THE LONDON BASIN FORUM
AN ENGINEERING GROUP OPEN MEETING
AT THE GEOLOGICAL SOCIETY
WEDNESDAY 28TH OCTOBER

Michael de Freitas[1] and Katherine Royse[2] describe how geologists and engineers from all backgrounds can now contribute to revealing the nature of the ground beneath London, its geological history, and the links this knowledge provides for predicting ground conditions within the Basin.

The challenge

Central London and its surroundings probably represent one of the most intensively investigated pieces of the upper crust on the surface of the Earth. Countless vertical boreholes have been drilled for ground investigation, aggregate evaluation and water supply, kilometres of horizontal tunnels have been excavated for railways, cable tunnels, water tunnels and sewers, immense volumes of ground have been excavated for foundations, basements, shafts, underpasses, road and rail cuttings, borrow pits, brick pits and quarries for sand, gravel and chalk, and a very considerable amount of geophysical surveying has been completed for scientific as well as commercial purposes. From all this it might be expected that the geology of London is well known - but not so!

London has a history of *"anomalous ground conditions"*; for example, gravels have been encountered where Eocene clay might reasonably be expected, sudden changes have been found in the elevation and inclination of the Lambeth Group, bedding parallel shears are found in almost horizontally dipping London Clay Formation, cones of depression for water levels in the Chalk can have a rectangular shape seen in plan and models for ground water flow in the Chalk repeatedly suggest that the notion of the Chalk as an hydraulic continuum is probably inappropriate; the list could go on. As many of these surprises have been found in isolation and in association with a particular investigation, and as the resources that revealed them usually only permit their presence to be noted, no further work follows; they remain as one more *"anomaly"* to add to the growing list of such anomalies within the Basin. These anomalous ground conditions can prove costly to new development projects, if not picked up in the initial site surveys, and may lead to project over-runs. However, this situation could be about to change.

In the 9th Glossop Lecture presented to the Engineering Group of the Society (de Freitas 2009) the results of research into possible relationships between these anomalies was presented and the hypothesis forwarded that many of these could be associated with movement in the Variscan basement below London. The orientation of its basic lineaments would make the basement vulnerable to shear displacement under the stress directions associated with the opening of the North Atlantic and the closing of Tethys. If pull-apart basins were generated by such displacements a series of local grabens, with their associated and

intervening horsts, could come to dominate the Mesozoic and Tertiary sedimentary environment of the region. Further, such an evolution would impose upon the region a structural framework inherited from lineaments within the basement itself. It is reasonable to expect that such weaknesses would be remobilised under appropriate stress conditions and it is interesting to speculate how the basement may have responded to the glacial loading of the crust to its north, during the Pleistocene; this could be one explanation for the linear sections of dry valleys and tributaries of the River Thames having the fractal characters of a shear zone.

The opportunity

This model provides a framework against which the known geology of the London Basin and its anomalies can be tested. Everyone from any walk of geology can contribute if they have evidence to add to the picture, be it palaeontalogical, geomorphological, stratigraphical, geochemical, mineralogical, geotechnical, or whatever. An open forum now exists for drawing together evidence presently dispersed throughout the geological community that has worked in the Basin. It would also be interesting to hear from those in adjacent areas, for we know that similar anomalies to those found in London occur in the Hampshire and Paris basins. The geological model that emerges will be of national and international significance, and will be the best example of how geological processes, environmental change and human development affect the behaviour and character of the Earth's materials from the nano- to macro- scale.

The London Basin Forum

This is the assembly that is now open to all and established to act as the receptor of information and knowledge; it has a web site hosted on the Home page for the British Geological Survey, and in that site there is a Portal for depositing information and a means for registering yourself as one of its members. There is no charge to join, no fees to participate and no cost to benefit from the project.

We are immensely fortunate in having the following agree to lead their particular subject;

Professor John W Cosgrove, Imperial College London; (Basement and structures)

Emeritus Professor Rory N Mortimore, Brighton University & RN Mortimore Ltd.; (pre-Chalk and Chalk)

Dr Christopher R King, CR King Ltd; (London Clay Formation)

Dr Jacque A Skipper, Geotechnical Consulting Group; (Lambeth Group)

Professor Philip Gibbard, Cambridge University, *Dr Ursula Lawrence*, Cross Rail and *Don Aldiss* (British Geological Survey); (Quaternary)

Dr Kate Royse, British Geological Survey; (Recent and Environmental aspects)

Emeritus Reader Dr Michael de Freitas, Imperial College London & First Steps Ltd., (Chairman)

The October Meeting; Wednesday 28th

This meeting is open to all from all disciplines and subjects, as its remit is to bring the project to as large a geological and engineering audience as possible. Further meetings are planned for 2010 and 2011, the latter being an Ordinary Meeting of the Society.

14.00 – 14.30 Introduction to the evidence, its implications and the need for this research project (MH de Freitas)
14.30 – 15.15 The Basement, its post Palaeozoic history and neotectonics (JW Cosgrove)
15.15 – 16.00 Chalk (RN Mortimore)
16.00 – 16.30 Tea & Biscuits
16.30 – 17.15 Palaeocene – Eocene (JA Skipper & C King)
17.15 – 18.15 Quaternary (P Gibbard, U Lawrence & D Aldiss)
18.15 – 19.00 Implications for London's future (K Royse)
19.00 – 20.00 Discussion

The Atlas

The results of this project will be assembled as an Atlas for the London Basin to be published in 2014. This will present the findings essentially as a series of maps, recording the history of the Basin and its relationship with features of known geological, hydrogeological, geotechnical and geo-environmental significance. Examples of its content and presentation will be presented at the meeting on the 28th. Sponsors will be needed and any company interested in furthering this work and being associated with it is invited to contact Michael de Freitas at info@firststeps.eu.com

de Freitas, M. H. (2009) Geology; its principles, practice and potential in Geotechnics. 9th Glossop Lecture. *Quarterly Journal of Engineering Geology and Hydrogeology.* **42,** (in press).

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