Report for Resolution

Report to	Executive 26 May 2010	6
Report of	Head of City Wide Services	
Subject	Review of Contaminated Land Strategy	

Purpose

To update members on progress being made on the investigation of potentially contaminated land in Norwich.

Recommendations

Executive are asked to note the content of this report and agree the approach to the investigation of potentially contaminated land within the attached strategy review.

Financial Consequences

The financial consequences of this report are zero; all costs associated with the report and future work streams will be absorbed in the general running cost of the service.

Risk Assessment

The review of the Council's contaminated land strategy is in accordance with current legislation and government guidance on local authority interventions and enforcement action to address contaminated land sites. The likelihood of any risk arising from following the review and implementation of the recommendations are considered to be unlikely and would have minor consequences. The financial risk is addressed above.

Strategic Priority and Outcome/Service Priorities

The report helps to meet the strategic priority "Safe and healthy neighbourhoods – working in partnership with residents to create neighbourhoods where people feel secure, where the streets are clean and well maintained, where there is good quality housing and local amenities and where there are active local communities" and the service plan priority putting environmental sustainability, culture and creativity at the heart of everything we do.

Executive Member: Councillor Bremner - Community Safety and Community Cohesion

Ward: Thorpe Hamlet

Contact Officers

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Background Documents

None

Report

1. The Contaminated Land provisions contained in Part IIA of the Environmental Protection Act 1990 requires each Local Authority to "*cause its area to be inspected from time to time for the purposed of identifying contaminated land"*

2. The definition of *"Contaminated Land"* relates to unacceptable risks to human health, and/or the environment in the form of controlled waters, ecosystems or property.

3. The legislation sets clear criteria to be met before land can formally be designated as Contaminated Land, and all such land must be detailed in a public register maintained by the Council at its main office.

4. The council published a strategy in June 2001, which details how it proposed to implement its inspection duties. The general priorities of the strategy were to:

   - Protect the health of the citizens of Norwich
   - Manage Council controlled land in relation to past current and future liabilities
   - Continue to maintain the City's heritage and its natural environment
   - Actively promote the land reuse and development for the benefit of the City.

5. The Council is the lead regulator on Contaminated Land for the City, but works in partnership with other organisations such as the Environment Agency.

6. The Contaminated Land regime gives the Council extensive powers to require the remediation of land formally designated as contaminated. However, the expectation in Government's guidance to Councils is that the majority of Contaminated Land remediation will be carried out under Planning and Development Control when redevelopment of land takes place, and not Part IIA of the above Act.

7. To this extent, the Council will continue to encourage the re-use of *"brownfield sites"*, and where possible support parties wishing to undertake voluntary remediation of land.

8. Overall, the aim of the regime is to identify all Contaminated Land, and this review, in combination with the original Strategy, provides a rational, ordered and efficient approach to address Contaminated Land within the City.

ENVIRONMENTAL PROTECTION ACT 1990, PART 2A

NORWICH
City Council

NORWICH CITY COUNCIL

CONTAMINATED LAND STRATEGY REVIEW 2009/10

Michael Stephenson, Regulatory Services Manager

April 2010

This Report, the Norwich City Council Contaminated Land Strategy Review 2009/10 has been prepared by STM Environmental Ltd., in consultation with and on behalf of on behalf of Norwich City Council

STM ENVIRONMENTAL
Environmental Consulting, Software and Training

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Executive Summary

Norwich City Council's Contaminated Land Inspection Strategy (The Strategy) was adopted in 2001 as part of the authority's duties under Part 2A of the Environmental Protection Act 1990 (Part 2A).

STM Environmental Ltd have been commissioned to complete a review of The Strategy .

This review examines progress to date with implementing Norwich City Council's Contaminated Land Strategy against a changing national and local legislative context and identifies work that remains outstanding.

The review also examines current procedures for investigating contaminated land as outlined in The Strategy and highlights key procedures that require updating.

Changes to The Strategy are outlined in Appendix 2

The document, once adopted forms an addendum to The Strategy.

1. Introduction

1.1. Scope and Purpose

1.1.1. This document has been produced by STM Environmental Ltd for and on behalf of Norwich City Council's Regulatory Services Manager, the designated officer with overall responsibility for environmental issues within the City.

1.1.2. The document should be read in conjunction with the original (and current) strategy , The Norwich City Council Contaminated Land Strategy 2001 (The Strategy) .

1.1.3. All views expressed within this document are those of STM Environmental Ltd in consultation with Norwich City Council's Regulatory Services Manager.

1.1.4. Subject to formal adoption the document forms an addendum to The Strategy, changes to The Strategy being outlined at Appendix 2

1.2. Legislative Background

1.2.1. Part 2A of the Environmental Protection Act 1990 which came into force in April 2000, created a new system for the identification and remediation of contaminated land. The responsibility for implementing and enforcing this legislation rests with local authorities.

