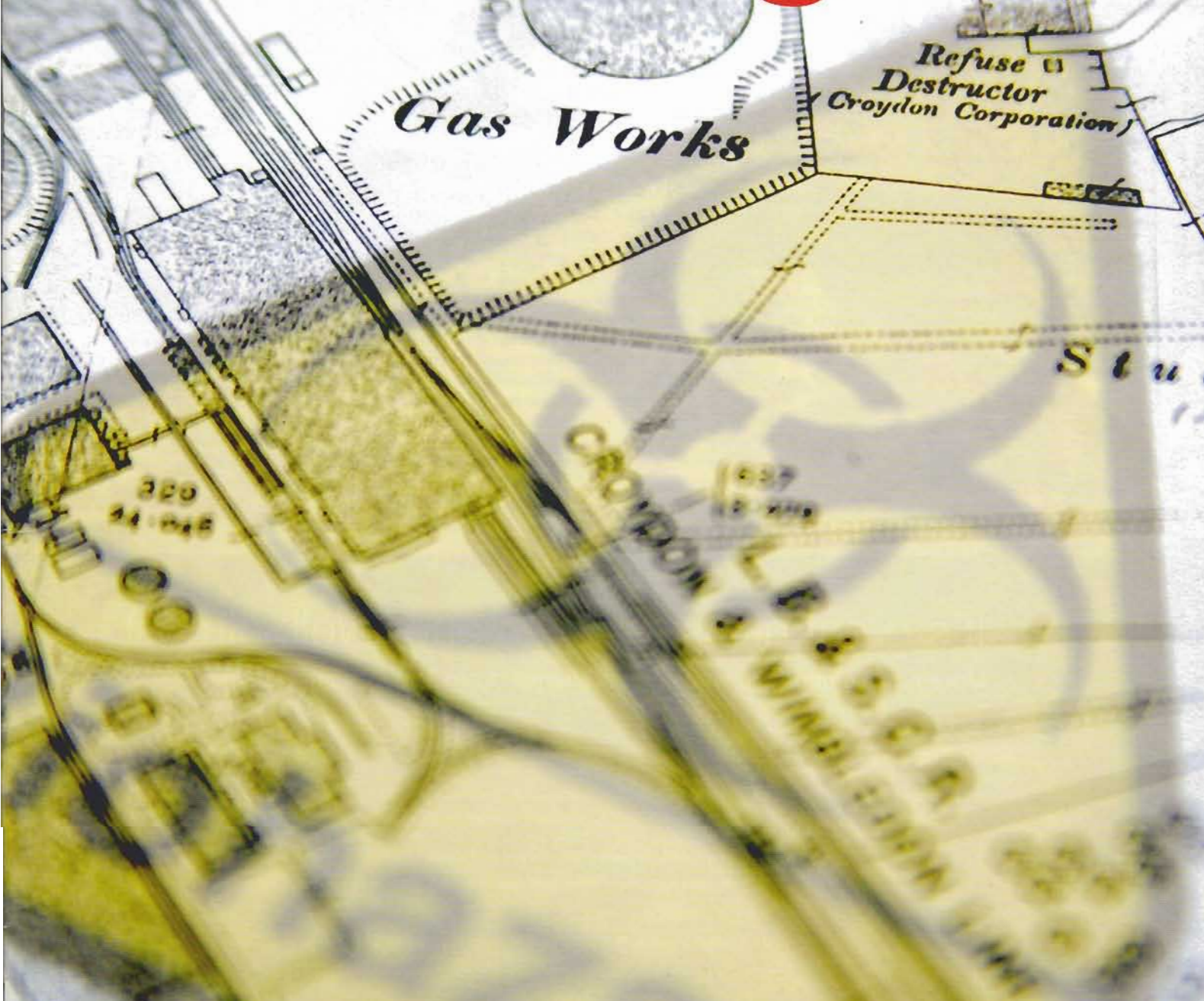


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HISTORY TODAY

How the past is mapping a future for contaminated land

Charting history

As councils across the country continue to get to grips with the contaminated land regime established under EPA 1990, **Matthew Spencer** reveals how one London borough is using IT to meet its obligations.

