

NORTH HERTFORDSHIRE DISTRICT COUNCIL

ENVIRONMENT ACT 1995
ENVIRONMENTAL PROTECTION ACT 1990

CONTAMINATED LAND STRATEGY



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Prepared by:
North Hertfordshire District Council
Housing and Public Protection Service
Council Offices
Gernon Road
Letchworth
Hertfordshire
SG6 3JF

Original Compiled by:
Simon Joynes
Environmental Protection Team

Reviewed and Updated by:
David Carr
Environmental Protection Team

EXECUTIVE SUMMARY

England has an industrial history of which we can be proud, but one of the legacies of this history is a significant stock of land which contains a wide variety of harmful substances or agents. In many cases, the activities which have polluted land have long since ceased, leaving its clean up to subsequent generations. This provides perhaps the clearest example of unsustainable development in the history of this nation.

Whilst some contaminated land has been rendered safe by the passage of time or by appropriate redevelopment, there are still examples where harm to the environment is taking place.

It is with this background that successive Governments towards the end of the 20th Century have attempted to intervene to resolve this national problem. The insertion of Part 2A into the Environmental Protection Act 1990 in April 2000 ushered in a new legislative regime. This legislation and associated guidance is complex, but seeks to deal with land contamination in a measured and balanced way. Indeed, much of this legislation depends on pivotal definitions, as exemplified by the following:-

“How contaminated land is defined is the cornerstone of the operation of the legislation and the entirety of Government policy regarding pollution in the UK landmass. Too wide a definition will lead to much expense being wasted on land which is actually causing no real harm, whereas too restrictive a definition will result in harm going unregulated and unchecked.”

Trevor Hellawell, Contaminated Land, 2000

Part 2A requires local authorities such as North Hertfordshire District Council to take a staged approach to the remediation of contaminated land:

- 1) The identification of land, with reference to an explicit definition, which can be formally determined to be ‘contaminated land’
- 2) The identification of the action required to clean up this contaminated land
- 3) The identification of those responsible for the clean up of contaminated land

North Hertfordshire District Council’s Contaminated Land Strategy sets out how it will implement this new regime and also how it will integrate its existing programmes to ensure a balanced and proportional approach to this issue.

Table of Contents

| | | |
|------------|--|-----------|
| | Executive Summary | i |
| | Table of Contents | ii |
| | Preface | iv |
| 1.0 | INTRODUCTION | 1 |
| 1.1 | Historical background to the contaminated land regime | 1 |
| 1.2 | Objectives of the regime | 3 |
| 1.3 | Legislative Overview | 4 |
| 2.0 | NORTH HERTFORDSHIRE DISTRICT COUNCIL | 6 |
| 2.1 | Geographical size and location | 6 |
| 2.2 | Population size and distribution | 7 |
| 2.3 | Current land use pattern | 7 |
| 2.4 | Location and status of protected ecosystems | 7 |
| 2.5 | Protected Areas | 9 |
| 2.6 | Strategic land use planning | 10 |
| 2.7 | Community Planning | 12 |
| 2.8 | North Hertfordshire District Council as a landowner | 13 |
| 2.9 | The physical environment | 13 |
| 3.0 | THE PROCEDURAL FRAMEWORK | 15 |
| 3.1 | The regulatory context | 15 |
| 3.2 | The Council's priorities | 19 |
| 3.3 | Overview of the procedure for identifying potentially contaminated land | 20 |
| 3.4 | Management of the regime at North Hertfordshire District Council | 22 |
| 3.5 | Information management | 27 |
| 3.6 | Data storage and management | 27 |
| 3.7 | Risk communication | 27 |
| 3.8 | Consultation and liaison arrangements | 28 |
| 3.9 | Strategy review arrangements | 30 |
| 4.0 | STAGE 1: IDENTIFICATION OF POTENTIALLY CONTAMINATED LAND WITHIN NORTH HERTFORDSHIRE | 30 |
| 4.1 | Data Harvesting | 31 |
| 4.2 | Stage 1 risk assessment methodology | 32 |
| 5.0 | STAGE 2: INSPECTION ARRANGEMENTS | 39 |
| 5.1 | Inspection of land | 39 |
| 5.2 | Site investigation | 40 |
| 5.3 | Guidelines and risk assessment | 45 |
| 5.4 | Inspection frequency | 48 |
| 5.5 | Special site arrangements | 48 |
| 6.0 | DESIGNATION OF CONTAMINATED LAND | 49 |
| 6.1 | Statutory declaration | 49 |
| 6.2 | Subsequent actions | 49 |
| 6.3 | Remediation notices | 51 |
| 6.4 | Contents of the contaminated land register | 52 |

| | | |
|------------|---|-----------|
| 7.0 | PROPOSED TIMETABLE AND FUNDING | 53 |
| 7.1 | Stage 1: Identification of potentially contaminated land within North Hertfordshire | 53 |
| 7.2 | Stage 2: Inspection arrangements | 53 |
| 7.3 | Stage 3: Designation of contaminated land | 55 |

APPENDICES

| | | |
|-----|---|----|
| 1: | Special Sites | 56 |
| 2: | Pollution of controlled waters | 57 |
| 3: | Glossary | 59 |
| 4: | Potentially contaminative land uses | 64 |
| 5: | Sites and designations for landscape and nature conservation (within towns) | 66 |
| 6: | Ancient monuments | 72 |
| 7: | Data sources for stage 1 | 74 |
| 8: | Landmark information group services | 76 |
| 9: | Typical contaminants linked to former land uses | 81 |
| 10: | Human exposure assessment matrix | 88 |
| 11: | Model flowcharts | 89 |

PREFACE

This document is Version 6.0 of the North Hertfordshire District Council (NHDC) Contaminated Land Strategy. Version 6.0 has been produced to accommodate the Central Government initiated changes to the 2006 Statutory Guidance. The Statutory Guidance has been in place in one form or another since 2000 in order to support the legal framework for dealing with contaminated land under Part 2A of the Environmental Protection Act 1990.

The new Statutory Guidance was published in April 2012 with the stated aims being to:

- give greater clarity to regulators as to how to when land is and is not actually contaminated land
- be shorter, simpler and more focused towards achieving optimum results in terms of dealing with sites most in need of remediation
- reflect the experience accumulated over eleven years of operating the regime allowing regulators to take a more targeted approach which remains precautionary but avoids an over cautious blanket approach

Version 5.0 (March 2010) of the Contaminated Land Strategy had identified Summer 2013 as the formal review date for the Strategy so that NHDC continued to meet the requirement placed on Local Authorities by the 2006 Statutory Guidance by paragraph B.13 to “keep its strategy under periodic review”. However, because of the new Statutory Guidance (April 2012) the review was brought forward in order to protect against the risk of ongoing Part 2A activities being challenged on the grounds that the NHDC Strategy was out of date.

The key changes that are incorporated into this Strategy to reflect the new Statutory Guidance are summarised below:

- The separation of the Statutory Guidance for radioactively contaminated land from the Statutory Guidance for non-radioactively contaminated land.
- Change to the definition and assessment of the significance of pollution of controlled waters from land contamination.
- The revocation of Regional Spatial Strategies and Planning Policy Statements/Guidelines following the introduction of the 2012 National Planning Policy Framework.

1.0 INTRODUCTION

1.1 HISTORICAL BACKGROUND TO THE CONTAMINATED LAND REGIME

The industrial revolution and its subsequent impact on the demographic and spatial distribution of people in the United Kingdom resulted in an unprecedented change in land use patterns. In the latter half of the 20th century the character of the UK economy shifted significantly, albeit gradually, away from industrial production to a more service based economy. Inevitably, these (and other) changes have left behind a legacy of land that has been contaminated with harmful agents which may pose a risk to the environment (human, animal, natural and built). The current and projected need for homes has placed renewed pressure on local authorities to reuse land in urban areas and this provides an additional impetus for the rehabilitation of polluted land.

The following is a brief précis of the historical development of legislation to deal with contaminated land:-

1985 The Government, in its response to the 11th report of the Royal Commission on Environmental Pollution, announced that the Department of the Environment was preparing a circular on the planning aspects of contaminated land. The draft of the circular stated:

Even before a planning application is made, informal discussions between an applicant and the local planning authority are very helpful. The possibility that the land might be contaminated may thus be brought to the attention of the applicant at this stage, and the implications explained.

This statement suggested that it would be advantageous for local planning authorities (i.e. local councils) to have available a list of potentially contaminated sites to facilitate dialogue with developers.

1988 The Town & Country Planning (General Development) Order required local planning authorities to consult with waste disposal authorities if development was proposed within 250m of land which had been used to deposit refuse within the last 30 years.

1990 The House of Commons Environment Committee published its first report on contaminated land. This document, for the first time, expressed concern that the Government's 'suitable for use approach', "... may be underestimating a genuine environmental problem and misdirecting effort and resources". The committee produced 29 recommendations, including the proposals that:

*The Department of the Environment concern itself with all land which has been so contaminated as to be a potential hazard to health or the environment regardless of the use to which it is to be put, and;
The Government bring forward legislation to lay on local authorities a duty to seek out and compile registers of contaminated land.*

Immediately following the House of Commons report, the Environmental Protection Act 1990 had a section (s.143 - a requirement for local authorities to compile 'Public registers of land, which may be contaminated') inserted. If enacted, this would have required local authorities to maintain registers of land which were, or may have been, contaminated as a result of previous specified land uses.

1992 However, in March of 1992 the widespread concern about the economic effect of such registers resulted in a press release published by the Secretary of State delaying the introduction of section 143 stating:

"The Government were concerned about suggestions that land values would be unfairly blighted because of the perception of the registers."

Subsequently in July, draft regulations were released which significantly reduced categories of contaminative uses "... to those where there is a very high probability that all land subject to those uses is contaminated unless it has been appropriately treated". Because of this change in definition, it was estimated that land to be included in registers would be only 10% to 15% of the area previously envisaged. This, however, still did not resolve landowners concerns about land values, so on the 24th of March 1993 the Secretary of State announced that the proposals for contaminated land registers were to be withdrawn and that a comprehensive review of land pollution responsibilities be undertaken.

1994 This review resulted in the Department of the Environment consultation paper, *Paying For our Past* (March 1994), which elicited no less than 349 responses. The outcome of this was the policy document, *Framework for Contaminated Land*, published in November 1994. This review emphasised a number of key points:

- The Government was committed to the "polluter pays" and "suitable for use" principles.
- Legislation is only needed with regard to past pollution incidents since there are sufficient legislative mechanisms to control current and future activities.
- Action should only be taken where the contamination poses actual or potential risks to health or the environment.
- Remedial action should have regard to the likely costs and benefits of such action.
- The long-standing statutory nuisance powers had provided an essentially sound basis for dealing with contaminated land, but now needed reviewing.

It was also made clear that the Government wished to:

- Encourage market forces to drive contaminated land clean-up and its appropriate redevelopment

1995 The proposed new legislation was first published in June 1995 in the form of section 57 of the Environment Act which amended the

Environmental Protection Act 1990 by introducing a new Part 2A. After lengthy consultation on statutory guidance this came into force in April 2000 and was updated in 2006.

1.2 OBJECTIVES OF THE REGIME

The Government believes contaminated land to be “an archetypal example of our failure in the past to move towards sustainable development”. The first priority has therefore been specified as the prevention of new contamination via various pollution legislation, guidance and economic instruments.

Secondly, there are three stated objectives underlying the ‘suitable for use’ approach:

- a) to identify and remove unacceptable risks to human health and the environment;
- b) to seek to ensure that contaminated land is made suitable for its current use;
- c) to seek to ensure that the burdens faced by individuals, companies and society as a whole are proportionate, manageable and compatible with the principles of sustainable development.

The ‘suitable for use’ approach recognises that risk can only be satisfactorily assessed in the context of a specific use; the principle aims to maintain an acceptable level of risk at minimum cost, thereby “not disturbing social, economic and environmental priorities”.

The specific stated objectives of the new regime are:-

- a) *to improve the focus and transparency of the statutory controls, ensuring authorities take a strategic approach to problems of land contamination;*
- b) *to enable all problems resulting from contamination to be dealt with within one regulatory mechanism (previously separate regulatory action was needed to protect human health and to protect the water environment);*
- c) *to increase the consistency of approach taken by different authorities; and*
- d) *to provide a more tailored regulatory mechanism, including liability rules, better able to reflect the complexity and range of circumstances found on individual sites.*

In addition to providing a more consolidated basis for direct regulatory action, the Government considers that the improved clarity and consistency of the regime, in comparison with its predecessors, is also likely to encourage voluntary remediation by landowners. It is intended that companies responsible for contamination should assess the likely requirements of regulators and plan remediation in advance of regulatory action.

There will also be significant incentives to undertake early voluntary remediation since a Landfill Tax exemption currently available will be removed once formal enforcement action has commenced under Part 2A of the Environmental Protection Act 1990.

The Government also considers the new regime will assist developers of contaminated land by reducing uncertainties about so called “residual liabilities”, in particular it should:

- a) reinforce the suitable for use approach, enabling developers to design and implement appropriate and cost-effective remediation schemes as part of their redevelopment projects;*
- b) clarify the circumstances in which future regulatory intervention might be necessary (for example, if the initial remediation scheme proved not to be effective in the long term); and*
- c) set out the framework for statutory liabilities to pay for any further remediation, should that be deemed necessary.*

1.3 LEGISLATIVE OVERVIEW

A comprehensive review of the legal and administrative procedures for dealing with contaminated land can be found in chapters 3, 4, 5 and 6 of this strategy document. However, the following summarises very briefly the main points of the new contaminated land regime:

The enforcement of the regime falls to two public bodies – the Environment Agency (for certain types of site and contamination) and local authorities (for the majority of contaminated sites).

Part 2A of the Environmental Protection Act 1990 states in section 78B (1) that:

Every local authority shall cause its area to be inspected from time to time for the purpose -

- a) of identifying contaminated land; and
- b) of enabling the authority to decide whether any such land is land which is required to be designated as a special site (see Appendix 1).

Section 78B(2) states that local authorities must act in accordance with guidance issued by the Secretary of State in this respect. Statutory guidance was first published in March 2000 and has been updated twice since. The initial update was in 2006, with the publication of the Department of Environment, Food and Rural Affairs (DEFRA) Statutory Guidance within Circular 01/2006 and the most recent update resulted in the Contaminated Land Statutory Guidance of April 2012.

Specific technical guidance on the drafting of Inspection Strategies has been available since July 2001 and has not significantly changed.

The statutory guidance makes clear that in order to carry out this duty local authorities must produce a formal contaminated land strategy document. This clearly sets out how land which merits detailed individual inspection will be identified in an ordered, rational and efficient manner, which reflects local circumstances.

The statutory guidance requires authorities to consult a range of agencies (see section 3.8) when preparing an inspection strategy. Local authorities were required to ensure that they were completed, formally adopted and published, within a period of fifteen months from the publication of the guidance (i.e. by end of June 2001).

Contaminated land is defined 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) Significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused*

What may and may not constitute the various categories of harm is described in the statutory guidance. Controlled waters include inland freshwater, groundwater and coastal waters (for definition, see Appendix 2).

Local authorities must search their areas for land which has both receptors (for definition see Appendix 3) and sources of potential contamination (see Appendix 4). Where they have good reason to believe these both exist, they **must** undertake a formal risk assessment in accordance with established scientific principles in order to establish whether there is the potential for harm or pollution (this is known as a 'pollutant linkage').

Where an enforcing authority is satisfied that the land meets either of the above definitions of contaminated land they **must** declare that a significant pollutant linkage exists and that the land is therefore statutorily contaminated. In cases where the contaminated land falls within the special site category, the local authority must obtain the agreement of the Environment Agency (EA) and work with the EA to deal with the land.

Part 2A requires local authorities to identify the persons responsible for the contamination and to negotiate its remediation. If these negotiations fail (or if immediate action is warranted) then the local authority **must** serve a remediation notice specifying, inter alia, what needs to be done to render the site safe. In certain circumstances the council may undertake the work itself and may seek to recover costs at a later date.

Subsequent chapters will describe in more depth how this process will be implemented by North Hertfordshire District Council.

2.0 NORTH HERTFORDSHIRE DISTRICT COUNCIL

This section provides a brief summary of the characteristics of the areas covered by North Hertfordshire District Council relevant to the consideration of contaminated land.

2.1 GEOGRAPHICAL SIZE AND LOCATION

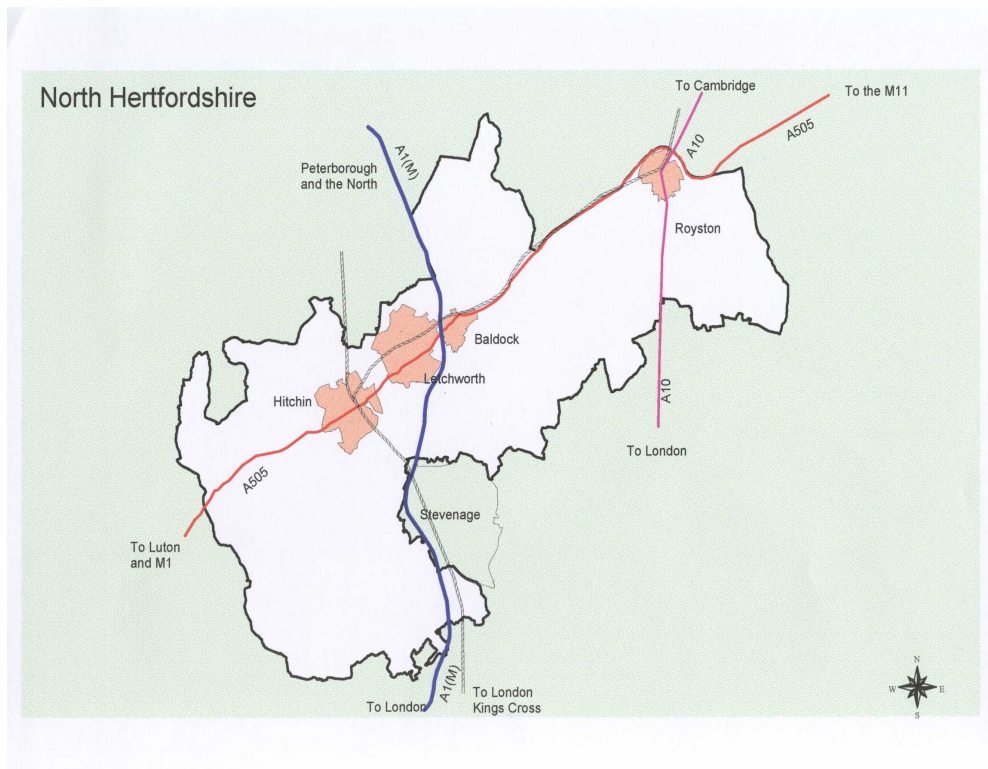
Hertfordshire is located in the Eastern Region of the United Kingdom, immediately to the north of London and adjoining the counties of Buckinghamshire, Bedfordshire, Cambridgeshire and Essex.

Hertfordshire covers an area of 634 square miles (163,306 Ha.) with a population density, taken from the Office of National Statistics' estimated resident population mid-2002, of about 6.3 persons per hectare.

North Hertfordshire

North Hertfordshire has an attractive environment of well established historic towns and villages as well as productively farmed countryside with important wildlife areas and archaeological remains.

The District covers 375 square kilometres (145 square miles) of northern Hertfordshire. North Hertfordshire District Council borders Bedfordshire (including Luton) to the west and north, Cambridgeshire and Essex boundaries around Royston in the east, and covers a broad band of country following the chalk escarpment of the Chiltern Hills.



2.2 POPULATION SIZE AND DISTRIBUTION

As of 2001, the population of the District was determined by the 2001 census to be 116,908 of which a little less than 80% reside within the following 5 urban centres (see table below):

| Town | Population |
|------------|------------|
| Royston | 14570 |
| Baldock | 9866 |
| Letchworth | 32932 |
| Hitchin | 30851 |
| Knebworth | *5034 |

* Estimate based on 2001 Census ward population data

| Population | Area (Ha.) | Area (Sq. Miles) | Population Density: persons/hectare |
|------------|------------|------------------|-------------------------------------|
| 116,908 | 37,537 | 144.9 | 3.11* |

* Estimate based on 2001 Census data

2.3 CURRENT LAND USE PATTERN

The area covered by North Hertfordshire District Council is characterised by a few relatively large towns (in terms of population) surrounded by a considerable number of villages and hamlets. In terms of population, North Hertfordshire is generally urbanised, with nearly 93,000 (79%) people living within its four main towns – Hitchin, Letchworth, Baldock and Royston. In terms of land use, the classification is as follows:

| Description | Area (Ha) |
|---------------------|-----------|
| General Rural Areas | 34037 |
| Urban Areas | 2387 |
| Villages | 1111 |

2.4 LOCATION AND STATUS OF PROTECTED ECOSYSTEMS

The main use of the North Hertfordshire landscape is for agriculture with some forestry forming the basis of the countryside. Trees, hedgerows and woodlands provide valuable wildlife habitats and add to the character of the countryside. The environment is rich in its wildlife diversity. Many rare plants, animals and interesting habitats are protected as Sites of Special Scientific Interest (SSSI). SSSIs are identified and designated by English Nature – there are 6 in North Hertfordshire:-

- Ashwell Springs – TL 270 398
- Blagrove Common – TL 326 338
- Knebworth Woods – TL 228 223
- Oughtonhead Lane – TL 172 299
- Therfield Heath – TL 335 400
- Wain Wood – TL 180 255

North Hertfordshire District Council also has at least 2 Local Nature Reserves – Therfield Heath and Purwell Meadows. Other sites of importance are also identified in records which are owned or managed by Herts County Council, North Hertfordshire District Council or Herts and Middlesex Wildlife Trust.

The Chilterns Area of Outstanding Natural Beauty (AONB) was designated in 1964 with boundary reviews approved by the Secretary of State in 1990. The landscape between Hitchin, Lilley and Hexton falls within the AONB. The primary purpose of the designation is to conserve the scenic beauty of this area of countryside and settlements.

North Hertfordshire District Council will endeavour to take all appropriate measures to conserve wildlife and geology in the implementation of Part 2A of the EPA, in line with its statutory responsibilities for Nature Conservation and the furthering of Agenda 21.

Urban Ecology

Opportunities for nature conservation also occur in towns, where sites for wildlife may be derived from urban or industrial dereliction of one kind or another. This is particularly the case for higher plants and invertebrates, where the survival of many species both within towns and in the landscape generally depends on continued existence of such sites. The least diverse sites are usually those treated as mown amenity grassland or sports fields.

Baldock

The general presence of chalk at the surface throughout most of the town gives rise to calcareous grasslands and potentially important arable weed communities.

The town has been intensively settled leading to a lack of natural woodland. The main body of the town is deficient in wildlife, partly owing to density of development, but also to its past land-uses, which have seen intense cultivation.

Hitchin

Four fundamental characteristics underpin the ecological importance of sites within Hitchin – these contribute to give the town the most complex bio-diversity:

- the town's inclusion of the headwater system of the River Hiz and some of its associated spring sources;
- occurrence of both chalk and fluvial-glacial gravel's as substrates under much of the town, giving rise to ecologically productive habitats;
- long history of built habitats within the town, providing long-established substrates and features for wildlife colonisation and survival;

- the survival within the town of some long-established gardens and ornamental woodlands etc., which have allowed the survival of a range of wildlife species.

Hitchin is also important due to its history as an agricultural market town and industrial centre. It has a long history of colonisation by specialist wildlife, particularly those associated with old buildings, some older processing industries and the railway.

Letchworth

Letchworth urban ecology:

- Survival of former rural landscape within the new town;
- Pix Brook habitats and spring sources within the old landscape;
- Existence on town's western edge of unique soil characteristics, giving rise to habitats akin to East Anglian Breckland
- General dominance of boulder clay across much of town gives a fairly uniform and species-poor habitat characteristic to much of the area.

The rural estate of Letchworth and Norton is known to have been very open backing on to woodlands. It was largely agricultural and cultivated. There are thus few important old habitats within the town, the exception being Norton Common. Most of the industrial estate has been built on former arable farmland.

Royston

As with Baldock, the town's ecology derives from two over-riding factors of importance:

The presence of the scarp of chalk across the southern half of the town; - and the presence of chalk as a substrate throughout the town, means that most semi-natural vegetation comes from the chalk grassland. Around the southern side of the town there are substantial 19th century woodland plantations present.

However, unlike Baldock, there is no significant water within or adjoining the town. The town has incorporated large areas of former countryside in recent years, much of which retains wildlife interest.

2.5 PROTECTED AREAS

2.5.1 LANDSCAPE & NATURAL ENVIRONMENT

The landscape and natural environment of the District is protected under various designations and policies through the Authority's Local Plan. The District Local Plan No.2 with Alterations (1996) for example contains the following policies:

| | |
|-----------|--|
| Policy 11 | Chilterns Area of Outstanding Natural Beauty |
| Policy 12 | Landscape Conservation, Improvement and Creation |
| Policy 14 | Nature Conservation |

Appendix 5 lists the sites protected under policies 11,12 and 14 in towns and parishes throughout North Hertfordshire.

