The built environment

Sustainability in the built environment

The part played by the geosciences

Paul Hooker, *Keyworth*

Redevelopment of the Bowman's Harbour site near the centre of Wolverhampton involving excavation of the shallow coal deposits beneath old landfill.

Sustainability, as defined by the 1987 Brundtland Commission, means 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'. Perceptions of the issues involved in sustainability in the built environment are crucial for gaining public acceptability and for informing best practice, and are influenced by a variety of means, not least the dissemination of professional journals like Earthwise. Geoscientific investigations carried out by the BGS form part of this continuing debate.

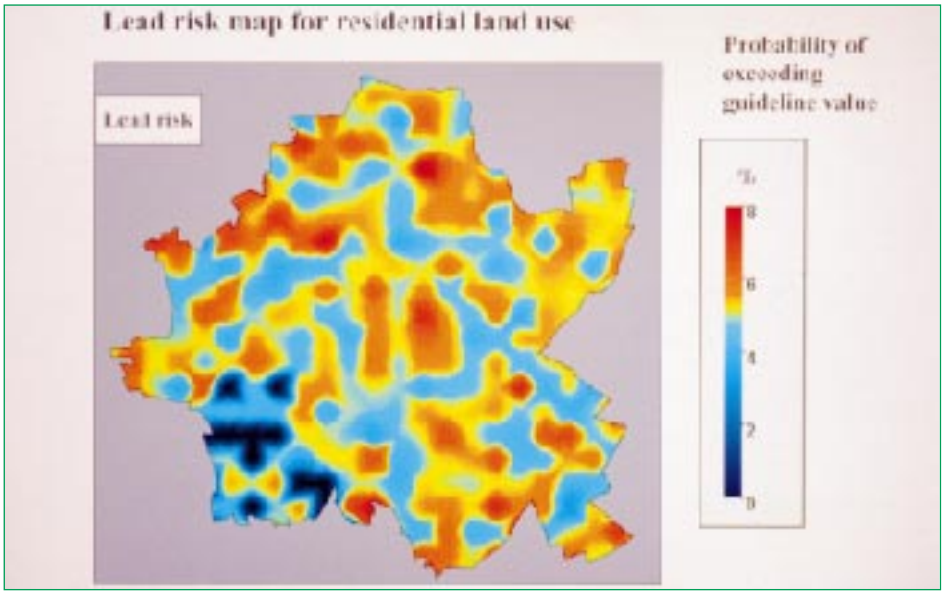
According to government projections, around about 200 000 extra new homes will be needed every year up to 2016. In order to relieve the pressure on greenfield land and to promote sustainable urban living, the Government has urged that at least 60 per cent of the new dwellings over the next ten years are built on brownfield sites. Such opportunities for new buildings, and even new super-cities, will require best planning practices and minimal risks to public health and the environment. These in turn depend on a good geoscientific understanding of the land and the built environment.

A first question is why should so much of the new built environment occupy the surface areas of our land. Why not build more car parking, shops and even homes underground? This would help contain urban sprawl and sustain Green Belts. To explore such options in urban developments, 3D applied geology maps, highlighting rock properties and ground stability conditions, would be essential planning tools.

If the surface areas are built upon, then redevelopment of brownfield sites is preferred, and this requires, initially, an assessment of the quality of the land to decide its fitness for new use. As part of the BGS's Geochemical Baseline Survey of the Environment (G-BASE) programme, baseline geochemical data are being collected for both rural and urban soils. By integrating the geochemical database with other digital datasets, particularly land use, in a Geographical Information System (GIS), it is possible to gain a better spatial awareness of the risks to human health from potentially harmful elements in the soils of built environments.

One potentially harmful element is radon gas, which is radioactive and can cause lung cancer. Radon is emitted from uranium in certain minerals in the ground, and can enter homes from the ground. Geological factors are primary in controlling which areas are prone to radon seepage, and the BGS, in collaboration with the National Radiological Protection Board, is producing a series of geological radon potential maps covering selected parts of England. These maps will help target any future radon measurement programmes.

Finally, what do we do with our wastes? In the UK, sustainable landfill implies an operation which is managed so as not to cause irreversible harm to the environment nor risks to future generations. In southern Britain in particular, void spaces for landfills are becoming scarce, so waste management practices of incineration, recycling and reuse are essential to help alleviate this problem. Interestingly, in the developing world, a quasi-sustainability often arises due to semi-formal recycling and reuse activities, mimicking more formal practices in the UK.



A health risk map for lead in Wolverhampton (70 sq km in area), showing the probability of top soils exceeding the guideline lead concentration value for residential areas with gardens. (Produced with the Centre for Research into the Built Environment, Nottingham Trent University).