Under Part IIA of the Environmental Protection Act 1990, all local authorities in England and Wales have a statutory duty to investigate the land within their boroughs to establish whether or not any of it is contaminated with pollutants. So, since the Act came into force in 2000, and in compliance with the new rules, councils have started the task of investigating all the land within their boundaries.

Among them is the London Borough of Hounslow, which has employed location analysis IT solutions in order to help it stay ahead of the game and achieve compliance.

The initial dilemma faced by the majority of local authorities was how to begin the investigation for areas which might be contaminated. The general consensus was to start with a location-based search across the borough, and this was the approach adopted by Hounslow.

'We were fortunate to already hold a considerable amount of historical information in-house,' says Andy Bent-Marshall, principal land quality officer at Hounslow. Much of this existed because there was a history of gravel extraction and landfill in parts of the borough.

'We maintain a public register of former landfill sites, which has been available since 1992. We also held scanned versions of Ordnance Survey County Series maps dating from 1865 to 1935, and land use surveys from the 1940s to 1970s, which had survived from the former Greater London Council.'

Equipped with these materials, Bent-Marshall and his team began the process of investi-

gating and prioritising sites by geo-referencing the scanned maps into MapInfo Professional. 'We didn't have a corporate geospatial information system (GIS) at the time but, as we already had MapInfo Professional installed in other parts of the council, it made sense to extend the use of the system,' he says.

For each series of maps – there were eight in total, ranging from the mid-1970s and going back to 1865 – staff digitised the boundaries of any site with a former industrial use. The team was then able to overlay this industrial history from the past 100 years on to the current map using the system.

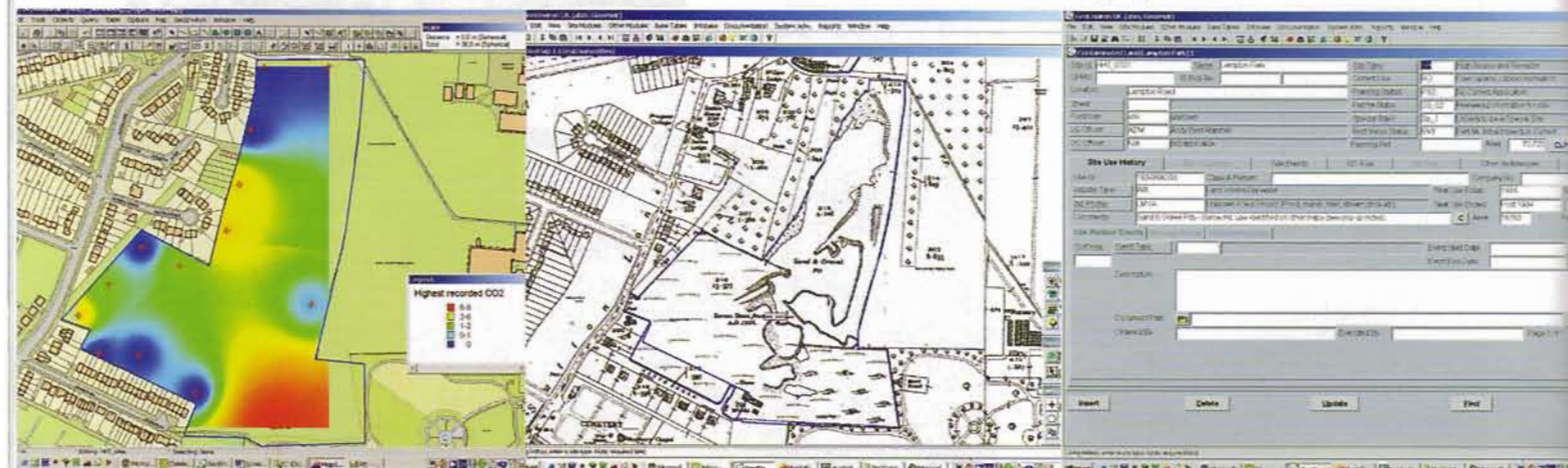
It was a lengthy process, as Bent-Marshall recalls: 'The land use surveys had been hand drawn on to a base map, with different areas shaded in different colours, depending on land use at the time. Information from these maps had to be digitised into AutoCAD, using a digitising tablet.'

He explains that the AutoCAD files were then imported into MapInfo Professional and the information from the scanned County Series maps digitised directly on-screen. 'The entire project collected more than 8,000 polygons,' he adds.