2.5.2 **ARCHAEOLOGICAL AREAS**

It is an objective of the District Local Plan to preserve Scheduled Ancient Monuments (SAMs) and preserve or record other Areas of Archaeological Interest or Archaeological Significance (AAI or AS). Appendix 6 gives details of the properties designated as such within the District.

2.5.3 **WATER RESOURCES / PROTECTION ISSUES**

North Hertfordshire's main source of water supply is drawn from groundwater abstraction points within the principal chalk aquifer underlying the area. Groundwater provides water supplies, feeds surface waters and supports important wetlands and ecosystems. Ground and surface water should be protected from harmful developments to ensure sufficient quality and quantity in the future.

2.6 **STRATEGIC LAND USE PLANNING**

Development plans

Decisions as to whether to allow proposals to build on land, or to change its use, are usually made by local authorities. The decision as to whether or not planning permission should be granted is taken against clearly set out criteria contained within the development plan (see below). A development plan is a statutory document setting out the authority's policies and proposals for the development and use of land within their area. It is used to guide and inform day-to-day decisions so that they are taken rationally and consistently and judged against the provisions contained within it.

The relevant legislation (section 54A of the Town & Country Planning Act 1990 as amended by the Planning and Compulsory Purchase Act 2004) requires that decisions should be made in accordance with the development plan unless material considerations indicate otherwise. These considerations are detailed in the National Planning Policy Framework (NPPF) published in April 2012.

In 2004 the Planning and Compulsory Purchase Act (PCPA) 2004 came into force alongside new regulations relevant to local development. Local Development Frameworks were introduced by the PCPA 2004 to replace the existing system of Structure and Local Plans, with strategic issues decided at regional level in Regional Spatial Strategies (RSS) with which LDFs must conform. RSS were subsequently abolished in July 2010 by the Local Democracy Economic Development and Construction Act 2009, which places planning decision making in the hands of local authorities, albeit those decisions must take account of the NPPF.

The Development Plan for North Hertfordshire

The Development Plan for Hertfordshire comprises:

The Local Development Framework (LDF): is a suite of documents produced by the district council. Each document sets out more detailed policies to guide development in the area in a particular way. The main documents within the LDF are the Core Strategy, which gives broad strategic policy, the Development Policies, which gives more detailed policies designed for determining planning applications and the Land Allocations, including proposals for specific sites suitable for housing, industry, retail or other land uses. The LDF must be in general conformity with the NPPF.

The Minerals and Waste Local Development Framework (these may be combined, but in Hertfordshire they are separate): produced by the County Council which is the development control authority for these issues.

All the above plans, which taken together form the Development Plan, should be as up-to-date as possible. As a statutory requirement all matters that affect the development of an area need to be kept under review in order to re-assess all or part of a plan. It is generally expected that, subject to differing local circumstances, the aspect of plans dealing with land allocations should be reviewed once every five years, whilst the other policy documents may be reviewed less frequently.

The process of producing a plan consists of various stages at which members of the public or interested parties may comment. Consultation is initially on the issues and options for the plan, followed by formal periods for objecting or supporting the plan proposals ('pre-submission' stage). The component documents are then submitted to a Government-appointed Inspector who holds an examination to establish whether the document is 'sound'. The Inspector then publishes a report directing what changes need to be made to make the plan sound.

The Local Development Framework—current position (November 2012)

The Council's own planning policies are no longer contained in one single document, but are split between several different documents. At present, these are:

- Saved policies from District Local Plan No. 2 with Alterations (1996)
- Planning Obligations Supplementary Planning Document (2006)
- Vehicle Parking Provision at new development Supplementary Planning Document (2006)
- Letchworth Garden City Town Centre Strategy (2007)
- Royston Town Centre Strategy (2008)

In deciding which sites to allocate for housing in Local Plans local authorities need to assess their potential and suitability for development against various criteria. This includes constraints such as the level of contamination of a site. Clearly, where a site has had a different use in the past, for example an industrial process, there is a risk that the land may be

contaminated. It is with these sites that the contaminated land strategy will assist the planning process in identifying their suitability for other uses. This is also a requirement within the NPPF, which helps ensure that in preparing local plan policies local authorities should take account of the environmental consequences, where known, of former land uses, manifested for example by contaminated land. In this way, the necessary action to bring forward currently derelict, unused or inefficiently used sites can be achieved, including the clean up and restoration of such sites. Ultimately this will contribute to realising the national objective of making efficient use of land and promoting an urban renaissance by giving confidence to potential investors as to how to deal with the site.

2.7 COMMUNITY PLANNING

The Local Government Act 2000 places a duty on local authorities to produce a Community Strategy for promoting the economic, social and environmental wellbeing of their area. The strategy aims to allow communities to articulate their aspirations, needs and priorities; and to co-ordinate the actions of the council, and other public, voluntary, community and private sector organisations that operate locally. It also aims to focus and shape existing and future activity of organisations so that they effectively meet community needs. In order to achieve these aims the strategy must include:

- a long term vision for the area;
- an action plan identifying shorter term priorities and activities;
- a shared commitment to implement the action plan and the proposals for doing so; and
- arrangements for monitoring the implementation of the action plan and for reviewing the Strategy.

A Community Strategy for North Hertfordshire

The Council has produced a Community Strategy for the District in 2003, with “local visioning” taking place in Baldock, Hitchin, Letchworth, Royston and the rural areas. The visioning work aimed to involve all members of the community and is being carried out in Partnership with other organisations. The findings of the Sustainable Community Strategy are reflected in the NHDC Corporate Plan, summarised in Section 3.2.

Linkages with other Strategies and Plans

The Community Strategy commits the resources and expertise of several local organisations in North Hertfordshire to addressing issues that local people feel will improve their quality of life. This Community Strategy is not intended to supersede existing strategies, plans and priorities of the partner organisations, but to enhance them and add value. The Community Strategy also includes new priorities that could benefit from a partnership approach, it includes certain actions that can be found in other strategies and plans in areas where increased partnership working can enhance them.

Linkages with corporate functions

The Community Strategy will be developed alongside the District Council's budgetary and performance processes. An officer working party is currently in place, working on the integration of the Community Strategy, Local Performance Plan and Service and Financial Plan with a view to producing a single coherent public document. This approach will result in a very explicit document detailing of the objectives we have drawn from the community through the Community Strategy; a linked explanation to how we will be measured against these objectives; and finally an explanation of how these objectives will be budgeted for.

2.8 NORTH HERTFORDSHIRE DISTRICT COUNCIL AS A LANDOWNER

North Hertfordshire District Council is of the belief that it has not knowingly allowed any of its land to become contaminated since its creation in 1974. However, this Authority as a landowner acknowledges that it has inherited land, which may have been used for purposes, which could have provided for potential contamination sources.

The Property Services Department has identified areas of theoretical concern and it is a possibility that there may be sites within the Authority's control that may be declared contaminated, by definition of Part 2A. In the interest of public confidence, the provisions of the new regime will apply equally to Council owned land (and possibly Council liable land) as it would to privately owned land.

2.9 THE PHYSICAL ENVIRONMENT

2.9.1 Broad Geological Characteristics

The geology of Hertfordshire ranges from claylands of the London Basin to extensive chalklands, and is the major factor determining the County's topography and its soils. Gault clay outcrops at the north-western extremity of the County, elsewhere overlain by up to 205 metres of chalk which in the north west forms the Chiltern Hills. Glacial clays and gravels overlie much of the north-east of Hertfordshire, and river gravel's occupy the Vale of St. Albans and many of the river valleys.

Chalk underlies almost the entire county, although London Clay and other younger rocks overlie the chalk in the south east. Large quantities of clay, sand and gravel were deposited over the whole county during the last ice age; the erosion of which has created the present landforms.

The topography follows the geology – higher areas in the north west where the District contains part of the Chilterns. Most of Hertfordshire's rivers are sourced in the Chilterns and most flow to the river Thames via the Colne and Lea. North Hertfordshire rivers include the Mimram, Lee and Beane, and the Hiz and Rib.

2.9.2 **Broad Hydrological Characteristics**

The chalk, which underlies most of Hertfordshire, forms an important water aquifer, which provides, from wells and pumped boreholes, a vital source of public drinking water and water for industry/agriculture. It also provides water for the natural environment. The vast majority of the District is underlain by aquifers designated by the Environment Agency as Principal Aquifer. The areas of the District that are not classified as such by the Environment Agency are parts of Holwell, Ickleford and north, north west and south west Hitchin, which are classified as Secondary Aquifer areas.

2.9.3 **Areas of Naturally Metal Enriched Soils**

The Background Concentrations of Contaminants in Soils (BCCS) Project is a Defra sponsored project (October 2011 — March 2012, SP1008) to determine 'normal' concentrations of contaminants in English soils.

The work is being carried out by the British Geological Society (BGS) and its G-BASE soil samples form an important part of this research along with chemical results from other regional soil surveys of varying spatial scales (e.g. UK Soil and Herbage Pollutant Survey and FOREGS).

The work seeks to add clarity to the contaminated land regime through a simplification of the contaminated land statutory guidance (amended Part IIA).

As part of this project a definition of a contaminant's normal background concentration in soil will be developed to help to more clearly define soils that are not contaminated and help focus resources on dealing with the contaminated land that is an environmental and health risk.

On completion of the project the BGS will publish its findings in technical guidance sheets. NHDC will take these documents into account in assessing the significance of contamination.

3.0 THE PROCEDURAL FRAMEWORK

In this section, legislation relevant to the consideration of contaminated land is outlined, together with a discussion as to the limitations of the new regime. North Hertfordshire District Council's administrative arrangement with regard to the contaminated land regime is also explored.

3.1 THE REGULATORY CONTEXT

3.1.1 OTHER RELEVANT LEGISLATION

It is important to be mindful that the primary aim of the Government is to prevent new contamination occurring. This aim is not secured by Part 2A of the Environmental Protection Act 1990, but by existing legislation.

Part 2A introduces both a formalised proactive approach to the identification of land which is contaminated due to past activities, and also a clearer legal mechanism to ensure that contaminated land is ultimately rehabilitated. However, this legislation cannot be viewed in isolation because there are a number of legislative tools, which are relevant to this area of environmental protection.

Industrial Pollution Control Regimes: Pollution from certain industrial processes are subject to control by pollution control regimes. Part 1 of the Environmental Protection Act 1990 set out a system called Integrated Pollution Control (IPC) and Local Air Pollution Control. IPC and subsequent regulatory frameworks seek to ensure that all environmental aspects of a process are controlled in a holistic way, having regard to technology, practicality and cost.

The Pollution Prevention and Control (England and Wales) Regulations 2000 (the "PPC Regulations") were introduced under the PPC Act 1999 and built on the existing system. The PPC Regulations also transposed the IPPC Directive (now Directive 2008/1/EC).

The primary aim of the IPPC Directive is to ensure a high level of environmental protection and to prevent and where it is not practicable, to reduce emissions to acceptable levels.

In England and Wales the PPC Regulations were replaced in April 2008 by the Environmental Permitting Regulations 2007 (EP Regulations). These Regulations bring together PPC and Waste Management Licensing Regulations into one new regulatory system. Apart from combining the two sets of Regulations there have been no major changes to the PPC aspects. A permit issued under the PPC Regulations is regarded as having been issued under the EP Regulations.

The PPC regulations introduced three separate but linked systems of pollution control and these have continued under the EP Regulations.

- Local Authority Pollution Prevention and Control, which covers installations known as Part B activities that are regulated by Local Authorities.
- Local Authority Integrated Pollution Prevention and Control which covers installations known as A(2) activities, which are regulated by Local Authorities and:
- Integrated Pollution Prevention and Control, which covers installations known as A(1) activities, which are regulated by the Environment Agency and includes the prevention of pollution to land and where necessary land remediation. Of particular importance is that where land is polluted by an A(1) activity the Part 2A regime is not applicable.

Food Standards Act 1999: Part I of the Food and Environment Protection Act 1985 gave Ministers emergency powers to prevent the growing of food on, *inter alia*, contaminated land. Following the establishment of the Food Standards Agency this power is now vested in the Secretary of State. Where this Authority suspects crops may be affected by land which is contaminated to such an extent they may be unfit to eat, it will consult the Food Standards Agency and the Department of Transport, Local Government and Rural Affairs (DEFRA) to establish whether an emergency order may be necessary. It should be noted, however, that remediation of the site, if necessary, would be carried out through the new powers in Part 2A of the Environmental Protection Act 1990.

Environmental Protection Act 1990 Part II: All waste disposal and processing sites (including scrap yards) should be subject to a licence issued, and enforced by, the Environment Agency. Contamination causing harm, or pollution of controlled waters, should be dealt with as a breach of the conditions of the licence. In exceptional circumstances, where the problem arises from an unlicensed activity, it is possible that Part 2A could apply. An example of this would be a leak from an oil tank outside a tipping area.

Where there has been an illegal dumping of controlled waste (fly tipping) this should also be dealt with under the Environmental Protection Act 1990 Part II (section 59) either by the Environment Agency or by this Authority's Enforcement Team.

Water Resources Act 1991 (section 161): Where a pollution incident has occurred and the pollutant is discharged directly into a body of water, or it has left land and it is entirely in a body of water (i.e. the land is no longer causing pollution), the Water Resources Act 1991 will apply. This legislation is enforced by the Environment Agency.

Health and Safety at Work, etc., Act 1974: Where there is a risk of harm solely to persons at work from land contamination, this should be dealt with under the Health and Safety legislation and not via the new contaminated land regime. The enforcing authority will be either the Health & Safety Executive or this Council depending on the nature of the work activity and so discussions between this Council's

Environmental Protection Team and either of those enforcing authorities will occur when necessary.

Environmental Protection Act 1990 Part III: This legislation, prior to the introduction of Part 2A of the Act, used the concept of statutory nuisance as the main legal mechanism for the remediation of contaminated land. However, since Part 2A is now in force in its entirety, land, which is contaminated can no longer be considered a statutory nuisance. However, common law nuisance is clearly unaffected by Part 2A.

Control of Major Accident Hazard Regulations 1999: Where there has been a release, explosion or other major incident at a site which is controlled by the above legislation that has caused land contamination, the restoration should be carried out as part of the COMAH on site / off site emergency restoration plan.

Town & Country Planning Act 1990 Legislation: Where land becomes a risk to potential new receptors as a result of a change of use, the Town & Country Planning Development Control regime will continue to apply as before. Typically, conditional planning consent can secure the remediation of land prior to its development.

The Clean Neighbourhoods and Environment Act 2005: Introduced with the aim of increasing powers, duties and guidance for dealing with problems associated with local environmental quality. One of the miscellaneous provisions of the Act amends arrangements for appeals against remediation notices served under Section 78e of Part 2A of EPA 1990. Previously arrangements were such that appeals against a notice served by the Local Authority were considered by Magistrates Courts, but now such appeals are considered by the Secretary of State.

The Radioactive Contaminated Land (Enabling Powers) (England) Regulations 2005: This extends the Part 2A regime to include radioactive contaminated land. It provides a system for the identification and remediation of land where contamination is causing lasting exposure to radiation of human beings and where intervention is liable to be justified. It does not apply to non-human species or controlled waters. The duties to inspect and deal with such land are with the Local Authority, up to the point of Special Site designation, if appropriate, although inspection is only a duty if there are "reasonable grounds" so there is no need to change inspection strategies. Additionally in order to simplify the Contaminated Land Statutory Guidance, a stand-alone Guidance document has been produced by the Department for Energy and Climate Change (DECC) to provide a framework for dealing with such sites.

The Environmental Damage (Prevention and Remediation) Regulations 2009: This transposes the requirements of the European Environmental Liability Directive 2004/35 into UK law and came into force on the 1st March 2009. It is a mechanism for making the polluter pay for environmental damage that is caused after the 1st March 2009 where that damage arises from an economic activity. They aim to oblige the operators of such activities to:

- prevent the imminent threat of environmental damage
- prevent further damage where damage may have already occurred
- remediate environmental damage

Environmental damage can be damage to land, water or biodiversity.

The enforcing authorities for this are Local Authorities, the Environment Agency and Natural England, with the exact jurisdiction varying depending on the activity causing the damage and the nature of the damage.

Local Authorities are the enforcing authority for:

- preventative action where there is damage to water or biodiversity arising from any category A2 environmentally permitted operation
- preventative and remediation action where there is damage to land arising from any category A2 environmentally permitted operation
- preventative and remediation action where there is damage to land from any category B environmentally permitted operation or any permitted economic activity not covered by environmental permitting regulations.

Land damage is defined by the regulations as “any contamination by substances or organisms which creates a significant risk of adverse effects on human health”.

The relationship between this and the Contaminated Land Regime is that it:

- operates without prejudice to existing legislation
- is intended to be used in preference to Part 2A in instances of environmental damage that have occurred after 1st March 2009.

3.1.2 **SITUATIONS WHERE THE REGIME DOES NOT APPLY**

Before considering how this Authority will approach the task of identifying land, which is contaminated, it is essential to establish the meaning of “contamination”. In section 78A of Part 2A of the

Environmental Protection Act 1990 contaminated land is defined 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...

The definition is therefore based on the presence of harmful “substances”. Accordingly, the following categories are not subject to control via the new contaminated land regime: -

Organisms - Part 2A does not apply to contamination caused by organisms such as bacteria, viruses or protozoa, as they do not fall within the definition of “substances”. It should be noted that even though contaminated sites used in connection with biological weapons must be designated Special Sites, this applies only to non biological contamination. However, legislation enforced by the Department for Environment, Food and Rural Affairs and the Health and Safety Executive may be used to secure control.

3.2 THE COUNCIL’S PRIORITIES

The Inspection Strategy is presented in the context of the District Council’s Vision Statement, which is illustrated below:-

| |
|---|
| <p style="text-align: center;">CORPORATE PLANNING FRAMEWORK</p> <p style="text-align: center;">The Vision for North Hertfordshire</p> <p style="text-align: center;">Making North Hertfordshire a vibrant place to live, work and prosper</p> <p style="text-align: center;">The Mission for North Hertfordshire District Council</p> <p style="text-align: center;">To work collaboratively with our partners and communities to deliver the vision for the district of North Hertfordshire</p> <p style="text-align: center;">Our Three Priorities</p> <p style="text-align: center;">Living Within Our Means To Deliver Cost-Effective Services</p> <p style="text-align: center;">Working With Local Communities</p> <p style="text-align: center;">Protecting Our Environment For Our Communities</p> <p style="text-align: center;">Actions</p> <p style="text-align: center;">Specific projects with timescales, measures of success and outcomes prioritised in the short, medium and longer term up to 2021</p> |
|---|

3.3 OVERVIEW OF PROCEDURE FOR IDENTIFYING POTENTIALLY CONTAMINATED LAND

The search for land that may ultimately be declared as statutorily contaminated can, without strict managerial control, result in the vast expenditure of time and financial resources. It is a key theme of government guidance that any approach to the identification of possible contaminated land must be ordered, rational and have regard to the principles of probability and risk.

A review of the recent history of government policy with regards to contaminated land reveals the essential dilemma faced by regulators: what 'filter' can be used in the search of land which:

- ✓ will reliably identify land that is actually causing harm
- AND YET
- ✓ will also reliably disregard land which may appear to be contaminated, but is not *actually* causing harm

At one level, if every square metre of North Hertfordshire was sampled for soil contamination this would give a very robust picture of land contamination in this area. Obviously, this approach is likely to be a very costly exercise and yield a lot of very unsurprising data. On the other hand, a very cursory analysis of land which has been historically associated with contamination incidents is likely to be a fairly inexpensive option, but is likely to result in a considerable number of potentially contaminated sites being unidentified.

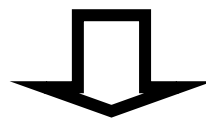
Therefore, the key purpose of this document is to identify the nature of the 'filter' which North Hertfordshire District Council will apply when seeking out land that may be said to be statutorily contaminated. In the following sections, the balance between the expenditure of resources and the probable benefit will be outlined.

In short, the methodology adopted within this strategy will seek to allocate scarce resources to investigate land, which would *indicate* that it may fall into the statutory definition of contaminated land. This approach is entirely consistent with guidance from the government. However, it is important to appreciate the limitations of this approach. It is unlikely to be effective at identifying isolated cases of contamination, such as the spillage of pesticides in a private garden. However, should these incidents come to the attention of this Authority (e.g. via a notification from a member of the public), it will of course be investigated.

3.3.1 A STAGED APPROACH

Since scarce resources must be allocated efficiently, this Authority will employ a staged approach to the identification of contaminated land. Data will be gathered and assessed at each stage, with only land requiring further research proceeding to subsequent stages. This approach is summarised overleaf:

| STAGE 1 |
|--|
| <ol style="list-style-type: none"> 1. Identification of land which may have been associated with a contaminative activity (now or historically) 2. Identification of the circumstances of each suspect case of contaminated land (e.g. how many people live near this land?) <p>Conduct a risk assessment which will rank each potential site with regard to the probability of contamination and likelihood of harm to receptors</p> <ol style="list-style-type: none"> 3. |



| STAGE 2 |
|--|
| The methodical inspection of each site identified in stage 1 |



| STAGE 3 |
|---|
| The declaration of land which is statutorily contaminated |

Stage 1

In Stage 1 information will be used to produce a prioritisation list of sites which will then undergo a more detailed inspection to confirm the existence of a pollutant linkage (Stage 2). This will be a systematic and progressive approach in order to ensure that resources and costs are minimised. For sites where the pollutant linkage is not confirmed these will remain under periodic review.

Stage 2

Once a reasonable possibility of a pollutant linkage has been determined this Authority will carry out an appropriate, scientific and technical assessment of the circumstances of the land using all the

available evidence. This will be primarily to obtain 'sufficient information' to enable this authority to make a judgement as to the state of contamination. In such circumstances North Hertfordshire District Council may not produce a complete characterisation of the nature of the contamination, but present only as much as is sufficient for it to make the determination that the land is contaminated.

Stage 3

Once the complete characterisation of the contamination has been finalised this authority will make a decision regarding the determination of whether or not the land appears to meet the definition of being contaminated under section 78A(2). This will involve providing an indication as to the basis on which the designation is made (significant harm being caused, risk of pollution, etc) and to specify what pollutant linkage gives rise to the designation of land as being 'contaminated'

With respect to a particular area of land being a potential 'special site' then this Authority will liaise with the Environment Agency in determining as to whether the site appears to be 'contaminated'.

Once the site has formally been identified as being contaminated, North Hertfordshire District Council will contact the parties responsible for the contamination requesting them to remediate it.

Within this identification of 'contaminated land' it is expected that this Authority will take the following into account:

- Action that has already been taken to deal with contamination during current or previous redevelopment of the sites.
- The extent to which contamination was understood and dealt with at the time of previous remedial works and to assign an appropriate degree of confidence in that remediation.
- To take into account any additional evidence of specific remediation or further remedial activity which has already been undertaken either by landowners, this authority or by third parties.

3.4 MANAGEMENT OF THE REGIME AT NORTH HERTFORDSHIRE DISTRICT COUNCIL

The duties imposed by Part 2A of the Environmental Protection Act 1990 were not assigned by the legislation, or supplementary guidance, to any particular department or service area within a council. The reason for this is that the implications arising from the new contaminated land regime in England and Wales are likely to involve many departments and professions found in a typical local authority. Statutory guidance emphasises the need for local authorities to employ a corporate approach to the implementation of the regime; it is only in this way that an effective, efficient and proportionate solution can be delivered.

In response to these new duties North Hertfordshire District Council formed a Contaminated Land Steering Group in the summer of 2000. The membership of this Group reflected the interdepartmental nature of the regime and allowed for a holistic consideration of how to safeguard the human, built and ecological environments. Due to the public health impact of polluted land, the Environmental Protection Section within the Housing and Public Protection Service has the overall co-ordinating responsibility.

The Steering Group comprises of representatives from the following service areas:

- Housing and Public Protection
- Legal Services
- Property Services
- Planning Control
- Planning Policy
- Customer Services Directorate
- Risk Management & Insurances

The Group met prior to the development of Version 1.0 of the Authority's Contaminated Land Strategy to discuss its content and how it will be delivered. It also explored mechanisms where contaminated land can be brought back into use via the Town & Country Planning system.

Since publication of Version 1.0 of the Strategy the Steering Group has not had cause to meet and it now only exists in an *ad hoc* way such that it can be convened as and when necessary.

The involvement of these service areas is explored in **Sections 3.4.1 - 3.4.6:**

3.4.1 THE ROLE OF THE HOUSING AND PUBLIC PROTECTION SERVICE

Prior to Part 2A of the Environmental Protection Act 1990, contaminated land was dealt with via Part III of the Act – via the statutory nuisance provisions. Historically in England and Wales Environmental Health departments administer this area of legislation. Therefore, it is a natural progression for these departments to use their experience with the older regime to assist in the implementation of the new.

