A reminder of the Ground Rules

The arguments for massive development in the Thames Gateway are largely economic. Kate Royse explains why we should dig a little deeper before we build

The 40-mile stretch of land along the River Thames that forms the Thames Gateway is the focus for the biggest building programme to be undertaken in the UK for over 50 years. The key areas for redevelopment have already been chosen, so one might reasonably ask, "Geology -why consider it now?"

The answer is straightforward. For the most part the key development areas have been selected primarily on the basis of socio-economic factors. However, environmental issues – sustainable urban drainage, biodiversity, flood control and foundation conditions – remain important considerations, for which an understanding of the geology can be critical.

Most major development projects in the Thames Gateway will necessitate construction on ground that would be classed as 'difficult' in engineering terms. Compressible soils, high groundwater levels and potentially contaminated brownfield sites are typical of the problems that will need to be faced.

Failure to fully appreciate the ground conditions at the planning stage of any development is likely to prove costly and may lead to project over-run. A report by the Institution of Civil Engineers in 1993 found that half of 5,000 industrial building projects surveyed overran their construction programmes by more than one month; those on redeveloped sites had all met unforeseen ground conditions. More recently, work in East London on the Channel Tunnel Rail Link was halted in early-2003 due to land subsidence.

Unlike the Environment Agency and the Countryside Agency, the BGS is not a statutory consultee in the planning process. However, the Thames Gateway planning framework document (Regional Planning Guidance 9a) recognises numerous issues related to geology. These include existing and potential land contamination, preservation of the natural environment (including sites of geological and geomorphological value) and flood risk.

The Kent County Structure Plan which applies to much of the Thames Gateway, contains a strategic land use policy stating that '***In the Thames Gateway.. it is strategic policy to upgrade the quality of the environment, and to enhance the economic base of the area…*** ***Decisions affecting the environmental quality of the area should take into account the cumulative impact of the proposal in question, in the context of other development and proposals.***'

If sound decisions are to be made, then clearly those organizations involved in planning and development need easy access to all relevant information. Whilst some planners and developers have regularly used geological information (mostly as map data), a great deal of useful 'technical' information is either overlooked or not sought. As a consequence, ground related constraints and opportunities have not always been taken into account. BGS recognizes that the under utilization of this national resource has partly been because public access to geological data has been relatively difficult and often only those with geological training fully understand the implications of the information (1).

Based on the wealth of geological, geotechnical and other related subsurface information built up in over three decades of work in London, the BGS has recently launched a project focused on making geoscience information for the Thames Gateway more accessible, relevant and understandable to a wide range of users.

Through television documentaries, newspaper and magazine articles we have all become accustomed to clear colourful illustrations ‘bringing to life’ particular issues and themes. Unfortunately, the presentation of geological information useful to planners and developers has lagged behind this graphical revolution.

Traditionally, geological information has been displayed as two-dimensional (2D) - on maps supported by cross-sections and map keys. Recent digital advances have introduced the routine use of Geographic Information Systems (GIS), which enable an unlimited range of spatial data to be displayed as single or multiple ‘layers’ and, importantly, these layers may be queried. Further more, “what if?” scenarios (forward modeling) may be introduced that will better inform ground investigation and reclamation strategies (2).

Rapid developments in three-dimensional (3D) modeling software are now providing challenging and exciting possibilities for constructing high-resolution geological models of the shallow sub-surface (3). Using this new technology (supported by our geological and geotechnical archives), we can predict not only the type of rocks that lie beneath our feet, but also their engineering properties (rock strength, shrink-swell characteristics and compressibility) and hydrological properties (permeability, porosity, thickness of the unsaturated zone or the presence of perched water tables).

BGS is striving towards producing 3D geological ‘property’ models, which may be readily accessed, viewed and queried by a wide range of users as their needs arise, and without the need necessarily to involve a professional geologist.

Planning authorities, developers, consultants and any one with an interest in learning more about this project and the products and services that the BGS has to offer are invited to contact the author.

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Text for Diagrams

Difficult to understand geologists.jpg (1)

No caption necessary

Constraintmap.jpg (2)

A Geographical Information System layer displaying potential geological hazard data from the Running Sand database for Kent. Areas coloured in green indicate there are no building constraints, whereas areas in red indicate that constraints are certain.

3D_block.jpg (3)

This 2 x 2 km block model of the Dartford Crossing area shows how new modeling techniques can reveal hidden deposits affecting foundation conditions. In this case, beds of compressible peat (brown) are revealed interbedded with clay (yellow), that in turn overlie gravel (orange). Man-made deposits are shown in grey; the M25 embankment is in blue, and Chalk bedrock in green.