1.2.2. In particular, under the legislation, each local authority was required to "…cause its area to be inspected from time to time for the purpose.

(i) Of identifying contaminated land; and

(ii) Of enabling the authority to decide whether any such land is land which is required to be designated as a special site."

1.2.3. Section 78(20 of the Environmental Protection Act 1990 defines contaminated land for the purposes of Part 2A of the Act as:

"*Any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:*

- *significant harm is being caused or there is a significant possibility of such harm being caused; or*
- *pollution of controlled waters is being, or is likely to be, caused".*

1.3. The Strategic Approach to Inspection

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

1.3.2. In developing this strategic approach the local authority should reflect local circumstances.

1.3.3. The legislation required each local authority to set out its approach as a written strategy, to be formally adopted and published. In developing the approach local authorities were required to consult with appropriate public bodies such as the Environment Agency.

1.3.4. Strategies vary from local authority to local authority reflecting different priories and problems. Guidance does dictate, however, that all strategies should include a specified range of key elements.

1.4. The Role of Contaminated Land Inspection Strategy Review

1.4.1. Legislation requires that local authorities should keep their strategy under periodic view. There is no guidance on how the review should be undertaken or how often.

1.4.2. Most local authorities specify the review period within the strategy itself, typically this varies between every 1 to 5 years.

1.4.3. For the purposes of this document the review process shall comprise the following elements:

a) An examination of recent changes in legislation and guidance on a national and local level.

b) a review of progress with contaminated land inspection within Norwich City Council's area and identification of outstanding objectives (gap analysis).

c) a review of current applicability of procedures within The Strategy

d) discussion and recommendations for changes to the Contaminated Land Inspection Strategy.

2. National and Local Context-Update

2.1. Legislative Changes

2.1.1. In 2004 the legal definition of groundwater was amended, so that only groundwater below the water table is now considered as controlled water for the Part 2A contaminated land regime.

2.1.2. In August 2006 the Part 2A contaminated land regime was extended by further legislation and guidance, the principal purpose of which was to address land contaminated by virtue of radioactivity.

2.1.3. The new legislation included the Radioactive Contaminated Land (Enabling Powers) (England) Regulations 2005 (S.I. 2005/3467) and the Radioactive Contaminated Land (Modification of Enactments) (England) Regulations 2006 (S.I. 2006/1379). Also introduced as part of the revised regime were the Contaminated Land (England) Regulations 2006 (S.I. 2006/1380), which were made under sections 78C, 78E, 78G, 78L, 78R and 78X of the Environmental Protection Act 1990.

2.1.4. In addition to the changes applying to radioactivity and contaminated land, changes were also made to the appeals procedure in respect of enforcement action, whereby any appeal will now be heard by the Secretary of State.

2.1.5. Appropriate statutory guidance was also updated and introduced accordingly. In particular, specific guidance was introduced giving guidance on how to deal with radioactivity as part of the contaminated land regime.

2.1.6. Defra has also published an extension to its Industry Profile series dealing with radioactive contaminated land on its website.

2.1.7. A Regulatory Impact Assessment (RIA) on the original implementation of the Part 2A regime was prepared and published in 2000. A partial RIA for the extension of the regime was published for consultation in July 2005. Following the consultation process a small amount of additional funding (£1130 average per authority) was made available for local authority's to take into account radioactivity as part of the contaminated land regime in their respective areas.

2.2. National Technical Guidance and Advice Update

2.2.1. The principal technical guidance for the contaminated land regime is available in the form of government-backed technical guidance produced by the Environment Agency. Of particular interest to local authorities is that guidance which constitutes the Contaminated Land Exposure Assessment (CLEA) regime.

2.2.2. Critical to the regime is the use of the CLEA Exposure Model to derive Soil Guideline Values (SGV's.) SGV's for a range of substances have been developed and published (first published 2001) by the Environment Agency and are commonly in use for generic site risk assessments. SGV's are derived by estimating the level of a substance in soil that will result in an amount of that contaminant entering a human body that is equal to the relevant Health Criteria Values (HCV). SGV's are thus scientifically based generic assessment criteria to help evaluate long-term risks to human health from chemical contamination in soil and therefore a vital tool in assessing whether or not land is contaminated land. Individuals may also use the CLEA model to derive their own SGV's to reflect more site-specific circumstances, or may use other models as long as it can be demonstrated that they comply with UK legislation.

2.2.3. However, in 2005 Defra produced a document that stated that the levels of contamination in excess of Soil Guideline Values (SGV's) in "CLEA" guidance should not be seen as automatically indicative of "contaminated land" for the purposes of Part 2A (see paragraph 2,2,6 for specific guidance) but rather as "trigger values" exceedences of which may be of concern for human health.

2.2.4. In late 2006, Defra published a discussion paper called "Soil Guideline Values: the Way Forward". The paper discussed various ideas for how the non-statutory "CLEA" technical guidance (first published by the Environment Agency and Defra in 2002) might be amended to make it more useful to assessors conducting risk assessments, and to help decide whether land qualifies as *contaminated land* under Part 2A of the Environmental Protection Act 1990.

