial activities which have the potential to cause low levels of contamination

Ceramics, cement and asphalt manufacturing works

Dockyards and dockland

Engineering works: vehicle manufacturing works

Power stations (excluding nuclear power stations)

Railway land

Sewage works and sewage farms

Dry-cleaners

Glass manufacturing works

Printing and bookbinding works

Appendix 4 : Further Information on Stage 3 - Identification of Potentially Contaminated Sites

Assessment of Risks to Developed Areas, Protected Habitats and Agriculture

Using the collected information each site will be placed into a priority category following the procedures shown on Figures 12 and 13. The procedures shown in Figure 12 will be used for land in residential, agricultural, commercial or industrial use, allotments, public open space or land in other amenity use. The procedures shown on Figure 13 will be used for unoccupied land and protected habitats.

Figures 12 and 13 take account of the types of contaminant present, the type of land use and the risk of exposure to the contaminants. To support the assessment of harm, risks and their significance reference will be able made to technical documents (including references 7, 8, 9)

Assessment of Risks to Surface Water

Using the collected information each site will be placed into a priority category following the procedures outlined on Figure 14. To support the assessment of pollution of controlled surface waters and the likelihood of pollution being caused reference will be able made to technical documents (including references 10, 11, 12, 13)

Assessment of Risks to Groundwater

The surface geology in particular the presence and type of superficial deposits will be assessed at this stage.

The physical and chemical nature of the aquifer can have a significant impact on the potential migration of contaminants. Contaminants may travel rapidly over significant distances through a fracture flow system in which groundwater can move rapidly through fractures and fissures. Fracture flow is characteristic of strata such as chalk, limestone and igneous rocks.

If the underlying aquifer is dominated by intergranular flow in which groundwater moves principally as laminar flow through a body of rock groundwater will travel at much lower velocities than in a fracture flow system. Intergranular flow is characteristic of strata such as sands and gravels and sandstone.

An assessment will be made of the direction of groundwater flow so that potential receptors such as groundwater abstractions down the hydraulic gradient of the site can be identified. Using the collected information each site will be placed into a priority category following the procedures outlined on Figure 15.

Following the assessment of the risks for each of the aspects described each site will be allocated a priority category for each of the three aspects. The sites placed in priority category 1 under all three aspects will be considered first in the following stages of the development of the Strategy followed by the sites placed in priority category 1 for two aspects and priority category 1 for one aspect and so on.

Glossary

The statutory guidance (and other parts of the Scottish Executive Rural Affairs Department Circular 1/2000) uses a number of terms which are defined in Part IIA of the 1990, other Acts or in the guidance itself. The meanings of the most important of these terms are set out below, along with a reference to the section in the Act or in the paragraph in which the relevant term is defined. These terms are asterisked.

***Appropriate person**

Defined in section 78A(9) as: "any person who is an appropriate person, determined in accordance with section 78F..., to bear responsibility for any thing which is to be done by way of remediation in any particular case."

Brownfield Site

A site that has been generally abandoned or underused where redevelopment is complicated by actual or perceived environmental contamination. Only a small proportion of brownfield sites will meet the definition of contaminated land.

CLEA

Contaminated Land Exposure Assessment, a methodology for carrying out a risk assessment

***Contaminant**

A substance which is in, on or under the land and which has the potential to cause harm or to cause pollution of controlled waters. Paragraph A.13

***Contaminated land**

Defined in section 78A(2) as: "any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that –

"(a) significant harm is being caused or there is a significant possibility of such harm being caused, or;

"(b) pollution of controlled waters is being, or is likely to be, caused."

***Controlled waters**

Defined in section 78A(9) by reference to the section 30A of the Control of Pollution Act 1974; this embraces territorial and coastal waters, inland fresh waters, and ground waters.

Ecological System

A biological system of interacting organisms and their physical environment.

GIS

Geographical Information System

Groundwater

Any water contained in underground strata, wells or boreholes.