Working in this way immediately highlighted areas across the borough where, regardless of what was there now, there had once been some form of industrial use which could have left residual contamination.

This was only one stage of the process, however. Bent-Marshall explains: 'It was a case of first identifying historical land uses which

A thematic map of boreholes at Lampton Park (far left), and historical land use of the same site (middle). Site details for Lampton Park loaded into the GeoEnviron contaminated land module (right)



might have caused a problem, then creating another layer in MapInfo, which reflected current land use in general categories such as housing with gardens, flats without gardens, open spaces and allotments.'

Such categorisation was also an important part of the process as it reflected the risk-based approach proposed under Part IIA. 'It's not just a case of establishing what contamination might be present, but also looking at whether that contamination could affect the current site and it's users,' he points out.

This is the 'source-pathway-receptor' approach, where the 'source' is the contamination, the 'receptor' is predominantly the people using the land now – and also nearby water-courses and groundwater – and the 'pathway' is the route by which contamination can affect those receptors.

For this reason, residential gardens and allotments were considered as highly-sensitive receptors because people dug their gardens and were likely to eat vegetables grown there. Consequently, if contamination was present, there was a greater risk of people coming into contact with it than if historically-contaminated soil was now sitting under a multi-storey car park.

So once the layer of current land usage was complete, the team performed a series of overlay queries using MapInfo's SQL query functionality. This permitted its members to identify areas where the highest-risk sources sat on top of, or directly adjacent to, the highest-risk receptors.

'This produced a series of distinct, top-priority sites, which required further investigation,' says Bent-Marshall.

Data relating to each of these identified sites, including boundary maps and aerial photos, is now held at the council in 'GeoEnviron'. This contaminated land management database was developed by Geokon, and is supplied in the UK by STM Environmental.

The council team initially reviewed four or five software options, but selected GeoEnviron because it most closely fitted its requirements. The embedded MapInfo facility, developed using Map X software, allowed it to directly import and visualise all existing data – users can pan around a map of the borough and double click on an area to be taken to that site record in the database.

'We are collecting new information all the time in a variety of formats,' Bent-Marshall says. 'What we're trying to do by using MapInfo and GeoEnviron is to create a single, centralised data store that pulls all this disparate information together in an accessible format.'

The database also incorporates a second stage risk assessment where, if the information is available, it can be entered on a site-by-site basis. Such information includes proximity to rivers and streams – because of the potential consequences – and further details about the current land use, such as whether it is a new or old development, is hard covered, or has exposed soil, and its proximity to any former landfill sites.

The team is now collecting further information for each site with a view to building a clearer picture of any potential issues and, ultimately, to decide whether any site should be

Project file

Contaminated land register



Borehole monitoring at Lampton Park

Client: London Borough of Hounslow
IT providers: MapInfo, Geokon, STM Environmental
Contract duration: ongoing

Plan: To conduct a location-based search of possible contaminated sites across the borough through historic research. Then to use current land-use data to prioritise further investigation of this resulting database of sites.

Reason for work: The duty placed on local authorities under Part IIA of the Environmental Protection Act 1990.

Solution: To use GIS-mapping techniques to overlay the current dataset on to the historic, and use various software modules to interrogate and present the results.

legally determined as 'contaminated land' (as defined by Part IIA).

Bent-Marshall explains: 'We first identify as many potential sources as we can, then overlay those with current land use to look at where they coincide with receptors. Where they do coincide, we load the site data on to the database and start gathering further information.'

'With the sites we have on the database at the present time, we're trying to review the entire planning history to see if we can find any evidence that the site was remediated at any time,' he continues.

'As we find out more information, the sites may move up or down our priority list.'

In many cases, there is no issue because, for example, planning records show that remediation has taken place during the redevelopment of a site. But he adds: 'We have conducted intrusive site investigations on some of the sites at the very top of the list.'

Bent-Marshall is also working with STM Environmental to develop Hounslow's use of GeoEnviron's Site Survey Manager module. 'We have a lot of historic borehole data, including strata logs, groundwater levels, and results from soil, water and landfill gas sampling,' he says.