2.2.5. In March 2007, the "Rogers Review" identified national enforcement priorities for local authority regulatory services. Unlike Air Quality, Contaminated land was not identified as a national high priority although it was clearly identified as a potential local priority.

2.2.6. In July 2008, the response to the consultation exercise in respect of "Soil Guideline Values: the Way Forward" was published by Defra. The response document made it clear that due to issues highlighted there was a need to radically revise the existing technical guidance in respect of Soil Guideline Values and how they should be used.

2.2.7. In July 2008, and as highlighted in the response document, Defra and the Environment Agency withdrew all the technical guidance relating to soil guideline values and their usage stating that they "no longer fully reflect the revised approach."

2.2.8. Also in July 2008 specific "Guidance on the Definition of Contaminated Land" was issued by Defra. This made it clear that site specific risk assessments in order to determine SPOSH (Significant Possibility of Possible Harm) would be necessary before local authorities could consider land as contaminated land for the purposes of Part2A. The withdrawal of "CLEA" technical guidance in respect of soil guidelines left many local authorities hesitant about progressing with Part 2A work. Revised CLEA documentation began to emerge in August 2008 with the final updated package being produced in January 2009. Publication of revised SGV reports with associated Tox reports and discussion documents about their derivation commenced in March 2009 and there are now some eleven SGV's published by the Environmental Agency.

2.3. State of Contaminated Land in England and Wales

2.3.1. In February 2009, the Environment Agency published their second statutory report on the state of *contaminated land* for England (and the first report for Wales), The report gives an overview of the progress made in identifying and remediating *contaminated land* since Part 2A was introduced in 2000 (England) and 2001 (Wales) until 31 March 2007. Information for the report was supplied by local authorities. Conclusions from the report included:

a) Land contamination in England and Wales is mainly dealt with through the planning system with local authorities estimating that only around 10 per cent of contaminated sites are dealt with under Part 2A.

b) All local authorities have produced strategies for inspecting their areas for *contaminated land*.

c) By the end of March 2007, most local authorities had inspected less than 10 per cent of their areas for *contaminated land*.

d) The cost of inspecting sites in England and Wales, including sites determined as *contaminated land*, designated *special sites* and sites that did not need to be determined, is around £30 million.

e) By the end of March 2007, 781 sites had been determined under Part 2A, including 35 designated *special sites*. Of the 746 *contaminated land* (non-special) sites, local authorities reported that 144 had been completely remediated.

f) Local authorities reported that the remediation of most *contaminated land* sites starts more than one year after the site has been determined and that the time it takes to remediate sites can range considerably between a number of months to many years.

g) Where sites have been remediated, this has mainly been through excavation and off-site disposal of material (colloquially known as dig and dump). Local authorities reported that this is also the most common way proposed for treating sites that have not yet been remediated

2.4. Local e-Government

2.4.1. The local e-Government agenda introduced in 2001 sought to ensure that all public dealings with government would be deliverable electronically by 2005. In particular the following services were highlighted as being of particular importance:

a) providing information
b) collecting revenue
c) providing benefits and grants
d) consultation
e) regulation
f) applications for services
g) booking venues, resources and courses
h) paying for goods and services
i) providing access to community, professional or business networks
j) procurement

2.4.2. Particular technology examples of high priority outcomes from the initiative include:

a) Document management systems

b) Geographical Information Systems (GIS)

2.5. Local Context

2.5.1. It was recognised within The Strategy that relatively few sites were likely to be defined as contaminated land for the purposes of Part 2A.

2.5.2. Although fully committed to the Part 2A contaminated land regime, it has always been of relatively low priority in comparison to for example air quality issues. In 2007 upon the publication of the Rogers Review (2.2.5) contaminated land was not identified as locally significant in Norwich. This is reflected in that:

a) There was and is no dedicated contaminated land officer for the authority.

b) There is no dedicated contaminated land budget.

2.5.3. Officers have sought to maximize cost effectiveness by concentrating on providing an advisory role through the planning process rather than be pursuing a proactive role through Part2A.

3. Progress Review

3.1. Overview of The Strategy

3.1.1. Norwich City Council adopted their first Contaminated Land Inspection Strategy in 2001 (The Strategy).

3.1.2. The delegated lead officer for environmental issues, including contaminated land, within Norwich City Council was at the time of The Strategy, The Head of Environmental Health Services. The corporate responsibility was given to the Contaminated Land Steering Group which comprised officers from all sections of the council. The Contaminated Land Steering Group was responsible for drafting The Strategy.

3.1.3. The stated general priorities of the Strategy are to:

- Protect the health of the citizens of Norwich
- Manage Council controlled land in relation to past, current and future liabilities
- Continue to maintain the City's heritage and its natural environment
- Actively promote land reuse and development for the benefit of the City

3.1.4. Detailed consultation was undertaken with all statutory consultees and stakeholders prior to publication of The Strategy.