At North Hertfordshire District Council, the Environmental Protection Team has been nominated to take the lead in co-ordinating how this Authority will deliver the requirements of Part 2A.

It will be within the Environmental Protection Team that land which may be contaminated due to historic activity will be systematically identified and then inspected (see Chapters 4, 5 & 6). They will be responsible for the technical aspects of the strategy and its implementation:

- Data collection regarding potentially contaminated land
- Data analysis and risk assessment

- Site prioritisation
- Intrusive site investigation
- Determination of whether land is statutorily contaminated
- Liaison on technical matters with other organisations (e.g. the Environment Agency)
- Case transfer to Legal Services and subsequent liaison i.e. remediation notices

The professional officers within the Environmental Protection Team will also work with fellow professionals in other local authorities in order to deliver a best practice solution in this area. This Authority is an active participant in the Hertfordshire and Bedfordshire Environmental Health Group and the Contaminated Land Sub Group. This Sub Group provides an information exchange forum so that participant authorities can deliver a consistent and informed approach to contaminated land for the region.

3.4.2 THE ROLE OF LEGAL SERVICES

Part 2A contains a highly complex legal framework, which may have significant implications for this Authority, landowners and others who have an interest in land.

Legal Services have been involved at an early stage with the implications of the new contaminated land regime. This involvement has taken the form of membership of the Officer Steering Group, which has considered how best this Authority can implement Part 2A. Initially, solicitors from Legal Services have commented on the division of responsibilities within the Authority, data management and liability management.

Furthermore, once the Housing and Public Protection Service has declared land as being statutorily contaminated, Legal Services will then be responsible for the preparation of the aspects of legal documentation as appropriate.

Identifying the 'appropriate person(s)' to serve a remediation notice is not by any means a straightforward task since there may be a number of landowners associated with a contaminated site. Additionally, whilst the polluter pays principle is notionally sound, it is not always clear who the polluter is and whether they are in a position to finance remediation works.

There are a considerable number of grounds of appeal to a remediation notice and there is potential that aggrieved recipients of notices will exercise their right of appeal. If this turns out to be the case, this may generate a significant workload for Legal Services.

In conclusion, the implementation of Part 2A is likely to be technically demanding in the first stage of the implementation of this Authority's Strategy – i.e. the identification by the Housing and Public Protection Service of land with a potentially contaminated history followed by detailed site-by-site investigations. The second phase of the Strategy is predicted to be more legally based, where

the polluters of land are required to conduct appropriate remediation works.

3.4.3 THE ROLE OF PROPERTY SERVICES

The authority has been a significant landowner in North Hertfordshire and indeed still owns land in the district; all of it under either a commercial or community land use.

As Local authorities alone are empowered to designate land which requires remediation, there may be a conflict of interests where the ownership of land in question lies with a local authority. However, this Authority will approach contaminated land which it owns (or is responsible for) in the same way as it would land in private ownership.

3.4.4 THE ROLE OF PLANNING CONTROL AND CONSERVATION

Since the Second World War, the vast majority of contaminated land in the United Kingdom has been brought back into productive use via the Town & Country Planning regime. Many 'brown field' (previously developed) sites have a high monetary value since they are often located in urban areas. Undeveloped land suitable for housing or for commercial use in such areas may be in short supply and thus developers are obliged to consider bringing vacant brown field sites (which may or may not be contaminated) back into use.

Development is regulated by the Town & Country Planning Act and this can be used effectively to deliver land remediation. Typically, this can be achieved via the use of specific contaminated land conditions when planning consent for a scheme is granted.

The economic climate, strategic planning control (i.e. the District Local Plan) will all be relevant factors influencing the pace of redevelopment. The development control function has therefore been the primary control mechanism as regards contaminated land and will continue to do so. Any remediation work agreed as a planning condition will be dealt with under planning control and not under Part 2A.

It is essential that the Planning Control and Conservation department of this Authority continues to use the powers of the Town & Country Planning legislation to ensure that where contaminated land is encountered that suitable and sufficient remediation schemes are integrated into planning consents (where granted). The research being undertaken by the Housing and Public Protection Service will be particularly useful regarding the development control function since land which is in a contaminative state, (but NOT *contaminated land* vis-à-vis section 78A(2) of Part 2A of the Environmental Protection Act 1990) may be remediated via a planning condition. The appropriate use of information on land of this type in a consistent way will ensure that future development is shaped by the spirit of the contaminated land regime.

Unfortunately, nationally there have been instances where redevelopment has taken place where the planning regime has not ultimately been able to provide appropriate protection from the deleterious effects of land contamination. The Housing and Public Protection Service will liaise with the Development Control Division so that sites previously subject to condition(s) requiring remediation are identified. A precautionary approach will be adopted for these sites – they will be investigated and the standard and effectiveness of remedial works evaluated.

3.4.5 THE ROLE OF THE PLANNING POLICY DEPARTMENT

The contaminated land regime will have a significant impact on strategic land use planning in North Hertfordshire. There remains reference to placing an emphasis on the need for new housing development to take place on brown field sites in the NPPF. The drive towards sustainable development will result in more recycling of previously developed land and this will be regulated by Planning Control on a site by site basis.

The Planning Policy Department can take account of the contaminated land regime when formulating specific planning policies. These policies will endeavour to balance the various needs of the community and to encourage sustainable development.

3.4.6 THE ROLE OF THE CUSTOMER SERVICES DIRECTORATE

Data Management

This Authority recognises that appropriately collected, stored and analysed data is key for the achievement of its objectives with regard to contaminated land. It has a great deal of experience with the use of Geographical Information Systems (GIS) and will be able to provide assistance with data management and communication for the planned work on the contaminated land strategy.

Additionally, GIS can be used for the proactive management of information relating to land, which is in a contaminative state (but not statutorily contaminated). For example, planning applications can be considered in the light of information on such sites so that appropriate development control decisions can be made.

Community Planning

The objectives of the contaminated land regime and community plan are similar since they both seek to ensure community wellbeing. In the future, officers from the Housing and Public Protection Service and Community Planning will work together to ensure the implementation of both strategies.

3.5 INFORMATION MANAGEMENT

Information obtained through the implementation of this Strategy will be kept in accordance with the provisions of the Data Protection Act 1998. This Authority will comply with 8 principles of good practice which relate to data collection. Collected data must be:-

- 1) Fairly and lawfully processed
- 2) Processed for limited purposes
- 3) Adequate, relevant and not excessive
- 4) Accurate
- 5) Not kept longer than is necessary
- 6) Processed in accordance with the subject's rights
- 7) Secure
- 8) Not transferred to countries without adequate protection

Details of information to be included in the register of contaminated land will be set out in section 6.4.

3.6 DATA STORAGE AND MANAGEMENT

This Authority envisages that the successful identification of 'contaminated land' will involve the capture, storage and analysis of vast amounts of data.

In order for this process to remain coherent and efficient this Authority aims to use its Geographical Information System (GIS) as the main tool for the storage and interpretation of data. The benefits of using such a system include:-

- (a) large volumes of data can be stored easily
- (b) potential for data to be retrieved and viewed both quickly and simultaneously
- (c) data can be amended and updated with ease
- (d) data can be manipulated easily

With reference to data capture Appendix 7 outlines what data this Authority believes to be important. With reference to all data held, this Authority places a high value on both this and other factual information received. It will therefore be assumed that this data is factually correct until it can be verified to the satisfaction of this Authority by an alternative source.

In instances where it is felt additional information is required, data will be obtained from the best possible source (in the opinion of this Authority) and if necessary using all this Authority's available statutory powers.

3.7 RISK COMMUNICATION

North Hertfordshire District Council acknowledges that the implementation of this regime will undoubtedly bring concern and anxiety to those within the community whom it may affect.

However, it is appreciated that concern may not only be brought to those who are directly involved, but also those in neighbouring areas and, in extreme cases, the wider community. The inherent nature of this regime will

also bring into peoples lives risks to which they have no voluntary control over. It is this lack of personal control, anxiety and concern, brought about by the inherent complex nature of contaminated land that North Hertfordshire District Council intends to control.

North Hertfordshire District Council will remain transparent and honest throughout the implementation of the regime, treating concerns raised by the members of public seriously and with respect, recognising the importance of the issues to those individuals. It is here that the benefits of risk communication exercises are recognised by the Authority in overcoming barriers that individuals may face. Examples of such barriers which may raise public concern and anxiety will include:-

- Unfamiliarity with the issues surrounding the contamination
- The lack of control that an individual feels they have over exposure
- Lack of knowledge regarding both the immediate and long term effects
- Lack of understanding of the scale of the problem
- The “Dread Factor” where an individual’s lack of understanding can lead to stress and make further explanation more difficult

This Authority recognises that risk communication serves an important part of implementing the strategy and will undertake all the necessary actions to ensure that the impacts of this regime are kept to a minimum.

3.8 CONSULTATION AND LIAISON ARRANGEMENTS

The Authority is mindful that effective liaison and communication is an essential part of the new contaminated land regime. As part of it’s strategy, this Council will endeavour to establish communication links with a wide variety of statutory consultees and interested parties to ensure an efficient and effective transfer of information.

3.8.1 STATUTORY CONSULTEES

The following is a list of statutory consultees who will be invited to comment on the consultation draft of this strategy. Any significant amendments of this Authority’s Contaminated Land Strategy will be forwarded to the following: -

- Environment Agency (Thames Region)
- Environment Agency (Anglian Region)
- English Nature
- English Heritage
- Department of the Environment, Food & Rural Affairs
- Department of Transport, Local Government and Regions
- Hertfordshire County Council
- Food Standards Agency

3.8.2 **NON STATUTORY CONSULTEES**

Whilst Part 2A of the Environmental Protection Act 1990 and the published statutory guidance requires all authorities to consult the organisations listed above, this Authority considers it essential to reach out to a wider group of stakeholders. In the event of significant changes to the Strategy consultation drafts of the Strategy will be forwarded to the following:

- Letchworth Garden City Heritage Foundation
- Anglian Water Plc
- Three Valleys Water Plc
- Chamber of Commerce
- National Farmers Union
- All local authorities which border this Authority
- Friends of the Earth
- Hertfordshire Wellbeing Board (Hertfordshire County Council)

Furthermore, this Authority believes that there is great scope for members of the public, businesses and voluntary organisations to play an important role in dealing with contaminated land. To facilitate public awareness in the event of significant changes to the Strategy, consultation drafts will be available for viewing and download from www.north-herts.gov.uk and be publicised on the home page.

3.8.3 **INFORMATION EXCHANGE WITH THE ENVIRONMENT AGENCY**

As a local authority, North Hertfordshire District Council is the prime regulator for dealing with land, which is affected by contamination. This role is further complemented by the Environment Agency and both regulators will need to rely on information from each other to discharge their responsibilities under the contaminated land regime.

In respect of these responsibilities a Memorandum of Understanding has been produced by the Agency and the Local Government Association. North Hertfordshire District Council will endeavour to make all the necessary efforts to fulfil its responsibilities outlined in the memorandum.

In addition to the responsibilities detailed in the memorandum, this Authority aims to fulfil its duty under section 78U and make every effort to provide the Environment Agency with the necessary information required in order for them to prepare and publish a report on the state of contaminated land in England. Such responsibilities currently include the notification of any contaminated land determinations that are made within the District.

On completion of this Strategy the Environment Agency will be provided with a copy for consultation purposes.

The primary Environment Agency contacts in terms of the implementation of this regime have been identified as:

Central Area:

Area Contaminated Land Officer
Environment Agency
Bromholme Lane
Brampton
Huntington
Cambs.
PE28 8NE

Tel: 01480 414581
Fax: 01480 413381

Thames Region:

Area Contaminated Land Officer
Environment Agency
Apollo Court
2 Bishops Square Business Park
ST Albans Road West
Hatfield
Herts.
AL10 9EX

Tel: 01707 632300
Fax: 01707 632500

3.9 STRATEGY REVIEW ARRANGEMENTS

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

Version 1.0 of the Strategy was published in December 2001. This was reviewed in April 2004 to produce Version 2.0 of the Strategy and subsequently, in Autumn 2005, which resulted in Version 3.0 of the strategy. Version 4.0 was adopted in October 2007, which identified Winter 2009 as the next review date and this resulted in Version 5.0 published in March 2010. Versions 1.0 to 5.0 are all kept on file with the NHDC Environmental Protection Team.

4.0 STAGE 1: IDENTIFICATION OF POTENTIALLY CONTAMINATED LAND WITHIN NORTH HERTFORDSHIRE

This chapter investigates how information about land, the environment and population distribution will be gathered and analysed in Stage 1. Because the area covered by North Hertfordshire District Council is largely rural in nature (over 93% of land, by area, may be categorised as being either 'rural' or 'village') it is a fundamental assumption of this Authority's Strategy that land, unless information suggests to the contrary, is uncontaminated. Stage 1 therefore seeks to gather information on *potential* land contamination for further programmed investigation and is therefore clearly distinct from authorities that assume that land is very likely to be contaminated because of its association with heavy, polluting industry (e.g. Portsmouth).

A rational risk assessment model will be used to rank suspected sites in terms of potential severity. This will assist in the allocation of site inspection resources.

4.1 DATA HARVESTING

Initially the entire land area is to be examined to identify those areas where there is a reasonable possibility that a pollutant linkage exists. This will be achieved through the evaluation of various data sources to identify areas where there currently is, or historically has been, potentially polluting activities. This determination of sites where a reasonable assumption can

be made that a pollutant linkage exists will be sufficient to warrant the site to undergo more detailed investigation in subsequent stages. If at this stage a pollutant linkage cannot be determined then the area of land in question will be placed under periodic review.

4.1.1 **ELECTRONIC DATA SOURCES**

Due to the characteristics of the district it is not practicable to study all aspects of land use in detail. However, there is a wealth of information from various agencies on potentially contaminative land uses, the presence and vulnerability of watercourses, soil characteristics, past pollution incidents and other relevant information. In order to facilitate the risk assessment process (see 4.2), the majority of the available information will be gathered in electronic form.

The main stay of this data gathering exercise will be the procurement of historic land use data from the Landmark Information Group Ltd. This organisation has created a land use database as a joint venture with the Ordnance Survey (OS) and came into being in 1995. Landmark Information Group has systematically analysed historic maps between 1846 and the present day to identify previous uses of a potentially contaminative nature. Land uses which may have been associated with land pollution are defined with reference to their nature and given a broad risk rating which then can be transposed, electronically, into the North Hertfordshire District Council's Stage 1 risk assessment model (see 4.2). Data gathering, analysis and report production is quality assured as part of a three step process.

For a more complete description of the methodology employed by the Landmark Information Group see Appendix 8.

For a summary of data sources, both electronic and otherwise, see Appendix 7.

4.1.2 **INFORMATION FORWARDED BY MEMBERS OF THE PUBLIC**

There is a vast, but often overlooked abundance of knowledge and information concerning urban and industrial history in and around North Hertfordshire – the residents of the district. North Hertfordshire District Council will publicise this Strategy and supply copies of it to local historical societies in an attempt to encourage the inflow of information about historic land uses, which may have caused land to be contaminated.

Any relevant information will be logged by the Housing and Public Protection Service as part of its day-to-day functions and will be acknowledged in writing. This information will then feed into the Stage 1 risk assessment model and be used to identify sites, which warrant further investigation. It may be the case therefore that the site will not be evaluated within a timescale that meets the complainant's expectations.

4.1.3 **LAND SUBJECT TO PLANNING CONDITIONS**

A substantial proportion of contaminated land has already been remediated due to private sector redevelopment rather than statutory enforcement action. Schemes which have already passed through the land use planning system (i.e. post war) that have been associated with soil remediation (either because of a planning condition or pre-decision agreement) may require review in the light of current knowledge and technology. Schemes which do not provide an adequate level of protection may be subject to action under the Part 2A regime.

4.1.4 **LAND OWNED / FORMERLY OWNED BY NORTH HERTFORDSHIRE DISTRICT COUNCIL**

Property Services holds information on land which is owned, or has been owned, by this Authority. Whilst a sizeable proportion of this information relates to domestic properties (which are unlikely to have caused significant land pollution) and which have since been transferred “with knowledge” to the registered social landlord (North Hertfordshire Homes), commercial properties still owned by NHDC will be relevant to Part 2A considerations. Certain information may be incomplete, but it can be studied to determine land uses, which require further investigation and risk assessment.

4.2 **STAGE 1 RISK ASSESSMENT METHODOLOGY**

4.2.1 **INTRODUCTION**

By definition, in order for land to be designated as being contaminated, the three elements of a pollutant linkage must exist: (see 1.3).



However, the existence of a pollutant linkage will not necessarily mean that a particular area of land can be deemed as being contaminated. A further assessment of that land will have to take place in order to evaluate the hazards posed by the site.

North Hertfordshire District Council aims to use the principles of the pollutant linkage as a basis for the inspection of land within its area. This approach is progressive in that it seeks to move efficiently from a situation where this Authority considers the entire land area; to one where it is able to consider particular areas of land which merit more detailed inspection. The principles of risk assessment are to be used throughout this inspection programme to ensure that this Authority's approach meets both the legislative and guidance requirements.

Particular areas of land that have been identified as requiring more detailed investigation are then to be prioritised via a risk assessment methodology

which evaluates the potential risk from the sites. This is to ensure that the most pressing and serious problems are dealt with first.

Note: The results of the prioritisation procedure have been obtained on a limited amount of potentially incomplete data. It is possible therefore that this risk rating may change after further assessment.

A document published by the Department of the Environment, Transport and the Regions entitled CLR6 –“The Prioritisation and Categorisation Procedure for sites, which may be contaminated” outlines a methodology for site prioritisation. However, risk rated output of the CLR6 model is unlikely to facilitate an ordered and rational examination of sites since it does not differentiate between different levels of risk.

Accordingly, North Hertfordshire District Council has devised a systematic methodology to prioritise the sites based on the potential risk characteristics of a site.

The first attempt at devising the risk prioritisation methodology was the methodology that was included within Version 1.0 of the Strategy. However, the author of the methodology identified a number of weaknesses with it, which he used to modify the methodology in order to produce a more robust risk prioritisation methodology. It is this amended risk prioritisation methodology that was adopted for Version 2.0 of the Strategy and remains relevant to this version (Version 6.0).

4.2.2 Risk Prioritisation Model

Model Overview

The model works by assessing the relationship between the source(s), pathway(s) and receptor(s) for a particular site, where it is known that former or current land uses may have resulted in contamination.

Firstly a score is derived, which reflects the characteristics of the potential source of contamination. This score is based upon the database of historical land use and potentially contaminative industries, identified by the Landmark Information Group. Each of these industries was awarded a risk rating of high, medium & low (scoring 1, 0.8 & 0.6 respectively). This score reflecting the nature of contaminants, associated with a particular industry. The model applies a default score (1) should land have a use which is not considered by Landmark Information Group. This ensures that the model always fails safe by ensuring that the worst-case scenario is considered.

An assessment is then made to identify the typical contaminants associated with the former land use. The matrix contained in Appendix 9 has been devised to assist in this process. It is based on the information contained within the DEFRA/EA Contaminated Land Report 8 and illustrates typical land uses, the contaminants associated with these and the receptors that may be at risk because of the presence of individual contaminants.

Then depending on which contaminants are likely to be present on a particular piece of land, the receptors considered to be at risk are identified

(i.e. should chromium be found on a site both humans and the aquatic environment are potentially at risk). For the purposes of this model the receptors are split into 5 categories, humans, groundwater, surface water, ecological and property.

Each of the receptors identified to be at risk is then awarded a further score based on a sensitivity of that receptor and its proximity to the source of contamination. For the purposes of the model an area within a 500m radius of the site is considered when identifying receptors. The only exceptions being the scores awarded to the property receptor group, this is discussed in more detail later. The individual receptor scores are then added together to provide a total receptor score. This is multiplied by the source characteristic score to provide an interim land prioritisation score.

Finally, the interim land prioritisation score is multiplied by a score (1, 0.8 or 0.6), to reflect any previous remediation, and/or reclamation that has taken place. This determines the final land prioritisation score. The flowcharts in Appendix 11 illustrate how the model works.



Figure 1: Scoring Methodology, Land Prioritisation Score, Model 2 (Appendix 11)

4.2.3 Determination of Sensitivity and Proximity Scores for Receptors

Introduction

The determination of a score, which reflects the sensitivity and proximity of each of the receptor groups is an essential part of the model. This detailed consideration aims to make the model more scientifically robust and therefore defensible, by minimising the element of subjectivity. This consideration is detailed below for each of the receptor groups:

Human Receptors

Consideration was given to the applicability of the Contaminated Land Exposure Assessment (CLEA) Model as a means of quantifying some of the assumptions made about the risks to human health. However, the CLEA model only considers a limited number of land uses. These were deemed to be inadequate in assisting any prioritisation procedure. Therefore a decision was made to examine a wider range of land uses, which would be representative of those typically found in North Hertfordshire. To determine the sensitivity of these lands uses, consideration was given to the mechanisms by which humans in each of these environments may be exposed to contaminants (i.e. pathways). The following were factors were considered to be important:

- The typical exposure pathways attributable to land use
- The typical exposure duration of humans for a particular land use
- The typical exposure frequency of humans for a particular land use
- The critical receptor at risk
- The behavioural characteristics of the critical receptor in that environment

With respect to this a further matrix was devised (Appendix 10). The matrix considered nine typical land uses and evaluates these against eight typical pathways by which humans may be exposed to contamination, in order to determine the sensitivity of these land uses.

The matrix was devised by firstly identifying a critical receptor for each land use. These receptors were considered to be infants, children and adults, which were awarded scores of 3, 2 & 1 respectively. These categories differ from the CLEA model as a result of the insertion of the child critical receptor. This was done to reflect the difference between the critical receptors present in a school (i.e. child) and the critical receptor in a nursery (i.e. infant).

Secondly, should the exposure pathway be considered to be applicable to a particular land use, an assessment of the characteristics of each of the pathways is made. This includes an assessment of the following:

a) Typical frequency of exposure to a pathway

This assessment considers, in relation to the pathway being evaluated, the typical frequency of exposure to contaminants of the critical receptor.

| | | Score |
|--------|--|-------|
| High | Critical receptor is considered to be exposed to this pathway at least once a day. For example a small child within a residential environment | 3 |
| Medium | Critical receptor is considered to be exposed to this pathway at frequent intervals i.e. more than twice a week but not every day such as an adult at work | 2 |
| Low | Critical receptor is occasionally exposed to this pathway i.e. visiting allotments or commercial premises | 1 |

b) Typical length of exposure to pathway

This assessment considers, in relation to the pathway being evaluated, the typical duration of exposure to contaminants by the critical receptor.

| | | Score |
|--------|---|-------|
| High | Critical receptor is exposed to pathway for majority of time | 3 |
| Medium | Critical receptor is exposed to pathway for the minority period of time | 2 |
| Low | Critical receptor is exposed to pathway only occasionally | 1 |

c) Likelihood of inadvertent exposure

This assessment considers, in relation to the pathway being evaluated, the likelihood of the critical receptors behaviour resulting in inadvertent exposure to contaminants.

| | | Score |
|-----|--|-------|
| Yes | Typical behavioural characteristics of receptor may lead to inadvertent behaviour | 3 |
| No | Typical behavioural characteristics of receptor are unlikely to lead to inadvertent exposure | 0 |

Please note that when considering each of the above characteristics, comparisons were made between similar exposure pathways (i.e. ingestion of outdoor soil and ingestion of indoor dust).

The sensitivity of each of the land uses was then derived using the following calculation. Firstly, a pathway significance score was determined to reflect the significance of each pathway using the following calculation.

$$\text{Frequency of Exposure} \times \text{Duration of Exposure} + \text{Inadvertent Exposure}$$

(Max Score 12)

Secondly, the significance scores for each attributable pathway were added together for each land use and multiplied by the critical receptor score. This provided a numerical sensitivity score for each of the nine land uses. It was firstly envisaged that this score would be directly applicable to the risk prioritisation model calculation. However, this complicated the model calculation and it was decided to split the different land uses into three separate risk classes, high medium & low. This can be seen in the flow diagrams in Appendix 11.

A number of assumptions were made when completing the matrix, these included:

1. When considering a commercial environment the critical receptor was assumed to be an adult working within that environment and not a human receptor visiting that environment. This consideration is made for the purposes of Risk Prioritisation Assessment purposes and does not necessarily mean that Health and Safety Legislation will be inappropriate in cases of exposure to contaminated land at while at work.
2. Agricultural land does not consider farm buildings and/or houses, which were classified as industrial or residential land uses.
3. That the majority of individuals work indoors within industrial and commercial sector.

Ecological Receptors

The risk to ecological receptors is based on an assessment of their conservation value, this reflects whether the receptors are of international, national or local importance. The model also considers the proximity of the receptor to the source of the contamination.