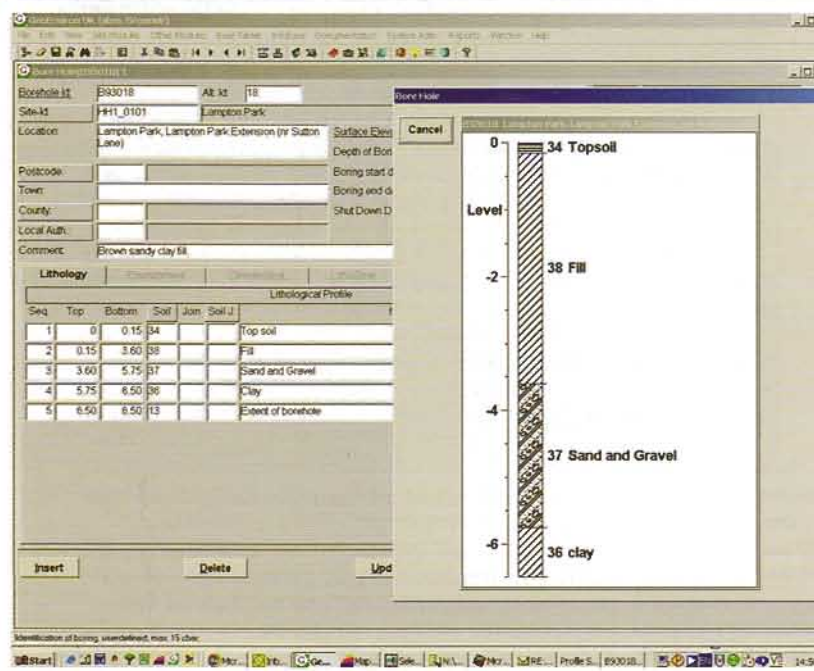
This data was recently imported into GeoEn-

'As we find out more information, the sites may move up or down our priority list'

CASE STUDY: CONTAMINATED LAND



Example of selecting borehole records in the site survey module (top), and viewing the borehole strata log (middle). Visualising site and borehole data together, using current aerial photos (bottom)



viron. Now, as well as being able to click on a site on the map to view the relevant entries in the Contaminated Land module, the council team can also click on an individual point which represents a borehole, and jump to the relevant record in the borehole module. 'We can now view historic sample data and produce borehole logs – all at the touch of a button.'

Going forward, Bent-Marshall now hopes to encourage consultants and property developers who are building in the borough to send in their numerous reports in an electronic format. The team can then attach them to the appropriate site record on the database and view them on screen.

He also wants environmental consultants to send in their sampling data in a spreadsheet, so the team can import the data directly into the Site Survey Manager module. The points can then be used to carry out thematic mapping in MapInfo Professional.

The team can map a series of sample points across a site and, in conjunction with the soil guideline values produced by the Environment Agency, as part of its CLEA (Contaminated Land Exposure Assessment) initiative, create a map to identify the hotspot areas.

Soil guideline values, which give initial screening values as to potentially unsafe contaminant levels, have been stipulated for some of the key contaminants, such as arsenic, lead and cadmium.

Although the data and analysis that Bent-Marshall and his team are currently producing can be shared with other MapInfo users within the council, he is also keen to ensure that much of the information – which is classed as environmental information – is available to the public, in order to comply with the Environmental Information Regulations 2004.

'We get a lot of requests, especially from solicitors acting on behalf of property-buyers, so we are trying to tie in the work we're doing under Part IIA with our obligations under the Environmental Information Regulations,' he explains. 'A few years ago, we were receiving around 20 requests a year, but in 2004 we received more than 90.'

This puts a strain on staff time, so the council has worked with STM Environmental to develop a MapInfo MapX-based reporting tool, known as MapEagle. The tool makes it much quicker to carry out a typical search, while reducing the possibility of errors or oversights being made.

Consequently, Bent-Marshall is looking to launch a new service this year. 'It allows us to quickly and easily perform spatial buffer searches and extract information directly from the GIS layers and the database into a standardised report format, which can then be sent out to members of the public.'

Matthew Spencer is EMEA marketing manager at MapInfo.
Further information available at:
www.hounslow.gov.uk
www.geoenviromental.co.uk
www.stmenvironmental.co.uk
www.mapinfo.co.uk