3.1.5. The Strategy was to concentrate initially on council owned land and land designated for development in the Local Plan.

3.1.6. The Council's stated intention was to continue to encourage the use of "brownfield" sites.

3.2. Key Objectives of the Strategy

3.2.1. The Aims, Objectives, Priorities and Timescales are detailed in full within The Strategy which should be read in conjunction with this report.

3.2.2. The key objectives of the The Strategy, including timescales where appropriate, are:

a) To collate existing information on known contaminated sites from both internal and external sources.

b) All information relating to contaminated land work within the city is to be recorded on the corporate GIS system.

c) To identify all potentially contaminated sites.

d) The Head of Property Services to develop a work programme within nine months of the adoption of the strategy to look at council owned property. All sites in which the council is a stakeholder are to be screened and inspected

e) A preliminary survey of the City to be completed within 1 year of commencement, concentrating on and identifying areas of greatest risk.

f) The council will prioritise its investigations to look initially at land which is now used as nursery schools, schools playing fields, residential accommodation, gardens and allotments or where local knowledge identifies potentially contaminated land as adjacent to controlled waters.

g) Categorised (prioritised) sites to be included in an inspection programme.

h) Internal procedures for the efficient handling of contaminated land issues to be developed.

i) The Strategy to be reviewed at the end of the first year after adoption or sooner if circumstances dictate.

j) To complete the inspection of the city within 7 years of adoption of The Strategy.

3.3. Progress Update

3.3.1. The Corporate GIS system has been used effectively to collate all available information pertaining to contaminated and potentially contaminated land sites within the City (3.2.2a and b.)

3.3.2. In 2002, Environmental Health Services purchased a historical land use dataset from Landmark Information Group Ltd. This dataset has been drawn from historical mapping and details of sites of potentially contaminative former use within the City that can be identified from 1:10,560 scale historical mapping. The information is supplied as a series of layers which most departments can access through the Corporate GIS system (3.2.2 c, e and f . Landmark have allocated the sites a basic risk rating of high, medium or low, based

simply on the industrial use identified. Some 393 potentially contaminated land sites were identified in the Landmark data set (3.2.2 c.)

3.3.3. The Landmark Dataset has been included within the corporate GIS system and has used to inform both Part 2A work and the development control process (see 3.2.2b).

3.3.4. In 2002, the authority purchased a range of digital historical mapping to inform the contaminated land inspection process.

3.3.5. In 2009, as part of the review, all 393 potentially contaminated land sites identified in the Landmark Dataset (3.3.2) were prioritised for future investigation (3.3.2 e and f). Details of the methodology used by STM Environmental Ltd in undertaking this prioritisation exercise can be found at Appendix 1.

3.3.6. The development control process has been the main mechanism for ensuring that potentially contaminated land is remediated. The Planning Department has access to the Environmental Health potentially contaminated land GIS layers. All planning applications for the redevelopment of land identified as potentially contaminated are referred to Environmental Health for comment. A weekly planning list is reviewed by the regulatory Services Manager to ensure that all appropriate are referred for consultation.

3.3.7. Some53 applications had been reviewed at the time of this review, 20 of which were subsequently deemed suitable for development with appropriate conditions.

3.3.8. It is understood that land purchased or acquired by the local authority since The Strategy was adopted has been fully assessed as to any potential risks of contamination and the implications thereof. Where site investigations have been required in such cases advice has been sought from the Regulatory Services Manager.

3.3.9. It is understood that where local authority owned land has been leased, contaminated land implications have been considered prior to leasing, on termination of leases, and in the marketing of sites. Procedures detailed within The Strategy have been followed ensure that the authority are aware of any potentially contaminative uses and appropriate steps taken to prevent land becoming unduly contaminated.

3.3.10. Internal procedures for the efficient handling of contaminated land issues are understood to have been developed .Complaints in respect of potentially contaminated land have been investigated on an individual site by site basis.

3.3.11. The Strategy makes provision for Review, the initial review to be within 1 year of adoption. This document completes to first review if not within the original timespan envisaged.

3.4. Outstanding Objectives- Gap Analysis

3.4.1. Whilst progress has been made with the identification and inspection of land within the City there are some areas which still require attention. In some case this may simply mean updating the Strategy to reflect procedural or policy changes whilst in others there is clearly outstanding work to be undertaken. Outstanding objectives are each discussed in turn below.

3.4.2. Since the adoption of The Strategy, work has concentrated principally upon new development and it has thus proved unnecessary for the Interdepartmental Contaminated Land Steering Group to meet regularly to monitoring progress with implementation of The Strategy. Discussions with key staff indicate that a more suitable way forward would be to report progress and discuss appropriate ways forward utilising the council's existing political structures. Technical guidance and reference to external agencies, principally the Environment Agency, is best furthered by reference to the Norfolk Contaminated Land Officers Group.