It was initially understood that Ramsar Sites, Special Protection Areas (SPA), and Special Areas of Conservation (SAC) were internationally designated, while Sites of Specific Scientific Interest (SSSI), National Nature Reserves, Marine Nature Reserves and Nature Reserves were nationally designated. However, further research identified that the SSSI system has assumed greater prominence as a result of the UK Government being signatory to the European Union Birds and Habitats Directive. In order for a site to be classified as a SAC or SPA under the Habitats Directive, or SPA under the Birds Directive the UK Government decided that it first must be designated as a SSSI. This means that SSSI's are in most instances likely to have equal conservation value as other internationally designated.

The model is designed to reflect this change by awarding equal conservation value to SSSI's as other internationally designated habitats. The District Council also requested that locally designated nature reserves were considered within the model. There remains some degree of discussion about this request, as local ecological receptors are not considered under the Part 2A regime. After consultation however, it was agreed that local designated ecological receptors would only be included, should the ecological receptors only be present within the boundary of the former contaminative land use. The priorities given to ecological receptors can be found within the flowcharts in Appendix 11.

Surface Water

In order to evaluate the impact of contaminants on surface water, the model considers the Environment Agency's guidance for prioritising the inspection of sites. This approach considers not only the existence of surface water features, but also the risk of compliance with River Quality Objectives.

Previous research had also identified that some surface water in North Hertfordshire was used for recreational purposes (i.e. outdoor swimming pools) and therefore was at greater risk than other surface water features. However, information identifying where surface water features are used for recreational purposes were not readily available and therefore this was not considered in the model. Similarly, information was not readily available to identify areas where surface water was either in continuity with groundwater, or interacting with any form of ecosystems. For that reason it was not considered within the model.

Groundwater

Having considered the guidance issued by the Environment Agency, it was concluded that the approach to assessing groundwater would be identical to the approach considered in the first model, taking into account the introduction of Section 86 of the Water Act 2003. (Appendix 2).

In accordance with the guidance offered by the Environment Agency (Smith, 2001), ground waters in made ground, fill, the unsaturated zone, or in hydraulically isolated perched bodies were not to be considered by the model. This was because of their low resource value.

Property

The diversity of the property receptors identified in the Statutory Guidance, means that consideration of their sensitivity is difficult. Much thought was given to this matter by the Authority in order to identify ways in which the sensitivity of these receptors could be established. This included trying to place a value to the receptors, and examining whether the risk would be reduced through other control mechanisms (i.e. Health & Safety Legislation).

However, it was how the different forms of property receptor would interact with other receptor groups (i.e. humans), which was considered to be most important. This model considers therefore, that any score awarded to a property receptor is a reflection on how (through the continued land use of that land) that property may impact on other types of receptors (i.e. humans). The scores therefore being used to refine priorities within the model, by placing greater importance on those forms of property where the impact may be most significant (i.e. allotments and the potential for ingestion of soil by humans).

4.2.4 Scoring Methodology

One of the main concerns, which arose from the development of the model, was how it would reflect and prioritise land contamination based on risk. The intention of the initial scoring methodology, within Version 1.0, was to ensure that each of the 4 receptor groups (humans, surface and groundwater and ecological) would have equal importance in the model. This was achieved by ensuring that scores for each of the receptor groups were out of a maximum of 20. However, it soon became apparent that the model, because of the scoring methodology employed did not equally consider all receptor groups. This was because human receptors unlike the other receptor groups took into account the cumulative risk of up to nine types of land uses. This meant that the human receptor group could achieve a maximum score of 135 not 20 (Appendix 11).

In order to overcome this the total cumulative score for the human receptor group was divided by 6.75 to give a relative figure out of 20. An additional weighting score of 0.148 was applied to the final scores of each of the receptor groups (other than humans) to ensure that the score had equal importance and therefore priority in the model (i.e. no receptor group other than humans could score greater than a maximum of 2.96).

Note: The use of a numerical scoring system should not be taken to imply undue scientific precision. It provides only an indication of risk potential and there may be instances where further clarification identifies either no pollutant linkage exists or the risk ranking has been assigned inappropriately.

5.0 STAGE 2: INSPECTION ARRANGEMENTS

In this section the process of individual site inspection is outlined. Stage 2 uses the site inspection prioritisation list created in Stage 1 to explore in more detail the potential for land contamination that *has* a significant impact on receptors. Should land be declared to be contaminated within the strict meaning of Part 2A steps will be taken to ensure that the site is adequately remediated. These steps are explained in section 6.0.

5.1 INSPECTION OF LAND

Following the Stage 1 prioritisation procedure outlined in the previous section, North Hertfordshire District Council will almost certainly have insufficient information for a formal contaminated land determination on any particular site. In such instances the Authority will consider whether to make an inspection of the suspected land in question. This decision will be based on whether there is: a) a reasonable possibility that a pollutant linkage exists; and b) whether, if this linkage were to be proven, the land would be classified as contaminated (regarding the statutory test provide in s. 78A(2) of the act).

Another consideration at this point would be whether any site might ultimately be determined to be a special site. If a special site designation is possible, this Authority will consult the Environment Agency as appropriate.

5.1.1 AUTHORISATION OF 'SUITABLE' PERSONS

The authorisation of suitable persons to investigate particular areas of land where there is a reasonable possibility that a pollutant linkage exists will be made under specific powers conferred upon this Authority under section 108 of the Environment Act 1995. However, it is envisaged that a voluntary approach will be adopted by the landowners (and other interested parties) in order for this Authority to facilitate such investigations. Where there appears to be a lack of co-operation this Authority will exercise its lawful powers of entry by virtue of Part 2A in order to undertake the inspection. For the purposes of the inspection this may involve the entering of premises, taking samples or carrying out related activities with the purpose of enabling this Authority to make a determination on the existence of a pollutant linkage. The act also provides for authorised officers of this Authority to requisition relevant information.

5.1.2 DETERMINATION OF CONTAMINATED LAND

The determination of land satisfying the definition contained within section 78A(2) will be based on the identification of **one or more** significant pollutant linkages in accordance with the statutory guidance. It should be noted, therefore, that it is not necessary for this Authority to produce a complete characterisation of the nature and extent of contaminants, pathways or receptors, or of other matters relating to the condition of the land in order to make this determination. Once land has been determined to be contaminated, a more detailed investigation and characterisation of significant pollutant linkages can, if necessary, form part of an assessment

action required under a remediation notice, or described in a remediation statement. The costs of determining whether the land appears to be contaminated will be borne by this Authority; however all subsequent investigations undertaken by this Authority will be at the expense of the appropriate person(s).

In certain instances an inspection may reveal land that cannot be statutorily described as contaminated on the basis of information assessed (having regard to the relevant burden of proof and/or on the **balance of probabilities**); yet this land may still be contaminated. This may occur where the mean concentration of a contaminant in a soil sample is marginally below an appropriate guideline value for that contaminant. This Authority will consider whether it is necessary or not to undertake further inspections or pursue other lines of enquiry to establish the condition of the land in question more accurately.

If land does not satisfy the Part 2A definition of contaminated land, this Authority will seek to ensure that this conclusion be reviewed at a later date or when further information becomes available.

5.1.3 **LAND POSING AN IMMINENT RISK OF HARM**

If at any stage in the inspection of land it appears to North Hertfordshire District Council that the land poses an immediate risk to a specified receptor (i.e. a pollution linkage is determined and that there is a significant possibility of significant harm being caused, or pollution of controlled waters is occurring) the Authority will assign sufficient resources in relation to the specific site and undertake the appropriate action.

5.2 **SITE INVESTIGATION**

Site investigations will be conducted, wherever practicable, in accordance with British Standard 10175 – Investigation of Potentially Contaminated Sites – Code of Practice 2011.

Site investigation need not be conducted directly by this Authority. Subject to resourcing details, the site inspection function will be split between external consultants and professional officers within the Authority's Environmental Protection Team. The exact function of this division will ultimately be governed by the results produced by the stage 1 risk assessment; however, due to the highly complex nature of some pollutant linkages it is appropriate that suitably experienced and qualified consultants be contracted within this stage.

In the event of testing laboratories being used during the course of inspections, these will be selected on the basis of their MCERTS / UKAS accreditation and their ability to analyse particular contaminants. The contaminants selected for analysis will be based on existing knowledge and on information given in the relevant DoE Industry Profile, which detail the contaminants most likely to be present due to a particular industrial use.

Where receptors are being subjected to significant harm (or where pollution of controlled waters is occurring) due to contaminated land outside the boundaries of this Authority, the appropriate neighbouring authority will be contacted to arrange early investigation.

5.2.1 PHASED APPROACH TO SITE INVESTIGATIONS

A phased approach to site investigation has been selected as this ensures the efficient use of resources and is in keeping with this Authority's obligation to provide 'Best Value' solutions.

If land has been determined as being contaminated land no further inspection phases will be undertaken unless for the purposes of remediation.

5.2.2 STEP 1: PRELIMINARY INVESTIGATION

This will encompass the collection and assessment of documentary information held by the Authority and provided by other relevant bodies and person(s).

The assessment will aim to give the assessor an understanding of the actual and probable nature and location of contaminants and hazards. This will enable a preliminary conceptual model of the site to be defined, which should focus subsequent inspection activities (where necessary).

This exercise may encompass the review of past remedial works which have been undertaken on the land, in such instances the council will appreciate the adequacy of such works in accordance with today's standards.

This exercise may involve inter-departmental co-operation and at all times the designated officer for the inspection will remain the central point of contact.

**Summary of Typical Objectives of the Preliminary Investigation
(Not exhaustive)**

To identify:

- past and current uses of the site and surrounding area
- the nature of any hazards and physical constraints
- potential receptors
- potential sources of contamination
- plausible pathways
- likely features
- features of immediate concerns that may require emergency action

And provide information on:

- geology
- geochemistry
- hydrogeology
- hydrology

to formulate:

- an initial conceptual model of the site

to enable:

- decisions to be made on the requirement for further investigations
- informed decisions to be made on the need for specialist assessment
- to provide information relevant to worker health and safety and to the protection of the environment during field investigations

5.2.3 **STEP 2: SITE RECONNAISSANCE**

Where a site has been identified as a result of step 1 as worthy of further inspection then a site reconnaissance shall be undertaken. At this stage it may be necessary, depending on the nature and accessibility of the land to initiate liaison with the site owners.

This reconnaissance exercise will be carried out by a suitable person who is capable of identifying any visual evidence of contamination and other relevant information.

Objectives of Site Reconnaissance (Not exhaustive)

To:

- Validate information on the site collected during the desk study
- Collect additional relevant information regarding the site
For example:
 - abiotic and biotic indicators
 - debris and structures on the site
 - derelict buildings and structures
 - public access (including trespass)
 - Undertake interviews if possible with the appropriate persons
 - Identify any obvious distinguishing features
 - Identify any surface deposits

For the purposes of:

- Assisting in the planning any subsequent investigations (if necessary)
- Eliminate any obvious immediate hazards to public health or safety or the environment
- Identifying the need to involve other regulatory bodies

In addition to the general reconnaissance exercise, where appropriate, surface samples will be taken for analysis to provisionally assess the existence and nature of any surface contamination. The exercise shall also consider adjacent areas of land to determine the likelihood that these areas have been affected by contaminant migration.

The evidence collected from this exercise will be utilised to determine whether further analysis of the site is required.

5.2.4 **STEP 3: INTRUSIVE INVESTIGATION**

The identification of pollutant linkages and the quantification of risk may require detailed intrusive analysis and modelling of the site. In such instances the Council will endeavour to work with the appropriate person in undertaking such investigations. If the appropriate person cannot be identified, or the site is owned by the Authority, then the Authority will carry out a detailed investigation itself (in line with legislative controls and guidelines). Any costs incurred by the Authority at this stage will be ultimately recovered by placing a charge on the land.

Prior to this Authority undertaking any intrusive investigations it must be satisfied that it is likely that the contaminant is actually present given the current use of the land; a classified receptor must also be present (or likely to be so).

North Hertfordshire District Council will not carry out any inspection using its statutory powers of entry if:

- It has already been provided with detailed information on the condition of the land, whether by the Environment Agency (or some other person such as the owner of the land), which provides an appropriate basis upon which the local authority can determine whether the land is contaminated land
- A person offers to provide such information within a reasonable and specified time and then provides such information within that time.

This Authority shall ensure that it takes all reasonable precautions to avoid harm, water pollution or damage to natural resources or features of historical or archaeological interest as a result of site investigations.

In the event of this Authority carrying out an inspection on any area notified as a Site of Special Scientific Interest (SSSI) or Natura 2000 sites (where applicable), this Authority shall consult English Nature on any action which, if carried out by the owner or the occupier, and would require consent of English Nature under section 28 of the Wildlife and Countryside Act 1981 as amended. Similarly, if this Authority is to inspect an area of land whose responsibility was associated with a statutory body, the scope of the inspection will be agreed between the relevant body and North Hertfordshire District Council prior to any works being carried out.

If the premises to be inspected are used for residential purposes, or the inspection will necessitate taking heavy equipment onto the premises, this Authority will give the occupier at least 7 days notice of the intention to do so.

5.2.5 LIAISON WITH OWNERS, OCCUPIERS & OTHER INTERESTED PARTIES

The Authority's approach to its regulatory duties under the new regime is to seek voluntary action before taking enforcement action. Therefore every effort will be made to liaise with the appropriate persons at the earliest possible stage in any inspection of land as it is recognised that in many cases more effective remediation can be achieved by agreement than by enforcement.

'Appropriate Persons' (for definition see 6.2.1) are also regarded as being a key to any inspection in terms of the information and assistance they can provide. The inspecting authorised officer will remain the central contact point to ensure effective communication is implemented at all stages of inspection.

5.2.6 INSPECTION REPORT

When the Authority has gathered sufficient information for it to determine that a specific site is contaminated land, a written record encompassing each phase of investigation will be made. This will

set out all the relevant information about the site and the Council's reasoning why the site is contaminated.

5.2.7 HEALTH AND SAFETY ARRANGEMENTS

Health and safety considerations will be made at every phase of the inspection of the site. An initial opinion will be made as a result of the preliminary inspection so that, where necessary, the investigating officer will liaise with the Authority's Safety Officer.

Upon the engagement of a consultant to perform a site investigation the Authority will ensure that such person(s) have made the appropriate health and safety arrangements and that they are in place to ensure safe working practices at all times. Public liability insurance will be required indemnifying the Council against any losses arising from contractor's actions.

5.3 GUIDELINES AND RISK ASSESSMENT

In order to determine whether land is contaminated this Authority will initially evaluate all data against current generic guidelines. However, these will have to be complemented with site specific risk assessment models during the latter stages of inspections in order to define the actual risk.

In carrying out any risk assessment this Authority will have regard to:

- The definition of harm, significant harm and significant pollution
- The nature, degree and location of the contamination on the land
- The pathways by which the contaminants would affect defined receptors on or surrounding the site
- The susceptibility of these receptors on or surrounding the site
- The time-scale within which harm may occur

5.3.1 GUIDELINES

With the publication of the 'Contaminated Land Exposure Assessment Model' (CLEA) and the gradual release of Soil Guideline Values (SGVs) the Environmental Protection Team will use those generic guidelines to inform the determination of contaminated land where humans are deemed to be receptors.

Where humans are the receptors but there are no SGVs published that correspond to the contaminant(s) of concern, the Environmental Protection Team will refer to the generic assessment criteria generated by the Chartered Institute of Environmental Health and Land Quality Management (CIEH/LQM) collaboration which utilises the current CLEA model. Where there is still an absence of appropriate generic assessment criteria the Environmental Protection Team will follow UK guidance produced by DEFRA and the EA in its preliminary assessment of risk. This is most likely to involve the review of appropriate literature for toxicological data and associated background information about the contaminants of concern. The collated information can then be entered into a human

health risk assessment model, for example CLEA, that is designed for use within the UK regulatory and risk assessment framework.

It is important to note that SGVs are representative of Generic Assessment Criteria and should not be used as direct indicators of whether there is a significant possibility of significant harm to human health.

Of particular note, is the fact that the Interdepartmental Committee on Redevelopment of Contaminated Land 59/83 guidance values (second Edition 1987) has been formally withdrawn by DEFRA.

If in the absence of appropriate generic guideline values, or human health risk assessment models, the use of non-UK based generic guideline values or risk assessment models will be necessary. In such circumstances their use should be justified taking into account how they relate to the UK regulatory and risk assessment framework.

Where controlled waters are considered to be receptors, any assessment targets will need to relate to the present or intended use of the water or its background quality. The compliance targets selected will typically be the most stringent applicable water quality standard. Advice will also be sought directly from the Environment Agency (EA), which is a statutory consultee on contaminated land issues where pollution of controlled waters is an issue. Additionally the Environmental Protection Team will give due consideration to the following EA publications:

- ~ Environment Agency technical advice to third parties on Pollution of Controlled Waters for Part 2A of the EPA 1990

- ~ Methodology for the derivation of remedial targets for soil and groundwater to protect water resources.

- ~ River Basin Management Plans

With regard to groundwater quality there are no specific groundwater guidelines in the UK. However relevant statutes include:

- ~ Water Resources Act 1991

- ~ Environmental Protection (Prescribed Processes and Substances) Regulations 1991

- ~ Environmental Permitting Regulations 2010 (as updated)

Where ecological receptors are considered to be an issue, there is currently a public consultation on a framework and methods for assessing harm to ecosystems from contaminants in soil. The consultation published by the EA is titled Ecological Risk Assessment and the consultation is due to end in December 2004. However, in the absence of current specific guidance on contamination and ecological receptors close collaboration between

the Environment Protection Team, the relevant Environment Agency team and the Conservation Body responsible for the ecological receptor will be required in any determination of appropriate guidelines.

5.3.2 RISK ASSESSMENT TOOLS

The Contaminated Land Exposure Assessment Model (CLEA)

It is a deterministic model that estimates child and adult exposures to soil contaminants for those potentially living, working and/or playing on contaminated sites over long time periods and has been used to produce the Soil Guideline Values (SGVs) which are Generic Assessment Criteria (GAC) for use in the United Kingdom.

The SGVs were being gradually published by the Environment Agency, with a total of ten contaminants currently with SGVs defined and plans for SGVs to be produced for many more contaminants. The current CLEA UK software is Version 1.06.

However, this process has been on hold for some years now and so GAC for other contaminants have been generated on a similar basis by non-governmental organisations such as the Chartered Institute of Environmental Health (CIEH) in partnership with a private company Land Quality Management (LQM).

Alternative risk assessment models exist. One of the simplest to use is the SNIFFER Model. This is a method limited to the derivation of assessment criteria for use when considering the risk to human health from chronic exposure to heavy metals (except lead), metalloids and organic substances in soil. It is a deterministic model that relies heavily on the CLR 9 and CLR 10 documents. This means that it is essentially another risk assessment model based on the UK principles of human health risk assessment for use in situations where an existing SGV is not appropriate, or where there is no SGV and where the CLEA software or any future replacements is not appropriate. It should not be used if appropriate SGVs are available, or if CLEA is appropriate, or where site circumstances and model limitations make its use inappropriate.

Groundwater Risk Assessment Modelling

Advice will be sought from the Environment Agency when controlled waters are subject to inspection. However it is anticipated that risk assessments in respect of controlled waters will be carried out in accordance with the Environment Agency's "Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination".

Should guidelines or risk assessments appear inadequate for any site investigation being undertaken or evaluated for controlled waters it is intended that the Environment Agency will be contacted at the earliest appropriate opportunity.

Other considerations

In some instances it may be that the guidelines and risk assessments are inadequate for the inspection being undertaken. In such instances this Authority may consult both the Health and Safety Executive and Local Health Authority on contaminants of a toxicological nature.

5.4 INSPECTION FREQUENCY

In certain instances a site may have contamination present but will not be designated as *contaminated land* because a pollutant linkage does not exist.

In such instances it shall be the aim for the site to be reviewed every 5 years. Such a review may be undertaken sooner in situations where additional information comes to light or if the land is the subject of a planning application.

5.5 SPECIAL SITE ARRANGEMENTS

The procedures for dealing with a special site cannot take place until this Authority has formally identified the land in question as contaminated land. In identifying contaminated land the government considers it appropriate for detailed investigation of any potential special sites to be carried out by the Environment Agency, acting on behalf of the Local Authority. Therefore this Authority will consult the Environment Agency as early as possible about sites which may become special sites. If after discussion with the Environment Agency the Authority decides that the site requires designation, the Authority will give notice in writing to the Environment Agency, the owner and occupiers(s) of the land and any persons who appear to be an appropriate person.

The Environment Agency then has 21 days within which it must notify the Authority if it disagrees with the designation decision. In the event of the Environment Agency disagreeing with the Authority's decision, the case will be referred to the Secretary of State for determination. Where the Environment Agency fails to notify its disagreement within the twenty-one days allowed, the contaminated land in question will be designated a special site.

This Authority's intention to consult the Environment Agency at an early stage is to ensure that any differences of opinion can be resolved before the point of formal determination and to minimise referrals to the Secretary of State under s78D.

6.0 STAGE 3: DESIGNATION OF CONTAMINATED LAND

In sections 4.0 and 5.0 the mechanisms for initially identifying potentially contaminated land and its subsequent investigation were explored. This section describes the action this Authority may take in the event of land being formally declared as being statutorily contaminated. Either statute or guidance will prescribe the majority of these actions.

6.1 STATUTORY DECLARATION

Part 2A requires local authorities to serve a remediation notice if a site is identified as contaminated land. There is no discretion in this function. However, before any formal remediation notice can be served the enforcing authority must conduct a formal consultation exercise with interested parties (although this requirement does not extend to sites which pose an imminent danger of serious harm / pollution of controlled waters). Enforcing authorities are also required to notify any 'appropriate person' of its intention to serve a remediation notice – this ensures that the appropriate person(s) have an opportunity to resolve the matter voluntarily. The minimum notification period is 3 months.

There are a number of circumstances where an enforcing authority is not permitted to serve a remediation notice (other than in cases of imminent danger). For example:-

- Where remediation works are so expensive that it would be unreasonable for the enforcing authority to require that they be completed. In this case a remediation statement explaining the grounds for this view will have to be published.
- Where the enforcing authority is of the opinion that the appropriate steps are (or will be) taken to satisfactorily remediate the site in question. The person(s) or company responsible for this type of site is required to prepare a remediation statement specifying what works will be undertaken and when they will take place.
- Where the enforcement authority is the appropriate person.
- Where grounds already exist for the exercise by the authority of its own clean-up powers in respect of the site.

6.2 SUBSEQUENT ACTIONS

6.2.1 APPORTIONING LIABILITY

Should a site be determined to fall within the statutory definition of contaminated land, the Authority will seek to establish the identity of the appropriate person (individual(s) / company who will be liable for the costs of remediation). In accordance with statutory guidance, the appropriate person may be either:

- An appropriate person Class A: The person(s) who caused or knowingly permitted a pollutant to be in/on or under that land, or
- An appropriate person Class B: The owner or occupier of the site. These persons are responsible for any necessary remediation only in the event of a Class A person(s) not being found.

This Authority will seek to be open and transparent in its decision making with regard to contaminated land and will give notice to all relevant parties. It will follow the statutory guidance provided by DEFRA in this respect.

Where there is more than one appropriate person (or company) linked to a contaminated land site, the Authority will apportion liability to reflect the degree of contamination that each party may have caused. Exclusion from liability or apportionment will be considered on a case by case basis, in accordance with Section 7 of the statutory guidance.

6.2.2 VOLUNTARY SITE CLEAN UP

This Authority, in keeping with the spirit of Part 2A, will take steps to encourage voluntary site remediation where sites are deemed to be contaminated. This approach aims to ensure that contaminated land is adequately controlled as quickly as is reasonably practicable and takes into account the willingness and abilities of appropriate persons to rehabilitate land.

However, on an individual case basis, the Authority will consider whether the proposals submitted (see 6.3) by the appropriate person(s) are adequate and will be conducted within a reasonable time frame. The Authority will use its enforcement powers provided by the regime to ensure that *'where the appropriate remediation is not being carried out, or where agreement cannot be reached on the remediation actions required'* a remediation notice is served.

6.2.3 HARDSHIP PROVISIONS

In cases where the appropriate person is a Small or Medium sized Enterprise (SME), statutory guidance suggests that authorities will need to consider the following:

- 1) Whether recovery of the full cost attributable to that person would mean that the enterprise is likely to become insolvent and cease to exist; and
- 2) If so, the cost to the local economy of such a closure.

In the event of the appropriate person being a SME which satisfies the above two tests, this Authority will enter into negotiation with that organisation to determine the appropriate level of cost recovery, which will avoid making an enterprise insolvent.

In cases where the appropriate person is a Class B owner-occupier of a residential dwelling the Council has put in place a Policy for determining whether the waiving or reducing of the costs of remediation is appropriate having regard to hardship provisions and statutory guidance.

