Contaminated land risk assessment

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Held at the Lighthouse, Glasgow

SPEAKERS

Ann Jobson, *West Dunbartonshire Council*
Joanne Kwan, *CIRIA*
Matt Gardner, *Arcadis Geraghty & Miller International, Inc*
Hugh Barron, *British Geological Survey*

Chaired by Andrew Gunning, *Ewan Associates Ltd*

SUMMARY

Scotland contains numerous sites of contamination, which will require assessing prior to release for re-development. This is likely to increase, as many local authorities start to implement their contaminated land strategies over the next few months. While some construction professionals are well versed in contaminated land risk assessment, many, including some from local authorities will be facing such responsibilities for the first time.

This workshop examined the problems that some local authorities may have with the implementation of the contaminated land regime. It also reviewed how different phases of risk assessment should be carried out including the use of Contaminated Land Exposure Assessment (CLEA) methodology and other software such as the Contaminated Land Site Evaluation and Prioritisation Tool (ConSEPT) used in the assessment process.

Key topics covered included the setting of risk assessment objectives, risk evaluation and communication, and the demonstration of good practice.

ConSEPT: ITS APPLICATION IN RISK ASSESSMENT

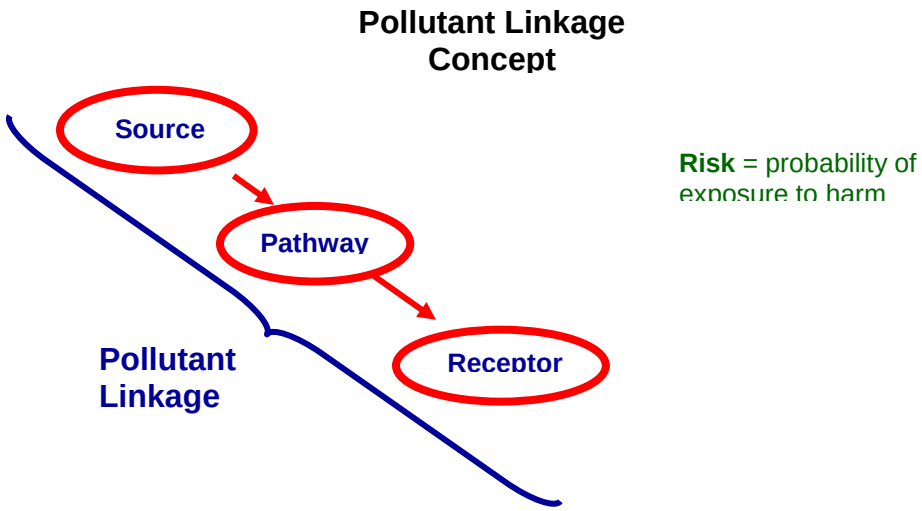
Hugh Barron, British Geological Survey

But firstly, what is the BGS? It is the national geological survey, formed in 1835 and since 1965, the largest institute in the Natural Environment Research Council (NERC) – The BGS has around 800 staff – about 500 of these are geoscientists, most qualified with postgraduate degrees. BGS have an annual income of around £40M – half of this come from the Government Science Budget – the shortfall they make up from commissioned and commercial work in UK and internationally. They hold extensive geoscience