3.4.3. Reports to Members on progress with the strategy have been made on an ad hoc rather than regular basis. It is evident from discussions that this is would be an appropriate way to continue unless the relevant committee deems otherwise.

3.4.4. The Objective to complete the inspection of The City within 7 years has not been met. In hindsight, this objective can be seen as not only over ambitious but arguably inappropriate. Since the Part 2A regime was first enacted it has become increasingly evident that the process of contaminated land investigation is a an ongoing and iterative process.

3.4.5. Whilst it may be appropriate not to set a fixed date of completion for inspection (3.4.4) it is clear that a risk based inspection programme should be developed, the purpose of which should be to ensure that all potentially contaminated is identified and investigated as necessary on a risk The prioritisation of potentially contaminated land sites having only recently been completed, a specific pro-active site investigation programme has yet to be developed.

3.4.6. In practice the investigation of sites within local authority ownership has not been given priority over privately owned land. This requirement can be removed from The Strategy.

4. Procedures Review

4.1. Overview

4.1.1. The Strategy sets out specific procedures for the contaminated land inspection work in the City, specifically:

a) Internal Management and Arrangements for Inspection and Identification
b) Inspection and Identification: where the council has no interest in the land
c) Inspection and Identification: where the council has an interest in the land
d) Land purchase and acquisitions
e) Leasing Property
f) Information Management
g) Handling of Complaints and Other Information
h) Review Mechanisms

4.1.2. The following paragraphs review the information contained in each section of The Strategy and highlight any requirement for modification. Unless otherwise stated procedures should remain as stated within The Strategy.

4.2. Internal Management and Arrangements for Inspection and Identification

4.2.1. Land considered as potentially contaminated has recently been prioritised for further investigation using a formal risk assessment system. This procedure requires revision to reflect the latest position in respect of site prioritisation.

4.2.2. It is noted that there are currently no procedures included within The Strategy for how an inspection programme might operate.

4.3. Inspection and Identification: where the council has no interest in the land

4.3.1. It is understood that these procedures are currently operating as stated.

4.4. Inspection and Identification: where the council has an interest in the land

4.4.1. This section makes reference to procedures whereby all existing local authority landholdings will be inspected and assessed.

4.4.2. As already highlighted in Section 3, the stated objective of devising an inspection programme of council owned land within 9 months has not taken place and caw be removed from the Strategy. The requirement for a procedure is therefore redundant.

4.5. Land purchase and acquisitions

4.5.1. It is understood that these procedures are currently operating as stated and there is no need to revise this procedure at the present time.

4.6. Leasing Property

4.6.1. It is understood that these procedures are currently operating as stated and there is no need to revise this procedure at the present time.

4.7. Information Management

4.7.1. It is understood that these procedures are currently operating as stated.

4.7.2. It is considered that all information pertaining to contaminated land should be stored and available electronically where possible in the spirit of e-government (2.4). This procedure requires amendment to reflect that.

4.8. Handling of Complaints and Other Information

4.8.1. It is understood that these procedures are currently operating as stated and there is no need to revise this procedure at the present time.

4.9. Role of Development Planning

4.9.1. It is understood that these procedures are currently operating as stated.

4.10. Role of Building Control

4.10.1. The building control function was outsourced to private contractors in 2007. The procedure requires amendment to reflect this.

4.11. Review Mechanisms

4.11.1. The current procedure indicates a review after 1 year. The procedure requires amendment to reflect current policy in respect of Strategy Review.

5. Summary and Recommendations

5.1. Discussions

5.1.1. This review has examined the Norwich City Council Contaminated Land Strategy 2001 (The Strategy) and has reviewed progress with meeting the original objectives set out in that document (3.1-3.3). Outstanding objectives have been identified (3.4) and procedures discussed (4.1-4.11).

5.2. Recommendations

5.2.1. This report should form an addendum to the Strategy which shall be amended by the changes outlined at Appendix 2.

Appendices

Appendix 1

See attached document ‘A System for the Prioritisation of Point Sources’“

Appendix 2:-Changes to The Strategy 2010

The following changes shall be applied to The Strategy as from 1 April 2010

1. The person responsible for managing The Strategy is Michael Stephenson, Regulatory Services Manager until further notice.

2. The Interdepartmental Contaminated Land Steering Group has not met since 2002. Henceforth all significant progress in respect of The Strategy shall be reported to the Executive Committee of Norwich City Council. Such reports will be made on an “as necessary” basis.

3. No completion date is envisaged for the contaminated land inspection process which will progress as a rolling programme to meet perceived needs.

4. An inspection programme, based on the Stage 1 prioritisation exercise undertaken in 2009 shall be developed by 30 December 2010. Henceforth, the inspection will proceed as detailed in the inspection programme.

5. The requirement for a separate assessment of local authority owned land should be omitted from The Strategy as should the requirement for an appropriate procedure.