6.2.4 ORPHAN SITES

Statutory guidance details the steps to be taken when a contaminated site is determined and the appropriate person(s) cannot be found:

- i) Where ‘the significant pollutant linkage relates solely to the pollution of controlled waters (and not to significant harm) and no class A person can be found’
- ii) Where no class A or class B persons can be found

The statutory provisions of Part 2A exempt those persons who would otherwise be liable.

In the event that orphan sites are determined to be statutorily contaminated, the enforcing authority will bear the cost of carrying out the appropriate remediation.

6.3 REMEDIATION NOTICES

Currently, the remediation notice is not a prescribed form (although the Secretary of State has the power to do so at a later date), but it must contain certain information. The table below outlines the mandatory contents of a remediation notice:

| Contents of a Remediation Notice | |
|---|---|
| 1 | The identity of the appropriate person |
| 2 | The character of the problem |
| 3 | The basis for the Authority’s view & actions |
| 4 | What remediation is required of the appropriate person |
| 5 | The timetable for this remediation |
| 6 | Rights of appeal |
| 7 | That the requirements of the remediation notice will be suspended on appeal |
| 8 | Other relevant information |
| If there is more than one appropriate person | |
| 9 | The details of other appropriate persons |
| 10 | The proportion of costs which each party will bear in carrying out the required works |

The recipient of a remediation notice can appeal to a magistrate’s court within 21 days of the service of the abatement notice. The grounds of appeal are contained within the Contaminated Land (England) Regulations 2006.

If the notice is not successfully appealed and the required actions are not taken, the appropriate person may be subject to a fine of up to £20,000 and subsequent fines of up to £2,000 per day for non-compliance. When considering enforcement action, this Authority will have regard to its Enforcement Policy.

If this Authority is of the opinion that the site in question requires immediate remediation, it may carry out the remedial work itself and seek to recover the costs from the appropriate person.

6.4 CONTENTS OF THE CONTAMINATED LAND REGISTER

Part 2A requires that Authorities create a comprehensive and accessible public register relating to sites designated as contaminated within their districts. This Authority's register will be available for inspection at the main council offices at Gernon Road, Letchworth, Hertfordshire. Other departments within the Authority will also use it.

The contents of the Register are outlined below: -

| Contents of Register | |
|----------------------|---|
| (a) | Remediation notices |
| (b) | Charging notices |
| (c) | Appeals against remediation & charging notices |
| (d) | Remediation statements and declarations |
| (e) | Other environmental controls |
| (f) | Designations of special sites |
| (g) | Notices terminating the designation of special sites |
| (h) | Notifications by owners/occupiers/appropriate persons of any voluntary works which they claim have been carried out on the site |
| (i) | Convictions for relevant offences |
| (j) | Agency site-specific guidance |

Sites that have been declared to be contaminated and subsequently remediated, will remain on the register together with details relevant to the remediation works carried out.

The Environmental Information Regulations 2004 provides for public access to environmental information held by public bodies, such as this register. This Authority will adopt an open and transparent stance on requests for information; however, Part 2A does provide an extensive list of exemptions from this duty.

7.0 PROPOSED TIMETABLE AND FUNDING

This section details the proposed timetable and potential funding implications for this Authority to fulfil its responsibilities under the new contaminated land regime. It should be noted that the timetable is provisional and may be subject to change.

7.1 STAGE 1: IDENTIFICATION OF POTENTIALLY CONTAMINATED LAND WITHIN NORTH HERTFORDSHIRE

Under the regime, local authorities had until July 2001 to prepare, formally adopt and publish a strategy to deal with contaminated land in their area.

After this date it is the responsibility of the individual authority to ensure that contaminated land functions are carried out in accordance with the legislation. No specific timetables are provided in statute or guidance.

North Hertfordshire District Council therefore adopted a provisional timetable to implement Stage 1 of the Strategy in Version 1.0 of the Strategy (December 2001). The 2001 proposed timetable up to the completion of the collation and rationalisation of the collected data is listed below along with dates of completion:

- Prepare Draft Strategy – proposed Jun 2001 – completed 2001
- Submit Strategy for Internal Review – proposed Jun 2001 – completed 2001
- Consult Stakeholders – proposed July-August 2001 – completed 2001
- Formal Adoption and Publication – proposed Aug 2001 – completed Dec 2001
- Data Acquisition – proposed September 2001 – completed 2002
- Collate and Rationalise Data – proposed Sept 2001 – completed April 2004

Subsequent stages along with proposed timetables are detailed in the Table below:

| ACTIONS | PROGRESS: MAY 2005 to JUNE 2007 & AMENDED TIMETABLE | PROGRESS: NOVEMBER 2009 & AMENDED TIMETABLE | PROGRESS: NOVEMBER 2012 & AMENDED TIMETABLE |
|---|---|--|--|
| Risk assess data & prepare inspection priority list for Stage 2 | 50% complete May 2005 59% complete June 2007 | 60% complete November 2009 | 60% complete November 2012 |
| Seek appropriate resources for Stage 2 implementation | In place on an annual basis Apr. 2004 onwards | In place on an annual basis Apr. 2004 onwards | In place on an annual basis Apr. 2004 onwards |
| Review & update of Contaminated Land Strategy | Complete October 2005 Update complete July 2007 Planned for Winter 2009 | Complete March 2010 Planned for Summer 2013 | Complete December 2012 Planned for Winter 2015 |

7.2 STAGE 2: INSPECTION ARRANGEMENTS

The speed with which this Council can examine suspected sites would be dependent on two factors – funding for external consultants and the resources available within the Housing and Public Protection Service.

Since it is likely that some sites identified in Stage 1 will be complex and therefore require in depth investigation and analysis, it is proposed that this work be contracted, on a case by case basis, to suitably qualified and

experienced consultants. An officer within the Housing and Public Protection Service will monitor the work of these consultants.

However, staff may inspect sites deemed to represent a lower order of potential risk. Should capacity and resources within the Housing and Public Protection Service staffing and budget be available in any one financial year this Strategy allows for the option of sites of lower potential risk to be progressed ahead of higher risk sites.

This option should only be utilised in cases where the following circumstances apply.

- 1) That a minimum of 2 of the highest ranked potentially contaminated sites identified by the Risk Prioritisation Assessment Methodology within Stage 1 of the Strategy are being progressed through Stage 2 of the Strategy in a given financial year.
- 2) That the ability to deal appropriately with potentially contaminated sites through the Planning Regime is not compromised.
- 3) That sufficient budgetary and staffing resources are available

It should be noted that all three of the listed circumstances must be in place in order to allow the promotion of a potentially contaminated site into a Stage 2 assessment before other potentially contaminated sites that had been assigned a higher priority by Stage 1.

It should also be noted that a detailed record of any decision to “promote” the progress of a site to Stage 2 shall be prepared by the Environmental Protection Officer with responsibility for contaminated land and shall be approved by the Environmental Protection Manager or their manager and included within the case file for the site.

The cost of site investigations will obviously be dependent on the characteristics of the site and its environmental setting. However, the financial resources currently in place will allow for expenditure of £25,000 per year. These resources will be initially targeted towards the investigation of those sites identified by the Risk Prioritisation Assessment part of the Strategy as being within the highest potential risk groupings.

The financial resources to be assigned for these works will be re-assessed at the beginning of each financial year on the basis of the nature of potentially contaminated sites being identified as needing investigation and the experience of the site investigation works undertaken in the previous year.

Remediation costs that may arise, dependent upon the outcome of the site investigation works, are likely to vary considerably between sites and so have tentatively been estimated to start from around £10,000 and could ultimately reach several hundred thousand pounds. Where remediation becomes a necessity and under Part 2A of the EPA 1990 is deemed to be the responsibility of North Hertfordshire District Council the financial implications will be accounted for as and when they arise.

7.3 STAGE 3: DESIGNATION OF CONTAMINATED LAND

The designation and subsequent work associated with the designation of contaminated land may also incur additional costs. Such may be borne in the form of further assessments, remedial treatments and monitoring actions. All of which may incur the potential for huge financial ramifications for this Authority. This liability may be due to current or former Authority land ownership or via other provisions of Part 2A regarding orphan sites and those where economic hardship can be established.

In general this Authority may consider the obtaining of additional funding for the investigation and remediation of contaminated land (where appropriate) via the Contaminated Land Capital Project Grant scheme operated by DEFRA.

APPENDIX 1: SPECIAL SITES

Section 78B of Part 2A requires local authorities to inspect its area, from time to time, for the purpose of identifying land, which falls within the statutory definition of contaminated land. However, 78C specify the actions, which a local authority must take if that land is classified as a 'special site'.

The definition of 'special site' can be found in the Contaminated Land (England) Regulations 2006. Broadly, the following characteristics may require special site classification (2(1)):

- **Controlled waters (see Appendix 2) are being polluted**
- **On sites subject to Integrated Pollution Control (see Environmental Protection Act 1990 Part I - Prescribed Processes and Substances Regulations 1991 schedule 1 part A)**
- **Land which is contaminated by reason of:**
 - waste acid tars
- **Land which has been used for:**
 - Purification of crude petroleum or oil extracted from any other bituminous substance except coal
 - The manufacture or processing of explosives
 - The manufacture of chemical weapons
 - The manufacture of any biological agent or toxin
 - The manufacture or disposal of atomic weapons
- **Land owned or occupied by:**
 - Secretary of State for Defence
 - The Defence Council
 - An international headquarters or defence organisation
 - The service authority of a visiting force

Contaminated land beyond the boundary of these premises (but contaminated by them) also forms part of the special site.

APPENDIX 2: POLLUTION OF CONTROLLED WATERS

Pollution of controlled waters is defined as:

“The entry into controlled waters of any poisonous, noxious or polluting matter or any solid waste matter”

Environmental Protection Act 1990 s78A(9) Part 2A

For the purposes of the contaminated land regime controlled waters are defined as:

- Groundwater, except that ground waters does not include waters contained in underground strata but above the saturation zone.
- Inland fresh waters (relevant rivers, watercourses, lakes, ponds, Reservoirs - including bottom / channel / bed, even if dry)
- Relevant territorial waters
- Coastal waters including docks

The full definition of controlled waters is given in Section 104 of the Water Resources Act 1991, which has been amended with regard to the definition of ground waters for the purposes of the Contaminated Land Regime by Section 86 of the Water Act 2003.

There is no power in the 1991 Act to enable the Secretary of State to issue guidance on what degree of pollution may constitute pollution of controlled waters and this had been accepted as a potential area of conflict. However, Section 86 of the Water Act 2003 has inserted “significant” in the definition of contaminated land, so that; “significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused”; has been put in place of “pollution of controlled waters is being, or is likely to be caused”.

Further clarification on the assessment of the significance of pollution of controlled waters was introduced in April 2012 by Section 4.4 of the Contaminated Land Statutory Guidance.

This clarification should help to ensure that unrealistic demands are not made in relation to cases of very minor pollution.

Local authorities will rarely deal with pollution of controlled waters and below is a summary of the issues relating to controlled waters.

Where pollution of groundwater has occurred and the source can not be identified, or the polluting substances are contained entirely within the body of water (and not in or on the land), then Part 2A does not apply and the matter would be dealt with by the Environment Agency under section Part III of the Water Resources Act 1991.

Where pollution has occurred from land which subsequently affects the wholesomeness of drinking water within the meaning of section 67 of the Water Industry Act 1991 (Water Supply [Water Quality] Regulations 1989 / Private Water Supplies Regulations 1991), then the land becomes a **special site**.

Where pollution has occurred from land, which results in surface water failing to meet the criteria in Regulations, made under section 82 of the Water Resources Act 1991, then the land becomes a **special site**:

| |
|--|
| The Surface Water (Dangerous Substances) (Classification) Regulations 1989 |
| The Bathing Waters (Classification) Regulations 1991 |
| The Surface Water (Dangerous Substances) (Classification) Regulations 1992 |
| The Surface Water (River Eco System) (Classification) Regulations 1994 |
| The Surface Water (Abstraction for Drinking Water) (Classification) Regulations 1996 |
| The Surface Water (Fish life) (Classification) Regulations 1997 |
| The Surface Water (Shellfish) (Classification) Regulations 1997 |
| The Surface Water (Dangerous Substances) (Classification) Regulations 1997 |
| The Surface Water (Dangerous Substances) (Classification) Regulations 1998 |

Where the pollution of a specified aquifer* is caused by any of the following contaminants the land becomes a **special site**:

| |
|---|
| Organohalogen compounds and substances which may form such compounds in the aquatic Environment; |
| Organophosphorus compounds; |
| Organotin compounds; |
| Substances which possess carcinogenic, mutagenic or teratogenic properties in or via the aquatic environment; |
| Mercury and its compounds; |
| Cadmium and its compounds; |
| Mineral oil and other hydrocarbons; |
| Cyanides. |

*Specified aquifers are those contained in the following rocks:

- Pleistocene Norwich Crag;
- Upper Cretaceous Chalk;
- Lower Cretaceous Sandstones;
- Upper Jurassic Corallian;
- Middle Jurassic Limestones;
- Lower Jurassic Cotteswold Sands;
- Permo-Triassic Sherwood Sandstone Group;
- Upper Permian Magnesian Limestone;
- Lower Permian Penrith Sandstone;
- Lower Permian Collyhurst Sandstone;
- Lower Permian Basal Breccias, Conglomerates and Sandstones;
- Lower Carboniferous Limestones.

This, in effect, leaves local authorities with the potential responsibility for the pollution of controlled waters where:

- a) Surface or coastal waters are affected but not breaching the Regulations
- b) Groundwater (other than a principal aquifer specified above) is contaminated and the water is not used for drinking.

Where a potential pollutant linkage includes a public water supply source as a receptor, the responsible water company will be notified and consulted regarding abstractions for public supply. This should enable operations to be managed and to fulfil their duty of keeping the Drinking Water Inspectorate informed of contamination of water used for public consumption.

APPENDIX 3: GLOSSARY

The April 2012 Contaminated Land Statutory Guidance supporting the Environmental Protection Act 1990: Part 2A, contains a detailed glossary of terms that provides legal definitions of terms that may be used in this strategy. This glossary provides some of those definitions and also an interpretation of terms used in the strategy.

AONB

Area of Outstanding Natural Beauty

Appropriate Person

Any person, who is an appropriate person, determined in accordance with section 78F of Environmental Protection Act 1990 Part 2A, to bear responsibility for anything, 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 are expected to meet the definition of contaminated land

Class A Person

A person who is an appropriate person for a significant pollutant linkage in that he/she has caused or knowingly permitted a pollutant to be in, on or under the land

Class B Person

A person who is an appropriate person for a significant pollutant linkage in that he/she is the owner or occupier of the land in circumstances where no Class A person can be found with respect to a remediation action

CLEA

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

Contaminated Land

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 harm being caused; or
- b) significant pollution of controlled waters is being, or there is a significant possibility of significant pollution being caused

Controlled Waters

These include:

Inland waters (rivers, streams, underground streams, canals, lakes and reservoirs)

Groundwaters (except that ground waters does not include waters contained in underground strata but above the saturation zone.)

Coastal Waters

Council (NHDC)

For North Hertfordshire: North Hertfordshire District Council

DEFRA

Department for Environment, Food and Rural Affairs (formerly DETR)

DETR

Department of the Environment, Transport and Regions

DTLR

Department of Transport, Local Government and the Regions

EA

Environment Agency

Eco-System

A biological system of interacting organisms and their physical environment

Environmental Protection Team

The team within the Housing and Public Protection Service, within NHDC's Financial and Regulatory Services Directorate for the implementation of Part 2A of the Environmental Protection Act 1990

GIS

Geographical Information System

Groundwater

Ground waters except that ground waters does not include waters contained in underground strata but above the saturation zone.

Hardship

Where an appropriate person can demonstrate that carrying out a remediation action would cause him/her 'hardship', the council will assess whether it is appropriate to require that person to carry out the remediation. This is covered in Section 8 of the Statutory Guidance.

Harm

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/her property.

ICRCL

Interdepartmental Committee on Remediation of Contaminated Land

Land in a Contaminated State

Land that appears to the local authority in whose area it is situated that:

- a) there is a high likelihood of a contaminant source being present in, on or under the land
- b) there is a high likelihood of the land meeting the contaminated land definition should a pathway or receptor be introduced to the site.

Liability Group

The persons who are appropriate persons with respect to a particular significant pollutant linkage

LNR

Local Nature Reserve

NNR

National Nature Reserve

Orphan site

A site that is identified as contaminated land, but where no appropriate person is liable for the remediation of the significant pollutant linkage.

Pathway

One or more routes by which a receptor can be exposed to a contaminant

Pollutant Linkage

The relationship between a contaminant, a pathway, and a receptor

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

Sometimes referred to as "the target". Any part of the human or wider environment that can be adversely affected by a source contaminant through a pathway.

Relevant Authority

For contaminated land sites, the relevant authority is North Hertfordshire District Council. For contaminated land sites, with the additional designation as a Special Site the relevant authority is the Environment Agency.

Remediation

Carrying out of works to assess, prevent or minimise effects of contamination. In the case of this legislation the term also encompasses assessment of the condition of land, and subsequent monitoring of land.

Remediation Action

Any individual thing which is being, or is to be, done by way of remediation

Risk

The likelihood and consequences of a defined hazard

Risk Assessment

The assessment of the likelihood and consequences of a hazard.

SAC

Special area of conservation

Significant Harm

Any harm that is determined to be significant in line with the statutory guidance

Significant Pollutant Linkage

A pollutant linkage, which forms the basis for a determination that a piece of land is, contaminated land

Significant Pollutant

A pollutant which forms a part of a significant pollutant linkage

SNIFFER

Scotland and Northern Ireland Forum for Environmental Research

Source

A substance in, on or under the land with the ability to cause harm

Source Protection Zone

A groundwater source protection zone (SPZ) is a designated area of underground water aquifers used for potable water abstraction. Within these zones, certain activities and processes are strictly regulated.

SPA

Special protection area for birds

Special Site

Any contaminated land which as a result of its current or previous use, or contaminants present is required to be designated as a Special Site (defined by section 78A(3) of EPA 1990 Part IIA), under the regulation of the Environment Agency.

Suitable Person

A person suitably qualified and experienced to carry out a specific task, as assessed by the relevant authority

SSSI

Site of special scientific interest

APPENDIX 4: POTENTIALLY CONTAMINATIVE LAND USES

This list has been drawn up to provide a broad indication of the type of sites that are known to use, or to have used in the past, materials that could pollute the soil. It must be understood that the list is not exhaustive, also that inclusion on this list does not necessary imply the existence of a pollutant linkage.

| | |
|--|-------------------------------------|
| Abattoirs | Food processing |
| Adhesives manufacture | Foundries |
| Agriculture Farms | Fuel manufacture |
| Aircraft manufacture | Fuel storage |
| Airports | Garages and depots |
| Animal burial | Gas mantle manufacture |
| Animal by-product processing | Gas works |
| Anodisers | Glass works |
| Anti-corrosion treatment | Glue manufacture |
| Asbestos products | Gum and resin manufacture |
| Asphalt works | Hatters |
| Automotive engineering | Hide and skin processors |
| Battery manufacture | Ink manufacture |
| Bearings manufacture | Iron founder |
| Blacksmiths | Iron works |
| Boiler makers | Knackers yards |
| Bookbinding | Lacquer manufacture |
| Brass and copper tube manufacture | Laundries |
| Brass founders | Leather manufacture |
| Brewing | Metal coating |
| Car manufacture | Metal manufacture |
| Carbon products manufacture | Metal sprayers and finishers |
| Cement works | Mining |
| Ceramics manufacture | Mirror manufacture |
| Chemical manufacture and storage | Motor vehicle manufacture |
| Chrome plating | Oil fuel distributors and suppliers |
| Coal carbonisation | Oil merchants |
| Coal merchant | Oil refineries |
| Concrete batching | Oil storage |
| Coppersmiths | Paint and varnish manufacture |
| Descaling contractors (chemical) | Paper manufacture |
| Detergent manufacture | Paper works |
| Distilleries | Pesticides manufacture |
| Dockyards | Petrol stations |
| Drum cleaning | Photographic film works |
| Dry cleaners | Photographic processing |
| Dye works | Plastics works |
| Dyers and finishers | Plating works |
| Electrical engineers | Power stations |
| Electricity generation | Print works |
| Electro platers | Printed circuit board manufacture |
| Engineering works | Radioactive materials processing |
| Explosives manufacture (including fireworks) | Railway land |
| Fellmongers | Railway locomotive manufacture |
| Fertiliser manufacture | Refiners of nickel and antimony |
| Fibre glass works | Resin manufacture |
| Rubber manufacture | Tank cleaning |
| Scrap metal dealers | Tanneries |
| Sealing compound manufacture | Tar and pitch distillers |
| Sewage sludge disposal areas | Textile manufacture |
| Sewage works | Thermometer makers |
| | Timber preservatives manufacturer |

| | |
|---------------------------------|---------------------------------|
| Sheet metal merchants and works | Timber treatment |
| Ship breakers | Tin plate works |
| Ship builders | Transport depots |
| Skein silk dyers | Tyre manufacture and retreading |
| Small arms manufacture | Vehicle manufacture |
| Smokeless fuel manufacture | Vulcanisers |
| Soap manufacture | Vulcanite manufacture |
| Solvent manufacture | Waste disposal |
| Solvent recovery | Waste recycling |
| Steel manufacture | Waste treatment |
| Stove enamellers | Zinc works |
| Synthetic fibre manufacture | |

APPENDIX 5: SITES AND DESIGNATIONS FOR LANDSCAPE AND NATURE CONSERVATION (WITHIN TOWNS)

| Town | Landscape Conservation/ AONB | Nature Conservation |
|-------------------|--|--|
| Baldock | LC2 This adjoins the town at the Green Belt boundary on the southeast side. | 12/029 Blackhorse Farm Storm Drain; 12/022 Weston Hills; 12/028 Blackhorse Farm Meadow; 12/025 Ivel Springs. |
| Hitchin | LC1 This area adjoins the town on the west and southwest, and penetrates into the town protecting the setting of the Priory. | 11/001 SI13 Oughtonhead Lane SSSI; 12/003 Wilbury Hill; 12/039 Keysheath Meadow; 11/021 Icknield Way Wilbury; 11/017 Cadwell Crossing; 11/023 Cadwell Marsh; 11/033 Cadwell Lane Gasworks Meadow; 12/002 Hitchin Railway Banks; 11/001 Oughtonhead; 20/015 Oughtonhead Lane; 20/053 Purwell Meadows; 21/010 Purwell Mill Pastures; 21/009 Purwell Ninesprings; 20/052 Hitchin Railway Cutting; 20/043 Windmill Hill Woodside Dell; 20/016 The Willows; 20/035 Land between Priory Park; 20/034 Priory Park; 21/007 Purwell Railway; 20/018 Charlton Mill Pond; 12/001 Stotfold Road Verges; 11/031 Ransoms Recreation Ground and Allotments; 11/042 Old Hale Way Allotments. |
| Letchworth | | 12/022 Weston Hills; 12/031 Norton Cross Nortonbury Road Verge; 05/002 Radwell Meadows; 12/032 Norton Pond Paynes Farm; 12/007 Norton Common; 12/003 Wilbury Hill; 12/039 Keysheath Meadow; 12/036 Icknield Way Railway Bank; 12/047 Lordship Farm Willian; 12/011 Letchworth Golf Course. |
| Royston | LC2 This surrounds the southern boundary of the town's Development Limits. | SI12 Therfield Heath SSSI; LNR1 Therfield Heath Local Nature Reserve; 08/042 Green Lane South of Royston; 04/001 Royston Chalk Pit; 03/001 Therfield Heath; 07/022 Therfield Green Lane; 04/012 Shaftesbury House Grassland. |

Sites and designations for landscape and nature conservation (Parishes).

| Parish | Landscape Conservation/ AONB | Nature Conservation |
|----------------|---------------------------------|--|
| Ashwell | LC2. | SI1 Ashwell Springs SSSI; 02/001 Loves Farm Moat; 06/014 Ashwell Springs; 06/008 Partridge Hall Track; 06/004 Ashwell Quarry Springs; 06/024 Slip Inn Hill A505; 06/037 Icknield Way SW of Slip End; 06/043 Duck Lake Farm; 06/003 Ashwell Quarry Pit and Road verges. |

