Three-dimensional Geological Mapping for Groundwater Applications Workshop
May 15, 2004, St. Catharines, Ontario, Canada, associated with the 2004 Geological Association of Canada Annual Meeting

Integrated modelling of geoscience information to support sustainable urban planning

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The provision of reliable and up-to-date geoscientific information for the urban environment has assumed increasing importance in recent years as legislative changes have forced developers, planning authorities and regulators to consider more fully the implications and impact on the environment of large-scale development initiatives. To comply with the principles of sustainable development, developers are increasingly required to demonstrate that proposals are based on the best possible scientific information and analysis of risk. Nowhere is this more relevant than in the context of urban regeneration, where planning policy guidance gives priority to re-use of previously developed (brownfield) land. In England, brownfield sites suitable for re-development cover an area equivalent to half the size of London.

To better understand the problems of bringing this land back into use, the quality of the land and any potential problems need to be investigated. Whilst site investigation studies may provide a local answer, there is generally little incentive for developers to integrate information and examine impacts beyond their own area of interest. By taking a more holistic view and combining knowledge of the near-surface geology with other geoscientific information, it is possible to predict geological scenarios that may better inform sustainable development objectives. On-going research in the conurbation of Greater Manchester, in north-west England, is working towards this objective through development of an integrated spatial model of the shallow sub-surface.

The Manchester model covers a geographical area of 100 km^2 and is built around a framework of 6500 site investigation boreholes. The three dimensional configuration of the geological units in the sub-surface is built up from serial cross-sections, drawn interactively by combining mapface data with downhole information. Correlated surfaces are gridded, and stacked to produce the final geological model. Attribution of the model with a range of parameters (geotechnical, hydrogeological, geochemical) allows rapid generation of a range of thematic products.

The model has the potential to deliver information in formats relevant to a wide range of planning issues (ground stability, contaminated land, groundwater management) but the success of this approach will ultimately depend on engaging more fully with a range of users (consultants, planners) and demonstrating that there are real benefits (financial and environmental) in taking a more holistic approach to environmental assessment.

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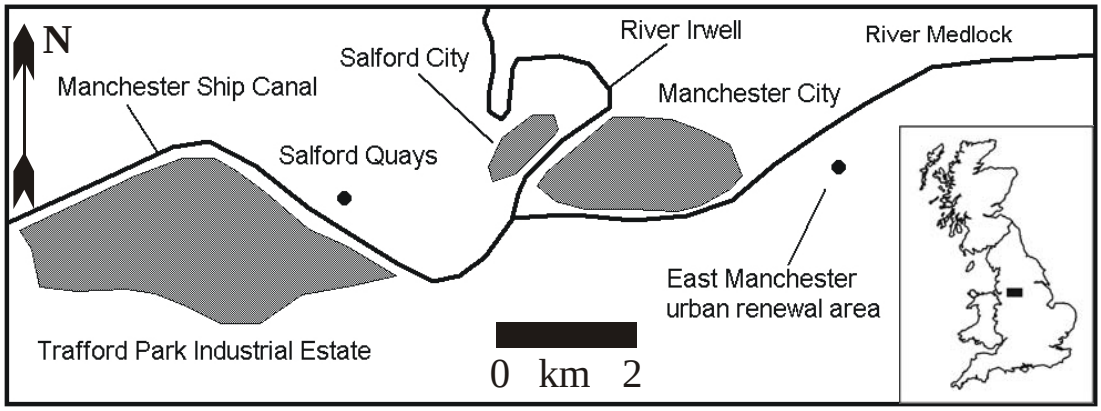
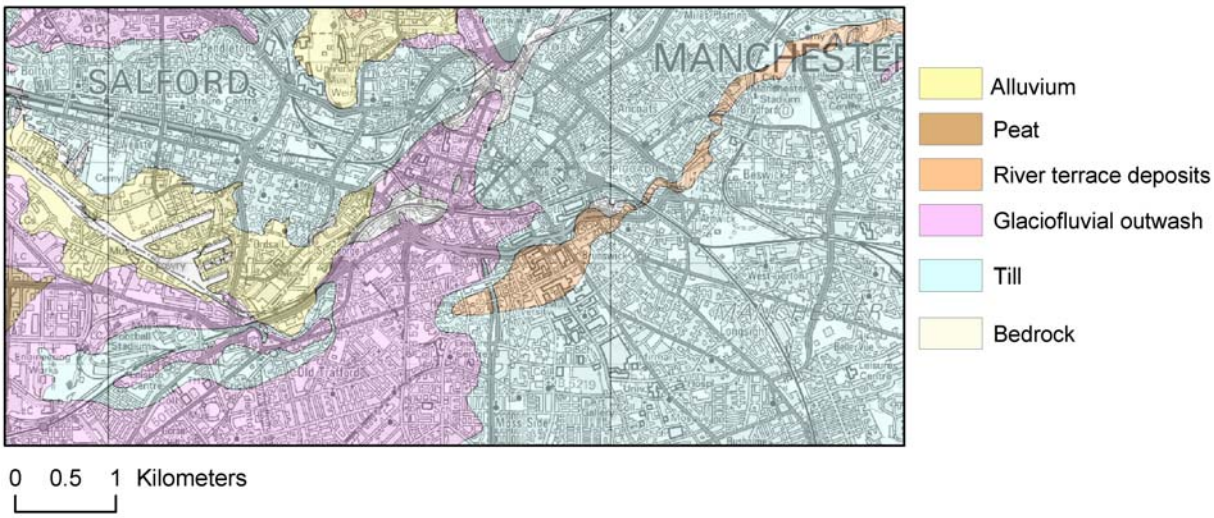


Project area

Trafford Park, Manchester
Issues: groundwater management and aquifer protection



Superficial geology

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