6. It is noted that the building control function of Norwich City Council has been outsourced and any reference to that department shall be removed.

7. The Strategy will be reviewed on a regular basis as the need arises. All proposed changes to the Strategy shall be reported to the Executive Committee of Norwich City Council.

A SYSTEM FOR THE PRIORITISATION OF POINT SOURCES

A summary of the site prioritisation methodology used in the GeoEnviron Contaminated Land Module

GeoEnviron

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TERMINOLOGY

The following gives short definitions of the meaning of certain terms as they are used in the report and in this document.

*Contact Risk**:*** refers to the possibility that humans will come into contact with polluted soil or gases. The possibility of humans coming into contact with polluted water is not considered in this definition.

Degradation: refers to breakdown of potentially hazardous contaminants to their harmless derivatives in the natural environment.

Hazard: a substance, property or situation that in particular circumstances could lead to harm. The hazardous nature of a contaminant is valued according to its mobility, toxicity, degradability and volatility.

Mobility: the mobility of a contaminant in soil is defined relative to groundwater velocity and is a function of dispersion, sorption, ion exchange, solubility etc.

Pathway: the mechanism by which the receptor and source can come into contact.

Receptor: the entity that is vulnerable to the adverse effects of the hazardous substance or material.

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

Risk characterisation: a preliminary evaluation of risks on a site. Risk characterisation differs from risk assessment in that the level of information required to carry out a characterisation can be a fraction of that required to carry out a risk assessment.

Risk Screening: identification of all major hazards and receptors

Source: the hazardous site, substance or material

Source strength: refers to the gas generation capability of a waste disposal site at any given moment.

Toxicity: refers to the relative ability of a particular chemical substance to cause harm to a living organism. The toxicity of the chemical is dependent on the environmental receptor being considered.

Volatility: This is defined as the propensity of a chemical to vapourise and is measured using Henry's Constant.

1. INTRODUCTION

For most Local Authorities, the implementation of their contaminated land strategies will begin with a desk top study. The information acquired from this exercise will then be used to set priorities for further investigation and remediation. Setting priorities is important for decision-making as it helps to promote transparency by ensuring an explicit and justifiable basis for decisions (DETR, 2000).

The USEPA and the UK Environment Agency advocate the use of the "*source-pathway-receptor*" concept as the basis for risk assessment. A *tiered approach* where risk management questions are answered at each stage is recommended.