***Harm**

Defined in section 78A(4) as: "harm to the health of living organism or other interference with the ecological systems of which they form part and, in the case of man, includes harm to his property."

***Human health effect**

Significant harm of a type listed in box 1 of Table A of Chapter A.

ICRCL

Interdepartmental Committee on Remediation of Contaminated Land.

***Intrusive investigation**

An investigation of land (for example by exploratory excavations) which involves actions going beyond simple visual inspection of the land, limited sampling or assessment of documentary information. Paragraph B.20(c)

***Pathway**

One or more routes or means by, or through, which a receptor:

(a) is being exposed to, or affected by, a contaminant, or

(b) could be so exposed or affected. Paragraph A.15

***Pollutant linkage**

The relationship between a contaminant, a pathway and a receptor. Paragraph A.18

***Pollution of controlled waters**

Defined in section 78A(9) as: "the entry into controlled waters of any poisonous, noxious or polluting matter or any solid waste matter."

***Possibility of significant harm**

A measure of the probability, or frequency, of the occurrence of circumstances which would lead to significant harm being caused. Paragraph A.27

Ramsar site

A site protected under an international convention on protection of wetlands of international importance, especially as habitats for waterfowl, named after the city in Iran where the convention was signed.

***Receptor**

Either:

(a) a living organism, a group of living organisms, an ecological system or a piece of property which:

(i) is in a category listed in Table A in Chapter A as a type of receptor, and

(ii) is being, or could be, harmed, by a contaminant; or

(b) controlled waters which are being, or could be, polluted by a contaminant.

Paragraph A.14

***Remediation**

Defined in section 78A(7) as:

“(a) the doing of anything for the purpose of assessing the condition of –

“(i) the contaminated land in question;

“(ii) any controlled waters affected by that land; or

“(iii) any land adjoining or adjacent to that land;

“(b) the doing of any works, the carrying out of any operations or the taking of any steps in relation to any such land or waters for the purpose –

“(i) of preventing or minimizing, or remedying or mitigating the effects of, any significant harm, or any pollution of controlled waters, by reason of which the contaminated land is such land; or

“(ii) of restoring the land or waters to their former state; or

“(c) the making of subsequent inspections from time to time for the purpose of keeping under review the condition of the land or waters.”

***Remediation declaration**

Defined in section 78H(6). It is a document prepared and published by the enforcing authority recording remediation actions which it would have specified in a remediation notice, but which it is precluded from specifying by virtue of sections 78E(4) or (5), the reasons why it would have specified those actions and the grounds on which it is satisfied that it is precluded from specifying them in a notice.

***Remediation notice**

Defined in section 78E(1) as a notice specifying what an appropriate person is to do by way of remediation and the periods within which he is required to do each of the things so specified.

***Remediation statement**

Defined in section 78H(7). It is a statement prepared and published by the responsible person detailing the remediation actions which are being, have been, or are expected to be, done as well as periods within which these things are being done.

***Risk**

The combination of:

(a) the probability, or frequency, of occurrence of a defined hazard (for example, exposure to property of a substance with the potential to cause harm); and

(b) the magnitude (including the seriousness) of the consequences. Paragraph A.9

SAC

Special Area of Conservation

***SEPA**

The Scottish Environment Protection Agency

***Significant harm**

Defined in section 78A(5). It means any harm which is determined to be significant in accordance with the statutory guidance in Chapter A (that is, it meets one of the descriptions of types of harm in the second column of Table A of that chapter).

***Significant possibility of significant harm**

A possibility of significant harm being caused which, by virtue of section 78A(5), is determined to be significant in accordance with the statutory guidance in Chapter A.

***Special site**

Defined by section 78A(3) as: "any contaminated land

"(a) which has been designated as such a site by virtue of section 78C(7) or 78D(6)...;and

"(b) whose designation as such has not been terminated by the appropriate Agency under section 78Q(4)...".

The effect of the designation of any contaminated land as a special site is that SEPA, rather than the local authority, becomes the enforcing authority for the land.

SSSI

Site of Special Scientific Interest

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