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| Barkway | LC2. | 08/007 Whiteley Hill Road Verge; 08/024 Bogmoor Road Verge; 08/022 Walk Wood; 08/020 Barkway Chalk Pit; 08/016 Bush Wood; 08/017 Rokey Wood; 08/021 Earl's Wood; 15/002 Biggin Moor; 08/050 Barkway Area; 08/039 Barkway Meadow. |
| Barley | LC2. | 08/024 Bogmoor Road Verge; 09/005 Pondbottom Wood; 09/006 Wigney Wood; 09/009 Cross Leys Wood; 09/002 Sheepwash Grove Messops Grove; 09/011 Garden Grove; 09/013 Ash Grove; 09/012 Wynnel's Grove; 09/014 Morrice Green Pit and Meadow; 09/026 Shaftenhoe End, Old Manor Farm; 09/010 Fold Yard Grove; 09/015 New England Moor; 09/016 New England Wood Doctor's Grove; 09/024 Manor Farm, Church End. |
| Bygrave | LC2 | 06/037 Icknield Way SW of Slip End; 06/035 Park Wood Meadow and Ponds; 06/021 Baldock Road Verges/Bygrave Road Verges; 06/036 Bygrave Moat; 06/041 St. Margarets Churchyard, Bygrave; 06/022 Bygrave Lane by A505. |
| Caldecote | LC2. | |
| Clothall | LC2. | 13/010 Wallington Road Verge by Clothall Common; 13/032 Spital Wood Brim Spring; 13/030 Round Wood; 13/031 Bush Spring Wood Quickswood; 13/027 Clothallbury Wood; 13/015 Ashanger Hill Green Lane; 12/022 Weston Hills; 13/017 Hooks Green Meadow; 13/018 Hickmans Hill Green Lane; 13/043 Shaw Green Lane; 13/045 Basket's Wood; 13/046 Munches Wood; 13/025 Rydals Wood; 13/024 Coldash Wood. |
| Codicote | LC1 & LC3. | 29/035 Knebworth Park; 29/003 Church Wood; 29/060 – 29/004 The Node, Node Wood; 43/012 New Wood; 43/018 Heath Plantation; 43/031 -; 43/022 Valley Farm Meadow; 43/036 Codicote Bottom Pastures; 43/052 Meadow NW of First Spring; 43/042 Hollards Farm Meadow; 43/043 Longston and Catchpole Woods; 43/020 Mimram Valley Marsh, Hollards Farm; 43/059 Copse by Codicote Lodge; 43/015 Mardley Heath (part); 43/005 Singlers Marsh/Fulling Mill Meadow; 43/016 Danesbury Park (part); 43/033 Codicote Lodge Icehouse and surroundings. |
| Graveley | LC2. | 21/030 How Wood, Graveley How; 21/033 Stavesley Wood; 21/029 Harbourclose Wood; 21/027 Ledgerside Plantation; 22/010 Tilekiln Wood, Parsonsgreen Wood; 22/009 New Spring Wood; 22/008 Brooches Wood; 22/007 Claypithills Spring Wood; 22/006 Box Wood, Pryor's Wood and Lob's Hole Spring; 21/035 Graveley Hall Farm. |
| Hexton | The majority of the Parish, including the village of Hexton, falls within the Chilterns Area of Natural Beauty. | 19/002 Hexton Chalk Pit; 19/033 Hexton Chalk Pit Road Verge; 19/001 Ravensburgh Castle, Hexton Manor Estate; 19/013 The Meg Wood, Belt Wood Devil's Ditch; 19/003 Gravel Hill; 19/012 Telegraph Hill Hoo Bit; 19/004 Icknield Way below Telegraph Hill; 10/003 Hexton Manor Park. |

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| | LC1. | |
| Hinxworth | | 01/004 Field S of Hinxworth High Street. |
| Ickleford | | 11/010 Ickleford Common; 11/011 Cadwell Cress Beds Ickleford Watercress; 12/003 Wilbury Hill; 11/021 Icknield Way Wilbury; 11/014 Cadwell Grove, West Meadow; 11/015 Cadwell Grove, North and South Meadow; 11/017 Cadwell Crossing; 11/023 Cadwell Marsh; 11/001 Oughton Head; 11/039 River Hiz, Cadwell; 11/038 Westmill Lane, Ickleford; 11/012 Lower Green, Ickleford; 11/013 Lower Green, South Meadow. |
| Kelshall | LC2. | 07/006 Icknield Way A505 North of Gallows Hill; 06/024 Slip Inn Hill A505; 06/029 Road Verge near Gallows Hill; 07/004 Crouch Hill Road Verge; 07/017 Duck's Green and Kelshall Lane; 07/036 Lord's Wood; 07/024 Collins Green Lane; 14/015 Notley Lane; 07/005 Coombe Bottom; 07/003 Mount Hill. |
| Kimpton | LC1 & LC3. | 42/007 Duck Trap Wood; 28/001 Hurst Wood; 42/017 Horsley's Wood; 42/052 Park Wood and Dovehouse Wood; 42/053 Christmashill Wood; 42/015 Hoo Park Wood; 42/001 Kimpton Mill Rye End Farm Meadows; 42/040 Meadow S of Park Farm; 42/013 Prior's Wood and Claggbottom Wood; 42/005 Priors Wood Chalk Bank; 42/030 Hall Wood; 42/008 Bishey Wood (part); 41/013 Plummers Lane (part). |
| Kings Walden | LC1. | 28/001 Hurst Wood; 19/028 Westbury Wood Angel's Wood; 28/014 Lady Grove; 28/016 Hitch Wood; 28/037 Hanger Wood Kingswaldenbury Icehouse; 28/015 Hearnfield Wood; 28/006 Watkins Wood Lords Wood; 27/003 Winchill Wood; 27/002 Burnt Wood Winchill Wood; 27/005 Diamond End Spring; 28/043 Sewett's and Sellbarn's Woods; 27/001 Withstocks Wood. |
| Knebworth | LC1. | SI6 Knebworth Wood including Langley Meadows SSSI; 42/007 Duck Trap Wood; 42/001 Kimpton Mill Rye End Farm Meadows; 29/035 Knebworth Park; 29/003 Church Wood; 29/060 -; 29/004 The Node, Node Wood; 43/012 Mardley Heath (part); 29/018 Kitchin Green Lane; 29/023 Burleigh Meadow; 29/030 Burleigh Grove; 29/020 Garston Meadow; 29/046 Pasture S of Watery Grove; 29/021 Watery Grove; 29/033 Wintergreen Wood; 29/007 Soot Wood Briary Spring; 29/009 Lammas Wood Easthall Wood; 29/008 Pear Tree Wood Roundwood Dell; 29/006 Graffridge Meadows, Burleighcroft Meadows; 29/005 Graffridge Wood; 29/001 Holl Lays Wood; 29/036 Park Wood Home Wood; 29/002 Crouch Green; 29/055 Crouch Green Woods; 29/066 Burleigh Farm; 29/028 Rusling End Meadow; 29/070 Burleigh Farm Meadow; 43/065 Crab Tree Road; 29/022 Norton Green. |
| Langley | LC1. | 29/018 Kitchin Green Lane; 29/030 Burleigh Grove; 29/007 Soot Wood Briary Spring; 29/009 Lammas Wood Easthall Dell; 29/006 Graffridge Meadows Burleighcroft |

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| | | Meadows; 28/014 Lady Grove; 28/016 Hitch Wood; 28/015 Hearnfield Wood; 29/014 Almshoe Bury Swallowhole; 29/019 Rush Green Airfield; 28/019 The Downs Hill End; 28/020 Hill End Pit; 28/021 Hitch Wood Shrubs; 28/058 Hitch Spring and Beach Spring; 28/023 Hitch Spring Woodland and Field; 29/012 Hobsland Spring Maiden Spring; 29/047 High Broomin Wood; 29/061 Upper Kitching Spring; 29/025 Mare's Plash Pond, Dyers Lane; 29/026 Morio Meadow Langley Meadow East; 29/024 Oak Grove; 29/051 Crab Tree Spring; 29/050 Pastures N of Burleighcroft Wood; 29/031 Burleighcroft Wood; 29/053 Maids Grove and Hodgkins Dell; 29/010 Browns Wood Wellcroft Wood, Easthall Wood; 29/028 Langley Meadow Spring; 29/063 Home Field Farm; 29/011 Martins Spring. |
| Lilley | The majority of the Parish including the village of Lilley falls within the Chilterns Area of Outstanding Natural Beauty. LC1. | 19/012 Telegraph Hill Hoo Bit; 19/014 Icknield Way; 19/007 Lilley Park Lilley Park Wood; 19/006 Wardswood Lane; 19/004 Icknield Way below Telegraph Hill. |
| Newnham | LC2. | |
| Nuthampstead | LC2. | 09/002 Sheepwash Grove Messops Grove; 09/013 Ash Grove; 09/012 Wynnel's Grove; 09/014 Morrice Green Pit and Meadow; 09/015 New England Moor; 09/016 New England Wood Doctor's Grove; 08/022 Walk Wood; 08/021 Earl's Wood; 16/002 Scales Park East Wood. |
| Offley | The northern part of the Parish including the village of Little Offley falls within the Chilterns Area of Outstanding Natural Beauty. LC1. | 19/012 Telegraph Hill Hoo Bit; 19/014 Icknield Way; 19/028 Westbury Wood Angel's Wood; 19/016 Markhams Hill; 19/019 Wellbury Lower Wood; 19/020 Wellbury Pit Wellbury Boulder; 19/021 Birkett Hill; 19/026 Offley Chalk Banks Offley Park; 19/027 Old Road Plantation New Plantation; 20/007 Cockroad Spring; 27/013 Stubbocks Wood; 19/052 Wellbury; 19/050 Offley Park Icehouse; 19/036 Offley Place; 19/051 Putteridge Bury Icehouse. |
| Pirton | The western part of the Parish falls within the Chilterns Area of Outstanding Natural Beauty. LC1. | 11/001 Oughton Head; 10/019 Hill Farm; 10/011 Wood Lane; 10/015 Larkinsons Pond; 10/010 Tingley Wood North Field Margin; 10/020 High Down, The Close; 10/006 Tingley Wood North Down; 10/005 Tingley Wood West Down; 10/007 South Field Margin; 10/004 Tingley Wood; 10/022 St. Mary's Churchyard and Pirton; 10/025 Pirton Grange Farm. |
| Preston | LC1 | S18 Wain Wood SSSI; 20/007 Cockroad Spring; 28/014 Lady Grove; 28/016 Hitch Wood; 28/015 Hearnfield Wood; 20/012 Offley Holes; 20/005 Pinnacle Hill; 20/024 Wain Wood The Warren; 28/059 Princess Helena College. |

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| Radwell | LC2. | 05/007 Radwell (A507) Road Banks; 05/004 Radwell Lake, Radwell Mill; 05/002 Radwell Meadows; 05/005 River Ivel Nortonbury; 12/029 Blackhorse Farm Storm Drain; 12/028 Blackhorse Farm Meadow. |
| Reed | LC2. | 08/016 Bush Wood; 08/003 Reed Chalk Pit; 08/009 Fiddlers Green SW Meadow; 08/011 Green Lane from Reed to Reed Wood; 08/012 Meadow West of Gannock Green; 08/014 Gannock Green Grove; 08/015 Roundabout Wood; 08/013 Reed and Hilly Wood; 08/051 Reed Churchyard; 08/010 Moat Meadow Fiddler's Green; 15/009 A10 Road Bank near Hilly Wood; 08/003 Reed Chalk Pit. |
| Rushden | LC2. | 13/043 Shaw Green Lane; 14/024 Friar's Wood; 14/005 Bachelors Wood; 14/004 Southern Green Farm Green Lane; 14/003 Southern Green Southern Green Farm Pond; 14/002 Southern Green S Copse and Chalk pit; 14/047 Rushden Churchyard. |
| St Ippolyts | LC1. | 29/014 Almshoe Bury Swallowhole; 29/019 Rush Green Airfield; 29/047 High Broomin Wood; 21/007 Purwell Railway; 21/003 Wymondley Transforming Station; 20/057 Folly Alder Swamp St. Ippolyts Common; 20/066 Sperberry Hill House Meadow; 20/058 St. Ibbs Park; 20/074 Maydencroft Manor Farm; 20/059 Vicars Grove; 20/072 St. Ibbs Bush. |
| St Pauls Walden | LC1. | 28/016 Hitch Wood; 28/015 Hearnfield Wood; 29/009 Lammas Wood Easthall Wood; 28/058 Hitch Spring and Beach Spring; 29/010 Browns Wood, Wellcroft Wood, Easthall Wood; 42/007 Duck Trap Wood; 42/017 Hersley's Wood; 28/017 Pinfold Wood; 28/018 Foxholes Wood; 28/032 Reynold's Wood Clagdell Spring; 28/025 Walk Wood Meadow; 28/026 Walk Chalkleys and Little Bury Woods; 28/004 Long Lane Whitwell Water Tower; 28/031 Water Hall Marsh; 28/034 Rose Farm Meadows; 29/054 Warren Wood; 28/060 Thieving Grove; 28/005 Rose Grove; 28/003 Heyshams Spring; 42/016 Christmas Wood Danesbury Park (part); 28/068 Stagenhoe; 28/030 Whitwell Watercress Beds; 28/062 St. Pauls Walden Icehouse; 28/044 Hollybush Lane area. |
| Sandon | LC2. | SI 11 Green End SSSI; 14/024 Friar's Wood; 06/024 Slip Inn Hill A505; 14/015 Notley Lane; 06/031 Deadman's Hill Road Verge; 14/016 Notley Green Common; 14/017 Tichney Wood; 14/052 Sandon Churchyard; 14/009 Roe Green Common; 14/020 Blagrove Common South Meadow; 14/018 Blagrove Common; 14/029 Bush Wood; 14/023 Sandon Moor; 14/028 Steward's Ley; 14/027 Beldero's Wood; 14/010 Roe Wood; 14/051 The Chapel, Roe Green. |
| Therfield | LC2. | SI 12 Therfield Heath SSSI; LNR1 Therfield Heath Local Nature Reserve; 14/015 Notley Lane; 07/006 Icknield Way A505 North of Gallows Hill; 07/017 Duck's Green and Kelshall Lane; 07/024 Collins Green Lane; 07/011 Fordhams Wood; 07/009 Fox Covert; 07/007 -; 07/027 Therfield Motte and Bailey; 07/015 Bell Meadow; 07/019 Hay Green; |

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| | | 07/029 Hay Green Meadow; 07/016 Duck's Green West Meadow; 14/032 Hawkins Wood; 14/031 West Wood; 14/037 Brandish Wood; 03/002 Therfield South of Tumulus; 03/001 Therfield Heath; 07/022 Therfield Green Lane; 07/025 Wing Hall Banks. |
| Wallington | LC2. | 06/037 Icknield Way SW of Slip End; 13/032 Spital Wood; 13/034 Bury Wood; 13/057 Copses S of Bury Wood; 13/041 Wallington Common and Coles Wood; 13/042 Coles Wood Green Lane; 13/056 Copse E of Prim Spring; 13/031 Bush Spring Wood Quickwood; 06/042 Metley Hill Wireless Station; 13/037 Wallington Churchyard; 13/062 Manor Farm. |
| Weston | LC2. | 13/015 Ashanger Hill Green Lane; 13/004 Newfield Hill Weston Hills; 12/022 Weston Hills; 13/002 Bush Wood Weston Green Grove; 13/018 Hickman's Hill Green Lane; 13/052 Pasture N of Horseshoe Farm; 13/022 Garthlands – Weston Meadows (part); 13/020 Weston Meadows; 13/023 Bell's Meadow Weston Meadows (part); 22/015 Manor Farm Meadows; 12/020 Lannock Spring Lannock Hill Wood; 22/018 Lalle Wood Green Lane; 22/030 Halls Green; 22/011 Claypits Wood; 22/010 Tilekiln Wood Parsonsgreen Wood; 22/039 Howell's Wood; 22/021 Sloggar's Wood; 22/009 New Spring Wood; 22/007 Claypithills Spring Wood; 22/016 Weston Churchyard; 22/052 Tilekiln Farm; 22/020 Hicks Grove. |
| Wymondley | | 21/007 Purwell Railway; 21/003 Wymondley Transforming Station; 21/019 Lucas Wood; 21/017 Titmore Green Meadows and Ponds; 21/045 Meadow by Lucas Wood. |

APPENDIX 6: ANCIENT MONUMENTS

| No | Description | Title |
|-----------|------------------|---|
| HT11557 | ANCIENT MONUMENT | MOBBS HOLE MOATED SITE AND DECOY POND ASHWELL |
| HT11558/1 | ANCIENT MONUMENT | MOATED ENCLOSURES E AND W OF LOVE LANE ASHWELL |
| HT11558/2 | ANCIENT MONUMENT | MOATED ENCLOSURES E AND W OF LOVE LANE ASHWELL |
| 80 | ANCIENT MONUMENT | BARLEY LOCK-UP |
| 20643 | ANCIENT MONUMENT | TWO BOWL BARROWS AT BYGRAVE 650M E OF PARK WOOD |
| 109 | ANCIENT MONUMENT | SITE OF CUMBERLOW MANOR HOUSE |
| 111 | ANCIENT MONUMENT | ENCLOSURE AND EARTHWORKS SE OF CLOTHELLBURY HOUSE |
| HT11517 | ANCIENT MONUMENT | MOATED SITE & ASSOCIATED REMAINS W OF HOOKS GREEN FARM |
| 12 | ANCIENT MONUMENT | CHESFIELD CHURCH |
| 8 | ANCIENT MONUMENT | RAVENSBURGH CASTLE |
| SM20622 | ANCIENT MONUMENT | GALLOWS HILL BARROW |
| SM27906 | ANCIENT MONUMENT | ROMAN BARROW & BRONZE AGE BOWL BARROW: GRAFFRIDGE WOOD 250M E OF WINTERGREEN COTTAGES |
| SM27907 | ANCIENT MONUMENT | ROMAN BARROW & BRONZE AGE BOWL BARROW: GRAFFRIDGE WOOD 250M E OF WINTERGREEN COTTAGES |
| 81 | ANCIENT MONUMENT | DEARDS END BRIDGE OVER RAILWAY |
| SM27902 | ANCIENT MONUMENT | HINXWORTH ROMAN FORTLET |
| 14 | ANCIENT MONUMENT | MINSDEN CHAPEL |
| SM20623 | ANCIENT MONUMENT | BARROW AT TELEGRAPH HILL |
| 108 | ANCIENT MONUMENT | RING DITCH AND ENCLOSURE |
| SM29387 | ANCIENT MONUMENT | SLIGHT UNIVALLATE HILLFORT ON WILBURY HILL |
| SM27913 | ANCIENT MONUMENT | ROMANO-BRITISH SMALL TOWN & LATE IRON AGE SETTLEMENT AT BALDOCK |
| SM20615 | ANCIENT MONUMENT | BARROW S OF RADWELL |
| SM20636 | ANCIENT MONUMENT | TWO BOWL BARROWS 500M S OF FEARNHILL SCHOOL |
| SM17003 | ANCIENT MONUMENT | MOATED SITE LITTLE COKENACH |
| SM13612 | ANCIENT MONUMENT | TOOT HILL MOTTE & BAILEY CASTLE & SHRUNKEN MEDIEVAL VILLAGE AT PIRTON HERTS |
| SM20648 | ANCIENT MONUMENT | MOATED SITE AND ASSOCIATED ENCLOSURE AT RECTORY FARM |
| SM27908 | ANCIENT MONUMENT | RADWELL ROMAN VILLA |
| 11513/1 | ANCIENT MONUMENT | GANNOCK GROVE MOATED SITE AND HOLLOW WAY |
| 11513/2 | ANCIENT MONUMENT | GANNOCK GROVE MOATED SITE AND HOLLOW WAY |
| HT11569 | ANCIENT MONUMENT | REED HALL MOATED SITE REED |
| SM20603 | ANCIENT MONUMENT | DOUBLE MOAT AND FISHPOND QUEENBURY |
| SM20605 | ANCIENT MONUMENT | MOATED SITE GOODFELLOWS |
| HT11514 | ANCIENT MONUMENT | BUSH WOOD MOATED SITE AND HOLLOW WAY REED |
| SM27200 | ANCIENT MONUMENT | ROYSTON CAVE |
| 73 | ANCIENT MONUMENT | BRIDGE AT HOO PARK |
| 18 | ANCIENT MONUMENT | THE MOUNT |
| HT11512 | ANCIENT MONUMENT | HANKINS MOATED SITE ROE GREEN |
| SM20664 | ANCIENT MONUMENT | BOWL BARROW 1KM SW OF HEATH FARM PART OF THE ROUND BARROW CEMETERY ON DEADMANS HILL |
| 125 | ANCIENT MONUMENT | MILE DITCHES |
| SM20632 | ANCIENT MONUMENT | FIVE BOWL BARROWS PART OF THE ROUND BARROW CEMETERY ON THERFIELD HEATH |

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| SM20641 | ANCIENT MONUMENT | BOWL BARROW PART OF THE ROUND BARROW CEMETERY ON THERFIELD HEATH |
| SM20631 | ANCIENT MONUMENT | TWO BOWL BARROW PART OF THE ROUND BARROW CEMETERY ON THERFIELD HEATH |
| SM20630 | ANCIENT MONUMENT | EARLS HILL BOWL BARROW PART OF THE ROUND BARROW CEMETERY ON THERFIELD HEATH |
| SM20635 | ANCIENT MONUMENT | LONG BARROW ON THERFIELD HEATH |
| SM20640 | ANCIENT MONUMENT | BELL BARROW PART OF THE ROUND BARROW CEMETERY ON THERFIELD HEATH |
| SM20633 | ANCIENT MONUMENT | BOWL BARROW ONE OF TWO ROUND BARROWS ON PEN HILLS |
| SM20634 | ANCIENT MONUMENT | BOWL BARROW ONE OF TWO ROUND BARROWS ON PEN HILLS |
| SM20672 | ANCIENT MONUMENT | MOTTE AND BAILEY CASTLE AND ASSOCIATED EARTHWORKS 100M S OF TUTHILL FARM |
| 27917 | ANCIENT MONUMENT | LAMMAS FIELD ROMAN VILLA 680M NE OF WESTON BURY |
| HT11518 | ANCIENT MONUMENT | WYMONDLEY PRIORY BARN MOAT ASSOCIATED EARTHWORKS ENCLOSURES PLATFORMS AND HOLLOW WAY |
| HT11518 | ANCIENT MONUMENT | CONDUIT HEAD |
| SM20637 | ANCIENT MONUMENT | GREAT WYMONDLEY CASTLE A MOTTE & BAILEY CASTLE & MANORIAL ENCLOSURE 20M E OF ST MARYS CHURCH GT WYMONDLEY |
| SM20616 | ANCIENT MONUMENT | HIGHLEY HILL BOWL BARROW |
| SM29389/01 | ANCIENT MONUMENT | SPRINGFIELD STYLE ENCLOSURE TREE BOWL BARROWS AND TWO POND BARROWS ON WHITELEY HILL |
| SM29389/02 | ANCIENT MONUMENT | SPRINGFIELD STYLE ENCLOSURE TREE BOWL BARROWS AND TWO POND BARROWS ON WHITELEY HILL |
| SM20764 | ANCIENT MONUMENT | HENGE 500M NW OF BUSH WOOD |
| SM20759 | ANCIENT MONUMENT | ARBURY BANKS IRON AGE HILLFORT |
| HT11568 | ANCIENT MONUMENT | PIRTON GRANGE MOATED ENCLOSURE & ASSOCIATED SETTLING POND PIRTON SEE ALSO BEDFORDSHIRE 11568 |
| 90 | ANCIENT MONUMENT | ROMAN VILLA (SITE OF) 330YDS (300M) N OF NINESPRINGS |
| 106 | ANCIENT MONUMENT | TRIPLE DITCHES AT GALLEY HILL |
| SM20419 | ANCIENT MONUMENT | BOWL BARROW AT KNOCKING KNOLL 640M E OF PEGSDON COMMON FARM |
| 104 | ANCIENT MONUMENT | SETTLEMENT SITE S OF BLACKHORSE FARM |
| 105 | ANCIENT MONUMENT | RING DITCHES AND ENCLOSURE AT SLIP END |

APPENDIX 7: DATA SOURCES FOR STAGE 1

| RESOURCE | DESCRIPTION | INTENDED USE |
|---------------------------------------|---|--|
| Historic Land Use Data | Such data is provided by the Landmark Information Group and provides an analysis of historic maps from approx. 1870 for features and historic land uses which represent contamination sources | To identify sources |
| Historic Maps | The County Archive office provide a wide range of maps that can be considered when identifying contaminated land (see note below) | To identify sources |
| Environmental Health Records | This Division of the District Council maintains records of previous complaints, investigations and remediation works | To identify sources and known information on contamination |
| Planning Records | This Division of the District Council maintains detailed planning records of development, which may include information on previous remediation exercises and ground conditions. | To identify sources and known information on contamination |
| Integrated Pollution control Register | The Council along with the Environment Agency maintain a public register containing details of all authorised industrial processes | To identify sources |
| Waste Management Licences | The EA has provided a list of current waste management licences | To identify sources |
| Landfill Sites | The EA has provided information regarding Landfill sites, which have closed and are in current use. This Authority also holds data on such and it will be cross referenced to check validity | To identify sources |
| Location of Pollution Incidents | The EA has provided information regarding Pollution Incidents which have occurred since 1991 | To identify sources |
| Local Historical Societies | Within North Hertfordshire there are located a wide range of Historic Societies which may hold valuable information when assessing land. | To identify sources |

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| Geological Maps | Solid and Drift Geology maps are to be purchased from the British Geological Survey | To characterise sources and pathways |
| Hydrological Maps | Hydrological Maps are to be purchased from the British Geographical Survey | To characterise pathways and identify receptors |
| Hydrogeological Maps | To be obtained from the stationary office for the purposes of identifying the vulnerability of groundwater to contamination | To identify receptors and characterise pathways |
| Source Protection Zones | To be used in conjunction with the Hydrogeological Maps, these maps outline and define the susceptibility of the catchments of private water supplies | To identify receptors |
| Additional Private Water Supplies | In addition to those identified on the above maps the Environmental Protection Team holds records of all other water abstraction points. | To identify receptors |
| District Local Plan | The District Local Plan holds a great deal of information on land use including most of the receptors as indicated in the guidance document | To identify receptors |
| National Soil Inventory | It is intended that either maps or data will be purchased as required from the Soil Survey and Land Research Centre to build up a statistically unbiased picture of background soil contamination levels within the district | To characterise pathways |
| County Records | It has been identified that the County Records Office holds a vast amount of information regarding the district. It is envisaged that this will be frequently used in researching site history etc. | To provide background research material |

APPENDIX 8: LANDMARK INFORMATION GROUP SERVICES

Historical Land Use Data

Introduction

In 1998 Landmark Information Group completed the creation of a unique database of Historical Land Use and Potentially Contaminative Industries based on the guidelines set out in the Environmental Protection Act 1990 and the Environment Act 1995. The database has been created from an historical map database created under a **Joint Venture** between Landmark and Ordnance Survey (OS) set up in 1995.