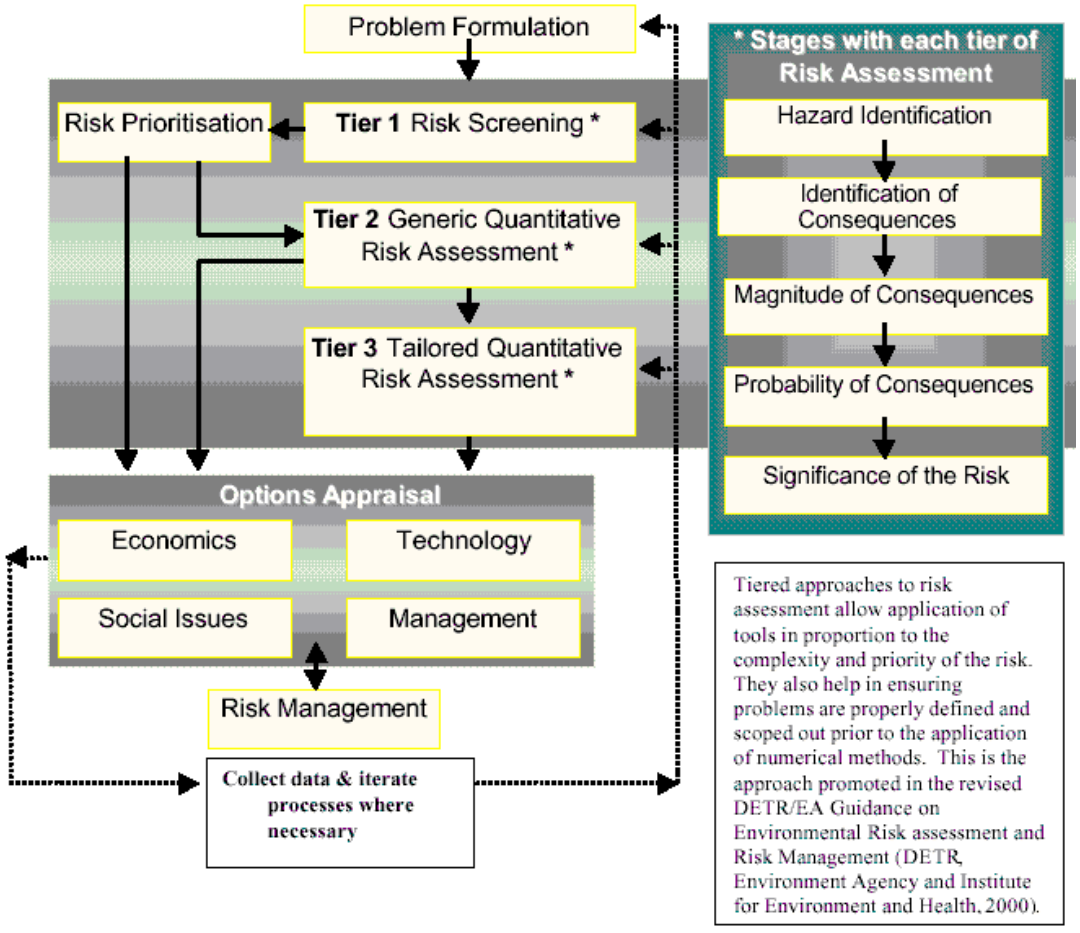

Figure 1 - A tiered approach to risk assessment
(Source: DETR, Environment Agency and Institute for Environment and Health).

As can be seen from the figure above, the first tier of the risk assessment process involves hazard identification, risk screening and prioritisation. This process is used to determine which hazards or risks should be investigated in more detail. The process helps to minimise unnecessary effort and reduces the chance of potentially important risks being overlooked. In addition, it provides an auditable trail to support or explain the omission of certain risks from further consideration. It also helps to identify risks where action, as

opposed to further investigation, may be preferable (DETR, 1999). Ultimately prioritisation provides a mechanism for targeting resources towards those sites that present the greatest risks.

There are various prioritisation methods available. One simple and effective method is to rank hazards based on screening scores, thereby providing a priority list for further action.

Geokon have produced a computer based environmental information management system known as GeoEnviron, which among other things, includes a module dedicated to managing information related to the identification, risk assessment and remediation of contaminated land. The module has built within it, a site prioritisation system for use in *tier 1* of the risk management process.

The prioritisation system uses the Source-Pathway-Receptor concept to assess risks. It is split into two stages. The Stage I assessment involves hazard ranking sites based on their historical industrial uses and the receptor's sensitivity. The Stage II procedure involves refining the assessment from Stage I by carrying out an exposure assessment.

The stage I assessment can be carried out very rapidly, providing that source and receptor information is available. The assessment produces a priority listing of sites for each type of receptor considered.

The Stage II assessment involves refining the priority listing obtained from stage I, by carrying out a pathway or exposure assessment to determine whether or not a potential pollutant linkage exists. The priority listing arrived at after Stage II can be used to inform decisions as to which sites should be investigated further under the Part IIA regime. In many instances the information yielded after a stage II assessment will be sufficient to enable a decision to be taken as to whether a site should be determined 'contaminated'.

The GeoEnviron Site Prioritisation methodology is similar to that proposed in Contaminated Land Research Report No. 6 (CLR6) in that it is not designed to produce a single site risk score that encompasses all the different receptors types. Instead it requires that policy decisions are taken with respect to the relative priority that is assigned to each of the receptor groups. These decisions should be made after taking local circumstances into account.

The main part of this document details the Stage I and II of the GeoEnviron site prioritisation methodology. The Appendix, which contains screen shots of the GeoEnviron system's risk assessment tab folders, describes how both the Stage I and II site prioritisation methods have been implemented practically within the GeoEnviron system.

2. BACKGROUND

The prioritisation system has been developed to fulfill the needs of local authorities to identify, register and deal with contaminated sites.

Overall Aim: To establish a prioritisation system for contaminated sites about which little is known.

Requirements:

- The system should prioritise sites based on their potential risk to humans and the environment;
- The system should be simple and transparent;
- Site characterisation should be based as much as possible, on existing data;
- Site prioritisation should be based on a uniform method;
- The system should be objective and verifiable (i.e. others performing the exercise should be able to arrive at the same score);
- The system should be capable of being used at both local and regional levels;
- The time used to prioritise sites should be minimal.

The prioritisation system caters for:

a) regional prioritisation of sites in terms of their requirement for detailed site investigations;
b) regional prioritisation of sites in terms of their requirement for remedial works;
c) national prioritisation of sites.

The system characterises sites according to their impact on three receptors:

a) *Groundwater* - considered mainly with regard to its value as a drinking water resource;
b) *Land Use related receptors* – the term land use related receptors encompasses the use of land by humans, wildlife, plants and buildings.
c) *Surface water* – considered mainly with regard to the desired quality objective of the water body.

The characterisation of each site results in a *Risk Score* for each receptor, which can then be used to prioritise the sites in terms of the need for detailed site investigation and/or remediation.

3. DATA REQUIREMENTS

In an ideal situation, data on geography, hydrogeology, contaminant properties, current and historical site uses as well as information on animal use and behavior patterns would be available for a risk assessment. In acknowledgement of the fact that this is rarely the case, this method has been designed such that it has very minimal data requirements.

Where the data required is not available, implementation of the method can be based on assumptions. In such cases, the user is advised to assume a worst case scenario for each situation. Further information should then be collected in order to verify assumptions made and further refine the priority listing.