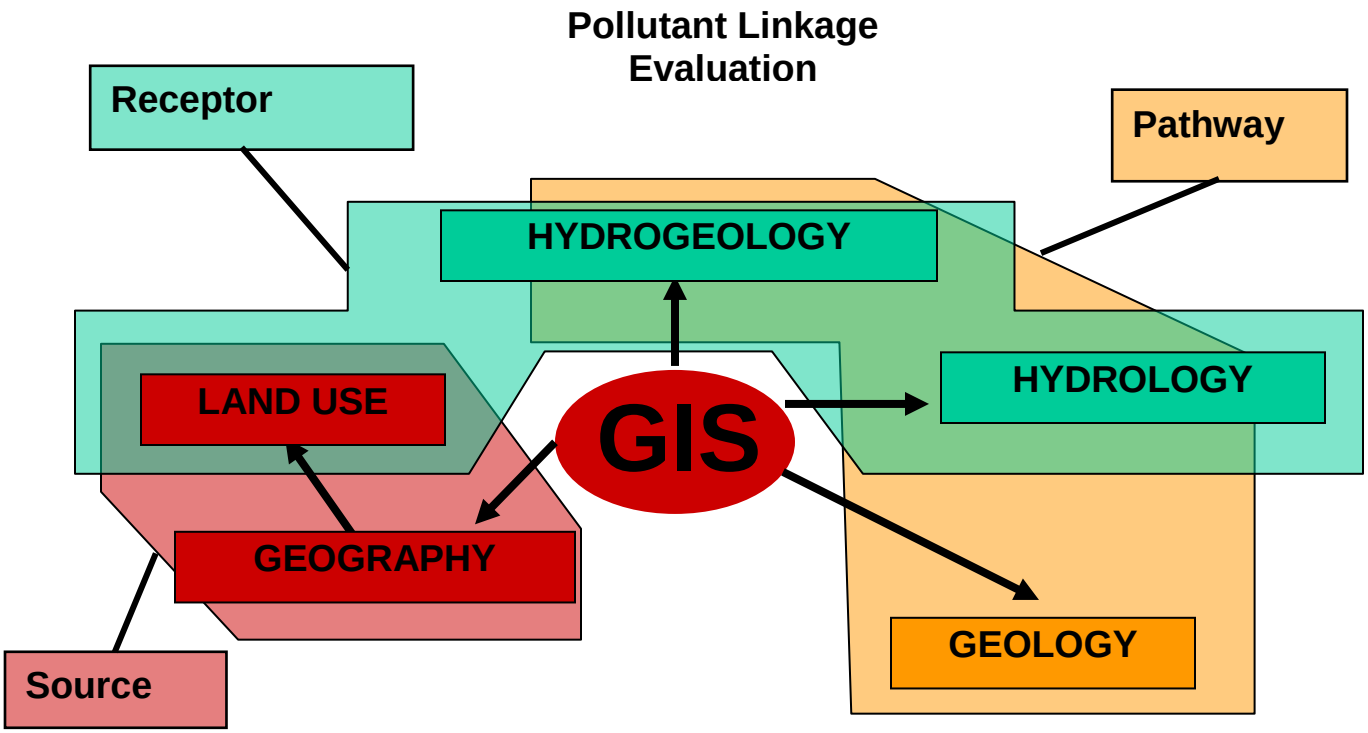
databases (most in digital format) and most recent dataset launch, GeoSure, holds data on geological hazards and stability.

ConSEPT (Contaminated Site Evaluation and Prioritisation Tool) identifies potentially contaminated land and provides a semi-quantitative ranking of potentially contaminated sites. The tool will run in ArcView 3 ArcGIS 8 and MapInfo.

Part IIA is risk based, where risk is defined as the probability of exposure to harm. This risk-based assessment is based on the SOURCE-PATHWAY-RECEPTOR conceptual model – a pollutant linkage is said to exist when all three components of the model can be identified on a site. It is only when a pollutant linkage is deemed significant that a site can be termed contaminated.



The pollutant linkage concept is useful in assessing potentially contaminated land scenarios in that it breaks down the problem into smaller parts, which helps focus our analysis.


Pollutant Linkage Evaluation
Receptor
Pathway
HYDROGEOLOGY
LAND USE
GIS
HYDROLOGY
GEOGRAPHY
GEOLOGY
Source

What about if we have to apply the assessment over a large area? For any given area there are potentially many sources, pathways and receptors:

- Sources – contaminated land - colliery spoil - landfill sites
- Pathways - aquifers - canals/streams
- Receptors - surface waters: streams/lakes/ponds
  - aquifers
  - wells: public supply, industrial, agricultural
  - ecosystems, property, humans

Sources, pathways and receptors are many, varied and often overlapping There is a need to characterise them in order to evaluate the potential for pollutant linkage in an area. There is therefore a large and complex set of spatially related components to characterise - ideal for GIS analysis.

This body of multi-attribute data must be interrogated to evaluate sites in terms of pollutant linkage, so that we can use it to characterise potential sources, potential pathways and potential receptors.

This completes the GIS to bring together this wide range data for a large number of potential sources, pathways and receptors for a required area i.e. a spatially related multi-attribute database

Method adopted by ConSEPT to evaluate datasets is called Additive Factorial Method, a fancy name for a simple concept. Additive factorial method is probably the best-known and widely used method of multi-attribute decision making. It is based loosely on Canadian National Classification System for Contaminated Sites, 1992 to promote consistency in the assessment and remediation of high-risk contaminated sites in Canada Evaluation factors are the starting point with AFM assigning scores to a number of site characteristics or evaluation factors relevant to pollutant linkage.

Examples:

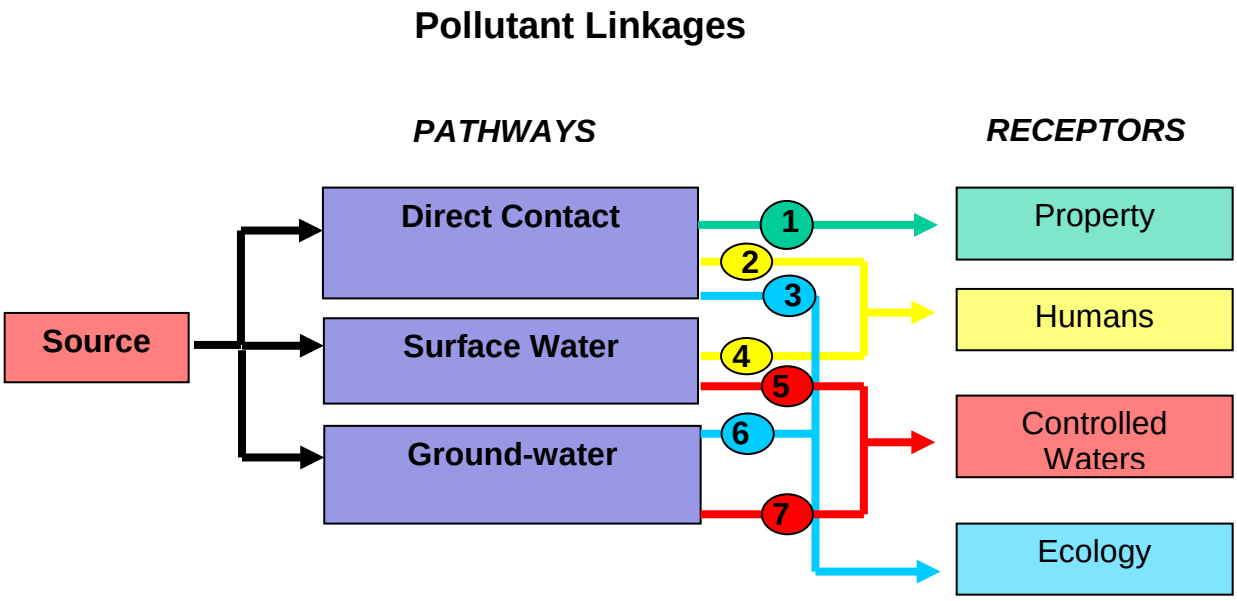
- Sources – contaminant potential of site, duration of potential polluting activity
- Pathways – presence of aquifers, streams, high permeability features
- Receptors – proximity of housing, steams, drinking water abstraction boreholes

Scoring criteria applied by interrogating data using:

- Spatial queries e.g. occurrence of a feature within a specified buffer zone
- Numerical queries e.g. number of epochs during which the site is active, from which we derive duration of activity
- To give scores for each of the many evaluation factors for source, pathway and receptors

EF scores then combined to give Source scores, pathway scores and receptor scores

Key issue is how to combine source, pathway and receptor scores to give pollutant linkage score, in such a way as to take into account that only certain pollutant linkages are likely and the weakest link rules.



To illustrate why only certain pollutant linkages (i.e. combinations of source, pathway and receptor) are either unlikely (in practise the chain is broken) or unnecessary (e.g. already dealt with by another linkage)? For a given source ConSEPT considers three types of pathway…

- Direct contact is that pathway whereby the receptor is at risk of exposure due to location on, or proximity to, the potential source e.g. housing built on a former landfill site or due to other direct pathways - private food production (allotments or private gardens) or private water wells on or near a potential source.
- To the Part IIA receptors
- For Humans only DC and SW pathways evaluated - treatment of drinking water breaks the PL

Similarly there are a restricted number of other linkages relevant to the other receptors.

Hugh proceeded to give a demonstration of the ConSEPT model. Concluding that CONSEPT collates a wide range of readily available datasets and evaluates potentially contaminated sites on the basis of risk. It also gives semi-quantitative evaluation, which is the basis for prioritisation in a manner that is informative, rapid, simple, transparent and flexible.

DISCUSSION

Freedom of information
The question of freedom of information in relation to designated sites was raised. It was confirmed that WDC try to ensure as much two-way communication between officers and site owners as possible. The information that WDC have is always made available to the site owner as well.

Extent of risk reduction
One delegate asked whether there is a risk that owners will be asked to do too much i.e. to reduce risk completely. The response was that local authorities should be able to properly assess remediation proposals within the remit of best practice. The Environment Agency has released a "determination" document, which directs owners and consultants to best practice. Ann Jobson confirmed that as a regulator, WDC are concerned that too few sites are volunteering alternatives to source material (i.e. shifting the problem).

Application of ConSEPT in Scotland?
Has been purchased by Glasgow City, Moray, Perth & Kinross and Stirling councils, and a related product, the Contaminated Land Reporting Module has been bought by these four plus Falkirk and Dundee City councils).

Definition of special site
Under the Contaminated Land (Scotland) Regulations, a special site is basically regulated by the Scottish Environmental Protection Agency (SEPA). There have been only two designated to date as Part IIA.

Barriers to greater clean up and reuse.
The speakers were asked to give their views of the greatest barriers. These included:

- Lack of local government resources to speed up site clean-up
- The need to develop greater trust between local authorities, owners and consultants
- The need for more time to be allocated by the client to the consultant and most appropriate remediation technology. Time for remediation is key in the application of alternative technologies.
- The need for more advice on alternative technologies
- The need to educate those people responsible for the sale of sites., as well as improving public perception.
- The need to meet the requirements of both the planning and contaminated land regimes can sometimes cause difficulties and have subsequent resource implications.