The resultant data has proved essential for investigations in to the existence of historically contaminated land. Local Authorities throughout England, Scotland and Wales have been able to correctly identify and prioritise the key "sources" as defined within Section 57 of the Environment Act 1995 in order to establish the presence of "significant pollution linkages" within their specific area.

This document details the methodology, analysis and quality assurance involved in the creation of this database.

Section One: The Base Mapping

The Joint Venture between OS and Landmark undertook the task of creating a digital historical mapping archive of mainland UK based on 1:10,560, 1:10,000, 1:2,500 and 1:1,250 scale maps. The historical mapping begins with the County Series maps first surveyed in Lancashire in September 1841. The rest of England, Wales and Scotland being surveyed in the subsequent years, each county being revised between three and five times prior to 1945. These sheets became known as the County Series because each county was surveyed separately and many of the counties were surveyed to different origins from their neighbours. In 1944/45 the origin was standardised for the entire Country and mapping was transferred to the National Grid. The result was a new projection and a map naming convention which continued until the introduction of modern digital mapping (OS Land-Line™) in the mid-1990's.

Further details on the Joint Venture is provided in "Historical Data -A Technical Information Leaflet" produced by OS/Landmark.

Section Two: The Mapping Analysis

In 1996 Landmark began a systematic analysis of the 1:10,000 and 1:10,560 scale mapping in order to identify previous industrial uses of a potentially contaminative nature and key historical land use features. The decision was made to restrict analysis to this scale and to not analyse mapping at the larger 1:2,500 and 1:1,250 scale. This was due to the immense number of additional maps involved and the fact that the detail on the larger scale maps did not greatly amplify the detail on the 1:10,560/1:10,000 scale maps. The detail provided by the smaller scale mapping would be sufficient to correctly identify all the major uses mapped by OS plus the vast majority of the smaller sites.

The maps for up to six time periods (epochs) were analysed. These epochs included up to four County Series Map editions at 1:10,560 scale between 1846-1939, the first National Grid 1:10,560 or 1:10,000 maps from 1948 and the latest 1:10,000 National Grid Map.

Seven Layers of data were created within the GIS to cover the whole of England, Wales and Industrial Scotland; six contaminative use layers corresponding to specific time periods and one land-use layer. Into the six contaminative use layers, based on each time period or epoch, potentially contaminative uses were categorised and digitised (*A full list is at annex A*). The seventh layer, the land-use layer contained the following features: Areas of Unknown Fill (water), Areas of Unknown Fill (non-water), Former Marshes and Areas Liable to Flood.

The analysis was undertaken as a 3 step process which was then subject to Quality Assurance: Manual Analysis, Methodology and Digitising.

Step One: Manual Analysis

On the first available map all water features, rivers, streams, ponds, coastline etc were highlighted. This process was then repeated on the next available map for the area. This second map was then placed over the first map on a light table. Any water feature, which does not appear on a subsequent map was marked as an area of "Disappeared Water". These sites were digitised into the Land-use layer and the process repeated for all epochs.

Potentially contaminative industries and land use were also identified in the same way, beginning with the first available map and continuing through the subsequent epochs. All uses were grouped into categories based on features identified on the maps. On the first map all potentially contaminative features were highlighted and annotated with a code. Comparison was then made with the next epoch to establish which features remained through the time period and to digitise new sites. This process was also completed throughout each epoch.

Specific types of contaminative use industries, by their nature, created areas which could be subject to infill; Air Shafts, Brick Works, Collieries, Mines, Pits and Quarries. The extent of each of these features would be mapped over time until there was no indication of their existence. When this occurred the largest extent indicated by the analysis of the epochs layers was digitised into the Land-use layer as "Unknown Fill (Non-water)".

In urban and other difficult areas (e.g. the Staffordshire potteries), the analysing process was carried out on a light table. In rural or light areas the same methods of analysis were used except the features were digitised directly onto the screen.

Step Two: Methodology

Three different kinds of features were created: Point Features, Linear Features and Area Features. Features covering an area of less than 100m x 100m on the ground were digitised as points as they were insufficiently defined on the map. Those features which cover a definable area greater than 1 ha on the ground were digitised as polygons around the boundary of each feature.

Due to changes in the railway network between the 1860s and the 1970s, it was decided that each length of railway line digitised would need to be identical in all the epochs in which the line occurred. This meant that if a siding was visible on a map in the epoch after the initial piece of track was analysed/digitised, the siding would then be analysed/digitised as a separate

feature. To facilitate the analysing / digitising of the railway network natural breaks such as bridges & tunnels were used as start & end points for these linear features. Within each Quarter Sheet railways were analysed/digitised from the map edge to the first natural break, to a maximum length of 2km.

Certain additional features were also added to the Land-use Layer: Areas Liable to Flood, Pits Unspecified and Areas of Former Water.

In the early County Series mapping the words "Liable to Flood" are found next to some rivers. As the precise extent of the area liable to flooding was unknown the information was captured by digitising a point on the word "to". The extent of an area of "former" marsh is also not easily identifiable on the 1: 10,560 and 1: 10,000 maps. This information was captured by digitising points at 100-metre intervals for those marshes which are no longer visible in the latest map and are in the proximity of an area where that mapping indicates the likelihood of development.

A specific category, "Pits Unspecified", was created when the mapping symbology indicates a pit but no text appears on the map. These features were digitised in the relevant Epoch layers and copied into the Land-use layer when the following criteria were met:

- The pit is no longer visible on the latest map (epoch 6), or development has occurred where the pit had previously been
- The area of the pit is greater than 1ha on the ground and it is in the proximity of an area where the latest mapping indicates the likelihood of development.

Areas of "Former Water" (small streams, drains or ponds) were only digitised into the Land-use layer when the stream or pond was no longer visible on the latest map (epoch 6) and in the proximity of an area where the latest mapping indicates the likelihood of development.

Step Three: Digitising

The digitising of potentially contaminative features found during analysis was undertaken in-house using software derived from *Genamap*. A contamination layer was allocated to each of the six epochs plus a Land-use layer in the National Grid projection. The system allowed a link between the graphical elements stored in *Genamap* and the attribute data stored in an *Oracle* database which contained feature type and date information.

For the mapping pre-digitising checks were carried out to compare the processed images with the paper copies to ensure the best possible processed image was loaded onto the system. Each individual TIFF image was checked and then compared against the most up to date mapping (epoch 6). In this way any mismatch caused by shrinkage of the original scanned paper map was limited. Further mismatch differences between epochs were checked to ensure that they were limited to less than 20 metres.

In urban areas the screen was divided into 16 equal boxes. The digitising process was then carried out by zooming in to each box in turn. This gave a standard working scale of 1:3463. All digitising was carried out at this scale thus reducing the potential for compounded error due to different digitisers working at different scales on the same region. In rural areas the screen was divided into 9 boxes. All rural areas were then analysed at the scale of 1

:4684, but any digitising of features found in rural areas was done at 1:3463 (as in urban areas).

Railways were the first features to be digitised. Linear features were copied from the most up to date maps to all epochs in which they appeared. Starting at the edge of the map and working in, points were chosen along the length of the rail by tracing its length with the mouse cursor and clicking at chosen points along its length.

For Point and Area features a keyword (contamination / land-use types) was selected from the digitising application menu and then, depending on the classification, a point/area and or linear feature was digitised. Once the feature had been digitised the next point was chosen and allocated a new sequential number. The classification and the date of the map on which the feature has been digitised were assigned to the feature. The sequential number allocated was a 12-digit GIS Unique Reference Number, called a gisurn. If the same contaminative feature then appeared in the subsequent epoch and in the same position, the original feature was simply copied to the following epoch. This meant the copied feature kept the same reference number as the original feature, but the date of the map in the next epoch would also be assigned to the feature. This linked the same occurrence of a feature through all epochs.

When features appeared for the first time annotated "Old" or "Disused", they were identified as the first likely potentially contaminative activity at this location and thus digitised. In certain instances active features (such as quarries), which subsequently become disused, were taken as active when they extended to larger areas in the immediately previous epoch. Unless there was a change on the map in subsequent epochs, features were generally taken to be no longer active once the words "Old" or "Disused" were appended to their description on the map.

After digitising features relating to potential contaminative uses, a check of land use was carried out. All water was checked for disappearance from one map edition to another. If any items merited inclusion in the Land-use layer (e.g. ponds that are no longer apparent or any water in one epoch which has been built on in another) these items were digitised in the epoch prior to their disappearance. In this way these items were accurately delineated. As with contamination features, gisurns were automatically allocated and coded as "Potential **Fill** (Water)".

"Non-water Fill" was also highlighted in the Land-use layer as detailed in the Manual Analysis section but handled differently. Contaminative Use features with the possibility of potential fill were checked against the previous epoch. If there was no longer any evidence of the original feature then it was copied through into the Land-use layer at its greatest extent and a gisurn allocated.

In cases where neighbouring counties mapped the same geographical area, each County was analysed in turn until every map covering that area had been examined and a cumulative picture built up. This was done whether the same origin or different origins were used for each of the counties. Whenever potentially contaminative uses appeared at the edge of a map and also on adjacent sheets, all the sheets required were matched to their neighbours. In most cases these potentially contaminative uses were digitised as a single feature even though it crossed the dividing line on the original mapping.

All of these steps were repeated methodically through every box on the screen, from the first available map to the latest epoch.

Section Three: Quality Assurance

All digitisers underwent an extensive training programme. Subsequently, trainee digitisers received individual supervision until they reached a required ability level at which point they joined the main digitising team. A User Manual was created which defined how all features would be handled. All the data within the Landmark database has been through a rigorous three-part Quality Assessment:

- i. To ensure that the quality of the work undertaken was maintained, all digitised areas have been checked. In addition an independent group of experienced digitisers examined trial sections, generated at random on every area worked in.
- ii. Before digitising a new area, the scanning and cropping quality of each map was verified and the published date checked.
- iii. A supervisory team provided an overview of the process to ensure a uniformity of approach and this resulted in a high degree of accuracy within the project. Any areas of work which caused concern were thoroughly re-examined and any remedial action carried out.
- iv. Integrity of the digital data has been checked.

APPENDIX 9: TYPICAL CONTAMINANTS LINKED TO FORMER LAND USE

Comprising 6 pages.

| SOURCE | Contaminant | | | | | | | | | | | | | | | | | | | |
|--|-------------|----|----|----|----|----|----|----|---|----|----|---|----|---------------------|------------|---------|------|-------|-----|---|
| | Metals | | | | | | | | | | | | | Inorganic Chemicals | | | | | | |
| | Ba | Be | Cd | Cr | Cu | Pb | Hg | Ni | V | Zn | As | B | Se | S | Complex Cn | Free Cn | NO3- | SO42- | S2- | |
| Landuse | | | | | | | | | | | | | | | | | | | | |
| Airports. | | | | X | X | X | | | | | | | | | X | | | | | |
| Animal and animal products processing works. | | | X | X | | | | | | | X | | | | | | | X | X | |
| Asbestos manufacturing works. | | | X | X | | X | | | | | | | | | | | | X | | |
| Ceramics, cement and asphalt manufacturing works. | | | X | X | X | X | X | X | | X | X | | | | | | | | | X |
| Chemical works: coatings (paints and printing inks) manufacturing works | X | | X | X | X | X | | X | | X | | | | X | | | | X | | |
| Chemical works: cosmetics and toiletries manufacturing works. | | | X | X | | | | | | X | | | | | | | | | | X |
| Chemical works: disinfectants manufacturing works | X | | | | X | | X | X | | X | | | | | | | | | X | |
| Chemical works: explosives, propellants and pyrotechnics manufacturing works | X | | | X | X | X | X | X | | X | X | X | | | | | X | X | | |
| Chemical works: fertiliser manufacturing works. | | | X | X | X | X | | X | | X | | | | | | | | | | |
| Chemical works: fine chemicals manufacturing works. | | | X | X | | X | X | | X | | X | | | | | | X | X | | |
| Chemical works: inorganic chemicals manufacturing works | X | | X | X | X | X | X | X | X | X | X | X | X | | | X | X | X | X | X |
| Chemical works: linoleum, vinyl and bitumen-based floor covering . manufacturing works | | | X | | | X | | | | X | X | | | | | | | | X | |
| Chemical works: mastics, sealants, adhesives and roofing felt manufacturing works. | X | | X | X | X | X | X | | | X | X | | | | | | | | X | |
| Chemical works: organic chemicals manufacturing works | | | | X | X | X | | X | X | X | X | | | | | X | | X | | |
| Chemical works: pesticides manufacturing works. | | | | X | X | X | X | | | X | X | | | | | | | | | |
| Chemical works: pharmaceuticals manufacturing works. | | | | X | X | | X | | | X | X | | | | | | | | | |
| Chemical works: rubber processing works (including works manufacturing tyres or other rubber products). | | | | | | | | | | X | | | | X | | | | | | X |
| Chemical works: soap and detergent manufacturing works. | | | | | | | | | | | | | | | | | | | | |
| Dockyards and dockland. | | | X | X | X | X | X | X | | X | X | | | | | | | X | X | |
| Engineering works: aircraft manufacturing works. | | | X | X | X | X | X | | | X | | | | | | X | X | X | | |
| Engineering works: electrical and electronic equipment manufacturing works (including works manufacturing equipment containing PCBs). | | | X | X | X | X | X | X | | X | X | X | | | | | X | X | X | |
| Engineering works: mechanical engineering and ordnance works. | | X | X | X | X | X | X | X | X | X | X | X | | | | X | X | X | | |
| Engineering works: railway engineering works. | | | X | X | X | X | | X | | X | X | | | X | | | | | | X |
| Engineering works: shipbuilding, repair and shipbreaking (including naval shipyards). | | | | X | X | X | | X | | X | X | | | | | X | | | | |
| Engineering works: vehicle manufacturing works | | | X | X | X | X | | | | X | | | X | | | X | X | X | X | X |
| Gasworks, coke works and other coal carbonisation plants | | | X | X | X | X | X | | X | X | X | | | X | X | X | | X | X | X |
| Metal manufacturing, refining and finishing works: electroplating and other metal finishing works. | | | X | X | X | X | | | | X | | X | | | | X | X | X | X | X |
| Metal manufacturing, refining and finishing works: iron and steelworks. | | | | X | X | X | | X | X | X | X | | | X | | X | | X | X | X |
| PRINCIPLE RECEPTOR(S) | | | | | | | | | | | | | | | | | | | | |
| Humans | | X | X | X | | X | X | X | X | | X | | X | X | X | X | | | | |
| Water | X | X | X | X | X | X | X | X | X | X | X | X | X | | X | X | | X | X | |
| Vegetation/ecosystems | | X | X | | X | X | X | X | | X | | X | X | X | X | X | X | X | X | X |
| Construction Materials | | | | | | | | | | | | | | X | X | | | | X | X |

| SOURCE | Contaminant | | | | | | | | | | | | | | | | | | |
|---|-------------|----|----|----|----|----|----|----|---|----|----|---|----|---------------------|------------|---------|------|-------|-----|
| | Metals | | | | | | | | | | | | | Inorganic Chemicals | | | | | |
| | Ba | Be | Cd | Cr | Cu | Pb | Hg | Ni | V | Zn | As | B | Se | S | Complex Cn | Free Cn | NO3- | SO42- | S2- |
| Metal manufacturing, refining and finishing works: lead works. | | | X | X | X | X | | X | | X | X | | | | | | | X | X |
| Metal manufacturing, refining and finishing works: non-ferrous metal works (excluding lead works) | | | X | X | X | X | X | X | | | X | | | | | | | | X |
| Metal manufacturing, refining and finishing works: precious metal recovery works. | | | X | X | X | X | X | | | X | X | | | | | | X | X | X |
| Oil refineries and bulk storage of crude oil and petroleum products. | | | | | X | X | | X | | | | | | | | X | | | X |
| Power stations (excluding nuclear power stations). | X | X | X | X | X | X | X | X | X | X | X | | X | | | | | X | X |
| Pulp and paper manufacturing works. | | | X | X | | | | | | X | | X | X | | | | | | |
| Railway land | | | X | X | X | | | X | X | | | | | | | | | X | |
| Road vehicle fuelling, service and repair: garages and filling stations | | | | X | X | | | | | X | | | | | | | | | |
| Road vehicle fuelling, service and repair: transport and haulage centres. | | | | X | X | | | | X | X | | | | X | | | | | |
| Sewage works and sewage farms. | | | X | X | X | | | X | | X | X | | | | | X | X | X | X |
| Textile works and dye works. | | | X | X | X | | | | | | | X | | | | | X | X | |
| Timber products manufacturing works. | | | X | | X | | | | | X | X | X | | | | | | X | |
| Timber treatment works. | | | | X | X | | | | | X | X | X | | | | | | X | |
| Waste recycling, treatment and disposal sites: drum and tank cleaning and recycling plants. | | | X | X | | | | | | | | | | | | | | X | |
| Waste recycling, treatment and disposal sites: hazardous waste treatment plants. | X | | X | X | X | | | X | X | X | X | | X | | | | X | | |
| Waste recycling, treatment and disposal sites: landfills and other waste treatment or waste disposal sites. | | | X | X | X | | | X | | X | X | | | | | | | | X |
| Waste recycling, treatment and disposal sites: metal recycling sites. | X | | X | X | X | | | X | | X | X | | | | | X | | X | X |
| Waste recycling, treatment and disposal sites: solvent recovery works. | | | X | X | X | | | X | | X | | | | | | | | | |
| Charcoal works, | | | X | X | X | X | X | X | | X | X | | | | | X | X | X | |
| Dry-cleaners | | | X | X | X | X | X | | | X | X | | X | | | X | X | X | |
| Fibreglass and fibreglass resins manufacturing works | | | X | X | X | X | X | X | | X | X | | X | | | X | X | X | |
| Glass manufacturing works | | | X | X | | X | X | | | X | X | X | | | | X | X | X | |
| Photographic processing industry | | | X | X | X | X | X | | | X | X | | X | | | X | X | X | |
| Printing and bookbinding works | | | X | X | X | X | X | | | X | X | | X | | | X | X | X | |
| PRINCIPLE RECEPTOR(S) | | | | | | | | | | | | | | | | | | | |
| Humans | | X | X | X | | X | X | X | X | | X | | X | X | X | X | | | |
| Water | X | X | X | X | X | X | X | X | X | X | X | X | X | | X | X | | X | X |
| Vegetation/ecosystems | | X | X | | X | X | X | X | | X | | X | X | X | X | X | X | X | X |
| Construction Materials | | | | | | | | | | | | | | X | X | | | X | X |

| SOURCE | | | | | | | | |
|--|--------------------------|---------|--------------|-----------|--------------|------|---------------------------|--------------------------|
| Landuse | Contaminant | | | | | | | |
| | Organic Chemicals | | | | | | | |
| | Phenol | Acetone | Chlorophenol | Oil/Fuels | Aromatic HCs | PAHs | Chlorinated aliphatic HCs | Chlorinated aromatic HCs |
| Airports. | | X | | X | X | | X | |
| Animal and animal products processing works. | X | | | X | X | X | X | |
| Asbestos manufacturing works. | | | | X | X | X | X | |
| Ceramics, cement and asphalt manufacturing works. | | X | | X | | X | | |
| Chemical works: coatings (paints and printing inks) manufacturing works | X | | | X | X | X | X | |
| Chemical works: cosmetics and toiletries manufacturing works. | | X | | X | X | X | X | |
| Chemical works: disinfectants manufacturing works | X | | X | X | X | X | | X |
| Chemical works: explosives, propellants and pyrotechnics manufacturing works | X | X | | X | X | | X | |
| Chemical works: fertiliser manufacturing works. | | | | X | | X | | |
| Chemical works: fine chemicals manufacturing works. | X | X | | X | X | X | | |
| Chemical works: inorganic chemicals manufacturing works | | | | X | | X | | |
| Chemical works: linoleum, vinyl and bitumen-based floor covering . manufacturing works | X | | | X | X | X | X | X |
| Chemical works: mastics, sealants, adhesives and roofing felt manufacturing works. | X | | | X | X | X | X | |
| Chemical works: organic chemicals manufacturing works | X | X | | X | X | | X | X |
| Chemical works: pesticides manufacturing works. | X | | X | X | X | | X | |
| Chemical works: pharmaceuticals manufacturing works. | | | | X | X | X | X | X |
| Chemical works: rubber processing works (including works manufacturing tyres or other rubber products). | X | | | X | X | | X | |
| Chemical works: soap and detergent manufacturing works. | | X | | X | X | X | | |
| Dockyards and dockland. | X | | | X | | X | X | X |
| Engineering works: aircraft manufacturing works. | | X | | X | X | | X | |
| Engineering works: electrical and electronic equipment manufacturing works (including works manufacturing equipment containing PCBs). | | | | X | X | | X | |
| Engineering works: mechanical engineering and ordnance works. | X | X | | X | X | X | X | |
| Engineering works: railway engineering works. | | | | X | X | X | X | |
| Engineering works: shipbuilding, repair and shipbreaking (including naval shipyards). | | X | | X | X | | X | |
| Engineering works: vehicle manufacturing works | | X | | X | X | X | X | |
| Gasworks, coke works and other coal carbonisation plants | X | | | X | X | X | | |
| Metal manufacturing, refining and finishing works: electroplating and other metal finishing works. | X | | | X | X | | X | |
| Metal manufacturing, refining and finishing works: iron and steelworks. | X | | | X | X | X | | |
| PRINCIPLE RECEPTOR(S) | | | | | | | | |
| Humans | X | X | X | X | X | X | X | X |
| Water | X | X | X | X | X | X | X | X |
| Vegetation/ecosystems | X | | X | X | X | | X | X |
| Construction Materials | X | | X | X | X | | X | |

| SOURCE | | | | | | | | |
|---|--------------------------|---------|--------------|-----------|--------------|------|---------------------------|--------------------------|
| Landuse | Contaminant | | | | | | | |
| | Organic Chemicals | | | | | | | |
| | Phenol | Acetone | Chlorophenol | Oil/Fuels | Aromatic HCs | PAHs | Chlorinated aliphatic HCs | Chlorinated aromatic HCs |
| Metal manufacturing, refining and finishing works: lead works. | | | | X | | X | | |
| Metal manufacturing, refining and finishing works: non-ferrous metal works (excluding lead works) | | | | X | | X | | |
| Metal manufacturing, refining and finishing works: precious metal recovery works. | | | | X | X | X | | |
| Oil refineries and bulk storage of crude oil and petroleum products. | X | X | | X | X | | | |
| Power stations (excluding nuclear power stations). | | | | X | | X | X | |
| Pulp and paper manufacturing works. | | | | X | | | X | X |
| Railway land | | | | X | | X | X | |
| Road vehicle fuelling, service and repair: garages and filling stations | | | | X | X | X | X | |
| Road vehicle fuelling, service and repair: transport and haulage centres. | | X | | X | X | X | X | |
| Sewage works and sewage farms. | | | | X | | | X | X |
| Textile works and dye works. | X | X | | X | X | | X | |
| Timber products manufacturing works. | X | X | | X | X | X | | |
| Timber treatment works. | X | | X | X | X | X | X | |
| Waste recycling, treatment and disposal sites: drum and tank cleaning and recycling plants. | | X | | X | X | | | |
| Waste recycling, treatment and disposal sites: hazardous waste treatment plants. | X | | | X | | | X | X |
| Waste recycling, treatment and disposal sites: landfills and other waste treatment or waste disposal sites. | | | | X | | X | X | X |
| Waste recycling, treatment and disposal sites: metal recycling sites. | | | | X | | | X | |
| Waste recycling, treatment and disposal sites: solvent recovery works. | | | | X | | | X | X |
| Charcoal works | | X | | X | X | | X | |
| Dry Cleaners | | | | X | X | | X | |
| Fibreglass and fibreglass resins manufacturing works | X | X | | X | X | | X | |
| Glass manufacturing works | | X | | X | X | X | | |
| Photographic processing industry | | X | | X | X | | X | |
| Printing and bookbinding works | | X | | X | X | | X | |
| PRINCIPLE RECEPTOR(S) | | | | | | | | |
| Humans | X | X | X | X | X | X | X | X |
| Water | X | X | X | X | X | X | X | X |
| Vegetation/ecosystems | X | | X | X | X | | X | X |
| Construction Materials | X | | X | X | X | | X | |