Information on former and historical land uses can in most instances be obtained fairly readily these days. It can be accessed from archive libraries or purchased from the increasing number of commercial organisations offering historical land use information for sale. One of the methods most important data requirements is information on contaminants likely to be present on the site. Information on typical contaminants associated with industries can be obtained from a variety of sources including the DOE industry profiles, which are included as part of the GeoEnviron system. Site specific information necessary for the exposure assessment can be obtained from land coverage's in a GIS, aerial photos, from documentation held by the local authorities or alternatively by carrying out site walkovers.

4. STAGE I SITE PRIORITISATION

Before arriving at the stage of site prioritisation you should have compiled a list of potentially contaminated sites. This can be done using sources and receptor information which will usually be available in a GIS. A simple spatial query can then be performed in the GIS, to find out for example, areas where sources and receptors overlap. A buffer zone can be incorporated within the spatial query, in cases where the source contamination is considered to have the potential to migrate. The areas identified via the spatial query are considered to be the potentially contaminated sites. The list of potential sites obtained from the GIS is then imported into the GeoEnviron Contaminated Land Module.

The different classes of receptors in the area along with a sensitivity score for each receptor is also entered in the base tables of the database. Receptors are divided into 3 broad categories - land use, groundwater and surface water. Land use receptors are further sub-divided into humans and protection zones (i.e. nature conservation reserves, SSI's, RAMSAR sites, listed buildings, etc). Following this, a list of receptors that each site may potentially impact is captured from GIS and imported into the database.

The first stage of the site prioritisation is based solely on the types of industrial uses the site has been subjected to and the sensitivity of the potential receptors. The issue of pathways is considered in Stage II. The GeoEnviron system contains as standard detailed information on all the DOE industry profiles. An objective methodology (which is not detailed here) has been used to derive hazard scores for each of the profiles in relation to land use, ground and surface water receptors. The hazard scores have been derived by considering the contaminants likely to be present on the site. Information on potential contaminants of concern is available from CLR8 "Potential Contaminants for the Assessment of Land". A spreadsheet is available with the GeoEnviron system to enable the same objective methodology to be used to rate industries that do not fall within the scope of the DOE industry profiles.

An example of risk categorisation and hazard ranking for a selection of the industry profiles is shown in the tables below.

Note: All the scores used in the GeoEnviron risk ranking are user configurable. The numbers presented below are only examples.

Table 1: Example of Stage I Prioritisation Risk Categories

Risk Category	CODE	Score
Very High	VH	6
High	H	5
Medium High	MH	4
Medium	H	3
Medium Low	ML	2
Low	L	1

Table 2: Example of Industry Profile Hazard Ranking

INDUSTRY PROFILE	LAND USE	GROUNDWATER	SURFACE WATER
Airports	M	MH	MH
Animal and animal products processing	M	L	L
Asbestos manufacturing works	VH	MH	MH
Ceramics, cement and asphalt manufacturing works	LM	L	L
Charcoal works	MH	MH	MH
Chemical works : Coatings (paints and printing inks)	MH	M	M
Chemical Works : Mastics, sealants, adhesives & roofing felt	M	M	M
Chemical works: Cosmetics and toiletries manufacturing works	L	M	M

As mentioned above, the different classes of receptors are rated in terms of their sensitivity. For human receptors, the sensitivity rating is carried out by assessing the current land use. For the groundwater receptor, the rating is carried out by considering the groundwater class. For surface water receptors, the rating is carried out by considering the water body's quality objective. An example is given below.

Table 3: Example of Land Use Sensitivity Rating

Land Use	Sensitivity	Score
Residential Houses with gardens	H	5
Residential without gardens	M	3
Commercial with soft cover	M	3
Commercial (no soft cover)	L	1
School with play grounds	H	5
Nursery	VH	6
Allotments	VH	6
Park	H	5
Nature Conservation Area	H	6
SSI or RAMSAR site	H	6

Table 4 : Example of Groundwater Sensitivity Classes

Groundwater Class	Sensitivity	Score
Major Aquifer	H	5
Intermediate Aquifer	M	3
Minor Aquifer	L	1

Table 5: Surface Water Sensitivity Classes

Surface Water Quality Objective	**Sensitivity**	**Score**
Major Aquifer	H	5
Intermediate Aquifer	M	3
Minor Aquifer	L	1

4.1. Calculation of Stage I Site Risk Score

The stage I site risk scores for each individual potentially contaminative industrial site use for each receptor is then automatically calculated using the following simple algorithm:

SRS= IRS x RSS

Where:

SRS = Site Risk Score
IRS = Industrial Risk Score
RSS = Receptor Sensitivity Score

When using the default scores, the maximum site risk score for land use related receptors is 30. The maximum for ground and surface water receptors is 25.

Using these site risk scores, one can rapidly obtain a site by use by priority listing.