| SOURCE | | | | | | | |
|--|-------------|------|----------------|----------------------|----------|----|-----------------------|
| Landuse | Contaminant | | | | | | |
| | Others | | | | | | |
| | Pesticides | PCBs | Dioxins/Furans | Organolead compounds | Asbestos | pH | Hexachlorocyclohexane |
| Airports. | | X | | | X | X | |
| Animal and animal products processing works. | X | | | | | | |
| Asbestos manufacturing works. | | X | | | X | | |
| Ceramics, cement and asphalt manufacturing works. | | X | | | X | X | |
| Chemical works: coatings (paints and printing inks) manufacturing works | | | | | X | X | |
| Chemical works: cosmetics and toiletries manufacturing works. | | | | | X | X | |
| Chemical works: disinfectants manufacturing works | | X | X | | | X | |
| Chemical works: explosives, propellants and pyrotechnics manufacturing works | | X | | | X | X | |
| Chemical works: fertiliser manufacturing works. | | X | | | X | X | |
| Chemical works: fine chemicals manufacturing works. | | X | X | | X | | |
| Chemical works: inorganic chemicals manufacturing works | | | | | X | X | |
| Chemical works: linoleum, vinyl and bitumen-based floor covering . manufacturing works | | X | | | X | X | |
| Chemical works: mastics, sealants, adhesives and roofing felt manufacturing works. | | | | | X | X | |
| Chemical works: organic chemicals manufacturing works | | | | | X | X | |
| Chemical works: pesticides manufacturing works. | X | X | X | | X | X | X |
| Chemical works: pharmaceuticals manufacturing works. | | X | | | X | X | |
| Chemical works: rubber processing works (including works manufacturing tyres or other rubber products). | | X | | | | | |
| Chemical works: soap and detergent manufacturing works. | | | | | | X | |
| Dockyards and dockland. | | X | | | X | | X |
| Engineering works: aircraft manufacturing works. | | X | | | X | X | |
| Engineering works: electrical and electronic equipment manufacturing works (including works manufacturing equipment containing PCBs). | | X | | | X | X | |
| Engineering works: mechanical engineering and ordnance works. | | X | | | X | X | |
| Engineering works: railway engineering works. | | X | | | X | X | |
| Engineering works: shipbuilding, repair and shipbreaking (including naval shipyards). | | | | | X | X | |
| Engineering works: vehicle manufacturing works | | X | | | X | X | |
| Gasworks, coke works and other coal carbonisation plants | | | | | X | X | |
| Metal manufacturing, refining and finishing works: electroplating and other metal finishing works. | | | | | X | X | |
| Metal manufacturing, refining and finishing works: iron and steelworks. | | X | | | X | X | |
| PRINCIPLE RECEPTOR(S) | | | | | | | |
| Humans | X | X | X | X | X | X | X |
| Water | X | X | X | | | X | X |
| Vegetation/ecosystems | X | X | X | X | | X | X |
| Construction Materials | | | | | | X | |

| SOURCE | Contaminant | | | | | | |
|---|--------------------|------|----------------|----------------------|----------|----|-----------------------|
| Landuse | Others | | | | | | |
| | Pesticides | PCBs | Dioxins/Furans | Organolead compounds | Asbestos | pH | Hexachlorocyclohexane |
| Metal manufacturing, refining and finishing works: lead works. | | X | | | X | | |
| Metal manufacturing, refining and finishing works: non-ferrous metal works (excluding lead works) | | X | | | X | X | |
| Metal manufacturing, refining and finishing works: precious metal recovery works. | | X | | | X | X | |
| Oil refineries and bulk storage of crude oil and petroleum products. | | X | | X | X | X | |
| Power stations (excluding nuclear power stations). | | X | | | X | X | |
| Pulp and paper manufacturing works. | | X | X | | | | X |
| Railway land | | X | | | X | | |
| Road vehicle fuelling, service and repair: garages and filling stations | | | | X | X | X | |
| Road vehicle fuelling, service and repair: transport and haulage centres. | | | | X | X | X | |
| Sewage works and sewage farms. | | X | | | X | X | |
| Textile works and dye works. | X | X | | | X | X | |
| Timber products manufacturing works. | | | | | | | |
| Timber treatment works. | X | | | | X | X | X |
| Waste recycling, treatment and disposal sites: drum and tank cleaning and recycling plants. | | X | | | X | | |
| Waste recycling, treatment and disposal sites: hazardous waste treatment plants. | X | X | | | X | X | X |
| Waste recycling, treatment and disposal sites: landfills and other waste treatment or waste disposal sites. | | X | X | | | X | |
| Waste recycling, treatment and disposal sites: metal recycling sites. | | X | | | X | X | |
| Waste recycling, treatment and disposal sites: solvent recovery works. | | | | | X | X | |
| Charcoal works | | X | | | X | X | |
| Dry cleaners | | X | | | | | |
| Fibreglass and fibreglass resins manufacturing works | | X | | | X | X | |
| Glass manufacturing works | | X | | | X | X | |
| Photographic processing industry | | X | | | X | X | |
| Printing and bookbinding works | | X | | | X | X | |
| PRINCIPLE RECEPTOR(S) | | | | | | | |
| Humans | X | X | X | X | X | X | X |
| Water | X | X | X | | | X | X |
| Vegetation/ecosystems | X | X | X | X | | X | X |
| Construction Materials | | | | | | X | |

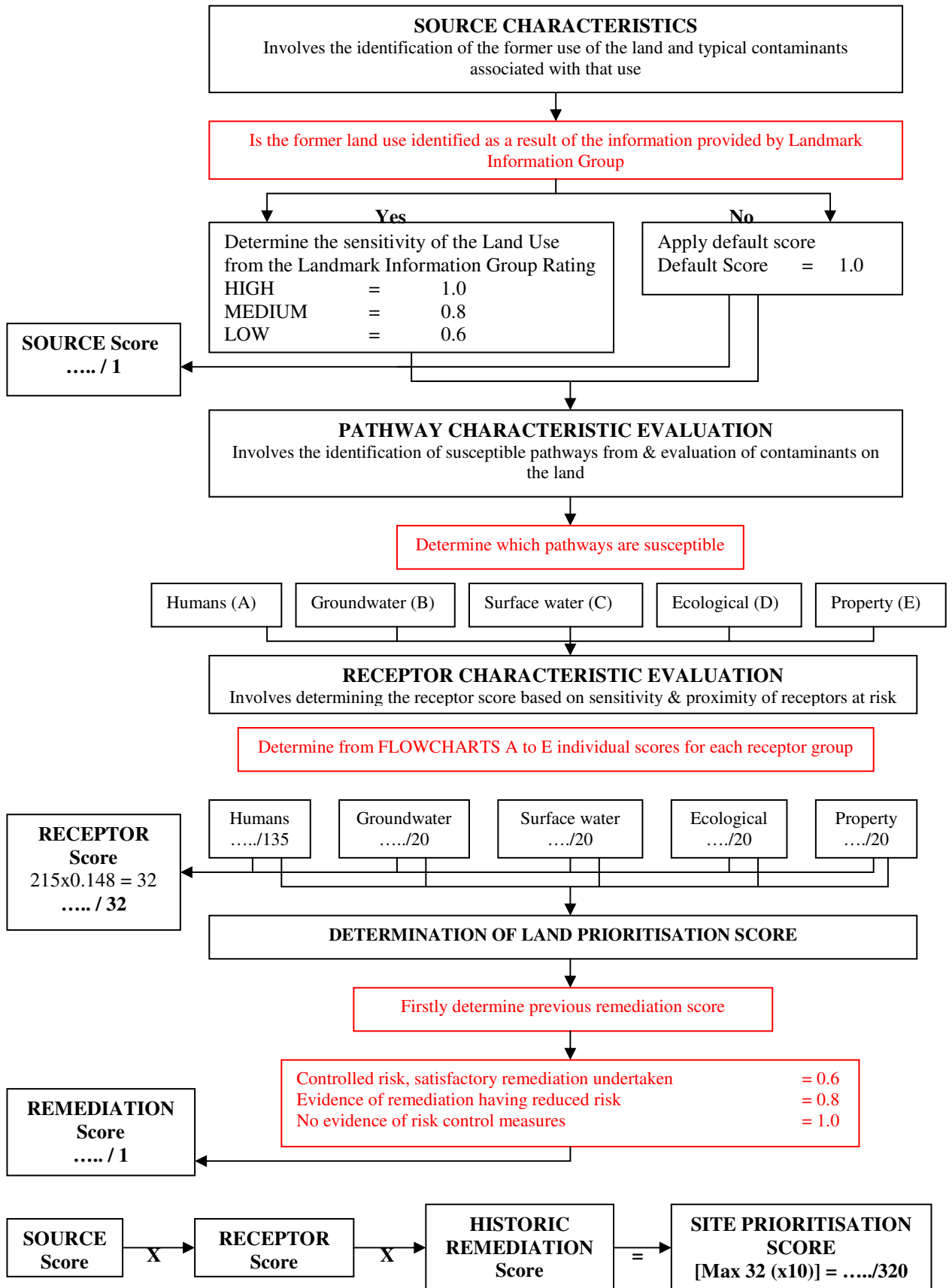
APPENDIX 10: HUMAN EXPOSURE ASSESSMENT MATRIX

| | | | | | | | | |
|-------------|------------|------------|---------|-----------|----------------------|-------------|------------|-------------------|
| Residential | Commercial | Industrial | Schools | Nurseries | Recreational Grounds | Playgrounds | Allotments | Agricultural Land |
|-------------|------------|------------|---------|-----------|----------------------|-------------|------------|-------------------|

| | | | | | | | | | |
|--|-----|----|----|-----|-----|----|----|----|----|
| Critical Receptor at Risk | 3 | 1 | 1 | 2 | 3 | 2 | 3 | 1 | 1 |
| Outdoor Ingestion of Soil | | | | | | | | | |
| Typical Frequency of exposure to pathway | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 |
| Typical length of exposure to pathway | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 3 | 3 |
| Likelihood of critical receptors behaviour resulting in inadvertent exposure via pathway | 3 | 0 | 0 | 3 | 3 | 0 | 3 | 3 | 3 |
| | 7 | 2 | 2 | 7 | 7 | 1 | 4 | 6 | 6 |
| Indoor Ingestion of Dust | | | | | | | | | |
| Typical Frequency of exposure to pathway | 3 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 |
| Typical length of exposure to pathway | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 |
| Likelihood of critical receptors behaviour resulting in inadvertent exposure via pathway | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| | 12 | 6 | 6 | 6 | 9 | 0 | 0 | 0 | 0 |
| Skin Contact with outdoor Soil | | | | | | | | | |
| Typical Frequency of exposure to pathway | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 |
| Typical length of exposure to pathway | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 3 | 3 |
| Likelihood of critical receptors behaviour resulting in inadvertent exposure via pathway | 3 | 3 | 0 | 3 | 3 | 3 | 3 | 3 | 3 |
| | 7 | 5 | 2 | 7 | 7 | 4 | 4 | 6 | 9 |
| Skin contact with indoor dust | | | | | | | | | |
| Typical Frequency of exposure to pathway | 3 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 |
| Typical length of exposure to pathway | 3 | 2 | 3 | 2 | 3 | 0 | 0 | 0 | 0 |
| Likelihood of critical receptors behaviour resulting in inadvertent exposure via pathway | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 |
| | 12 | 4 | 6 | 7 | 9 | 0 | 0 | 0 | 0 |
| Outdoor Inhalation of Fugitive Dust | | | | | | | | | |
| Typical Frequency of exposure to pathway | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 |
| Typical length of exposure to pathway | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 3 | 1 |
| Likelihood of critical receptors behaviour resulting in inadvertent exposure via pathway | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | 7 | 7 | 7 | 7 | 7 | 4 | 4 | 6 | 5 |
| Indoor Inhalation of Dust | | | | | | | | | |
| Typical Frequency of exposure to pathway | 3 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 |
| Typical length of exposure to pathway | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 |
| Likelihood of critical receptors behaviour resulting in inadvertent exposure via pathway | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 |
| | 12 | 9 | 9 | 9 | 9 | 0 | 0 | 0 | 0 |
| Outdoor Inhalation of Soil Vapour | | | | | | | | | |
| Typical Frequency of exposure to pathway | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 |
| Typical length of exposure to pathway | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 |
| Likelihood of critical receptors behaviour resulting in inadvertent exposure via pathway | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | 9 | 7 | 7 | 7 | 7 | 4 | 4 | 4 | 5 |
| Indoor Inhalation of Soil Vapour | | | | | | | | | |
| Typical Frequency of exposure to pathway | 3 | 2 | 3 | 2 | 2 | 0 | 0 | 0 | 0 |
| Typical length of exposure to pathway | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 |
| Likelihood of critical receptors behaviour resulting in inadvertent exposure via pathway | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 |
| | 12 | 9 | 12 | 9 | 9 | 0 | 0 | 0 | 0 |
| Total/96 | 78 | 49 | 51 | 59 | 64 | 13 | 16 | 22 | 25 |
| Total multiples by Critical Receptor Value | 234 | 49 | 51 | 118 | 192 | 26 | 48 | 22 | 25 |

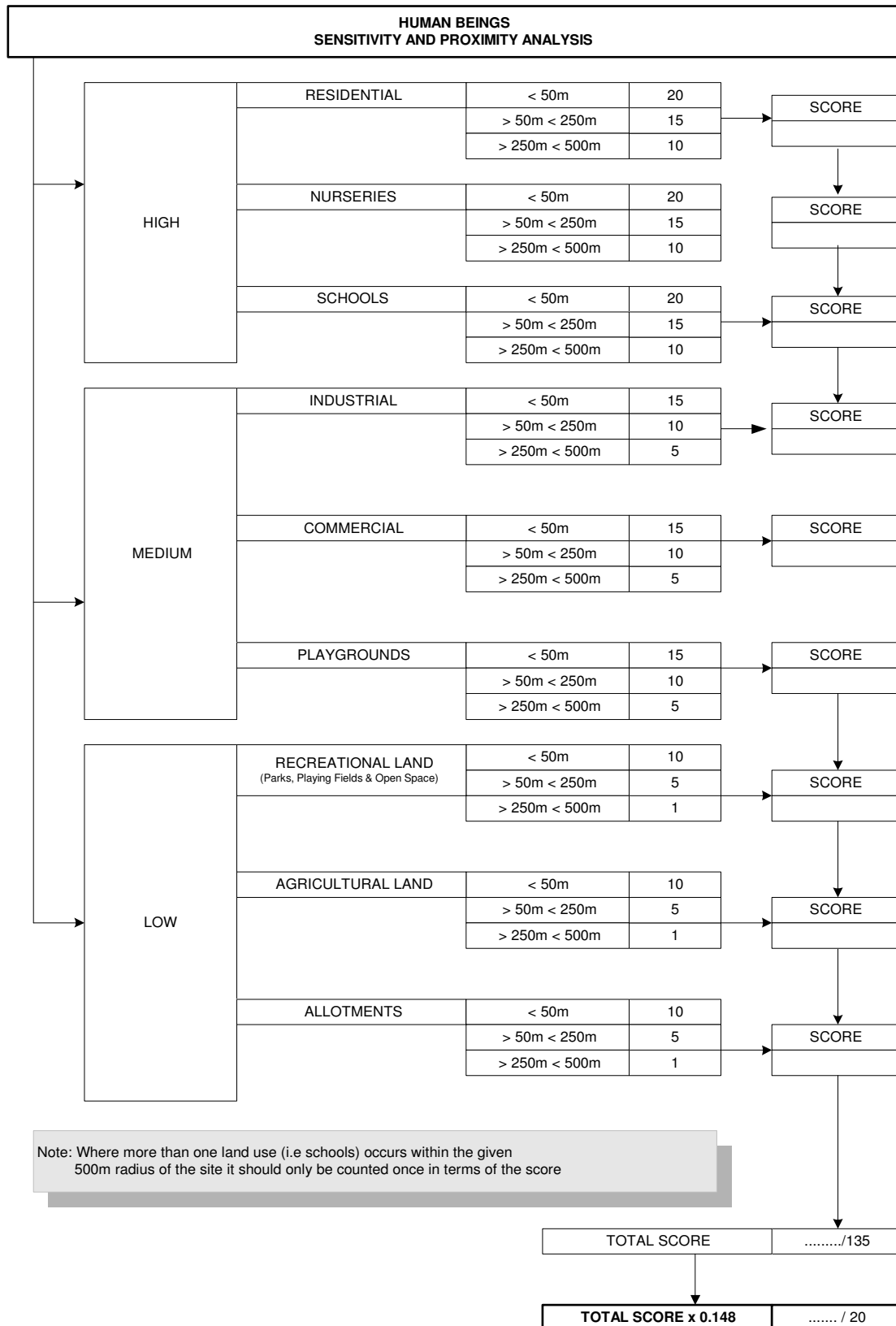
APPENDIX 11: MODEL FLOWCHARTS

NHDC CONTAMINATED LAND SITE PRIORITISATION MODEL



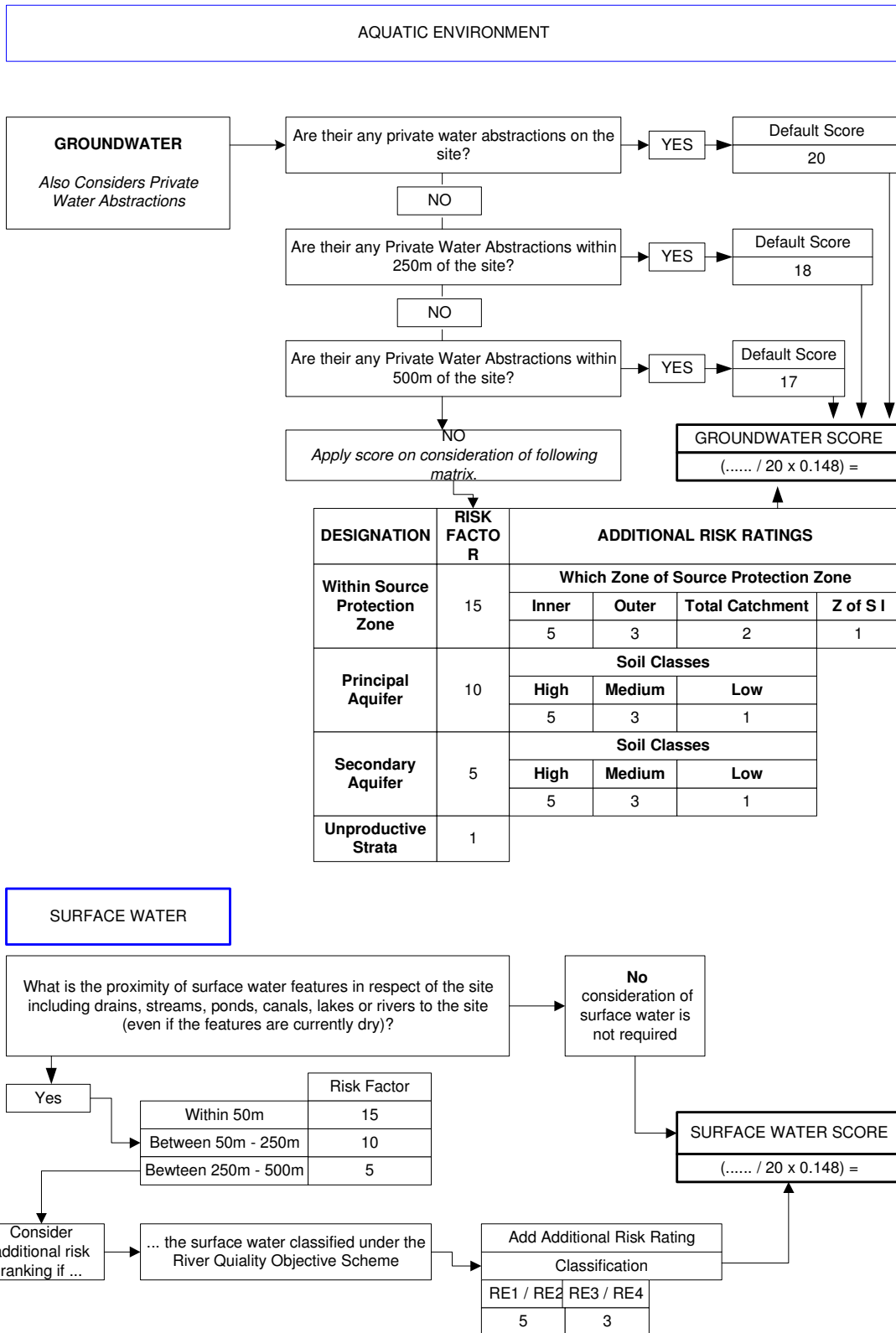
APPENDIX 11: MODEL FLOWCHARTS continued

FLOWCHART A



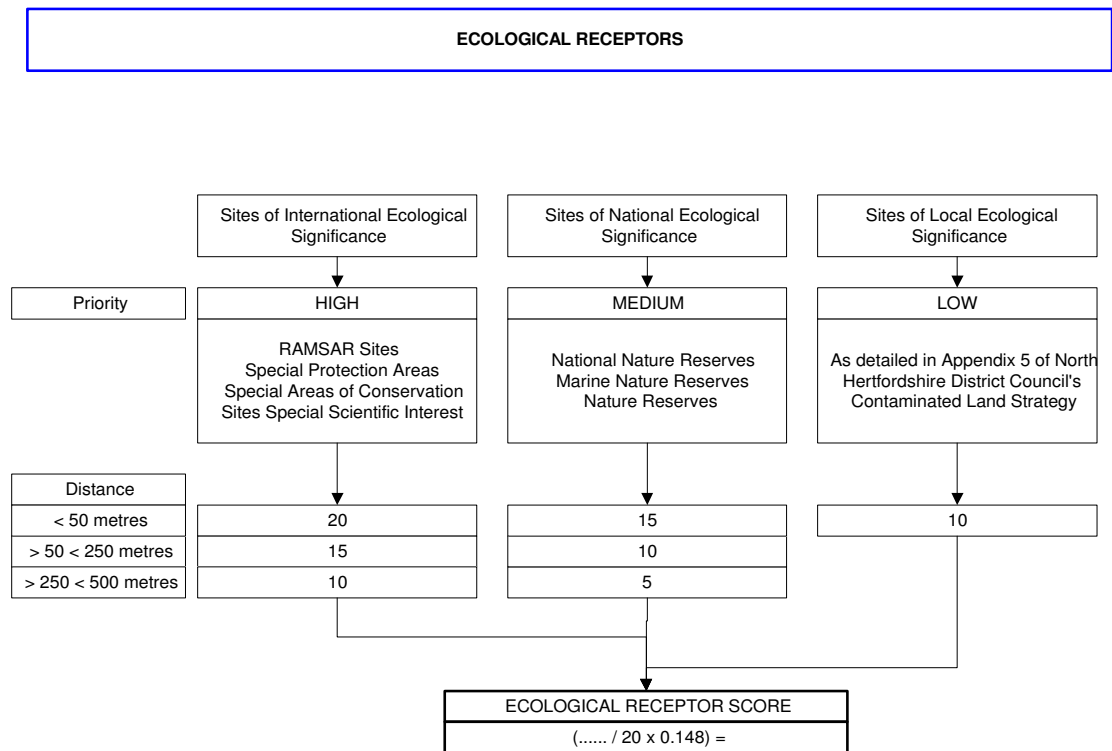
APPENDIX 11: MODEL FLOWCHARTS continued

FLOWCHART B and FLOWCHART C



APPENDIX 11: MODEL FLOWCHARTS continued

FLOWCHART D



APPENDIX 11: MODEL FLOWCHARTS continued

FLOWCHART E

PROPERTY RECEPTORS

Note: If site is within 250m of a gassing landfill site apply default and ignore matrix below.

